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The Flora of Buxa Tiger Reserve
West Bengal, India

THE FLORA OF Buxa Tiger Reserve WEST BENGAL, INDIA



The book

The Buxa Tiger Reserve in West Bengal is the second declared Tiger Reserve in the state and endowed with rich floral wealth. The Botanical Survey of India in collaboration with the West Bengal State Forest Department has brought out this publication entitled "The Flora of Buxa Tiger Reserve, West Bengal". The book has dealt with 988 plant taxa (spread in 574 genera under 135 families) with the updated information as for the nomenclature and taxonomy are concerned. The major stress has gone into the identification of plants used for various purposes, recognition of rare, endemic, threatened taxa, CITES species, and exotic species, and threats to the flora. The work also suggested future strategies for protection, preservation, and maintenance of the Tiger reserve. It has documented many rare and threatened species. The colour photographs and illustrations of many interesting and least known species were given in support of the text. The book will be of great use to the forestry/academic personnel involved in taxonomic research.



West Bengal Forest & Biodiversity Conservation Project



2022



Botanical Survey of India
Govt. of India
&
Directorate of Forests
Govt. of West Bengal



2022

THE FLORA OF
Buxa Tiger Reserve
WEST BENGAL, INDIA

Authors

ANANT KUMAR
GOPAL KRISHNA
P. VENU



भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

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MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
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The Flora of Buxa Tiger Reserve West Bengal, India

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জ্যোতিপ্রিয় মল্লিক


ভারপ্রাপ্ত মন্ত্রী
সনকির্মাণে
পশ্চিমবঙ্গ সরকার
অরণ্য ভবন, নবম তল, ব্লক - এল.এ.-১০এ
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কলকাতা-৭০০ ১০৮
টেলি : ০৩৩ ২৩২৫-৪০৪০

MESSAGE

The West Bengal State Forest Department and its major divisions have been engaged in forest and wildlife management, participatory forest management, social/urban forestry, Research, Monitoring & Training with goal of sustainable conservation for future generations. The Forest Department has been actively working with great seriousness on the conservation of wildlife and biodiversity inherited in different National Parks, Sanctuaries, Elephant Reserves & Tiger Reserves.

Buxa is one important Tiger reserve with rich biodiversity at varying altitudes in the Eastern part of the State adjoining Bhutan & Assam. The area lies in the moist tropical zone with different forest types and important shrubby and herbaceous flora. Identifying these vital components have a critical bearing in the conservation of its biodiversity. The State Department has felt that the effective documentation of flora and fauna is the foundation for all conservation actions in this Tiger Reserve. There was no authentic and comprehensive inventory on plants available in this reserve. This has left the department with a limited understanding of plant diversity and its functions. The reserve is also under pressure due to cattle grazing, invading weeds, forest fires, and Anthropogenic Pressures. Many critical habitats in the reserve are struggling to survive due to frequent flooding and degradation in patches.

The Botanical Survey of India had taken up floral Survey & Research in this Tiger Reserve and completed the task of documentation. The Forest Department, Govt. of West Bengal took initiative for publication of the Research Reports in book form. I am extremely happy to write this congratulatory message to both the organizations for this much awaited publication under the title "The Flora of Buxa Tiger Reserve, West Bengal, India" at an appropriate time. I am sure that the Forest Department will fully utilize this publication in conserving all plant species which form the important habitat for diverse assemblage of fauna in Buxa Tiger Reserve.



(Jyoti Priya Mallick)
Minister-in-Charge
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VIVEK KUMAR, IAS
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April 26, 2022

MESSAGE

Thanks to its six agro-climatic zones, West Bengal has diverse forest types in the Himalayas, Terai & Duars, Gangetic plains, the laterite plateau and the Sundarban delta. The variety of land forms, rivers and climate has endowed this State with some of richest flora and fauna, which are managed scientifically by the Forest Department, Govt. of West Bengal through a network of Protected Areas.

The Buxa Tiger Reserve nurtures a most diverse flora & fauna and is a biodiversity hotspot of the country.

Regular studies and documentation of flora and fauna are a critical component of forest management; the health of the flora and fauna are a vital indicator of the success of biodiversity management.

This book titled 'Flora of Buxa Tiger Reserve, West Bengal, India', is a collaborative project of the Forest Department, Govt. of West Bengal and the Botanical Survey of India.

Documentation of the unique floristic variety of Buxa Tiger Reserve, especially its focus on endemic and threatened plants, will help in conservation and management of this unique Tiger Reserve. I am sure this book will be of immense help to Foresters, researchers and students for further research and documentation.

(Vivek Kumar, IAS)
Additional Chief Secretary,
Department of Forest,
Govt. of West Bengal

*Principal Chief Conservator of Forests,
Research, Monitoring and Development,
Government of West Bengal*



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MESSAGE

The scientific study and documentation of plants in West Bengal State started way back in 17th Century. William Roxburgh and David Prain were pioneer Botanists, who were involved in documentation of comprehensive flora of the erstwhile Bengal.

Buxa Tiger Reserve in Eastern part of North Bengal has attracted Researchers and Scientists from the very beginning because of diverse assemblage of flora and fauna. There has been discovery of many endemic plants as well as new species of wild animals in this Reserve in the past.

Buxa is storehouse of biodiversity and unique in terms of representing ecosystem and habitat types. There is increasing threats to flora and fauna due to anthropogenic pressure due to high human population living in adjacent Tea Gardens and villages. Documentation of biodiversity of this ecologically important forest landscape is important for long term conservation. Forest Department, Govt. of West Bengal in collaboration with team of Scientists of Botanical Survey of India took the challenge of documenting plant diversity through series of botanical exploration & survey of different forest types of Buxa Tiger Reserve.

I would like to express my appreciation to Botanical Survey of India, especially Dr. A. A. Mao, the Country Director of this pioneer organization for such research collaboration and scientific documentation of "Flora of Buxa Tiger Reserve, West Bengal, India".

The detail enumeration of Angiosperms in Buxa Tiger Reserve will serve as a reliable reference to recognize and identify diverse plant species. Such document will help in preparation of Action Plans for long term conservation and development of precious habitat of Tigers and other associated wild animals of this Protected Area.

(Vinod Kumar Yadav, IFS)
Principal Chief Conservator of Forests
Research, Monitoring & Development, W.B.

ए. ए. माओ
निदेशक
A. A. Mao
Director



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FOREWORD

Floral documentation and other related areas of scientific research in Protected Areas is vital for a better understanding of ecosystems, their functions, and the status of various species. The data generated has a bearing in understanding ecological processes to take up appropriate conservation and management actions. The Botanical Survey of India gave focus to the documentation of Protected Areas and Tiger Reserves both in the 11th and 12th plan programs. There are 51 declared Tiger Reserves in India. The Buxa Tiger Reserve in West Bengal is the second declared Tiger Reserve in the state and is endowed with rich floral wealth. In keeping with the mandate of Project Tiger, all Tiger Reserves in India strive to have an inventory of the flora and fauna to protect rare and threatened species. The Botanical Survey of India in collaboration with the West Bengal State Forest Department has brought out this publication entitled "The Flora of Buxa Tiger Reserve, West Bengal, India". The book has dealt with 988 plant taxa with the updated information as for the nomenclature and taxonomy. These taxa belong to 574 genera and 135 families. Photographs and illustrations of many interesting and little-known species are given in support of the text. I am confident that this book will be a valuable resource for forestry and academic personnel involved in taxonomic research. The Botanical Survey of India will continue its efforts to bring out similar contributions in other tiger reserves.

I congratulate the authors on their significant contribution, which provides an up-to-date status on the flora of this Tiger Reserve.


(A.A. Mao)



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We express our sense of gratitude and appreciation to Dr. A. A. Mao, the Director, Botanical Survey of India, Kolkata, for his interest and support in the execution of this approved action plan program.

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We thank our colleagues, Dra. P. L. Narasimhan (late), S. K. Srivastava, P. V. Prasanna, V. Ranjan, M. K. Pathak (late), Sri K. L. Maity, M. K. Kandwal, A. Bhattacharjee, C. M. Sabapathy with whom we had quite useful deliberations on nomenclatural and identity issues of many taxa. Drs. Althaf Ahamed Kabeer and J. S. Jalal had gone through the draft scripts of Poaceae and Orchidaceae respectively. They also supported us in various ways during the execution of this program. Sri Anchal Biswas has assisted in designing the cover page. Sri S. K. Patra, Sri Aloke Mukherjee, Sri Tapas Kumar Mondal, Sri P. K. Halder, Sri T. K. Baidya, and Sri Debabrata Banerjee (late) assisted in the collection and processing of plant specimens during field works. Sri D. K. Sah assisted us in drawing illustrations.

We also thank the Principal Chief Conservator of Forests, Kolkata, the Field Director, Buxa Tiger Reserve, Alipurdwar, and the Deputy Field Director, Buxa Tiger Reserve, Alipurdwar for official permissions to explore the tiger reserve. They have shown their interest and had readily volunteered to finance to publish this in the form of a book. Many officers and staffs connected to this Tiger Reserve whose names are difficult to list here, gave us their unstinted support in field explorations, without whose help, the work would not have been completed. We express our gratitude to all the villagers and forest guides of Buxa Tiger Reserve for their guidance/help during the field trips.

Anant Kumar
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CONTENTS

Messages	iii-v
Foreword	vi
Acknowledgments	vii
1. Introduction	1
The Study Area	2
Climate	3
Forest Types	6
Faunal Diversity	10
Review of Literature	12
Materials and Methods	13
The Present Work	13
The Plan of Presentation	14
2. Taxonomic Account	15
Angiosperms	15
A. Dicotyledons	15
1. Polypetalae	117
2. Gamopetalae	427
3. Monochlamydeae	734
B. Monocotyledons	905
The Floral Analyses	1046
New species/New records	1047
Endemic plants	1048
IUCN Red List species	1049
CITES species	1049
Plants of economic importance	1050
Major issues	1053
3. References	1057
4. Index to the local names	1061
5. Index to the scientific names	1066

Introduction

India is a mega diverse nation and contributes to 8% of the known global biodiversity with only 2.4% of the world's geographical area. There has been great stress on our natural resources from the growing population and the various developmental activities. The country's conservation planning is based on the philosophy of identifying and protecting representative wild habitats in diverse ecosystems. The Indian constitution entails the subject of forests and wildlife in the concurrent list. The central ministry involves in the policies and planning of wildlife conservation, while the state forest departments are assigned the responsibility of implementation of national policies and plans. The Commission on National Parks and Protected Areas (CNPPA) of the International Union for Conservation of Nature and Natural Resources (IUCN) broadly categorized the protected areas into six major management categories. There are 4 categories of Protected Areas viz., National Parks, Sanctuaries, Conservation Parks, and Community Parks in India. At present, there are 981 Protected Areas, including National Parks (104), Wildlife Sanctuaries (566), Conservation Reserves (97), and Community Reserves (214) in India, covering a total geographical area of 1,71,921 sq km. This is approximately 5.03% of the total area. Besides, there are 18 Biosphere Reserves, 32 Elephant Reserves, 51 Tiger Reserves, 47 Ramsar Wetland Sites, 7 Natural World Heritage Sites, and 18 Biodiversity Heritage Sites (<http://www.wiienvs.nic.in>). The National Board for Wildlife (NBWL) provides a policy framework for wildlife conservation. The National Wildlife Action Plan (2002–2016) was adopted in 2002.

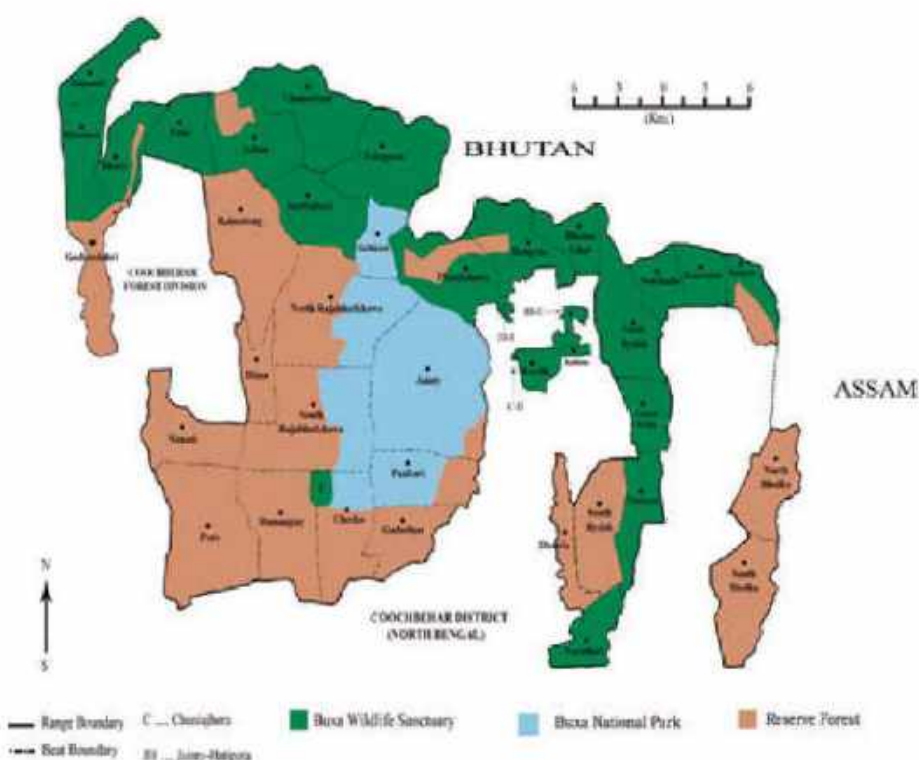
Protected areas facilitate a well-recognized *in-situ* conservation approach to protect biodiversity across the world. There are now about 1,30,000 protected areas, covering nearly 13% of the world's terrestrial surface and over 6% of territorial marine areas (<http://www.cbd.int/protected/overview/>). Scientific research/documentation in the wildlife-protected areas is vital for a better understanding of ecosystems in their totality. These areas serve as control sites and information generated in scientific research would be valuable in understanding ecological processes and taking appropriate conservation and management actions. The Botanical Survey of India gave focus to protected areas documentation both in the 11th plan and 12th plan programs. The Survey got engaged in studies on the vegetation/flora of many national parks and wildlife sanctuaries in India. The present study is one such effort to document the floral diversity of the Buxa Tiger Reserve, located in West Bengal. The state of West Bengal spreads in 88,752 sq km (21°45'–27°16' N and 85°55'–89°56' E) and 14% of it is covered by forests. It has 6 national parks, 16 wildlife sanctuaries, 5 conservation reserves, 2 tiger reserves, 1 elephant reserve and 1 biosphere reserve (<http://www.wiienvs.nic.in>). Its varied physical features have given rise to 5 well-defined Phyto-ecological zones. 1. The Himalayan zone between 500-3800 m (Darjeeling); 2. Sub-montane

Terai region and the adjacent plains (Lower plains of Darjeeling and Jalpaiguri districts); 3. Alluvial plain on both sides of the Ganges and its northern and western tributaries (Berhampur, Krishnanagar districts); 4. The Western dry flanks of Chhota Nagpur Plateau (Purulia, Bankura, and West Midnapur districts) and 5. Mangrove forests of Sundarbans (Bhattacharyya, 1997).

The Study Area

Most of the forest areas enjoyed reserve forests status under Indian Forest Act (1927) since British rule. The Buxa Tiger Reserve (hereafter, BTR; Map 1, Plate Ia) is the 15th Tiger Reserve, declared in 1983 under Project Tiger. It spreads in an area of 738.5 sq km with a core area of 390 sq km. Before the declaration of Tiger Reserve, Buxa Wildlife Sanctuary was declared under the Wildlife Protection Act (1972) that covers an area of 314 sq km. In the year 1990, an additional area of 54.5 sq km was added to the sanctuary with an effective total area of 368.5 sq km. An area of 117 sq km of the sanctuary was preliminarily notified as National Park in 1992. This was finally constituted as Buxa National Park in the year 1997.

BUXA TIGER RESERVE



Map 1: Buxa Tiger Reserve

The Flora of Buxa Tiger Reserve, West Bengal, India

Both the national park and the sanctuary are part of the BTR. Its breakup is given below. The fragmented appearance of BTR is due to well-settled habitations before bringing it under a protected area network.

Table 1: Break up details of Buxa Tiger Reserve

Sl. No.	Protected area	Area in sq km
1.	Buxa Wildlife Sanctuary	251.5
2.	Buxa National Park	117
3.	Reserve Forests	370
	Total Area	738.5

The BTR is the second declared Tiger reserve in West Bengal after the Sundarbans. The area is biologically very rich as it is situated in the confluence of three major Bio-geographic Zones viz., the Lower Gangetic plains (7B), the Central Himalayas (2C), and the Brahmaputra valley (8A). Its declaration as a Tiger reserve is in fact, an acknowledgment to the great faunal and floral wealth this area harbours. It is located in the Alipurduar district of West Bengal and stretches over a length of 50 km from West to East and, 35 km from North to South. It is entirely bordered by Bhutan in the North, Cooch Behar district in the South, Assam by the Sankosh river in the East, and Coochbehar forest division in the West. The reserve spreads in both plains and hills. The hilly slopes in Adma, Chnabhati, Hatipota, Lepchakhawa, Phashkhawa, Santrabari, Tashigaon and Tobgaon blocks are vertical and steep.

Many rivers namely, Sankosh, Dima, Rydak, Gaburbasra, Pana, Dhoksa, Jainti, and Bala, originate from Bhutan and Buxa hills and flow southwards criss-crossing the reserve. The rivers inundate and fierce during May-August but turn shallow in the dry season. The natural Salt lick at Khurul/Kalikhola is situated beyond the international border of the reserve. The Phipsu wildlife sanctuary of Bhutan is contiguous to the Buxa Tiger Reserve in the north making it an effective elephant corridor and facilitating elephant migration. The reserve comprises nine forest ranges, namely, Buxaduar, Jainti, North Rydak, South Rydak, Kumargram, East Rajabhatkhawa, West Rajabhatkhawa, Pana, and Hamiltonganj. The Buxa fort used as a detention camp by the British, and the Jainti river (Jainty village) add scenic beauty. Tourists visit the reserve in February. Narathali lake (c. 1000 × 50 m) in Narathali beat is a large wetland and attracts many birds. Mahakal Cave and Pokhari are situated in dense forests in the Jainti range. There are 37 villages inside the reserve and 33 tea gardens in its periphery (Plate I-II).

Climate

The area lies in the moist tropical zone with mean day temperature fluctuating from 12°C to 21°C in November to February, 27°C to 32°C in September and



Plate I: a. Entrance of Buxa Tiger Reserve at Rajabhatikheswa; b. Martyrs Colum inside Buxa Fort; c. ruins of Buxa Fort

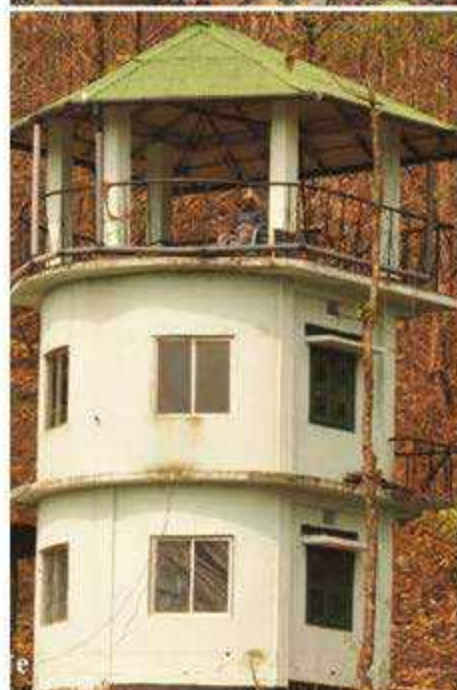


Plate II: d. Bluntia Pond in Jainti Range (sacred grove); e. Watch Tower near Phantikhawa Compartment; f. Village near Gadadhar Range

24°C to 27°C for the rest of the months. The reserve receives maximum rainfall between June-August. Mean annual rainfall is about 410 cm. The hill streams are unpredictable and floods are often reported causing damage to the forests. The reserve remains adequately humid throughout the year. Maximum relative humidity varies about 80% [$\pm 5\%$], and seldom below 75% with maximum from June to September and minimum from December to February.

Forest Types

Seven forest types can be discerned in the Tiger reserve. They include: 1. Evergreen forests; 2. Wet mixed forests; 3. Semi evergreen forests; 4. Sal forests; 5. Dry mixed forests; 6. Hill forests and 7. Riverine forests (Champion & Seth, 1968).

1. Evergreen forests

[Plate IIIa]

This type is found in Checko, Buxa Dur, North & South Rajabhatkhawa, Panbari, and Jainty blocks. The typical trees are *Actinodaphne sikkimensis*, *Archidendron clypearia*, *Castanopsis indica*, *Cryptocarya amygdalina*, *Elaeocarpus varunna* and *Sloanea sterculiacea*. The ground vegetation is with herbs and shrubs like *Alocasia fornicata*, *Begonia ovalifolia*, *Casuarina vareca*, *Elatostema lineolatum*, *E. parvum* and *Phlogocanthus thyrsoformis*. The common climbers and lianas are *Uncaria sessilifructus*, *Pegia nitida* and *Cayratia japonica*. The forest also supports some terrestrial orchids namely, *Goodyera procera*, *Zeuxine reflexa*, *Z. lindleyana*, *Z. stratiomatica* and *Z. longilabris*.

2. Wet mixed forests

[Plate IIIb]

This type is found in the parts of Adma, Raimatang, Dima, Bhojka, South Rytak and Checko blocks. The top canopy consists of *Aphanamixis polystachya*, *Duabanga grandiflora*, *Senna siamea* and *Sloanea sterculiacea*. The middle storey is with *Meliosma simplicifolia*, *Syzygium claviflorum*, and *Turpinia pomifera*. The under storey is composed mainly of canes.

3. Semi evergreen forests

[Plate IVc]

Semi evergreen forests are found in Kumargram, Bhrutanghat, Damanpur, Hatipota, Rangamati and Tashigon blocks. The top storey consists of *Schinus wallichii* in association with *Bauhinia purpurea*, *Toona ciliata*, *Duabanga grandiflora*, *Itea macrophylla* and *Ficus fulva*. The lower storey is with *Litsea salicifolia*, *Mallotus philippensis* and *Morinda angustifolia*.

4. Sal forests

[Plate IVd]

This type occurs in Sankosh, Checko, Newlands, Mainabari, Panbari, Marakata, Kartika and Sautrabari blocks. As the name suggests, 'Sal' (*Shorea robusta*) is predominant species that spreads in the plains and foothills. *Terminalia bellirica*,



Plats III: a. Evergreen Forests at Buxa Duar; b. Wet mixed Forests at Adma



Plate IV: c. Semi-evergreen Forests at Kumargram; d. Sal Forests at Sankosh

Dillenia pentagyna, *Sterculia villosa* and *Schima wallichii* appear as associates. The middle storey consists of *Aphananixis polystachya* and *Macaranga denticulata*. The common climbers and lianas are *Caesalpinia cucullata*, *Gymnema inodorum*, *Marsdenia tinctoria* and *Stixis suaveolens*.

5. Dry mixed forests

[Plate Vc]

Dry mixed forests occur in the Pana, Poro, Gadadhar, Marakata, Jainty, Newlands, Bhutanghat and Kumargram blocks. The upper storey in this type is composed of *Crataeva religiosa*, *Dillenia pentagyna*, *Holarrhena pubescens* and *Stereospermum colais*. The middle storey is composed of *Litsea salicifolia*, *Mallotus philippensis*, *Oroxylum indicum*, *Persea glaucescens* and *Wrightia arborea*. The common climbers/lianas are *Aristolochia acuminata*, *Dioscorea bulbifera*, *Gouania leptostachya*, *Porana paniculata* and *Vallisneria spiralis*. Ferns and fern allies such as *Adiantum philippense*, *Diplazium esculentum* and *Lygodium flexuosum* grow as under growth.

6. Hill forests

Hatipota, Phaskhawa, Tashigaon, Tobgaon, Chunabhati, Buxaduar and Adma blocks harbor hill forests. In foot hills, Sal occurs along with *Acrocarpus fraxinifolius*, *Castanopsis indica*, *C. lanceifolia*, *Dendrocalamus hamiltonii*, *Gynocardia odorata*, *Heliconia nilagirica*, *Magnolia hodgsonii*, *Ostodes paniculata*, *Phoebe lanceolata* etc. *Dendrobium moschatum*, *D. eriiflorum*, *Aerides multiflora*, *Coelogyne prolifera*, *Crepidium josephianum* and *Pholidota articulata* are the common orchids.

7. Riverine forests

[Plate Vf]

This type occurs along the banks of the Bala, Jainti, Pana, Rydak and Sankosh rivers. The principal constituents are *Acacia catechu*, *Albizia lucidior*, *Lagerstroemia parviflora*, *Falconeria insignis*, *Sterculia villosa* and *Trewia nudiflora*. The undergrowth includes *Clerodendrum cordatum*, *Hyptis suaveolens*, *Lantana camara* and *Ziziphus mauritiana*. The common climbers are *Cryptolepis dubia*, *Dregea volubilis*, *Millettia extensa*, *Paederia cruddasiana*, *Reissantia arborea* and *Tetrastigma serrulatum*. The parasite, *Scurrula gracilifolia* and the scrambler, *Broussonetia kurzii* also appear here.

Faunal Diversity

The reserve harbours 68 species of mammals, 41 species of reptiles, about 360 species of birds, and rich amphibian and fish fauna (Plate VI). 20 species of mammals, 7 species of birds and 10 species of reptiles are variously threatened. The main carnivores are tiger (*Panthera tigris*), leopard (*Panthera pardus*), clouded leopard (*Neofelis nebulosa*), wild dog (*Cuon alpinus*), jungle cat (*Felis chaus*), leopard cat (*Prionailurus bengalensis*), fishing cat (*Prionailurus*



Plate V: e. Dry mixed forests at Jainthi; f. Riverine Forests at Jainthi-Phushikhawa



Plate VI: a. *Elephas maximus*; b. *Axis axis*; c. *Pavo cristatus*; d. *Bos gaurus*; e. *Vanellus indicus*; f. *Microhierax caerulescens*; g. *Sturmus contra*; h. *Acridotheres tristis*; i. *Buceros bicornis*; j. *Pycnonotus cafer*; k. *Streptopelia orientalis*.

viverrina), hog badger (*Arctonyx collaris*), mongoose (*Herpestes edwardsii*), marbled Cat (*Pardofelis marmorata*) and golden cat (*Catopuma temminckii*). The common herbivores are elephant (*Elephus maximus*), gaur (*Bos gaurus*), sambar (*Cervus unicolor*), chital (*Axis axis*), barking deer (*Muntiacus muntjak*) and wild pig (*Sus scrofa* sp.). Some birds found in the reserve are under the negative list of CITES appendix viz., black necked crane (*Grus nigricollis*), Bengal florican (*Houbaropsis bengalensis*), great pied hornbill (*Buceros bicornis*), red breasted parakeet (*Psittacula alexandri*), and blossom leaved parakeet (*Psittacula cyanocephala*).

Review of Literature

The floral diversity of West Bengal attracted many explorers and the botanical activity in the state was initiated in 1784 when William Jones founded the Asiatic Society of Bengal. The botanical findings were systematically recorded by him. Gamble made rich collections in Darjeeling and Jalpaiguri districts and presented the first-hand list of Himalayan trees including climbers (Gamble, 1878). Clarke (1876, 1885) made extensive collections from these districts and prepared valuable notes on rich valleys. Clarke's entire set of collections was utilized by Gamble in preparing the useful catalogue (Gamble, 1875). Both Haines (1896) and Prain (1903a) explored various parts of North Bengal and Duars. Prain published the flora of the plains of Bengal as "Bengal Plants". This work constitutes as the only comprehensive flora of the erstwhile Bengal with workable keys and vernacular names. He also published the flora of Sundribuns (Prain, 1903b) and the flora of Howrah, Hooghly, and 24-Parganas (Prain, 1905).

Buxa Tiger Reserve, and its floristic accounts are quite limited. Gamble (1878) provided the first account of tree species of undivided Jalpaiguri district. Prain (1903) listed collections from North Bengal in general and without mention of Jalpaiguri district. Cowan and Cowan (1929) also listed plants without precise localities. Chaudhuri (1959) focused on sedges and grasses of the area. Mukerjee (1965) presented a brief sketch of the vegetation of Jalpaiguri district (Rajabhatkhawa Forest Range and Apalchand Forest Range); later, he made additions of a few orchids and ferns (Mukerjee, 1972a, 1972b). Biswas (1966) listed 145 species based on specimens from Rajabhatkhawa and Buxaduar, but again, without mention of precise localities. Ghosh and Ghosh (1977) also prepared a list based on collections by Narayanswami and his collaborators in 1949. Subsequently, Ghosh & Maiti (1978), Krishna & Dutta (1979), Sikdar (1980, 1981a, 1981b, 1982, 1985), Sikdar & Ghosh (1978, 1979, 1981a, 1981b), Sikdar & Maiti (1981, 1982), Sikdar & Maji (1981), Sikdar & Rao (1984), Sikdar et al. (1983), Raichaudhuri & al. (1982), Bist & Katham (1999), Ghoshal (2003), Singh & al. (2007) and Paul & al. (2012) made contributions on varied aspects of the flora of the BTR or its surrounding areas.

Materials and Methods

Literature on the flora of Buxa Tiger Reserve including national park and wildlife sanctuary, and Jalpaiguri district was collected from published works before undertaking explorations. Plants collected by Sikdar from the Jalpaiguri district, BTR, and Buxa forest division, Narayanswami from Buxa forest division, and by earlier workers deposited at CAL were studied and indexed. Surveys were undertaken during 2009-2015 periodically to explore floral wealth in the Buxa Tiger Reserve. The duration of each study tour ranged from 15 to 20 days. Plants in flowers and fruits were collected during explorations. Three specimens were collected for every species and field numbers were tagged. Two specimens were mounted and one was kept in newspaper folders. Field details such as habitat, habit, and height of the plant, color, and odor of the flowers and fruits, associated plants, and distribution were noted in the field book. Plants in flowering and fruiting and different types of vegetation in the reserve were photographed. The collected specimens were processed following standard herbarium techniques (Johnston, 1939; Fosberg & Sachet, 1965; Jain & Rao, 1977 and Bridson & Forman, 1998). Specimens were identified using regional floras and also compared with authentic specimens deposited at CAL. Monographs, revisions, and more recent literature were referred to for critical identification and name updating. Descriptions were made based on fresh collections and also old specimens housed at CAL. But only specimens collected by us or the collections made earlier by Sikdar, Narayanswami, Das, Krishna, and Biswas from the reserve were cited under 'specimens examined'. Descriptions were precise and but the keys were elaborate to recognize species easily. The descriptions for infra-specific taxa were restricted to diagnostics from the species proper. Illustrations, in general, were prepared for habit and floral parts for selected species. In certain cases, comparative features are drawn for different species of the same genus to make it worthwhile in the identification of component species. Scale is given to assess the actual size of all floral parts. A set of voucher specimens duly labeled are deposited at CAL. Bentham and Hooker's system of classification was adopted and families under dicots were broadly categorized into Polypetalac, Gamopetalac, and Monochlamydeac. While keying out families, major diagnostic features were included and for the same reason, some of the features cited are not exactly opposite in the leads but can be used practically in arriving at correct families. Only few families or genera recognized in the APG (Angiosperm Phylogeny Group) system of classification or its incremental versions were adopted in this work.

The Present Work

1. Documentation of the floral wealth of the reserve;
2. Recognition of endemic, threatened taxa, CITES species, and exotic species;
3. Recognition of species-rich areas/hot spots within the reserve;
4. Recognition of plants used for various purposes;
5. Threats to the flora; and
6. Suggestions for strategies for the protection, preservation, and maintenance of this Tiger reserve.

The Plan of Presentation

The presentation of the families is based primarily on Bentham & Hooker's system of classification with modifications as per current concepts following Hutchinson (1926, 1934), Cronquist (1981), and Kubitzki (1990-2015). Since all the Indian herbaria hold their collections under Bentham & Hooker's classification, the authors presented the flora under this classification. Moreover, this is even familiar among foresters. Keys to families were adopted from Prain (1903) with minor modifications. The genera under a family and the species under a genus have been arranged in alphabetical order. Bracketed keys have been provided for the families, genera, and species. The nomenclature was updated applying the current ICN (McNeill & al., 2012; Turland & al., 2018) and referring to recent taxonomic literature. For each taxon, the correct botanical name, followed by basionym, if any, has been provided with a full citation. The names appeared in the Flora of British India and the Bengal Plants were also given under citation. Other synonyms were ignored as they could be connected with other available electronic plant databases. The local names [Bengali (B), Hindi (H), Nepali (N) and Lepcha (L)] were provided wherever known. The names of authors were abbreviated following 'Authors of Plant Names' (Brummitt & Powell, 1992). The spacing in the author's name abbreviations is followed as maintained in the Code. Author citation of plant names was given only once under enumeration and not in other places. Taxonomic Literature (ed. 2) (Stafleu & Cowan, 1976–1988) and its supplements (Stafleu & Mennega, 1992–2000; Dorr & Nicolson, 2008–2009) and Botanico-Periodicum-Huntianum (Lawrence & al., 1968) and its supplement (Bridson, 2004) have been followed for the abbreviation of titles of books and periodicals. Nomenclatural citation is followed by the description based primarily on morphological characters. Distribution details concerning India were given. The details such as exact localities of collections, and phenology have been given. The specimens studied or collected are given under the "Specimen/s examined". The names of collectors under the specimen/s examined are abbreviated as *AK* (Anant Kumar), *BK* (B. Krishna), *CRD* (C. R. Das), *GK* (Gopal Krishna), *JKS* (J. K. Sikdar), *SKS* (S. K. Srivastava), *VN* (V. Narayanswami) etc. Only metric units have been used to present sizes of different plant parts. Maps and tables connected to analysis are provided. The color photographs of vegetation/plants, and illustrations are given. References, indexes to scientific names, and local/ vernacular names (exclusively from the enumeration part) have been provided.

Taxonomic Account

Angiosperms

- 1a. Stems with a central pith surrounded by one or more concentric rings of woody vascular tissues enclosed in a separable bark; leaves articulated on the stem and usually with branched or reticulated veins; embryo with 2 cotyledons **A. Dicotyledons**
- 1b. Stems without central pith, the woody substance in isolated bundles embedded in cellular tissue encased in a firmly adhering outer rind; leaves sheathing at the base and not articulated on the stem; their veins usually parallel and not branched, running from base to apex and connected by straight cross-veinlets; embryo with only 1 cotyledon **B. Monocotyledons**

A. Dicotyledons

Key to subclasses

- 1a. Flowers lack distinct sepals and petals; sepals and petals present as perianth, in whorl/s or rarely lack perianth; usually unisexual, rarely bisexual **3. Monochlamydeae**
- 1b. Flowers with distinct sepals and petals in two different whorls; usually bisexual, rarely unisexual **2**
- 2a. Petals free **1. Polypetalae**
- 2b. Petals united **2. Gamopetalae**



Plate 1: a-b. *Clematis gouriana*; c-d. *Clematis ussilaefolia* [Photo credit: a. R.K. Arigala]



Plate 2: a. *Clematis zeylanica*; b-c. *Ranunculus sceleratus*

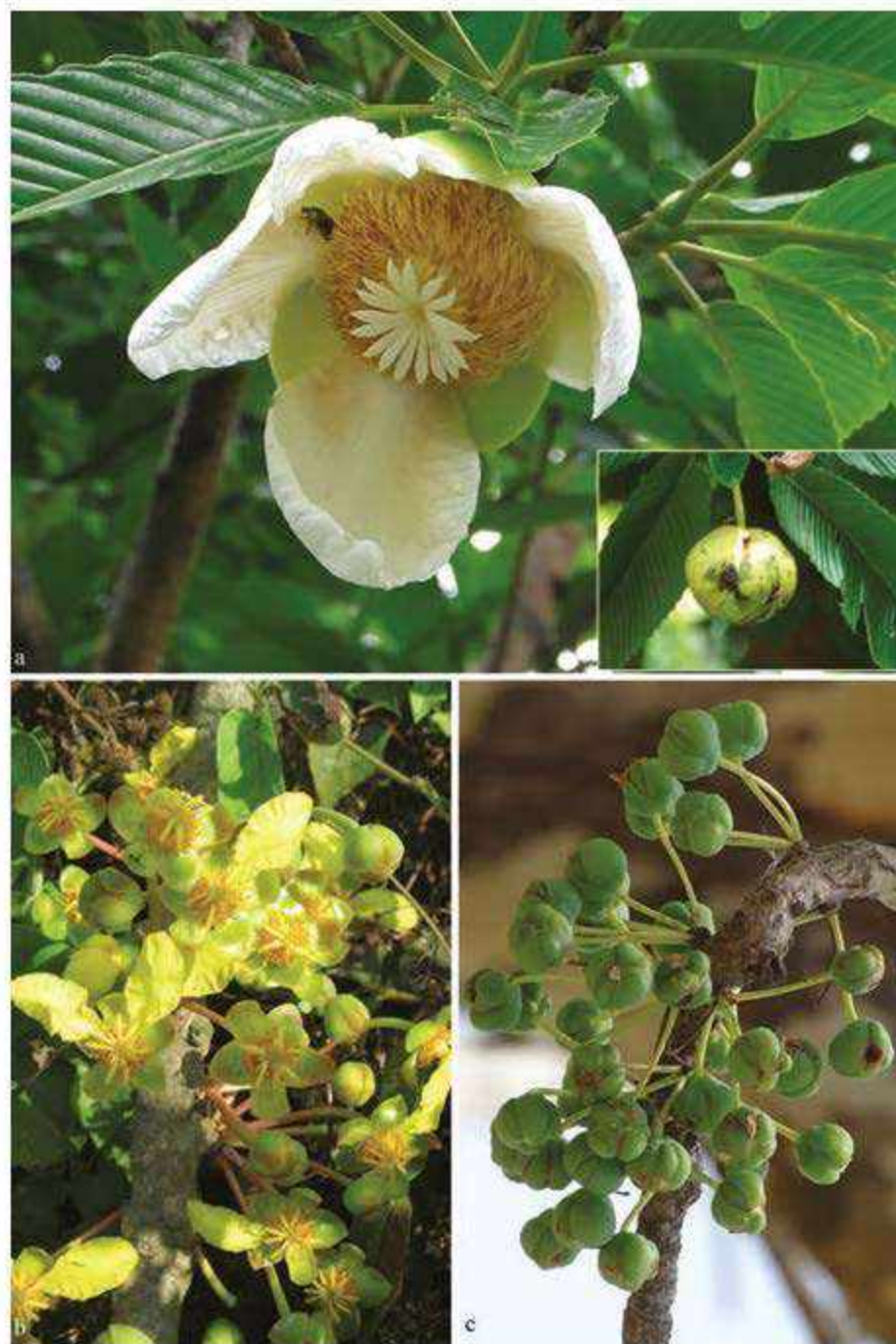


Plate 3: a. *Dillenia indica*; b-c. *Dillenia pentagyna*



Plate 4: a-b. *Magnolia dalzoga*; c-d. *Magnolia hodgsonii*



Plate 5: a-b. *Derris chinensis*



Plate 6: a-b. *Gonisthalaenus saequipedalis*; c-d. *Miliusa dioeca*



Plate 7: a-b. *Polyalthia simiarum*; c. *Clisampelos pareira*



Plate 8: a. *Cocculus laurifolius*; b-a. *Cydonia barbatata*



Plate 9: a-b. *Cyclea bicristata*; c. *Pycnarrhena pinniflora*

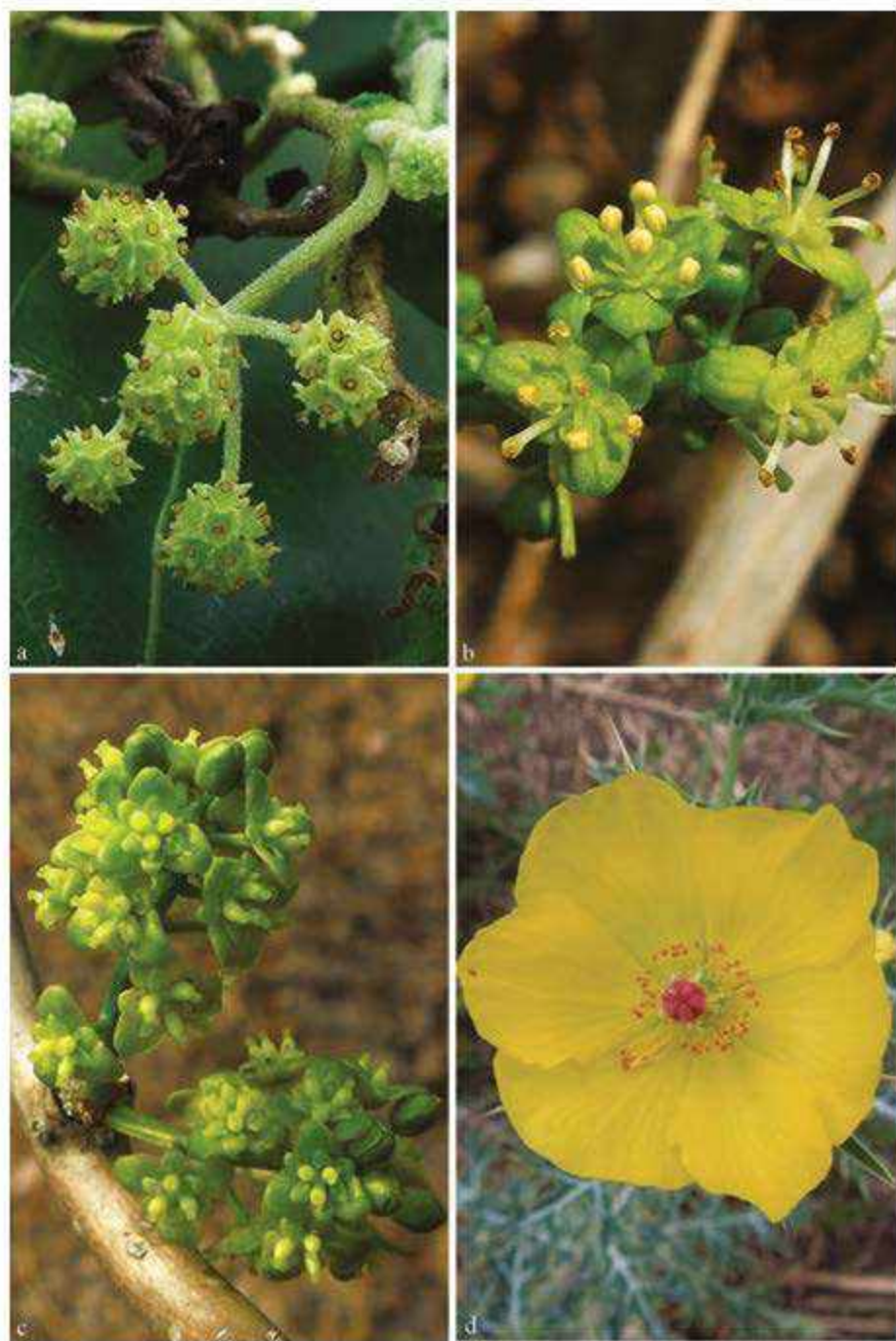


Plate 10: a. *Stephania japonica* var. *discolor*; b-c. *Thunbergia cordifolia*; d. *Argemone mexicana*



Plate 11: a. *Cardamine flexuosa*; b. *Rorippa indica*; c-d. *Capparis multiflora*



Plate 12: a-b. *Capparis elasticifolia*; c. *Cleome houstonia*



Plate 13: a. *Cleome rutidosperma*; b. *Cleome viscosa*; c. *Cratogeomys religiosa*



Plate 14: a-b. *Stixis suaveolens*; c. *Viola diffusa*



Plate 15: a. *Camouria varosa*; b-d. *Gynocardium odorata*
Photo credit a: Truptirekha Kar



Plate 16: a. *Hostalium nepalense*; b. *Brachystemma calycinum*



Plate 17: a. *Sagina japonica*; b. *Stellaria alina*; c. *Stellaria media*



Plate 18: a. *Hypocisum japonicum*; b. *Eurya acuminata*; c. *Schima wallichii*



Plate 19: a-b, *Saurauia roxburghii*; c-d, *Shorea robusta*



Plate 20: a. *Bombax ceiba*; b-c. *Abroma augusta*

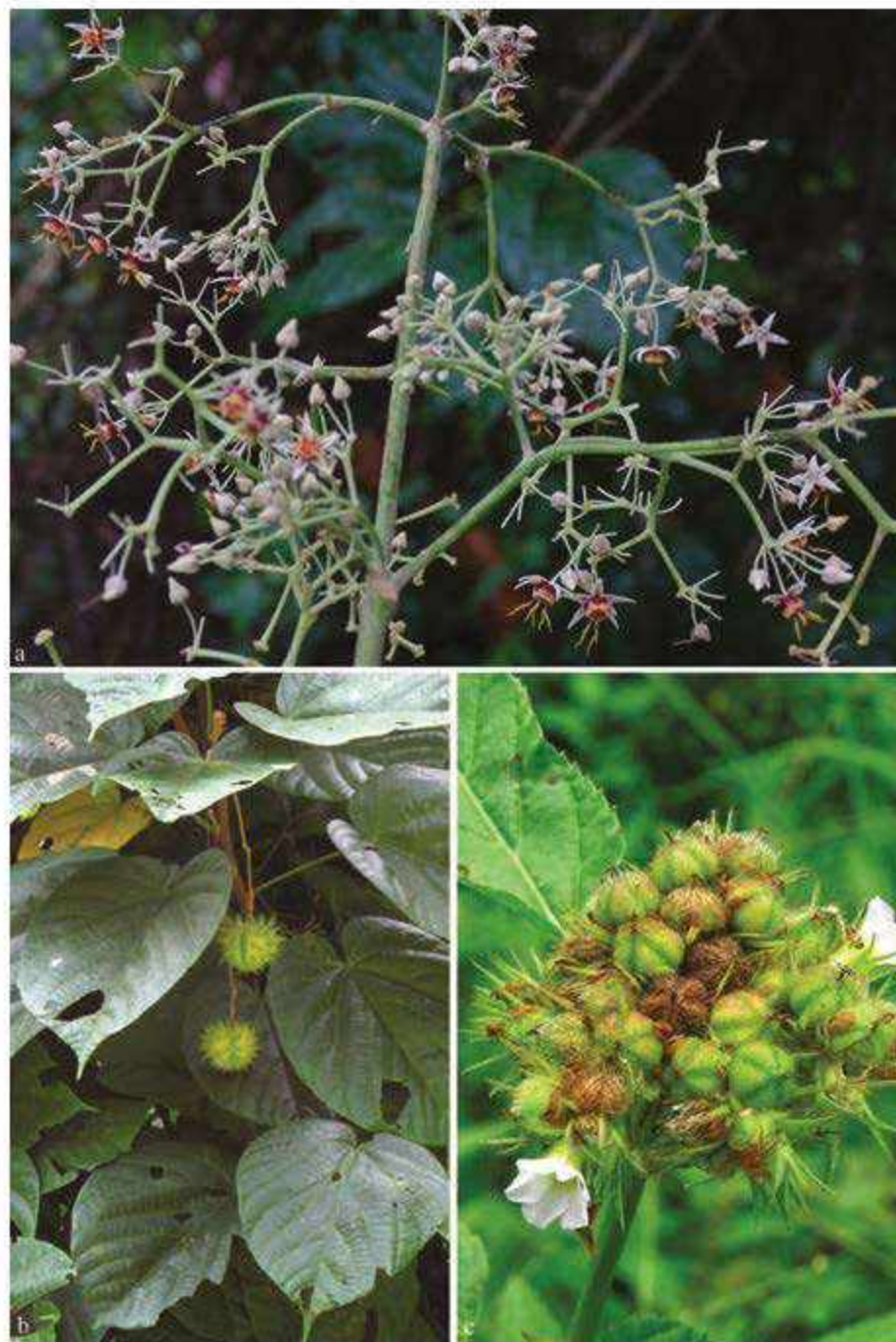


Plate 21: a-b. *Byttneria grandifolia*; c. *Melochia corchorifolia*



Plate 22: a-b. *Sterculia villosa*; c. *Corchorus aestuans*



Plate 23: a. *Microcos paniculata*; b-c. *Triumfetta semina*; d. *Triumfetta pilosa*



Plate 24; a. *Triumfetta pilosa*; b-c. *Triumfetta rhomboides*; d. *Klacocarpus angustifolius*



Plate 25: a. *Elaeocarpus rugosus*; b. *Elaeocarpus varanus*; c-d. *Sloanea sterculiacea* var. *ascanica* [Photo credit: c. Truptirekha Kar]



Plate 26: a. *Rehwardtia indica*; b-a. *Aspidopterys nutans*



Plate 27: a-b. *Hiptage benghalensis* [Photo credit: J. Jayarshi]; c. *Oxalis debilis*



Plate 28: a. *Impatiens balsamina*; b. *Impatiens exilis*; c. *Impatiens jursia*; d. *Impatiens latiflora*

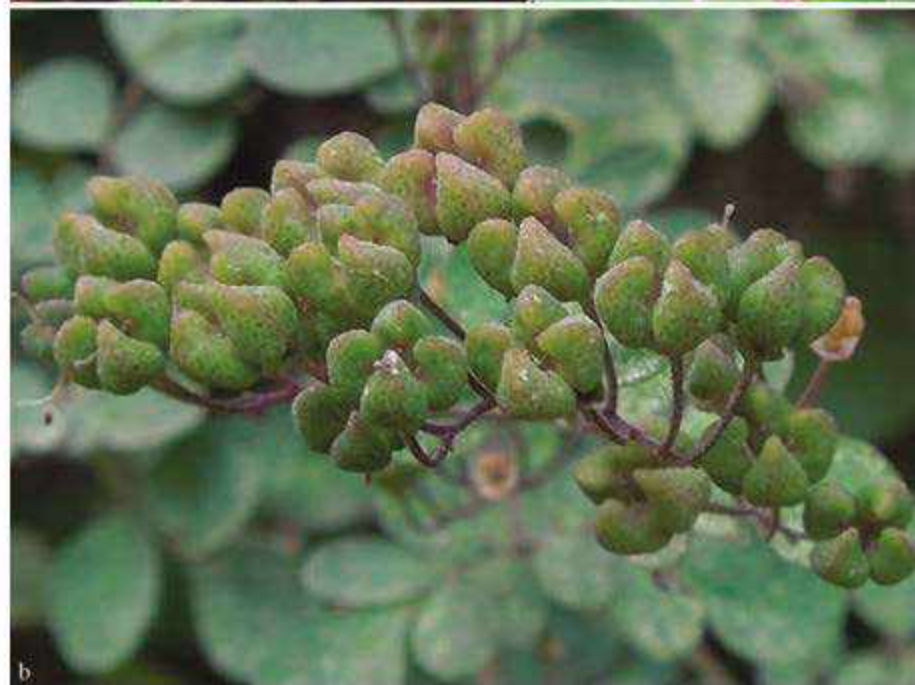


Plate 29: a. *Impatiens tripetala*; b. *Boconinghausenia sessilicarpa*



Plate 30: a. *Citrus medica*; b-c. *Glycyrrhiza sphenocarpa*



Plate 31: a-b. *Glycosmis pentaphylla*; c-d. *Micromelum integerrimum*



Plate 32: a. *Murraya koenigii*; b-c. *Murraya paniculata*; d. *Toddalia asiatica*



Plate 33: a-b. *Ailanthus integrifolia*; c-d. *Eruca mollis*



Plate 34: a-b *Pistacia javanica*; c. *Garuga floribunda* var. *gamblei*; d. *Aphananixis polytaetia*



Plate 35: a. *Aphanamixis polystachya*; b. *Cipadessa baccifera*; c. *Chisocheton cumingianus* var. *balanace*



Plate 36: a. *Dysoxylum gotadhora*; b. *Malia azodirach*; c. *Sphaerocarpus decandra*

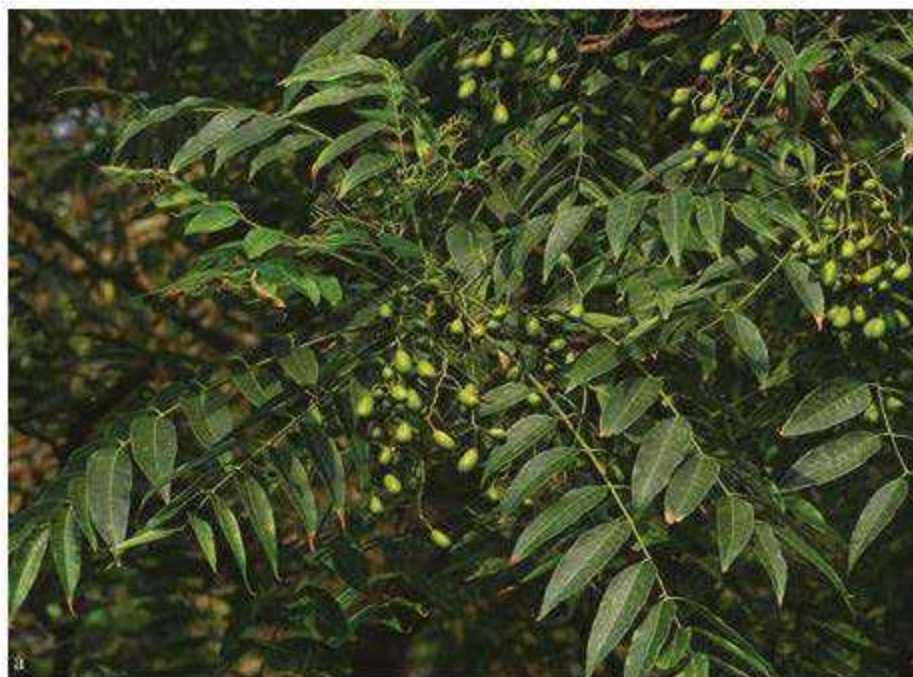


Plate 37: a. *Toona ciliata*; b. *Lepidoturus sylvestris*



Plate 38: a-c. *Natalatum herpeticum*; d. *Microtropis discolor*



Plate 39: a. *Goosania leptostachya*; b-c. *Rhamnus napalensis*; d. *Vostlago denticulata*



Plate 40: a-b. *Ventilago denticulata*; c-d. *Ziziphus spetala*



Plate 41: a. *Ziziphus mauritiana*; b. *Ampelocissus barbata*; c. *Cayratia goncalvata*



Plate 42: a. *Cayratia japonica*; b-c. *Claevis discolor*; d. *Claevis elongata*

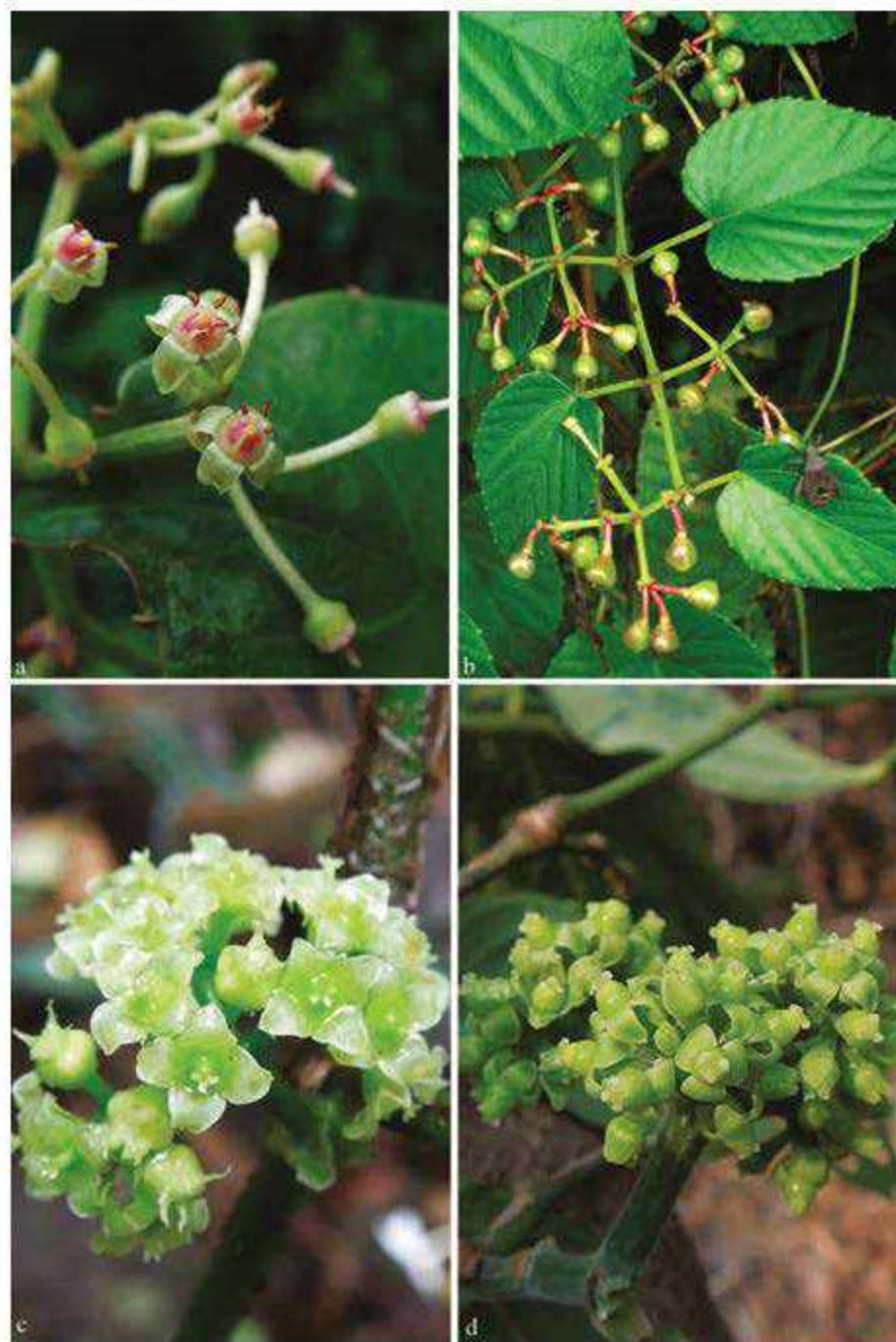


Plate 43: a-b. *Clusia repens*; c. *Tetraetigma dubium*; d. *Tetraetigma leucostaphylum*



Plate 44: a-b, *Tetrastigma leucostaphylum*; c, *Tetrastigma serrulatum*



Plate 45: a-b, *Leuca noyana*; c, *Leuca compactiflora*; d, *Leuca guineensis*



Plate 46: a. *Lepisanthes senegalensis*; b-c. *Aesculus assamica*

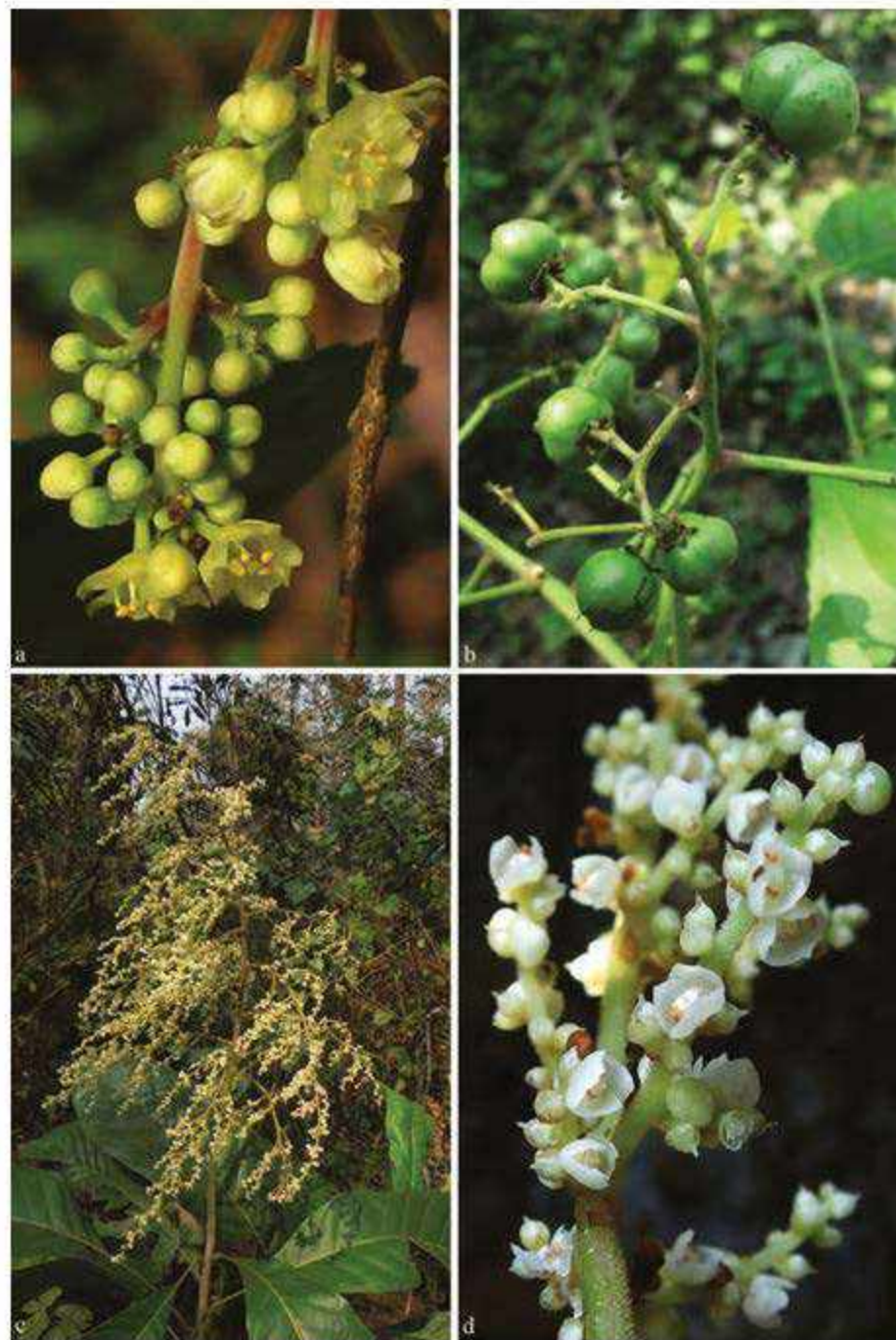


Plate 47: a-b. *Turpinia posnifera*; c-d. *Meliosma simplicifolia*



Plate 48: a-b. *Sabia limoniacea*; c-d. *Lannea coromandelica*



Plate 49: a. *Rhus obtusifolia*; b-c. *Scaevola anacardium*; d. *Acrocarpus fraxinifolius*



Plate 50: a. *Bauhinia purpurea*; b. *Bauhinia variegata*; c-d. *Cassalpinia cuscollata*



Plate 51: a. *Phanera scandens*; b-d. *Ptilostigma malabaricum*



Plate 52: a. *Sesma alata*; b-c. *Sesma hirsuta*; d. *Sesma occidentalis*



Plate 53: a-b. *Acacia oswaldii* var. *submunda*; c-d. *Acacia catechu*



Plate 54: a. *Acacia concinna*; b. *Acacia pennata*; c. *Albizia lobbekii*



Plate 55: a. *Albizia procera*; b. *Archidendron clypearia*; c-d. *Mimosa diplotricha*



Plate 56: a. *Mimosa pudica*; b. *Mimosa rubicaulis* subsp. *himalayana*; c-d. *Abrus malabaricus*



Plate 57: a. *Alysicarpus vaginalis*; b-c. *Butea monosperma* [Photo credit: I. Jayanthi]; d. *Cajanus scarabaeoides*

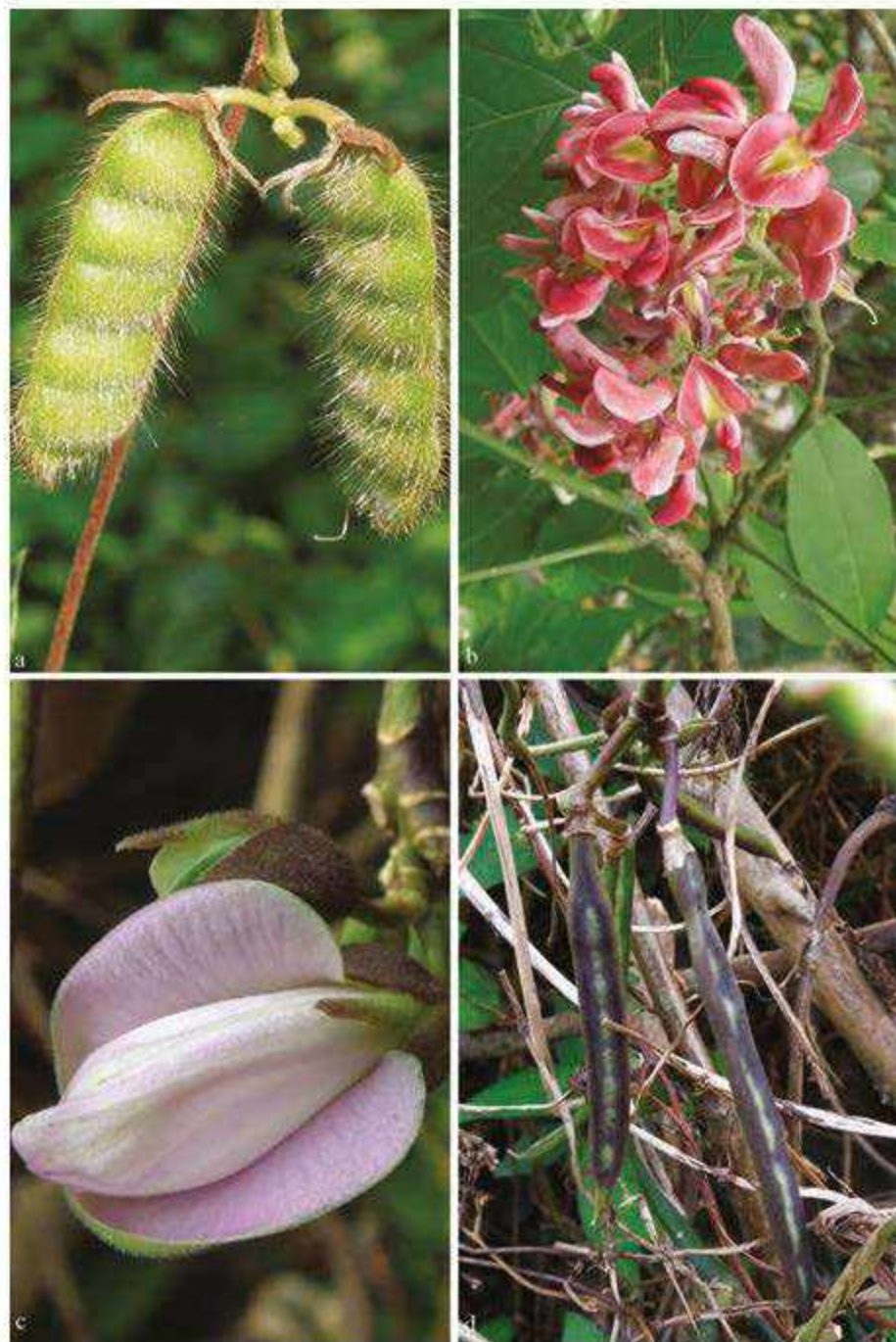


Plate 58: a. *Cajanus scarabaeoides*; b. *Callerya chinensis*; c-d. *Centrosema virginianum*



Plate 59: a. *Crotalaria alata*; b. *Crotalaria albida*; c-d. *Crotalaria cyticoides*



Plate 60: a-b. *Crotalaria pallida* var. *obovata*; c-d. *Dalbergia lanocoloris*

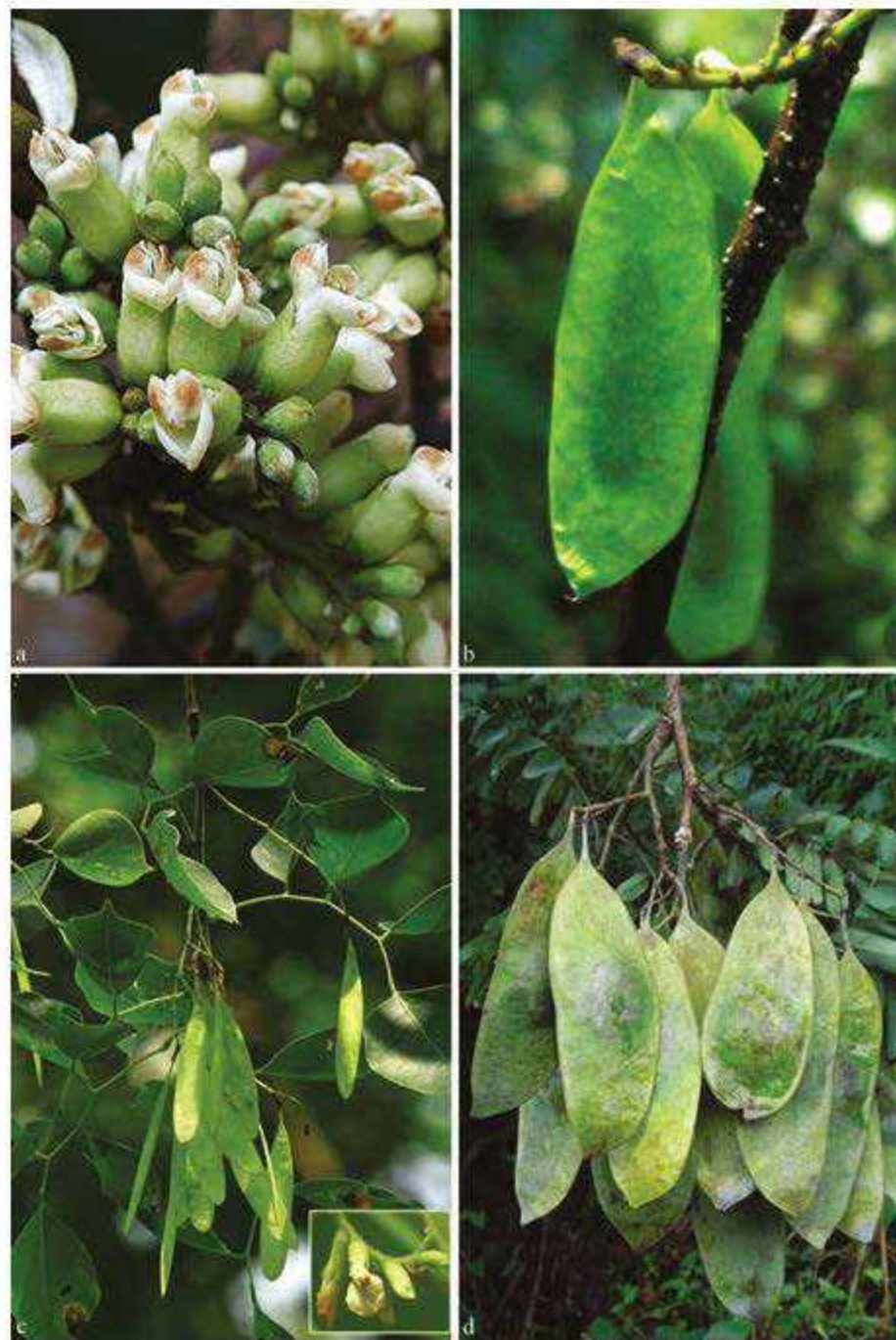


Plate 61: a-b. *Dalbergia planata*; c. *Dalbergia sissoo*; d. *Dalbergia stipularia*



Plate 62: a. *Dalbergia volubilis*; b. *Dendrolobium triangulare*; c. *Desmodium confertum*; d. *Desmodium gangeticum*



Plate 63: a-b. *Desmodium gangeticum*; c-d. *Desmodium heterocarpum*

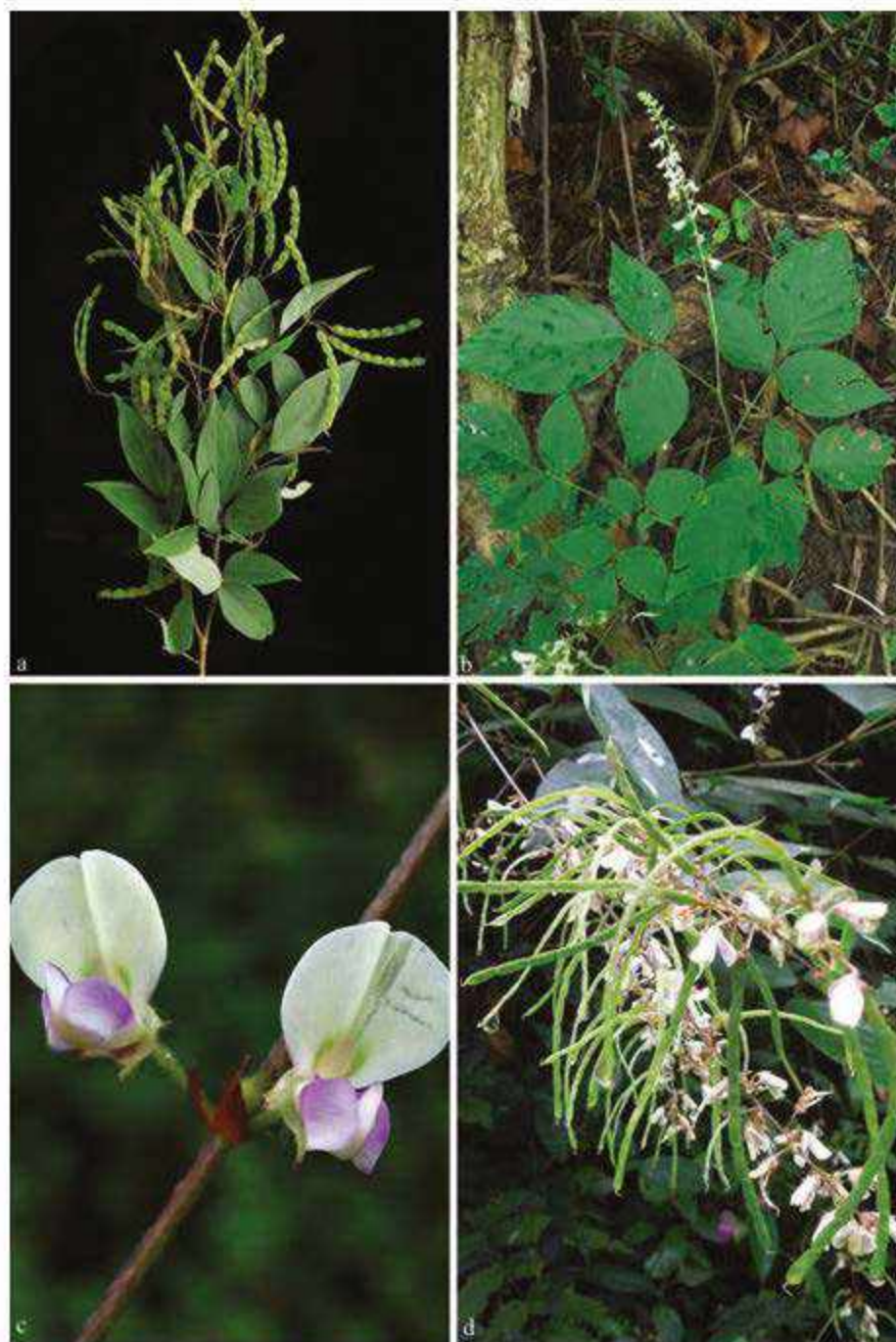


Plate 64: a. *Desmodium khasianum*; b-d. *Desmodium laxiflorum*



Plate 65: a-b. *Desmodium motorium*; c-d. *Desmodium sequax*



Plate 66: a-b. *Desmodium triflorum* [Photo credit: b. Anand Kumar]; c-d. *Dyalobium yellowum*



Plate 67: a. *Erythrina stricta*; b-c. *Flemingia stricta*; d. *Giliricidia septum*



Plate 68: a-b. *Indigofera linifolia*; c-d. *Millettia extensa*



Plate 69: a-b. *Millettia glaucescens*; c. *Millettia pachycarpa*



Plate 70: a. *Mucuna pruriens* b. *Pachyrhizus erosus* c-d. *Pustaria phaseoloides*



Plate 71: a-b. *Puararia phaseoloides* var. *subpicata*; c-d. *Puararia sikimensis*



Plate 72: a-c. *Sphaleria hirsuta*; d. *Sphaleria involucreta*



Plate 73: a. *Skutteria involucrata*; b-c. *Smithia sensitiva*; d. *Spatholobus parviflorus*



Plate 74: a-b. *Spatholobus parviflorus*; c. *Tephrosia candida*



Plate 75: a. *Tephrosia candida*; b. *Tephrosia purpurea*; c. *Vicia sativa*; d. *Vigna radiata* var. *sublobata*



Plate 76: a-b. *Potentilla indica*; c-d. *Prunus cerasoides*



Plate 77: a. *Prunus ceylanica*; b-c. *Rubus calycinoides*; d. *Rubus ellipticus*



Plate 78: a-c. *Itea macrophylla*; d. *Myriophyllum tetrandrum*



Plate 79: a-b. *Carallia brachista*; c-d. *Combretum griffithii*



Plate 80: a-h *Combretum punctatum* subsp. *squamosum*; c-d. *Combretum wallichii* var. *flagrocarpum*



Plate 81: a. *Terminalia arjuna*; b. *Terminalia bellirica*

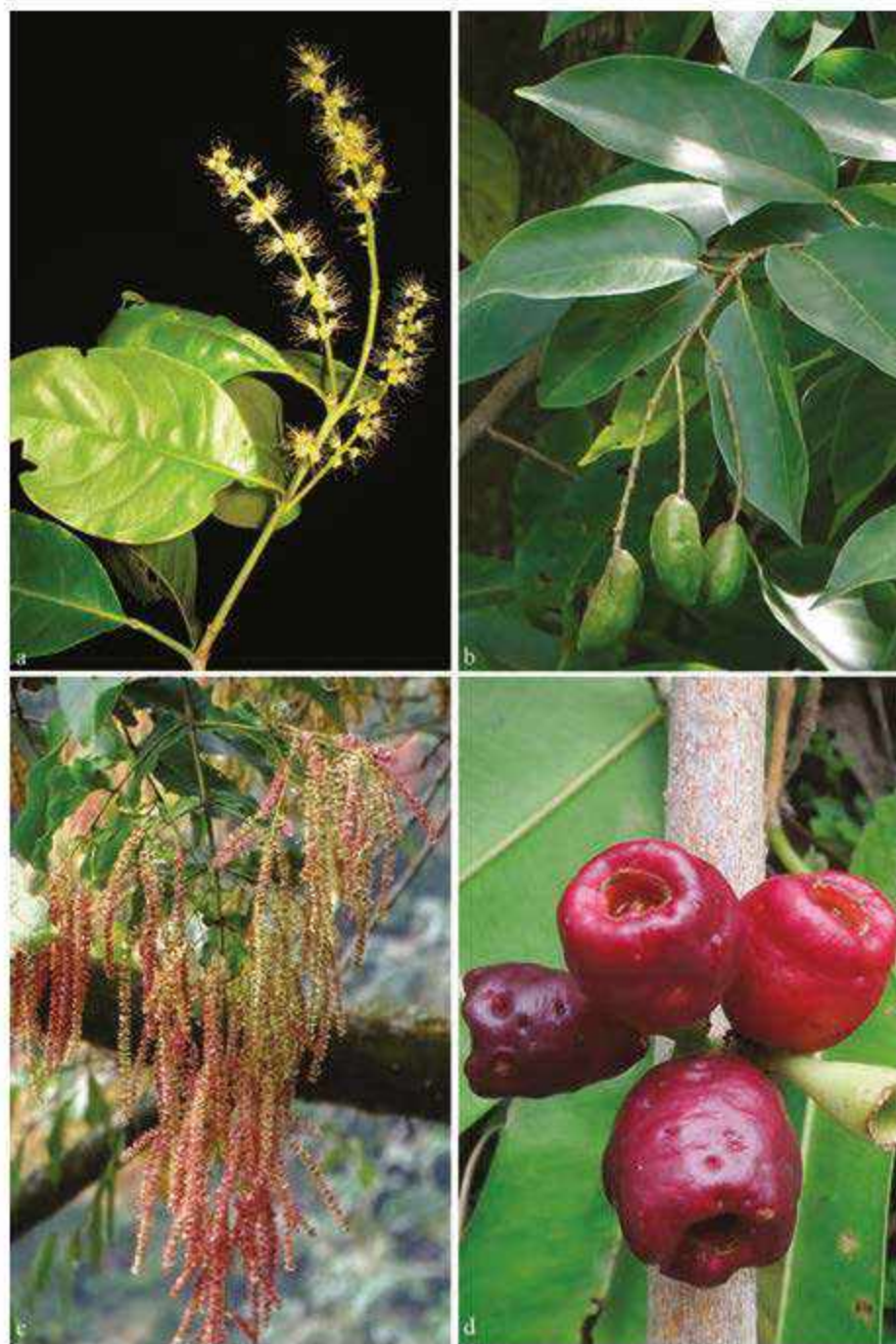


Plate 82: a-b. *Terminalla chebula*; c. *Terminalla myriocarpa*; d. *Syzygium claviflorum*



Plate 83: a-b. *Syzygium camini*; c. *Syzygium formosum*



Plate 84: a. *Syzygium fruticosum*; b-c. *Syzygium karzii*; d. *Syzygium oblatum*



Plate 85: a. *Syzygium ramosissimum*; b. *Syzygium smallamum*; c-d. *Careya arborea*



Plate 86: a-b. *Medinilla rubicnada*; c. *Malastoma malabathricum*

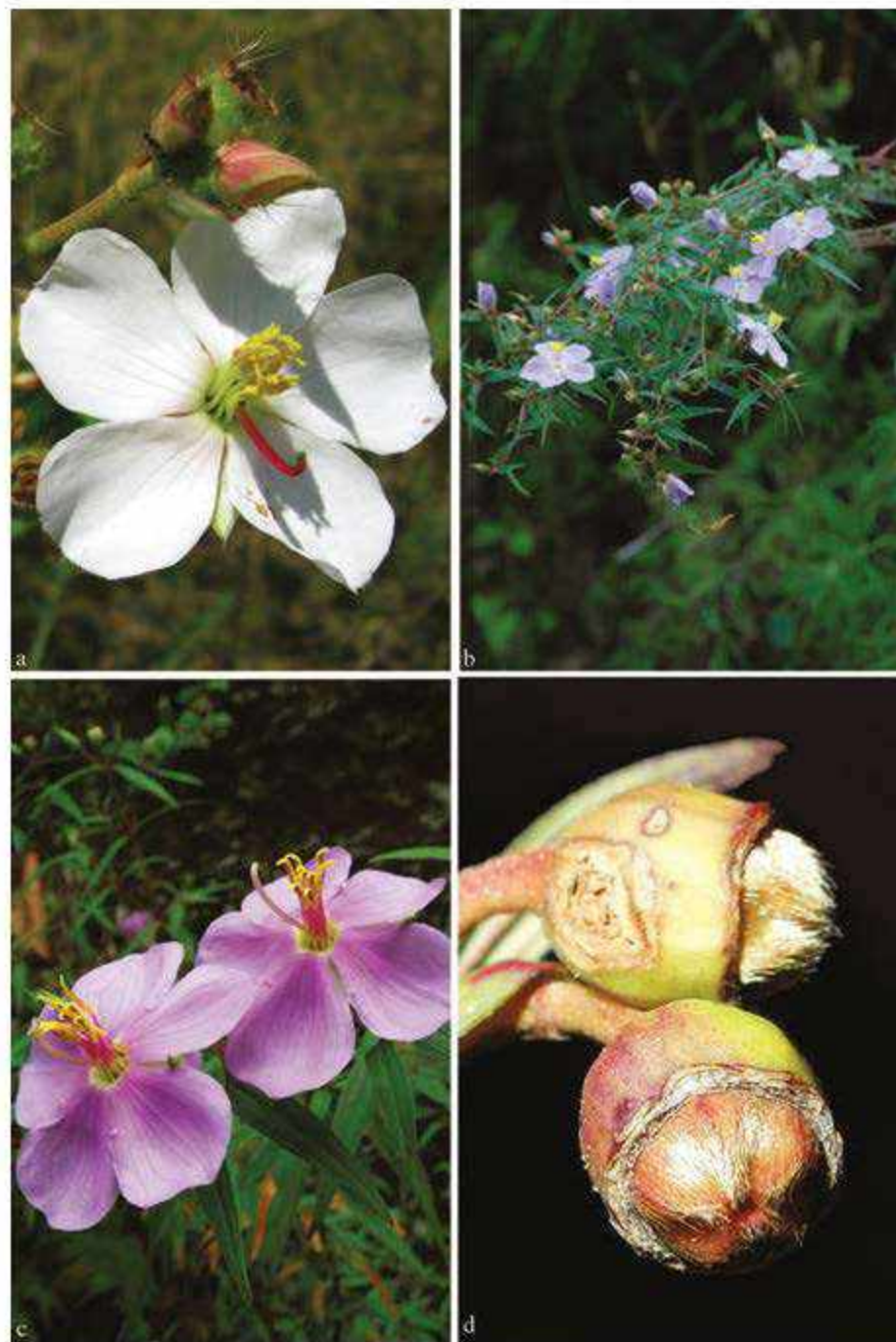


Plate 87: a. *Osbeckia nepalensis*; b-d. *Osbeckia nutans*



Plate 88: a. *Orobanchia stellata*; b. *Oxyrhopala paniculata*



Plate 89: a-b. *Ammannia baccifera*; c. *Lagerstroemia parviflora*



Plate 90: a. *Lagerstroemia speciosa*; b. *Eotala indica* c. *Eotala rotundifolia*



Plate 91: a. *Eatala rotundifolia*; b. *Woodfordia fruticosa*; c. *Duabanga grandiflora*



Plate 92: a. *Ludwigia hyssopifolia*; b. *Ludwigia octovalvis*; c-d. *Trapa natans*



Plate 93: a. *Adenia trilobata*; b-c. *Diplocyclos palmatus*; d. *Hodgsonia heteroclita*



Plate 94: a-b. *Mukia maderaspatana*; c. *Solena heterophylla*; d. *Trichosanthes costata*



Plate 95: a-c. *Begonia hatacoa*; d. *Begonia nepalensis*



Plate 96: a-b. *Begonia nepalensis*; c-d. *Begonia ovatifolia*



Plate 97: a-b. *Begonia soxburghii*; c. *Begonia xanthina*



Plate 98: a. *Castella asiatica*; b. *Eryngium foetidum*; c. *Hydrocotyle javanica*



Plate 99: a. *Hydrocotyle javanica*; b-c. *Hydrocotyle sibthorpioides*; d. *Oenanthe javanica*

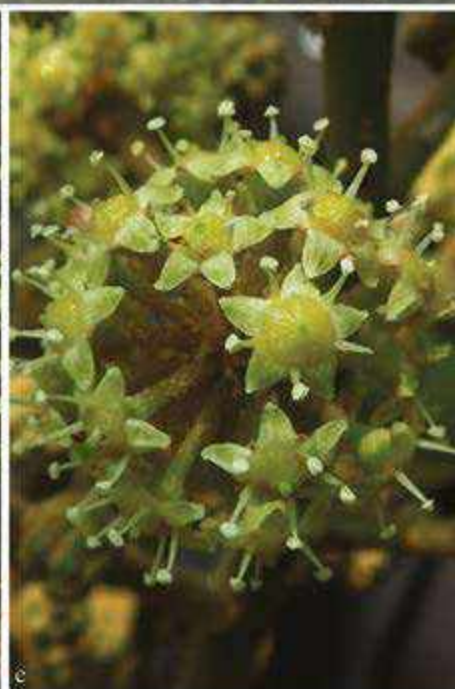


Plate 100: a. *Aralia foliolosa*; b-c. *Brasconopsis latina*



Plate 101: a-b. *Schefflera bangalensis*; c-d. *Alangium chinense*

I. Polypetalae

Key to the families

- 1a. Ovary superior; receptacles usually flat bearing floral parts successively; stamens arising direct from the receptacle or from disk 2
- 1b. Ovary semi-inferior or inferior; receptacles usually encircled by cupular calyx on which floral parts appear successively; stamens arising from calyx or from the disk lining the calyx tube 43
- 2a. Sepals imbricate, if valvate then leaves opposite, sepals free, stamens many, and fruitlets separate (Clematis) 3
- 2b. Sepals valvate; if imbricate or sub-imbricate then petals invariably valvate 36
- 3a. Sepals free; if united below then leaves even-pinnate or odd-pinnate (Turpinia) 4
- 3b. Sepals united at least at the base 23
- 4a. Stamens 10 or fewer 5
- 4b. Stamens more than 10 14
- 5a. Plants dioecious; flowers 3-merous **Menispermaceae**
- 5b. Plants monoecious; flowers 4-5-merous 6
- 6a. Petals 4; stamens 6, tetradynamous **Brassicaceae**
- 6b. Petals usually 5, sometimes 4; perfect stamens as many or twice as many as petals and sepals 7
- 7a. Flowers isomeric; ovary 1-celled 8
- 7b. Flowers isomeric or not; ovary 2- or more-celled 10
- 8a. Flowers zygomorphic; stamens as many as sepals; placentation parietal **Violaceae**
- 8b. Flowers actinomorphic; stamens usually twice as many as sepals; placentation free central 9
- 9a. Herbs; leaves linear, opposite and clustered above; sepals united; petals entirely free; seeds not hairy but ornamented **Caryophyllaceae**
- 9b. Shrubs; leaves scaly, alternate; sepals free; petals slightly connate below; seeds with tufts of hair at one end **Tamaricaceae**
- 10a. Herbs; seeds pendulous, arillate partly 11
- 10b. Shrubs or trees; seeds erect, fully arillate or not 12
- 11a. Sepals and petals regular; stamens always 5 **Linaceae**
- 11b. Sepal and petals irregular; stamens 6 or 10 13
- 12a. Inflorescences axillary or sub-terminal racemes or pseudo-umbellate, pedunculate or not fascicled or solitary; flowers zygomorphic, resupinate to through 180°; stamens 5 **Balaenidaceae**

Botanical Survey of India

12b. Inflorescences umbellate, cymose, racemose, or flower solitary; flowers actinomorphic, heterostylous; stamens 10	Oralidaceae
13a. Flowers unisexual; seeds arillate	Sapindaceae
13b. Flowers bisexual; seeds exarillate	Staphyllaceae
14a. Sepals 3 or fewer, deciduous	15
14b. Sepals 4 or more, deciduous or persistent	17
15a. Trees or shrubs; sepals petaloid, petals in 2-many whorls; carpels many; fruits usually aggregate	Magnoliaceae
15b. Herbs; sepals distinct from petals; petals 2-3-whorls; ovary 1-celled; fruits not aggregate	16
16a. Leaves alternate; sap milky; placentation parietal	Papaveraceae
16b. Leaves alternate or opposite; sap watery; placentation free central	Portulacaceae
17a. Sepals persistent	18
17b. Sepals deciduous	19
18a. Plants without short branches; flowers usually bisexual; sepals not connate into a calyx tube; disk absent; ovary on a gynophore, superior	Capparaceae
18b. Plants often with short branches; flowers usually unisexual; sepals connate into a calyx tube; disk present; ovary not on a gynophore, semi-inferior	Flacourtiaceae
19a. Carpels free; placentation basal	Ranunculaceae
19b. Carpels coherent; placentation parietal	20
20a. Herbs; leaves opposite, gland-dotted; fruits capsules	Hypericaceae
20b. Trees or shrubs; leaves alternate, not gland-dotted; fruits capsules or not	21
21a. Stamens free; gynoecium of 2-7 carpels; placentation marginal/sub-marginal; fruits leathery; seeds arillate or not, wingless	Dilleniaceae
21b. Stamens free or not; gynoecium of 3-5 carpels; placentation axile; fruits baccate or capsules; seeds exarillate, winged or not	22
22a. Climbing shrubs; inflorescences cymose or paniculate; ovary 5-celled	Actinidiaceae
22b. Erect shrubs or trees; inflorescences solitary or fascicled; ovary 3-5-celled, superior	Thesaceae
23a. Trees; leaves simple, eglandular; stamens indefinite, variously connate; connective prominent; fruits winged	Dipterocarpaceae
23b. Shrubs or lianas; leaves simple or compound, gland-dotted or not; stamens 12, fewer, or indefinite; connective not prominent; fruits winged or not	24
24a. Leaves glandular	Rutaceae
24b. Leaves eglandular	25

The Flora of Buxa Tiger Reserve, West Bengal, India

- 25a. Leaves opposite; disk obscure; filaments basally connate, declinate; ovary 3-celled; fruits winged **Malpighiaceae**
- 25b. Leaves alternate; disk enlarged; filaments not declinate; ovary 1-celled; fruits not winged 26
- 26a. Stamens opposite to petals 27
- 26b. Stamens alternate with the petals 28
- 27a. Climbing shrubs; leaves simple or digitately to pedately compound with tendrils; stipules often caducous; ovules 2 in each locule **Vitaceae**
- 27b. Erect shrubs; leaves pinnately compound, devoid of tendrils; stipules sheathing along rachis margins with conspicuous wings; ovule 1 in each locule **Legaceae**
- 28a. Leaves exstipulate; petals imbricate **Sabiaceae**
- 28b. Leaves usually stipulate; petals valvate 29
- 29a. Flowers bisexual and polygamo-dioecious; ovules erect or ascending 30
- 29b. Flowers unisexual; ovules pendulous 32
- 30a. Leaves simple or compound; ovary usually 1-locular, rarely 2-5-locular **Anacardiaceae**
- 30b. Leaves simple; ovary 3-5-locular 31
- 31a. Scandent shrubs; fruits not in 3s; capsule globose; seeds endospermous, arillate and not winged **Celastraceae**
- 31b. Lianas; fruits usually in 3s; capsules flattened; seeds non-endospermous, exarillate, winged **Hippocastaceae**
- 32a. Leaves compound 33
- 32b. Leaves simple 34
- 33a. Inflorescences racemes, cymes or thyrses; petals 3-5; stamens equal or twice the number of petals, free; fruits drupes/samaras **Simaroubaceae**
- 33b. Inflorescences axillary thyrses, rarely racemose or spicate; petals 3-6; stamens 4-12, united in a tube; fruits capsules/drupes **Meliaceae**
- 34a. Inflorescences axillary cymose, racemose, or subumbellate; drupe 3-5 of 1-seeded pyrenes **Aquifoliaceae**
- 34b. Inflorescences usually spicate and pendulous; fruit 1-celled, 1-seeded 35
- 35a. Erect shrubs, monoecious; inflorescences panicles/umbels/spikes; flowers bisexual; sepals cupular; disk present **Opiliaceae**
- 35b. Climbing shrubs, dioecious; inflorescences racemose; flowers unisexual; sepals tubular; disk present or not **Loasaceae**
- 36a. Sepals free; ripe carpels free or conjoined **Annonaceae**
- 36b. Sepals united below (excl. *Grewia* & *Trismifetta*); fruits not as above 37

Botanical Survey of India

- 37a. Stamens united 38
37b. Stamens free 40
- 38a. Flowers usually unisexual, rarely bisexual or polygamous; stamens in a column or cup, round the style; mouth of tube usually with 5 sterile prolongations; androgynophore usually present; ovules 2 or more per locule **Sterculiaceae**
38b. Flowers usually bisexual; stamens indefinite in a column, round the style with only short free filaments towards apex or dividing upwards; androgynophore usually absent; ovules 1 to many per locule 39
- 39a. Epicalyx present; stamens numerous, monadelphous; fruit a loculicidal capsule or a schizocarp, separating into individual mericarps; seeds without endocarpic hairs **Malvaceae**
39b. Epicalyx absent; stamens 5-many, monadelphous to pentadelphous, rarely free; fruit a capsule, seeds with endocarpic hairs **Bombacaceae**
- 40a. Stamens definite 41
40b. Stamens indefinite 42
- 41a. Dioecious usually, unarmed; leaves compound; petals not hooded; stamens usually twice as many as petals or equal to petals; alternate to petals **Burseraceae**
41b. Monoecious, armed; leaves simple; petals usually hooded; stamens equal to petals; opposite to petals **Rhamnaceae**
- 42a. Inflorescences solitary flower, racemes, fasciated; stamens 20-many, free; ovary 2-5-celled; 2-20 ovules per cell; stigma simple; seeds arillate or not **Elaeocarpaceae**
42b. Inflorescences terminal cymes or panicles or 1-3 per axil; stamens 10-many, free or connate at base; ovary 2-10-celled; ovules 1-many per cell; stigma capitate; seeds exarillate **Tiliaceae**
- 43a. Trees; ovary syncarpous, 1-locular, placentation parietal **Datiaceae**
43b. Trees, shrubs or climbers; apocarpous or syncarpous with several locules 44
- 44a. Climbers; ovary syncarpous, 1-locular **Pasifloraceae**
44b. Trees, shrubs or climbers; ovary apocarpous or syncarpous with several locules 45
- 45a. Ovules arising from the inner angles or from base of carpels or loculi or if arising from apex of locules then with ovules many 46
45b. Ovules suspended from apices of carpels/locules; ovules always few 58
- 46a. Leaves stipulate; flowers zygomorphic with definite diadelphous stamens or actinomorphic with indefinite free stamens; carpel solitary, excentric; style terminal; ovules many or few arising from margins **Leguminosae [Fabaceae (s. l.)]**
46b. Leaves exstipulate; flowers actinomorphic; carpels several, if solitary (some Rosaceae), then style not terminal and odd sepal remote from axis 47
- 47a. Flowers unisexual; ovary inferior 48
47b. Flowers bisexual; ovary inferior or not 49

The Flora of Buxa Tiger Reserve, West Bengal, India

- 48a. Weak herbs or shrubs or climb through tendrils; flowers actinomorphic; stamens usually three; styles united or only free at apex; fruits not winged **Cucurbitaceae**
- 48b. Erect herbs or shrubs; flowers zygomorphic; stamens numerous, free or conjoined; styles free or only united at base; fruits winged **Begoniaceae**
- 49a. Stipulate; carpels free or if united, then with styles distinct 50
- 49b. Exstipulate; carpels and styles united throughout 52
- 50a. Leaves stipulate; stamens indefinite **Rosaceae**
- 50b. Leaves exstipulate; stamens definite 51
- 51a. Seeds with straight embryo in centre of albumen; ovules from placentas suspended from top of 1-locular ovary **Saxifragaceae**
- 51b. Seeds with curved embryo enclosing albumen; ovules from inner angle or from base of the loculi **Molluginaceae**
- 52a. Calyx lobes imbricate 53
- 52b. Calyx lobes valvate 55
- 53a. Shrubs; petals valvate, white, mauve to purple; stamens definite; fruit a capsule or drupe; seeds numerous **Melastomataceae**
- 53b. Trees; petals imbricate, white to pinkish; stamens indefinite; fruit a berry or drupe or capsule; seeds 2-many 54
- 54a. Stamens joined and to the petals or staminodes at their base in one or more rings **Loeythidaceae**
- 54b. Stamens usually numerous, in 1 to several whorls; filaments distinct or connate into 5 bundles **Myrtaceae**
- 55a. Herbs; ovary adnate or semi-adnate to calyx-tube 56
- 55b. Herbs, shrubs or trees; ovary free from calyx-tube 57
- 56a. Free floating aquatic plants; leaves long petioled, whorled; fruits indehiscent, 2-4-horned, turbinate, cupular, or elongate rhombic, exocarp succulent, ephemeral, endocarp stony **Trapaceae**
- 56b. Terrestrial plants; leaves not long petioled, not whorled; fruits loculicidal capsule or indehiscent nut or berry **Onagraceae**
- 57a. Inflorescences solitary flower/fascicles/terminal racemes/spikes/panicles; seeds winged **Lythraceae**
- 57b. Inflorescences terminal, corymbose cymes; seeds tailed **Sonneratiaceae**
- 58a. Ovule solitary in each locule 59
- 58b. Ovule solitary in each locule in female flowers, or when bisexual, ovules more than 1 in each locule 61
- 59a. Leaves simple, opposite, exstipulate; inflorescences axillary cymes or fascicles, subtended by petaloid bracts; style simple; fruits drupes **Alangiaceae**

Botanical Survey of India

- 59b. Leaves compound/simple and lobed, alternate, stipulate; inflorescences umbels, subtended by involucre of free or united bracts; styles 2; schizocarp of 2-mericarps 60
- 60a. Trees or shrubs; fruits usually fleshy, never separating spontaneously; eglandular vittae Araliaceae
- 60b. Herbs; fruits dry, separating spontaneously; glandular vittae Apiaceae
- 61a. Aquatic submerged herbs; leaves in whorl; flowers unisexual; styles usually 4, free; ovule solitary Haloragaceae
- 61b. Terrestrial or if aquatic, then not submerged, trees and shrubs; flowers usually bisexual, rarely unisexual; styles united; ovules more than one 62
- 62a. Trees; leaves opposite, eglandular; ovary 2-6-locular; fruits berries; seeds arillate Rhizophoraceae
- 62b. Trees or lianas; leaves opposite or alternate, usually glandular; ovary 1-locular; fruits drupaceous, winged or not; seeds exarillate Combretaceae

Ranunculaceae

Key to the genera

- 1a. Climbing shrubs; stem solid, not succulent; leaves always cauline, not pinnatisect; sepals 4; achenes spreading on flattened thalamus; styles, prominent 1. *Clematis*
- 1b. Erect herbs; stems hollow, succulent; leaves basal as well as cauline, pinnatisect; sepals 5; achenes closely set on elongated thalamus; styles insignificant 2. *Ranunculus*

1. *Clematis* L.

Key to the species

- 1a. Plants climb by tendrils (modified terminal leaflet); petals present 3. *C. zeylanica*
- 1b. Plants climb by twining petioles or rachis; petals absent 2
- 2a. Leaves biternate; leaflets cordate at base; 3-veined from base; midvein pubescent; floral bracts not prominent; achenes swollen, c. 10 1. *C. gouriana*
- 2b. Leaves simple, broadly cordate at base; 7-9-veined from base; midvein glabrous; floral bracts prominent; achenes sunken, more than 20 2. *C. smilacifolia*

Clematis gouriana Roxb. ex DC., Syst. Nat. 1: 138. 1817; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 4. 1872; Prain, Bengal Pl. 1: 192. 1903.

[Plate 1a-b; Fig. 1a-c]

Climber shrub, pilose when young. Leaflets 7-11, ovate or ovate-lanceolate, 4-9 × 1.4-2.4 cm, cordate, entire, 1 or few toothed and acuminate at apex, glabrous or sparsely pubescent on upper surface; petioles c. 5 cm. Inflorescences paniculate

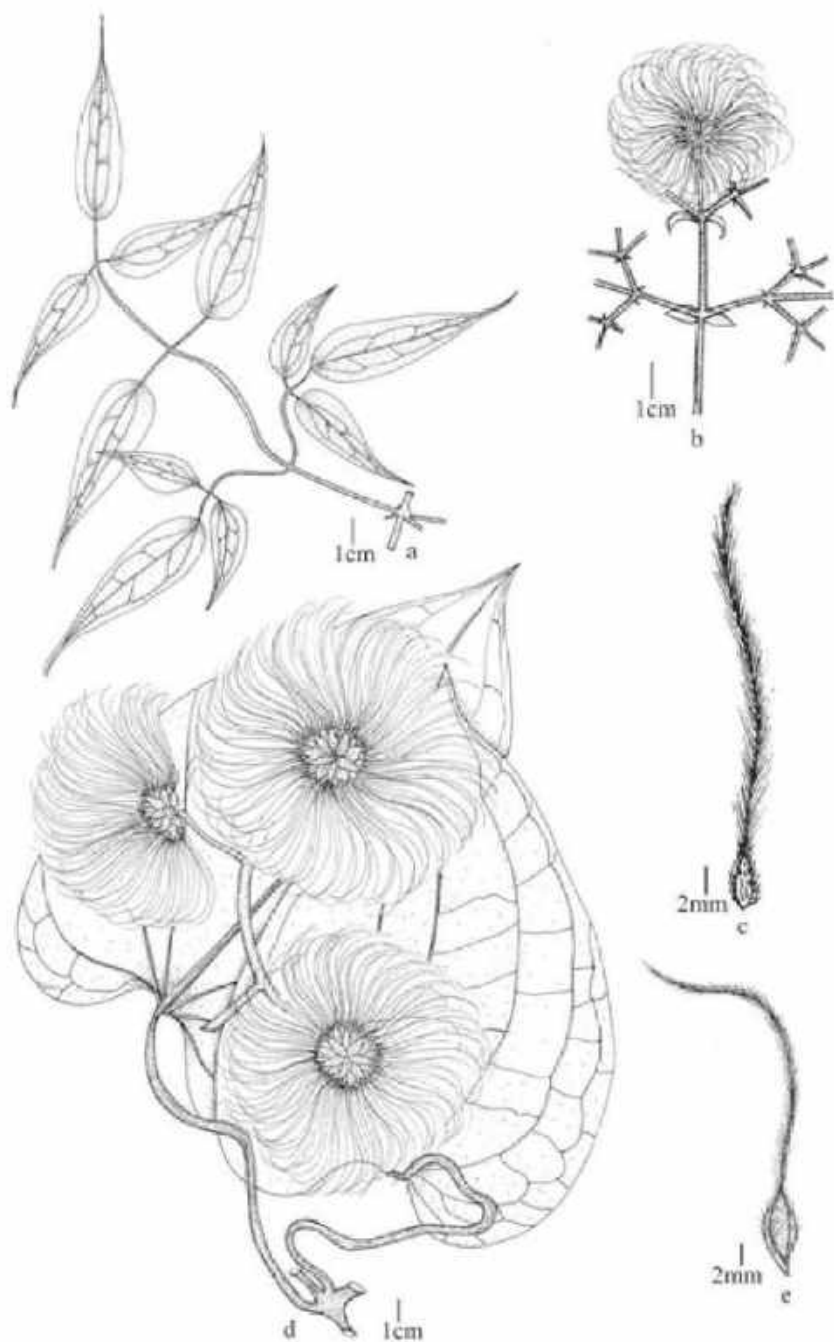


Fig. 1. *Clematis gouriana*: a. Leaf; b. Fruiting branchlet; c. Achene (AK 58849); *Clematis smilacifolia*: d. Leaves with fruiting branchlet; e. Achene (AK 59940).

cymes, pubescent; bracts ovate to elliptic-ovate or lanceolate, glabrous or sparsely hairy; bracteoles pubescent. Flowers sub-sessile. Sepals white, oblong-obovate, c. 6 × 2.5 mm, pubescent. Petals absent. Stamens many; filaments 3–4 mm. Carpels linear-oblong; style c. 2.5 cm; stigma clavate. Achenes swollen, c. 4 mm, white pubescent with long persistent styles.

Flowering & Fruiting: October–February.

Distribution. India: Southern/Central/Northern/North-East Indian states.

Specimens examined: Chunabhati, JKS 993; Jainti 3B, 04.03.2011, GK 47243; Pana, 11.02.2013, AK 58849.

2. *Clematis smilacifolia* Wall., *Asiat. Res.* 13: 402. 1820; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 3. 1872. [Plate 1c-d; Fig. 1d-e]

Climber. Leaves broadly ovate, 15–25 × 13–18 cm, short acuminate, coriaceous; petioles 10–17 cm, twining. Inflorescence axillary, lax, trichotomously branched panicles, brown pubescent; floral bracts pubescent; pedicels 2–5.5 cm, brown pubescent. Sepals creamy white, oblong-lanceolate, sub-acute, reflexed, brown pubescent. Petals absent. Stamens many; filaments short; anthers oblong. Carpels linear-oblong, pubescent; style c. 6 mm, villous; stigma clavate. Achenes elliptic-obovate, puberulous with long persistent styles.

Flowering & Fruiting: September–March.

Distribution. India: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Achalung, 14.02.2014, AK 59940.

3. *Clematis zeylanica* (L.) Poir. in Lam. & al., *Encycl. Suppl.* 2. 296. 1811. *Atragene zeylanica* L., *Sp. Pl.* 1: 542. 1753. *Naravelia zeylanica* (L.) DC., *Syst. Nat.* 1: 167. 1817; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 7. 1872; Prain, *Bengal Pl.* 1: 193. 1903. [Plate 2a]

Rashgagri (N).

Climbing shrub, pubescent. Leaves 3-foliolate; lateral leaflets broadly ovate, 5.5–12 × 3–7.7 cm, apiculate to acuminate, pubescent; tendrils 3-fid, sparsely pilose. Inflorescences paniculate cymes; inflorescence and floral bracts triangular, tomentose. Sepals elliptic-oblong, 5–6.5 × 2–3.5 cm, acute to sub-acute, pubescent. Petals 12, green, clavate. Stamens many; filaments short; anthers linear-oblong, acuminate. Carpels 10–12, fusiform, villous; style villous; stigma clavate. Achenes fusiform with 3–3.5 cm, persistent styles.

Flowering & Fruiting: September–December.

Distribution. India: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya

Pradesh, Maharashtra, Meghalaya, Odisha, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Santrabari, 27.09.2013, AK 59611.

2. *Ranunculus* L.

Ranunculus aceleratus L., Sp. Pl. 1: 551. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 19. 1872; Prain, Bengal Pl. 1: 193. 1903. [Plate 2b-c]

Herb, 60–100 cm high, glabrous or puberulent. Basal leaves reniform or sub-orbicular, 3-segmented; segments 2–3-lobed; cauline leaves whorled, lower one reniform or sub-orbicular and segmented, uppermost oblanceolate or linear-lanceolate, 2–2.5 cm, cuneate, obtuse at apex, glabrescent or sparsely pubescent; stipules ovate, ciliate; upper leaves sessile. Inflorescences terminal, corymbose cymes; inflorescence bracts and bracteoles oblanceolate, pubescent. Sepals ovate or elliptic-ovate, obtuse, hairy. Petals yellow, elliptic-oblong or ovate-oblong, minutely clawed. Stamens many; filaments short; anthers elliptic. Carpels minute; stigma sub-capitate. Achenes obovoid.

Flowering & Fruiting: January–May.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Manipur, Punjab, Rajasthan, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Buxa-Bhutan Border, 20.05.1949, VN 2761; Marakata, 22.02.2012, AK 55883, 55902.

Dilleniaceae

Dillenia L.

Key to the species

- 1a. Evergreen; flowers large, solitary; sepals succulent; petals creamy white; inner stamens reflexed at tip; carpels 14–20; fruits 10–12 cm across; seeds red, reniform, densely hairy 1. *D. indica*
- 1b. Deciduous in flowering; flowers small in umbellate fascicles; sepals not succulent; petals bright yellow; inner stamens reflexed from base; carpels 5; fruits 13–15 mm across; seeds black, ovoid, glabrous 2. *D. pentagyna*

1. *Dillenia indica* L., Sp. Pl. 1: 535. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 36. 1872; Prain, Bengal Pl. 1: 195. 1903. [Plate 3a]

Chalta (B); *Panchphal*, *Panchkul* (N).

Evergreen tree, 10–15 m high, with scars of fallen leaves, appressed pubescent. Leaves oblanceolate to elliptic, 23–25 × 7–8 cm, attenuate, serrate, acute to shortly acuminate, coriaceous, puberulous below; lateral veins 30–40 pairs, parallel,

prominent beneath; petioles pubescent, narrowly winged; floral bracts lanceolate; pedicels pubescent. Sepals obovate or elliptic, 3–6 × 3–5 cm. Petals obovate, 6–9 × 5–6 cm. Stamens in 2 whorls, unequal; inner whorl 2–2.2 cm; outer whorl 1.3–1.5 cm; anthers linear-oblong, apiculate. Style oblanceolate to linear-lanceolate. Fruits yellowish green, sub-globose, in thick sepals; seeds reniform, reddish, black on maturity, exarillate.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andhra Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: NRVK-7, 12.10.2010, SKS & GK 46332; NRVK 6, 27.11.2011, GK 47149; Narathali, 20.02.2012, AK 55764.

Notes: The fleshy pericarp is sour and edible and locals use it in preparing chutney; elephants eat the fruits.

2. *Dillenia pentagyna* Roxb., Pl. Coromandel 1: 21, t. 20. 1795; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 38. 1872; Prain, Bengal Pl 1: 195. 1903.

[Plate 3b-c]

Karkotta (B); *Tuntri* (N).

Deciduous tree, c. 20 m high, with scars of old fallen leaves. Leaves obovate or oblanceolate, 20–45 × 10–19 cm, attenuate to cuneate, serrate, obtuse, coriaceous, glabrous or appressed puberulous; petioles scabrid; floral bracts ovate-lanceolate, 5–7 mm; pedicels 2–6 cm. Sepals crimson, broadly ovate to obovate or elliptic, 6–8 × 4.5–5 mm, obtuse to rounded, ciliate. Petals yellow, obovate, 1.5–2 × 0.5–1 cm. Stamens in 2 whorls, unequal; inner whorl 10; outer whorl 30–60, incurved; filaments short; anthers linear-oblong, apiculate. Carpels oblong or ellipsoid; style reflexed. Fruits greenish-yellow, sub-globose, in thick sepals; seeds ovoid, black, glabrous, exarillate.

Flowering & Fruiting: January–June.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Panbari 7, 29.03.2012, GK 50628; Buxa, Santrabari, 800ft, 23.05.1949, VN & party 2935; Sankosh, 28.09.2011, AK 52993; Buxa-Santrabari, 23.05.1949, VN 2935.

Notes: *D. pentagyna* is not as common as *D. indica* in this Tiger reserve.

Magnoliaceae

Magnolia L.

Key to the species

- 1a. Deciduous or evergreen; leaves ovate, elliptic or obovate, acute or obtuse; carpels free, dehiscing along dorsal suture 1. *M. doltsopa*
1b. Evergreen; leaves oblanceolate, shortly acuminate; carpels united, dehiscing transversely around base 2. *M. hodgsonii*

1. *Magnolia doltsopa* (Buch.-Ham. ex DC.) Figlar, Proc. Internat. Symp. Fam. Magnoliac.: 21. 2000. *Michelia doltsopa* Buch.-Ham. ex DC., Syst. Nat. 1: 448. 1818. [Plate 4a-b]

Rani-champa (B); *Seto Champ* (N).

Tree, 16–25 m high, ferruginous tomentose; buds greyish-brown, sericeous. Leaves ovate-lanceolate to elliptic, 15–29 × 5–9 cm, cuneate to faintly rounded, entire, acute to acuminate, thinly coriaceous, glaucous and pubescent beneath; stipules oblong-acuminate, 4–5 cm, silky outside. Flowers axillary, sometimes apparently terminal, mild scented, 10–13 cm across; buds lanceolate, apiculate, c. 3.5 cm, silky outside; bracts 2, spatheaceous, oblong-ovate, 4–6 × 2–3 cm. Perianth white, 12, obovate to spatulate, 5–6 × 2–3.5 cm, outer whorl larger, gradually narrower towards centre. Stamens 50–80, yellowish; filaments short; anthers c. 1 cm, appendaged apically. Ovary stalk c. 6 mm; style recurved. Fruiting receptacles up to 15 cm; ripened carpels woody, obliquely obovoid, loosely placed, slightly compressed, shortly beaked, ventrally dehiscent, lenticellate; seeds 1–2, compressed.

Flowering & Fruiting: March–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimen examined: NRVK 5, 29.03.2012, GK 50624.

Uses: Wood is used as timber.

Notes: This species is endemic to North East India and West Bengal.

2. *Magnolia hodgsonii* (Hook. f. & Thomson) H. Keng, Gard. Bull. Singapore 31 (2): 129. 1978. *Talauma hodgsonii* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 40. 1872. [Plate 4c-d; Fig. 2a-c]

Hare (N).

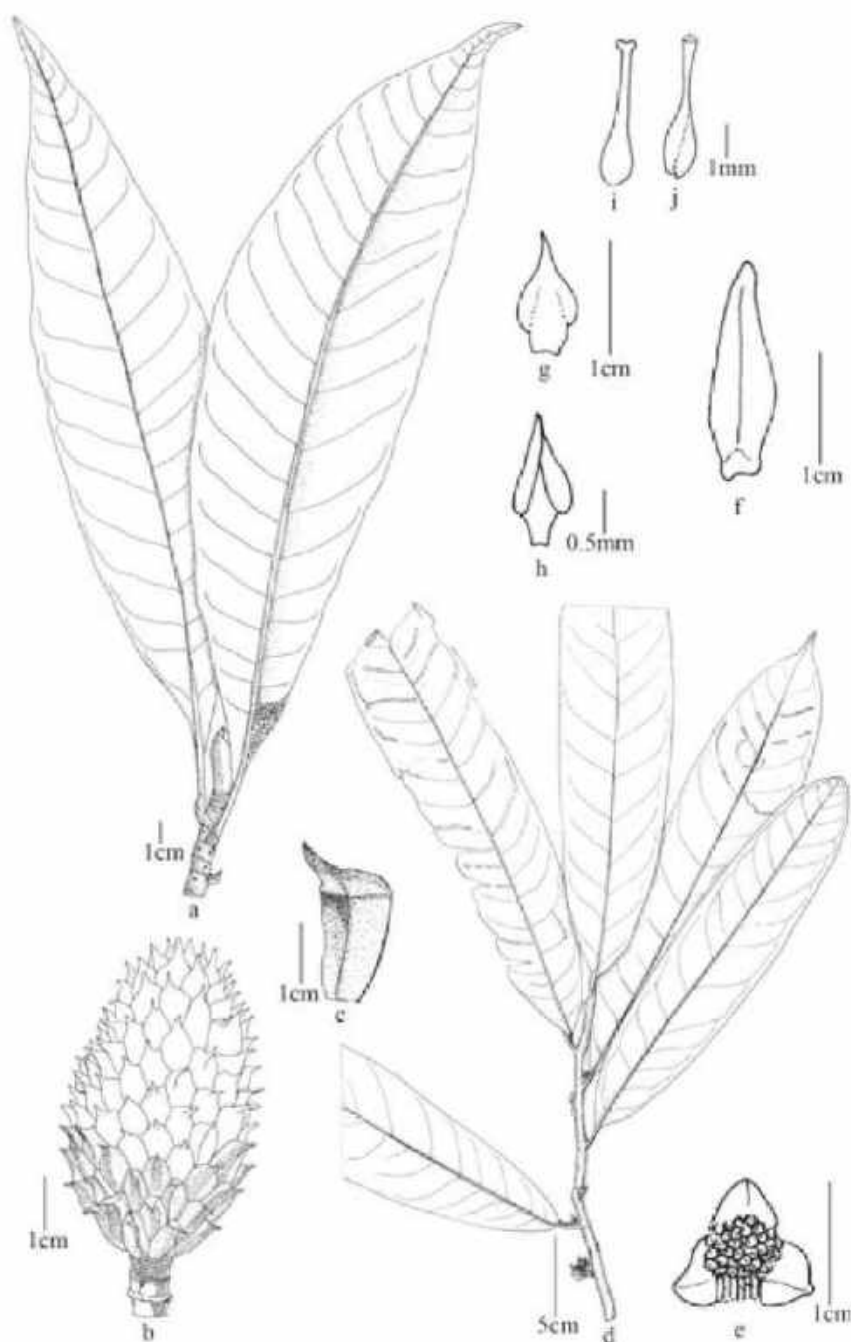


Fig. 2. *Magnolia hodgsonii*: a. Leaves; b. Fruit; c. Fructing carpel (AK 59839); *Goniothalamus sesquipedalis*: d. Flowering branchlet; e. Flower (petals removed); f. Outer petal; g. Inner petal; h. Stamen; i-j. Gynoecium (SKS & GK 46283).

Evergreen tree, 8–10 m high. Leaves lanceolate or oblanceolate, 25.5–37 × 7.5–10 cm, attenuate, obtuse to acuminate, coriaceous; petioles c. 6 cm; stipules caducous, stipular scars prominent. Flower sessile, terminal, solitary, fragrant; floral bracts caducous; spathaceous bracts purplish. Perianth 9–15; outer whorl greenish, 3, saploid, c. 3.5 × 2.5 cm; inner whorl whitish, red above, ovate, c. 5.5 × 4 cm. Stamens many; filaments short; anthers oblong. Carpels 40–80, ellipsoid to ovoid, 2.5–4 cm, long tipped. Fruiting carpels on 6–7 cm long receptacle, ovoid or elliptic head, woody.

Flowering & Fruiting: April–August.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh (?), Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa to Chunabhati, 17.05.1949, VN & party 2654; On way to Buxaduar, 12.05.1976, JKS 4607; Near Buxaduar range office, 26.11.1975, JKS 943; Hatipota, 18.02.2013, AK 59839; Tashigaon to Rovers point, 03.10.2013, AK 59775.

Notes: It is a CITES listed species and also appears in the negative list of exports.

Annonaceae

Key to the genera

- | | |
|---|-------------------------|
| 1a. Inner whorl of petals reduced or absent; fruit syncarpous, many seeded, embedded in pulp | 1. <i>Annona</i> |
| 1b. Inner whorl of petals present; fruit apocarpous and carpels devoid forming free, often stipitate monocarps with single seed and of pulp | 2 |
| 2a. Petals dark pink; anther cells not concealed by connectives | 4. <i>Miliusa</i> |
| 2b. Petals not red; anther cells concealed by connectives | 3 |
| 3a. Scrambling shrubs; flowers pendent; petals greenish-yellow; ovules uniseriate, 2–6 on ventral suture; fruits moniliform | 2. <i>Desmos</i> |
| 3b. Erect shrubs or trees; flowers not pendent; petals white or green; ovules 1–2 in each carpel; fruits baccate | 4 |
| 4a. Shrubs; flower solitary, white; inner petals larger than outer ones, clawed and connivent in a vaulted cone; carpels golden yellow hairy; fruitlets sessile | 3. <i>Goniothalamus</i> |
| 4b. Trees; flowers in fascicle, green; inner petals nearly equal to outer ones, flat, spreading from the base; carpels not hairy; fruitlets stalked | 5. <i>Polyalthia</i> |

L. *Annona* L.

Annona reticulata L., Sp. Pl. 1: 537. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 78. 1872; Prain, Bengal Pl. 1: 206. 1903.

Nona (B).

Tree, 4–6 m high. Leaves oblong-lanceolate, 1.4–9 × 4.5–5 cm, cuneate, acuminate, sub-coriaceous, petiolate. Inflorescences axillary, solitary or fascicled cymes; floral bracts caducous; bracteoles deltoid. Sepals 3, broadly ovate, short acuminate, pubescent. Petals green, 6 in 2 whorls, unequal; outer whorl oblong, 1.5–2 × 0.4–0.5 cm, reddish at the base inside; inner whorl smaller. Filaments short; anthers minute. Carpels ovoid-linear; stigma muriculate. Fruit aggregate, yellow to reddish, spherical to ovoid; fruiting carpels woody.

Flowering & Fruiting: May–February.

Distribution. India: Andhra Pradesh, Assam, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: North Rydak, 26.09.2011, AK 52934; NRVK 6a compt., 04.12.2011, GK 52324.

Notes: Cultivated and often naturalized.

2. *Desmos* Lour.

Desmos chinensis Lour., Fl. Cochinch. 1: 352. 1790. *Unona discolor* Vahl, Symb. Bot. 2: 63, t. 36. 1791; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 59. 1872; Prain, Bengal Pl. 1: 203. 1903. [Plate 5a-b]

Scrambling shrub, 2–3 m high, pubescent. Leaves elliptic-oblong to elliptic, obovate, 8–14 × 3.5–6.2 cm, subcordate to rotund, bluntly acute or acuminate, villous below; petioles tomentose. Flowers extra-axillary or leaf-opposed, fragrant; bracts linear; pedicels pubescent. Sepals 3, elliptic-ovate to ovate-lanceolate, 4–8 × 2–3 cm. Petals 6 in 2 whorls, unequal; outer whorl elliptic-lanceolate, 5–7 × 1.3–2.3 cm, clawed, obtuse; inner whorl lanceolate, 4–6 × 1–2 cm, obtuse, glabrous to sparsely pubescent. Stamens sessile; anthers linear-oblong, flat-topped. Carpels oblong; ovules uniseriate, 2–6 on ventral suture; stigma clavate. Fruitlets many, ovoid or globose moniliform, stalked, apiculate; seeds 1–3, globose or ovoid.

Flowering & Fruiting: April–October.

Distribution. India: Assam, Andhra Pradesh, Kerala, Maharashtra, Meghalaya, Mizoram, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Hauda nala, 03.10.2012, AK 58692; Bhutri, 05.10.2012, AK 58650; Santrabari to Buxaduar, 18.05.2014, AK 62618.

Notes: Its large showy and fragrant flowers have potential use in perfume industries.

3. *Goniothalamus* (Blume) Hook. f. & Thomson

Goniothalamus sesquipetalis (Wall.) Hook. f. & Thomson, Fl. Ind. 1: 108. 1855; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 73. 1872. *Guatteria sesquipetalis* Wall., Pl. Asiat. Rar. 3: t. 266. 1832. [Plate 6a-b; Fig. 2d-j]

Sane (N).

Shrub, 1–1.5 m high. Leaves elliptic-oblong to oblanceolate, 20–30 × 5.8–9.4 cm, cuneate, acuminate, coriaceous, brown-black, scattered hairy below; petioles 1–1.5 cm. Flower solitary; floral bracts 2–6, triangular-ovate. Sepals 3, ovate, 5–7 × 3.5–5.5 mm, acute to short acuminate, puberulous. Petals 6 in 2 whorls, pubescent; outer whorl lanceolate, acuminate; inner whorl lanceolate to ovate, connivent at apex. Filaments short; anthers oblong, conical, brown pubescent. Carpels linear-oblong, golden yellow hairy; style pubescent; stigma bifid. Fruits orange red, ovoid to ellipsoid, apiculate, puberulent; seed solitary, ellipsoid.

Flowering & Fruiting: April–December.

Distribution. India: Assam, Manipur, Meghalaya, Nagaland and Sikkim.

Specimens examined: Santrabari, 09.10.2009, SKS & GK 46283; Buxa Fort to Achalung, 29.09.2013, AK 59636; Buxaduar to Achalung, 19.05.2014, AK 62667.

4. *Milusa* Lesch. ex A. DC.

Milusa dioeca (Roxb.) Chaowasku & Kessler, Willdenowia 43 (1): 104. 2013. *Uvaria dioeca* Roxb., Fl. Ind. 2: 659. 1832. *Milusa roxburghiana* (Wall.) Hook. f. & Thomson, Fl. Ind. 1: 150. 1855; Prain, Bengal Pl. 1: 201. 1903.

[Plate 6c-d; Fig. 3a-e]

Dioecious shrub to tree, 2–3 m high. Leaves elliptic-lanceolate to oblong-elliptic, 2.5–12 × 0.7–3.5 cm, rotund, hairy at margins, acuminate; petioles pubescent. Flower axillary, solitary, usually unisexual; floral bracts triangular-ovate, pubescent; pedicels pubescent. Sepals 3, triangular-ovate, pubescent. Petals pinkish to crimson, 6 in 2 whorls; outer whorl sepaloid, triangular-ovate to lanceolate, smaller than inner whorl; inner whorl ovate, 7–8 × 3–3.5 mm, connate, pubescent. Filaments short, hairy at base; anthers globose. Ovary obovoid or subglobose, stipitate; style short; stigma sub-clavate. Fruiting carpels ovoid to subglobose; seed solitary, ovoid.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Assam and West Bengal.

Specimens examined: On way to Buxaduar, 12.05.1976, JKS 4593; Panbari 1 compt., 09.03.2011, GK 50523; Hatipota, 18.02.2013, AK 59828; Buxaduar to Achalung, 19.05.2014, AK 62656.

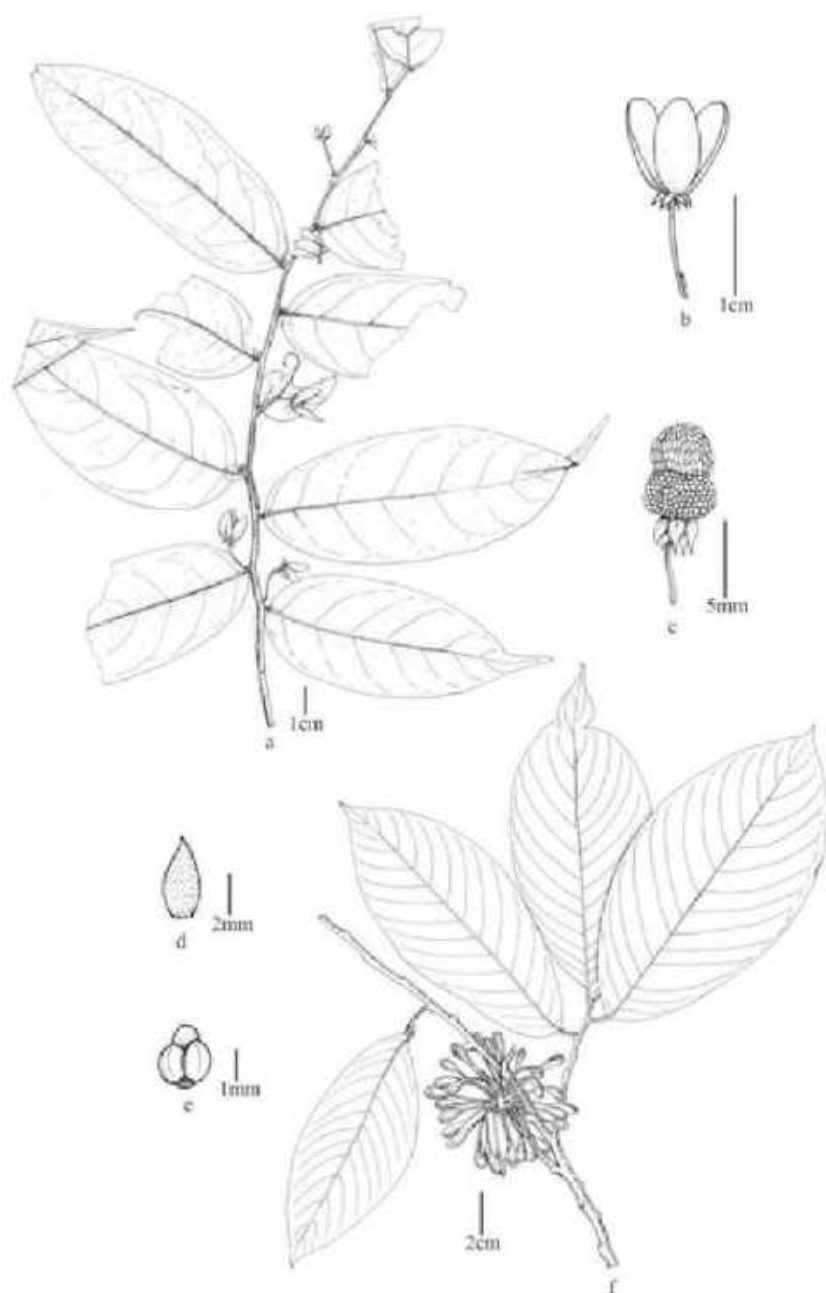


Fig. 3. *Milium dioeca*: a. Flowering branchlet; b. Flower; c. Flower (petals removed); d. Sepal; e. Stamen (GK 50523); *Polyalthia simiarum*: f. Fruiting branchlet (GK 50684).

5. *Polyalthia* Blume

Polyalthia simiarum (Hook. f. & Thomson) Hook. f. & Thomson, Fl. Brit. India 1: 63. 1872, *p. p.* *Guatteria simiarum* Hook. f. & Thomson, Fl. Ind. 1: 142. 1855; Prain, Bengal Pl. 1: 204. 1903. [Plate 7a-b; Fig. 3f]

Boga-kainla (L); *Khuti* (N).

Tree, 15–25 m high. Leaves elliptic-oblong to oblong-lanceolate or elliptic-obovate, 15–30 × 5–11 cm, subcordate to slightly oblique, acute to short acuminate, sub-coriaceous; petioles short, puberulous. Flowers usually 2–3 in axils of fallen leaves, short peduncled; floral bracts orbicular; pedicels 1.3–2.6 cm, pubescent. Sepals 3, broadly ovate, puberulous. Petals yellowish-green, 6 in 2 whorls; outer ones strap-shaped, 2.2–2.9 × 0.3–0.4 cm, acute to sub-acute, puberulous; inner ones 1.7–2.3 × c. 0.3 cm, same as outer whorl. Filaments short; anthers oblong. Carpels triangular; style and stigma indistinct. Fruitlets orange red to bluish black, 2.5–3.0, ellipsoid, 2.5–3 × 1.5–1.8 cm, stalked; seed solitary, oblong-ovoid, 2.5–2.8 × 1.2–1.5 cm, transversely striated.

Flowering & Fruiting: February–November.

Distribution. India: Andaman & Nicobar Islands, Assam, Odisha, Sikkim and West Bengal.

Specimens examined: Tashigaon 1 compt., 11.02.2010, SKS & GK 47036; Panbari 10 compt., 31.03.2012, GK 50684; Santrabari to Buxaduar, 18.05.2014, AK 62626; Santrabari to Buxaduar, 18.05.2014, AK 62629.

Menispermaceae

Key to the genera

- 1a. Leaves elliptic or oblanceolate, narrowly rounded or cuneate at base 2
- 1b. Leaves ovate or deltoid, truncate or cordate at base 3

- 2a. Climbing shrubs; leaves pinnately veined 6. *Pycnarrhena*
- 2b. Shrubs to small trees; leaves prominently 3-veined at base 2. *Cocculus*

- 3a. Leaves peltate; stamens fused; carpel solitary; staminodes absent 6
- 3b. Leaves not peltate; stamens free; carpels 3; staminodes present 4

- 4a. Leaves cordate or hastate at base, basal lobes usually acute 4. *Parabaena*
- 4b. Leaves shallowly cordate and then basal lobes always rounded 5

- 5a. Inflorescences cymose 5. *Pericampylus*
- 5b. Inflorescences racemose or narrowly racemiform-paniculate 8. *Tinospora*

- 6a. Leaves emarginate at apex; female inflorescences paniculate; flowers in fascicles in the axils of foliaceous cordate bracts; female flowers asymmetric; sepal and petal solitary **1. Cissampelos**
- 6b. Leaves acuminate at apex; female inflorescences compound umbels or panicles; flowers not subtended by foliaceous cordate inflorescence bracts; female flowers symmetric; sepal and petal not solitary (petals absent in *Cyclea bicristata*) **7**
- 7a. Inflorescences umbels, sometimes condensed to disk-like capitula; male: floral bracts subulate; bracteoles absent; sepals and petals 5, free; female: sepals and petals 3–5; style 3–5-lobed; seed glabrous **7. Stephania**
- 7b. Inflorescences paniculate; male: floral bracts trullate or linear-lanceolate; bracteoles present; sepals and petals 4, fused at least at base; female: sepals and petals 2 (petals absent in *Cyclea bicristata*); style 3-lobed; seed hairy **3. Cyclea**

1. *Cissampelos* L.

Cissampelos pareira L., Sp. Pl. 2: 1031. 1753. *Cissampelos hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535. 1817. *Cissampelos pareira* var. *hirsuta* (Buch.-Ham. ex DC.) Forman, Kew Bull. 22: 356. 1968. *Cissampelos pareira* L., Sp. Pl. 2: 1031. 1753 μ , Hook. f., Fl. Brit. India 1: 103. 1872. [Plate 7c]

Ekleja (B); *Thamarke*, *Batulpati* (N).

Climbing shrub. Leaves broadly ovate to sub-orbicular, 3.7–6.8 × 5.3–7.8 cm, peltate, cordate, sparsely hairy below. Male: inflorescences supra-axillary, pendulous, sub-corymbose cymes, pubescent; inflorescence bracts obovate to sub-orbicular; floral bracts linear; pedicels pubescent; sepals 4, oblanceolate, pilose above; petals green to yellow, 4, connate into a shallow cup; staminal column c. 5 mm. Female: inflorescence bracts revolute, abruptly apiculate, pubescent; flowers asymmetric; pedicels pubescent; sepals obovate to oblanceolate, villous; petals greenish yellow, obovate, truncate, villous; ovary pilose or hispid; style 3-lobed above. Drupes red, obovoid, style scar sub-basal.

Flowering & Fruiting: July–May.

Distribution. India: Almost throughout India.

Specimens examined: Chunbhati to Buxaduar, 14.05.1976, JKS 4659; Jainti range, 11.10.2009, SKS & GK 46286; Rangamati to Bharnabari, 06.10.2012, AK 58700; Buxaduar to Tashigaon, 20.05.2014, AK 62685; Buxaduar to Chunabhati, 21.05.2014, AK 65903.

Notes: This species is discernable by its ovate to sub-orbicular leaves and prominent bracts.



Fig. 4. *Cocculus laurifolius*: a. Flowering branchlet; b. Flower bud; c. Flower (petals removed); d. Sepal; e. Outer petal; f. Inner petal; g. Stamen (GK 47210).

2. *Cocculus* DC.

Cocculus laurifolius DC., Syst. Nat. 1: 530. 1817; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 101. 1872. [Plate 8a; Fig. 4]

Shrub to small tree, 2–3 m high. Leaves elliptic-oblong to lanceolate, 7.5–12 × 2–4 cm, cuneate, undulate, acuminate. Inflorescences axillary, single or thyrsoid cymes. Male: floral bracts subulate, puberulous; pedicels short; sepals 6 in 2 whorls, elliptic, outer whorl smaller than inner ones; petals 6, c. 5 mm; stamens 6; filaments c. 7 mm. Female: pedicels 3–5 mm; staminodes 6; style short, reflexed. Drupes green, sub-globose, compressed.

Flowering & Fruiting: March–October.

Distribution. India: Himachal Pradesh, Karnataka, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Jainti Range, 13.10.2009, GK 46350; Jainti Range, 03.03.2011, GK 47210; Jainti 3 & 6a, 08.04.2012, GK 56059; Jainty-Phashkhawa, 02.10.2012, AK 58600.

Notes: It is the only tree species of Menispermaceae and its fruits are used as an adulterant of black pepper.

3. *Cyclea* Arn. ex Wight

Key to the species

1a. Leaves prominently peltate; floral bracts trullate; calyx lobes 4, prominent; petals present; synandrium 4-loculed; ovary pilose; style 3-lobed from base; drupes obliquely obovoid to rotund; seed without hooked tubercles

1. *C. barbata*

1b. Leaves marginally peltate; floral bracts linear-lanceolate; calyx lobes 4–8, minute; petals absent; synandrium 4–8-loculed; ovary glabrous; style 3-lobed at apex; drupes subspherical to subovoid; seed hooked tubercled

2. *C. bicristata*

1. *Cyclea barbata* Miers, Contrib. Bot. 3: 237. 1871; A. Pramanik & M. Gangop. in B. D. Sharma & al., Fl. India 1: 322. 1993. [Plate 8b-c; Fig. 5]

Climbing shrub, hispid when young. Leaves deltoid-ovate, 11–16 × 8–10 cm, truncate, repand and ciliate, coriaceous, tomentose below. Inflorescences extra-axillary, dense, clustered. Male: floral bracts pubescent; bracteoles linear-lanceolate, tomentose; pedicels pubescent; calyx campanulate, pubescent; tube short; lobes linear-oblong; corolla greenish yellow, cyathiform, rim undulated; synandrium brown, exserted. Female: flowers sessile; floral bracts same as in male; sepals ovate to obovate, sub-rhomboid, pilose; petals reniform; ovary ellipsoid, curved, pilose; style short; stigmas 3. Drupes compressed.

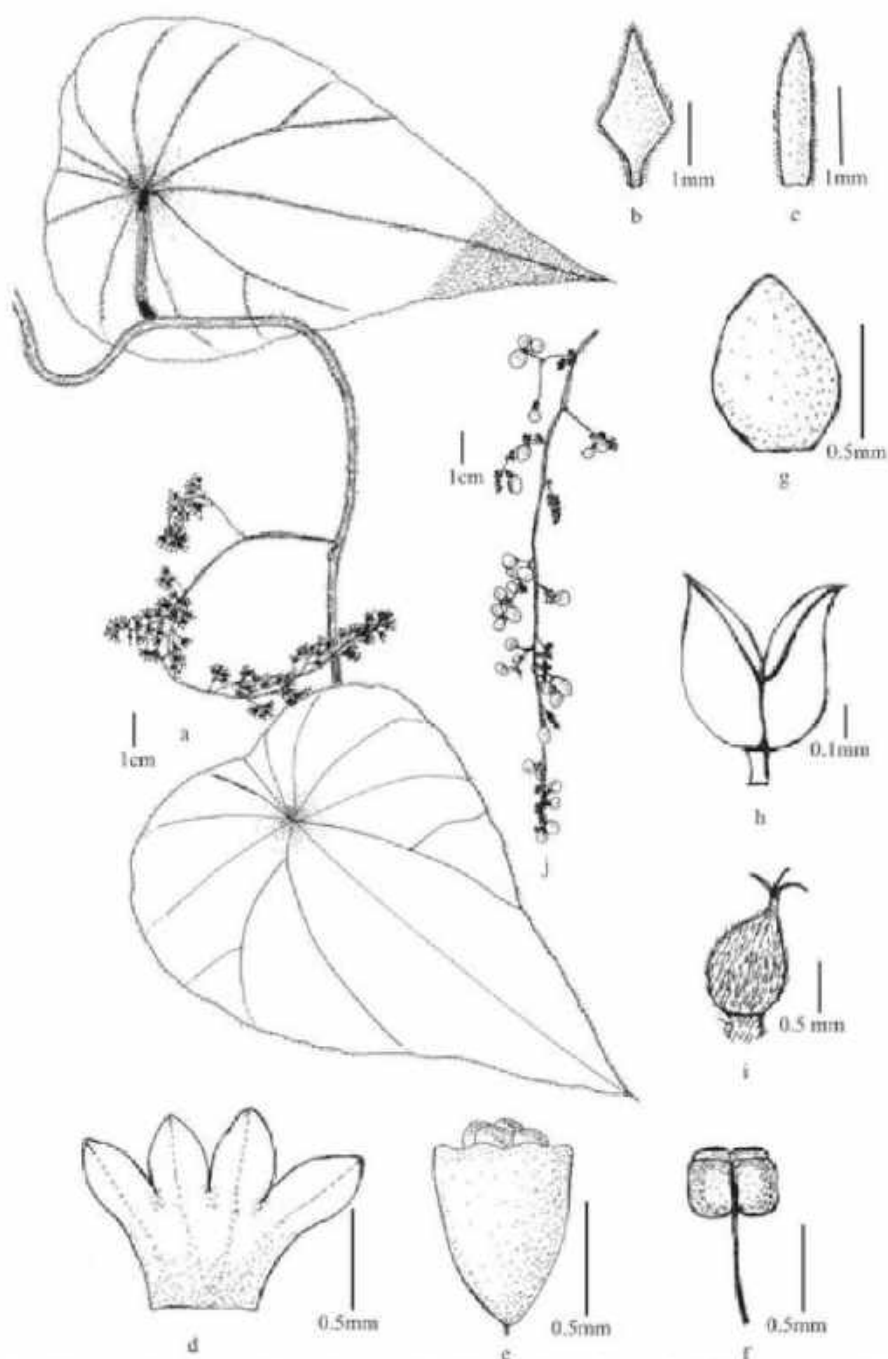


Fig. 5. *Cyclea barbata*: a. Flowering branchlet; b. Bract; c. Bracteole; d. Male calyx; e. Male corolla with synandria; f. Synandria; g. Female sepal; h. Female corolla; i. Gynoeceum; j. Fruiting branchlet (AK 58708, AK 59609).

Flowering & Fruiting: July–October.

Distribution. India: Andaman & Nicobar Islands, Assam and Sikkim.

Specimens examined: Bhutri, 05.10.2012, AK 58647; Rangamati to Bharnabari, 06.10.2012, AK 58708; Santrabari, 27.09.2013, AK 59609.

2. *Cyclea bicristata* (Griff.) Diels in Engl., *Pflanzenr.* IV, 94: 317. 1910. *Lophophyllum bicristata* Griff., *Not. Pl. Asiat.* 4: 313, t. 491. 1854; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 105. 1872. *Cyclea populifolia* Hook. f. & Thomson, *Fl. Ind.* 1: 202. 1855. [Plate 9a-b]

Climbing shrub; stems furrowed, pilose when young. Leaves broadly ovate, 6–14 × 5–13.5 cm, cordate, pilose beneath. Inflorescence axillary or on old stems, pilose. Male: Floral bracts pilose; pedicels short; calyx cupuliform; tube short; lobes obtuse; synandrium short. Female: Floral bracts and pedicels same as in male; sepals creamy yellow, sub-orbicular; ovary ovoid to sub-globose; style sub-apical, short; stigmas 3. Drupes 4–6 mm across, compressed, style scar sub-basal, pilose.

Flowering & Fruiting: February–July.

Distribution. India: Arunachal Pradesh, Manipur, Meghalaya, Sikkim and West Bengal.

Specimens examined: Tashigaon to Rovers point, 12.02.2014, AK 59923; Buxaduar to Lepchakhawa, 13.02.2014, AK 59929.

4. *Parabaena* Miers

Parabaena sagittata Miers ex Hook. f. & Thomson, *Fl. Ind.*: 181. 1855; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 96. 1872; Prain, *Bengal Pl.* 1: 207. 1903.

Karpati Lahara (N).

Twiner, with milky latex, pubescent. Leaves ovate or oblong-ovate, 11–24 × 6–15 cm, sagittate or hastate, entire or distantly dentate, acute to acuminate, thinly coriaceous, glabrous above, pubescent to subglabrous beneath. Inflorescences dichotomously branched cymes, occasionally thyrsoid, 3–10 cm, pubescent; flowers few to many, often solitary or paired. Male: sepals greenish-yellow, elliptic-ovate, 1.5–2 cm, pubescent to glabrescent; petals obovate; staminal column c. 1 mm; anthers 6, free, with transverse slits. Female: sepals and petals as in male flowers; staminodes 6, oblong; carpels 3, erect; style recurved. Drupes ovoid, rostrate, orange.

Flowering & Fruiting: April–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Meghalaya, Odisha, Sikkim and West Bengal.

Specimen examined: Jainti 5, 06.04.2012, GK 56043.

5. *Pericampylus* Miers, *nom. cons.*

Pericampylus glaucus (Lam.) Merr., *Interpr. Rumph. Herb. Amboin.*: 219. 1917; A. Pramanik in B. D. Sharma & al., *Fl. India* 1: 330. 1993. *Menispermum glaucum* Lam., *Encycl. Meth.* 4: 100. 1797. *Pericampylus incanus* (Colebr.) Miers ex Hook. f. & Thomson, *Fl. Ind.* 1: 194. 1855.

Pipal-pali Lahara, Tschethangru (N).

Twiner, tomentose. Leaves sub-peltate, broadly ovate, 4–10 × 3.5–11 cm, subtruncate or sub-cordate, crenate, mucronate, subcoriaceous, whitish-green, pubescent. Inflorescence axillary, paniculate cymes. Male flowers: pedicels tomentose; bracts linear, tomentose; sepals green, 9 in 3 whorls, pubescent; outer whorl obovate; middle whorl oblanceolate; inner whorl obovate; petals white, 6, obovate, glabrous; stamens 6, monadelphous; filaments short; anthers globose 4-celled. Female flowers: sepals and petals as in male flowers; staminodes linear. Drupes compressed globose, red or purple initially, blackish on maturity.

Flowering & Fruiting: March–August.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Santrabari Range, 05.10.2009 SKS & GK 46165; SRVK 11, 29.03.2012 GK 50603.

6. *Pycnarrhena* Miers ex Hook. f. & Thomson

Pycnarrhena pleniflora Miers ex Hook. f. & Thomson, *Fl. Ind.*: 206. 1855 (as "*planiflora*"). [Plate 9c]

Scandent shrub or woody vine. Leaves ovate-elliptic or oblong-lanceolate, 10–20 × 3.5–7 cm, obtuse or rounded, entire, acuminate or bluntly acuminate, chartaceous or thinly coriaceous, sometimes puberulous on the midvein beneath. Inflorescences axillary, glomerulate or rarely congested, fascicled. Flowers unisexual, white. Male inflorescences axillary, pedunculate, short congested paniced; bracts 3, sepals 6, outer series puberulous, minute, inner series, obovate, glabrous; petals 4–5, deltoid; stamens 6–12. Fruits drupes, globose, wrinkled; stalks c. 4 mm; style scar lateral; seeds ellipsoidal, reniform.

Flowering & Fruiting: March–August.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Tripura and West Bengal.

Specimen examined: Rajabhatkhawa Range, 29.03.2011, GK 59100.

7. *Stephania* Lour.

Stephania japonica (Thunb.) Miers, Ann. Mag. Nat. Hist. Ser. 3, 18: 14. 1866. *Menispermum japonicum* Thunb. in Murray, Syst. Veg., ed. 14. 892. 1784. *Stephania herandifolia* (Willd.) Walp., Rep. Bot. Syst. 1: 96. 1842; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 103. 1872; Prain, Bengal Pl. 1: 208. 1903.

Climbing shrub, puberulous when young. Leaves deltoid-ovate, 8.5–19.5 × 8–17 cm, truncate to faintly rounded, repand. Inflorescences axillary, pedunculate. Flowers sub-sessile. Male: floral bracts pubescent; sepals oblanceolate; petals greenish, obdeltoid, truncate at apex; synandrium 6–8-loculed. Female: sepals same as in male; petals yellow, 3–5, or else same as in male; stigmas 3–5. Drupes obovoid or sub-globose, compressed, style scar basal, stalked; seed curved, 5–6 mm, transversely ridged.

Key to the varieties

- 1a. Leaves glabrous; petioles inserted 2–4 cm from base of lamina, glabrous 7.1. var. *japonica*
1b. Leaves puberulous beneath; petioles inserted 0.8–2 cm from base of lamina, puberulous 7.2. var. *discolor*

7.1. var. *japonica*

Charcharey Lahara (N).

Flowering & Fruiting: July–December.

Distribution. India: Karnataka, Tamil Nadu and West Bengal.

Specimen examined: Santrabari to Chunabhati, 04.10.2013, AK 59785.

7.2. var. *discolor* (Blume) Forman, Kew Bull. 11: 49, 56. 1956. *Clypea discolor* Blume, Bijdr. Fl. Ned. Ind. 1: 26. 1825. [Plate 10a]

Flowering & Fruiting: July–December.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: North Rydak, 26.09.2011, AK 52938; Phashkhawa river belt, 30.09.2012, AK 58547.

8. *Tinospora* Miers

Tinospora cordifolia (Willd.) Miers, Ann. Mag. Nat. Hist., Ser. 2, 7: 35. 1851; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 97. 1872; Prain, Bengal Pl. 1: 209. 1903. *Menispermum cordifolium* Willd., Sp. Pl. 4: 826. 1806. [Plate 10b-c]

Guhuicha (B); *Gurjo* (N).

Twinner; stems tubercled. Leaves ovate-cordate, 4–15 × 4–13 cm, acuminate. Inflorescences racemose on leafless branches, flowers in clusters. Male: floral bracts triangular-ovate; sepals 6 in 2 whorls, outer whorl smaller than inner ones; outer whorl ovate; inner whorl elliptic-ovate, 3.5–4 × 2–2.5 mm, obtuse; petals 6 in 2 whorls, papillose; stamens 6; filaments dilated or flat; anthers sub-globose. Female: pedicels short; floral bracts same as in male; sepals same as in male; petals c. 2.5 mm, or else same as in male; staminodes 6; carpels ellipsoid, on annular disk; style short; stigma peltate; disk 3-lobed. Drupes red when ripe, ellipsoid; seed ellipsoid, papillose.

Flowering & Fruiting: January–July.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Delhi, Gujarat, Jharkhand, Kerala, Maharashtra, Karnataka, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: On way to Sinchu, JKS 4686; Kumargram, 18.02.2012, AK 55736; Narathali, 20.02.2012, AK 55793.

Papaveraceae

Argemone L.

Argemone mexicana L., Sp. Pl. 1: 508. 1753, Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 117. 1872; Prain, Bengal Pl 1: 216. 1903. [Plate 10d]

Bara shil-kanta (B); Mexican Poppy, Prickly Poppy (E).

Prickly herb, 40–80 cm high; produce yellow sap. Leaves sessile, elliptic-obovate, pinnatifid, 4–9-lobed, 1.8–13 × 0.3–6 cm, semiamplexicaul; spines yellow, up to 5 mm; veins prickly at lower surface. Flowers sessile, solitary; floral bracts foliaceous. Sepals 3, elliptic, 0.8–1.6 × 0.3–0.7 cm, spine-tipped, sub-terminal horn, prickly. Petals bright yellow, 6, obovate, 2–3 × 1.5–2 cm. Stamens many; filaments yellow; anthers yellow, minute. Ovary spinose; stigma red, 4–6-lobed. Capsules ellipsoid to oblong, prickly; seeds sub-spherical, pitted.

Flowering & Fruiting: February–May.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 6a, 13.02.2010, SKS & GK 47063; Newlands, 15.02.2012, AK 53095.

Uses: Seed oil is used in treating skin diseases.

Brassicaceae

Key to the genera

- 1a. Leaves basal and cauline, compound; cauline leaflets orbicular-ovate, not dentate at margins; petals white; pods terete; seeds pale brown, ellipsoid, 1-seriate, smooth
1. Cardamine
- 1b. Leaves only cauline, simple; cauline leaves ovate-lanceolate, dentate at margins; petals yellow; pods flattened; seeds reddish brown, spherical or ovoid, 2-seriate or irregularly 1-seriate, wrinkled
2. Rorippa

1. Cardamine L.

Cardamine flexuosa With., Arr. Brit. Pl., ed. 3: 3: 578. 1796. *Cardamine hirsuta* L. var. *sylvatica* (Link) Hook. & Arn., Bot. Beechey Voy: 6. 1830. *Cardamine debilis* D. Don, Prodr. Fl. Nepal.: 201. 1825; Prain, Bengal Pl. 1: 219. 1903.

[Plate 11a]

Small herb, 10–30 cm high, flexuous, hairy. Basal leaves 6–7-foliolate, in rosette; leaflets orbicular, 2–6 × 2–3 mm, 3–5-lobed; lobes short mucronate, glabrous or hairy. Cauline leaves 4–6-foliolate; leaflets 3-lobed, or else same as basal leaflets. Inflorescence raceme. Sepals oblong to oblong-elliptic. Petals spathulate. Filaments short; anthers yellow. Ovary oblong-elliptic; style short; stigma capitate. Capsules cylindrical, long stalked, 1.5–2 cm, 6–15-seeded.

Flowering & Fruiting: January–May.

Distribution. India: Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Uttarakhand and West Bengal.

Specimens examined: Sankosh, 17.02.2012, AK 55647; Santrabari to Buxaduar, 16.02.2014, AK 59969.

2. Rorippa Scop.

Key to the species

- 1a. Flowers bracteate, white; pods 6–17 mm
1. R. benghalensis
- 1b. Flowers ebracteate, pale yellow; pods 1.2–2.5 cm
2. R. indica

1. Rorippa benghalensis (DC.) Hara, J. Jap. Bot. 49: 132. 1974. *Nasturtium benghalensis* DC., Syst. Nat. 2: 198. 1821. *Nasturtium indicum* (L.) DC. var. *benghalensis* (DC.) Hook. f. & T. Anderson in Hook. f., Fl. Brit. India 1: 134. 1872.

Bil-rai (B).

Herb, 30–50 cm high, glabrescent. Leaves crowded at nodes, simple to lyrate-pinnate, 1.5–4.5 × 0.5–1.7 cm, acute, dentate, attenuate, chartaceous, setose above. Inflorescence racemes, many flowered. Flowers bisexual; bracts lyrate, 1.5–2 ×

c. 1 mm; Sepals 4, free; linear-oblong, obtuse at apex, chartaceous. Petals white, 4, free, linear-obovate, obtuse at apex, chartaceous. Stamens 6, tetradynamous. Ovary oblong; style indistinct; stigma bilobed. Siliqua cylindrical, many seeded; fruiting pedicels puberulent; seeds reddish brown, subglobose or ovoid, biseriate, mucilaginous when wet.

Flowering & Fruiting: March–July.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Jainti 7–8, 12.03.2011, GK 50552.

2. *Rorippa indica* (L.) Hiern, Cat. Afr. Pl. 1: 26. 1896. *Sisymbrium indicum* L., Mant. Pl.: 93. 1767. *Nasturtium indicum* DC., Syst. Nat. 2: 199. 1821; Hook. f. & T. Anderson in Hook. f., Fl. Brit. India 1: 134. 1872; Prain, Bengal Pl. 1: 219. 1903.

[Plate 11b]

Herb, 8–13 cm high. Leaves variable, lyrate-pinnatifid; lower ones 1.5–4 × 0.4–1 cm, 2–3 segmented; upper leaves sessile. Inflorescence terminal racemes. Sepals oblong-ovate. Petals obovate or spatulate. Filaments short; anthers minute. Ovary oblong; style short; stigma capitate. Pods sub-cylindrical, 1–2.4 cm; seeds many, minute.

Flowering & Fruiting: January–May.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, Hathinala, 21.02.2012, AK 55849; Marakata, 21.02.2012, AK 55901.

Capparaceae

Key to the genera

- 1a. Herbs; leaves digitate; fruits capsules, cylindrical, ribbed or striated; seeds many, hemispherical, orbicular or reniform, ornamented 2. *Cleome*
- 1b. Trees or shrubs; leaves simple or digitate; fruits drupes or woody, not cylindrical, not ribbed nor striated; seeds few, not as above, not ornamented 2
- 2a. Climbing shrubs; leaves spirally arranged; inflorescences racemes; sepals orange yellow, 6–8; petals absent; stamens on androgynophore; style 3-fid above; fruits drupes, orange pulpy; seeds heart-shaped 4. *Stixis*
- 2b. Trees or erect shrubs; leaves not spirally arranged; inflorescences not racemes; sepals not orange yellow, 4; petals present; stamens from the base of gynophores; style not 3-fid; fruits baccate or woody, not orange pulpy; seeds obovoid, polygonal or globose 3

- 3a. Shrubs, usually armed (except *Capparis acutifolia* subsp. *viminea*), leafy in fruiting; leaves simple; inflorescences axillary or supra-axillary rows of flowers; petals not one sided; fruits small, smooth; seeds polygonal or globose 1. *Capparis*
- 3b. Small trees, unarmed, leafless in fruiting; leaves digitate; inflorescences terminal, lax, many flowered corymbs; petals one sided; fruits large, pustular; seeds obovoid 3. *Crateva*

1. *Capparis* L.

Key to the species

- 1a. Stems unarmed; cataphylls absent; sepals ciliate; petals obovate-oblong, tomentose inside; seeds 3–5 1. *C. acutifolia* subsp. *viminea*
- 1b. Stems armed; cataphylls present; sepals not ciliate; petals not obovate-oblong, glabrous inside; seeds 1–3 2
- 2a. Erect shrubs; branchlets not drooping, pubescent when young, not punctate; petioles narrowly winged, glabrous; inflorescences supraaxillary vertical rows of 6–10-flowers; petals elliptic to sub-orbicular; stamens 10–12; ovary ovoid, glabrous; seeds polygonal 2. *C. multiflora*
- 2b. Scrambling shrubs; branchlets drooping, stellate tomentose when young, punctate; petioles not winged, puberulous; inflorescences axillary or supra-axillary rows of 2-flowers; petals obovate to oblanceolate; stamens 38–42; ovary ellipsoid, tomentose; seeds globose 3. *C. olacifolia*

1. *Capparis acutifolia* Sweet subsp. *viminea* Jacobs, *Blumea* 12: 429. 1965. *Capparis viminea* sensu Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 179. 1872, non Oliver 1869.

Chila Pati (N).

Shrub, 1–2.5 m high, armed, brown pubescent. Leaves elliptic to elliptic-ob lanceolate or elliptic-obovate, 10–14.3 × 4.2–6.2 cm, cuneate, abruptly acuminate, coriaceous. Inflorescences in a row of 2–4-flowers, sometimes solitary; pedicels 1.2–1.8 cm. Sepals 5–6 mm; outer pair boat-shaped; inner pair elliptic. Petals white, 4, 6–8 × 2–3 mm. Stamens many; filaments white, 1.8–2.2 cm; anthers linear-lanceolate. Ovary on gynophore; style short; gynophore c. 2 cm. Fruits blackish, globose, apiculate; seeds c. 6 × 5 mm.

Flowering & Fruiting: March–July

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 62673.

2. *Capparis multiflora* Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 178. 1872. [Plate 11c-d]

Shrub, 2–3 m high; stipular thorns curved, sometimes absent; cataphylls subulate. Leaves elliptic-oblong to elliptic-ob lanceolate, 10–18 × 3.5–7 cm, cuneate, acuminate. Inflorescences on leafless parts of old shoots, subtended by bract-like leaves. Flowers fragrant; floral bracts subulate. Sepals reflexed, sparsely appressed hairy to glabrous; outer pair boat-shaped; inner pair obovate. Petals white, 4; filaments 6–9 mm; anthers lanceolate. Fruits reddish purple, turning blackish, 1–3 in a row, sub-globose; seeds *c.* 6 × 4 mm.

Flowering & Fruiting: April–December.

Distribution. India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: On the way to Buxaduar, 28.02.1934, *KB* 1790; Buxa Fort to Tashigaon, 01.10.2013, *AK* 59718.

3. *Capparis olacifolia* Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 178. 1872; Prain, *Bengal Pl.* 1: 227. 1903. [Plate 12a-b]

Naski, Hai (N).

Shrub, *c.* 2 m high; stipular thorns in pairs, recurved; cataphylls subulate. Leaves lanceolate or ovate-lanceolate, 2–10 × 0.4–3.3 cm, cuneate, caudate-acuminate, stellate hairy when young, punctate below; pedicels punctate, stellate pubescent, turning glabrescent. Sepals in 2 whorls; outer pairs ovate, boat-shaped, *c.* 1 cm; inner pairs lanceolate to elliptic-ovate, *c.* 1 cm, tomentose. Petals 4; outer pairs greenish white or greenish yellow, *c.* 1.8 × 0.5 cm, pubescent; inner pairs yellow, or else same as outer pair. Filaments white, 2.6–2.8 cm; anthers lanceolate. Style short, tomentose; stigma black or violet. Fruits red or reddish black, globose to ovoid, 0.7–1.2 cm across; seeds minute.

Flowering & Fruiting: January–May.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Mizoram, Meghalaya, Nagaland, Odisha, Sikkim and West Bengal.

Specimens examined: Way to Tobgaon, 13.05.1976, *JKS* 4634; Jainti 4, 04.03.2011 *GK* 47239; Kumargram, 18.02.2012, *AK* 55706; Jainti 8–9, 31.03.2012, *GK* 50668. Buxaduar to Achalung, 14.02.2014, *AK* 59942.

2. *Cleome* L.

Key to the species

1a. Stems viscid; petals yellow; stamens 8–12; staminodes present; gynophore absent; style prominent; ovary and capsules glandular pubescent

3. *C. viscosa*

- 1b. Stems not viscid; petals white/blue; stamens 6; staminodes absent; gynophore present; style short or absent; ovary and capsules not glandular pubescent 2
- 2a. Stems sub-woody, glandular pubescent; leaves 5–6-foliolate; inflorescences terminal, corymbose; pedicels glandular pubescent; petals white, elliptic-ovate, strongly clawed, obtuse or circular; stamens all equal, not reflexed, strongly exerted; capsules straight 1. *C. houtteana*
- 2b. Stems herbaceous, glabrescent to hairy; leaves 3-foliolate; inflorescences lax, axillary, few flowered racemes; pedicels not glandular pubescent; petals bluish with white base, oblanceolate to elliptic, attenuate, apiculate; stamens unequal, reflexed towards petals, weakly exerted; capsules falcate 2. *C. rutidosperma*

1. *Cleome houtteana* Schldl., *Linnaea* 24: 669. 1851. *Cleome hassleriana* Chodat, *Bull. Herb. Boissier* 6, App. 1: 12. 1898. [Plate 12c]

Herb, 70–100 cm high; leaflets unequal, oblanceolate, cuneate, glandular hairy, acute, glandular pubescent; central leaflet 2.8–4.2 × 1–1.3 cm; lateral leaflets smaller than central ones; floral bracts ovate, glandular pubescent; pedicels 2–3 cm. Sepals 4, lanceolate to linear-lanceolate, reflexed, glandular pubescent. Petals 4, 2–2.6 × 0.6–0.8 cm. Stamens on short androphore; filaments c. 3.7 cm; anthers 8–9 mm. Ovary cylindrical; stigma peltate; gynophore 5–6 cm in fruits. Fruits 2, 5–8 mm; seeds tuberculate.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout.

Specimen examined: Marakata, 24.09.2011, AK 52834.

2. *Cleome rutidosperma* DC., *Prodr.* 1: 241. 1824. [Plate 13a]

Herb, 5–12 cm high. Lower leaves long petioled and upper ones short petioled; leaflets sub-equal, sub-sessile, rhomboid or ovate, 1–3 × 1–2 cm, attenuate, entire or slightly wavy and hairy, acute to obtuse or rounded, glabrescent; floral bracts foliaceous; pedicels hairy. Sepals 4, linear-lanceolate, ciliate, acuminate, pubescent. Petals 4, 0.6–1.2 cm. Stamens 6, 2 bigger and 4 smaller; filaments 5–8 mm; anthers black, lanceolate. Ovary linear, sparsely pubescent on a short gynophore; stigma capitate. Capsule 4–6 cm, beaked; seeds transversely ridged.

Flowering & Fruiting: March–November.

Distribution. India: Andaman & Nicobar Islands, Assam, Karnataka, Kerala, Maharashtra and West Bengal.

Specimens examined: Rajabhatkhawa range, 05.03.2011, GK 47260; Kumargram, Kalikhola river belt, 21.09.2011, AK 52705.

3. *Cleome viscosa* L., Sp. Pl. 2: 672. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 170. 1872; Prain, Bengal Pl. 1: 225. 1903. [Plate 13b]

Hurhuria (B).

Herb, 50–90 cm high, glandular pubescent. Leaves 3–5-foliolate, unequal, subsessile, lanceolate, obovate to oblanceolate, spathulate, cuneate, ciliate, acute; central one 0.7–4.2 × 0.3–1.6 cm, softly pubescent; lateral ones 1.5–3.5 × 0.8–1.5 cm. Inflorescence lax racemes; floral bracts foliaceous; pedicels 8–10 mm, glandular pubescent. Sepals 4, oblong to lanceolate, 6–8 × 2–3 mm, glandular pubescent. Petals 4, oblanceolate to ovate, 8–12 × 2–4 mm, clawed. Stamens intermixed with staminodes; filaments 5–7 mm; anthers black, lanceolate. Ovary linear; style puberulous; stigma capitate. Capsules beaked; seeds with longitudinal striations and transverse ridges.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram-Bhutan border, Kalikhola river belt, 27.09.2011, AK 52955.

3. *Crateva* L.

Crateva religiosa G. Forst., Fl. Ins. Austr.: 35. 1786; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 172. 1872; Prain, Bengal Pl. 1: 227. 1903. [Plate 13c]

Chiple (N).

Deciduous tree, 4–6 m high. Leaves 3-foliolate, papillose or glabrous below; central leaflet lanceolate, 8–12 × 4.5–6.2 cm, cuneate, acute to short acuminate; lateral leaflets elliptic-ovate, 5.5–10 × 2.8–5.5 cm, obliquely cuneate, acuminate; floral bracts triangular, caducous; pedicels 3.5–4.8 cm, papillose. Sepals ovate, connate, acute to short acuminate. Petals white or creamy, 4, ovate to elliptic-ovate or oblanceolate, 1.5–1.7 × 1–1.5 cm, clawed. Stamens many; filaments maroon, 4–5 cm; anthers linear-lanceolate. Ovary globose, on 3–4.2 cm long gynophore; style short; stigma peltate. Fruits globose to sub-globose or obovoid, 4.5–5.5 cm across; seeds 3–4, ellipsoid, slightly compressed.

Flowering & Fruiting: March–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Sikkim and West Bengal.

Specimens examined: Panbari 7, 12.03.2011, GK 50546; North Rydak, 26.09.2011, AK 52936; Bhutanghat, 26.09.2011, AK 52926.

Notes: Trees leafless in fruiting.

4. *Stixis* Lour.

Stixis suaveolens (Roxb.) Pierre, Bull. Soc. Linn. Paris 1: 654. 1887. *Roydsia suaveolens* Roxb., Pl. Coromandel 3: 87, t. 289. 1819; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 180. 1872. [Plate 14a-b]

Kasouli Lahara (N).

Climbing shrub. Leaves elliptic to elliptic-oblong or obovate to oblanceolate, 8.5–19.5 × 4.8–9 cm, cuneate or rounded, repand, short acuminate, coriaceous. Inflorescences axillary or terminal; floral bracts triangular-ovate or linear-lanceolate, pubescent; pedicels pubescent. Sepals arranged in 2 whorls; lobes ovate or elliptic-ovate, sub-acute to obtuse, tomentose. Stamens many, on androphore; filaments orange yellow, turning white, hairy at base; anthers elliptic-ovate. Ovary ellipsoid, on a pubescent gynophore; style short; stigmas 3. Fruits obovoid, flat whitish warty, 1.5–5.5 × 1.2–4 cm, lenticellate, pulpy; seed solitary.

Flowering & Fruiting: February–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Buxa to Adma, 24.05.1949, VN & party 2969; Buxa to Santrabari Road, 21.05.1949, VN & party 2879; Sinchu, 22.05.1975, JKS 284; Jainti Range, 09.02.2010, SKS & GK 46368; Jainti 3 & 4, 04.03.2011, GK 47228; Buxa Fort to Chumabhati, 30.09.2013, AK 59676; Santrabari to Buxaduar, 16.02.2014, AK 59982; Buxaduar to Tashigaon, 20.05.2014, AK 62695.

Notes: Fruits edible.

Violaceae

Viola L.

Viola diffusa Ging. in DC., Prodr. 1: 298. 1824; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 183. 1872. [Plate 14c; Fig. 6]

Diffused herb, 5–7 cm high. Leaves basal and cauline, ovate to elliptic-ovate, 0.7–2.8 × 0.5–1.7 cm, decurrent, crenate-serrate and ciliate, obtuse to acute, hirsute; stipules linear to linear-lanceolate, ciliate. Flowers terminal, solitary; floral bracts same as stipules; pedicels 0.7–1.6 cm, geniculate. Sepals lanceolate, prolonged at base beyond attachment, ciliate. Petals white, greenish yellow, unequal, ovate-oblong, c. 1 cm, sub-acute to obtuse, lowermost prolonged behind into a short spur and purple streaked. Filaments connate; anthers fused at tip, connectives enlarged at apex, the two lowermost anthers prolonged at base into a nectariferous appendage and projecting into spur. Ovary sub-globose; style clavate; stigma slightly 2-lobed. Capsules oblong-ellipsoid, 3-valved, apiculate; seeds many, ovoid.

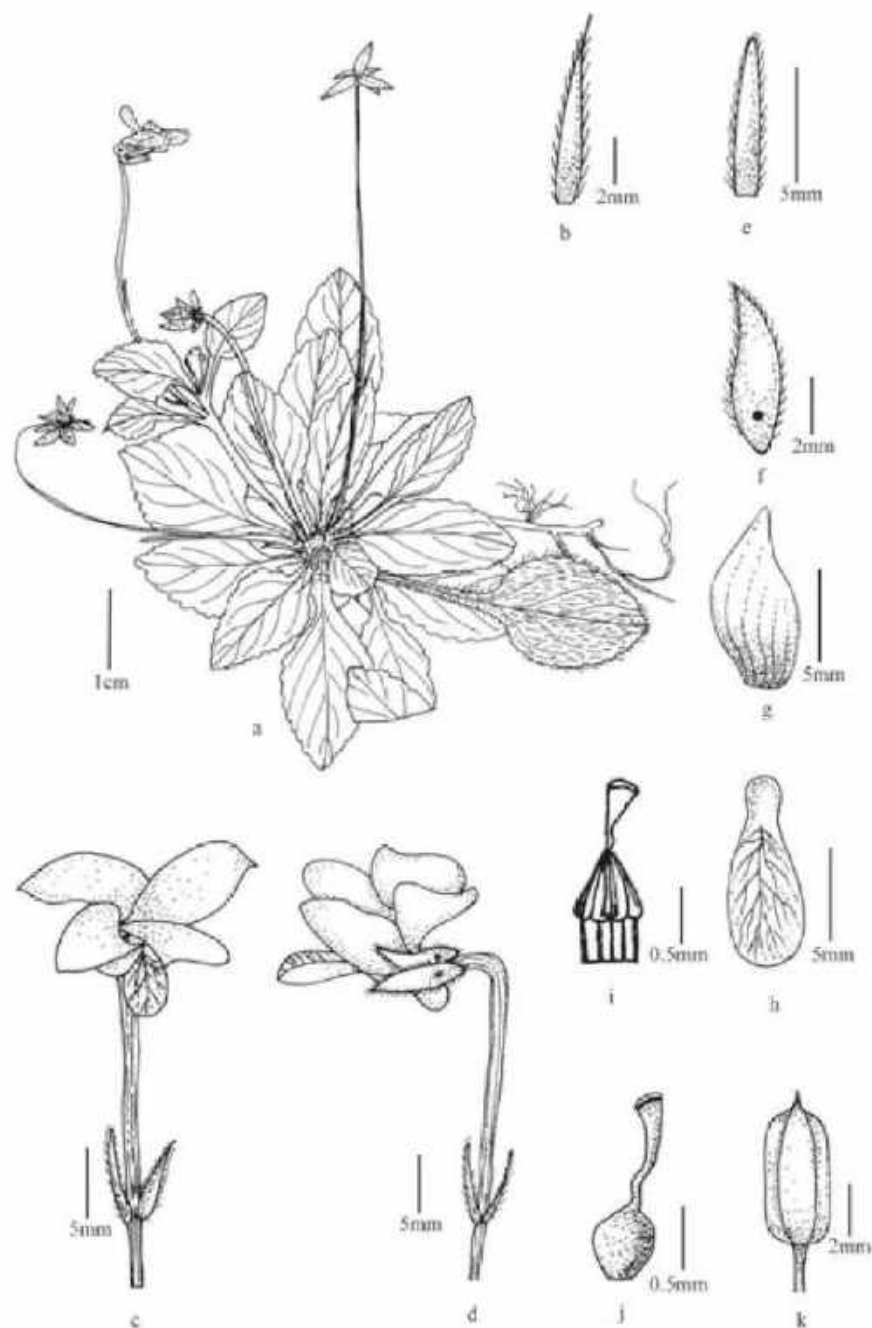


Fig. 6. *Viola diffusa*: a. Habit; b. Stipule; c. Front view of flower; d. Lateral view of flower; e. Floral bract; f. Sepal; g. Lateral petal; h. Lower petal; i. Stamens with exserted style; j. Gynoecium; k. Capsule (AK 59910).

Flowering & Fruiting: February–August.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 11.02.2014, AK 59910.

Flacourtiaceae

Key to the genera

- 1a. Dioecious; leaves entire at margins; flowers unisexual; epipetalous scales present; stamens many; fruits sub-globose, woody, large, on old trunks **3. Gynocardia**
- 1b. Monoecious; leaves not entire at margins; flowers bisexual; epipetalous scales absent; stamens 6–7 or 8; fruits capsules, ovoid or ellipsoid, not woody, small, not on old trunks **2**
- 2a. Branchlets angular, pubescent when young; leaves oblong to oblong-elliptic or oblanceolate, serrulate at margins, pubescent below; sepals connate; episepalous glands absent; petals absent; stamens 8 **1. Casearia**
- 2b. Branchlets terete, glabrous when young; leaves ovate to ovate-elliptic, dentate at margins, glabrous below; sepals free; episepalous glands present; petals present; stamens 6 or 7 **2. Homalium**

1. *Casearia* Jacq.

Casearia vareca Roxb., Fl. Ind. 2: 418. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2: 593. 1879. [Plate 15a; Fig. 7a]

Tree, 2–3 m high. Leaves oblong to oblong-elliptic or oblanceolate, 3–4 × 12–15 cm, cuneate, short acuminate, sub-coriaceous; stipules caducous. Inflorescences axillary fascicles; floral bracts ovate to broadly ovate, pubescent; pedicels articulate, pubescent below. Calyx cupular; lobes 4–6, ovate. Filaments united into a tube, alternating staminodes; staminodes slightly shorter than stamens, white hairy at apex. Carpels 3, connate, ovoid to oblong; style short; stigma capitate. Fruits orange yellow, 3-valved, beaked; seeds 4–6, oblong.

Flowering & Fruiting: November–March.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa Depot. Road, 14.05.1949, VN & party 2400; Check-2, 13.02.2010, SKS & GK 47070; Checko-1, 09.02.2013, AK 58811.

2. *Gynocardia* R. Br.

Gynocardia odorata R. Br. in Roxb., Pl. Coromandel 3: 95, t. 299. 1820; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 195. 1872. *Chaulmoogra odorata* Roxb., Fl. Ind. 3: 835. 1832; Prain, Bengal Pl. 1: 232. 1903. [Plate 15b-d]

Gante, Bandre (N).

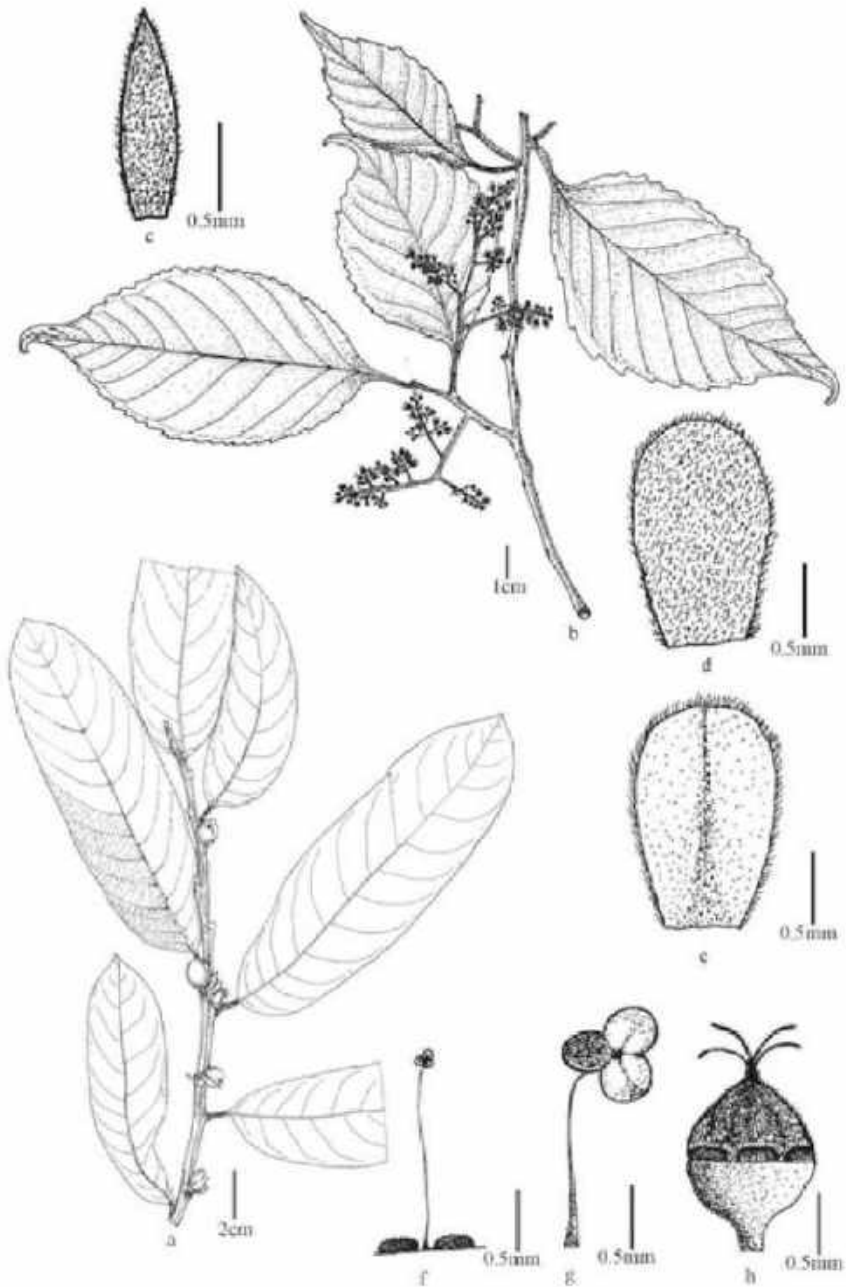


Fig. 7. *Casaria vareca*: a. Fruiting branchlet (SKS & GK 47070); *Homalium napaulense*: b. Flowering branchlet; c. Sepal; d. Outer view of petal; e. Inner view of petal; f. Stamen with glands; g. Stamen; h. Gynoecium (AK 58516).

Deciduous tree, 10–15 m high. Leaves oblong-elliptic, oblong-obovate, 14–20 × 5–8 cm, rounded, cuspidate, coriaceous. Inflorescences few flowered, axillary corymbs or numerous aggregate in several corymbose clusters at tubercles on old stems. Male: floral bracts ovate, pubescent; pedicels angular, 2–2.5 cm. Calyx campanulate; tube shallowly 5-lobed above; lobes obtuse. Petals greenish white, elliptic-oblong, c. 1.5 × 0.7 cm, gland-dotted; epipetalous scales oblong, ciliate. Filaments hairy; anthers oblong. Female: calyx and petals same as in male flowers but larger; staminodes 10–15, linear, villous; ovary globose; styles 5; stigmas hastate. Fruits 8–12 cm across, smooth and green when young, rugose, brownish on maturity; seeds many, ovoid to ellipsoid, 2.5–3 × 1.8–2.2 cm.

Flowering & Fruiting: April–November.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa to Bhutan road, 900m, 16.05.1949, VN 2513; way to Tobgaon, 18.05.1949, VN 2695; Way to Tabgaon, 18.05.1949, VN & party 2695; SRVK 12, 30.03.2012 GK 50665; Buxa Fort to Chunabhati, 30.09.2013, AK 59697.

Notes: Fruits persist on trunks for long period and decay while on trunk; seeds used in fish poisoning.

3. *Homalium* Jacq.

Homalium napaulense (DC.) Benth., J. Proc. Linn. Soc., Bot. 4: 34. 1859; C. B. Clarke in Hook. f., Fl. Brit. India 2: 596. 1879. *Blakwellia napaulensis* DC., Prodr. 2: 54. 1825. [Plate 16a; Fig. 7b-h]

Tree, 3–4 m high. Leaves 4.4–14 × 2.3–7 cm, cuneate, acuminate at apex, sub-coriaceous. Inflorescences axillary, panicles, tomentose; pedicels pilose. Sepals 6, linear-lanceolate, white tomentose outside, sparsely pubescent inside; episealous glands whitish, hairy. Petals white, 6–7, oblong-oblancheolate, ciliate, obtuse, pilose. Stamens opposite to petals; anthers blackish, trithecous, one lobe aborted. Ovary compressed, pubescent; style 3–4-fid. Fruits dehisce at apex or indehiscent; seeds 1–few, oblong, angular.

Flowering & Fruiting: August–December.

Distribution. India: Andhra Pradesh, Bihar, Odisha, Nagaland and West Bengal.

Specimen examined: Hatipota, 29.09.2012, AK 58516.

Caryophyllaceae

Key to the genera

- 1a. Scandent shrubs; leaves thick, crenulate at margins; staminodes present; styles distinct; disk present; capsules 4-valved; seed solitary 1. *Brachystemma*
- 1b. Prostrate or decumbent herbs; leaves not thick, entire/repand at margins; staminodes absent; style not distinct; disk absent; capsules not 4-valved; seeds few to many 2

- 2a. Leaves sessile to sub-sessile, oblanceolate or linear to linear-oblong; petals absent, if present, then shallowly lobed or not lobed 3
- 2b. Leaves petiolate, broadly ovate to deltoid-ovate or sub-orbicular; petals present, lobed 4
- 3a. Leaves acute at apex; inflorescences dichasial, paniculate cymes; petals absent; stamens 3; style short, 3-fid; stigmas 3, not fimbriate; capsules 3-valved; seeds sub-cylindrical, tuberculate 3. Polycarpon
- 3b. Leaves acuminate awned at apex; inflorescences simple cymes; petals present; stamens 6-8; style absent; stigmas 5, fimbriate; capsules 5-valved; seeds reniform, papillose 4. Sagina
- 4a. Leaves obtuse, acute or rotund at base; stipules present; veins 3 from base; inflorescences papillose; petals bifid; capsules 2-3-valved; seeds cochleate 2. Drymaria
- 4b. Leaves cordate or connate at base; stipules absent; veins inconspicuous; inflorescences not papillose; petals 2-partite; filaments not connate at base; capsules 6-valved; seeds not cochleate 5. Stellaria

1. *Brachystemma* D. Don

Brachystemma calycinum D. Don, Prodr. Fl. Nep.: 216. 1825; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 235. 1874. [Plate 16b; Fig. 8]

Scandent shrub, sparsely pilose. Leaves lanceolate, 1-7 × 0.4-1.5 cm, cuneate, hairy at margins, acuminate, sub-coriaceous, sparsely pilose above. Inflorescences axillary or terminal panicles; inflorescence bracts lanceolate to linear-lanceolate, recurved, pilose; pedicels angular, pilose. Sepals greenish white, elliptic-lanceolate, 4-6 mm. Petals white, lanceolate to oblong-lanceolate, bilobed. Filaments connate with disk; anthers elliptic to sub-globose; staminodes 5; disk 5-lobed. Ovary globose; styles 2, reflexed. Capsules golden yellow, sub-globose to ovoid, crustaceous; seed reniform, tuberculate.

Flowering & Fruiting: January-April.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Tashigaon to Rovers point, 12.02.2014, AK 59917.

2. *Drymaria* Schult.

Drymaria cordata (L.) Willd. ex Schult. in Roem. & Schult., Syst. Veg. 5: 406. 1819; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 244. 1874; Prain, Bengal Pl. 1: 238. 1903. *Holosteum cordatum* L., Sp. Pl. 1: 88. 1753.

Herb, 10-12 cm high, glabrous to glandular papillose. Leaves broadly ovate or suborbicular, 0.6-1.8 × 0.3-1.6 cm, obtuse or acute or subcircular, entire, acute or



Fig. 8. *Brachystemma calycinum*: a. Flowering branchlet; b. Flower without petals; c. Floral bract; d. Sepal; e. Petal; f. Stamen; g. Gynoecium (AK 59917).

obtuse with mucronate tip, chartaceous; stipules subulate, scarious. Inflorescences terminal, sometimes axillary cymes; inflorescence bracts triangular-lanceolate; floral bracts ovate or triangular-ovate, papery; pedicels glandular papillose. Sepals oblong-lanceolate, 2–2.5 mm, keeled, 3-nerved, glandular papillose on midvein outside. Petals white; lobes acute to obtuse. Stamens 3, connate at base; anthers sub-globose. Ovary sub-globose to broadly ellipsoid; style 3-fid above. Capsules 2–3-valved; seeds tuberculate.

Flowering & Fruiting: Throughout the year.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Buxaduar, 13.05.1976, JKS 4627; Tashigaon, JKS 4238; Santrabari, 05.10.2009, SKS & GK 46170; Bhutanghat, 26.09.2011, AK 52908; Rajabhatkhawa range, 01.12.2011, GK 47185; Kumargram, 13.02.2012, AK 53004; Pana, 08.10.2012, AK 58732.

Notes: The flowers exhibit sticky nature due to presence of glands.

3. Polycarpon L.

Polycarpon prostratum (Forssk.) Asch. & Schweinf., Oesterr. Bot. Z. 39: 128. 1889. *Alsine prostrata* Forssk., Fl. Aegypt.-Arab.: 207. 1775. *Polycarpon loeflingiae* Benth. & Hook. f., Gen. Pl. 1 (1): 153. 1862, *nom. illeg.*; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 245. 1874; Prain, Bengal Pl. 1: 238. 1903.

Ghima (B).

Prostrate herb, 6–8 cm high, glabrous to pilose. Leaves sessile to subsessile, appear whorled due to axillary leaves, oblanceolate or linear-oblong, 3.5–10 × 0.8–3.8 mm, attenuate, glabrescent to hispid or pilose; stipules white, lanceolate or triangular-ovate, scarious. Inflorescences axillary or terminal; inflorescence bracts lanceolate, scarious. Flowers sub-sessile; floral bracts lanceolate or triangular-ovate, or else same as inflorescence bracts. Sepals ovate, scarious. Filaments connate at base; anthers ellipsoid. Ovary minute. Capsules ovoid; seeds minute.

Flowering & Fruiting: March–September.

Distribution. India: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Odisha, Rajasthan, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Rajabhatkhawa, 22.04.1959, CRD 25; Jainti 6, 11.02.2010, SKS & GK 47043; Jainti 6a & 8, 11.03.2011, GK 50540; Kumargram, Hathinala, 21.02.2012, AK 55841; Bhutanghat, 25.02.2012, AK 55943.

4. *Sagina* L.

Sagina japonica (Sw. ex Steud.) Ohwi, J. Jap. Bot. 13 (6): 438. 1937. *Spergula japonica* Sw. ex Steud., Nomencl. Bot.: 802. 1821. *Sagina procumbens* sensu Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 243. 1874, *p. p.*, non L. 1753.

[Plate 17a]

Herb, 10–12 cm high. Leaves sessile, linear, 0.6–1.3 cm, connate, vesicular. Inflorescences axillary, terminal; pedicels 0.3–2.2 cm. Sepals ovate to elliptic-ovate, scarious, obtuse. Petals white, ovate or elliptic-obovate, clawed. Filaments short; anthers white, cordate. Ovary minute; stigmas white, reflexed, fimbriate. Capsules ovoid; seeds minute.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Sikkim and West Bengal.

Specimen examined: Rydak river belt, 26.02.2012, AK 55962.

5. *Stellaria* L.

Key to the species

- 1a. Stem glabrous; leaves sessile, connate at base; floral bracts present; lobes of petals linear-oblong or narrowly linear-lanceolate; filaments 1–1.2 mm; stigma fimbriate; seeds sub-orbicular or elliptic **1. *S. alsine***
- 1b. Stem septate hairy in a vertical line on one side of internodes; leaves petiolate, free at base; floral bracts absent; lobes of petals obliquely obovate; filaments 3.5–4 mm; stigma not fimbriate; seeds plano-convex **2. *S. media***

1. *Stellaria alsine* Grimm, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 3 (Append.): 313. 1767. *Stellaria uliginosa* Murray, Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 233. 1874. [Plate 17b]

Herb, 10–15 cm high. Leaves ovate-lanceolate to lanceolate or linear-lanceolate, 5–9 × 1.2–4 mm, acute. Inflorescence axillary or terminal cymes; floral bracts lanceolate. Sepals narrowly lanceolate, acuminate. Petals white; lobes c. 2.5 mm. Stamens 10; anthers yellow, globose. Ovary globose; stigmas white, 3. Capsules ovoid, shorter than persistent calyx; seeds minute, sub-orbicular or elliptic, smooth.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Rydak river belt, 26.02.2012, AK 55944.

2. *Stellaria media* (L.) Vill., Hist. Pl. Dauphine 3: 615. 1789; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 230. 1874; Prain, Bengal Pl. 1: 237. 1903. *Alsine media* L., Sp. Pl. 1: 272. 1753. [Plate 17c]

Chickweed (E).

Herb, 10–15 cm high; stems angular, rooting at nodes. Upper leaves short petiolate and lower ones long petiolate, 1.7–1.4 × 0.4–1 cm, acute at apex, vesicular; petioles 3–11 mm, septate hairy in a vertical line. Inflorescences axillary or terminal cymes; pedicels glandular, hairy. Sepals 4–5, ovate-lanceolate, sub-acute to obtuse, glandular pubescent. Petals white; lobes sub-acute to obtuse. Stamens 5–6; anthers white, globose. Ovary small; stigma 2–3-lobed. Capsules ovoid, shorter than persistent calyx; seeds plano convex, minute.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Punjab, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Jainti 6, 10.02.2010, SKS & GK 47002; Jainti 6, 05.03.2011, GK 47265; Newlands, 15.02.2012, AK 53065.

Portulacaceae

Portulaca L.

Portulaca oleracea L., Sp. Pl. 1: 445. 1753; Dyer in Hook. f., Fl. Brit. India 1: 246. 1874; Prain, Bengal Pl. 1: 240. 1903.

Purslane (E).

Diffuse herb, 5–6 cm high, succulent. Leaves sub-sessile, obovate, 2–4 mm, cuneate, rounded at apex, sub-coriaceous, succulent, long bristly in leaf axils. Inflorescence terminal, clustered in head. Flowers sub-sessile, surrounded by bristles; floral bracts obovate to sub-orbicular. Sepals 2, hooded, 6–8 mm across, keeled. Petals yellow, obovate, 3–8 × 6–7 mm, slightly connate, retuse. Stamens 7–8, slightly adnate to petals at base; filaments c. 4 mm; anthers yellow, oblong or elliptic. Ovary fusiform; style 5-fid, c. 5 mm. Capsules ovoid, c. 5 mm, circumscissile; seeds many, reniform, tuberculate.

Flowering & Fruiting: July–October.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52708.

Tamaricaceae

Tamarix L.

Tamarix indica Willd., Neue Schriften Ges. Naturf. Freunde Berlin 4: 214. 1803. *Tamarix gallica* L. var. *indica* (Willd.) Ehrenb., Linnaea 2 (2): 268. 1827. *Tamarix gallica* auct. non L. 1753: Dyer in Hook. f., Fl. Brit. India 1: 248. 1874; Prain, Bengal Pl. 1: 242. 1903.

Jhau (B, N).

Shrub, 1–3 m high. Leaves spirally arranged, sessile, deltoid, 3–4 mm, sheathing at base, acute to acuminate, scale-like. Inflorescences a simple vernal or compound aestival racemes; inflorescence bracts ovate-lanceolate, denticulate to sub-entire, acuminate, reflexed; pedicels short. Sepals trullate or ovate, denticulate above. Petals pink, obovate or obovate-elliptic, caducous. Stamens exserted; filaments between the lobes of disk; anthers cordate, apiculate; disk 10-lobed. Ovary bottle-shaped; style 3-fid. Capsules conical, trigonous; seeds many, with sessile comma.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andhra Pradesh, Delhi, Gujarat, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Kumargram, Hathinala, 21.02.2012, AK 55850.

Hypericaceae

Hypericum L.

Hypericum japonicum Thunb. in Murray, Syst. Veg., ed. 14. 702. 1784; Dyer in Hook. f., Fl. Brit. India 1: 256. 1874; Prain, Bengal Pl. 1: 244. 1903. [Plate 18a]

Herb, 6–7 cm high. Leaves green above, brick red below, sessile, ovate to lanceolate, elliptic-ovate or elliptic-oblong, 3–7.5 × 1.5–5.5 mm, cordate or rounded, obtuse or sub-acute at apex, clasping the stem, pellucid gland-dotted; veins 3–5 from base. Flowers solitary or dichasial or monochasial cymes; floral bracts linear-lanceolate, pellucid gland-dotted. Sepals variable, lanceolate, ovate to ovate-deltoid, linear-oblong, 3–5 mm, keeled, pellucid gland-dotted. Petals yellow, elliptic to obovate, 3–3.5 mm. Stamens yellow, 20–25, connate; filaments short; anthers globose. Ovary 3-lobed; style 3-partite; stigmas clavate. Capsules ovoid or ellipsoid; seeds many, oblong, tapered, longitudinally striated.

Flowering & Fruiting: January–March.

Distribution. India: Almost throughout India.

Specimens examined: Panbari 8, 08.03.2011, GK 50513; Narathali, 20.02.2012, AK 55811; Rydak river belt, 26.02.2012, AK 55953.

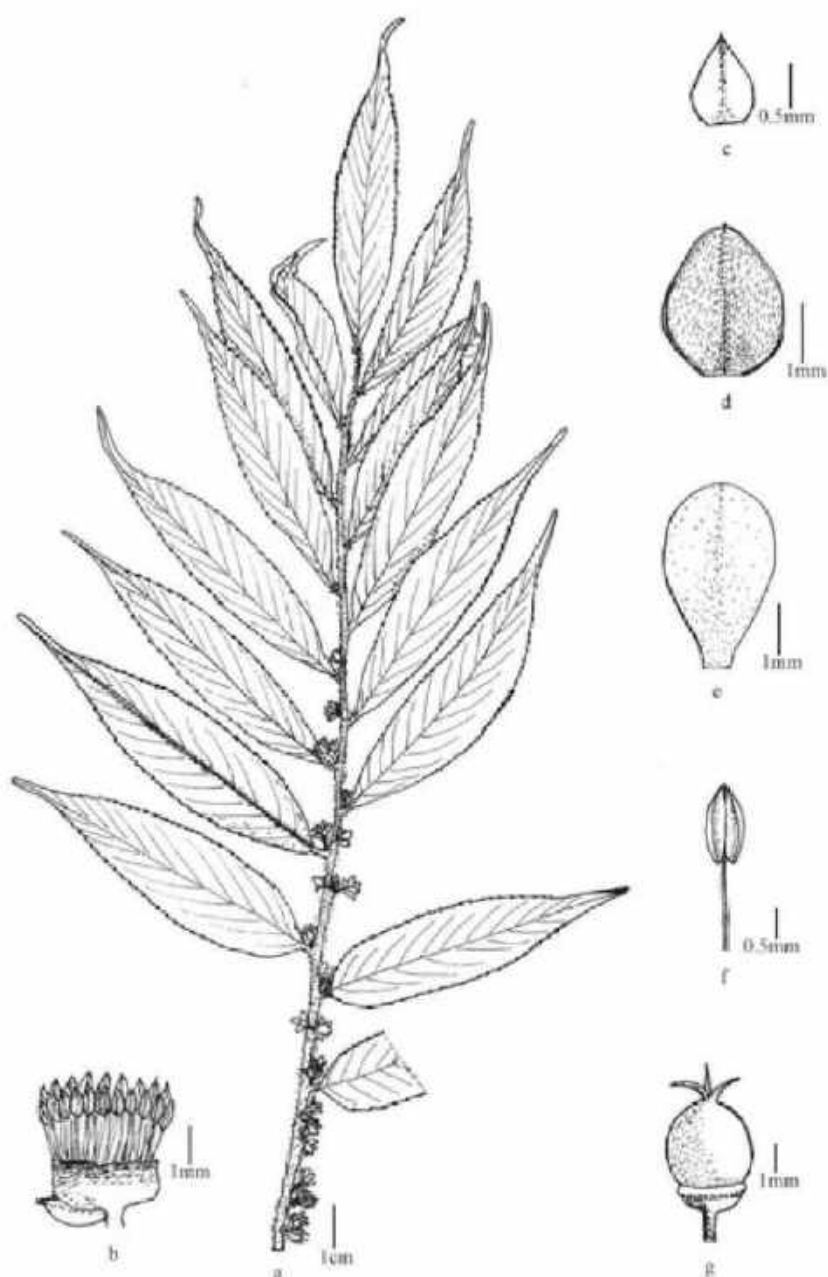


Fig. 9. *Burya acuminata*: a. Flowering branchlet; b. Male flower without petal; c. Floral bract; d. Sepal; e. Petal; f. Stamen; g. Gynoecium (AK 59765).

Theaceae

Key to the genera

- 1a. Branchlets pilose when young; leaves serrate upwards at margins; inflorescences 1-5-flowered fascicles; flowers unisexual; petals orange yellow; style 3-lobed; fruits berries; seeds bluntly trigonous, not winged **1. Eurya**
- 1b. Branchlets silky tomentose when young; leaves undulate at margins; inflorescences terminal, short racemes; flowers bisexual; petals creamy white; style not lobed; fruits capsules; seeds reniform, winged **2. Schima**

1. *Eurya* Thunb.

Eurya acuminata DC., Prodr. 1: 525. 1824; Dyer in Hook. f., Fl. Brit. India 1: 285. 1874; Prain, Bengal Pl. 1: 248. 1903. *Eurya japonica* Thunb. var. *phyllanthoides* (Blume) Dyer in Hook. f., Fl. Brit. India 1 (2): 284. 1874. [Plate 18b; Fig. 9]

Sanu Jhingni (N).

Medium size tree, 4-5 m high. Leaves elliptic-oblong to elliptic-lanceolate, 3.5-7.5 × 1-2 cm, cuneate, acuminate at apex, glabrous to sparsely pilose below. Flowers 2-4 in axillary clusters, usually from axils of fallen leaves, sometimes solitary. Male: floral bracts ovate; bracteoles elliptic-ovate or ovate; sepals broadly elliptic to broadly ovate, concave, scarious, appressed pubescent; petals pale yellow, obovate, 2.5-3.5 × 2-2.5 mm, connate at base; stamens many; filaments short; anthers orange yellow, ovate to ovate-oblong, apiculate; pistillode sub-globose, apiculate at apex. Female: sepals and petals same as in male flowers; ovary sub-globose; style short. Fruits bluish black or brown, globose to sub-globose; seeds many.

Flowering & Fruiting: September-January.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: On the way to Chunabhati near Buxa, 24.05.1949, VN & party 2972; Checko 2, 27.11.2011, GK 47141; Tashigaon to Rovers point, 03.10.2013, AK 59765.

2. *Schima* Reinw. ex Blume

Schima wallichii (DC.) Korth., Verh. Nat. Gesch. Ned. Bezitt., Bot. 5: 143. 1842; Dyer in Hook. f., Fl. Brit. India 1: 289. 1874; Prain, Bengal Pl. 1: 249. 1903. *Gordonia wallichii* DC., Prodr. 1: 528. 1824. [Plate 18c]

Chillaune (N).

Tree, 20-25 m high. Leaves elliptic-oblong, lanceolate, 11-12.5 × 3.5-4.5 cm, cuneate to rounded, revolute and hairy, acuminate at apex, coriaceous, granular and puberulous below. Inflorescences axillary; floral bracts linear-oblong, retuse,

caducous; pedicels 1–2 cm, up to 3 cm in fruits, pubescent. Sepals sub-orbicular, 2–3 × 3–4 mm, ciliate, puberulous outside, silky pubescent inside. Petals bright yellow, obovate, 1–2 × 1–1.2 cm, pubescent at base. Stamens many, adnate to petals at base; filaments yellow-green; anthers yellow, globose. Ovary sub-globose, tomentose; style 5–6 mm; stigma capitate. Fruits greenish or yellowish brown, globose, 5-valved, woody; seeds 3 in each valve.

Flowering & Fruiting: April–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Chunabhati, 28.11.1975, JKS 1000; Buxaduar, JKS 4639; SRVK 5, 08.10.2009, SKS & GK 46228; Jainti 5a, 27.11.2011, GK 50578; Jainti 5a, 07.04.2012, GK 56046; Rangamati to Bharnabari, 06.10.2012, AK 58694; Santrabari to Buxaduar, 18.05.2014, AK 62622.

Actinidiaceae

Saurauia Willd. ["Saurauja"], (*nom. cons.*)

Saurauia roxburghii Wall., Pl. Asiat. Rar. 2: 40. 1831; Dyer in Hook. f., Fl. Brit. India 1: 287. 1874; Prain, Bengal Pl. 1: 250. 1903. [Plate 19a-b]

Dalimp (B).

Tree, 5–7 m high, scurfy hairy and appressed scaly. Leaves crowded towards end of branchlets, elliptic-oblong or elliptic, 11.5–26 × 4.3–7.2 cm, rounded-cuneate, distantly serrate, shortly acuminate, coriaceous, rusty tomentose when young, glabrous later. Inflorescences axillary cymes; pedicels tomentose; bracts minute, deltoid, acute. Sepals pale green, 5, ovate to ovate-rounded, acute at apex, hairy. Corolla campanulate, light pink, 5-lobed; lobes suborbicular, 4–5 × 3–4 mm, obtuse at apex, glabrous. Stamens many in whorls; anthers oblong, dehiscing by pores. Ovary conical; styles 5-fid, connate. Berries whitish, subglobose, fleshy; seeds many, minute, brown.

Flowering: March–May; *Fruiting:* September–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim and West Bengal.

Specimens examined: NRVK 10, 14.02.2010 SKS & GK 47095; NRVK 11, 29.11.2011, GK 47168.

Notes: Gall formation is frequently seen on the branches.

Dipterocarpaceae

Key to the genera

- 1a. Leaves plicately folded in buds; stipules amplexicaul, stipular scar encircling the twigs; inflorescence axillary racemes; calyx in fruit with a distinct urceolate tube; ovary semi-inferior **1. Dipterocarpus**
- 1b. Leaves not plicately in bud; stipules not amplexicaul; inflorescence in panicles; calyx in fruit without a tube, lobed above; ovary superior **2**
- 2a. Petioles straight; sepals free; stamens more than 15; filaments pandurate; three outer calyx lobes expanded into wings **2. Shorea**
- 2b. Petioles short and curved; sepals united at base; stamens 15; filaments flattened; two calyx-lobes expanded into wings **3. Vatica**

1. Dipterocarpus Gaertn. f.

Dipterocarpus retusus Blume, Catalogus: 77. 1823; K. P. Janardh. in B. D. Sharma & al., Fl. India 3: 218. 1993. *Dipterocarpus macrocarpus* Vesque, Compt. Rend. Hebd. Séances Acad. Sci. 78: 627. 1874. [Fig. 10a-d]

Hollang (N).

Tree, 20–30 m high, brown stellate pubescent. Leaves elliptic-obovate, obovate to oblanceolate, 28–32 × 12–14 cm, sub-rotund, repand and ciliate, acuminate, stellate or simple pubescent below; stipules oblong, 7–12 cm, caducous, Inflorescences 2–4-flowered; pedicels articulate, stellate pubescent. Calyx cupular, velvety pubescent; tube slightly angular, 1.5–1.7 cm; lobes unequal, 3 smaller and 2 larger; smaller triangular; larger lobes strap-shaped, c. 1.5 cm, elongated in fruiting. Petals white, reddish, falcate, 5–6 cm, fused at base, obtuse, velvety pubescent. Stamens many; filaments short; anthers 5–8 mm. Ovary silky pubescent; style hairy at base. Fruits globose, stellate hairy; fruiting calyx lobes (larger ones) strap-shaped, 3-parallel veined, stellate hairy; smaller lobes orbicular, recurved.

Flowering & Fruiting: June–November.

Distribution. India: Arunachal Pradesh, Assam, Nagaland and West Bengal.

Specimens examined: Checko 2, 08.04.2012, GK 5608; Checko-1, 25.09.2012, AK 56108.

2. Shorea Roxb. ex C. F Gaertn.

Shorea robusta C. F Gaertn., Suppl. Carp. 3: 48, t. 186. 1805; Dyer in Hook. f., Fl. Brit. India 1: 306. 1874; Prain, Bengal Pl. 1: 254, 1903. [Plate 19c-d]

Sakhua (N).

Tree, 25–30 m high, tardily deciduous. Leaves ovate-oblong, 9.5–15 × 5–9.3 cm, rounded or shallowly cordate, undulate, acuminate at apex, sub-coriaceous,

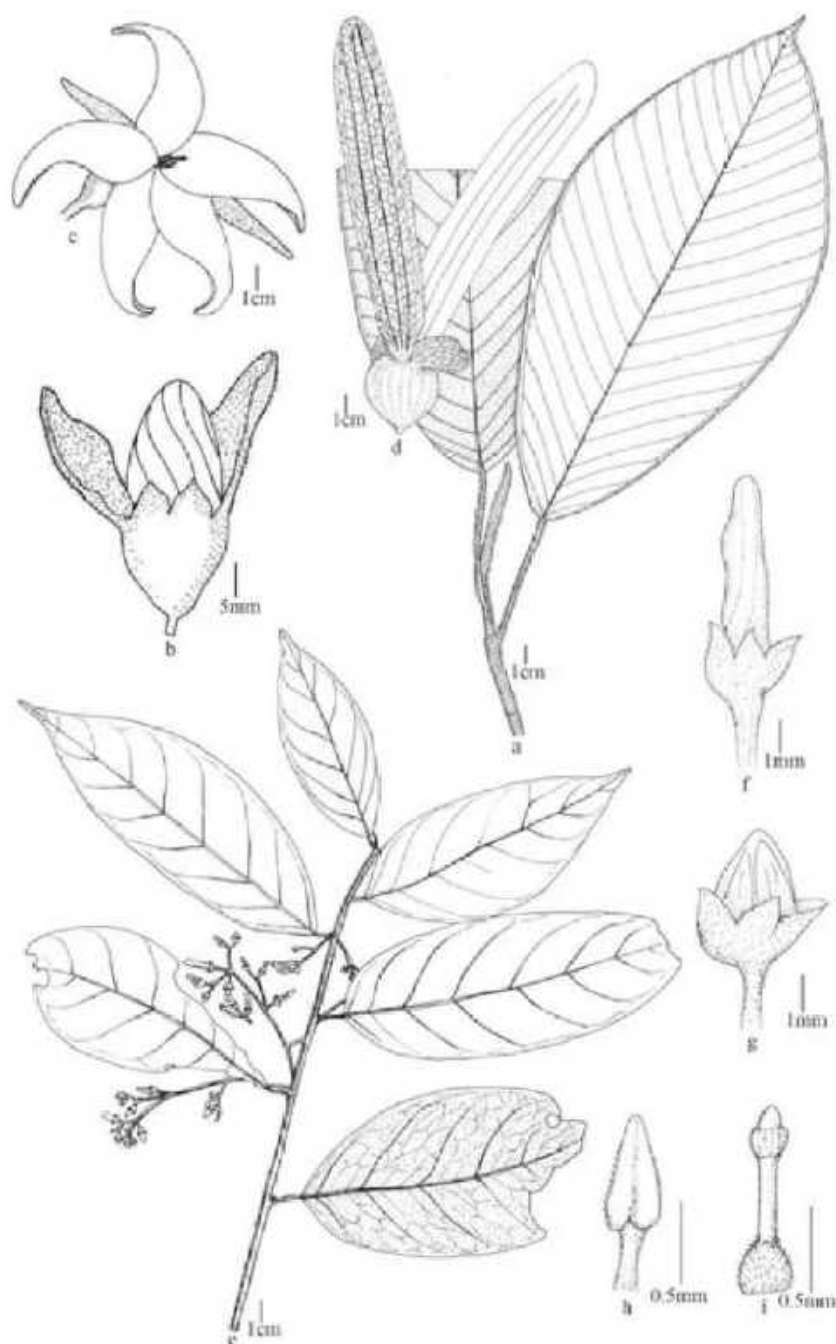


Fig. 10. *Dipterocarpus retusus*: a. Leaves; b. Flower bud; c. Flower; d. Fruit with fruiting calyx lobes (AK 56108); *Vatica lanceifolia*: e. Flowering branchlet; f. Flower bud; g. Flower (petals removed); h. Stamen; i. Gynoecium (GK 56083).

glabrous; stipules falcate, 7–12 mm, pubescent. Inflorescences axillary or terminal, lax panicles; rachis 12–35 cm, pale velvety tomentose; pedicels stout, angled, silky tomentose. Sepals 5, triangular ovate, 2–2.5 mm, acute at apex, coriaceous, silky tomentose outside, glabrous inside, imbricate. Petals light yellow, 5, obovate-lanceolate, twisted, sericeous, 12–13-nerved, nerves conspicuous. Stamens more than 15; filaments pandurate; anthers oblong hairy; connective slightly extended, c. 0.5 mm. Ovary oblong, pubescent; style subulate; stigma denticulate, 3-lobed. Nuts ovoid, beaked; wings linear-oblong or spatulate, subequal, 3 rather larger, prominently nerved.

Flowering & Fruiting: February–July.

Distribution. India: Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Odisha, Tripura and West Bengal.

Specimen examined: SRVK 6, 29.03.2012, GK 50601.

Uses: Wood is used as timber.

3. *Vatica* L.

Vatica lanceifolia (Roxb.) Blume, Mus. Bot. 2: 31. 1856 (as "*lanceaeifolia*"); Dyer in Hook. f., Fl. Brit. India 1: 302. 1874. *Vateria lanceaeifolia* Roxb., Fl. Ind. 2: 601. 1824. [Fig. 10e-i]

Tree, 7–10 m high. Leaves oblong-lanceolate, 10–14 × 3.6–8.6, cuneate, entire, obtuse to acuminate at apex, subcoriaceous, glabrous. Inflorescences axillary panicles, 6–7 cm, pubescent. Flower fragrant; pedicels tomentose. Sepals 5, free above, connate below, triangular, 1.5–2 mm, acute at apex, tomentose, valvate, accrescent. Petals 5, imbricated in buds, linear-falcate, 1.5–2 cm, tomentose. Stamens 15; filament dilated; anthers ovoid-oblong; connective elongated. Ovary puberulous, 3-loculed; stigma clavate, 3-toothed. Fruits ovoid or globose, apiculate, indistinctly 3-furrowed, finely tomentose later glabrous; fruiting calyx lobes broadly cordate at base, 2-outer ones overlapping with either the right or left edge, longitudinally 5-nerved.

Flowering & Fruiting: April–May.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland and West Bengal.

Specimen examined: Gadadhar range, 09.04.2012, GK 56083.

Notes: Though its distribution was reported in Jalpaiguri district, there are no representative collections in CAL. Only 3–4 individuals were noted in the Gadadhar range. The species was assigned "Critically Endangered" status.

Malvaceae

Key to the genera

- 1a. Staminal column antheriferous throughout; style 5-partite at apex; fruit capsule 2
1b. Staminal column antheriferous above only; style as many as carpels or twice; fruit schizocarp 3
- 2a. Leaves similar; calyx 5-toothed, spathaceous, splitting along one side, adnate to and deciduous with petal; capsules angular 1. **Abelmoschus**
2b. Leaves dissimilar; calyx 5-lobed, not spathaceous, not splitting along one side, not adnate or deciduous with petals; capsules not angular 2. **Hibiscus**
- 3a. Leaves without nectaries at base below; epicalyx absent; petals creamy white to yellow; staminal column yellow to pale yellow, less than 1 cm, antheriferous at apex; styles as many as carpels; schizocarps smooth; mericarps awned 3. **Sida**
3b. Leaves with nectaries at base below; epicalyx present; petals pale pink; staminal column pale pink, more than 1 cm, antheriferous outside at apex; styles twice as many as carpels; schizocarps glochidiate; mericarps not awned 4. **Urena**

1. Abelmoschus Medik.

Key to the species

- 1a. Epicalyx lobes 5-6; stigma spreading in 5-spathulate lobes, star-like; seeds stellate hairy in several lines 1. **A. manihot**
1b. Epicalyx lobes 6-10; stigma not spreading, discoid; seeds stellate hairy in concentric rings 2. **A. moschatus**

1. Abelmoschus manihot (L.) Medik., Malvenfam.: 46. 1787. *Hibiscus manihot* L., Sp. Pl. 2: 696. 1753; Mast. in Hook. f., Fl. Brit. India 1: 340. 1874; Prain, Bengal Pl. 1: 266. 1903.

Undershrub, c. 1 m high, glabrous to glabrescent. Leaves palmately 3-5-lobed, 2-8 × 1-4 cm, cordate, serrate, hispid; lobes spathulate; stipules linear, pubescent. Inflorescences axillary, solitary or terminal racemes; pedicels 1-1.5 cm, pubescent; epicalyx lobes ovate-lanceolate to oblong-lanceolate, 5-8 cm, caducous, hirsute. Calyx longer than epicalyx, puberulent. Petals yellow, purple based, obovate to orbicular, 3.5-7 × 2.5-5 cm. Staminal column 1.2-1.8 cm; anthers yellowish, sessile to sub-sessile. Ovary hirsute; style hairy; stigma purple black. Capsules ovoid-ellipsoid, hirsute; seeds many, reniform.

Key to the subspecies

- 1a. Epicalyx lobes hirsute; seeds with several lines of stellate hairy 1.1. subsp. **manihot**
1b. Epicalyx lobes clothed with soft hairs; seeds with broad sinus 1.2. subsp. **tetraphyllus**

1.1. subsp. **manihot**

Flowering & Fruiting: July–February.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, 15.02.2012, AK 53079; Tashigaon to Rovers point, 03.10.2013, AK 59758.

1.2. subsp. **tetraphyllus** (Roxb. ex Hornem.) Borss., *Blumea* 14: 97. 1966. *Hibiscus tetraphyllus* Roxb. ex Hornem., *Hort. Hafn.*: 661. 1815.

Flowering & Fruiting: August–December.

Distribution. India: Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan and West Bengal.

Specimens examined: Bhutanghat, 26.09.2011, AK 52923; Hatipota, 29.09.2012, AK 58523.

2. **Abelmoschus moschatus** Medik., *Malvenfam.*: 46. 1787. *Hibiscus abelmoschus* L., *Sp. Pl.* 2: 696. 1753; *Mast. in Hook. f., Fl. Brit. India* 1: 342. 1874; Prain, *Bengal Pl.* 1: 265. 1903.

Undershrub, 1.5–2 m high, hirsute. Leaves palmately 5–7-lobed; lobes oblong-ovate or ovate-lanceolate, 8.5–13.5 × 2.5–5.3 cm, serrate-dentate, acute to acuminate at apex, sub-coriaceous, hispid on upper surface, stellate hairy beneath; stipules filiform, hairy. Flower solitary; pedicels 2.5–3 cm, hirsute; epicalyx lobes linear-lanceolate, 1.8–2.3 × 0.5–0.6 cm, hirsute. Calyx 1.5–3 cm, stellate tomentose outside, silky pubescent inside. Petals yellow, dark purple at base, obovate, c. 10 cm, hairy at base. Staminal column included. Ovary 5-locular. Capsules oblong-ovoid, hirsute; seeds many, reniform.

Flowering & Fruiting: July–December.

Distribution. India: Almost throughout India.

Specimens examined: Marakata, 24.09.2011, AK 52843; NRVK 6a, 06.12.2011, GK 52349.

2. **Hibiscus** L.

Key to the species

- 1a. Herbs; stems without prickles; leaves stellate hairy; epicalyx absent; petals white; staminal column with glands; seeds tetragonus to heart-shaped, verrucose
1. *H. lobatus*
- 1b. Undershrubs; stems prickly; leaves without stellate hairs; epicalyx present; petals yellow, dark purple based; staminal column without glands; seeds not as above 2

- 2a. Erect undershrubs; stems woody; epicalyx lobes without appendages; ovary globose, white hirsute; stigma capitate; seeds trigonous, scabrous 2. *H. radiatus*
2b. Scrambling or prostrate undershrubs; stems fistular; epicalyx lobes appendaged; ovary conical, glabrous; stigma discoid; seeds reniform, downy 3. *H. surattensis*

1. *Hibiscus lobatus* (Murray) Kuntze, Revis. Gen. Pl. 3 (3): 19. 1898. *Solandra lobata* Murray, Commentat. Soc. Regiae Sci. Gott. 6: 20, pl. 1. 1785. *Hibiscus solandra* L'Herit., Strip. Nov. 1: 103, t. 49. 1788, *nom. illeg.*; Mast. in Hook. f., Fl. Brit. India 1: 336. 1874; Prain, Bengal Pl. 1: 267. 1903.

Undershrub, 20–80 cm high, pubescent, rarely stellate hairy. Leaves 1.2–7 × 0.8–6.5 cm, pubescent; upper leaves ovate to ovate-lanceolate, cordate to subcordate, crenate or serrate, acute to acuminate; lower leaves 3-lobed; lobes linear to ovate, obtuse, acute to acuminate; stipules linear, ciliate. Inflorescences axillary, solitary, terminal racemes; pedicels articulate, pubescent. Calyx campanulate, pubescent intermixed with stellate hairs; tube c. 3 mm; lobes triangular-ovate, c. 3 mm. Petals obovate, c. 10 mm, hairy at base. Staminal column 2–4 mm. Ovary 2–3 mm; style arms minute; stigmas capitate. Capsules ovoid, with short rostrum, pubescent intermixed with stellate hairs; seeds many.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Tashigaon 1, 05.10.2009, SKS & GK 46153; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58560.

2. *Hibiscus radiatus* Cav., Diss. 3: 150, t. 54, f. 2. 1787; Mast. in Hook. f., Fl. Brit. India 1: 335. 1874; Prain, Bengal Pl. 1: 267. 1903.

Undershrub, 1.2–1.8 m high, hairy, turning glabrescent. Leaves 2.5–4.5 × 1.5–3.5 cm, subcordate, serrate and hairy; lower leaves broadly ovate, shallowly 3-lobed; upper leaves sub-orbicular, 3-lobed; lobes oblong-ob lanceolate, 1.8–3.6 × 0.9–1.4 cm, acute to acuminate; stipules linear to linear-lanceolate, bristly. Flowers axillary, solitary; pedicels articulate, pubescent; epicalyx lobes 8–10, linear, 0.8–1.5 cm, forked at apex, bristly. Calyx spreading; tube short; lobes ovate, 8–10 mm, acuminate, bristly. Petals obovate, 5–6 mm, sparsely hairy. Staminal column 1.5–2.2 cm. Ovary 5–7 mm across; style arms purple; stigmas dark purple. Capsules ovoid, shortly beaked, bristly; seeds many.

Flowering & Fruiting: August–February.

Distribution. India: Assam, Bihar, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan, Tamil Nadu and West Bengal.

Specimen examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59733.

3. Hibiscus surattensis L., Sp. Pl. 2: 696. 1753; Mast. in Hook. f., Fl. Brit. India 1: 334. 1874; Prain, Bengal Pl. 1: 267. 1903.

Kauscho (N).

Undershrub, 5–6 m high, strigose. Leaves sub-sessile to long petiolate; long petioled leaves sub-orbicular or ovate, plamately 3–5-lobed, 6–6.5 × 7–7.5 cm, strigose; segments lanceolate to linear-lanceolate; veins 5–7 from base; petioles 5–6 cm, strigose, prickly; short petioled leaves ovate to deltoid-ovate, sometimes 3-lobed, 1.5–3 × 1.3–2.5 cm, cordate, dentate-crenate, acute at apex, hair intermixed with stellate hairs; stipules ovate, auricled, ciliate, acute to short acuminate; petioles 1–1.7 cm, strigose, prickly. Flowers axillary, solitary; pedicels articulate, strigose, prickly; epicalyx lobes yellow, 10, spathulate, linear appendaged near the apex, ciliate, pubescent, spiny. Calyx campanulate; tube short; lobes ovate to deltoid, acuminate, hispid. Petals obovate, 3–5 cm. Staminal column 0.5–1.5 cm; filaments short. Ovary 3–5 mm; style arms 2–2.5 mm; stigmas hairy. Capsules ovoid, bristly white or yellow hairy; seeds many.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Bhutri, 05.10.2012, AK 58648; Rangamati to Bharnabari, 06.10.2012, AK 58696.

3. *Sida* L.

Key to the species

- 1a. Leaves lanceolate to linear-lanceolate; veins 3 from base; stipules dissimilar; staminal column stellate hairy 1. *S. acuta*
- 1b. Leaves not as above; veins 7 from base or pinnate; stipules similar; staminal column not stellate hairy 2
- 2a. Stems tomentose; veins palmate; pedicels not articulate, not stellate hairy; petals creamy white, pale yellow at base, irregularly wavy at apex; mericarps 10; awns retrorse hairy 2. *S. cordifolia*
- 2b. Stems hairy at least when young; veins pinnate; pedicels articulate, stellate hairy; petals yellow, emarginate at apex; mericarps 6; awns simple hairy 3. *S. rhombifolia*

1. *Sida acuta* Burm. f., Fl. Ind.: 147. 1768; Prain, Bengal Pl. 1: 259. 1903. *Sida carpinifolia* Mast. in Hook. f., Fl. Brit. India 1: 323. 1874, non L. f. 1781.

Jaharu, Khareto (N).

Herb, c. 1 m high, stellate hairy. Leaves 1.7–7 cm, subcordate to rotund, serrate, acute at apex, sparsely hairy to glabrous; one stipule linear to lanceolate and other linear to filiform. Inflorescences solitary, axillary, terminal racemes; pedicels 2–9 mm, articulate, stellate hairy. Calyx campanulate, sparsely hairy; tube c. 4

mm; lobes triangular, acuminate, sparsely hairy to glabrescent or glabrous. Petals obliquely obovate, c. 10 mm, slightly emarginate, glandular pubescent. Staminal column 2–3 mm. Carpels ovoid or globose; style 5–10-partite; stigmas capitate. Schizocarps globular or obovate; mericarps 6, semilunar, reticulately nerved, glabrous to sparsely hairy awned; seed solitary in each mericarp, triangular-ovoid.

Flowering & Fruiting: May–September.

Distribution. India: Almost throughout India.

Specimens examined: Buxa to Chunabhati, 17.05.1949, VN & party 2620; Bhutanghat, JKS 4100; Santrabari, 100m, 05.10.2009, SKS & GK 46146; Kumargram, 18.09.2011, AK 52607; Rydak river belt, 20.09.2011, AK 52682; Marakata, 24.09.2011, AK 52841.

2. *Sida cordifolia* L., Sp. Pl. 2: 684. 1753; Mast. in Hook. f., Fl. Brit. India 1: 324. 1874; Prain, Bengal Pl. 1: 258. 1903.

Undershrub, c. 1 m high, stellate and simple hairy. Leaves ovate or sub-orbicular, 0.7–3.4 × 0.4–2.6 cm, cordate, serrate, acute or obtuse at apex, coriaceous, pubescent intermixed with stellate hairs; stipules filiform, pubescent. Flower solitary, axillary below, clustered towards apex; pedicels pubescent. Calyx campanulate, stellate and simple hairy; tube short; lobes triangular, acute to acuminate. Petals obliquely obovate, 1.2–1.5 cm across. Staminal column pubescent. Carpels ovoid or sub-globose; style 8–10-partite; stigmas capitate. Schizocarps globular or obovate; mericarps reticulately nerved, 3-awned, pubescent; seed solitary in each mericarp, reniform.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Near Buxaduar, 18.05.1976, JKS 6929; Newlands, Sukno river, 22.09.2011, AK 52755; Newlands, Sukno river, 22.09.2011, AK 52794; Newlands, 15.02.2012, AK 53056.

3. *Sida rhombifolia* L., Sp. Pl. 2: 684. 1753; Mast. in Hook. f., Fl. Brit. India 1: 323. 1874; Prain, Bengal Pl. 1: 259. 1903.

Herb, c. 1 m high. Leaves variable, ovate to elliptic-ovate, obovate or rhomboid, 0.6–2 × 0.3–1.3 cm, rounded or truncate or acute, serrate towards apex at margins, acute or obtuse at apex, pubescent or glabrous above, stellate pubescent below; stipules filiform. Inflorescences axillary, solitary or terminal clusters. Calyx campanulate, stellate and simple hairy; tube 2.5–3 mm; lobes triangular-ovate, 3–3.5 mm. Petals obliquely obovate, c. 7 mm. Staminal column hairy. Carpels conical, stellate pubescent; style 9–12-partite; stigmas capitate. Schizocarps globular or obovate; mericarps 2 awned, simple hairy; seed solitary in each mericarp, reniform.

Flowering & Fruiting: July–December.

Distribution. India: Almost throughout India.

Specimens examined: Santrabari Rangc, 04.10.2009, SKS & GK 46135; Rajabhatkhawa range, SRVK 4, 05.10.2009, SKS & GK 46147; Rydak river belt, 20.09.2011, AK 52690.

4. *Urena* L.

Urena lobata L., Sp. Pl. 2: 692. 1753; Mast. in Hook. f., Fl. Brit. India 1: 329. 1874; Prain, Bengal Pl. 1: 261. 1903.

Kurey Pat (N).

Undershrub, c. 1.5 m high, pubescent, stellate hairy. Leaves variable; lower leaves orbicular to sub-orbicular, shallowly 3–5-lobed, 3.8–5.8 cm, serrate, sub-coriaceous; upper leaves ovate to elliptic-ovate, 1.4–4.5 × 0.6–1.8 cm, attenuate, serrate, acute at apex, sub-coriaceous; stipules linear, hairy. Inflorescences axillary, solitary or 2–3-flowered in terminal clusters. Epicalyx cupular; tube short; lobes linear to linear-lanceolate. Calyx tubular; lobes ovate to lanceolate, ciliate. Petals obliquely obovate, truncate. Staminal column 1–1.5 cm, pubescent; filaments short; anthers oblong. Ovary sub-globose; style 10-partite; stigmas discoid. Shizocarps globose; spines 4–5, retrorsely hooked; mericarps stellate hairy; seeds reniform, hairy or glabrescent.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Santrabari, 300m, 08.10.2009, SKS & GK 46219; SRVK 5, 15.02.2010 SKS & GK 47109; Jainti 3, 13.12.2010, SKS & GK 47067; Newlands, Sukno river, 22.09.2011, AK 52771; Bhntanghat, Mainabari, 26.09.2011, AK 52883; Newlands, 15.02.2012, AK 53033; Rangamati to Bharnabari, 06.10.2012, AK 58706.

Bombacaceae

Bombax L.

Bombax ceiba L., Sp. Pl. 1: 511. 1753. *Bombax malabaricum* DC., Prodr. 1: 479. 1824; Mast. in Hook. f., Fl. Brit. India 1: 349. 1874; Prain, Bengal Pl. 1: 271. 1903. [Plate 20a]

Tree, 12–20 m high, deciduous in flowering. Leaves digitate, 5–7-foliolate; leaflets lanceolate to elliptic-lanceolate, 4–18 cm, attenuate, caudate-acuminate at apex, coriaceous. Inflorescences clusters at the end of branchlets, sometimes axillary and solitary. Calyx campanulate, silky pubescent inside; tube 0.8–1.5 cm; lobes obovate, 1.2–2 × 2–2.5 cm. Petals bright red to orange yellow, obovate to elliptic-obovate or oblong, 8–10 cm, succulent, stellate pubescent. Stamens many,

arranged in 6 bundles in 2 series; central bundle of 15 stamens, 5 longer and 10 shorter; outer 5 bundles of many stamens; staminal tube short; filaments flat, hairy below; anthers reniform. Ovary conical, tomentose; style 5–6 cm; stigma 5-fid. Capsules ovoid to oblong, velvety; seeds many, pyriform, with creamy white silky fibers.

Flowering & Fruiting: January–March.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 10.02.2010, SKS & GK 46312; Kumargram, 13.02.2012, AK 53013; Narathali, 20.02.2012, AK 55742; Narathali, 20.02.2012, AK 55783.

Notes: The flower petals are used as coloring agent and the silky fibers of the seeds used as filling material in mattresses/pillows.

Sterculiaceae

Key to the genera

- 1a. Flowers unisexual or polygamous; petals absent; fruit apocarpous with separate follicles 5. *Sterculia*
- 1b. Flowers bisexual; petals present; fruit usually syncarpous, sometimes dividing into separate mericarps 2

- 2a. Stamens 5, only tubular below 4. *Melochia*
- 2b. Stamens in a ring on the top of the column 3

- 3a. Flowers actinomorphic; staminodes clavate; seeds winged 3. *Pterospermum*
- 3b. Flowers zygomorphic; staminodes not clavate; seeds not winged 4

- 4a. Flowers large; stamens 15, alternating with 5 emarginate staminodes; capsules erect, 5-winged; many seeds per locule 1. *Abroma*
- 4b. Flowers very small; stamens 5, alternating with 5 staminodes; capsules pendulous, spiny, not winged; 1-seed per locule 2. *Byttneria*

1. *Abroma* Jacq.

Abroma augusta (L.) L. f., Suppl. Pl.: 341. 1781 (as "*Ambroma*"); Mast. in Hook. f., Fl. Brit. India 1: 375. 1874; Prain, Bengal Pl. 1: 278. 1903. *Theobroma augusta* L., Syst. Nat., ed. 12. 233. 1770. [Plate 20b-c]

Sanu Kapasi (N); Devil's Cotton (E).

Shrub to medium size tree, 2–3 m high, stellate and simple hairy. Leaves ovate to broadly ovate, sub-orbicular, 5–27 × 2.3–16 cm, cordate to subcordate or truncate, hairy, acute to acuminate at apex, sparsely simple and stellate hairy; stipules linear or subulate, caducous, pubescent. Inflorescences few flowered, leaf-opposed, axillary or terminal, pedunculate cymes; floral bracts linear to linear-lanceolate;

pedicels 1.8–2.5 cm, stellate pubescent. Sepals lanceolate, 1–2.3 × 0.3–0.7 cm, connate, pubescent. Petals spatulate, 1.8–2.5 × 1–1.2 cm; claws cupular, hooded, hairy near base and apex. Stamens sessile; anthers oblong; staminodes 5, spatulate or clavate, ciliate. Ovary oblong or ellipsoid, villous; style 5-fid. Capsules 4–4.5 cm across, truncate at apex; seeds many, obovoid, tuberculate.

Flowering & Fruiting: June–December.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52637; Marakata, 24.09.2011, AK 52838; Phashkhawa, 27.09.2012, AK 56183.

2. *Byttneria* Loebl., *nom. cons.*

Byttneria grandifolia DC., Prodr. 1: 486. 1824; Malick in B. D. Sharma & al., Fl. India 3: 410. 1993. [Plate 21a-b]

Large woody climber, stellate pubescent. Leaves suborbicular to broadly ovate, 10–20 × 10–21 cm, cordate, entire or obscurely repand, abruptly acuminate at apex, chartaceous or subcoriaceous, glabrescent above, puberulous on nerves beneath; stipules linear-lanceolate, early caducous. Inflorescences axillary umbellate cymes, stellate pubescent; pedicels slender, tomentose; floral bracts and bracteoles subulate. Sepals 5, lanceolate to deltoid hairy outside. Petals lanceolate, 2–2.5 mm, clawed, yellow-green outside. Staminal cup with 5 staminodal lobes alternating with 5 fertile stamens. Anther lobes reniform, divergent; staminodes ovate. Ovary c. 1 mm across; styles about as long as ovary, 5-fid at tip. Capsules globose to ovoid globose, woody, stout curved prickly, puberulent, 1-seed per locule; seed elliptic-oblong to triangular.

Flowering & Fruiting: September–May.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jharkhand, Meghalaya and West Bengal.

Specimen examined: SRVK 5, 08.10.2012, GK 56078.

3. *Melochia* L.

Melochia corchorifolia L., Sp. Pl. 2: 675. 1753; Mast. in Hook. f., Fl. Brit. India 1: 374. 1874; Prain, Bengal Pl. 1: 277. 1903. [Plate 21c]

Tiki-okra (B).

[Herb, c. 1 m high, sparsely stellate pubescent. Leaves variable, ovate, ovate-lanceolate, deltoid-ovate, oblong-lanceolate, 0.5–2.5 × 0.3–1.6 cm, rounded, cordate or sub-truncate, dentate, acute, obtuse or rounded at apex, sparsely stellate hairy abaxially, glabrous adaxially; stipules lanceolate to linear-lanceolate, caducous, hairy. Inflorescences axillary, clustered, terminal, pedunculate, umbellate

corymbs. Flowers sub-sessile; floral bracts linear to linear-lanceolate; epicalyx lobes 4–6, linear, 3–3.5 mm, ciliate. Calyx campanulate, pubescent; tube short; lobes triangular-ovate, ciliate. Petals obovate or spatulate, 3–4 mm. Stamens arranged in spindle shape cup; anthers oblong. Ovary oblong to elliptic-oblong, villous; stigmas 5, filiform. Capsules faintly 5-lobed; seeds solitary in each locule, trigonous.

Flowering & Fruiting: July–April.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52740; Newlands, Sukno river, 22.09.2011, AK 52778.

4. *Pterospermum* Schreb., *nom. cons.*

Pterospermum acerifolium (L.) Willd., Sp. Pl., ed 4. 3: 729. 1801; Mast. in Hook. f., Fl. Brit. India 1: 368. 1874; S. K. Chandra in B. D. Sharma & al., Fl. India 3: 448. 1993. *Pentapetes acerifolia* L., Sp. Pl. 2: 698. 1753.

Kanak Champa (B); *Hattipaile* (N).

Tree, 10–15 m high, appressed hairy, floccose. Leaves whorled, broadly ovate, 25–39 × 14–30 cm, peltate, palmately lobed to coarsely toothed, acute at apex, leathery, sparsely hairy or glabrous above, yellowish and grey stellate velutinous beneath. Inflorescences axillary, solitary or 2–3-flowered cymes. Flowers fragrant; pedicels 1–3 cm. Sepals 5, free above, connate below, linear, 8–11 × 0.6–0.9 cm, fleshy, rusty tomentose outside, silky inside. Petals white, 5, linear-oblong, 7–9.5 cm. Stamens 15, in 5 groups of 3 alternating with staminodes; filaments connate into tube, free at top; staminodes clavate, 6–8.5 cm, hairy. Ovary oblong, 1–3 cm, 5-locular; styles 5, c. 6.5 cm; stigma clavate. Capsules oblong, brown tubercled, many seeded; seeds obliquely ovoid, winged.

Flowering & Fruiting: March–December.

Distribution. India: Almost throughout India.

Specimen examined: SRVK 6, 06.12.2011, GK 52356.

5. *Sterculia* L.

Key to the species

- 1a. Deciduous trees; leaves broadly ovate or sub-orbicular, 5–7-lobed, subcordate at base, stellate tomentose below; veins palmate; stipules lanceolate; calyx yellow, reddish at base 3. *S. villosa*
- 1b. Evergreen shrubs/trees; leaves not broadly ovate nor sub-orbicular, unlobed, cuneate or rotund at base, sparsely stellate hairy below; veins pinnate; stipules subulate; calyx creamy white/red 2

Botanical Survey of India

- 2a. Branchlets pubescent; leaves cuneate at base; inflorescences drooping panicles; calyx creamy white; lobes conniving at tip, glandular pubescent with long white hairs inside; staminal column 3–4 mm **1. *S. hamiltonii***
- 2b. Branchlets glabrous; leaves rounded at base; inflorescences erect panicles; calyx red; lobes spreading, glabrous inside; staminal column c. 1 mm **2. *S. lanceifolia***

1. *Sterculia hamiltonii* (Kuntze) Adelb., *Blumea* 5: 506. 1945. *Clompanus hamiltonii* Kuntze, *Rev. Gen. Pl.* 1: 77. 1871. *Sterculia coccinea* Roxb., *Fl. Ind.* 3: 151. 1832, non Jack. 1820; Mast. in Hook. f., *Fl. Brit. India* 1: 357. 1874.

Chiwariapat (N).

Tree, 5–6 m high. Leaves oblanceolate, lanceolate to elliptic-lanceolate, 11–27.5 × 4–8.2 cm, acuminate; stipules caducous, rusty pubescent. Inflorescence axillary to supra-axillary, sparsely stellate pubescent; floral bracts linear to linear-lanceolate, caducous, stellate pubescent; pedicels 0.4–1.4 cm, articulate, stellate pubescent. Calyx campanulate; tube 2–2.5 mm, stellate pubescent; lobes ovate, 1.2–1.4 cm, revolute and white villous, acuminate. Male: staminal column curved. Female: ovary on a short gynophore, hairy; style curved, short; stigma 5-lobed. Follicles greenish-orange to crimson, 2–5, oblong-lanceolate, beaked, velvety; seeds 4–8 in each follicle, ovoid.

Flowering & Fruiting: August–May.

Distribution. India: Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa to Chunabhati, 17.05.1949, VN & party 2617; Jainti, 05.10.2009, SKS & GK 46163; SRVK 11–12, 20.03.2011, GK 50641; Checko-1, 25.09.2012, AK 56119; Buxa Fort to Chunabhati, 30.09.2013, AK 59684.

2. *Sterculia lanceifolia* Roxb., *Fl. Ind.* 3: 150. 1832. *Sterculia roxburghiana* Wall., *Pl. Asiat. Rar.* 3 (11): 39 t. 262. 1832; Mast. in Hook. f., *Fl. Brit. India* 1: 356. 1874; Prain, *Bengal Pl.* 1: 274. 1903 (as “*roxburghii*”).

Chiwariapat (N).

Tree, 8–10 m high. Leaves obovate, elliptic-lanceolate or oblanceolate, 7.7–13 × 2.7–4.6 cm, short acuminate; stipules caducous. Inflorescence axillary; pedicels articulate. Calyx campanulate, pubescent; tube short; lobes oblong-lanceolate. Male: staminal column curved. Female: ovary globose on a minute gynophore, puberulent; style short; stigma 5-lobed. Follicles reddish green, 4–5, oblong-lanceolate, beaked, velvety; seeds 4–8 in each follicle, ovoid.

Flowering & Fruiting: Throughout.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: Buxaduar, 12.05.1976, JKS 4613; Rydak, Tiamari, 23.02.2012, AK 55912; Buxaduar to Achalung, 19.05.2014, AK 62671.

3. *Sterculia villosa* Roxb. ex Smith in Rees, Cycl. 34: no. 16. 1816; Mast. in Hook. f., Fl. Brit. India 1: 355. 1874; Prain, Bengal Pl. 1: 274. 1903. [Plate 22a-b]

Odal (B, N).

Tree, 12–15 m high, tomentose to glabrescent. Leaves crowded at the ends of branchlets, 15–30 cm, glabrescent or sparsely stellate hairy above; lobes ovate-oblong, acuminate; stipules acuminate, caducous. Inflorescences terminal at branchlets, in axils of fallen leaves, clustered, pendulous, panicles, brown stellate tomentose; pedicels articulate, brown stellate tomentose. Calyx campanulate, brown stellate tomentose outside, glandular hairy inside; tube short; lobes ovate. Male: staminal column curved with few white hairs. Female: ovary globose, on 2–3 mm long gynophore, hairy; style curved, short; stigma 5-lobed. Follicles red inside, 3–5, oblong, rusty villous; seeds 3–5 in each follicle, oblong.

Flowering & Fruiting: January–May.

Distribution. India: Almost throughout India.

Specimens examined: Jainti 14, 14.02.2010, SKS & GK 47101; Jainti 8 compt., 12.03.2011, GK 50560; Narathali, 20.02.2012, AK 55773.

Tiliaceae

Key to the genera

- | | |
|--|----------------------|
| 1a. Fruit a capsule | 2 |
| 1b. Fruit a drupe | 3 |
| 2a. Androgynophore absent; flowers usually solitary or 2; sepals purple-red; petals glandular; fruit elongated, a smooth capsule | 1. <i>Corchorus</i> |
| 2b. Androgynophore present; flowers in clusters; sepals green; petals glandular; fruit globose, a spiny capsule | 4. <i>Triumfetta</i> |
| 3a. Inflorescences simple cymes, usually axillary; sepals are smaller than petals; petals glandular; stigma swollen, lobed | 2. <i>Grewia</i> |
| 3b. Inflorescences compound cymes, terminal; sepals are larger than petals; petals with hairy glands at base adaxially; stigma subulate, not lobed | 3. <i>Microcos</i> |

1. *Corchorus* L.

Corchorus acutuans L., Syst. Nat., ed. 10. 2: 1079. 1759. *Corchorus acutangulus* Lamk., Encycl. 2: 104. 1786; Mast. in Hook. f., Fl. Brit. India 1: 398. 1874; Prain, Bengal Pl. 1: 286. 1903. [Plate 22c]

Spreading herb, 10–50 cm high, pilose. Leaves ovate to ovate-lanceolate or elliptic, 0.5–5.3 × 0.3–3 cm, rotund, serrate and hairy, acute, obtuse or rounded at apex, pilose and punctate above; stipules linear to linear-subulate. Flowers leaf-opposed, solitary; floral bracts linear-subulate. Sepals linear, hooded. Petals

Botanical Survey of India

yellow, obtuse. Filaments c. 3 mm; anthers small. Ovary cylindrical, 3-celled, pubescent; style 3-fid; stigmas 5-toothed. Capsules 5-angled; beak bifid, hispid to puberulent; seeds minute.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 28.05.1949, VN 3084; Tashigaon 1, 11.10.2010, SKS & GK 46304; North Rydak, 26.09.2011, AK 52941; Sankosh, 28.09.2011, AK 52972; Hatipota, 29.09.2012, AK 58527.

2. *Grewia* L.

Grewia serrulata DC., Prodr. 1: 510. 1824. *Grewia laevigata* auct. non Vahl 1790: Mast. in Hook. f., Fl. Brit. India 1: 384. 1874; Prain, Bengal Pl. 1: 283. 1903. *Grewia multiflora* auct. non Juss. 1804: Mast. in Hook. f., Fl. Brit. India 1: 388. 1874; Prain, Bengal Pl. 1: 284. 1903.

Chiple (N).

Shrub to small tree, 2–5 m high, stellate hairy. Leaves lanceolate to oblanceolate, elliptic-ovate, ovate to obovate, 2–12 × 1.2–4.3 cm, narrowed or obtuse, acute or acuminate; stipules subulate or triangular, glabrescent. Inflorescence axillary, pedunculate, 3-flowered, stellate pubescent; floral bracts triangular-ovate or subulate, stellate pubescent. Sepals oblanceolate or oblong to oblong-lanceolate, 7–8 mm, acute or obtuse, stellate tomentose. Petals 2–2.5 mm, acute to short acuminate, glabrous or sparsely stellate hairy; glands half of petals; receptacle grooved. Stamens many, unequal; anthers globose. Drupes black, 2-lobed, if not lobed then globose; pyrenes 1–2, globose.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa Range, 05.09.1981, BS & party 10346; Jainti 4, 12.10.2010, SKS & GK 46322; Kumargram, Kalikhola river belt, 21.09.2011, AK 52720; Newlands, Sukno river, 22.09.2011, AK 52762; SRVK 6, 27.11.2011, GK 50575; Jainty-Phashkhawa, 02.10.2012, AK 58604; Marakata, 22.02.2012, AK 55884.

3. *Microcos* L.

Microcos paniculata L., Sp. Pl. 1: 514. 1753. *Grewia microcos* L., Syst. Nat., ed. 12. 2: 602. 1767; Mast. in Hook. f., Fl. Brit. India 1: 392. 1874; Prain, Bengal Pl. 1: 282. 1903. *Grewia nervosa* (Lour.) Panigrahi, Taxon 34 (4): 702. 1985. [Plate 23a]

Asar (B).

Shrub, 1–2 m high. Leaves distichous, elliptic-lanceolate, 6–16 × 2.3–6.5 cm, rounded to subcordate, crenulate or obscurely sinuate, acuminate at apex, subcoriaceous, glossy, glabrous except nerves beneath; 6 or 7 nerves at base, sparsely pubescent prominent beneath, veinlets prominent beneath; stipules subulate. Inflorescence terminal panicles, 7–12 cm, stellate pubescent. Sepals 5, oblong-spathulate, pubescent. Petals yellow, 5, oblong, smaller than sepals, 3–4 mm, entire or emarginate, ciliate, hairy glands at base. Stamens many; filaments hairy at base. Ovary globose, glabrous, 2–5-loculed; stigma 2-fid, minute. Drupes globose or obovoid, green when young, turned black when ripened.

Flowering & Fruiting: June–March.

Distribution. India: Assam, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Jainti 4, 11.10.2010, SKS & GK 46305; Jainty-Phashkhawa, 02.10.2012, AK 58598.

4. *Triumfetta* L.

Key to the species

- 1a. Undershrubs; leaves dissimilar, usually lobed, rounded or cuneate at base; inflorescence bracts present; stamens 8; anthers oblong; ovary 2–3-celled
3. *T. rhomboidea*
- 1b. Herbs; leaves similar, usually not lobed, rounded to subcordate or cordate at base; inflorescence bracts absent; stamens 10; anthers elliptic or circular; ovary 4-celled 2
- 2a. Veins 3 from base; floral bracts absent; filaments *c.* 2.5 mm, smooth throughout; anthers circular; capsules glabrous; spines patent hairy throughout 1. *T. annua*
- 2b. Veins 3–5 from base; floral bracts present; filaments 4.5–6.5 mm, denticulate throughout; anthers elliptic; capsules tomentose; spines without hairs 2. *T. pilosa*

1. *Triumfetta annua* L., Mant. Pl.: 73. 1767; Mast. in Hook. f., Fl. Brit. India 1: 396. 1874; Prain, Bengal Pl. 1: 285. 1903. [Plate 23b–c]

Herb, 50–90 cm high, sparsely stellate hairy. Leaves ovate, 1.8–9.5 × 0.9–4.8 cm, rotund to subcordate, serrate, acuminate at apex, puberulous; stipules linear-lanceolate, hairy. Inflorescence terminal, pedunculate, umbellate; pedicels hairy. Sepals greenish yellow, lorate, 3–4 mm, hairy. Petals yellow, obtuse to sub-acute, hairy at base; glands whitish, patch-like; receptacle glandular, hairy at apex. Ovary globose, hairy; style short; stigma 4-lobed. Capsules globose, uncinat spinous; seeds ovoid.

Flowering & Fruiting: September–March.

Distribution. India: Almost throughout India.

Specimens examined: Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58563; Buxa Fort to Chunabhati, 30.09.2013, AK 59704.

2. *Triumfetta pilosa* Roth, Nov. Pl. Sp.: 223. 1821; Mast. in Hook. f., Fl. Brit. India 1: 394. 1874; Prain, Bengal Pl. 1: 285. 1903. [Plate 23d, 24a]

Herb, 75–90 cm high, stellate and simple hairy. Leaves ovate to lanceolate, 3.5–10 × 1.5–4 cm, cordate, coarsely serrate and hairy, acute to acuminate; stipules linear-lanceolate to triangular-ovate, acute to long acuminate. Inflorescence many-flowered, shortly pedunculate; floral bracts lanceolate, acuminate. Sepals lorate, 6–7.5 mm, acute. Petals yellow, 5–7 mm, ciliate at base, obtuse, obscurely toothed at apex; receptacle membranous, ciliate, glandular below. Ovary globose, hispid. Capsules sub-globose, uncinately spinous; seeds ovoid, plano-convex.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59688.

3. *Triumfetta rhomboidea* Jacq., Enum. Syst. Pl.: 22. 1760; Mast. in Hook. f., Fl. Brit. India 1: 395. 1874; Prain, Bengal Pl. 1: 285. 1903. [Plate 24b]

Undershrub, 1–1.5 m high, stellate hairy. Leaves stellate and simple hairy; lower ones sub-orbicular or broadly rhomboid-ovate, palmately 3-lobed, 2.5–6 cm, rounded to cuneate, irregularly serrate and hairy, acute to acuminate; upper ones ovate or lanceolate, lobed or not, 0.7–3 × 0.2–1 cm; stipules triangular-ovate to subulate, hairy. Inflorescence terminal, pubescent; inflorescence bracts subulate, hairy; floral bracts same as inflorescence bracts; pedicels pubescent. Sepals oblong, 4.5–5 mm, hooded, stellate pubescent. Petals yellow, 4–4.5 mm, hairy at base. Ovary sub-globose, hairy; style 3–4 mm. Capsules globose to sub-globose, uncinately spiny, tomentose; seeds ovoid.

Flowering & Fruiting: August–February

Distribution. India: Almost throughout India.

Specimens examined: Santrabari, 04.10.2009, SKS & GK 46128; Narathali, 23.09.2011, AK 52805; Marakata, 24.09.2011, AK 52878.

Elaeocarpaceae

Key to the genera

- 1a. Flowers in racemes, 5-merous; petals lacinate or fimbriate at apex; disk lobed, hairy; drupes not spiny; seeds not arillate 1. *Elaeocarpus*
- 1b. Flowers solitary or in fascicles, 4-merous; petals toothed at apex; disk not lobed, glabrous; capsules spiny; seeds arillate 2. *Sloanea*

1. *Elaeocarpus* L.

Key to the species

- 1a. Disk 10-lobed 2
1b. Disk 5-lobed 3
- 2a. Petals sericeous within, thickened or pouched at base; fruit ovoid, 1–2-celled 4. *E. varunua*
2b. Petals glabrous within, not thickened or pouched at base; fruit globose, (4–)5-celled 1. *E. angustifolius*
- 3a. Leaves obovoid-lanceolate, clustered at end of branches; flower buds oblong-ovoid; anthers awned at apex 2. *E. rugosus*
3b. Leaves elliptic to ovate, distributed all through the branches; flower buds ovoid; anthers bristly at apex 3. *E. tectorius*

1. *Elaeocarpus angustifolius* Blume, Bijdr. Fl. Ned. Ind. 3: 120. 1825; Mast. in Hook. f., Fl. Brit. India 1: 401. 1874. *Elaeocarpus ganitrus* Roxb. ex G. Don, Gen. Hist. 1: 559. 1831; Mast. in Hook. f., Fl. Brit. India 1: 400. 1874; Prain, Bengal Pl. 1: 287. 1903. [Plate 24d]

Tree, 15–20 m high, appressed pubescent when young. Leaves spirally arranged, oblong to oblong-lanceolate or oblanceolate, 12.2–17 × 1.8–4 cm, cuneate, obtuse or short acuminate at apex, sub-coriaceous. Inflorescences drooping, pubescent; pedicels 6–8 mm, pubescent. Sepals lanceolate to linear-lanceolate or oblong, 6–7 mm, acuminate. Petals oblong or cuneiform, 5–8 × 2–3 mm, hairy. Stamens many; filaments pubescent; anthers awned and white bristly at apex; disk 10-lobed. Ovary globose; styles short. Drupes globose, each locule contains single seed.

Flowering & Fruiting: June–October.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, 18.09.2011, AK 52601.

2. *Elaeocarpus rugosus* Roxb. ex G. Don, Gen. Hist. 1: 559. 1831; Mast. in Hook. f., Fl. Brit. India 1: 405. 1874; Prain, Bengal Pl. 1: 288. 1903; Murti in B. D. Sharma & al., Fl. India 3: 551. 1993. [Plate 25a; Fig. 11]

Tree, to 10–15 m high, rusty brown puberulent. Leaves clustered at the end of branches, elliptic-oblong to ovate or oblong, 13.5–16.5 × 5–7.4 cm, rounded, entire to wavy, acuminate, coriaceous, glabrous above, sparsely pubescent beneath. Inflorescences axillary racemes in axils of fallen and existing leaves; rachis 6–12 cm, gray-white silky pilose; bracts triangular, acute, adpressed hairy. Sepals 5, lanceolate, c. 7 × 1.5 mm, acute at apex, grey silky tomentose. Petals cream-white, 5, oblong, 6–7 mm, lacinate at apex, silky tomentose below apex. Stamens 20–25; filaments hairy; anthers oblong, awned; disk 5-lobed, sparsely pubescent. Ovary



Fig. 11. *Elaeocarpus rugosus*: a. Flowering branchlet; b. Petal; c. Stamen; d. Gynoecium with disk glands (GK 56009).

sericeous, 2-loculed; style subulate, villous. Drupes oblong-ovoid, 3-grooved, rugose, hirsute.

Flowering & Fruiting: February–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya and Tamil Nadu.

Specimens examined: SRVK 5, 30.03.2012, GK 50656; SRVK 12, 31.03.2012, GK 56009.

Notes: There are 7–10 individuals in the Gadadhar range and the species was designated under IUCN's Vulnerable (VU) status.

3. *Elaeocarpus tectorius* (Lour.) Poir., *Encycl. Suppl.* 2: 704. 1812; Murti in B. D. Sharma & al., *Fl. India* 3: 559. 1993. *Craspedum tectorium* Lour., *Fl. Cochinch.* 1: 336. 1790. *Elaeocarpus robustus* Roxb., *Fl. Ind.* 2: 597. 1832, *p p*; Mast. in Hook. f., *Fl. Brit. India* 1: 405. 1874, *p p*

Jalpai (B).

Tree, 15–18 m, pubescent. Leaves whorled, ovate-oblong, elliptic, 10–16.4 × 5.3–7.8 cm, cuneate-rounded, crenate, shortly acuminate or broadly acute at apex, coriaceous, glabrous. Inflorescences axillary racemes, 6–12.5 cm; rachis angled, rusty tomentose. Flower buds ovoid, tomentose; pedicels 3–5 mm, grey tomentose. Sepals, 5, lanceolate, acute at apex, thick, silky tomentose outside. Petals white, 5, sub-orbicular, lacinate at apex. Stamens 35–45; filaments pubescent; anthers oblong, puberulous, shortly bristled; disk 5-lobed; Ovary 3-loculed; style short; stigma simple. Drupesovoid, 3-grooved, rugose.

Flowering & Fruiting: April–October.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Arunachal Pradesh, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Meghalaya, Nagaland, Odisha, Sikkim, Tripura, Tamil Nadu and West Bengal.

Specimens examined: Buxa-Santrabari, 333m, 23.05.1949, VN & party 2927; SRVK 12 & 5, 08.04.2012, GK 56069.

Notes: The drawing of *E. tectorius* in *Fl. India* (3: 558, f. 155) with leaves narrowly ovate-lanceolate, appears like *E. varunua*. The species is known from Darjeeling and Jalpaiguri districts.

4. *Elaeocarpus varunua* Buch.-Ham. ex Mast. in Hook. f., *Fl. Brit. India* 1: 407. 1874; Prain, *Bengal Pl.* 1: 288. 1903. [Plate 25b-c]

Bhadrase (N).

Tree, 10–15 m high, appressed pubescent. Leaves clustered at end of branchlets, 14–20.5 × 5–7.3 cm, cuneate or sub-rotund, acuminate at apex, coriaceous, glabrous

or appressed puberulous; stipules falcate, caducous. Inflorescence axillary, grey silky tomentose; pedicels grey tomentose; floral bracts dimorphic, basal ones subulate, apical ones triangular-ovate, caducous, grey tomentose. Sepals lanceolate or ovate-lanceolate. Petals creamy white, oblong, silky tomentose outside, pilose and keeled inside. Stamens many; filaments short; anthers oblong, short reflexed awn at apex, puberulous; disk 10-lobed, tomentose. Style short. Drupes oblong to oblong-ovoid, rounded at apex; single seeded in each locule.

Flowering & Fruiting: February–September.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa Rly. Station, 14.05.1949, VN & party 2471; East Damanpur Range, 30.03.2012, GK 50656; Checko-1, 09.02.2013, AK 58819; Checko-1, 10.02.2013, AK 58829.

2. *Sloanea* L.

Key to the species

- 1a. Leaves glabrous except nerves beneath; fruits densely bristly bristles c. 2 mm **L. S. dasycarpa**
1b. Leaves tomentose beneath; fruits densely spinous, spines 2–2.5 cm **L. S. sterculiacea**

L. *Sloanea dasycarpa* (Benth.) Hemsl., Hooker's Icon. Pl. 27 (2): t. 2628. 1901. *Echinocarpus dasycarpus* Benth., J. Linn. Soc. 5. Suppl. 2: 73. 1861; Mast. in Hook. f., Fl. Brit. India 1: 400. 1874.

Tree, 7–10 m high. Leaves whorled, rhombic-elliptic, 8–17 × 4–8.5 cm, rounded or sub-cordate, serrate-dentate, abruptly acuminate at apex, sub-coriaceous, glabrous, except on veins on lower side. Inflorescence axillary, solitary; pedicels tomentose. Sepals 4-lobed; lobes oblong-ovate or ovate, equal, acute at apex, tomentose. Petals light yellow, 4; lobes obovate, denticulate; nerves prominent, hairy. Stamens many, unequal, hairy; anthers oblong, hairy, beaked; disk flattened, pitted. Ovary tomentose; style subulate tomentose. Capsules globose-ovoid, plumose bristly, 3–4 or 5 valved, 1-seed per valve; seeds arillate.

Flowering & Fruiting: July–March.

Distribution. India: Almost throughout India.

Specimen examined: East Damanpur range, Checko, 27.11.2011, GK 50585.

2. *Sloanea sterculiacea* (Benth.) Rehder & E. H. Wilson in Sarg., Pl. Wilson. 2: 362. 1915. *Echinocarpus sterculiaceus* Benth., J. Proc. Linn. Soc., Bot. 5 (Suppl. 2): 72. 1861; Mast. in Hook. f., Fl. Brit. India 1: 400. 1874.

Gobre (N).

Deciduous tree, 15–20 m high, tomentose when young. Leaves ovate to obovate, 16–23 × 8.5–10.8 cm, subcordate, serrate, acute at apex, coriaceous, tomentose below. Inflorescence axillary, pubescent; pedicels tomentose. Sepals ovate to oblong-ovate, 5–8 mm, rounded with mucronate tip, tomentose. Petals greenish, sub-orbicular, equal to sepals, tomentose. Stamens many; filaments pubescent; anthers oblong, short awn at apex; disk flat, pitted. Ovary globose or ovoid, 4-loculed, tomentose; style hairy at base; stigma geniculate. Capsules sub-globose, 4-valved, reddish spinous; seed solitary in each locule, ovoid.

Key to the varieties

- 1a. Leaves obovate or elliptic-ovate, short acuminate at apex, glabrescent below; petioles and pedicels glabrous 2.2. var. *assamica*
1b. Leaves ovate to obovate, acute at apex, tomentose below; petioles and pedicels tomentose 2.1. var. *sterculiacea*

2.1. var. *sterculiacea*

Flowering & Fruiting: May–December.

Distribution. India: Almost throughout India.

Specimens examined: Nimati, 17.11.1999, RBG 20468; SRVK 5, 09.03.2011, GK 50527; Checko-1, 25.09.2012, AK 56131.

2.2. var. *assamica* (Benth.) Coode, Kew Bull. 38 (3): 388. 1983. *Echinocarpus assamicus* Benth., J. Proc. Linn. Soc., Bot. 5 (Suppl. 2): 72. 1861; Mast. in Hook. f., Fl. Brit. India 1: 399. 1874. [Plate 25d]

Flowering & Fruiting: September–April.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 25.09.2012, AK 56146.

Linaceae

***Reinwardtia* Dumort.**

Reinwardtia indica Dumort., Comm. Bot.: 19. 1822. *Reinwardtia trigyna* (Rchb.) Planch., London J. Bot. 7: 522. 1848; Hook. f., Fl. Brit. India 1: 412. 1874.

[Plate 26a]

Herb, 10–35 cm high. Leaves clustered at ends of stems, elliptic-obovate to obovate, 1–6.5 × 0.5–3.7 cm, decurrent, crenate-serrate, short acuminate to obtuse; stipules ovate to sub-orbicular, obtuse to acuminate. Inflorescence terminal, solitary or 2–3-flowered cymes; floral bracts oblong-lanceolate, ciliate. Sepals oblong-lanceolate, glabrous or glandular hairy. Petals bright yellow, obovate, 2–3 × 1.2–1.8 cm. Stamens 5; filaments c. 1 cm, dilated and connate, linear gland at

base, hairy below; anthers yellow, elliptic; staminodes 5, filiform; Style 4-partite above; stigmas capitate. Capsules globose, dehisce in 6–8 cocci; seed solitary in each cocci, reniform.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Santrabari, 27.09.2013, AK 59603; Buxaduar to Achalung, 19.05.2014, AK 62652.

Malpighiaceae

Key to the genera

- 1a. Leaves ovate to ovate-oblong, rounded to subcordate at base, gland-dotted above, white appressed pubescent below; flowers symmetric in axillary, terminal panicles of sub-umbellate cyme; sepals eglandular; petals white, oblong, somewhat hooded or boat-shaped, entire at margins, glabrous outside; ovary not lobed, villous; styles glabrous; samara equally winged, hairy 1. *Aspidopterys*
- 1b. Leaves elliptic-oblong or lanceolate, cuneate at base, not gland-dotted above, glabrous to glabrescent below; flowers asymmetric in axillary racemes; sepals glandular; petals white with yellow or pink hue, sub-orbicular to obovate, clawed, fringed at margins, pubescent outside; ovary 3-lobed, pubescent; styles pubescent; samara unequally winged, glabrous 2. *Hiptage*

1. *Aspidopterys* Juss.

Aspidopterys nutans (Roxb. ex DC.) A. Juss., Ann. Sci. Nat., Bot. sér. 2, 13: 267. 1840; Hook. f., Fl. Brit. India 1: 421. 1872; Prain, Bengal Pl. 1: 227. 1903. *Hiraea nutans* Roxb. ex DC., Prodr. 1: 585. 1824. [Plate 26b-c]

Shubung Lahara (N).

Scandent shrub, tomentose when young. Leaves ovate to ovate-oblong, 4.5–12 × 2.6–9.8 cm, acute, entire, acuminate at apex, coriaceous, white appressed pubescent beneath; stipules acute, hairy. Inflorescence bracts subulate, hairy; bracteoles acute; pedicels c. 1.3 cm, articulate. Sepals oblong to oblong-obovate, connate at base. Petals 2.5–4 mm, spreading to reflexed. Stamens 10; filaments connate at base. Ovary ellipsoid; styles 3; stigmas capitate. Samara broadly elliptic, ovate-oblong, 1–2.2 × 0.7–1.5 cm, 3-winged.

Flowering & Fruiting: July–February.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: Rydak river belt, 20.09.2011, AK 52687; Bhutanghat, 26.09.2011, AK 52901; Checko-1, 25.09.2012, AK 56152; Jainty-Phashkhawa, 02.10.2012, AK 58610; Rangarnati to Bharnabari, 06.10.2012, AK 58713.

2. *Hiptage* Gaertn.

Hiptage benghalensis (L.) Kurz, J. Asiat. Soc. Bengal, Nat. Hist. 43 (2): 136. 1874; R. C. Srivast. in Hajra & al., Fl. India 4: 14. 1997. *Banisteria benghalensis* L., Sp. Pl. 1: 427. 1753. *Hiptage madablotia* Gaertn., Fruct. Sem. Pl. 2: 169, t. 116. 1790, *nom. illeg.*; Hook. f., Fl. Brit. India 1: 418. 1874; Prain, Bengal Pl. 1: 290. 1903. [Plate 27a-b]

Charpate Lahara, Madhabi-lata (N).

Scandent shrub, puberulent or glabrous. Leaves ovate-oblong or oblong-elliptic, 9.4–14.8 × 4.2–5.2 cm, cuneate, entire, acuminate at apex, coriaceous, glabrous. Inflorescences axillary racemes, 5–10 cm, silky tomentose. Flowers fragrant; pedicels 0.8–1.8 cm, articulate; bracts linear-lanceolate, tomentose; bracteoles 2, linear-lanceolate, tomentose. Sepals 5, connate below, oblong, subequal, 4–5 mm, obtuse at apex, ciliate, tomentose, gland adnate to pedicel. Petals cream-white, 5, suborbicular or obovate, c. 4 mm, obtuse at apex, laciniate, sericeous. Stamens 10; filaments declinate, length variable, glabrous, connate at base; anthers oblong. Ovary villous; style glabrous; stigma subcapitate. Fruit samara; middle wing oblanceolate, 3–4.3 cm, puberulous; lateral wings oblanceolate, 2–2.5 cm, puberulous; seed solitary, subglobose.

Flowering & Fruiting: February–May.

Distribution. India: Almost throughout India.

Specimens examined: Panbari 2, 31.03.2012, GK 56011; Hatipota, 17.02.2013, AK 59815; Santrabari, 18.02.2014, AK 59993.

Oxalidaceae

Key to the genera

- 1a. Cauliscent, non-bulbous herbs; leaves fascicled at top of stem, even-pinnate, pinnately 12–22-foliolate; inflorescences 4–6-flowered, terminal umbels in clusters among leaves; floral bracts ovate, ciliate, long acuminate or subulate at apex, keeled outside; pedicels glandular and simple hairy; sepals without brown callii at apex, glandular hairy; petals yellow, small, not clawed; ovary ellipsoid; capsules obovoid, not angled 1. *Biophytum*
- 1b. Acaulescent, bulbous herbs; leaves basal or cauline along stem, 3-foliolate; inflorescences 6–7-flowered pseudo-umbel, not among leaves; floral bracts lanceolate, not ciliate, acute at apex, not keeled outside; pedicels 1–1.5 cm, pilose; sepals with 2 brown callii at apex, not glandular hairy; petals pink, large, clawed; ovary oblong; capsules oblong, 5-angled 2. *Oxalis*

1. *Biophytum* DC.

Biophytum reinwardtii (Zucc.) Klotzsch in Peters, Naturw. Reise Mossambique 6 (Bot., 1): 85. 1861; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 437. 1874;

Prain, Bengal Pl. 1: 295. 1903. *Oxalis reinwardtii* Zucc., Abh. Math.-Phys. Cl. Koenigl. Bayer. Akad. Wiss. 1: 274. 1830.

Herb, 15–40 cm high, retrorsely appressed pubescent. Rachis 1.5–5 cm, red bulbous at base, ending in short subulate tip, puberulous; lower leaflets ovate, middle ones elliptic, terminal ones obovate, 2–9 mm, rotund to obliquely rotund at base. Sepals ovate-lanceolate or linear-lanceolate, 3–3.2 mm, simple and glandular hairy. Petals elliptic-obovate or oblanceolate, 5–6 mm, connate at base. Stamens 10 in 2 whorls; outer small and inner bigger; filaments pubescent above; anthers yellow, elliptic. Ovary ellipsoid; styles 5, sparsely hairy; stigmas 5-lobed. Capsules pubescent; seeds many, ovoid or ellipsoid. Capsules obovoid, not angled.

Flowering & Fruiting: July–December.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52745; Marakata, 24.09.2011, AK 52854; Sankosh, 28.09.2011, AK 52975; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58584.

2. *Oxalis* L.

Oxalis debilis Kunth, Nov. Gen. Sp. 5: 236, t. 466. 1821 [1822]. *Oxalis corymbosa* DC., Prodr. 1: 696. 1824; M. K. Manna in Hajra & al., Fl. India 4: 246. 1997.

[Plate 27c]

Creeping herb, brownish bulbous root stocked. Leaves basal; leaflets obcordate, 1.5–2.5 × 2–3.5 cm, notched at apex, entire, cuneate, chartaceous, hairy. Inflorescences subumbellate corymbs, 2–12-flowered; peduncles 5–15 cm, pubescent; pedicels sparsely villous; bracts ovate, villous. Sepals green, 5, elliptic-ovate, 4–4.5 cm, acute, pubescent at apex with two elliptic glands. Petals pink, dark pink streaked, 5-lobed above, obovate, c. 10 mm, obtuse at apex, recurved; tube hairy within. Stamens 10, in 2 whorls; outer whorl shorter; filaments free above, jointed below enclosing ovary, hairy; anthers ovoid, dorsifixed. Ovary oblong, hairy; styles 5, hairy; stigma capitate. Capsules oblong, 5-angled.

Flowering & Fruiting: January–September.

Distribution. India: Assam, Bihar, Delhi, Jammu & Kashmir, Kerala, Manipur, Meghalaya, Mizoram, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: 23rd mile watch tower, 09.02.2010, SKS & GK 46359; Sankosh, 17.02.2012, AK 55678.

Balsaminaceae

Impatiens Riv. ex L.

Key to the species

- 1a. Leaves crenate-serrate at margins; petioles with a pair of stipitate glands at apex; flowers yellow; floral bracts and sepals glandular tip at apex; keels ends in c. 1 cm long subulate appendages, overtopping the dorsal petal; ovary with linear cystoliths; capsules clavate 4. *I. jurpia*
- 1b. Leaves crenate or serrate at margins; petioles without stipitate glands at apex; flowers pink or variously coloured; floral bracts and sepals not glandular tip at apex; keels not as above; ovary without linear cystoliths; capsules fusiform 2
- 2a. Stems corrugate, straight; leaf base without filiform appendages; stipules absent; petioles glandular; flowers variously coloured; dorsal sepal glabrous or hairy at margins, glabrous or pubescent; lower part of lateral petals overlapped, bilobed at apex; capsules white tomentose 1. *I. balsamina*
- 2b. Stems not corrugate, zig-zag; leaf base filiform appendaged; stipules present; petioles not glandular; flowers pink; dorsal sepal glabrous at margins, glabrous; lower part of lateral petals not overlapped, not bilobed at apex; capsules glabrous 3
- 3a. Leaves opposite to sub-opposite above; midvein glabrous or sparsely pubescent; inflorescences not pedunculate; floral bracts triangular-ovate; lateral sepals bluntly acute at apex; lower sepal abruptly constricted in spur at base; spurs strongly incurved, less than 1 cm 5. *I. tripetala*
- 3b. Leaves alternate above; inflorescence pedunculate; floral bracts lanceolate to linear-lanceolate; lateral sepals sharply acute or apiculate at apex; lower sepal gradually constricted in spur at base; spurs slightly curved, equal or more than 1 cm 4
- 4a. Stems terete, pubescent; leaves serrate at margins, acuminate at apex; petioles vesicular; lateral sepals sharply acute at apex; lower sepals beaked at apex of mouth; spurs 1-2 cm; dorsal petal without crest 2. *I. exilis*
- 4b. Stems angular, glabrous; leaves crenate at margins, caudate-acuminate at apex; petioles not vesicular; lateral sepals apiculate at apex; lower sepals acute at apex of mouth; spurs 2-3 cm; dorsal petal with crest 3. *I. latiflora*

1. *Impatiens balsamina* L., Sp. Pl. 2: 938. 1753; Hook. f., Fl. Brit. India 1: 453. 1874; Prain, Bengal Pl. 1: 296. 1903. [Plate 28a]

Herb, 30-60 cm high, glabrous or pubescent. Leaves lanceolate or oblanceolate, 5-14 × 1-2.5 cm, attenuate, acute or acuminate. Inflorescence axillary, solitary or in fascicles; floral bracts triangular-ovate, glabrous or pubescent; pedicels pubescent. Lateral sepals ovate or ovate-lanceolate, glabrous or pubescent; lower sepals petaloid, navicular, 6-10 mm, spurred, beaked, pubescent; spurs 1.2-2 cm, pubescent. Dorsal petal cucullate, 6-8 mm, keeled outside, white hairy; lateral petals united, 2-lobed; upper lobes irregularly obovate, appendaged; lower lobes ovate-circular or orbicular. Filaments connate at base; anthers cohering. Ovary 5-celled; stigma sessile, 5-toothed. Capsules fusiform; seeds many, globose.

Flowering & Fruiting: March–October.

Distribution. India: Almost throughout India.

Specimens examined: Tobgaon, JKS 4005; Checko-1, 25.09.2012, AK 56149, 56150.

2. *Impatiens exilis* Hook. f., Rec. Bot. Surv. India 4: 13. 1905; Vivek. & al. in Hajra & al., Fl. India 4: 145. 1997. [Plate 28b]

Herb, 30–60 cm high. Leaves ovate to elliptic-ovate, 4.5–12 × 1.7–3.5 cm, attenuate, hairy, puberulous above when young; stipules filiform glandular processes, glabrous or pubescent. Inflorescences 6–7-flowered, fascicled racemes; pedicels 0.5–3.8 cm. Lateral sepals ovate to lanceolate, 3–4 mm; lower sepals petaloid, navicular, 5–10 mm, spurred. Dorsal petal cucullate, c. 5mm, keeled, minute hairy; lateral petals united, 2-lobed, vesicular; upper lobes irregularly ovate or orbicular; lower lobes elliptic, 4–6 mm, yellow appendaged. Filaments connate at base; anthers cohering. Ovary 5-celled, elliptic-oblong; style short; stigma 5-toothed. Capsules fusiform, 4–5.5 mm; seeds many, minute.

Flowering & Fruiting: December–March.

Distribution. India: Sikkim and West Bengal.

Specimens examined: Buxa to Chunabhati, VN 2613; Bhutri, 13.02.2013, AK 58888; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59664.

3. *Impatiens jurpia* Buch.-Ham. ex Hook. f. & Thomson, J. Proc. Linn. Soc., Bot. 4 (no. 15): 140. 1859; Hook. f., Fl. Brit. India 1: 471. 1875; Vivek. & al. in Hajra & al., Fl. India 4: 161. 1997. [Plate 28c; Fig. 12]

Herb, 50–60 cm high. Leaves elliptic to elliptic-oblong, 8–25 × 2.5–12 cm, attenuate, small appendages at margins, acuminate at apex, sparsely hirsute. Inflorescence axillary, 2 to many flowered, pedunculate racemes; peduncles 2.5–5 cm, hirsute; floral bracts ovate to lanceolate; pedicels 1.4–2.7 cm. Lateral sepals reddish, ovate to lanceolate; lower sepal orange yellow with reddish hue, navicular, beaked, lincolate; spurs reddish, incurved, notched at end. Dorsal petal obovate to sub-orbicular, cucullate, keeled; lateral petals fused, 2-lobed; upper lobes elliptic-oblong, 0.8–1 cm, dorsal auricled; basal lobes asymmetrically obovate. Filaments connate at base; anthers oblong, connate. Ovary linear-oblong; stigma 5-toothed. Capsules 1–3 cm, sub-acute at apex; seeds many, minute.

Flowering & Fruiting: September–December.

Distribution. India: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal.

Specimen examined: Tashigaon to Rovers point, 02.10.2013, AK 59751.

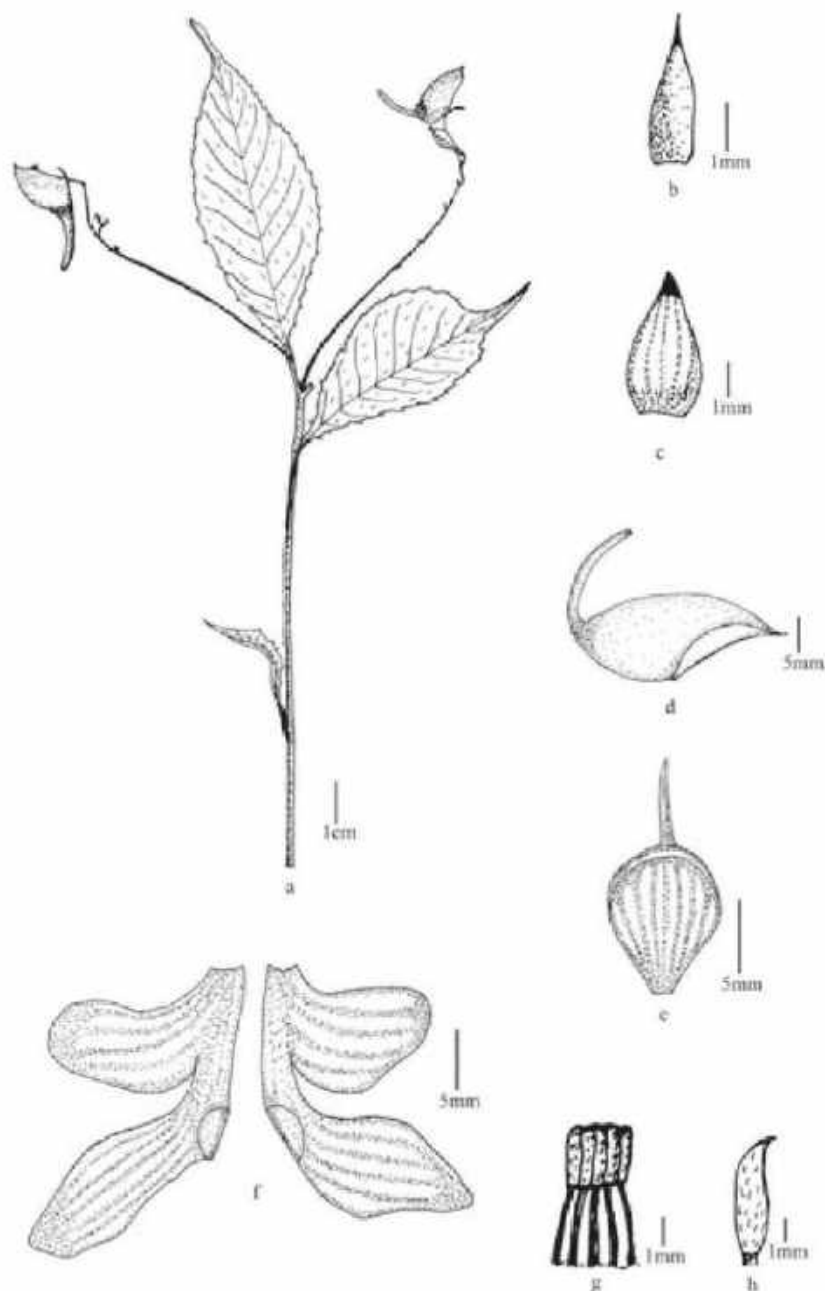


Fig. 12. *Impatiens jurpia*: a. Flowering branchlet; b. Floral bract; c. Lateral sepal; d. Lower sepal; e. Dorsal petal; f. Lateral petals; g. Stamens; h. Gynoecium (AK 59751).

Notes: Impatiens jurpia can be distinguished by its sparsely hirsute leaves, orange yellow flowers, long appendage of the dorsal petal and smaller lateral sepals.

4. *Impatiens latiflora* Hook. f. & Thomson, J. Proc. Linn. Soc., Bot. 4 (no. 15): 139. 1859; Hook. f., Fl. Brit. India 1: 459. 1874; Vivek. & al. in Hajra & al., Fl. India 4: 168. 1997. [Plate 28d]

Herb or undershrub, 30–100 cm high. Leaves elliptic-lanceolate to lanceolate, 7.5–17.5 × 3–5 cm, attenuate and decurrent at base. Inflorescences 2–3-flowered, fascicled racemes; pedicels 2–3 cm. Lateral sepals ovate to lanceolate, apiculate; lower sepals pinkish, shallowly and obliquely navicular, spurred. Dorsal petal sub-orbicular-obcordate, c. 8 mm across; lateral petals united, 2-lobed; upper lobes asymmetrically oblong-ovate, obtuse; lower lobes asymmetrically elliptic-obovate, obtuse. Filaments connate at base; anthers cohering. Ovary 5-celled; style short; stigma 5-toothed. Capsules fusiform; seeds many, ovate.

Flowering & Fruiting: September–December.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland and West Bengal.

Specimens examined: Rangamati to Bharnabari, 06.10.2012, AK 58717; Buxa Fort to Tashigaon, 01.10.2013, AK 59715.

5. *Impatiens tripetala* Roxb. & DC. in DC., Prodr. 1: 687. 1824; Hook. f., Fl. Brit. India 1: 470. 1875; Vivek. & al. in Hajra & al., Fl. India 4: 219. 1997. [Plate 29a]

Herb, 60–90 cm high, pubescent when young. Leaves ovate to elliptic-ovate or lanceolate, 2–15 × 1–5 cm, attenuate, acuminate at apex, pubescent; stipules fimbriate. Inflorescence axillary, solitary or 2–3-flowered fascicle; pedicels 3–4 cm. Lateral sepals ovate or lanceolate; lower sepals saccate, 1.2–1.5 × 1–1.4 cm, beaked, pubescent. Dorsal petal cucullate, keeled; lateral petals united, 2-lobed; upper lobes sub-orbicular; lower lobes ovate, 1–1.2 × 0.5–0.8 cm. Filaments connate at base; anthers cohering. Ovary 5-celled; style short; stigma 5-toothed. Capsules fusiform; seeds 4–5, obovate, pubescent.

Flowering & Fruiting: July–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland and West Bengal.

Specimens examined: Buxa road, KB 1627; Jainti range, Bhutia Pond, 04.10.2009, SKS & GK 46118; Jainti 7–8, 05.03.2011, GK 47248; Newlands, Sukno river, 22.09.2011, AK 52738; Bhutanghat, Mainabari, 26.09.2011, AK 52900; Bhutanghat, 26.09.2011, AK 52909; North Rydak, 26.09.2011, AK 52935; SRVK 10, 30.03.2012, GK 50657; Chuniajhora, 28.09.2012, AK 58504; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58590.

Rutaceae

Key to the genera

- 1a. Herbs; leaves bipinnately compound; stamens below disk; disk stipitate; ovary short stipitate; stigma clavate; fruits capsules, 4-lobed, connate at base, splitting into 4 distinct fruitlets when mature; seeds acutely papillate 1. *Boenninghausenia*
- 1b. Shrubs or small trees; leaves not bipinnately compound; stamens not below disk; disk not stipitate; ovary sessile; stigma not clavate; fruit not as above; seeds smooth or gland-dotted 2
- 2a. Leaves simple; stems armed, 0.5–2.6 cm, straight, axillary spinous; petals pinkish outside; stamens 20–50, polyadelphous; ovary cylindric, 12–14-locular; ovules more than 2 in each locule; fruits hesperidium 2. *Citrus*
- 2b. Leaves digitately or pinnately compound; stems unarmed, if armed then with 2–7 mm, straight or hooked, scattered spines; petals green or white outside; stamens 4–10, free; ovary not cylindric, 1–7-locular; ovules 1–2 in each locule; fruits not hesperidium 3
- 3a. Climbing shrubs (except *Zanthoxylum acanthopodium*), armed; flowers unisexual; stamens less than 10 4
- 3b. Erect shrubs or small trees, unarmed; flowers bisexual; stamens 10 5
- 4a. Stems armed, hooked spinous; leaflets 3, digitate, crenate at margins; female flowers syncarpous; stamens usually 5; stigma 5-lobed; fruits drupes; seeds reniform 6. *Toddalia*
- 4b. Stems armed, straight/hooked spinous; leaflets more than 3, pinnate, glandular serrate or repand at margins; female flowers apocarpous; stamens 4–6; stigma not lobed; fruits follicles; seeds sub-globose 7. *Zanthoxylum*
- 5a. Leaflets symmetrically cuneate at base, coriaceous; stamens in single whorl, equal; style indistinct; stigma truncate, obscurely 5-lobed 3. *Glycosmis*
- 5b. Leaflets obliquely cuneate at base, chartaceous; stamens in 2 whorls, 5 small and 5 bigger; style distinct; stigma capitate, not lobed 6
- 6a. Leaflets black gland-dotted; floral bracts triangular-ovate; petals strongly reflexed; ovary pubescent; style c. 1.5 mm; seeds reniform, smooth 4. *Micromelum*
- 6b. Leaflets black gland-dotted above only; floral bracts lanceolate; petals slightly reflexed; ovary glabrous; style more than 1.5 mm; seeds ovoid-oblong to ellipsoid, gland-dotted 5. *Murraya*

1. *Boenninghausenia* Rchb. ex Meisn.

Boenninghausenia sessilicarpa H. Lév., Repert. Spec. Nov. Regni Veg. 12: 282. 1913; K. Narayanan & M. P. Nayar in Hajra & al., Fl. India 4: 359. 1997.

[Plate 29b; Fig. 13]

Herb, 30–50 cm high, gland-dotted and sparsely hairy at nodes. Leaves bipinnate, 4–16 cm; leaflets 3–5, elliptic to obovate to broadly obovate to suborbicular;

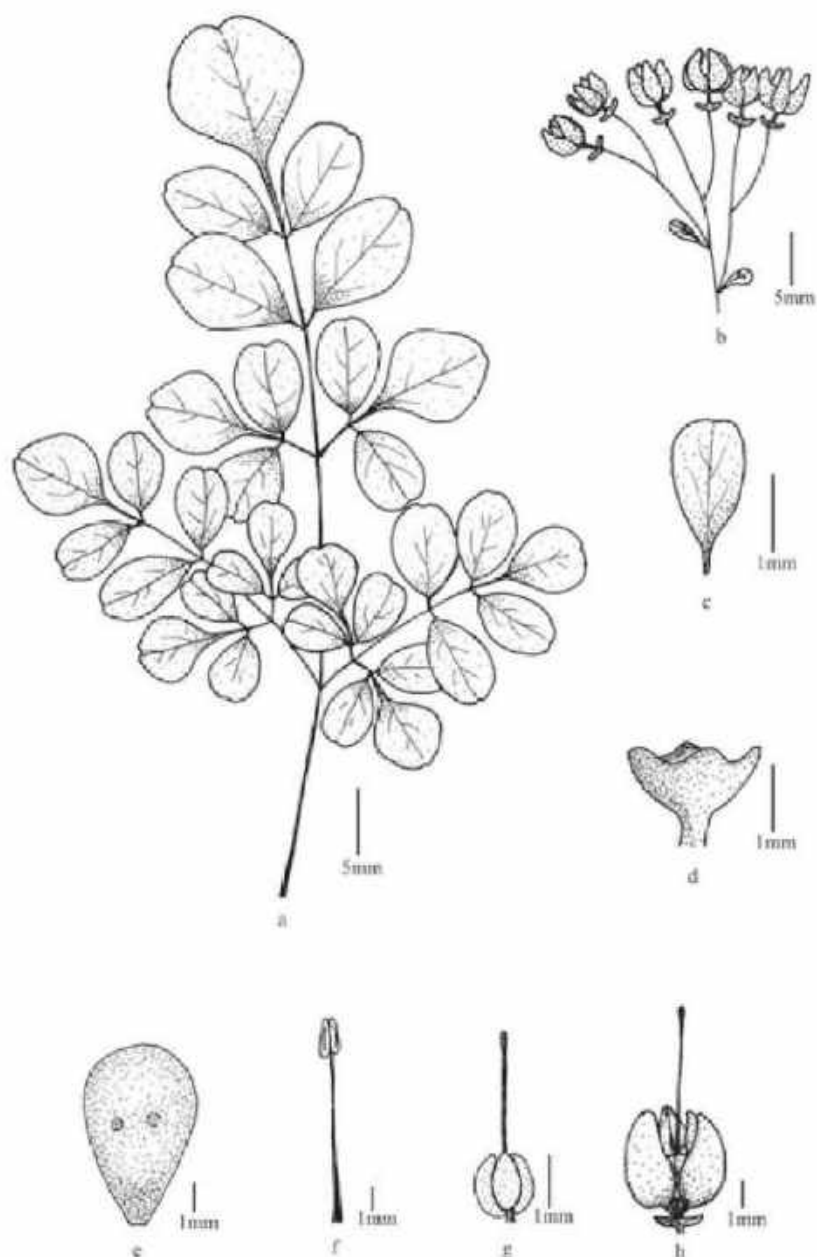


Fig. 13. *Boenninghausenia sessilicarpa*: a. Leaf; b. fruiting twig; c. Inflorescence bract; d. Calyx; e. Petal; f. Stamen; g. Gynoecium; h. Capsule with style and calyx (AK 59904).

terminal one larger than lateral ones, glandular below; lateral ones obovate to obcordate or sub-orbicular, cuneate, obtuse to rounded or slightly emarginate at apex. Inflorescence terminal umbellate; inflorescence bracts obovate or oblanceolate, obtuse to emarginate, glandular. Calyx cupular; tube short; lobes 4–5, obtuse, glandular. Petals white, 4–5, sub-orbicular. Stamens 8; filaments 5–7 mm; anthers reddish, ellipsoid; disk cupular. Ovary 3–5-lobed, splitting at tip, connate at base, glandular; styles as many as carpels, free below, fused above. Capsules green with maroon hue, sub-globose, glandular; fruitlets trigonous-ovoid; seeds many, reniform.

Flowering & Fruiting: November–February.

Distribution. India: Assam, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 11.02.2014, AK 59904.

2. Citrus L.

Citrus medica L., Sp. Pl. 2: 782. 1753; Hook. f., Fl. Brit. India 1: 514. 1875; Prain, Bengal Pl. 1: 306. 1903. [Plate 30a]

Begpura (B); *Bogati*, *Bimira*, *Bimera*, *Samphor* (N).

Shrub, 2–3 m high, armed, gland-dotted. Leaves oblong-obovate, broadly ovate or elliptic, 6.7–9.7 × 3–6 cm, acute to obtuse, serrulate, rounded or emarginate, coriaceous, black gland-dotted; petioles slightly winged or not, articulate. Inflorescence axillary, umbellate, 6–8-flowered. Flowers bisexual and staminate; floral bracts linear, ciliate. Male: calyx cupular, gland-dotted; lobes pinkish green or brownish green, 4 or 5, deltate; petals white inside, 4 or 5, elliptic-oblong, obovate to oblanceolate, 10–15 × 4–6 mm, acute to obtuse; stamens 20–50; filaments pubescent; anthers creamy white; pistillodes white glandular. Bisexual: calyx, petals and stamens same as staminate flowers; ovary c. 8 × 4 mm; style c. 1.5 cm; stigma globose. Fruits yellowish, ovoid or ellipsoid, 3.5–10 × 2.7–5 cm, juicy, pellucid glandular; seeds many, obovoid.

Flowering & Fruiting: December–June.

Distribution. India: Manipur, Meghalaya and West Bengal.

Specimens examined: Jainti River, 03.03.2011, GK 47216; Newlands, 15.02.2012, AK 53092.

3. *Glycosmis* Correa

Key to the species

- 1a. Leaflets repand at margins, acuminate to caudate-acuminate, blunt at apex; ovary glandular; style glabrous; berries bluish, obovoid or ellipsoid, glandular, pulpy; seeds ellipsoid **1. *G. cymosa***
- 1b. Leaflets serrate at margins, acute to obtuse or rounded at apex; ovary and style glandular papillose; berries creamy white to pinkish, sub-globose to globose, mammillate, mucilaginous; seeds plano-convex **2. *G. pentaphylla***

1. *Glycosmis cymosa* (Kurz) V. Naray., Rec. Bot. Surv. India 16 (2): 26. 1941. *Glycosmis cyanocarpa* (Blume) Spreng. var. *cymosa* Kurz, J. Bot. 14: 34. 1876. *Glycosmis pentaphylla* var. 2, subvar. 4 sensu Hook. f., Fl. Brit. India 1: 500. 1875. *Glycosmis pentaphylla* var. *nitida* Prain, Bengal Pl. 1: 300. 1903. [Plate 30b-c]

Shrub, 2–3 m high, rusty pubescent when young. Leaves pinnate; leaflets 2–5, lanceolate, oblong-lanceolate to elliptic-lanceolate, 10–16 × 3.5–4.6 cm, sub-coriaceous, gland-dotted. Inflorescences axillary, dichotomously branched panicles, rusty pubescent; floral bracts triangular-ovate, ciliolate, rusty pubescent. Sepals sub-orbicular, ciliolate at apex. Petals obovate, 3.5–4.2 mm, glandular. Filaments flat; anthers elliptic-oblong; disk white, annular, many lobed. Ovary sub-globose; style angular; stigma glandular; seed solitary, 7–8 mm.

Flowering & Fruiting: February–May.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal.

Specimens examined: NRVK 6, 05.03.2011, GK 47272; Hatipota, 18.02.2013, AK 59832; Buxaduar to Tashigaon, 20.05.2014, AK 62692.

Notes: Berries are edible.

2. *Glycosmis pentaphylla* (Retz.) DC., Prodr. 1: 538. 1824. *Limonia pentaphylla* Retz., Observ. Bot. 5: 24. 1788. *Glycosmis pentaphylla* auct. non DC. 1824: Hook. f., Fl. Brit. India 1: 499. 1875, *p p*; Prain, Bengal Pl. 1: 300. 1903. [Plate 31a-b]

Evergreen shrub, 2–4 m high, gland-dotted or smooth, rusty pubescent when young. Leaves imparipinnate; leaflets 3–5, sometimes 7, elliptic to elliptic-oblong, oblanceolate, 3–17 × 1.2–5.2 cm, gland-dotted. Inflorescences panicles, rusty pubescent; floral bracts ovate to triangular-ovate, ciliolate, rusty pubescent. Sepals ovate to sub-orbicular, ciliolate, acute or obtuse, rusty pubescent. Petals obovate, 3–3.5 mm, pellucid glandular. Filaments flat; anthers elliptic-oblong; disk white, annular, obscurely lobed. Berries globose, apiculate, up to 2 cm across; seeds 2–3, 4–5 mm across.

Flowering & Fruiting: July–February.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, JKS 4140; Buxaduar, JKS 6925; SRVK, 08.12.1975, JKS 4246; Jainti, 06.10.2009, SKS & GK 46193; Kumargram, 19.09.2011, AK 52636; Kumargram, Kalikhola river belt, 21.09.2011, AK 52725; Bhutanghat, Mainabari, 26.09.2011, AK 52888; Chuniajhora, 28.09.2012, AK 58506.

4. *Micromelum* Blume

Micromelum integerrimum (Roxb. ex DC.) Wight & Arn. ex Voigt, Hort. Suburb. Calcutt.: 140. 1845. *Bergera integerrima* Roxb. ex DC., Prodr. 1: 537. 1824. *Micromelum pubescens* auct. non Blume 1825: Hook. f., Fl. Brit. India 1: 501. 1875, *p. p.*, excl. vars. 1 & 3; Prain, Bengal Pl. 1: 302. 1903. [Plate 31c-d]

Tree, 3–5 m high, pubescent. Leaflets 7–8, ovate, elliptic-ovate to elliptic-lanceolate, 6.5–15 × 3.5–7.7 cm, acuminate at apex, sparsely pubescent. Inflorescences terminal or from upper leaf axils, paniculate cymes; floral bracts and pedicels pubescent. Calyx cupular; tube short; lobes ovate, pubescent. Petals elliptic to elliptic-ovate or elliptic-oblong, c. 3.5 mm, pubescent. Staminal filaments 4–6 mm; anthers oblong or elliptic; disk annular. Ovary pale yellow, oblong-ovate; style angular or cylindric, swollen at base. Berries orange or reddish, ellipsoid, 8–12 mm, pulpy, pellucid-punctate; seeds 2 or 3, compressed.

Flowering & Fruiting: January–July.

Distribution. India: Andaman Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: Checko 2, 09.02.2010, SKS & GK 46381; Jainti 4, 04.03.2011, GK 47245; Newlands, 15.02.2012, AK 53082; NRVK 5, 27.11.2012, GK 50592.

5. *Murraya* Koenig ex L.

Key to the species

- 1a. Rachis 5–18 cm; leaflets 7–19, serrulate at margins; inflorescence many flowered corymbose cymes; floral bracts glabrous; calyx saucer-shaped; petals linear-lanceolate to lanceolate; style 3–3.5 mm; berries ovoid-oblong to ellipsoid, pilose
1. *M. koenigii*
- 1b. Rachis 1.2–6 cm; leaflets 3–7, entire to irregularly crenate at margins; inflorescence few flowered panicles; floral bracts pubescent; calyx cupular; petals obovate; style 4–8 mm; berries sub-globose, glabrous
2. *M. paniculata*

1. *Murraya koenigii* (L.) Spreng., Syst. Veg. 2: 315. 1825; Hook. f., Fl. Brit. India 1: 503. 1875; Prain, Bengal Pl. 1: 302. 1903. *Bergera koenigii* L., Mant. Pl. Altera: 565. 1771. [Plate 32a]

Mechia Sag (N).

Tree, 1–4 m high, pilose when young. Leaflets ovate to lanceolate, 1–6.5 × 0.6–2.3 cm, glandular and glabrous or hairy, short acuminate at apex; pedicels black gland-dotted, pilose. Calyx saucer like; lobes triangular-ovate, pilose. Petals 5–7 mm. Filaments connate at base; anthers sub-globose to ellipsoid; disk annular. Ovary oblong-ovoid. Berries pinkish, 3.5–8.5 mm, umbonate, pulpy, pellucid glandular; seeds 1 or 2.

Flowering & Fruiting: February–July.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Jainti Range, 11.10.2009, SKS & GK 46291; Kumargram, 18.02.2012, AK 55702; Hatipota, 29.09.2012, AK 58517; Rangamati, 14.02.2013, AK 59802.

2. *Murraya paniculata* (L.) Jack, Malayan Misc. 1 (5): 31. 1820. *Murraya exotica* L., Mant. Pl. Altera: 563. 1771 (as "*Murraea*"); Hook. f., Fl. Brit. India 1: 502. 1875; Prain, Bengal Pl. 1: 302. 1903. [Plate 32b-c]

Shrub, 2–3 m high, glandular and pilose when young. Leaflets 3–9, arranged alternately on the rachis, lanceolate, ovate or ovate-elliptic, 2.8–7 × 1–2.5 cm, rounded, entire, hairy at margins, acuminate at apex. Flowers fragrant; pedicels c. 1 cm in fruiting, pubescent. Calyx tube short; lobes 4 or 5, triangular-ovate, glandular-punctate. Petals 5, white or cream, 1–1.2 × 0.2–0.4 cm, obtuse, glandular. Filaments 5–8 mm, connate at base; anthers yellow; disk shallowly lobed. Ovary ovoid-ellipsoid. Berries orange-red, 4.5–6.5 mm, umbonate at apex, pellucid gland dotted; seeds 1 or 2.

Flowering & Fruiting: February–September.

Distribution. India: Almost throughout India.

Specimens examined: Jainti 3–4, 04.03.2011, GK 47235; Jainty-Phashkhawa, 02.10.2012, AK 58607.

6. *Toddalia* Juss.

Toddalia asiatica (L.) Lam., Tabl. Encycl. 2: 116. 1797. *Paullinia asiatica* L., Sp. Pl. 1: 365. 1753. *Toddalia aculeata* Pers., Syn. Pl. 1: 249. 1805, *nom. illeg.*; Hook. f., Fl. Brit. India 1: 497. 1875; Prain, Bengal Pl. 1: 299. 1903. [Plate 32d]

Shingane (N).

Liana, thorny, brown tomentose. Leaves 3-foliolate; leaflets oblanceolate or elliptic-obovate, 6.7–9.2 × 2.8–3.7 cm, attenuate, crenate, acuminate, subcoriaceous, gland-dotted. Inflorescences panicles of umbellate cymes; floral bracts triangular-ovate, pubescent; pedicels pubescent. Male: calyx cupular; tube short; lobes 5, rarely 6, deltoid or triangular, pubescent; petals yellow-green, 5, rarely 6, oblong or elliptic-oblong, 3–4 mm, acute, sparsely hairy and keeled inside, gland-dotted; filaments 3–5 mm; anthers yellow, elliptic; disk annular, 5 or more-lobed; pistillodes cylindric. Female: calyx same as in male flowers; petals oblong, caducous, or else same as male flowers; staminodes short; disk same as male flowers; ovary sub-globose, punctate; style minute; stigma punctate. Drupes orange yellow or reddish, sub-globose, faintly 3–6-grooved, glandular; seed solitary in each locule.

Flowering & Fruiting: November–June.

Distribution. India: Almost throughout India.

Specimens examined: Way to Sinchula, KPB 2071; Buxaduar, JKS 4643; Pana, 11.02.2013, AK 58847; Buxaduar to Tashigaon, 20.05.2014, AK 62686.

Notes: Flowers usually 5-merous but often seen 6-merous condition in male flowers.

7. *Zanthoxylum* L.

Key to the species

- 1a. Trees, straight spinous; rachis 9–12 cm, narrowly winged; leaflets sessile, glandular-serrate at margins; lateral veins parallel, 15–30 pairs; calyx and petals indistinct; perianth lobes 5–8, ligulate; anthers not gland-tipped; follicles glandular
1. *Z. acanthopodium*
- 1b. Scrambling shrubs, hooked spinous; rachis 20–33 cm, not winged; leaflets petiolulate, entire and irregularly repand at margins; lateral veins not parallel, 5–15 pairs; calyx and petals distinct; petals 4, ovate or elliptic, boat-shaped; anthers gland-tipped; follicles pustular
2. *Z. nitidum*

1. *Zanthoxylum acanthopodium* DC., Prodr. 1: 727. 1824; Hook. f., Fl. Brit. India 1: 493. 1875. *Zanthoxylum acanthopodium* var. *timbor* Hook. f., Fl. Brit. India 1(3): 493. 1875.

Boke Timur (N).

Straggling thorny shrubs, 6–10 m high, glandular, pubescent when young. Leaves imparipinnate, c. 25 cm long; rachis winged; leaflets 5–11, ovate-lanceolate to elliptic-lanceolate, 2.5–8 × 1.2–2.8 cm, obliquely cuneate, acuminate at apex, glandular. Inflorescences axillary, dense, short, paniculate cymes, pubescent; floral bracts hairy; pedicels pubescent; perianth uniseriate; lobes small, hairy. Male: stamens 4–6; filaments short; anthers reddish purple; disk pulvinate; pistillodes

2–5. Female: ovary 2–5 carpellate, carpels glandular-punctate; style divergent. Follicles reddish, in clusters, ovoid to sub-globose; seed solitary in each carpel, black.

Flowering & Fruiting: March–September.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59950.

Notes: Tender leaflets used in chutney preparations.

2. *Zanthoxylum nitidum* (Roxb.) DC., Prodr. 1: 727. 1824. *Fagara nitida* Roxb., FL Ind. 1: 439. 1820. *Zanthoxylum hamiltonianum* Wall. ex Hook. f., Fl. Brit. India 1 (3): 494. 1875. *Zanthoxylum hamiltonianum* var. *tomentosum* Wall. in Hook. f., Fl. Brit. India 1: 484. 1875.

Parpar Timur (N).

Woody climber, prickly. Leaves 10–34 cm; leaflets 7–9, elliptic-ovate to elliptic-lanceolate or oblong, 0.5–1.6 × 3–5.5 cm, obliquely rounded or obtuse, cuneate, acuminate, sparsely gland-dotted. Inflorescences axillary, paniculate, fascicles. Flowers either functionally male or female. The male flowers with four stamens, c. 3.5 mm and four sterile, finger-like carpels. The female flowers lack stamens and have four carpels, 1.5–2 mm; calyx cupular; tube short; lobes 4, triangular-ovate; petals 4, small, hyaline, obtuse with curved mucronate tip, keeled inside. Male: stamens 4; filaments short; anthers ovoid; disk flat; pistillodes 4, spindle or fusiform. Female: carpels 4, ovoid; style short; stigma capitate; disk pulvinate. Follicles reddish-brown, in clusters, globose, beaked; seed solitary in each carpel.

Flowering & Fruiting: January–September.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal.

Specimens examined: Rajabhatkhawa Range, 14.02.2010, SKS & GK 47085; Panbari 8, 03.04.2012, GK 50680; Checko-1, 10.02.2013, AK 58835.

Notes: Fruits are lemon scented.

Simaroubaceae

Key to the genera

- | | |
|--|---------------------|
| 1a. Leaves even-pinnate; stamens 10; fruit a cluster of samaras | 1. <i>Ailanthus</i> |
| 1b. Leaves trifoliolate or odd-pinnate; stamens 5; fruit a cluster of drupes | 2 |
| 2a. Shrubs; leaflets caudate; inflorescence in cymes; filaments glabrous at base; drupes without persistent calyx | 2. <i>Brucea</i> |
| 2b. Trees; leaflets acute to shortly acuminate; inflorescence in umbels; filaments hairy at base; drupes with persistent calyx | 3. <i>Picrasma</i> |

1. *Ailanthus* Desf., *nom. cons.*

***Ailanthus integrifolius* Lam.** in Lam. & al., *Encycl.* 3: 417. 1789. [Plate 33a-b]

Deciduous tree, c. 15 m high, pubescent when young, then glabrescent. Leaves odd-pinnate, c. 40 cm; leaflets 3–7 pairs, lanceolate, 4–14.5 × 1.5–6 cm, cuneate, entire, acuminate, a gland on main lateral veins near margins. Inflorescences panicles, 30–40 cm. Sepals 5, 2–3 mm. Petals light green, 5, base hispid. Stamens 10; filaments hispid, longer than petals in males, shorter than petals in females. Carpels 5; styles connate; stigmas 5-lobed. Samaras oblong, seed in the middle of wing, flat-globosc.

Flowering & Fruiting: April–October.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimen examined: Buxafort to Tashigaon, 01.10.2013, AK 59709.

2. *Brucea* J. F. Mill.

***Brucea mollis* Wall. ex Kurz,** *J. Asiat. Soc. Bengal Pt. 2, Nat. Hist.* 42: 64. 1873; A. W. Benn. in Hook. f., *Fl. Brit. India* 1: 521. 1875. [Plate 33c-d]

Shrub, 1–1.5 m high, tomentose when young. Leaves pinnate; rachis 7–25.5 cm, tomentose; leaflets 3–11; lateral ones ovate to lanceolate, oblong-lanceolate, 2.5–11 × 0.9–4.5 cm, obliquely cuneate, repand and hairy, acuminate at apex, basal pairs smaller than apical pairs, pubescent; terminal ones obovate to oblanceolate, or else same as lateral ones. Inflorescences axillary, panicles pendulous during fruiting, tomentose. Flowers unisexual or bisexual; floral bracts linear, pubescent; pedicels tomentose. Male and female floral parts same as in bisexual flowers. Bisexual: sepals 4, ovate or triangular-ovate, pubescent. Petals greenish white, 4, bluntly acute, pubescent. Stamens 4; filaments short; anthers white, globose; disk 4-lobed. Carpels 4; style reflexed; stigma capitate. Drupes red, ovoid, 10–12 mm, appressed pubescent; seed solitary, fusiform.

Flowering & Fruiting: July–March.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Bhutanghat, 26.09.2011, AK 52896, 52919; Jainti 6–7, 04.12.2011, GK 52321; Bhutanghat, 25.02.2012, AK 55934; Phashkhawa, 27.09.2012, AK 56187.

Notes: Its leaves are good fodder.

3. *Picrasma* Blume

Picrasma javanica Blume, Bijdr. Fl. Ned. Ind. 5: 248. 1825; A. W. Benn. in Hook. f., Fl. Brit. India 1: 520. 1875. [Plate 34a-b]

Tree, 15–20 m high, dioecious. Leaves whorled, 5–7-foliolate, 12–16 cm; rachis terete, glabrous, pulvinate; leaflets elliptic, oblong-ovate or obovate, acute, entire or wavy, caudate at apex, sub-coriaceous, glabrous. Inflorescence axillary, umbels, pubescent. Flowers unisexual. Male: pedicels hispid; sepals shallowly 4-lobed, connate below; lobes ovate or sub-orbicular, acute, hispid outside; petals white, 4, ovate, slightly incurved, cuspidate at apex; disk white hairy; stamens 4; filaments subulate, hairy at base; anthers ovoid. Female: sepals and disk as in male flowers; petals ovate, larger than in male flowers and accrescent; ovary globose. Drupes ovoid-subglobose, black with persistent petals.

Flowering & Fruiting: Throughout the year.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Odisha, Sikkim, Tripura and West Bengal.

Specimen examined: Panbari 3–6, 31.03.2012, GK 56014.

Burseraceae

Garuga Roxb.

Garuga floribunda Decne. var. *gamblei* (King ex W. W. Sm.) Kalkman, Blumea 7: 466. 1953; V. Chithra & A. N. Henry in Hajra & al., Fl. India 4: 448. 1997. *Garuga gamblei* King ex W. W. Sm., Rec. Bot. Surv. India 4: 262, 1911. [Plate 34c]

Dabdbe (N).

Deciduous tree, 15–20 m high, pubescent when young. Leaves paripinnate, 15–45 cm; stipules linear to spatulate, deciduous; leaflets elliptic or oblong-lanceolate, 5–14 × 2–5.5 cm, obliquely rounded or cuneate, serrate, acuminate, subcoriaceous, glabrescent. Inflorescences paniculate cymes, 7–20 cm, tomentose; pedicels tomentose. Sepals 5, free above, cupular below, tomentose outside; lobes deltoid, acute at apex, tomentose inside, hairy outside. Petals light yellow, 5; triangular-ovate, acute, tomentose. Stamens 10, 2-seriate, attached to calyx tube at margins; filaments flattened, hairy at base; anthers oblong, glandular pubescent; disk 10-lobed. Ovary globose, 4–5-loculed; style hairy at base; stigma 5-lobed, greenish. Drupes black, subglobose; seed with a membranous covering.

Flowering & Fruiting: January–December.

Distribution. India: Assam, Sikkim and West Bengal.

Specimen examined: NRVK 5, Near Watch Tower, 29.03.2012, GK 50611.

Notes: The trees become leafless at the time of flowering and not easy to differentiate from *Garuga pinnata*.

Meliaceae

Key to the genera

- | | |
|--|------------------------|
| 1a. Leaves 2-3-pinnate; flowers white or purplish | 6. <i>Melia</i> |
| 1b. Leaves 3-foliolate or pinnate; flowers white or yellowish | 2 |
| 2a. Leaves paripinnate | 3 |
| 2b. Leaves imparipinnate | 4 |
| 3a. Flowers c. 1.2 cm; capsules globose, without a columella; seeds usually 2-5, triangular in section | 3. <i>Chisocheton</i> |
| 3b. Flowers c. 5 mm; capsules oblong, with a central columella; seeds many, winged, flat | 8. <i>Toona</i> |
| 4a. Capsules ovoid-ellipsoid, with a central columella; seeds winged | 4. <i>Chukrasia</i> |
| 4b. Capsules ellipsoid to obovoid or globose, without a central columella, or fruit a drupe or berry; seeds not winged | 5 |
| 5a. Flowers 0.75-1.3 cm; fruit a capsule, 5.5-8 cm in diam.; seeds arillode | 5. <i>Dysoxylum</i> |
| 5b. Flowers less than 0.7 cm; fruit a drupe or berry, or if a capsule, then smaller; seeds arillode or not | 6 |
| 6a. Leaves 15-50 cm; leaflets up to 5 pairs; fruit a drupe, 5-6 mm or if capsule then ellipsoid, c. 1.3 x 1.2 cm | 2. <i>Cipadessa</i> |
| 6b. Leaves 45-75 cm; leaflets 6 or 7 pairs; fruit a capsule then obovoid, c. 3 x 2.5 cm | 7 |
| 7a. Petals 3, united by staminal tube; anthers 6; ovary 5-celled, 2-ovuled in each cell | 1. <i>Aphanamixis</i> |
| 7b. Petals 5 free from staminal tube; anthers 10; ovary 5-celled, 1-ovuled in each cell | 7. <i>Sphaerosacme</i> |

1. *Aphanamixis* Blume

Aphanamixis polystachya (Wall.) R. Parker, Indian Forester 57: 486. 1931. *Aglaia polystachya* Wall., Fl. Ind. 2: 429. 1824. *Amoora rohinka* (Roxb.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 119. 1834; Hiern in Hook. f., Fl. Brit. India 1: 559. 1875; Prain, Bengal Pl. 1: 316. 1903. [Plate 34d, 35a]

Lahasune (N).

Tree, 10-15 m high, appressed pubescent. Leaflets 9-11, ovate-oblong, 6-19 x 3.2-7.2 cm, acuminate; floral bracts triangular-ovate, hairy. Male: Calyx saucer-shaped; lobes orbicular; petals orbicular to ovate, thick; stamens same as in bisexual flowers; pistillodes rudimentary. Female: Calyx and petals similar to male flower; antherodes narrow; ovary conical or ellipsoid, 3-grooved, tomentose; style minute; stigma truncate, 3-lobed. Bisexual: staminal tube more or less equal

to petals; anthers oblong-lanceolate. Ovary sub-globose; style short, tomentose; stigma 3-lobed; disk short. Capsules greenish or yellowish with pinkish hue, obovoid, 2.5–4 cm across, 3-valved; seeds ellipsoid.

Flowering & Fruiting: July–December.

Distribution. India: Almost throughout India.

Specimens examined: SRVK 6, 10.02.2010, SKS & GK 47013, 47014; Bhutia Pond, 11.02.2010, SKS & GK 47048; Newlands, Sukno river, 22.09.2011, AK 52764; Narathali, 23.09.2011, AK 52832; Newlands, 15.02.2012, AK 53051.

Notes: The aril of the fruit is eaten by birds.

2. *Cipadessa* Blume

Cipadessa baccifera (Roxb. ex Roth) Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 6. 1868. *Melia baccifera* Roxb. ex Roth, Nov. Pl. Sp.: 215. 1821. *Cipadessa fruticosa* Blume, Bijdr. Fl. Ned. Ind. 4: 162. 1825; Hiern in Hook. f., Fl. Brit. India 1: 545. 1875; Prain, Bengal Pl. 1: 314. 1903. [Plate 35b]

Tree, 2–5 m high, appressed pubescent. Leaflets 9–11, lanceolate to elliptic-lanceolate, 2.4–7.2 × 0.9–2.3 cm, acuminate; floral bracts dimorphic; foliaceous one oblanceolate, pilose; the other lanceolate, pubescent. Calyx saucer-shaped; lobes triangular-ovate, pubescent. Petals whitish green, ovate or oblong, acute, pubescent. Male and female floral parts same as in bisexual flowers. Bisexual: staminal tube cylindrical, ending in to bilobed apex, villous inside at above only; anthers pale yellow, ovoid, between 2 lobes; disk short. Ovary obovoid or sub-globose, faintly lobed; style columnar; stigma capitate, 5-lobed. Drupes purplish black, sub-globose; seeds creamy white, reniform.

Flowering & Fruiting: August–October.

Distribution. India: Peninsular India and West Bengal.

Specimen examined: Hatipota, 29.09.2012, AK 58513.

3. *Chisocheton* Blume

Chisocheton cumingianns (C. DC.) Harms var. *balansae* (C. DC.) Mabb., Taxon 26: 528. 1977; S. S. Jain & Bennet in Hajra & al., Fl. India 4: 479. 1997. *Chisocheton balansae* C. DC., Bull. Herb. Boissier 2: 578. 1894. *Chisocheton paniculatus* (Roxb.) Hiern in Hook. f., Fl. Brit. India 1 (3): 552. 1875. [Plate 35c]

Bandrephal, Lasuni (N).

Tree, 10–15 m high, rusty pubescent when young. Leaves to 1 m; leaflets 7–24 (–30), oblong-ovate or lanceolate, unequally acute, entire, acuminate at apex, glabrescent above, nerves thinly pubescent beneath. Panicles to 1 m, drooping.

Flowers mildly scented. Calyx cupular, subtruncate, small. Petals pale yellow, ligulate, puberulous, imbricate. Staminal tube to *c.* 18 mm, with 6–8 obscure bifid pubescent appendages; anthers 8, sessile, linear; disk annular. Ovary 4-locular; locules 1–2-ovuled; style slender, pubescent below, slightly exceeding staminal tube; stigma disciform or capitate. Capsules dark orange or red; seeds black; aril white or yellow.

Flowering & Fruiting: June–December.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Tripura and West Bengal.

Specimen examined: Panbari 6–8, 04.12.2011, GK 52312.

4. *Chukrasia* A. Juss.

Chukrasia tabularis A. Juss., Bull. Sci. Nat. Geol. 23 (no. 140): 241. 1830; Hiern in Hook. f., Fl. Brit. India 1: 568. 1875 (as "*Chickrassia*").

Chukrassi (N).

Tree, to 25 m high, monoecious. Leaves abruptly pinnate, usually 30–50 cm; leaflets 10–16, ovate to oblong-lanceolate, 7–12 × 3–5 cm, oblique, dentate, acute to acuminate. Inflorescence axillary thyrses, lax; bracts linear. Flowers unisexual, fragrant. Calyx puberulent. Petals 3 or 5, contorted, cream to lavender, linear-oblong to spatulate, 12–15 × 5–6 mm, reflexed. Staminal tube cylindric, truncate at apex; anthers 10, oblong, near tip of tube. Ovary on a short disk, elongate, with trichomes; style cylindric, short, thick, with trichomes; stigma capitate, apically 3-lobed. Capsules yellowish gray to brown, subglobose to oblong, usually 3-valved, woody, coarse and verrucose; seeds many, flat, oblong, winged.

Flowering & Fruiting: April–January.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimen examined: NRVK11, 07.12.2011, GK 52391.

5. *Dysoxylum* Blume

Key to the species

- 1a. Branchlets appressed pubescent when young; leaflets 4–8; petiolules 1–1.5 cm; inflorescence paniculate cymes; flower buds not green, oblong; staminal tube *c.* 1 cm, appressed pubescent; disk obconic, 5-toothed at apex; ovary pubescent; style quadrangular, *c.* 6 mm, pubescent all along 1. *D. excelsum*
- 1b. Branchlets glabrous when young; leaflets 8–10; petiolules *c.* 5 mm; inflorescence simple cymes; flower buds green, sub-globose; staminal tube *c.* 6 mm, glabrous; disk annular, 8-lobed; ovary tomentose; style terete, 2–4 mm, pubescent at base 2. *D. gotadhora*

1. *Dysoxylum excelsum* Blume, Bijdr. Fl. Ned. Ind. 4: 176. 1825. *Dysoxylum procerum* Hiern in Hook. f., Fl. Brit. India 1 (3): 547. 1875; Prain, Bengal Pl. 1: 315. 1903.

Lahasune (N).

Tree, 15–20 m high. Leaflets ovate to elliptic-ovate or oblong-elliptic, 7.2–21 × 4–10 cm, obliquely cuneate, short acuminate at apex, coriaceous. Inflorescence bracts triangular, appressed pubescent; floral bracts same as inflorescence bracts; pedicels articulate. Calyx cupular, appressed pubescent; tube short; lobes triangular. Petals lorate, 1–1.3 cm, sub-acute, appressed pubescent. Staminal tube cylindrical, many toothed; anthers attached at below the apex inside, oblong-elliptic; disk pubescent. Ovary 2.5–3 mm; stigma capitate. Capsules sparsely pubescent; seeds 3–4, ellipsoid.

Flowering & Fruiting: October–July.

Distribution. India: Assam, Meghalaya, Sikkim, Tripura and West Bengal.

Specimen examined: Buxa Fort to Achalung, 29.09.2013, AK 59649.

2. *Dysoxylum gotadhora* (Buch.-Ham.) Mabb., Fl. China 11: 127. 2008. *Guarea gotadhora* Buch.-Ham., Mem. Wern. Nat. Hist. Soc. 6: 307. 1832. *Dysoxylum binectariferum* Hook. f. ex Bedd., Trans. Linn. Soc. London 25 (2): 212. 1865; Hiern in Hook. f., Fl. Brit. India 1: 546. 1875; Prain, Bengal Pl. 1: 315. 1903.

[Plate 36a]

Lahasune (N).

Tree, 12–15 m high. Leaflets ovate to ovate-oblong or elliptic-lanceolate, 11–14 × 4.4–5.6 cm, obliquely cuneate, repand, acuminate at apex, coriaceous; floral bracts triangular-ovate, puberulent; pedicels puberulent. Calyx cupular, sub-entire or lobed; lobes triangular-ovate. Petals oblong, obtuse, pubescent. Staminal tube toothed at apex; anthers attached below the apex inside staminal tube, oblong; disk puberulous. Stigma capitate. Capsules 4-valved; seeds 4, ellipsoid.

Flowering & Fruiting: May–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Daman & Diu, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Tashigaon 2, 0610.2009, SKS & GK 46189; Kumargram, 19.09.2011, AK 52622; Buxaduar to Lepchakhawa, 13.02.2014, AK 59933; Buxaduar to Chunabhati, 21.05.2014, AK 65912.

6. *Melia* L.

Melia azedarach L., Sp. Pl. 1: 384. 1753; Hiern in Hook. f., Fl. Brit. India 1: 544. 1875. [Plate 36b]

Neem (H).

Tree, 6–10 m high, scurfy-tomentose when young, turning glabrous. Leaves whorled, crowded towards end of branchlets, bipinnate, rarely 3-pinnate; pinnac 5–9, usually opposite; leaflets 3–7, opposite or subopposite, ovate-lanceolate or elliptic-lanceolate, 2.3–5.1 × 0.9–2.7 cm, oblique, serrate, acuminate at apex, pubescent when young, glabrescent later. Inflorescence axillary thyrse, lepidote pubescent. Flowers unisexual; pedicels slender, to 7 mm. Calyx cupular below, 5-lobed above; cup pubescent; lobes triangular ovate, acute. Petals white, 5, free up to base; lobes linear-oblong or oblanceolate, c. 2 × 1 mm, acute or obtuse at base, pubescent. Staminal tube purple, 2–3 mm, cylindric 20–30-toothed; anthers at mouth of tube, apiculate. Ovary glabrous; style clavate at apex; stigma 10-lobed. Drupes ovoid-ellipsoid, fleshy, yellow when ripe; seed ellipsoid, 5–7 ribbed.

Flowering & Fruiting: May–December.

Distribution. India: Almost throughout India (cultivated).

Specimen examined: Tashigaon, 13.10.2009, SKS & GK 46345.

7. *Sphaerosacme* Wall. ex Royle

Sphaerosacme decandra (Hiern) T. D. Penn., *Blumea* 22 (3): 489. 1975. *Amoora decandra* Hiern in Hook. f., *Fl. Brit. India* 1 (3): 562. 1875. [Plate 36c; Fig. 14]

Bandre, Lasunni (N).

Dioecious tree, 10–15 m high, pubescent when young. Leaves odd-pinnate; leaflets 7–13, elliptic-oblong to oblanceolate, 5–14 × 1.5–4 cm, obliquely cuneate, repand, acuminate. Inflorescence supra-axillary panicles; floral bracts triangular-ovate, pubescent. Female: calyx and petals same as in male flowers; ovary 3–5-locular; stigma 3–5-angled; capsules globose-obovoid; seed solitary in each lobe, broadly ellipsoid, orange arillate.

Flowering & Fruiting: May–December.

Distribution. India: Sikkim and West Bengal.

Specimen examined: Tashigaon to Rovers point, 03.10.2013, AK 59771.

8. *Toona* (Endl.) M. Roem.

Toona ciliata M. Roem., *Fam. Nat. Syn. Monogr.* 1: 139. 1846; S. S. Jain & Bennet in Hajra & al., *Fl. India* 4: 504. 1997. *Cedrela toona* Roxb. ex Retzler, *Neue Schriften Ges. Naturf. Freunde Berlin* 4: 198. 1803; Hiern in Hook. f., *Fl. Brit. India* 1: 568. 1875, *p. p.*; Prain, *Bengal Pl.* 1: 320. 1903. [Plate 37a]

Indian Mahogany (E); *Toon*, *Tun* (N).

Tree, to 25 m high, tomentose. Leaves whorled, c. 30 × 15 cm; leaflets 6–9 pairs, subopposite, oblong-lanceolate, 8–9 × 2–3 cm, obliquely cuneate, entire or undulate, acuminate, thinly coriaceous, glabrous. Inflorescences panicles as long as or longer than leaves, usually c. 25 cm; pedicels pubescent. Sepals 5-lobed, free



Fig. 14. *Sphaerosacme decandra*: a. Leaf; b. Fruiting twig (AK 59771).

above, connate below; lobes triangular-ovate, acute at apex, ciliate. Petals white, 5, oblong-ovoid, obtuse at apex, ciliate. Stamens 5; filaments subulate, hairy at base; anthers oblong; disk 5-lobed, thick, villous. Ovary pubescent or sparsely hairy; style short; stigma globose or discoid. Capsules oblong, lenticelled or not, blackish when dry; seeds winged.

Flowering & Fruiting: December–May.

Distribution. India: Almost throughout India.

Specimens examined: Tashigaon near Bhutia Pond, 15.02.2010, SKS & GK 47114; Marakata, 24.09.2011, AK 52873; Newlands, 15.02.2012, AK 53058.

Opiliaceae

Lepionurus Blume

Lepionurus sylvestris Blume, Bijdr. Fl. Ned. Ind. 17: 1148. 1826; Prain, Bengal Pl. 1: 325. 1903. *Lepionurus oblongifolius* (Griff.) Mast. in Hook. f., Fl. Brit. India 1 (3): 583. 1875. [Plate 37b]

Khorsane (N).

Deciduous shrub, 4–5 m high. Leaves lanceolate, oblong to elliptic-oblong, 5.5–21.5 × 1.4–6.6 cm, cuneate, repand, acuminate at apex, coriaceous, verrucose. Inflorescences axillary, racemes, supported by numerous bracts in whorls; inflorescence bracts ovate or lanceolate. Perianth yellow, urceolate; tube short; lobes 4, ovate to obovate, acute. Stamens 4; filaments short; anthers globose; disk short. Ovary oblong; style short; stigma truncate. Drupes yellow, ellipsoid or obovoid, fleshy; seed solitary, ellipsoid.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: NRVK 12, 30.03.2012, GK 50647; Checko-1, 10.02.2013, AK 58841; Hatipota, 18.02.2013, AK 59821.

Icacinaceae

Natsiatum Buch.-Ham.

Natsiatum herpeticum Buch.-Ham. ex Arn., Edinburgh New Philos. J. 16: 314. 1834; Mast. in Hook. f., Fl. Brit. India 1: 595. 1875; Prain, Bengal Pl. 1: 326. 1903. [Plate 38a-c]

Climbing shrub, strigose. Leaves broadly ovate, 3–9.5 × 2.4–9.5 cm, cordate, dentate-serrate, short acuminate, scabrid. Inflorescences supra-axillary, pendulous racemes; floral bracts linear, hirsute; pedicels hirsute. Calyx saucer-shaped;

tube short; lobes linear-lanceolate to lanceolate, hirsute. Petals golden yellow, lanceolate, connate, acute, reflexed, hirsute. Male: filaments short, 2-glandular; anthers orange, sagittate, mucronate; pistillodes small, stiff hairy. Female: staminodes same as stamens; ovary hairy; style 2-lobed; stigma indistinct. Drupes blackish, ovoid, pulpy, sparsely appressed pubescent; seed solitary.

Flowering & Fruiting: December–March.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Jainti 6, 09.02.2010, SKS & GK 46382; Jainti 5, 04.12.2011, GK 52329; Kumargram, 13.02.2012, AK 53006; Sankosh, 17.02.2012, AK 55689; Jainti 4, 29.03.2012, GK 50632.

Aquifoliaceae

Ilex L.

Ilex umbellulata (Wall.) Loes., Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 78: 99. 1901; D. Basu in N. P. Singh & al., Fl. India 5: 70. 2000. *Ehretia umbellulata* Wall., Fl. Ind. 2: 344. 1824. *Ilex sulcata* Wall. ex Hook. f., Fl. Brit. India 1(3): 604. 1875.

Hati paile (N).

Tree, 5–8 m high, dioecious, pubescent. Leaves oblong-ovate, 3.8–7.6 × 2.3–4 cm, cuneate, entire, acuminate at apex, chartaceous, glabrous. Inflorescence many-flowered pseudo-umbels; flowers inconspicuous; peduncles 3–10 mm, pubescent. Male: pedicels 1–4 mm, pubescent; sepals 4, oblong-obovate, 1–1.5 mm, obtuse at apex, ciliate, pubescent; petals creamy white, 4, obovate, 1.5–1.7 mm, obtuse, glabrous; stamens 4; filaments flattened, subulate; anthers ovate; pistillode rudimentary, globose 3–5-lobed apically. Female: pedicels hairy; sepals 4, suborbicular, obtuse at apex, ciliate, pubescent; petals as in male flowers; sterile anthers sagittate; ovary 1–2-ovuled; stigma sessile, capitate. Fruits ellipsoid to globose with persistent stigma.

Flowering & Fruiting: April–September.

Distribution. India: Andaman & Nicobar Islands, Assam, Arunachal Pradesh, Meghalaya and West Bengal.

Notes: Female plants common in the Park.

Specimens examined: SRVK 11, 13.03.2011, GK 50565; Panbari 9, 08.04.2012, GK 56073.

Celastraceae

Key to the genera

- 1a. Erect shrubs; leaves opposite, entire at margins; flowers in cymes; petals 4; stigma 4-lobed; disk absent; capsules obovoid, laterally split along one side 3. *Microtropis*

- 1b. Trees or scandent shrubs; leaves alternate, repand or serrate at margins; flowers in panicles or spike-like racemes; petals 5; stigma 3-lobed or inconspicuous; disk present; capsules not obovoid, dehiscent by 2-3-valves 2
- 2a. Trees; leaves ovate-oblong to oblong-elliptic, rounded at base, repand at margins; flowers in spike-like racemes, bisexual; stamens below the disk; styles 2; stigma inconspicuous; capsules ellipsoid, dehiscent by 2-valves; seed arillate 1. **Bhesa**
- 2b. Scandent shrubs; leaves elliptic, cuneate at base, serrate at margins; flowers in panicles, unisexual; stamens along margin of disk; style solitary; stigma 3-lobed; capsules cylindric, dehiscent by 3-valves; seed not arillate 2. **Celastrus**

1. **Bhesa** Arn.

Bhesa robusta (Roxb.) Ding Hou, *Blumea* Suppl. 4: 152. 1958. *Celastrus robustus* Roxb., *Fl. Ind.* 2: 385. 1824. *Kurrimia pulcherrima* Wall., *Numer. List*: n. 4336. 1831, *nom. inval.*; M. A. Lawson in *Hook. f., Fl. Brit. India* 1: 622. 1875; Prain, *Bengal Pl.* 1: 330. 1903. *Kurrimia maingayi* M. A. Lawson in *Hook. f., Fl. Brit. India* 1: 622. 1875. [Fig. 15]

Tree, 15-20 m high. Leaves ovate to oblong-lanceolate, 10-23 × 4-10 cm, rounded, crenate-serrate, acuminate, coriaceous; stipules caducous. Calyx cupular; tube short; lobes ovate, obtuse. Petals obovate-oblong, 2-3 mm, obtuse, reflexed. Filaments short; anthers oblong. Ovary sub-globose, pubescent at apex; disk cupular, lobed, pubescent. Capsules ovoid, beaked; seed solitary, elliptic-oblong.

Flowering & Fruiting: October-March.

Distribution. India: Andaman Islands, Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Sankosh, 17.02.2012, AK 55692.

2. **Celastrus** L.

Celastrus monospermus Roxb., *Fl. Ind.* 2: 394. 1824. *Celastrus championii* Benth., *Hooker's J. Bot. Kew Gard. Misc.* 3: 334. 1851; M. A. Lawson in *Hook. f., Fl. Brit. India* 1: 618. 1875.

Climbing shrub. Leaves elliptic, 6.5-11.5 × 2-4.5 cm, cuneate, serrate, acuminate, sub-coriaceous; stipules laciniate. Inflorescence bracts dimorphic, triangular-ovate, laciniate at margins, others ligulate; pedicels angular. Male: sepals ovate to sub-orbicular, glandular-toothed; petals white to greenish yellow, or else same as sepals; filaments short; anthers ovoid; pistillode columnar; disk slightly 5-lobed. Female: sepals, petals and disk same as in male flowers except smaller petals; staminodes minute; ovary minute; style columnar; stigma reflexed. Capsules cylindric, c. 2 cm, stipitate; seed solitary.

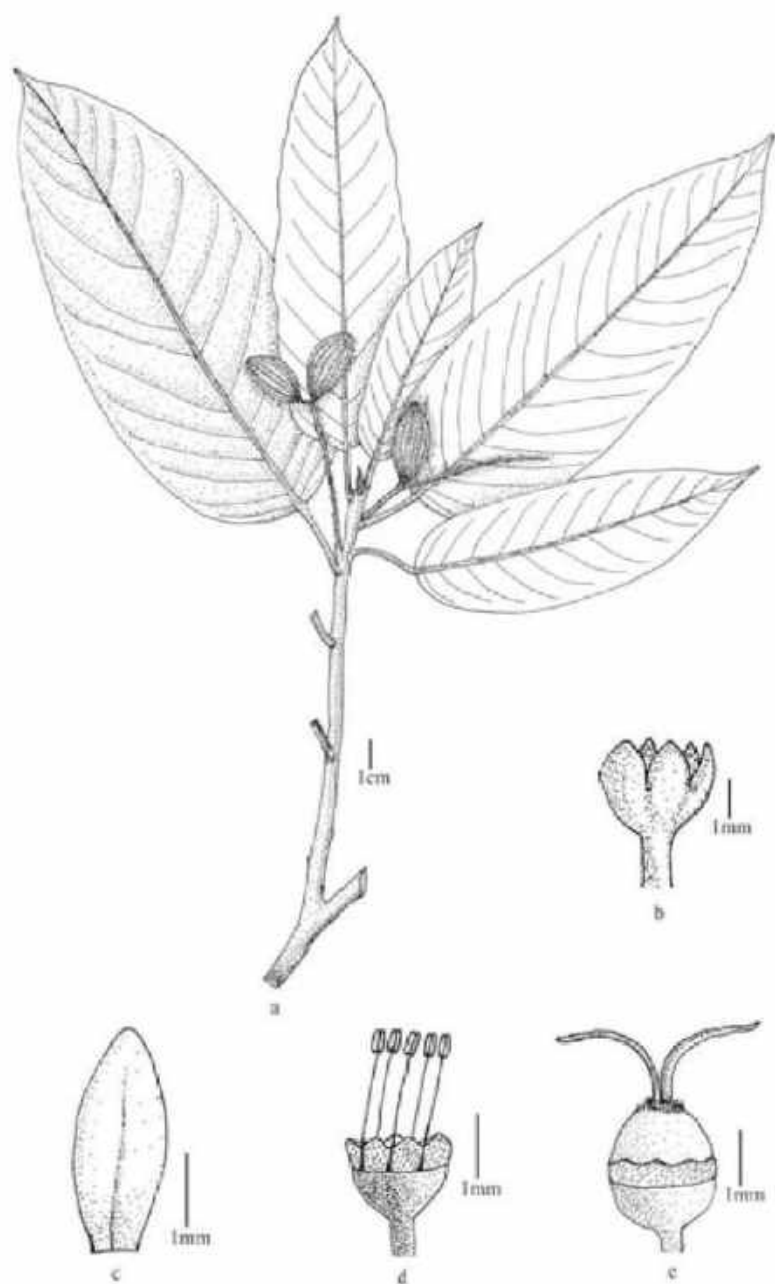


Fig. 15. *Bhesa robusta*: a. Fruiting branchlet; b. Calyx; c. Petal; d. Stamens with disk; e. Gynoecium with disk (AK 55692).

Flowering & Fruiting: March–August.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59949.

Notes: The dimorphic bracts were not documented before.

3. *Microtropis* Wall. ex Meisn.

Microtropis discolor (Wall.) Wall. ex Meisn., Pl. Vasc. Gen. 2 (Commentarius): 49. 1837; M. A. Lawson in Hook. f., Fl. Brit. India 1: 614. 1875. *Cassine discolor* Wall., Fl. Ind. 2: 378. 1824. [Plate 38d]

Chilekath (N).

Shrub or small tree, 2–3 m high. Leaves elliptic-obovate to elliptic-lanceolate, 3.5–12 × 1–6 cm, attenuate, entire, acuminate at apex, coriaceous; stipules intrapetiolar, scaly, caducous. Inflorescence bracts triangular-ovate, caducous. Flowers sessile to sub-sessile; floral bracts ovate to broadly ovate. Sepals 4, sub-orbicular. Petals greenish white, elliptic-oblong, concave, hooded. Stamens 4; filaments short; anthers elliptic-oblong, apiculate. Style columnar; stigma 4-lobed. Capsules pinkish orange, obovoid, apiculate, pulpy; seed red, solitary, elliptic-oblong, persistent on pedicel after capsule valves have fallen.

Flowering & Fruiting: Throughout the year.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Buxa Fort to Achalung, 29.09.2013, AK 59639; Buxa Fort to Chunabhati, 30.09.2013, AK 59689; Rovers point to Bhutan Border, 15.02.2014, AK 59952.

Hippocrateaceae

Reissantia Halle

Reissantia arborea (Roxb.) Hara, Jap. J. Bot. 40 (11): 327. 1965. *Hippocratea arborea* Roxb., Pl. Coromandel 3: 3, t. 205. 1819; M. A. Lawson in Hook. f., Fl. Brit. India 1: 625. 1875. [Fig. 16a-b]

Thakauley Thulo, Takaule Lahara (N).

Climbing shrub. Leaves ovate, elliptic to elliptic-ovate, 6.9–12.5 × 3.8–6 cm, rounded or cuneate, shallowly serrate, acuminate, coriaceous; stipules palmately 3–5-segmented, caducous. Flowers in branched cymes; floral bracts ovate-lanceolate, dentate; pedicels articulate. Sepals 5 rarely 4, ovate or triangular-ovate, crenulate. Petals greenish yellow, rarely 6, elliptic-oblong, margins entire

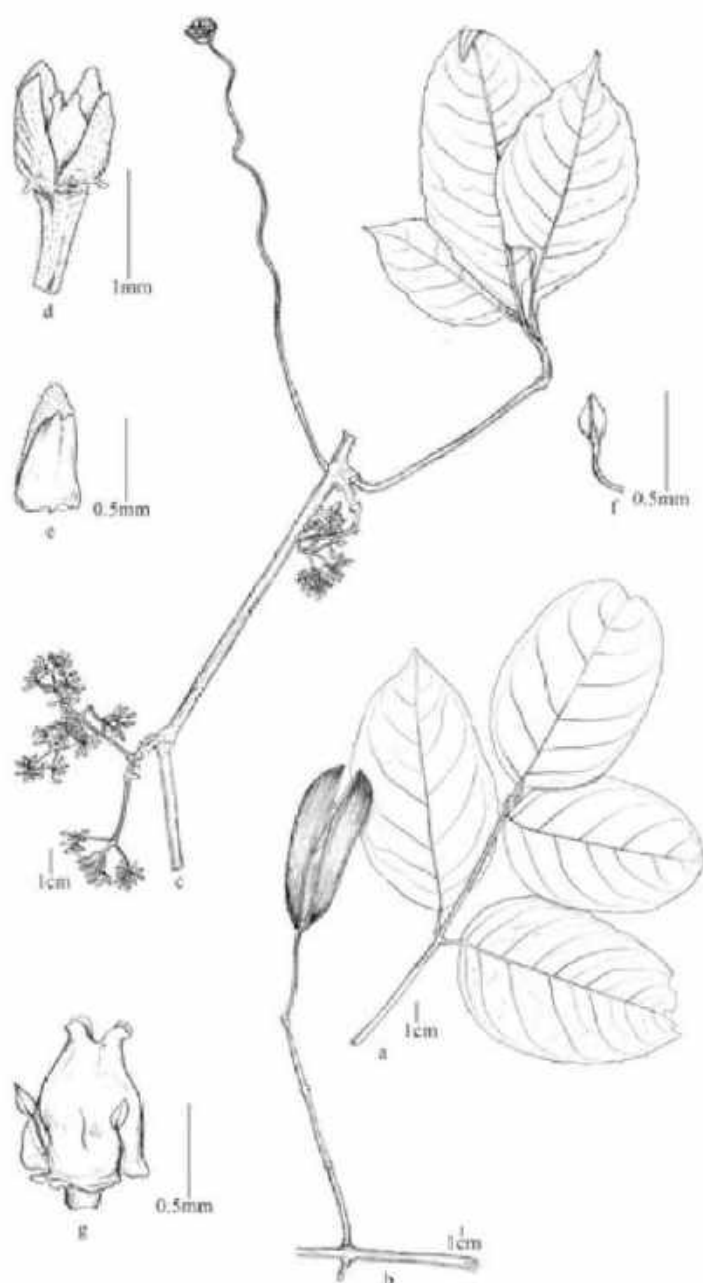


Fig. 16. *Reissantia arborea*: a. Leaves; b. Dehiscent capsule (GK 52347); *Tetrastigma leucostaphylum*: c. Flowering branchlet; d. Flower; e. Petal; f. Staminode; g. Gynoecium with staminodes (GK 50504).

or crenulate. Stamens 3; filaments flat; anthers capitate; disk obscurely lobed. Ovary 3-loculed; style short; stigma obscure. Capsules pendulous, 2 or 3-lobed to the base; lobes oblong or oblanceolate, 8–9.5 × 2.5–3 cm, compressed, striated, dehisced into 2 boat shape valves; seeds 2–2.5 cm, winged.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Meghalaya, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 03.03.2011, GK 47214; NRVK 6a, 06.12.2011, GK 52347; Kumargram, 18.02.2012, AK 55741; NRVK 7, 08.04.2012, GK 56068; Chumiajhora, 28.09.2012, AK 58503; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58559.

Rhamnaceae

Key to the genera

- | | |
|---|---------------------|
| 1a. Climbing or scandent shrubs | 2 |
| 1b. Small trees or shrubs (except <i>Ziziphus apetala</i>) | 3 |
| 2a. Fruit a capsule with longitudinal wings; tendrils present | 1. <i>Gouania</i> |
| 2b. Fruit a samara with apical appendages; tendrils absent | 3. <i>Ventilago</i> |
| 3a. Stems armed; leaves obtuse at apex, brown tomentose below; veins palmate, 3 from base; flowers in fascicled cymes; disk 10-lobed; fruits with a stone | 4. <i>Ziziphus</i> |
| 3b. Stems unarmed; leaves acuminate at apex, glabrous; veins pinnate; inflorescence racemes; disk not 10-lobed; fruits without stone | 2. <i>Rhamnus</i> |

1. *Gouania* Jacq.

Gouania leptostachya DC., Prodr. 2: 40, 1825; M. A. Lawson in Hook. f., Fl. Brit. India 1: 643, 1875; Prain, Bengal Pl. 1: 335, 1903. [Plate 39a]

Bainshi Khanra, Pat Pate (N).

Climbing shrub; tendrils brown silky pubescent. Leaves broadly ovate, 4.2–9.2 × 2.6–5.6 cm, acuminate, rough to velvety; stipules lanceolate, caducous; floral bracts lanceolate. Calyx campanulate; tube short sparsely hairy; lobes 5, ovate, keeled and punctate. Petals white, 5, spatulate, truncate, hooded, punctate. Stamens 5, below disk, enclosed by petals; filaments flat; anthers globose; disk smooth. Ovary inserted into disc; style 3-fid above; stigma obtuse, reflexed. Capsules obovoid, crowned by persistent calyx; seeds 3, obcordate, keeled.

Flowering & Fruiting: July–December.

Distribution. India: Andaman & Nicobar Islands, Assam, Maharashtra, Odisha, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa, 05.09.1981, BS & party 10362; Rajabhatkhawa Forest, 15.11.1999, AKG 20444; Santrabari Range, 08.10.2009, SKS

& GK 46209; Narathali, 23.09.2011, AK 52804; Marakata, 24.09.2011, AK 52876; Jainti 5-6, 04.12.2011, GK 52332; Jainty-Phashkhawa, 02.10.2012, AK 58606.

2. *Rhamnus* L.

Rhamnus napalensis (Wall.) M. A. Lawson in Hook. f., Fl. Brit. India 1: 640. 1875 (as "*napalensis*"). *Ceanothus napalensis* Wall., Fl. Ind. 2: 375. 1824.

[Plate 39b-c]

Shrub, 4-5 m high, pubescent. Leaves variable, elliptic-oblong, broadly elliptic to orbicular, ovate to obovate or oblong, 1.2-12 × 1-6.4 cm, rounded to cuneate, serrate; stipules lanceolate, pubescent; floral bracts triangular, pubescent; pedicels angular, pubescent. Calyx cupular; lobes lanceolate, ciliate. Petals greenish, ovate, cucullate, obtuse or emarginate, shortly clawed. Filaments short; anthers elliptic or ovate; disk inconspicuous. Ovary 3-lobed; stigma obtuse. Fruits blackish, obovoid, 4-6 mm; seeds 3, obovoid.

Flowering & Fruiting: July-February.

Distribution. India: Andhra Pradesh, Assam, Bihar, Odisha and West Bengal.

Specimens examined: Buxaduar to Lepchakhawa, 30.11.1975, JKS 4061; Rajabhatkhawa Range, 29.11.2011, GK 47161; Checko-1, 26.09.2012, AK 56163; Hatipota, 29.09.2012, AK 58518; Pana, 08.10.2012, AK 58722; Pana, 11.02.2013, AK 58842.

3. *Ventilago* Gaertn.

Ventilago denticulata Willd., Neue Schriften Ges. Naturf. Freunde Berlin 3: 417. 1801. *Ventilago calyculata* Tul., Ann. Sci. Nat., Bot. sér. 4, 8: 124. 1857; M. A. Lawson in Hook. f., Fl. Brit. India 1: 631. 1875. *Ventilago madraspatana* var. *calyculata* King, J. Asiat. Soc. Bengal 65: 378. 1896; Prain, Bengal Pl. 1: 335. 1903. [Plate 39d, 40a-b]

Climbing shrub, tomentose when young. Leaves ovate to ovate-elliptic, 3.5-7.5 × 1.5-3.5 cm, serrate upwards at margins, sub-coriaceous. Inflorescence bracts connate, tomentose; lobes lanceolate; floral bracts lanceolate, tomentose; pedicels tomentose. Calyx cupular; tube short; lobes triangular-ovate, pubescent, keeled inside. Petals white, spatulate, emarginate. Filaments short; anthers globose; disk yellowish, 5-lobed. Ovary pilose; stigma swollen. Fruits 1-3 cm, with oblong wings; seed solitary, basal, ovate.

Flowering & Fruiting: January-June.

Distribution. India: Andaman & Nicobar Islands, Assam, Bihar, Gujarat, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 3, 09.03.2011, GK 47281; Santrabari to Buxaduar, 16.02.2014, AK 59978.

4. *Zizyphus* Mill.

Key to the species

- 1a. Scandent shrubs; leaves ovate-lanceolate; stipular spines in same direction; petals absent; disk 5-lobed; ovary hairy 1. *Z. apetala*
1b. Trees or shrubs; leaves elliptic-orbicular; stipular spines in opposite direction; petals present; disk 10-lobed; ovary glabrous 2. *Z. mauritiana*

1. *Zizyphus apetala* Hook. f., Fl. Brit. India 1: 635. 1875; Bhandari & Bhansali in N. P. Singh & al., Fl. India 5: 225. 2000. [Plate 40c-d]

Scandent shrub, rusty tomentose; spines recurved, c. 2.5 mm, pubescent at base. Leaves ovate-lanceolate, 4.5–9.5 × 2–4.5 cm, slightly oblique, serrate, acuminate, sub-coriaceous, dark green, basally 3-nerved, prominent beneath. Inflorescences axillary, dichotomous cymes, 1.5–2.5 cm, rusty tomentose; pedicels c. 4 mm. Sepals pale green, 5, free above, connate below, triangular ovate, acute, pubescent. Petals absent. Stamens 5; filaments subulate, glabrous; anthers globose; disk 5-lobed. Ovary hairy; style bifid; stigma simple. Drupes globose, slightly apiculate at apex; seed compressed.

Flowering & Fruiting: March–May.

Distribution. India: Assam, Arunachal Pradesh and West Bengal.

Specimens examined: Panbari 7, 09.03.2011, GK 50525; SRVK 5, 29.03.2012, GK 50634.

Notes: *Z. apetala* is abundant in the Tiger reserve. It exhibits only 5-disk lobes as also seen in *Z. rugosa*. But the leaf shape and the number of stipular spines make good distinctions to diagnose above species.

2. *Zizyphus mauritiana* Lam., Encycl. 3 (1): 319. 1789; Bhandari & Bhansali in N. P. Singh & al., Fl. India 5: 225. 2000. *Rhamnus jujuba* L., Sp. Pl. 1: 194. 1753. *Zizyphus jujuba* Lam. in Lam. & al., Encycl. 3 (1): 318. 1789; M. A. Lawson in Hook. f., Fl. Brit. India 1: 632. 1875. [Plate 41a]

Kul (B).

Shrub or small tree, 1–3 m high; spines solitary or in pairs, straight or one of them recurved. Leaves variable, elliptic or oblong-ovate, 1.8–4.5 × 1.4–3 cm, cuneate, finely serrulate or entire, obtuse, leathery, tomentose to brown or yellow white silky tomentose beneath; stipules spinescent. Inflorescence axillary cymes or 10–13-flowered fascicles, tomentose; pedicels 2–4 mm, 3–7 mm in fruits. Sepals 5, triangular-ovate, c. 1.5 mm, acute, tomentose, keeled within. Petals 5, oblong-spathulate, 1–1.5 mm, clawed. Stamens 5, equal to petals; filaments subulate; anthers oblong; disk fleshy, 10-lobed, concave. Ovary globose; style short, 2-cleft, united to the middle; stigmatic lobes curved. Drupes oblong or globose, yellow

Botanical Survey of India

when ripen; seeds 1-2, compressed.

Flowering & Fruiting: August-December.

Distribution. India: Almost throughout India.

Specimens examined: Bala and Jainti rivers, 13.10.2009, SKS & GK 46339; Rydak river belt, 20.09.2011, AK 52677; Marakata, 24.09.2011, AK 52849; Kumargram, 18.02.2012, AK 55734.

Uses: Locals collect fruits as they are edible.

Vitaceae

Key to the genera

- | | |
|---|------------------------|
| 1a. Leaves simple (digitate in <i>Cissus elongata</i>) | 2 |
| 1b. Leaves compound | 3 |
| 2a. Tendrils usually twice bifid, never on peduncles; flowers 4-merous; style elongate | 3. <i>Cissus</i> |
| 2b. Tendrils once-bifid, or with one branch again bifid, often on peduncles; flowers 5-merous; style very short or absent | 1. <i>Ampelocissus</i> |
| 3a. Leaves 3-foliolate | 4 |
| 3b. Leaves palmately or pedately 4-7-foliolate | 5 |
| 4a. Tendrils 1-2× bifid; leaves softly villous beneath; stigma minute on slender elongate style | 2. <i>Cayratia</i> |
| 4b. Tendrils simple; leaves glabrous beneath; stigma conspicuously 4-lobed or disk-like, sessile on ovary | 5. <i>Tetrastigma</i> |
| 5a. Tendrils 1-2 × bifid; style elongate | 4. <i>Cyphostemma</i> |
| 5b. Tendrils simple or radiately branched; style absent or very short | 5. <i>Tetrastigma</i> |

1. *Ampelocissus* Planch.

Ampelocissus barbata (Wall.) Planch. in DC., Monogr. Phan, 5: 372. 1887. *Vitis barbata* Wall., Fl. Ind. 2: 478. 1824; M. A. Lawson in Hook. f., Fl. Brit. India 1: 651. 1875; Prain, Bengal Pl. 1: 338. 1903. [Plate 41b]

Jarila Lahara (N).

Climbing shrub, brown glandular hairy. Leaves 16-22 × 12-18 cm, cordate, irregularly sinuate-dentate, acuminate. Flowers in axillary, floccose panicles; tendrils bifurcate, glandular hairy; floral bracts dimorphic, one subulate, other linear-oblong or ovate or lanceolate; pedicels glandular pubescent. Calyx cupular; tube short; lobes rounded or obtuse. Petals elliptic-oblong, hooded. Filaments short; anthers ovoid; disk columnar. Ovary conical; stigma minute. Berries greenish black, globose; seed 1 or 2, elliptic-obovate, c. 5.5 × 4.5 mm, compressed; adaxial

surface with longitudinal ridges; abaxial surface with elliptic spot with very fine fissures radiate towards margins.

Flowering & Fruiting: April–September.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimen examined: Narathali, 23.09.2011, AK 52801.

2. *Cayratia* Juss.

Key to the species

- 1a. Stems fistular; tomentose; leaves digitate, 3-foliolate, punctate above, tomentose below; lateral leaflets petiolulate; stipules lanceolate, 5–5.5 mm; petioles terete, 7–8 cm, tomentose; floral bracts linear-oblong, tomentose; petals papillose; disk papillose
1. *C. geniculata*
- 2b. Stems woody; pubescent; leaves pedate, 5-foliolate, not punctate above, hispid below; lateral leaflets sub-sessile; stipules ovate to sub-orbicular, 1–2 mm; petioles angular, 1.5–4 cm, pubescent; floral bracts linear-oblong, pubescent; petals pubescent; disk glabrous
2. *C. japonica*

1. *Cayratia geniculata* (Blume) Gagnep., Notul. Syst. (Paris) 1: 345. 1911. *Cissus geniculata* Blume, Bijdr. Fl. Ned. Ind. 4: 184. 1825. *Vitis geniculata* (Blume) Miq., Ann. Mus. Bot. Lugduno-Batavi 1: 81. 1863; M. A. Lawson in Hook. f., Fl. Brit. India 1: 654. 1875; Prain, Bengal Pl. 1: 338. 1903. [Plate 41c]

Climbing shrub; tendrils tomentose. Leaves 3-foliolate; lateral leaflets elliptic to elliptic-ovate, 15–17 × 6.5–8.5 cm, obliquely subcordate, crenate-dentate, caudate-acuminate; terminal leaflet obliquely obtuse, or else same as lateral leaflets. Flowers in axillary paniced cymes; pedicels papillose. Calyx cupular, papillose; tube short; lobes 4, shallowly toothed or truncate. Petals greenish yellow, 4, ovate, hooded. Stamens 4; filaments short; anthers oblong. Style subulate, papillose. Berries sub-globose; seeds 2–4, sub-globose; adaxial surface with raised circular pit; abaxial surface convex with a spatulate chalaza.

Flowering & Fruiting: February–September.

Specimen examined: Checko-1, 10.02.2013, AK 58830.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Sikkim and West Bengal.

Notes: The presence of stipules/bracts and the papillose nature of floral parts is overlooked in Indian floras.

2. *Cayratia japonica* (Thunb.) Gagnep., Notul. Syst. (Paris) 1: 349. 1911. *Vitis japonica* Thunb. in Murray, Syst. Veg., ed. 14.: 244. 1784. *Vitis mollis* Wall. ex M. A. Lawson in Hook. f., Fl. Brit. India 1 (3): 660. 1875. [Plate 42a]

Climbing shrub; tendrils pubescent. Leaves 5-foliolate; lateral leaflets ovate to orbicular, 1-4 × 0.8-2.5 cm, oblique, serrate and hairy at margins, acute to obtuse; terminal ones 2.5-6.5 × 1.3-4 cm, cuneate to rounded, serrate and hairy at margins, acute to short acuminate; tendrils grow opposite to each leaf. Flowers in axillary or terminal umbels; pedicels short, pubescent. Calyx cupular, undulate at margins, pubescent. Petals greenish, 4, ovate, hooded. Stamens 4; filaments short; anthers sub-globose. Style angular. Berries sub-globose; seeds 3-4, obovoid; adaxial surface with longitudinal ridge in the middle and an elongated pit on either side; abaxial surface with linear chalaza with prominently rugose sides.

Flowering & Fruiting: March-June.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Buxa-Bhutan road, VN 2586; Buxaduar to Tashigaon, 20.05.2014, AK 62683.

Notes: The presence of stipules/bracts is overlooked in Indian floras.

3. *Cissus* L.

Key to the species

- 1a. Stems terete, not striated, glabrous; tendrils not branched; leaves compound; leaflets attenuate at base; veins pinnate; berries ellipsoid 2. *C. elongata*
- 1b. Stems angular, striated, hairy; tendrils branched; leaves simple, not attenuate at base; veins palmate; berries pyriform 2
- 2a. Plants dark purplish red; stems not fistular, pubescent; leaves dark purplish red at margins, glabrous above when young, dark purplish red below; stipules saccate; midvein dark purplish red above; calyx dark purplish red 1. *C. discolor*
- 2b. Plants green; stems fistular, pilose; leaves green at margins, appressed hairy above when young, greenish below; stipules not saccate; midvein green above; calyx green 3. *C. repens*

1. *Cissus discolor* Blume, Cat. Gew. Buitenzorg: 39. 1823; B. V. Shetty & P. Singh in N. P. Singh & al., Fl. India 5: 282. 2000. *Vitis discolor* (Blume) Dalzell., Hooker's J. Bot. Kew Gard. Misc. 2: 39. 1850; M. A. Lawson in Hook. f., Fl. Brit. India 1: 647. 1875. [Plate 42b-c]

Samu, Puren (N).

Climbing herb; tendrils leaf opposed, twice bi-fid. Leaves ovate-lanceolate, 5-13 × 1.9-4.5 cm, truncate or sub-cordate, serrate-dentate, acuminate, blotched with white deep red, glabrous. Inflorescence leaf opposed umbellate cymes; pedicels 1.5-2 mm. Calyx shallowly 4-lobed above, cupular below. Petals reddish, 4, ovate-oblong, acute, glabrous; disk 4-lobed. Ovary enclosed by disk; style elongated;

stigma discoid. Berries reddish-purple, obovoid-globose, red when ripe, often with styler remains, 1–2-seeded.

Flowering & Fruiting: June–December.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Tashigaon 1–2, 08.10.2009, SKS & GK 46241; Santrabari to Chunabhati, 04.10.2013, AK 59778.

2. *Cissus elongata* Roxb., Fl. Ind. 1: 429. 1820. *Vitis elongata* (Roxb.) Wall. ex M. A. Lawson in Hook. f., Fl. Brit. India 1: 658. 1875. [Plate 42d]

Charchare (N).

Climbing shrub. Leaves digitate, 5-foliolate; stipules caducous. Lateral leaflets elliptic, 6–14 × 3–5 cm, slightly oblique, dentate-serrate, acuminate; terminal ones 10–16 × 5–7 cm, or else same as lateral ones. Flowers in leaf-opposed, umbellate cymes; inflorescence bracts caducous; pedicels short. Calyx cupular, truncate. Petals elliptic-oblong. Stamens below the disk; filaments short; anthers oblong-ovoid. Ovary inserted in disk; style stout; stigma minute. Berries 1.5–2 × 1–1.5 cm; seed solitary, ridged raphe encircling it.

Flowering & Fruiting: April–December.

Distribution. India: Andaman & Nicobar Islands, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Achalung, 29.09.2013, AK 59634.

3. *Cissus repens* Lam., Encycl. 1: 31. 1783; B. V. Shetty & P. Singh in N. P. Singh & al., Fl. India 5: 290. 2000. *Cissus cordata* Roxb., Fl. Ind. 1: 425. 1820. *Vitis repens* (Lam.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 125. 1834; M. A. Lawson in Hook. f., Fl. Brit. India 1: 646. 1875; Prain, Bengal Pl. 1: 338. 1903.

[Plate 43a-b]

Climbing shrub. Leaves ovate, 3.5–10 × 1.8–7 cm, cordate or truncate to sub-truncate, dentate, acuminate, vesicular and raphides above, few vesicles below; stipules variable, linear-oblong, obovate or rounded, vesicular. Flowers in umbellate cymes; floral bracts lanceolate or oblong-lanceolate, vesicular; pedicels angular, 2–5.5 mm, vesicular. Calyx cupular, shallowly lobed, vesicular. Petals yellowish or greenish creamy, oblong or oblong-ovate, hooded, vesicular. Stamens below disk; filaments flat; anthers ovoid; disk annular, vesicular. Style columnar; stigma circular. Berries c. 6 × 4 mm, sub-truncate; seed solitary, encircling ridged raphe.

Flowering & Fruiting: August–December.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Meghalaya, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52787; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58586; Achalung to Lepchakhawa, 29.09.2013, AK 59655; Buxa Fort to Chumabhati, 30.09.2013, AK 59701; Tashigaon to Rovers point, 02.10.2013, AK 59746.

4. *Cyphostemma* (Planch.) Alston

Cyphostemma auriculatum (Roxb.) P. Singh & B. V. Shetty, *Taxon* 35: 596. 1986; B. V. Shetty & P. Singh in N. P. Singh & al., *Fl. India* 5: 298. 2000. *Cissus auriculata* Roxb., *Fl. Ind.* 1: 430. 1820. *Vitis auriculata* (Roxb.) Wall., *Numer. List*: n. 6031. 1832; M. A. Lawson in Hook. f., *Fl. Brit. India* 1: 658. 1875; Prain, *Bengal Pl.* 1: 338. 1903.

Climbing shrub, hispid. Leaves digitate, 5-foliolate; stipules falcate, c. 10 × 5 mm; lateral leaflets ovate, 8–11 × 4.5–5 cm, slightly oblique, serrate, acuminate, divided into two unequal part, thinly coriaceous, rough; terminal leaflet rhomboidal-elliptic, 13.5–15 × 6.5–7 cm, or else same as lateral ones. Inflorescence axillary or terminal branched cymes, 18–20 cm; pedicels 2–3 cm. Calyx cupular, pubescent, 4-lobed above. Petals 4-lobed; lobes hooded. Stamens 4; anthers globose; disks of 4 glands; ovary pyramidal, hairy. Berries globose, red, 1-seeded; seed obovoid to subglobose.

Flowering & Fruiting: July–December.

Distribution. India: Andhra Pradesh, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and West Bengal.

Specimen examined: Panbari 8–9, 01.12.2011, GK 47195.

5. *Tetrastigma* (Miq.) Planch.

Key to the species

- | | |
|--|---------------------------|
| 1a. Leaves digitately foliolate | 2 |
| 1b. Leaves pedately foliolate | 3 |
| 2a. Leaves 3-foliolate; petals with dorsal spur | 1. <i>T. bracteolatum</i> |
| 2b. Leaves 5-foliolate; petals without dorsal spur | 4. <i>T. planicaule</i> |
| 3a. Style distinct; stigma 4-rayed | 2. <i>T. dubium</i> |
| 3b. Style indistinct or absent; stigma 4-lobed | 4 |

- 4a. Robust climbers with simple or bifid tendrils; leaflets large, 7–11.5 × 3–4.5 cm; seeds obovoid, 6–7 × 4–5 mm 3. *T. leucostaphylum*
4b. Slender climber with bifid tendrils; leaflets small, 1–6.5 × 0.5–3 cm; seeds pyriform, c. 5 × 3 mm 5. *T. serrulatum*

1. *Tetrastigma bracteolatum* (Wall.) Planch. in DC., Monogr. Phan. 5: 428. 1887. *Vitis bracteolata* Wall. in Roxb., Fl. Ind. 2: 483. 1824; M. A. Lawson in Hook. f., Fl. Brit. India 1: 654. 1875; Prain, Bengal Pl. 1: 339. 1903.

Lahara Bilauney (N).

Climbing shrub. Leaves 3-foliolate; lateral leaflets ovate to ovate-lanceolate, 7–14.5 × 4–7 cm, obliquely rounded to cuneate, serrate, short acuminate, pilose below; terminal leaflet 8.5–15 × 4.5–7.5 cm, rounded to obliquely obtuse, or else same as lateral ones. Flowers in umbellate cymes; pedicels angular, pilose. Male: calyx cupular, pilose; tube short; lobes 4, circular; petals greenish, 4, ovate or ovate-oblong, acute with dorsal spur, pilose; stamens 4; filaments short; anthers ovoid; disk membranous. Female: calyx, petals and disk same as in male flowers; ovary conical; style columnar. Berries globose; seeds 1–2, obovoid.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa Range, 10.02.2010, SKS & GK 46395; Newlands, Sukno river, 22.09.2011, AK 52786.

2. *Tetrastigma dubium* (M. A. Lawson) Planch. in DC., Monogr. Phan. 5: 437. 1887. *Vitis dubia* M. A. Lawson in Hook. f., Fl. Brit. India 1: 661. 1875. *Vitis oxyphylla* Wall., Numer. List: n. 6035. 1832; Prain, Bengal Pl. 1: 338. 1903.

[Plate 43c]

Climbing shrub. Leaves digitate if 3-foliolate or if 5-foliolate then pedate; lateral leaflets elliptic-lanceolate, 4–8 × 1.5–3.5 cm, obliquely circular or obtuse, serrate, acuminate; terminal leaflet 6–11.5 × 1–3.5 cm, cuneate at base, or else same as lateral ones. Flowers in axillary, umbellate cymes; floral bracts subulate, hairy; pedicels short. Male: calyx cupular; tube short; lobes 4, triangular, acute or acuminate; petals greenish yellow, 4, ovate or ovate-oblong; stamens 4; filaments flat; anthers ovoid; disk cupular, undulate. Female: calyx, petals and disk same as in male flowers; style columnar. Berries ovoid, c. 1 cm across; seeds 1 or 2.

Flowering & Fruiting: August–May.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal.

Specimens examined: Tobgaon, VN 2677, 2679; Jainti, 09.02.2010, SKS & GK 46395; Jainti 4, 04.03.2011, GK 47229; Jainti 4, 06.03.2011, GK 47293; Jainti 4, 06.03.2011, GK 47297; Jainti 4, 05.04.2012, GK 56040; Checko-1, 25.09.2012, AK 56145; Hatipota, 18.02.2013, AK 59823; Buxa duar to Tashigaon, 20.05.2014, AK 62684.

3. *Tetrastigma leucostaphylum* (Dennst.) Alston, *Taxon* 26 (5–6): 539. 1977. *Cissus leucostaphyla* Dennst., *Schlüssel Hortus Malab.*: 17, 19, 33. 1818. *Vitis lanceolaria* Wall., *Numer. List*: n. 6013. 1832, *nom. illeg.*; M. A. Lawson in Hook. f., *Fl. Brit. India* 1: 660. 1875; Prain, *Bengal Pl.* 1: 339. 1903.

[Plate 44a-b; Fig. 16c-g]

Bherseri, Tsare Lahara (N).

Climbing shrub. Leaves pedately 5-foliolate; lateral leaflets elliptic-lanceolate, 7–9.5 × 3–4 cm, oblique, serrate, short acuminate; terminal leaflet 9–11.5 × 4–4.5 cm, cuneate, or else same as lateral ones. Flowers in axillary, umbellate cymes. Male: calyx cupular; petals greenish, 4, ovate, hooded; stamens 4; filaments flat; anthers oblong; disk undulate. Female: calyx, petals and disk same as in male flowers; staminodes 4; ovary conical; style minute. Berries globose, c. 1 cm across; seeds 2–4.

Flowering & Fruiting: January–June.

Distribution. India: Andhra Pradesh, Assam, Karnataka, Kerala, Meghalaya, Odisha, Tamil Nadu and West Bengal.

Specimens examined: Rajabhatkhawa, 08.03.2011, GK 50504; Bhutanghat, 25.02.2012, AK 55931.

4. *Tetrastigma planicaule* (Hook. f.) Gagnep., *Notul. Syst. (Paris)* 1: 319. 1911; B. V. Shetty & P. Singh in N. P. Singh & al., *Fl. India* 5: 317. 2000. *Vitis planicaulis* Hook. f., *Bot. Mag.*: t. 5685. 1868; M. A. Lawson in Hook. f., *Fl. Brit. India* 1: 658. 1875.

Climbing shrub; tendrils simple. Leaves pedately 5-foliolate or rarely digitately 3-foliolate; lateral leaflets oblong to obliquely-ovate, 5.2–10 cm, oblique, distantly crenate-serrate, abruptly acuminate, sub-coriaceous; terminal leaflet elliptic to oblong or rhombic-ovate, 9.5–10 × 5–5.4 cm, cuneate, or else as in lateral leaflets. Inflorescence corymbose cymes; peduncles 1–3 cm; pedicels pubescent. Male: calyx 4-lobed, truncate; petals green, 4, oblong-ovate, hooded, pubescent outside; stamens 4; filaments 1–2 mm; disk 4-lobed. Female: calyx, petals and disk same as in male flowers; stamens absent; ovary c. 1 mm across, glabrous; stigma 4-lobed. Berries c. 2 cm across, 1–2-seeded; seeds oblong-obovoid, c. 10 mm.

Flowering & Fruiting: November–May.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: NRVK 14, 13.02.2010, SKS & GK 47057.

5. *Tetrastigma serrulatum* (Roxb.) Planch., Monogr. Phan. 5: 432. 1887. *Cissus serrulata* Roxb., Fl. Ind. 1: 432. 1820. *Vitis capreolata* D Don, Prodr. Fl. Nepal.: 188. 1825; M. A. Lawson in Hook. f., Fl. Brit. India 1: 659. 1875. [Plate 44c]

Chare hare (N).

Climbing shrub. Leaves pedately 5-foliolate; lateral leaflets lanceolate to oblanceolate, oblong-lanceolate, elliptic-lanceolate, 1–4.5 × 0.5–1.5 cm, oblique, serrate, short acuminate; terminal leaflet 4–6.5 × 1.5–3 cm, cuneate, or else same as lateral ones. Flowers in umbellate cymes. Male: calyx cupular; tube short; lobes 4, small; petals greenish, 4, ovate, hooded; stamens 4; anthers elliptic; disk short; pistillodes short. Female: calyx, petals and disk same as in male flowers; style indistinct. Berries globose or ellipsoid; seeds 2; prominent raphe on adaxial face; spatulate chalaza on abaxial surface.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: SRVK 6, 09.02.2010, SKS & GK 46378; Panbari 2, 05.03.2011, GK 47267; Jainti range, Jainti 8, 05.03.2011, GK 47255; Bhutri, 05.10.2012, AK 58645; Checko-1, 10.02.2013, AK 58831; Buxaduar to Achalung, 14.02.2014, AK 59937.

Lecaceae

Leca L.

Key to the species

- | | |
|--|----------------------------|
| 1a. Leaves and inflorescence glandular-scaly | 1. <i>L. aequata</i> |
| 1b. Leaves and inflorescence never glandular-scaly | 2 |
| 2a. Plant/plant parts vesicular and glabrous; rachis 20–30 cm; flowers sessile; whole inflorescences more dispersed, looks red | 4. <i>L. guineensis</i> |
| 2b. Plant/plant parts not vesicular and pubescent; rachis less than 20 cm; flowers pedicellate; whole inflorescences congested, looks greenish white | 3 |
| 3a. Corymbs with persistent bracts, bracts ovate, 6–12 mm | 3. <i>L. compactiflora</i> |
| 3b. Corymbs ebracteate or bracts lanceolate, up to 2 mm, often caducous | 4 |
| 4a. Leaves simple, ovate | 6. <i>L. macrophylla</i> |
| 4b. Leaves 3-foliolate or 1–2 (–3)-pinnate | 5 |
| 5a. Branchlets, rachis and petioles winged; leaflets usually cordate at base; veins 5–9 from base; floral bracts c. 2 mm; staminal tube 3–4 mm | 2. <i>L. asiatica</i> |
| 5b. Stems and rachis not winged; leaflets narrowed at base; veins 3 from base; floral bracts 6–9 mm; staminal tube 1.5–2.5 mm | 5. <i>L. indica</i> |

1. *Leea sequata* L., Syst. Nat., ed. 12. 2: 627. 1767; Prain, Bengal Pl. 1: 340. 1903. *Leea hirta* Roxb. ex Hornem., Hort. Bot. Hafn. 1: 231. 1813; M. A. Lawson in Hook. f., Fl. Brit. India 1: 668. 1875. [Plate 45a-b]

Shrub to small tree, 3–6 m high, with discoid pearl glandular. Leaves 1–3-foliolate; stipules 2.5–5 cm, caducous; leaflets oblong to oblong-lanceolate, elliptic-oblong, 4.7–19 × 2.5–5.5 cm, obtuse, serrate, acuminate, hispid. Flowers sub-terminal, in branched cymes, pearl glandular; floral bracts pubescent; pedicels short, pubescent. Calyx cupular; tube short, with pearl glands; lobes ovate to elliptic-ovate, obtuse. Corolla cupular; tube short; lobes ovate. Staminal tube 1.5–2.5 mm. Stamens between staminal lobes; filaments short; anthers fused. Ovary inserted in disk; style short; stigma minute. Berries oblate, 4–6-seeded.

Flowering & Fruiting: June–November.

Distribution. India: Andamans & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa Forest, 1999, RBG 20448; Santrabari Range, 05.10.2009, SKS & GK 46162; Jainti 3–4, 03.03.2011, GK 47207; Kumargram, Kalikhola river belt, 21.09.2011, AK 52733; Newlands, Sukno river, 22.09.2011, AK 52742; Santrabari to Chunabhati, 04.10.2013, AK 59782.

2. *Leea asiatica* (L.) Ridsdale in Manilal, Bot. Hist. Hort. Malab.: 189. 1980. *Phytolacca asiatica* L., Sp. Pl. 1: 474. 1753. *Leea crispa* L., Mant. Pl.: 124. 1767; M. A. Lawson in Hook. f., Fl. Brit. India 1: 665. 1875; Prain, Bengal Pl. 1: 340. 1903. *Leea aspera* Edgew., Trans. Linn. Soc. London 20 (1): 36. 1846; M. A. Lawson in Hook. f., Fl. Brit. India 1: 665. 1875; Prain, Bengal Pl. 1: 340. 1903. *Leea pumila* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41(4): 302. 1872; M. A. Lawson in Hook. f., Fl. Brit. India 1: 666. 1875.

Erect shrub to small tree, 3–5 m high, with few pearl glands. Leaves 1–3-foliolate; stipules narrow adnate wing; leaflets oblong to elliptic-oblong, ovate-oblong, 4–14.5 × 1.5–6.5 cm, serrate, acute or short acuminate. Flowers in sub-terminal, branched cymose, with pearl glandular; floral bracts ovate to triangular-ovate or linear-lanceolate, sparsely pubescent; pedicels angular, pubescent pearl glandular. Calyx cupular; tube short; lobes ovate. Corolla cupular; tube short; lobes ovate. Staminal tube lobed above; lobes further bilobed. Stamens between staminal lobes; filaments short; anthers fused. Ovary inserted into disk; style short; stigma minute. Fruits violet to black when ripe, globose, shallowly lobed; seeds 6, obovoid.

Flowering & Fruiting: June–November.

Distribution. India: Almost throughout India.

Specimens examined: Way to Buxaduar, JKS 4640; Marakata, 24.09.2011, AK 52864.

3. *Leea compactiflora* Kurz, J. Asiat. Soc. Bengal 42 (2): 65. 1873; B. D. Naithani in N. P. Singh & al., Fl. India 5: 333. 2000. *Leea trifoliata* M. A. Lawson in Hook. f., Fl. Brit. India 1 (3): 666. 1875. *Leea bracteata* C. B. Clarke, J. Bot. 19: 164. 1881. [Plate 45c]

Straggling shrub, sometimes with creeping rootstocks, 2–5 m high, ferruginous pubescent when young. Leaves bi or tripinnate; stipules represented by a narrow wing extending to the entire length of petioles; leaflets 7–15, elliptic to elliptic-lanceolate, 2.7–11.5 × 1.7–5.7 cm, obtuse to cuneate, serrate, acuminate to caudate, subcoriaceous, glabrous above pubescent on the nerves beneath. Inflorescence leaf-opposed, corymbs, pubescent; floral bracts ovate-lanceolate, 6–12 mm. Sepals c. 3 mm, glabrous to pubescent. Petals greenish white, elliptic, 3.2–3.5 mm, pubescent. Staminal tube 2–2.5 mm; lobes shallowly retuse or cleft. Stamens 5; filaments 1.6–1.8 mm; anthers elliptic. Ovary globose, 4–6-loculed; style 2–3 mm; stigma capitate. Berries orange-yellow, black when ripe; 4–6-seeded.

Flowering & Fruiting: May–December.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Panbari 8, 31.03.2012, GK 56019.

4. *Leea guineensis* G. Don, Gen. Hist. 1: 712. 1831; A. M. Cowan & Cowan, Trees N. Bengal: 40. 1929; B. D. Naithani in N. P. Singh & al., Fl. India 5: 336. 2000. [Plate 45d]

Shrub, 1–2 m high. Leaves 2 or 3-foliolate; leaflets ovate to elliptic-ovate, oblong to elliptic-oblong or oblong-lanceolate, 4–17 × 2–4 cm, rounded to cuneate, serrate, acuminate, vesicles and pellucid glands above, scattered pellucid glands below. Flowers sub-terminal, laxly branched cymose, with pearl glands, pubescent; floral bracts triangular-ovate. Calyx cupular; tube short; lobes triangular-ovate. Corolla cupular; tube short; lobes ovate, reflexed. Staminal tube 2.5–3 mm, 5-lobed; lobes bifid. Stamens inserted between staminal lobes; filaments short; anthers fused. Ovary grooved; style columnar, grooved; stigma capitate. Fruits orange red, subglobose; seeds 3–4, triangular.

Flowering & Fruiting: July–December.

Distribution. India: Andaman Islands, Assam, Maharashtra, Manipur, Meghalaya, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56122.

5. *Leea indica* (Burm. f.) Merr., Philip. J. Sci. 14: 245. 1919; B. D. Naithani in N. P. Singh & al., Fl. India 5: 337. 2000. *Staphylea indica* Burm. f., Fl. Ind.: 75, t. 24, f. 2. 1768. *Leea sambucina* Willd., Sp. Pl., ed. 4, 1(2): 1177. 1798. *Leea umbraculifera* C. B. Clarke, J. Bot. 19: 141. 1881.

Undershrub, to 1 m high. Leaves 2–3-pinnate; stipules obovate-oblong; leaflets oblong, ovate-lanceolate or elliptic-lanceolate, 5.5–13 × 1.6–3.2 cm, rounded to cuneate, coarsely serrate to dentate, acute or acuminate to caudate, subcoriaceous, glabrous. Inflorescence lax, sometimes dense, glabrous to pubescent cymes; floral bracts triangular to linear, c. 4 mm, early caducous. Sepals lobed up to middle, glabrous to pubescent. Petals greenish white, 5-lobed above; tube 2.5–3.5 mm; lobes 3–4 mm. Stamitodial tube 2.5–3.5 mm. Ovary globose; stigma expanded slightly. Berries depressed globose, purple-black; seeds 4–6 mm, grooved.

Flowering & Fruiting: June–March.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Kerala, Madhya Pradesh, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Santrabari, 05.10.2009, SKS & GK 46161.

6. *Leea macrophylla* Roxb. ex Hornem., Hort. Hafn. 1: 213. 1813; M. A. Lawson in Hook. f., Fl. Brit. India 1: 664. 1875; Prain, Bengal Pl. 1: 341. 1903. *Leea integrifolia* Roxb., Fl. Ind. 2: 472. 1824. *Leea robusta* Roxb., Fl. Ind. 2: 468. 1824. *Leea parallela* Wall. ex M. A. Lawson in Hook. f., Fl. Brit. India 1: 666. 1875. *Leea cinerea* M. A. Lawson in Hook. f., Fl. Brit. India 1(3): 665. 1875. *Leea diffusa* M. A. Lawson in Hook. f., Fl. Brit. India 1 (3): 667. 1875.

Bulyettra (N).

Erect shrub to small tree, 2–3 m high, with pearl glands. Leaves 1–3-foliolate; leaflets oblong, ovate-lanceolate or elliptic-lanceolate, 20–27 × 6–8 cm, rounded or cuneate, serrate, caudate-acuminate, coriaceous, vesicular above. Flowers in sub-terminal, laxly branched cymes; floral bracts acuminate, pubescent. Calyx cupular, pubescent; tube short; lobes ovate. Corolla cupular; tube short; lobes ovate, pubescent to papillose. Staminal tube short. Stamens inserted in between staminal lobes; filaments short; anthers fused. Style short. Seeds 6, obovoid.

Flowering & Fruiting: July–March.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Adma, Panbari, 12.02.2013, AK 58873.

Sapindaceae

Key to the genera

- 1a. Climbing herbs with angular stems; tendrils cochleate; leaves biternate; veins 3 from base; petiolules winged; flowers asymmetric in umbellate cymes; nectary scale white or yellow; disk with 2 glands; fruits membranous, inflated, triangular, winged

2. *Cardiospermum*

- 1b. Trees or shrubs with terete stems; tendrils absent; leaves not bifernate; veins pinnate; petiolules not winged; flowers symmetric in racemes or panicles; nectary scales not as above; disk without glands; fruits not as above 2
- 2a. Trees; leaves 18–21-foliolate; petals with woolly nectar scales; filaments villous at base; stigma 3-lobed; fruits with aborted lobes 4. *Sapindus*
- 2b. Shrubs; leaves 1-foliolate or 8–12-foliolate; petals with villous or pubescent nectar scales; filaments glabrous or villous throughout; stigma bifid; fruits without aborted lobes 3
- 3a. Stems pubescent; leaves 1-foliolate; petioles with 2 lateral appendages; flowers in racemes, bisexual, 4-merous; petals white with villous nectar scales; filaments connate at base, villous; style prominent; disk 4-lobed 1. *Allophylus*
- 3b. Stems glabrous; leaves 8–12-foliolate; petioles without lateral appendages; flowers in panicles, unisexual, 5-merous; petals crimson red with sparsely white pubescent nectar scales; filaments free, glabrous; style not prominent; disk not lobed 3. *Lepisanthes*

1. *Allophylus* L.

Allophylus chartaceus (Kurz) Radlk. in Engl. & Prantl, Nat. Pflanzenfam. 3 (4): 313. 1895. *Schmidelia chartacea* Kurz, J. Asiat. Soc. Bengal 43 (2): 183. 1874. *Allophylus zeylanicus* L. var. *grandifolia* Hiern in Hook. f., Fl. Brit. India 1: 673. 1875.

Shrub, 1–2 m high. Leaves variable, obovate to oblong, 14–25.5 × 5.5–13.5 cm, cuneate, wavy or irregularly serrate-dentate, acuminate; floral bracts triangular-ovate, pubescent; pedicels short. Sepals biseriate; outer ones obovate, concave, glabrous or sparsely pubescent; inner ones obovate to orbicular. Petals oblong, incurved. Stamens 8; filaments short; anthers ovoid; disk one sided. Ovary subglobose, 2-lobed, glabrous or pubescent; style short; stigma short. Fruits subglobose, rarely bilobed; seeds 1 or 2, circular.

Flowering & Fruiting: July–December.

Distribution. India: Assam, Nagaland, Sikkim and West Bengal.

Specimens examined: Checko-1, 25.09.2012, AK 56135; Bhutri, 05.10.2012, AK 58637.

2. *Cardiospermum* L.

Cardiospermum halicacabum L., Sp. Pl. 1: 366. 1753; Hiern in Hook. f., Fl. Brit. India 1: 670. 1875; Prain, Bengal Pl. 1: 342. 1903.

Climbing herb, white pubescent; tendrils on peduncles, pubescent. Leaflets deltoid-lanceolate or ovate, 1.8–4.5 × 0.8–2 cm, decurrent or attenuate, lobed and hairy at margins, acute, sparsely pilose. Flowers unisexual; floral bracts lanceolate,

sparsely pilose; pedicels short. Sepals 4, biseriate; outer ones circular-obovate, smaller, concave; inner ones larger, obovate or elliptic-obovate. Petals white, 4 in 2 unequal pairs, obovate or flabellate, each with large nectary scale; appendages glabrous in one pair and pubescent in another pair. Stamens 8, unequal; filaments flat, connate at base, villous; anthers ellipsoid; disk one sided. Ovary 3-lobed; style short; stigma 3-lobed. Capsules pyriform, 1–1.5 × 1.5–2 cm, pubescent; seeds 3, globose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Rydak river belt, 20.09.2011, AK 52691; Kumargram, 13.02.2012, AK 53008.

3. *Lepisanthes* Blume

Lepisanthes senegalensis (Juss. ex Poir.) Leenh., *Blumea* 17: 85. 1969. *Sapindus senegalensis* Juss. ex Poir. in Lam. & al., *Encycl.* 6 (2): 666. 1805. *Sapindus bifoliolatus* (Thwaites) Hiern in Hook. f., *Fl. Brit. India* 1: 684. 1875. *Otophora paucijuga* Hiern in Hook. f., *Fl. Brit. India* 1: 680. 1875. *Sapindus attenuatus* Wall. ex Hiern in Hook. f., *Fl. Brit. India* 1: 684. 1875, *nom. illeg.* [Plate 46a]

Achatta (N).

Shrub to medium size tree, 2–3 m high, verrucose. Leaflets oblong-lanceolate, 8–24 × 3–6 cm, obliquely cuneate, acute or short acuminate, sub-coriaceous. Inflorescence pseudoterminal, panicles, 5–15(–20) cm, brownish pubescent; floral bracts triangular-ovate, pubescent. Sepals 5, unequal, sub-orbicular, ciliate; outer ones 2, smaller. Petals yellowish green, ovate, 3–3.5 × 2–2.5 mm, clawed. Stamens 8; filaments minute; anthers ovoid; disk raised. Ovary 2-lobed. Fruits orange red to purple or black when ripe, ellipsoid, 1–3-lobed; seed solitary in each lobe, crustaceous.

Flowering & Fruiting: December–June.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Jainti, 13.02.2010, SKS & GK 47074; Jainti, 04.03.2011, SKS & GK 47241; Jainti, 31.03.2012, GK 50670; Checko-1, 09.02.2013, AK 58812.

4. *Sapindus* L.

Sapindus mukorossi Gaertn., *Fruct. Sem. Pl.* 1: 342, t. 70, f. 3. 1788; Hiern in Hook. f., *Fl. Brit. India* 1: 683. 1875; Prain, *Bengal Pl.* 1: 344. 1903.

Deciduous tree, 8–15 m high, pubescent. Leaves paripinnate to imparipinnate;

leaflets lanceolate-oblong, 6–17 × 2.5–5 cm, obliquely rounded, acute to acuminate at apex. Flowers in large terminal and lateral panicles; inflorescence bracts lanceolate, pubescent; floral bracts same as inflorescence bracts; pedicels short, pubescent. Sepals 4–5, unequal, elliptic-oblong to lanceolate, ciliate, pubescent. Petals 4–5, same as sepals but concave. Stamens 8; filaments short; anthers sub-circular; disk lobed, slightly raised. Ovary 2–4-lobed; style short, angled. Fruits reddish brown, globose, 2–2.5 cm across; seeds globose, 1.3–1.5 cm across, stony, with prominent white hilum.

Flowering & Fruiting: April–February.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59961.

Hippocastanaceae

Aesculus L.

Aesculus assamica Griff., Not. Pl. Asiat. 4: 540. 1854. *Aesculus punduana* Wall. ex Hiern in Hook. f., Fl. Brit. India 1 (3): 675. 1875. [Plate 46b-c]

Satpate (N).

Tree, to 10 m high. Leaves digitate; leaflets 7–8, elliptic to elliptic-obovate, 12–30 × 4–9.8 cm, cuneate, serrulate, abruptly acuminate, sub-coriaceous, glabrous. Inflorescence thyrses, usually erect, sometimes terminal portion bending, main axis in racemes and branches with terminal cymes, pubescent. Calyx 5-lobed; tube 5–7 mm, glabrous; lobes circular. Petals creamy white, with a yellow or orange spot, 4 + 2, unequal, pubescent outside; 4 larger petals spatulate, 1.6–2 cm; 2 smaller petals linear, c. 2 mm. Stamens 7–8, prominently exerted, recurved; filament c. 3 cm; anthers oblong; disk conspicuous. Ovary linear, puberulous, 3-loculed; style slender, c. 7 mm; stigma linear. Capsules brown, ovoid-ellipsoid, obliquely and bluntly beaked, scurfy brown, 1-seeded.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: SRVK 11, 17.02.2010, SKS & GK 47136.

Staphyleaceae

Turpinia Vent.

Turpinia pomifera (Roxb.) DC., Prodr. 2: 3. 1825; Hiern in Hook. f., Fl. Brit. India 1: 698. 1875; Prain, Bengal Pl. 1: 347. 1903. *Dalrympleia pomifera* Roxb., Pl. Coromandel 3: 76, t. 279. 1819. [Plate 47a-b]

Thali, Nagpat (N).

Tree, 15–20 m high. Leaves 5–7-foliolate; leaflets obovate or oblong-elliptic, 5.5–14.5 × 3.2–6.8 cm, cuneate or slightly oblique, serrulate, acuminate, coriaceous. Flowers in terminal panicles, puberulous; inflorescence bracts triangular-ovate, ciliate. Flowers sub-sessile; floral bracts same as inflorescence bracts. Sepals pale green, ovate or obovate, ciliate. Petals creamy white, oblong, obtuse. Filaments flat, short; anthers oblong, tetrahectous. Carpels 5; stigma capitate. Fruits purplish black, globose, 3-grooved, rugose; seeds 2–3, angular.

Flowering & Fruiting: January–August.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: NRVK 4–14, 10.02.2010, SKS & GK 47006; Panbari, 08.03.2011, GK 50506; SRVK 12, 30.03.2012, GK 50639; Checko-1, 09.02.2013, AK 58807.

Sabiaceae

Key to the genera

- 1a. Trees; leaves compound; flowers zygomorphic; stamens 2, fertile; staminodes 3; fruit a drupe 1. *Meliosma*
- 1b. Scandent shrubs; leaves simple; flowers actinomorphic; stamens 5, fertile; staminodes absent, subequal; fruit a schizocarp 2. *Sabia*

1. *Meliosma* Blume

Meliosma simplicifolia (Roxb.) Walp., Repert. Bot. Syst. 1: 423. 1842; Hook. f., Fl. Brit. India 2: 5. 1876; Prain, Bengal Pl. 1: 349. 1903. *Millingtonia simplicifolia* Roxb., Pl. Coromandel 3: 50. 1820. [Plate 47c-d]

Tree, 3–4 m high, pubescent when young. Leaves obovate to oblong-obovate, lanceolate, 6–31 × 1.5–12 cm, attenuate, acute at apex, rarely emarginate. Inflorescence terminal panicles; bracts ovate, pubescent. Flowers sessile. Sepals unequal, 3 large and 1 small, broadly ovate, ciliate. Petals white, dissimilar, 3 in outer whorl and 2 in inner whorl; outer ones sub-orbicular; inner ones bifid. Stamens 5; fertile 2, inserted at inner petals; filaments minute; anthers bilobed; staminodes 3; disk annular, 5-lobed. Ovary sub-globose; style and stigma minute. Fruits obliquely sub-globose; seed solitary, globose, prominently keeled and strongly reticulate sides.

Flowering & Fruiting: December–June.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Manipur, Meghalaya, Odisha, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Newlands, 15.02.2012, AK 53085; Marakata, 22.02.2012, AK 55890; Near 23rd Mile Watch Tower, 08.04.2012, GK 56079; Buxaduar to Chunabhati, 17.02.2014, AK 59985.

2. *Sabia* Colebr.

Key to the species

- 1a. Leaves glabrous throughout on lower surface; lateral veins 6 or 7 pairs; inflorescence rachis glabrous; petals obovate or suborbicular 1. *S. limoniacea*
1b. Leaves pubescent beneath; lateral veins 3–5 pairs; inflorescences rachis yellowish pilose; petals ovate-oblong 2. *S. paniculata*

1. *Sabia limoniacea* Wall. ex Hook. f. & Thomson, Fl. Ind. 1: 210. 1855; Hook. f., Fl. Brit. India 2: 3. 1876; Prain, Bengal Pl. 1: 348. 1903. [Plate 48a-b]

Scandent shrub. Leaves usually lanceolate to oblong-ovate, rarely elliptic, 7.2–12.2 × 2.5–4.9 cm, cuneate-rounded, entire, mucro-acute to obtuse, leathery, glabrous. Inflorescence 2–3-flowered paniculate cymes, 6–15 cm, glabrous. Sepals 5, ovate or elliptic, acute or obtuse, ciliate, nerves obscure, gland-dotted at base. Petals pale yellow, 5, obovate or suborbicular, obtuse. Stamens 5, free, but fused at the base of the petals; filaments expanded below; anthers globose; disk cupular, shallowly 5-lobed. Ovary 2-loculed; style short; stigma simple. Fruits drupaceous; drupelets 2, red or black, subglobose to obovoid, compressed, 1 or (2)-seeded.

Flowering & Fruiting: September–April.

Distribution. India: Assam, Kerala, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Panbari 8, 04.03.2011, GK 47233.

2. *Sabia paniculata* Edgew. ex Hook. f. & Thomson, Fl. Ind. 1: 211. 1855; Hook. f., Fl. Brit. India 2: 3. 1876; S. C. Majumdar in N. P. Singh & al., Fl. India 5: 433. 2000.

Kali Lahara (N).

Climbing shrub, puberulent or glabrous. Leaves oblong-ovate or ovate, 10–19.5 × 4.5–8.8 cm, rounded, entire, mucro-acute, coriaceous, glabrous except nerves. Inflorescence 10–30-flowered paniculate cymes, c. 12 cm, pubescent. Flowers fragrant; pedicels 2–8 mm, pubescent. Sepals 5, ovate, acute, ciliate. Petals yellowish green, 5, ovate-oblong, acute, glabrous, nerves conspicuous. Stamens 1.5–2.5 mm; disk shallowly cupular, shortly 5-lobed. Style cylindrical or conical. Fruits drupaceous; drupelets 2, suborbicular, compressed.

Flowering & Fruiting: June–August.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 5, 04.03.2011, GK 47233; Panbari 8, 29.11.2011, GK 47169.

Anacardiaceae

Key to the genera

- 1a. Leaves simple 2
1b. Leaves compound 3
- 2a. Leaves elliptic-oblong, undulate, acuminate; lateral veins join the marginal vein just below the margin; style solitary, glabrous; stigma obscurely 3-lobed; disk not 5-lobed, not bristly; fruits oblate, not seated on a receptacle 1. *Drimycarpus*
2b. Leaves obovate, entire, obtuse; lateral veins extend to the margin with no marginal vein; styles 3, hairy; stigma inconspicuous; disk 5-lobed, bristly; fruits obliquely ovoid or oblong, seated on enlarged receptacle 5. *Semecarpus*
- 3a. Scandent shrubs; branchlets ribbed, tomentose; rachis tomentose; lateral leaflets differently margined, entire below and serrate above; veins 3-5 from base; stamens 10; styles 5 3. *Pegia*
3b. Trees or erect shrubs; branchlets not ribbed, pubescent or glabrous; rachis pubescent; lateral leaflets uniformly margined, entire/serrate; veins pinnate; stamens 5 or 8; styles 3 or 4 4
- 4a. Trees, leafless in flower; branchlets glabrous; leaflets entire, pubescent below; rachis not winged; inflorescences pendulous, clustered at the end of branchlets, stellate pubescent; petals greenish maroon; stamens 8; style 4-partite above; disk 8-lobed 2. *Lannea*
4b. Shrubs, leafy in flower; branchlets pubescent; leaflets serrate, white tomentose below; rachis narrowly winged; inflorescences spreading, not clustered at end of branchlets, white tomentose; petals white; stamens 5; styles 3 from base; disk 5-lobed 4. *Rhus*

1. *Drimycarpus* Hook. f.

Drimycarpus racemosus (Roxb.) Hook. f. ex Marchand, Rev. Anacardiaceae: 172. 1869. Hook. f., Fl. Brit. India 2: 36. 1876; Prain, Bengal Pl. 1: 352. 1903. *Holigarna racemosa* Roxb., Fl. Ind. 2: 82. 1832.

Khak Balaiyo (N).

Tree, 10-12 m high. Leaves elliptic-oblong to oblanceolate, 11-20 x 3.5-5.5 cm, cuneate, coriaceous. Flowers bisexual and unisexual (either male or female) in panicles; floral bracts triangular-ovate; pedicels short. Male: calyx cupular; lobes triangular-ovate; petals greenish, ovate to broadly ovate; filaments short; anthers sub-globose; disk annular, concave. Female: calyx, petals and disk same as in male flowers; ovary short; style short. Bisexual: floral parts same as in male and female flowers. Drupes black when ripe, oblate, 2-3 x 3-4 cm, compressed, producing watery latex; seed solitary, oblate.

Flowering & Fruiting: October-April.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam,

Manipur, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59957.

Notes: Latex producing from fruits made wounds on skin.

2. *Lanea* A. Rich.

Lanea coromandelica (Houtt.) Merr., J. Arnold Arbor, 19: 353. 1938. *Dialium coromandelinum* Houtt., Handl. Pl-Kruidk. 2: 39, t. 5, f. 2. 1774. *Odina wodier* Roxb., Fl. Ind. 2: 293. 1832; Hook. f., Fl. Brit. India 2: 29. 1876; Prain, Bengal Pl. 1: 354. 1903. [Plate 48c-d]

Jia, Amaroo (N).

Tree, 10–15 m high. Leaves 7–17-foliolate; leaflets elliptic-oblong to elliptic-ovate, 9–15 × 5–7 cm, obliquely rounded, acuminate at apex. Flowers sessile to pedicellate, polygamous in terminal panicles, stellate pubescent to glabrescent; inflorescence bracts ovate to triangular-ovate, ciliate. Male: calyx crimson red; tube short; lobes 4–5, oblong-ovate to ovate or sub-orbicular; petals 4 or 5, oblong-ovate, reflexed; stamens unequal, 2 large, 6 small; filaments short; anthers oblong; disk annular; ovary rudimentary. Female: calyx, petals and disk same as in male flowers; stigma yellow, capitellate. Bisexual: floral parts same as in male and female flowers. Drupes red when ripe, sub-reniform, compressed; seed solitary, elliptic-oblong.

Flowering & Fruiting: December–June.

Distribution. India: Almost throughout India.

Specimen examined: Narathali, 20.02.2012, AK 55785.

3. *Pegia* Coleb.

Pegia nitida Colebr., Trans. Linn. Soc. London 15 (2): 364. 1827. *Tapiria hirsuta* Hook. f., Fl. Brit. India 2: 28. 1876, (as "*Tapiria*").

Lahara Anp (N).

Climbing shrub. Leaves 11–15-foliolate; lateral leaflets ovate to elliptic-ovate or elliptic-oblong, 4.2–4.5 × 1.8–2.2 cm, acuminate at apex, sparsely glandular pubescent above, villous below; terminal leaflet lanceolate or obovate, obtuse or sub-circular, or else same as lateral ones. Flowers polygamous, fragrant in axillary, terminal panicles, tomentose; floral bracts linear-lanceolate, acuminate, tomentose; pedicels short. Male: calyx cupular; tube short; lobes ovate; petals white, oblong to elliptic-oblong; filaments short; anthers sub-globose; pistillodes with 5 style-like structure. Female: calyx, petals and disk same as in male flowers; ovary sub-globose, 5-lobed; style short; stigma capitate; staminodes smaller than fertile stamens. Bisexual: floral parts same as in male and female flowers. Drupes black when ripe, obliquely ellipsoid; seed oblong.

Flowering & Fruiting: February–May.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Jainti, 05.03.2011, GK 47258; NRVK 5, 30.03.2012, GK 50661; Checko-1, 10.02.2013, AK 58834.

4. *Rhus* L.

Rhus chinensis Mill., Gard. Dict. ed. 8. sub: 7. 1768. *Rhus semialata* Murray, Commentat. Soc. Regiae Sci. Gott. 6: 27, t. 3. 1784; Hook. f., Fl. Brit. India 2: 10. 1876. [Plate 49a]

Bhakimlo (N).

Shrub, 4–5 m high. Leaves 7–9 foliolate; lateral leaflets ovate to ovate-lanceolate, 4.5–12 × 2–4.5 cm, asymmetrically rounded, acuminate at apex, sparsely pubescent above; terminal ones elliptic-lanceolate, 10–13 × 3–4 cm, attenuate, or else same as lateral ones. Flowers sub-sessile, polygamous in terminal panicles, tomentose; inflorescence bracts sub-orbicular, tomentose; floral bracts lanceolate, pubescent. Bisexual: calyx cupular; tube short; lobes elliptic-ovate, connate, ciliate, pubescent. Petals obovate, ciliate, reflexed. Filaments short; anthers yellow, elliptic. Ovary sub-globose, hairy; style short, hairy up to middle only; stigma sub-capitate. Male flowers same as bisexual flowers except pistil reduced to pistillodes while stamens reduced to staminodes in female flowers. Drupes reddish, sub-globose, puberulent; seed solitary, globose, compressed.

Flowering & Fruiting: October–April.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Rajasthan, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Santrabari to Buxa Fort, 28.09.2013, AK 59615

5. *Semecarpus* L. f.

Semecarpus anacardium L. f., Suppl. Pl.: 182. 1782; Hook. f., Fl. Brit. India 2: 30. 1876; Prain, Bengal Pl. 1: 353. 1903. [Plate 49b-c]

Bhalayo (N).

Small tree, 3–5 m high, brown pubescent. Leaves clustered at ends of branchlets, obovate, 31.5–34 × 17–18 cm, cuneate, coriaceous. Flowers sessile to sub-sessile, unisexual in terminal panicles; inflorescence bracts foliaceous, 3–5 × 2–4 cm, deciduous; floral bracts triangular; pedicels short. Male: calyx cupular; tube short; lobes 5, triangular-ovate, ciliate; petals white, elliptic-oblong, sparsely pubescent; filaments short; anthers ovate; disk annular. Female: calyx, petals and disk smaller, or else same as in male flowers; ovary sub-globose, brown pubescent; staminodes

subulate. Drupes black when ripe, obliquely ovoid or oblong, notched, laterally compressed, glabrous or pubescent; seed solitary, pendulous.

Flowering & Fruiting: August–February.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Hauda nala, on way to Mahakal cave, 03.10.2012, AK 58691.

Leguminosae [Fabaceae (s.l.)]

Key to the subfamilies

- 1a. Flowers symmetric, in heads or spikes; petals valvate; stamens usually more than 10 **2. Mimosoideae**
- 1b. Flowers asymmetric, solitary/in racemes/spikes/panicles; petals imbricate; stamens 10 or less than 10 **2**
- 2a. Leaves bipinnate or pinnate, rarely simple or 1-foliolate; adaxial petal overlapped by adjacent lateral petals; stamens 5 or 10, free **1. Caesalpinioideae**
- 2b. Leaves usually odd-pinnate; adaxial petal outside the adjacent lateral petals; stamens 10, monoadelphous or diadelphous **3. Papilionoideae**

1. Caesalpinioideae

Key to the genera

- 1a. Leaves simple or unipinnate **2**
- 1b. Leaves bipinnate **6**
- 2a. Leaves unipinnate; veins pinnate; flowers usually yellow **3**
- 2b. Leaves simple, bilobed; veins palmate; flowers usually other than yellow **4**
- 3a. Bracteoles 1 or 2; filaments of 3 abaxial stamens sigmoid and their anthers dehiscing by slits; other stamen filaments straight and shorter their anthers dehiscing by basal pores; pods cylindrical, terete; seeds elliptic-ovate, flat, separated by papery septa **4. Cassia**
- 3b. Bracteoles absent; filaments of all stamens straight or simply curved; anthers dehiscing by slits or pores; pods not cylindrical; seeds not as above **7. Senna**
- 4a. Lianas with tendrils, rarely trees without tendrils but with nectariferous disk; seeds 1 or 2 **5. Phanera**
- 4b. Trees or shrubs (rarely semi-scandent), without tendrils and nectariferous disk; seeds many **5**
- 5a. Flowers bisexual, rarely female; calyx splitting to mouth of hypanthium at anthesis; all stamens, not all fertile **2. Bauhinia**
- 5b. Flowers unisexual; calyx splitting only in the upper part at anthesis; stamens, all fertile **6. Piliostigma**

- 6a. Trees, unarmed; flowers drooping; calyx and petals citrine with scarlet hue at apex; petals similar, oblanceolate; stamens equal; pods oblong or strap-shaped, attenuate at base; seeds many, ellipsoid, smooth 1. *Acrocarpus*
- 6b. Scandent shrubs, armed; flowers erect; calyx and petals yellow; petals dissimilar, upper one flabellate and others oblong or elliptic; stamens unequal; pods elliptic-oblong, obliquely cuneate at base; seed solitary, sub-orbicular, punctate, rugose 3. *Caesalpinia*

1. *Acrocarpus* Wight & Arn.

Acrocarpus fraxinifolius Wight & Arn., Mag. Zool. Bot. 2: 547. 1838; Baker in Hook. f., Fl. Brit. India 2: 292. 1878. [Plate 49d]

Mandane (N).

Tree, 20–30 m high, reddish brown tomentose when young. Pinnae 3–8 pairs; leaflets 4–6 pairs, obliquely ovate or lanceolate-oblong, 5–10 × 2–4.5 cm, obliquely rounded or cuneate, hairy at margins, acuminate. Flowers in axillary, flowered elongate racemes, brown pubescent; floral bracts lanceolate, caducous, brown pubescent; pedicels short, brown pubescent. Calyx citrine, cupular, brown pubescent; tube short; lobes ovate-oblong, ciliate. Petals 6–7 mm, pubescent. Stamens on margin of campanulate receptacle, exerted; filaments citrine at below, scarlet above, flat, 0.7–1.5 cm; anthers oblong-elliptic. Ovary oblanceolate, compressed, stipitate, pubescent at base; style short, curved; stigma indistinct. Pods 10–15 × 1.5–2 cm, winged along ventral suture.

Flowering & Fruiting: February–June.

Distribution. India: Assam, Karnataka, Kerala, Meghalaya, Mizoram, Tamil Nadu, Sikkim, Madhya Pradesh (cultivated), Maharashtra, Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Achalung, 14.02.2014, AK 59944.

2. *Bauhinia* L.

Key to the species

- 1a. Leaves bilobed at apex; lobes acute; petals light pink, oblong to oblanceolate; fertile stamens 3; staminodes 7; style tomentose; stigma linguiform, tomentose 1. *B. purpurea*
- 1b. Leaves shallowly bilobed; lobes rounded at apex; petals reddish purple, obovate; fertile stamens 5; staminodes 1–5; style sparsely hairy; stigma capitate, glabrous 2. *B. variegata*

1. *Bauhinia purpurea* L., Sp. Pl. 1: 375. 1753; Baker in Hook. f., Fl. Brit. India 2: 284. 1878; Prain, Bengal Pl. 1: 442. 1903. [Plate 50a]

Tanki (N).

Tree, 10–12 m high. Leaves ovate to sub-orbicular, 7.5–15 × 4.5–13.5 cm, subcordate, sub-coriaceous, appressed hairy below; stipules ovate, caducous, pubescent. Flowers in axillary or terminal, simple or branched racemes, appressed pubescent; floral bracts ovate, tomentose; bracteoles same as floral bracts; pedicels 8–10 cm, tomentose. Calyx tube fused with hypanthium, c. 1 cm, striated, tomentose; lobes fused. Petals 4.5–5.5 × c. 1.5 cm, clawed. Filaments 3–4.5 cm; anthers oblong; staminodes linear. Ovary oblong, stipitate, tomentose; style flat, 8–10 cm; stigma oblique. Pods brown, oblong or strap-shaped, 15–20 × 1.5–2 cm, beak curved, puberulous along sutures; seeds 5–7, sub-orbicular.

Flowering & Fruiting: September–April.

Distribution. India: Almost throughout India (often cultivated).

Specimens examined: NRVK 6 compt., 09.10.2009, SKS & GK 46270; Newlands, 15.02.2012, AK 53052; Achalung to Lepchakhawa, 29.09.2013, AK 59658; Santrabari to Buxaduar, 16.02.2014, AK 59981.

2. *Bauhinia variegata* L., Sp. Pl. 1: 375. 1753; Baker in Hook. f., Fl. Brit. India 2: 284. 1878; Prain, Bengal Pl. 1: 442. 1903. [Plate 50b]

Tanki (N).

Tree, 8–12 m high. Leaves sub-orbicular, 3.5–6.5 × 5.5–9 cm, cordate, repand, sub-coriaceous, sparsely puberulous below; stipules ovate, pubescent. Flowers in terminal or axillary, few-flowered, branched racemes, tomentose; floral bracts ovate, pubescent; bracteoles same as floral bracts; pedicels short, tomentose. Calyx tube fused with hypanthium, striated, tomentose; lobes fused. Petals 4–6 × 2–3.5 cm, clawed. Filaments reddish purple, sub-equal, 2.5–3.3 cm, connate at base; anthers oblong; staminodes reddish purple, 1–5. Ovary oblong, compressed, stipitate, sparsely hairy; style 5–10 mm. Pods light brown, oblong or strap-shaped, beaked; seeds 5–7, sub-orbicular to orbicular.

Flowering & Fruiting: January–May.

Distribution. India: Almost throughout India (often cultivated).

Specimen examined: Sankosh, 17.02.2012, AK 55694.

3. *Caesalpinia* L.

Caesalpinia cucullata Roxb., Fl. Ind. 2: 358. 1832. *Mezoneuron cucullatum* (Roxb.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 283. 1834; Baker in Hook. f., Fl. Brit. India 2: 258. 1878. *Mezoneuron cucullatum* var. *grandis* Heyne ex Baker in Hook. f., Fl. Brit. India 2: 258. 1878. [Plate 50c-d]

Bokshi Khanra (N).

Climbing shrub. Leaves compound; leaflets 6–7 pairs, ovate to elliptic-ovate or obovate, 3.5–6 × 1.5–3 cm, cuneate, acuminate at apex, sub-coriaceous. Flowers

in axillary, simple or branched racemes; floral bracts minute; pedicels 7–10 mm. Calyx obliquely cupular; lobes unequal; lowest one cucullate and larger than others, enclosing other lobes in buds; upper ones triangular-ovate or rounded. Petals yellow, uppermost one short and broad, apex 2-lobed forming fishtail-shape, shortly clawed at base, other 4 yellowish tinged red striate, oblong, glabrous. Stamens 10, exserted; filaments 2–2.5 cm, pubescent; anthers maroon, oblong. Ovary oblong, compressed; style short; stigma truncate. Pods reddish, winged along upper suture.

Flowering & Fruiting: November–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Bhutanghat, JKS 4121; Jainti range, 03.03.2011, GK 47219; NRVK 6a, 04.12.2011, GK 52323; Kumargram, 18.02.2012, AK 55727; Narathali, 20.02.2012, AK 55767.

Notes: This species is similar to *C. nuga* but can be distinguished by its maroon anthers.

4. *Cassia* L.

Key to the species

- 1a. Leaflets 6–8, ovate or ovate-oblong, puberulent; inflorescences pendent racemes; petals yellow, ovate; anthers puberulent along connective on one side 1. *C. fistula*
- 1b. Leaflets 12–14, oblong-lanceolate to elliptic-oblong, appressed pubescent; inflorescences erect, corymbose; petals pink, spatulate; anthers glabrous

2. *C. javanica*

1. *Cassia fistula* L., Sp. Pl. 1: 377. 1753; Baker in Hook. f., Fl. Brit. India 2: 261. 1878; Prain, Bengal Pl. 1: 437, 1903. *Cassia rhombifolia* Roxb., Fl. Ind. 2: 334. 1832.

Bandarlata (N).

Deciduous tree, 10–12 m high, pubescent when young. Leaflets broadly ovate or ovate-oblong, 6–10 × 2.2–4.5 cm, cuneate, acute at apex, coriaceous; floral bracts lanceolate, caducous, appressed pubescent; pedicels 1.5–3.3 cm, sparsely puberulent to glabrous. Calyx divided to base; lobes ovate-oblong, 1–1.5 cm, ciliate, hairy. Petals 2.2–2.5 × 1.2–1.6 cm, clawed. Stamens 10, unequal; long filaments 3, declinate, 4–4.5 cm; medium size filaments 4, straight, 6–10 mm, with reduced anthers; small filaments 3, curved, c. 5 mm; anthers elliptic-oblong. Ovary oblong, stipitate, sparsely appressed pubescent; style 4–4.5 cm, sparsely appressed pubescent; stigma small. Pods blackish brown, cylindric, 30–50 × 2–2.5 cm, pendulous; seeds many, elliptic-ovate, flat, separated by papery septa.

Flowering & Fruiting: April–October.

Distribution. India: Almot throughtout India (cultivated).

Specimens examined: Buxa-Jainty, 25.05.1949, VN & party 2983; Narathali, 23.09.2011, AK 52808; Tashigaon, 10.04.2012, GK 56069; Santrabari to Buxaduar, 18.05.2014, AK 62614.

2. *Cassia javanica* L. subsp. *nodosa* (Buch.-Ham. ex Roxb.) K. Larsen & S. S. Larsen, Nat. Hist. Bull. Siam Soc. 25(3-4): 205. 1974. *Cassia nodosa* Buch.-Ham. ex Roxb., Fl. Ind. 2: 336. 1832; Baker in Hook. f., Fl. Brit. India 2: 261. 1878; Prain, Bengal Pl. 1: 437. 1903.

Deciduous tree, 12-15 m high, pubescent when young. Leaflets 5-6 × 1.9-2.3 cm, rounded to cuneate, hairy at margins, acute, coriaceous; floral bracts lanceolate, deciduous, appressed pubescent; pedicels 2-3.5 cm, pubescent. Calyx divided to base; lobes ovate, ciliate, pubescent. Petals 1.5-4 × 1.2-2 cm, shortly clawed. Stamens 10, unequal; long filaments 3, declinate, 3.8-4.2 cm; medium sized filaments 4, straight, c. 2.8 mm; short filaments 3, curved, 2-2.5 mm, with reduced anthers; anthers elliptic-oblong. Ovary oblong, stipitate, appressed pubescent; style 3.5-4 cm; stigma small. Pods blackish brown, cylindric, 30-40 × 1.8-2 cm, pendulous; seeds many, ovate, flat, separated by papery septa.

Flowering & Fruiting: May-February.

Distribution. India: Almot throughtout India (cultivated).

Specimen examined: Rydak river belt, 26.02.2012, AK 55971.

5. *Phanera* Lour.

Phanera scandens (L.) Lour. ex Raf., Sylva Tellur.: 122. 1838. *Bauhinia scandens* L., Sp. Pl. 1: 374. 1753. *Bauhinia anguina* Roxb., Fl. Ind. 2: 328. 1832; Baker in Hook. f., Fl. Brit. India 2: 284. 1878; Prain, Bengal Pl. 1: 441. 1903.

[Plate 60a; Fig. 17]

Lianas, appressed pubescent when young, beaded when older; tendrils flat, cochleate, sparsely appressed pubescent. Leaves variable, entire when young, bifid at maturity, ovate to sub-orbicular, 4-8 cm across, subcordate, acuminate at apex, sub-coriaceous, glabrous or appressed pubescent below; stipules ovate, appressed pubescent. Inflorescence terminal or axillary, branched, spicate, appressed pubescent; floral bracts lanceolate, deciduous, pubescent; bracteoles same as floral bracts; pedicels sericeous. Calyx cupular; tube short, sericeous; lobes deltoid in upper part, later splitting irregularly. Petals white, turning pale yellow, obovate, 3-4 × 2-2.5 mm, shortly clawed. Stamens 5, fertile 3; filaments short; anthers elliptic; staminodes 2. Ovary elliptic-oblong, shortly stipitate; style flat; stigma indistinct. Pods oblong-elliptic to elliptic, apiculate; seeds 1-2, irregular in shape.

Flowering & Fruiting: October-February.

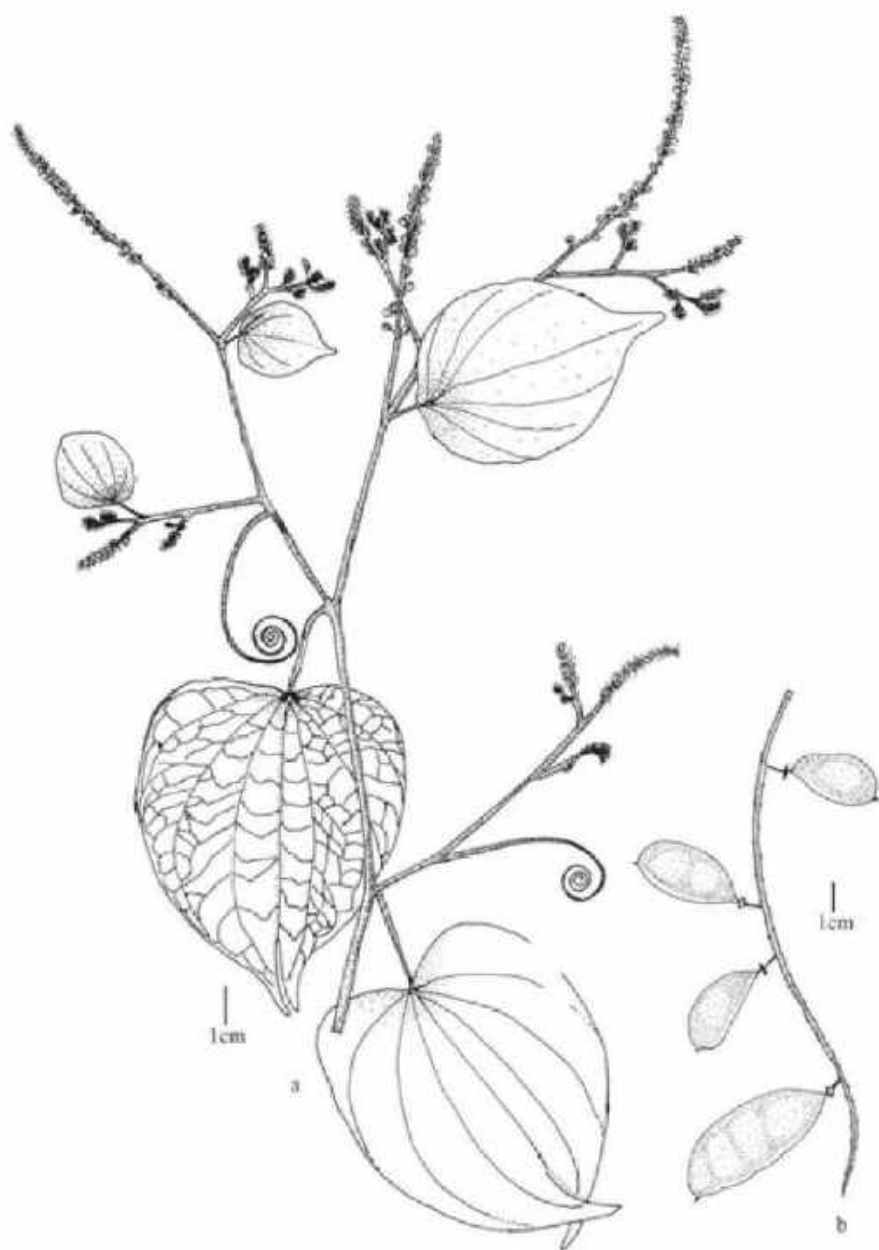


Fig. 17. *Phanora scandens*: a. Flowering branchlet; b. Fruiting twig (AK 59726, 59966).

Distribution. India: Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Panbari 1–2, 01.12.2011, GK 47190; Bhutanghat, 25.02.2012, AK 55936; Panbari 8–9, 10.04.2012, GK 56086; Buxa Fort to Tashigaon, 01.10.2013, AK 59726; Buxaduar to Achalung, 14.02.2014, AK 59938; Santrabari to Buxaduar, 16.02.2014, AK 59966.

Notes: It is known by 'Monkey ladder' since older stems twist and appear like ladder. The plants rarely flower and specimens housed at CAL are without flowers.

6. *Piliostigma* Hochst.

Piliostigma malabaricum (Roxb.) Benth. in Miq., Pl. Jungh.: 261. 1852. *Bauhinia malabarica* Roxb., Fl. Ind. 2: 321. 1832; Baker in Hook. f., Fl. Brit. India 2: 277. 1878, (incl. var. *reniformis* Royle ex Baker); Prain, Bengal Pl. 441. 1903. *Piliostigma malabaricum* var. *reniforme* (Royle ex Baker) Thoth., Bull. Bot. Soc. Bengal 19: 131. 1967. [Plate 51b-d]

Amil Tanki (N).

Tree, 10–12 m high, pubescent when young. Leaves sub-orbicular, 3.5–11 × 4.5–13.5 cm, cordate, bilobed, coriaceous, puberulous below; lobes obtuse; stipules ovate, caducous. Flowers in axillary or terminal racemes, male and female flowers on separate racemes, puberulous. Male: floral bracts ovate-lanceolate, pubescent; bracteoles linear-lanceolate, puberulous; pedicels 2–3 cm, puberulous. Calyx tubular, puberulous; tube short; lobes triangular-ovate. Petals pinkish white, oblanceolate, 0.8–1.2 cm, wavy, reflexed. Stamens 10 in 2 whorls, outer whorl longer than inner whorl; filaments short, pubescent at base; anthers oblong. Ovary rudimentary, pubescent. Female: calyx and petals same as in male flowers; staminodes 10. Ovary oblong, stipitate, pubescent; style pubescent; stigma capitate, pubescent. Pods oblong or strap-shaped, beaked; seeds many, sub-orbicular.

Flowering & Fruiting: September–March.

Distribution. India: Almost throughout India including tropical Himalayas.

Specimens examined: Central Rydak, JKS 4134; Jainti, 09.10.2009, SKS & GK 46295; Mainabari, Bhutanghat, 26.09.2011, AK 52898; Marakata, 22.02.2012, AK 55895.

Notes: Immature seeds are eaten by parrots.

7. *Senna* P. Miller

Key to the species

- | | |
|---------------------------------|---|
| 1a. Rachis of leaves eglandular | 2 |
| 1b. Rachis of leaves glandular | 3 |

Botanical Survey of India

- 2a. Shrubs; petals not spreading; stamens 10, 7 of them only perfect; pods tetragonal, winged 1. *S. alata*
2b. Trees; petals spreading; stamens 10, all perfect; pods strap shaped, without wing 4. *S. siamea*
- 3a. Plants hirsute throughout 2. *S. hirsuta*
3b. Plants not hirsute 4
- 4a. Leaflets more than 3-pairs; sessile glands at the base of rachis; pod green with purplish tinge, strap shaped 3. *S. occidentalis*
4b. Leaflets 3-pairs; stalked glands on rachis between the first pair of leaflets; pod green, cylindrical 5. *S. tora*

1. *Senna alata* (L.) Roxb., Fl. Ind. 2: 349. 1832. *Cassia alata* L., Sp. Pl. 1: 378. 1753; Hook. f., Fl. Brit. India 2: 264. 1878; Prain, Bengal Pl. 1: 438. 1903.

[Plate 52a]

Shrub, 1.5–2 m high, pubescent. Leaves paripinnate, 30–60 cm long; stipules triangular; leaflets 6–14 pairs, 6–10 × 3.5–5.5 cm, coriaceous, glabrous to sparsely pubescent. Flowers in axillary, many flowered spikes. Calyx orange yellow, divided to base; lobes unequal, obovate, puberulent. Petals bright yellow, obovate, clawed. Stamens 10, 7 fertile, unequal; filaments short; anthers oblong. staminodes 3. Ovary falcate, shortly stipitate, puberulent; style flat, short, curved, puberulent; stigma swollen. Pods strap-shaped, 10–20 × 1.5–2 cm, crenate winged along edges, puberulent; seeds many, deltoid-rhombic, compressed.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52798; Jainti 6, 07.04.2012, GK 56097.

2. *Senna hirsuta* (L.) H. S. Irwin & Barneby, Phytologia 44: 499. 1979. *Cassia hirsuta* L., Sp. Pl. 1: 378. 1753; Sanjappa, Leg. India: 15. 1992. [Plate 52b–c]

Undershrub, 1–2 m high. Leaves paripinnate; stipules subulate, caducous; leaflets 4–5 pairs, ovate to elliptic-ovate, 2.7–6 × 1.5–2.5 cm, obliquely cuneate, margins hairy, short acuminate, sub-coriaceous. Flowers in axillary racemes; floral bracts subulate, caducous; pedicels 1–2 cm. Calyx pale green, deeply divided to base; lobes unequal, obovate; outer 2 smaller and 3 larger. Petals obovate, 1.4–1.8 × c. 1 cm, clawed. Stamens 10, 7 fertile, unequal; filaments short; anthers oblong; staminodes 3. Ovary falcate; style short; stigma capitate. Pods strap-shaped, compressed; seeds many, sub-orbicular.

Flowering & Fruiting: November–February.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 7, 04.12.2011, GK 52314; Mainabari, 24.02.2012, AK 55918.

3. *Senna occidentalis* (L.) Link, Handbuch 2: 140. 1831. *Cassia occidentalis* L., Sp. Pl. 1: 377. 1753; Baker in Hook. f., Fl. Brit. India 2: 262. 1878; Prain, Bengal Pl. 1: 437. 1903. [Plate 52d]

Undershrub, 0.8–1 m high; branchlets sub-angular when young. Leaves paripinnate, 11–20 cm long; stipules lanceolate, caducous; leaflets 3.5–7 × 1.5–2.5 cm. Flowers in axillary or terminal racemes; floral bracts ovate-lanceolate, acuminate, caducous. Calyx divided to base; outer lobes 2, sub-orbicular; inner lobes 3, ovate. Inner petals 3, smaller, outer 2 slightly larger, obovate, 1–1.5 × c. 1 cm, clawed. Stamens 10, 7 fertile; filaments short; anthers oblong; staminodes 3. Ovary falcate, pubescent; style short; stigma indistinct. Pods brown with pale thick margins, strap-shaped, short acuminate; seeds many, orbicular, compressed.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 04.10.2009, SKS & GK 46133; Kumargram, 19.09.2011, AK 52623.

4. *Senna siamea* (Lam.) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35 (1): 98. 1982. *Cassia siamea* Lam., Encycl. Meth. Bot. 1 (2): 648. 1785; Baker in Hook. f., Fl. Brit. India 2: 264. 1878; Prain, Bengal Pl. 1: 438. 1903.

Tree, 10–12 m high, sparsely puberulent. Leaflets 4–5 × 1.6–2 cm, slightly emarginate at apex, coriaceous, appressed pubescent below; pedicels sub-angular, 2–3 cm, puberulent. Calyx divided to base; lobes unequal, sub-orbicular, outer 3 smaller, inner 2 larger, 5–9 mm across, puberulent. Petals obovate, 1.2–1.5 × 0.6–0.9 cm, clawed. Stamens 10, 7 fertile, unequal; filaments 2–9 mm; anthers oblong; staminodes 3. Ovary oblong-falcate, 1–1.2 cm, white pubescent; style flat, curved; stigma swollen, laterally hairy at one side. Pods reddish brown, 20–30 × 1.2–1.5 cm, acuminate, puberulent; seeds many, obovate to sub-orbicular.

Flowering & Fruiting: July–February.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52770; East Damanpur range, 27.11.2011, GK 50587; Newlands, 15.02.2012, AK 53027.

5. *Senna tora* (L.) Roxb., Fl. Ind. 2: 340. 1832. *Cassia tora* L., Sp. Pl. 1: 376. 1753; Baker in Hook. f., Fl. Brit. India 2: 263. 1878, *p p*; Prain, Bengal Pl. 1: 438. 1903.

Herb, 20–40 cm high, glabrous or sparsely puberulous. Leaves paripinnate, 4–8 cm long; stipules linear, caducous, puberulous; leaflets 0.8–3.5 × 0.4–1.8 cm, cuneate, margins hairy, coriaceous, glabrous or puberulous below. Flowers in

axillary, short, 1–2-flowered racemes; floral bracts linear, puberulous; pedicels 4–8 mm, puberulous. Calyx divided to base; lobes ovate or ovate-oblong, 5–8 mm, puberulous. Petals unequal, lower 2 slightly longer, obovate, 1.2–1.5 × 0.5–0.7 cm, clawed. Stamens 10, 7 fertile, sub-equal; filaments short; anthers oblong; staminodes 3. Ovary oblong-falcate, pubescent; style short, curved; stigma disciform. Pods cylindrical, subtetragonous, acuminate, sparsely puberulous; seeds many, rhomboid.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 18.09.2011, AK 52618; Jainti range, 07.04.2012, GK 56057.

2. Mimosoideae

Key to the genera

- 1a. Petioles without glands; flowers usually pink, 4-merous; stamens 4–8; pods congested/clustered, divided transversely into 1-seeded segments, sutures persistent after fragmentation 4. *Mimosa*
- 1b. Petioles with glands; flowers usually not pink, 5-merous; stamens many; pods not congested, not divided transversely into 1-seeded segments, sutures not persistent after fragmentation 2
- 2a. Central flower of head unlike others, slightly larger; staminal tube exerted from corolla 2. *Albizia*
- 2b. All flowers of head apparently alike; staminal tube not exerted from corolla 3
- 3a. Plants usually armed; leaflets 8–50 pairs, small, generally larger near middle of pinnae; filaments free or connate at base only; pods not coiled 1. *Acacia*
- 3b. Plants unarmed; leaflets 3–4 pairs, prominently large and differently sized (increase in size towards apex); filaments connate in lower half; pods coiled 3. *Archidendron*

1. *Acacia* Willd.

Key to the species

- 1a. Trees; inflorescence cylindrical spikes, solitary or in pairs 2
- 1b. Climbing shrubs; inflorescences panicles of globose heads 3
- 2a. Stipules not modified into thorns; leaflets 20–50 pairs, linear, 1.2–3.5 mm, truncate at base, sub-entire or crenate at margins, obtuse; veins pinnate; lateral veins inconspicuous; inflorescence bracts present; pods attenuate at base, beaked, less than 2 cm wide 2. *A. catechu*
- 2b. Stipules modified into stout thorns; leaflets 9–11 pairs, elliptic-oblong to obovate, 1–2.5 cm, obliquely rounded at base, entire at margins, rounded with apiculate tip; veins 3–4 from base; lateral veins prominent; inflorescence bracts absent; pods cuneate at base, rounded with apiculate tip, more than 2 cm wide 4. *A. lenticularis*

- 3a. Inflorescence bracts oblong-obovate to oblong-spathulate; pods undulate along sutures; prominently thick and pulpy with depressions 3. *A. concinna*
- 3b. Inflorescence bracts triangular; pods not as above 4
- 4a. Petiolar glands not cupular; stipules present; pinnae 6–8 pairs; leaflets 14–21 pairs, cuspidate, appressed puberulous below; midvein starting centrally or sub-centrally 1. *A. caesia*
- 4b. Petiolar glands cupular; stipules absent; pinnae 15–20 pairs; leaflets 30–50 pairs, obtuse, glabrous below; midvein starting marginally 5. *A. pennata*

1. *Acacia caesia* (L.) Willd. var. *subnuda* (Craib) I. C. Nielsen, *Adansonia* 2, 19: 348. 1980; Anant Kumar & Venu, *Indian J. Forest.* 42 (3): 201. 2019. *Mimosa caesia* L., *Sp. Pl.* 2: 1507. 1753. *Acacia oxyphylla* Benth. var. *subnuda* Craib, *Fl. Siam. Enum.* 1 (3): 550. 1928. *Acacia intsia* (L.) Willd. var. *oxyphylla* (Graham ex Benth.) Baker in Hook. f., *Fl. Brit. India* 2: 297. 1878. [Plate 53a-b]

Climbing shrub, tomentose. Leaves bipinnate; stipules filiform, caducous, pubescent. Leaflets oblong, 0.4–1.2 cm, truncate or rounded, entire to sub-crenate and hairy, sub-coriaceous. Heads greenish maroon, c. 1.2 cm across; inflorescence bracts curved, pubescent; floral bracts ovate, pubescent. Calyx campanulate; tube short; lobes sub-equal, ovate. Corolla campanulate; tube short; lobes ovate-elliptic. Stamens many; filaments short; anthers sub-globose. Ovary falcate, stipitate, pilose; style short; stigma swollen, sub-truncate. Pods strap-shaped; seeds 6–8, elliptic, compressed.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram and West Bengal.

Specimens examined: Jainti range, 04.12.2011, GK 52342; Checko-1, 25.09.2012, AK 56151; Checko-1, 10.02.2013, AK 58828.

2. *Acacia catechu* (L. f.) Willd., *Sp. Pl.* 4 (2): 1079. 1806; Baker in Hook. f., *Fl. Brit. India* 2: 295. 1878; Prain, *Bengal Pl.* 1: 458. 1903. *Mimosa catechu* L. f., *Suppl. Pl.*: 439. 1781. [Plate 53c-d]

Tree, 8–15 m high, pubescent when young. Leaves bipinnate; pinnae 10–30 pairs; leaflets ciliate; stipules subulate, ciliate, caducous. Inflorescence bracts same as stipules. Calyx cupular, sparsely pubescent; tube short; lobes triangular. Corolla creamy white, campanulate; tube short; lobes oblong-lanceolate, sparsely pubescent at apex. Stamens many; filaments short, connate at base; anthers sub-globose. Ovary falcate, stipitate; style short; stigma truncate. Pods greenish brown to brown, strap-shaped; seeds 4–10, sub-orbicular.

Flowering & Fruiting: April–September.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, JKS 4097; Jainti range, 13.10.2009, SKS & GK 46352; Narathali, 23.09.2011, AK 52817; Kumargram-Bhutan border, Kalikhola river, 27.09.2011, AK 52956; Phashkhawa river belt, 30.09.2012, AK 58541.

3. *Acacia concinna* (Willd.) DC., Prodr. 2: 464. 1825; Baker in Hook. f., Fl. Brit. India 2: 296. 1878; Prain, Bengal Pl. 1: 458. 1903. *Mimosa concinna* Willd., Sp. Pl. 4: 1039. 1806. [Plate 54a]

Climbing shrub, lanate when young. Leaves bipinnate; pinnae 4–8 pairs; leaflets 8–25 pairs, oblong, truncate, hairy at margins, sub-acute, sparsely appressed pubescent; stipules filiform, caducous. Heads greenish maroon, c. 1 cm across; inflorescence bracts rounded and puberulous at apex, caducous, pubescent. Calyx tubular; tube short; lobes circular. Corolla campanulate; tube short; lobes oblong-lanceolate, papillose at margins. Stamens many; filaments 7–9 mm, connate at base; anthers sub-globose. Ovary oblong; style short; stigma indistinct. Pods strap-shaped; seeds 6–10, sub-orbicular.

Flowering & Fruiting: December–March.

Distribution. India: Almost throughout India.

Specimens examined: Way to Murichom, Buxadnar, VN 2801; Rangamati, 14.02.2013, AK 59805.

4. *Acacia lenticularis* Buch.-Ham. ex Benth. in Hook., London J. Bot. 1: 508. 1842; Baker in Hook. f., Fl. Brit. India 2: 296. 1878.

Tree, 8–15 m high. Pinnae 3–4 pairs. Calyx cupular; tube short; lobes triangular, papillose along margins. Corolla campanulate; tube short; lobes oblong-lanceolate, papillose at margins. Stamens many; filaments short; anthers sub-globose. Ovary oblong, stipitate; style short; stigma truncate. Pods strap-shaped; seeds 6–10, sub-orbicular.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andhra Pradesh, Chhattisgarh, Himalayas, Jharkhand, Madhya Pradesh, Maharashtra, Odisha and West Bengal.

Specimen examined: Newlands, 15.02.2012, AK 53061.

5. *Acacia pennata* (L.) Willd., Sp. Pl. 4: 1090. 1806; Baker in Hook. f., Fl. Brit. India 2: 297. 1878; Prain, Bengal Pl. 1: 459. 1903. *Mimosa pennata* L., Sp. Pl. 1: 522. 1753. *Acacia pennata* var. *arrophula* (D. Don) Baker in Hook. f., Fl. Brit. India 2: 298. 1878. [Plate 54b]

Climbing shrub, puberulous when young. Leaves bipinnate; leaflets oblong, 4–6 mm, truncate at base. Heads greenish maroon, c. 1 cm across; inflorescence bracts slightly curved, tomentose to glabrescent; floral bracts oblanceolate,

slightly concave, sparsely pilose. Calyx sub-campanulate; tube short; lobes ovate, papillose at margins. Corolla campanulate; tube short; lobes oblong-lanceolate. Stamens many; filaments short, connate at base; anthers sub-globose. Ovary cylindrical-falcate, stipitate, puberulent; style short; stigma indistinct. Pods brown, strap-shaped, slightly beaked; seeds 10–11, elliptic-oblong.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Jharkhand, Karnataka, Mizoram, Rajasthan, Sikkim and West Bengal.

Specimens examined: Way to Santrabari, JKS 6992; Buxa to Tobgaon, VN 2662; Tobgaon, KB 3221; Rajabhatkhawa range, 11.02.2010, SKS & GK 47035; Bhutanghat, 26.09.2011, AK 52918; Hatipota, 17.02.2013, AK 59817.

2. *Albizia* Durazz.

Key to the species

- 1a. Midvein of leaflets eccentrically close to upper margin; flowers heads solitary or in fascicles 1. *A. lebbeck*
- 1b. Midvein of leaflets medial or eccentrically close to lower margin; flower heads in axillary or terminal panicles 2
- 2a. Main vein medial; stamens yellow or cream; staminal tube shorter than corolla tube 2. *A. lucidior*
- 2b. Main vein of leaflets slightly eccentrically close to lower margin; stamens white; staminal tube longer than corolla tube 3. *A. procera*

1. *Albizia lebbeck* (L.) Benth., London J. Bot. 3: 87. 1844 (as "*lebbeck*"); Baker in Hook. f., Fl. Brit. India 2: 298. 1878; Prain, Bengal Pl. 1: 461. 1903 (as "*Albizzia*"). *Mimosa lebbeck* L., Sp. Pl. 1: 516. 1753. [Plate 54c]

Tree, to 15 m high, pubescent. Leaves bipinnate; pinnae 2–4 pairs, disk like glands near base of leaves and at base of pinnae; leaflets 4–8 pairs, obliquely oblong or oblong-obovate, 2.3–3 × 1.1–1.4 cm, obliquely cuneate, entire, obtuse, chartaceous, glabrous above, pubescent beneath. Inflorescence axillary, solitary heads or in fascicles, 30–40-flowered. Flowers dimorphic, fragrant; pedicels puberulent. Sepals campanulate below, shallowly lobed above tomentose; lobes triangular ovate acute; tube c. 2.6 mm. Petals green-yellow, infundibular, 7–8 mm; lobes deltoid-ovate. Stamens many, white or light pale-green, staminal tube shorter than corolla tube; filaments 2–3 cm. Ovary glabrous, sessile. Pods coriaceous, straw-colored, strap-shaped, hanging from jointed pedicels, 4–12-seeded; seeds suborbicular.

Flowering & Fruiting: April–May.

Distribution. India: Almost throughout India.

Specimen examined: NRVK 6a, 07.04.2012, GK 56058.

2. *Albizia lucidior* (Steud.) I. C. Nielsen, *Adansonia* 2, 19: 222. 1979. *Inga lucidior* Steud., *Nomencl. Bot.* 1: 810. 1840. *Albizia lucida* Benth., *London J. Bot.* 3: 86. 1844; Baker in Hook. f., *Fl. Brit. India* 2: 299. 1878; Prain, *Bengal Pl.* 1: 461. 1903 (as "*Albizzia*").

Tree, 10–15 m high. Leaflets 5–9.5 × 1.2–3 cm, cuneate at base, sub-coriaceous, hairy below, turning glabrous. Inflorescence bracts subulate, sparsely puberulous; floral bracts subulate, caducous, puberulous. Calyx campanulate, puberulous; tube short; lobes triangular-ovate, puberulous. Corolla tubular-campanulate, puberulous; tube infundibular; lobes oblong-lanceolate to triangular-lanceolate. Stamens many; filaments 0.8–1.3 cm, connate at base; anthers sub-globose. Ovary linear-oblong, stipitate; style short; stigma truncate. Pods strap-shaped, beaked; seeds 7–8, sub-orbicular.

Flowering & Fruiting: May–February.

Distribution. India: Arunachal Pradesh, Bihar, Himachal Pradesh, Jharkhand, Maharashtra (cultivated), Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Bhutia Pond, 13.10.2009, GK 46355; Marakata, 24.09.2011, AK 52836; Santrabari range, 04.10.2009, SKS & GK 46142; Santrabari range, 08.10.2009, SKS & GK 46205; Kumargram, Kalikhola river belt, 21.09.2011, AK 52714; Rajabhatkhawa range, 02.12.2011, GK 47200; Newlands, 15.02.2012, AK 53050; Rangamati to Bharnabari, 06.10.2012, AK 58698; Buxaduar to Achalung, 19.05.2014, AK 62662.

3. *Albizia procera* (Roxb.) Benth. in Hook., *London J. Bot.* 3: 89. 1844; Baker in Hook. f., *Fl. Brit. India* 2: 299. 1878; Prain, *Bengal Pl.* 1: 461. 1903 (as "*Albizzia*"). *Mimosa procera* Roxb., *Pl. Coromandel* 2: 12, t. 121. 1799. [Plate 55a]

Tree, 15–20 m high, sparsely puberulous when young. Leaflets ovate to sub-rhombic, 1.5–3.2 × 1–1.7 cm, obliquely cuneate at base, sub-coriaceous. Inflorescence bracts subulate, curved, puberulous; floral bracts subulate, caducous, puberulous. Calyx campanulate; tube short; lobes triangular. Corolla tubular-campanulate; tube funnellform, short; lobes ovate, puberulous. Stamens many; filaments c. 1 cm, connate at base; anthers sub-globose. Ovary linear-oblong, shortly stipitate; style short; stigma truncate. Pods strap-shaped, mucronate; seeds 5–9, sub-elliptic.

Flowering & Fruiting: May–February.

Distribution. India: Almost throughout India.

Specimens examined: Bhutia Pond, 13.10.2009, SKS & GK 46354; Sankosh, 17.02.2012, AK 55687; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58568.

Notes: Bark is orange yellow. Seeds are used as poultry feed.

3. *Archidendron* E Muell.

Archidendron clypearia (Jack) I. C. Nielsen, *Adansonia* sér. 2, 19 (1): 15. 1979.
Inga clypearia Jack, *Malayan Misc.* 2 (7): 78. 1822. *Pithecellobium angulatum*
Benth., *London J. Bot.* 3: 208. 1844; Baker in Hook. f., *Fl. Brit. India* 2: 306. 1878;
Prain, *Bengal Pl.* 1: 462. 1903. [Plate 55b]

Tree, 8–10 m high, brownish yellow puberulous when young. Pinnae 1 pair; leaflets dissimilar, with sub-globose glands at below of each node of leaflets; proximal ones ovate to lanceolate, 4–6.7 × 2.3–2.5 cm, rounded-cuneate, repand, acuminate, coriaceous, few scattered hairs below; distal ones elliptic-oblong to elliptic-oblancheolate, 11–13 × 3.8–4 cm, cuneate at base, or else same as proximal ones. Flowers in terminal or axillary panicles of globose heads, pubescent; inflorescence bracts subulate to oblong-lanceolate, pubescent; floral bracts obovate or oblong-lanceolate, pubescent. Calyx campanulate, pubescent; tube short; lobes triangular. Corolla campanulate; tube short; lobes ovate-lanceolate, pubescent. Stamens many; filaments 1–1.3 cm, connate at base; anthers sub-globose. Ovary oblong, compressed, stipitate, brown hairy along edges; style 6–7 mm; stigma truncate. Seeds 4–10, ellipsoid.

Flowering & Fruiting: February–August.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: SRVK 5, near 23rd mile watch tower, 60 m, 30.03.2012, GK 50658; Buxaduar to Achalung, 14.02.2014, AK 59943.

4. *Mimosa* L.

Key to the species

- 1a. Pinnae 1–2 pairs, clustered at apex of rachis, sensitive; stamens 4; filaments slightly connate at base; pods straight with constrictions between seeds, bristly along sutures 2. *M. pudica*
- 1b. Pinnae 4–5 pairs, not clustered at apex of rachis, not sensitive; stamens 8; filaments free; pods straight/curved, with no constrictions between seeds, prickly throughout or without prickles 2
- 2a. Scandent undershrubs, stiff hairy; prickles along angles on stems; pods clustered, curved, up to 3 cm, prickles throughout 1. *M. diplotricha*
- 2b. Erect shrubs, pubescent; prickles scattered on stems; pods laxly clustered, straight, more than 3 cm, prickles absent 3. *M. rubicaulis* subsp. *himalayana*

1. *Mimosa diplotricha* C. Wright, *Anales Acad. Ci. Med. Habana* 5: 405. 1868; Sanjappa, *Leg. India*: 67. 1992; Anant Kumar & Venu, *Indian J. Forest.* 42 (3): 204. 2019. [Plate 55c-d]

Undershrub, 60–80 cm high, with recurved prickles. Leaves bipinnate; stipules subulate. Pinnæ 4–5 pairs; stipels linear-subulate, unequal; leaflets 11–30 pairs, oblong, 1–3 mm, truncate, sub-acute at apex, sub-coriaceous, white villous. Inflorescence axillary, 1 or 2 globose heads, white villous; inflorescence bracts triangular-lanceolate, ciliate, acuminate, curved, villous; floral bracts oblanceolate, ciliate above. Calyx cupular; tube short; lobes minute, hairy at margins, gland tipped. Corolla tubular; tube short; lobes sparsely hirsute. Filaments 7–9 mm; anthers sub-globose. Ovary faintly trigonous, slightly curved, ciliate on one of the edges; stigma truncate. Pods oblong; seeds 4–5, sub-globose.

Flowering & Fruiting: January–March.

Distribution. India: Introduced and naturalised in Assam, Karnataka, Kerala and West Bengal.

Specimens examined: SRVK 6, 11.02.2010, SKS & GK 47031; Sankosh, 17.02.2012, AK 55655.

2. *Mimosa pudica* L., Sp. Pl. 1: 518. 1753; Baker in Hook. f., Fl. Brit. India 2: 291. 1878; Prain, Bengal Pl. 1: 456. 1903. [Plate 56a]

Undershrub, 30–40 cm high, glabrous or bristly with few scattered recurved prickles. Leaves bipinnate, sensitive; stipules lanceolate or oblong-lanceolate, ciliate, acuminate, striated; leaflets 12–18 pairs, oblong, truncate, bristly at margins, obtuse, sub-coriaceous; stipels subulate, unequal, bristly. Inflorescence globose heads, axillary, solitary or in pairs, hispid; inflorescence bracts subulate, bristly along margins, acuminate, striated; floral bracts linear, ciliate above, curved. Calyx cupular; tube short; lobes acute, minute. Corolla tubular; tube short; lobes ovate, puberulous. Filaments short; anthers sub-globose. Ovary compressed, hairy; style short; stigma truncate. Pods oblong, lomentum-like; seeds 4–5, elliptic.

Flowering & Fruiting: July–November.

Distribution. India: Almost throughout India (Naturalised).

Specimens examined: 21 mile road, 13.05.1949, VN & party 2351; Rajabhatkhawa, 23.04.1959, KD 65; Rajabhatkhawa, 05.09.1981, BS & party 10347; SRVK 6, 05.10.2009, SKS & GK 46156; Marakata, 24.09.2011, AK 52847.

3. *Mimosa rubicaulis* Lam. subsp. *himalayana* (Gamble) H. Ohashi, Enum. Fl. Pl. Nepal 2: 126. 1979. *Mimosa himalayana* Gamble, Bull. Misc. Inform. Kew 1920 (1): 4. 1920. *Mimosa rubicaulis* auct. non Lam. 1783; Baker in Hook. f., Fl. Brit. India 2: 291. 1878, p. p.; Prain, Bengal Pl. 1: 456. 1903. [Plate 56b]

Shrub, 2–6 m high, with recurved prickles, pubescent. Leaves bipinnate; stipules subulate, puberulous; leaflets 10–15 pairs, oblong to oblong-elliptic, 2–4 mm, truncate, ciliate, obtuse, puberulous below; stipels unequal, linear, puberulous.

Inflorescence 3–4 globose heads in terminal panicles, pubescent; inflorescence bracts subulate, pubescent. Flowers polygamous or unisexual; floral bracts oblanceolate, ciliate above. Calyx campanulate; tube short; lobes rarely 5, triangular, gland tipped. Corolla campanulate; tube funnellform, short; lobes rarely 5, oblong-ovate. Filaments c. 7 mm; anthers sub-globose; staminodes 8, clavate. Ovary oblong, shortly stipitate; stigma indistinct. Pods strap-shaped, acuminate; seeds 3–9, sub-orbicular.

Flowering & Fruiting: August–December.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Mainabari, Bhutanghat, 26.09.2011, AK 52884; Chuniajhora, 28.09.2012, AK 56197.

3. Papilionoideae

Key to the genera

- | | |
|---|-----------------------|
| 1a. Trees (except <i>Millettia extensa</i> and <i>Dalbergia volubilis</i>) | 2 |
| 1b. Herbs, shrubs and climbers | 6 |
| 2a. Deciduous trees | 3 |
| 2b. Evergreen trees | 5 |
| 3a. Leaves pinnate; leaflets 7–9; veins pinnate; inflorescences racemes; calyx truncate or shallowly toothed; petals pink; standard sub-orbicular, clawed; ovary glabrous; seeds sub-orbicular | 14. <i>Gliricidia</i> |
| 3b. Leaves digitate; leaflets 3; veins palmate, 3-veins from base; inflorescences densely flowered panicles/long peduncled racemose; calyx spathaceous or campanulate with prominent teeth; petals scarlet/orange red; standard not sub-orbicular, not clawed; ovary tomentose; seeds reniform | 4 |
| 4a. Branchlets unarmed, dark and dull; inflorescences densely flowered panicles; calyx campanulate, toothed; petals equal in length, clawed (not prominent in standard); stamens diadelphous, included; pods elliptic-oblong, compressed, densely brown pubescent; seed solitary, confined to pod apex | 3. <i>Butea</i> |
| 4b. Branchlets armed, grayish, shining; inflorescences racemose, densely flowered in the upper half with long peduncles; calyx spathaceous; petals unequal in length, not clawed; stamens monadelphous, exerted; pods linear-oblong, bulged where seeds placed, glabrous; seeds many, evenly distributed in the pod | 12. <i>Erythrina</i> |
| 5a. Leaflets opposite; stipels present; flowers large, pink or creamy white, in racemes; bracts caducous; calyx shallowly 5-toothed; pods woody, thick along sutures, usually indehiscent; seeds usually many | 16. <i>Millettia</i> |

Botanical Survey of India

- 5b. Leaflets alternate (except *Dalbergia stipulacea*); stipels absent; flowers small, pale purple or creamy white, in simple or branched cymes; bracts sub-persistent; calyx prominently 5-toothed; pods coriaceous, thin along sutures, dehiscent; seeds usually 1, sometimes 1-4 **8. Dalbergia**
- 6a. Herbs or shrubs, twining/climbing/scandent 7
- 6b. Herbs or shrubs, erect 18
- 7a. Twining herbs (except *Pueraria sikkimensis*) 8
- 7b. Climbing or scandent shrubs 15
- 8a. Leaves paripinnate, 6-12-foliolate; leaf rachis terminating in tendril; leaflets truncate with mucronate tip; stipules semi-sagittate, 2-3-toothed; staminal tube equal or less than 3 mm **24. Vicia**
- 8b. Leaves digitate, 3-foliolate; leaf rachis not terminating in tendril; leaflets and stipules not as above; staminal tube more than 3 mm 9
- 9a. Flowers yellow 10
- 9b. Flowers pink purple or pale purple, not yellow 11
- 10a. Stipules not spurred at base; terminal leaflet elliptic-oblong to elliptic-rhombic, obtuse at apex; stipels absent; inflorescences 1-5-flowered racemes, rusty brown pubescent; inflorescence bracts present; floral bracts triangular-ovate, 1-2 mm, pubescent outside; calyx lobes lanceolate, 4-6 mm, acuminate, pubescent outside; standard obovate, rounded with mucronulate tip; keels acute and curved at apex; staminal tube 7-8 mm; ovary oblanceolate, pubescent; style glabrous all along; stigma capitate; pods oblong, 1.5-1.8 cm, compressed, depressions between adjacent seeds, villous; seeds 3-6, rotund **4. Cajanus**
- 10b. Stipules spurred at base; terminal leaflet ovate to lanceolate, acuminate at apex; stipels present; inflorescences many flowered, long pedunculate racemes, sparsely hispid; inflorescence bracts absent; floral bracts elliptic, c. 5 mm, glabrous; calyx lobes triangular-ovate, c. 1 mm, bluntly acute, glabrous; standard sub-orbicular, emarginate; keels beaked and twisted at apex; staminal tube 1-1.2 cm; ovary linear-oblong, hairy along edges only; style bearded at apex only; stigma penicillate; pods cylindrical, 5-8 cm, terete, glabrous; seeds 6-10, oblong **25. Vigna**
- 11a. Wing petals with appendage along upper margins; keels falcate, with dentate auricle, beaked at apex; style bearded below stigma; pods sub-cylindric, sub-terete, brown pubescent **11. Dysolobium**
- 11b. Wing petals without appendage along upper margins; keels not as above; style not bearded below stigma; pods oblong/linear-oblong/strap-shaped (moniliform in *Pueraria sikkimensis*), compressed, variously hairy, not brown pubescent 12
- 12a. Veins pinnate; floral bracts obliquely ovate to broadly elliptic, enclosed the calyx; standard keeled on back; wings with hairy auricles; ovary with faintly impressed median groove; stigma indistinct; pods blue grey, acuminate at apex, glandular and depressed in middle throughout length **6. Centrosema**

The Flora of Buxa Tiger Reserve, West Bengal, India

- 12b. Veins palmate, 3-veins from base; floral bracts not as above; standard not keeled on back; wings with glabrous auricles; ovary without median groove; stigma distinct; pods not as above 13
- 13a. Standard with yellow green spot near base, ovate; ovary oblong-oblancoelate; style pubescent all along; pods 12-13 × 1.4-1.5 cm, wavy along sutures, wavy depressions between two adjacent seeds, appressed silky pubescent; seeds sub-squarish 18. *Pachyrhizus*
- 13b. Standard without yellow green spot near base (except *Pueraria sikkimensis*), obovate or elliptic-obovate/sub-orbicular; ovary linear or oblong; style glabrous or pubescent at base only; pods less than 10 × 1 cm, straight/constrictions along sutures; seeds reniform/sub-reniform 14
- 14a. Terminal leaflet ovate-rhomboid, sub-rhomboid to broadly ovate; nodes of raceme more or less swollen; standard sub-orbicular, emarginate at apex; calyx campanulate; claw of wing and keel petals shorter; stamens monadelphous; vexillary filament free at the base, connate in the middle with the rest, rarely quite free; anthers elliptic 19. *Pueraria*
- 14b. Terminal leaflet obovate-rhomboid or sub-orbicular; nodes of racemes not swollen; standard obovate to obovate-elliptic, obtuse to rounded at apex; calyx campanulate/cylindric; claw of wing and keel petals longer; stamens diadelphous; vexillary filament free; anthers sub-globose 20. *Shuteria*
- 15a. Leaves imparipinnate or paripinnate; leaflets 5 or 16-24 16
- 15b. Leaves digitate; leaflets 3 17
- 16a. Stems slender; leaves paripinnate; leaflets 16-24, oblong, subcircular with mucronate tip at apex; inflorescence axillary or terminal racemes, nodes of inflorescence axis swollen; calyx shallowly lobed; standard pale pink throughout; stamens 9, vexillary stamen absent; pods compressed; seeds sub-orbicular 1. *Abrus*
- 16b. Stems robust; leaves imparipinnate; leaflets 5, elliptic-obovate, acuminate at apex; inflorescence terminal panicles, nodes of inflorescence axis not swollen; calyx prominently lobed; standard magenta with orange yellow in centre; stamens 10, vexillary stamen present; pods not compressed; seeds ellipsoid 5. *Callerya*
- 17a. Terminal leaflet acuminate or acute at apex; inflorescence pendulous racemes; flowers dull purple; ovary tomentose with brown bristles; pods with irritant bristles; seeds 2-6, evenly distributed in the pod 17. *Mucuna*
- 17b. Terminal leaflet rounded at apex; inflorescence terminal panicles; flowers creamy white; ovary tomentose without brown bristles; pods samaroid without irritant bristles; seed solitary, confined to apex of the pod 22. *Spatholobus*
- 18a. Herbs (except *Indigofera zollingeriana*) 19
- 18b. Shrubs (except *Crotalaria albida* and *Desmodium triflorum*) 21

Botanical Survey of India

- 19a. Sub-erect herbs; leaves paripinnate; stipules spurred at base; leaflets pellucid gland-dotted; flowers yellow; calyx bilipped; stamens 5+5; pods reddish brown, 3-5-segmented flat lomentum, folded and enclosed in persistent calyx, papillate; seeds reniform **21. Smithia**
- 19b. Prostrate herbs; leaves usually 1-foliolate (imparipinnate in *Indigofera zollingeriana*); stipules not spurred at base; leaflets not pellucid gland-dotted; flowers pinkish/bright red to pale light red; calyx campanulate; stamens 9+1; pods not as above; seeds not reniform **20**
- 20a. Stems pubescent; stipules ovate-oblong or elongate triangular; leaflets oblong-lanceolate or rotund, some leaves orbicular, subcordate at base, rounded and sub-acute at apex; lateral veins 5-7 pairs; standard retuse at apex, claw prominent; anthers oblong; ovary tomentose; pods jointed, puberulous **2. Alysicarpus**
- 20b. Stems appressed laterally attached hairs, sometimes mixed with basifixed hairs (except *I. zollingeriana*); stipules lanceolate; leaflets linear-oblong to oblanceolate/lanceolate to oblanceolate, cuneate to sub-rotund at base, obtuse or short acuminate at apex; lateral veins inconspicuous or 11-13 pairs; standard rounded at apex, claw not prominent; anthers sub-globose or elliptic; ovary glabrous; pods not jointed, sericeous or appressed rusty pubescent **15. Indigofera**
- 21a. Bracteoles present and stamens monoadelphous **22**
- 21b. Bracteoles absent and stamens diadelphous (except *Desmodium confertum*) **23**
- 22a. Stems angular, white cottony; terminal leaflet repand at margins, white cottony below; stipules present; flowers white, in axillary fascicles; standard attenuate at base; anthers similar; pods linear, compressed, 1-3-segmented, sericeous; seeds ellipsoid **9. Dendrolobium**
- 22b. Stems terete, appressed pubescent or sericeous; terminal leaflet entire at margins, appressed pubescent below; stipules absent; flowers yellow in racemes; standard rounded or auriculate at base; anthers dimorphic; pods cylindrical or elliptic, usually inflated, not segmented, not sericeous; seeds reniform **7. Crotalaria**
- 23a. Leaves imparipinnate, 9-23-foliolate; lateral veins numerous, parallel, uniting in a marginal vein **23. Tephrosia**
- 23b. Leaves 1-foliolate or 3-foliolate; lateral veins not as above **24**
- 24a. Stipules oblong to elliptic-oblong, 4-5 cm; petioles winged; leaflets black glandular; lateral leaflets usually elongate ovate-lanceolate, the midvein divides its lamina unequally; stipules absent; inflorescence bracts many, oblong to elliptic-oblong, 4-5 cm, whorled at base; petals with dark red or maroon streaks; stigma bearded; pods elliptic-ovoid, turgid, 2-seeded, not segmented **13. Flemingia**
- 24b. Stipules various, not as above; petioles not winged except *D. triquetrum*; leaflets not glandular; lateral leaflets various, not elongate ovate-lanceolate, the midvein divides its lamina equally; stipules present; inflorescence bracts usually absent, if present then not as above; petals without any streaks; stigma glabrous; pods linear to linear-oblong or oblong, flattened, 4 or more seeded, segmented **10. Desmodium**

1. *Abrus* Adans.

Abrus melanospermus Hassk., Cat. Hort. Bot. Bogor.: 282. 1844. *Abrus pulchellus* Wall. ex Voigt, Hort. Suburb. Calcutt.: 228. 1845. *Abrus pulchellus* Wall. ex Thwaites, Enum. Pl. Zeyl.: 91. 1859, *isonym*; Baker in Hook. f., Fl. Brit. India 2: 175. 1876; Prain, Bengal Pl. 1: 369. 1903. [Plate 56c-d; Fig. 18]

Climbing shrub, hirsute. Leaves paripinnate, 10.5–13.5 cm long; stipules lanceolate, hairy; leaflets 1.7–3.2 × 0.7–1.3 cm, rounded at base, sparsely white appressed hairy below; stipules linear, hairy. Inflorescence bracts lanceolate, acute to acuminate, hairy. Flowers arranged in clusters on swellings nodes; floral bracts oblong-lanceolate, hairy; pedicels short, hirsute. Calyx campanulate, appressed hairy; tube short; lobes minute, obtuse, upper 2 lobes sub-connate. Petals clawed; standard obovate c. 10 × 6 mm; wings oblong, auriculate, obtuse; keels free or fused, curved, acute. Stamens 9; staminal sheath c. 5 mm; anthers rotund. Ovary linear, hairy; style minute; stigma capitate. Pods oblong or strap-shaped, crenate along one side of suture, sub-apical mucronate tip, leathery, appressed hairy; seeds 5–10.

Flowering & Fruiting: August–November.

Distribution. India: Almost throughout India.

Specimens examined: Bhutri, 05.10.2012, AK 58633; Rangamati to Bharnabari, 06.10.2012, AK 58712; Buxa Fort to Achalung, 29.09.2013, AK 59630.

2. *Alysicarpus* Neck. ex Desv.

Alysicarpus vaginalis (L.) DC., Prodr. 2: 353. 1825; Baker in Hook. f., Fl. Brit. India 2: 158. 1876; Prain, Bengal Pl. 1: 428. 1903. *Hedysarum vaginale* L., Sp. Pl. 2: 746. 1753. [Plate 57a]

Herb, 20–30 cm long. Leaves 1-foliolate, variable; stipules minute hairy, scarious, parallel-veined; leaflets 1.6–4.7 × 1–2.2 cm, hairy, pubescent below. Inflorescence axillary or terminal racemes; floral bracts ovate-oblong, caducous, or else same as stipules; pedicels short, puberulous. Calyx puberulous; tube short; lobes unequal, lower 3 larger and upper 2 smaller, triangular, nerved. Petals clawed; standard pale light red with bright yellow streaks at base, obovate; wings magenta, oblanceolate, auriculate, rounded; keels greenish, oblanceolate, obtuse. Staminal tube c. 5 mm. Ovary linear; style short; stigma sub-capitate. Pods yellowish brown, cylindric, reticulately nerved; seeds 2–6, ellipsoid.

Flowering & Fruiting: August–November.

Distribution. India: Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Rajasthan, Tamil Nadu and West Bengal.

Specimen examined: Hauda nala, 03.10.2012, AK 58688.

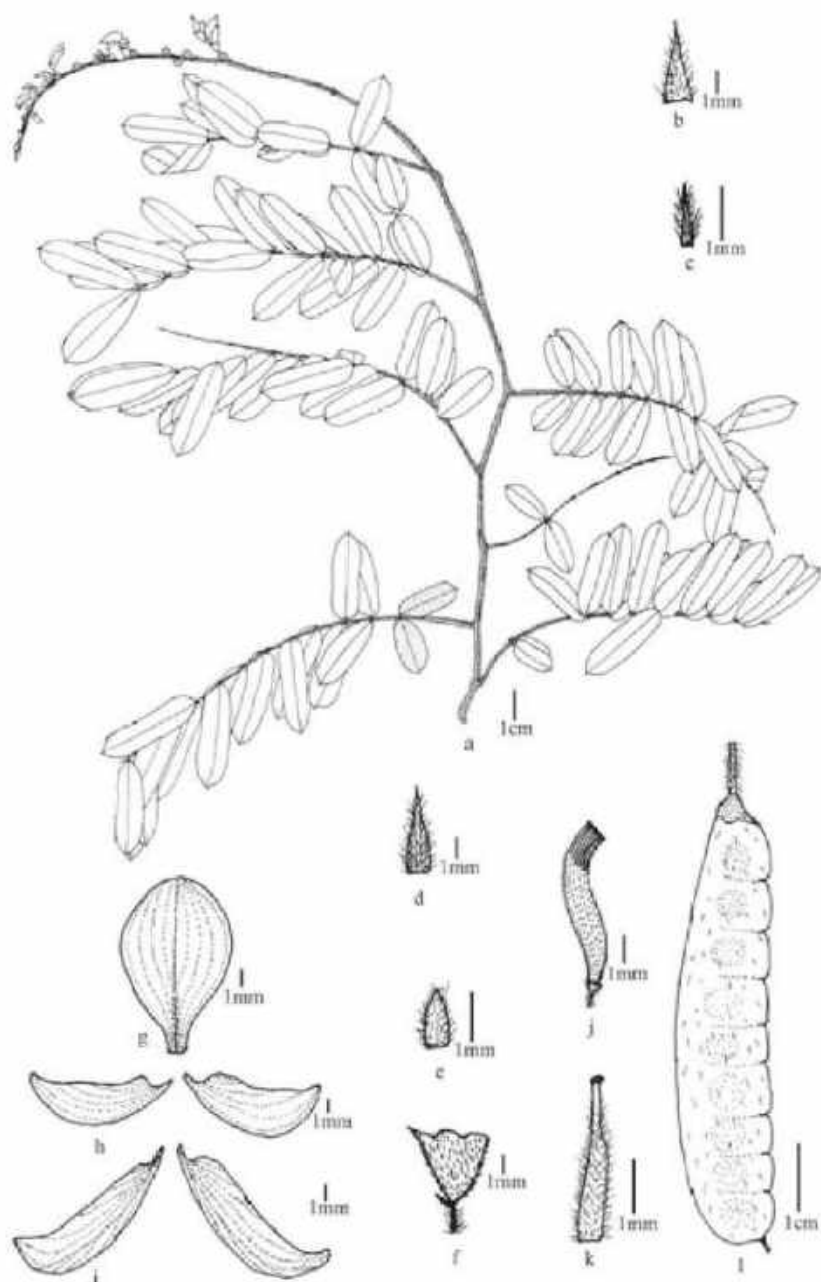


Fig. 18. *Abrus melanospermus*: a. Flowering branchlet; b. Stipule; c. Stipel; d. Inflorescence bract; e. Floral bract; f. Calyx; g. Standard petal; h. Wing petals; i. Keel petals; j. Staminal tube; k. Gynoeceium; l. Pod (AK 58712, AK 59630).

3. *Butea* Roxb.

Butea monosperma (Lam.) Taub. in Engl. & Prantl., Nat. Pflanzenfam. 3: 365. 1894. *Erythrina monosperma* Lam., Encycl. 2: 391. 1786. *Butea frondosa* Roxb. ex Willd., Sp. Pl., ed. 4, 3 (2): 917. 1802, *nom. illeg.*; Baker in Hook. f., Fl. Brit. India 2: 194. 1876; Prain, Bengal Pl. 1: 401. 1903. [Plate 57b-c]

Tree, 10–15 m high, glabrous or appressed pubescent. Leaves digitate, 3-foliolate; stipules caducous; leaflets coriaceous, glabrous or appressed hairy above, hispid below; lateral leaflets asymmetrically ovate, c. 18 × 10.5 cm, cuneate, sinuate at margins upwards, retuse with mucronulate tip; terminal leaflet rhombic-obovate, c. 20.5 × 16.5 cm, or else same as lateral leaflets; stipels linear, pubescent; floral bracts and bracteoles caducous; pedicels short, articulate, brown tomentose. Calyx campanulate, brown pubescent; tube short; lobes ovate. Petals velvety tomentose; standard ovate, 4–5 × c. 2 cm, clawed, auriculate, reflexed; wings falcate, 4–4.5 × c. 1 cm; keels boat-shaped, 4–5 × c. 1.5 cm, auriculate, curved. Stamens 10; staminal tube 5–5.5 cm; anthers oblong. Ovary oblong; stigma swollen. Pods oblong, samaroids; seed solitary.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 6, 11.02.2010, SKS & GK 47047; Sankosh, 17.02.2012, AK 55695.

4. *Cajanus* DC.

Cajanus scarabaeoides (L.) Thouars, Dict. Sc. Nat. 6: 617. 1817 (as "*Cajan*"). *Dolichos scarabaeoides* L., Sp. Pl. 2: 726. 1753. *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungl. 2: 242. 1852; Baker in Hook. f., Fl. Brit. India 2: 215. 1876; Prain, Bengal Pl. 1: 383. 1903. [Plate 57d; 58a]

Twining herb, rusty brown pubescent. Leaves digitate, 3-foliolate; stipules triangular, acuminate, deciduous, tomentose; lateral leaflets asymmetrically elliptic-obovate, 1.6–3.7 × 1–2 cm, cuneate, sub-coriaceous, pubescent; terminal leaflet 1.3–4.5 × 0.8–2.2 cm, or else same as lateral ones. Inflorescence bracts ovate or sub-orbicular, entire or 3-toothed, caducous, pubescent; floral bracts caducous; pedicels pubescent. Calyx campanulate; tube short, pubescent; lobes unequal, lower ones larger than upper ones, acuminate. Petals clawed; standard c. 8 × 4–5 mm, auriculate; wings oblong, slightly curved, auriculate, acute; keels oblong. Stamens 10, diadelphous; anthers sub-globose. Ovary c. 7 mm; style 5–6 mm. Pods beaked; seed small.

Flowering & Fruiting: September–November.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 23.09.2011, AK 52803; Marakata, 24.09.2011, AK 52855; NRVK 7, Bala River, 04.12.2011, GK 52330; Jainty-Phashkhawa, 02.10.2012, AK 58601.

5. *Callerya* Endlicher

Callerya cinerea (Benth.) Schot in Blumea 39: 17. 1994. *Millettia cinerea* Benth. in Miq., Fl. Jungh.: 249. 1852; Baker in Hook. f., Fl. Brit. India 2: 106. 1876; Prain, Bengal Pl. 1: 406. 1903. [Plate 58b; Fig. 19]

Climbing shrub, appressed pubescent when young. Leaves imparipinnate, 5-foliolate; stipules triangular, appressed pubescent; lateral leaflets unequal, ovate-oblong to oblong-elliptic, 6–14 × 2.7–4.6 cm, rounded-cuneate, sparsely hirsute; terminal leaflet 10–15 × 4.7–6.9 cm, or else same as lateral ones; stipels subulate; pedicels angular, articulate, pubescent. Calyx campanulate, appressed pubescent; tube short; lobes triangular, upper ones fused and notched. Petals clawed; standard ovate, c. 3 × 0.8 cm, auriculate, sericeous; wings oblong, c. 8 mm, slightly curved, auriculate, sub-acute; keels oblong, 1.4–1.6 × c. 3.5 cm, or else same as wings. Stamens 10, diadelphous; staminal tube 7–10 mm; anthers oblong. Ovary falcate, shortly stipitate, pubescent; stigma capitate. Pods strap-shaped, grey pubescent; seeds 1–4.

Flowering & Fruiting: April–August.

Distribution. India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimens examined: Buxa, Santrabari, 21.05.1949, VN & party 2891; Buxaduar to Tashigaon, 20.05.2014, AK 62676; Buxaduar to Tashigaon, 20.05.2014, AK 62689.

6. *Centrosema* (DC.) Benth.

Centrosema virginianum (L.) Benth., Ann. Wien. Mus. 2: 120. 1838; Sanjappa, Leg. India: 111. 1992. *Clitoria virginiana* L., Sp. Pl. 2: 753. 1753. *Centrosema pubescens* Benth., Commentat. Legum. Gen.: 55. 1837. [Plate 58c-d]

Twining herb, pubescent. Leaves digitate, 3-foliolate; stipules ovate to ovate-lanceolate, striated, pubescent; lateral leaflets oblong-elliptic to ovate-oblong, 2–9 × 0.7–4.8 cm, obliquely obtuse, short acuminate at apex, pubescent; terminal leaflet same as lateral ones but slightly larger; stipels linear-subulate, pubescent or glabrous. Inflorescence axillary, 2–4-flowered racemes, pubescent; inflorescence bracts similar to stipules; floral bracts striated, pubescent. Calyx dark brown, campanulate, sparsely pubescent; tube short; lobes unequal; upper lobes fused, ovate, bilobed; lateral pair triangular, ciliate; lower one triangular, ciliate. Petals shortly clawed; standard sub-orbicular, 9–10 × 7–8 mm, emarginate, sericeous; wings falcate-oblongate, 9–10 × 2–3 mm, obtuse; keel falcate-obovate, 10–12 × 4–5 mm, obtuse. Stamens 10, diadelphous; staminal tube 1.2–1.4 cm; anthers globose. Ovary falcate, 8–10 mm, compressed, pubescent; style short; stigma

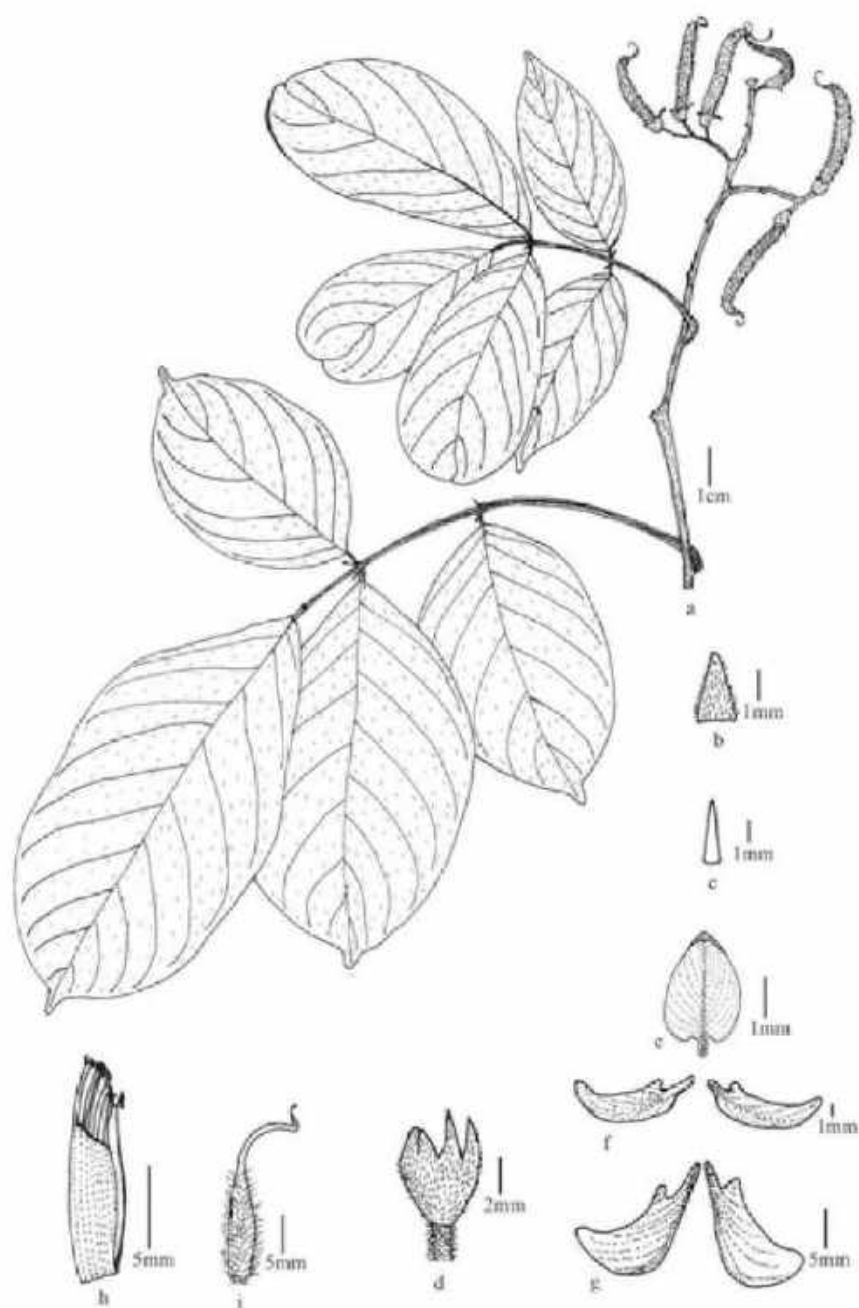


Fig. 19. *Callerya cinerea*: a. Fruiting branchlet; b. Stipule; c. Stipel; d. Calyx; e. Standard petal; f. Wing petals; g. Keel petals; h. Staminal tube; i. Gynoecium (AK 62676).

membranous. Pods blackish, linear-oblong, beaked, sparsely appressed pubescent; seeds 7–15, sub-reniform.

Flowering & Fruiting: January–March.

Distribution. India: Karnataka, Kerala, Maharashtra and West Bengal.

Specimen examined: Sankosh, 17.02.2012, AK 55669.

7. *Crotalaria* L.

Key to the species

- 1a. Decumbent shrubs; stems winged; leaflets appressed pubescent above; inflorescences 2–3-flowered racemes; floral bracts ovate, shortly clawed, acuminate; bracteoles ovate, attached near mouth of calyx tube; ovary ovoid **1. *C. alata***
- 1b. Erect herbs/shrubs; stems not winged; leaflets glabrous/long hairy above; inflorescences many flowered racemes; floral bracts linear/lanceolate, not clawed, acute; bracteoles linear/oblong or falcate, attached at base/near mouth of calyx tube; ovary linear-oblong **2**
- 2a. Erect herbs; leaves simple, 1-foliolate, up to 5.5 mm wide, obtuse at apex, long hairy above; standard obtuse and ciliate at apex; wings not scaly outside; keels with twisted beak; staminal tube not split; ovary glabrous; pods 0.9–1 cm long **2. *C. albida***
- 2b. Erect shrubs; leaves digitate, 3-foliolate, more than 5.5 mm wide, not obtuse at apex, glabrous above; standard acute and glabrous at apex; wings scaly outside; keels without twisted beak; staminal tube split laterally; ovary pubescent along one edge only; pods 2–4 cm long **3**
- 3a. Leaflets acute or acuminate at apex, not gland-dotted above; racemes usually leaf-opposed, rarely terminal; floral bracts lanceolate; bracteoles oblong or falcate; standard rounded at base, with hairy claw; pods elliptic, compressed, appressed pubescent throughout, not gland-dotted above, 3–6-seeded **3. *C. cytisoides***
- 3b. Leaflets acute or rounded at apex, gland-dotted above; racemes always terminal; floral bracts linear; bracteoles linear, attached at middle of calyx; standard auriculate at base, with glabrous claw; pods cylindrical, inflated, appressed pubescent along sutures only, glandular, 8–12-seeded **4. *C. pallida***

1. *Crotalaria alata* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 241. 1825; Baker in Hook. f., Fl. Brit. India 2: 69. 1876; Prain, Bengal Pl. 1: 373. 1903. [**Plate 59a**]

Shrub, 10–30 cm high; stem wings 2–4 mm wide each side, abruptly acuminate at apex of each side, appressed pubescent. Leaves lanceolate to ovate-lanceolate, elliptic or elliptic-obovate, 1–5.5 × 0.8–3 cm, cuneate, obtuse at apex, scabrous; pedicels short, pubescent. Calyx campanulate, pubescent; tube short; upper lobe bilobed, others falcate, 8–9 mm long. Petals clawed; standard broadly elliptic, c. 1.2 × 1 cm, slightly auriculate, ciliate at apex; wings oblong, c. 10 × 4 mm; keels same as wings. Stamens 10; anthers globose and linear-oblong, alternate to each other. Style short, hairy at apex; stigma slightly oblique. Pods cylindrical, beaked; seeds 5–6, reniform.

Flowering & Fruiting: September–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Meghalaya, Odisha, Punjab, Sikkim, Tamil Nadu, Uttarakhand and West Bengal (cultivated and naturalized).

Specimens examined: Near 26 mile watch tower, 29.11.2011, GK 47151; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58574.

2. *Crotalaria albida* Heyne ex Roth, Nov. Spec. Pl.: 333. 1821; Baker in Hook. f., Fl. Brit. India 2: 71. 1876; Prain, Bengal Pl. 1: 374. 1903. [Plate 59b]

Herb, 30–80 cm high. Leaves oblanceolate, 0.5–2.2 cm, cuneate at base; stipules linear, caducous; floral bracts linear, pubescent; bracteoles same as floral bracts. Calyx campanulate, appressed pubescent; tube short; lobes dissimilar; upper 2, falcate, slightly obtuse to acuminate; lower 3, oblong-lanceolate, acute. Petals clawed; standard elliptic-obovate, 5–8 × 4–6 mm, auriculate; wings oblong-ob lanceolate, 4–6 × 2–3 mm; keels rounded, 8–10 × 4–5 mm. Stamens 10; anthers globose and linear-oblong, alternate to each other. Style short, hairy at apex; stigma slightly oblique. Pod cylindrical; seeds 6–12, glabrous.

Flowering & Fruiting: October–February.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 27.05.1949, VN & party 3066; Phashkhawa, 27.09.2012, AK 56185; Hatipota, 17.02.2013, AK 59813.

3. *Crotalaria cytisoides* Roxb. ex DC., Prodr. 2: 131. 1825. *Crotalaria psoralioides* D. Don, Prodr. Fl. Nepal.: 242. 1825, non Lam. 1786. *Priotropis cytisoides* (Roxb. ex DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 180. 1834; Baker in Hook. f., Fl. Brit. India 2: 65. 1876. [Plate 59c-d]

Shrub, 1–3 m high; branchlets striated or not. Leaves digitate, 3-foliolate; stipules subulate to narrowly triangular, appressed pubescent; lateral leaflets elliptic, 1.8–5 × 0.8–1.9 cm, cuneate, sub-coriaceous; terminal leaflet 4.5–7 × 1.3–2.3 cm, or else same as lateral ones; floral bracts acuminate, sericeous; bracteoles obtuse or acute, sericeous. Calyx campanulate, sericeous; tube short; lobes unequal, upper pair smaller than lower 3, triangular, acute. Petals clawed; standard broadly ovate or sub-orbicular, keeled; wings oblong-elliptic, 1–1.2 × 0.3–0.4 cm, rounded; keels ovate, c. 1.2 × 0.5–0.6 cm, curved, hairy along margins, beaked. Stamens 10; anthers globose and linear-oblong, alternate to each other. Ovary stipitate; style hairy at apex; stigma sub-capitate; disk cupular, shallowly lobed. Pods beaked.

Flowering & Fruiting: August–November.

Distribution. India: Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Jainti range, 03.03.2011, GK 47202; Newlands, Sukno river, 22.09.2011, AK 52788; Marakata, 24.09.2011, AK 52872; Bhutanghat, Mainabari, 26.09.2011, AK 52885; Jainti range, 04.12.2011, GK 52319; Phashkhawa, 27.09.2012, AK 56182; Tashigaon to Rovers point, 02.10.2013, AK 59749; Tashigaon to Rovers point, 03.10.2013, AK 59755.

4. *Crotalaria pallida* Aiton var. *obovata* (G. Don) Polhill, Kew Bull. 22 (2): 265. 1968; Sanjappa, Leg. India: 126. 1992. *Crotalaria obovata* G. Don, Gen. Syst. 2: 138. 1832. [Plate 60a-b]

Shrub, 1–2 m high. Leaves digitate, 3-foliolate; stipules linear, hairy; lateral leaflets 2.9–6.2 × 1.1–4.2 cm, cuneate, sub-coriaceous; terminal leaflet elliptic, 3.5–7.7 × 1.3–4.7 cm, or else same as lateral ones; floral bracts and bracteoles deciduous, pubescent; pedicels appressed pubescent. Calyx sub-campanulate, appressed pubescent; tube short; lobes triangular or falcate. Petals with reddish nerves, clawed; standard broadly ovate to sub-orbicular, 0.8–1.1 × 0.6–0.8 cm, obtuse; wings oblong, hairy along margins at base, acute; keels ovate, 1–1.2 × 0.5–0.6 cm, curved, hairy at margins, beaked. Stamens 10; staminal tube 5–6 mm; anthers globose and linear. Ovary stipitate; style hairy at apex; stigma subcapitate. Pods oblong, beaked.

Flowering & Fruiting: August–February.

Distribution. India: Sikkim and West Bengal.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 46262; Jainti range, 05.03.2011, GK 47285; Kumargram, 19.09.2011, AK 52629; Kumargram, 19.09.2011, AK 52648; Newlands, 15.02.2012, AK 53087; Jainty-Phashkhawa, 02.10.2012, AK 58609.

8. *Dalbergia* L. f.

Key to the species

- | | |
|--|------------------------|
| 1a. Scandent shrubs; Stamens 10, monadelphous | 5. <i>D. volubilis</i> |
| 1b. Trees; Stamens 9, monadelphous/if 10, diadelphous | 2 |
| 2a. Leaves paripinnate; leaflets 4–6, sub-orbicular or rhombic-obovate, acuminate at apex; inflorescences puberulent; stamens 9, monadelphous | 3. <i>D. sissoo</i> |
| 2b. Leaves imparipinnate; leaflets more than 4–6, not sub-orbicular or rhombic-obovate, not acuminate at apex; inflorescences glabrous/hairy; stamens 10, diadelphous (9+1) or isodiadelphous (5+5) | 3 |
| 3a. Branchlets pubescent; leaflets appressed puberulous; inflorescences brown pubescent; petals creamy white; stamens 10 (9+1), diadelphous; staminal tube splitting one-sided; ovary glabrous; pods oblong, papery; seeds 1–4 | 2. <i>D. pinnata</i> |
| 3b. Branchlets glabrous; leaflets glabrous above, pubescent below; inflorescences glabrous/puberulous; petals pale purple; stamens 10 (5+5), isodiadelphous; staminal | |

tube divided in two lateral sheaths; ovary hairy along edges; pods elliptic to oblong-elliptic, coriaceous; seeds 1-2 4

- 4a. Large spreading trees; branchlets erect; leaflets alternate; inflorescences puberulous; floral bracts lanceolate-oblong; calyx lobes sub-equal; seeds 1-2 1. *D. lanceolaria*
4b. Sprawling trees; branchlets drooping; leaflets opposite; inflorescences glabrous; floral bracts obovate; calyx lobes unequal; seed solitary 4. *D. stipulacea*

1. *Dalbergia lanceolaria* L. f., Suppl. Fl.: 316. 1781; Baker in Hook. f., Fl. Brit. India 2: 235. 1876; Prain, Bengal Pl. 1: 411. 1903. [Plate 60c-d]

Tree, 10-15 m high. Leaves imparipinnate, 13.5-22 cm long; stipules deciduous; leaflets 15-27, elliptic-oblong or oblanceolate, 3.5-6.3 × 1.7-2.7 cm, cuneate to rounded, emarginate at apex, sub-coriaceous; floral bracts brown pubescent; bracteoles minute, deciduous; pedicels short, brown pubescent. Calyx campanulate, brown pubescent; tube short; upper lobes fused, triangular-ovate, bifid; lower 3, oblong, sub-acute to obtuse. Petals clawed; standard sub-orbicular or broadly ovate, slightly emarginate, reflexed; wings oblanceolate, auriculate, rounded; keels falcate or oblanceolate, auriculate, obtuse. Staminal sheaths c. 6 mm; anthers sub-globose. Ovary oblong, stipitate; style short; stigma sub-capitate. Pods elliptic, acute or obtuse with mucronulate tip, compressed, stalked, dark at centre with nerves, coriaceous; seeds reniform.

Flowering & Fruiting: March-September.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Sikkim and West Bengal.

Specimen examined: Hatipota, 29.09.2012, AK 58512.

2. *Dalbergia pinnata* (Lour.) Prain, Ann. Roy. Bot. Gard. (Calcutta) 10 (1): 48. 1904. *Derris pinnata* Lour., Fl. Cochinch.: 432. 1790. *Dalbergia tamarindifolia* Roxb., Fl. Ind. 3: 233. 1832; Baker in Hook. f., Fl. Brit. India 2: 234. 1876; Prain, Bengal Pl. 1: 411. 1903. [Plate 61a-b]

Siris Lahara (N).

Sprawling tree, 5-7 m high. Leaves imparipinnate, 12-15 cm long; stipules ovate-oblong, sericeous; leaflets 25-31, oblong, 1.2-1.9 × 0.6-0.7 cm, rounded-cuneate, emarginate at apex, sub-coriaceous; floral bracts sub-orbicular, ciliate, brown pubescent; bracteoles tomentose; pedicels short, brown pubescent. Calyx campanulate, brown puberulous; tube short; lobes ovate, ciliate. Petals clawed; standard sub-orbicular; wings obovate, c. 6 mm, auriculate; keels obovate, c. 5 mm, auriculate. Staminal tube c. 3.5 mm; anthers sub-globose. Ovary oblong, stipitate; style short; stigma sub-capitate. Pods beaked, reticulately nerved; seeds oblong.

Flowering & Fruiting: January-July.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Sikkim and West Bengal.

Specimens examined: Panbari 8, 31.03.2012, GK 50678; Marakata, 22.02.2012, AK 55892; Hauda nala, 19.02.2013, AK 59850.

3. *Dalbergia sissoo* Roxb. ex DC., Prodr. 2: 416. 1825; Baker in Hook. f., Fl. Brit. India 2: 231. 1876; Prain, Bengal Pl. 1: 411. 1903. [Plate 61c]

Tree, 10–15 m high. Leaves paripinnate, 4–9 cm long; stipules lanceolate, deciduous; leaflets 2–7 × 1.9–5.2 cm, cuneate to rounded at base, sub-coriaceous. Flowers sub-sessile; floral bracts lanceolate, puberulent; bracteoles ovate, larger than floral bracts, enclosed the calyx. Calyx campanulate, puberulent; tube short; lobes unequal; upper 2, circular; lateral pair sub-acute; lowest lanceolate. Petals clawed; standard broadly obovate, slightly emarginate; wings falcate, circular; keels oblanceolate. Staminal tube c. 4 mm; anthers sub-globose. Ovary stipitate, pubescent; stigma sub-capitate. Pods oblong-elliptic, strap-shaped, reticulately nerved; seeds 2–3, reniform.

Flowering & Fruiting: March–September.

Distribution. India: Almost throughout India (cultivated).

Specimens examined: Marakata, 24.09.2011, AK 52837; way to Mahakal cave, 20.02.2013, AK 59867.

4. *Dalbergia stipulacea* Roxb., Fl. India 3: 233. 1832; Baker in Hook. f., Fl. Brit. India 2: 237. 1876; Prain, Bengal Pl. 1: 410. 1903. [Plate 61d; Fig. 20]

Sprawling tree or scandent shrub, 3–5 m high. Leaves imparipinnate, 9–17 cm long; stipules ovate-lanceolate to lanceolate, deciduous; leaflets 17–25, oblong to obovate-oblong, 1–3.9 × 0.6–1.7 cm, cuneate to cuneate-rounded, emarginate at apex, sub-coriaceous; floral bracts pubescent; bracteoles obovate to oblanceolate, pubescent; pedicels short, pubescent. Calyx campanulate, sparsely pubescent; tube short; upper lobes fused, obtuse; lateral pair broadly falcate, shorter than lowest one; lowest oblong-falcate. Petals clawed; standard sub-orbicular, reflexed; wings oblanceolate-falcate, auriculate; keels same as wings. Staminal sheaths c. 6 mm; anthers sub-globose. Ovary falcate, stipitate; style short; stigma sub-capitate. Pods oblong-elliptic, 7–9 × 1.8–3 cm, obtuse or slightly beaked; seed reniform.

Flowering & Fruiting: Throughout the year.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa-Santrabari, 23.05.1949, VN & party 2921; Bhutanghat,

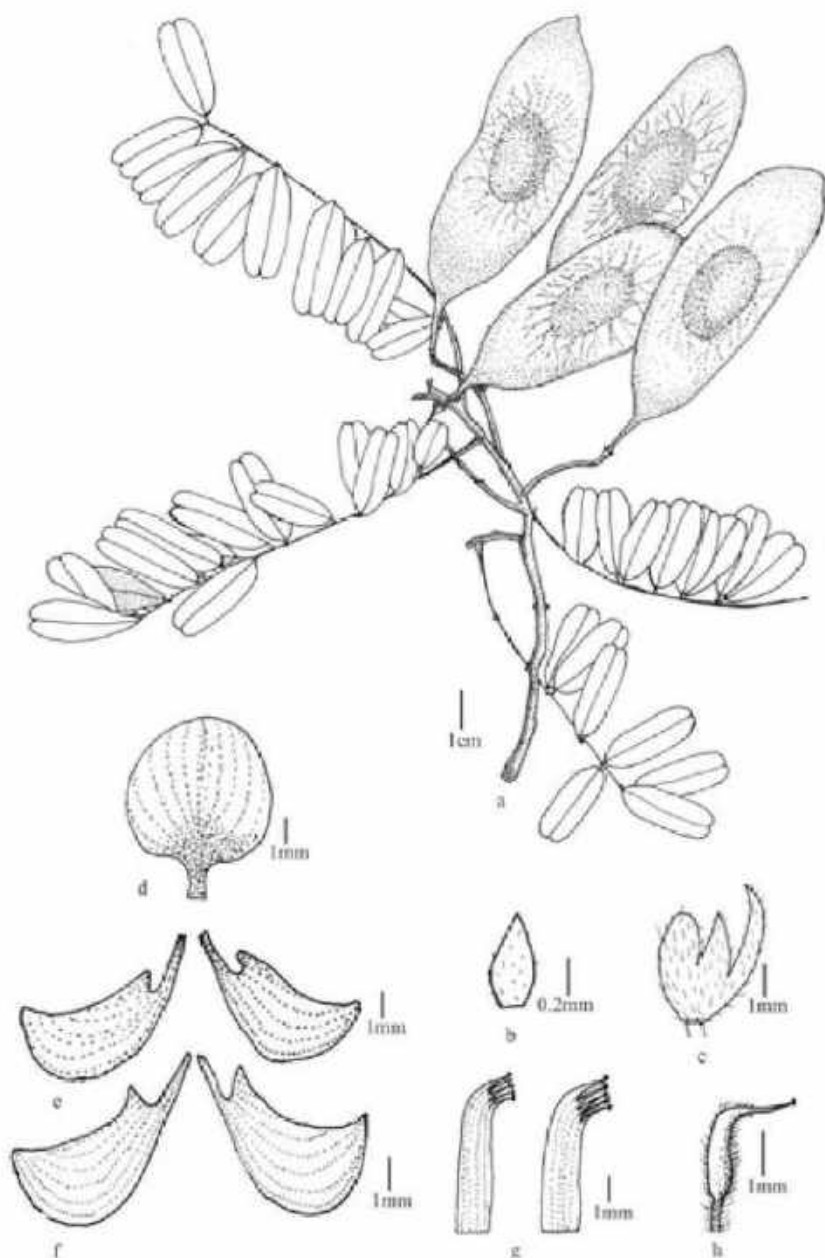


Fig. 20. *Dalbergia stipulacea*: a. Fruiting branchlet; b. Stipule; c. Calyx; d. Standard petal; e. Wing petals; f. Keel petals; g. Staminal sheaths; h. Gynoecium (AK 58579).

JKS 4085; Tashigaon 2, Bhutia pond, 04.10.2009, SKS & GK 46124; Bhutia Pond, 04.10.2011, GK 52316; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58579; Pana, 08.10.2012, AK 58724; Santrabari to Buxaduar, 18.05.2014, AK 62612.

5. *Dalbergia volubilis* Roxb., Pl. Coromandel 2: 48, t. 191. 1805; Baker in Hook. f., Fl. Brit. India 2: 235. 1876; Prain, Bengal Pl. 1: 411. 1903. [Plate 62a]

Scandent shrub, pubescent at nodes. Leaves imparipinnate, 7–12 cm long; stipules deciduous; leaflets oblong or oblong-obovate, 2–3.9 × 1.6–2.2 cm, cuneate-rounded, obtuse-rounded or emarginate with mucronulate tip, sub-coriaceous. Inflorescence golden brown pubescent; floral bracts obliquely oblong to ovate, golden-brown pubescent; bracteoles oblong, golden brown pubescent; pedicels short, pubescent. Calyx campanulate, sparsely pubescent; tube short; lobes unequal; upper 2, orbicular; lateral pair lanceolate; lowest oblong-lanceolate, curved. Petals clawed; standard sub-orbicular, emarginate; wings falcate auriculate, obtuse; keel same as the wings. Staminal tube c. 3 mm; anthers globose. Ovary oblong-falcate, stipitate, pubescent; stigma sub-capitate. Pods elliptic, obtuse with mucronulate tip, reticulately nerved; seed solitary, reniform.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Bala River, 08.03.2011, GK 50505; Marakata, 22.02.2012, AK 55891.

9. *Dendrolobium* (Wight & Arn.) Benth.

Dendrolobium triangulare (Retz.) Schindl., Repert. Spec. Nov. Regni Veg. 20: 279. 1924. *Hedysarum triangulare* Retz., Observ. Bot. 3: 40. 1783. *Desmodium cephalotes* (Roxb.) Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 224. 1834; Baker in Hook. f., Fl. Brit. India 2: 161, 1876; Prain, Bengal Pl. 1: 424. 1903.

[Plate 62b]

Shrub, to 1 m high, white cottony hairy. Leaves digitate, 3-foliolate; stipules ovate, c. 3.5 × 1–1.5 mm, hairy; leaflets elliptic-ovate, rounded-cuneate, entire, undulate, mucro-acute at apex, coriaceous, white appressed hairy beneath; stipels villous outside, glabrous inside; terminal ones 6.7–9.8 × 3.3–4.9 cm; lateral ones 4–7 × 1.4–3 cm. Inflorescence axillary umbels; peduncles 4–5 mm. Calyx tube 2–2.5 mm, sericeous outside, 5-lobed above; lobes ovate, 1.5–2.2 × 1–1.5 mm. Petals yellowish-white; standard broadly elliptic, c. 6 mm broad; wings oblong, 6–7 × c. 1.5 mm; keel spatulate, 5–6 × c. 3 mm. Stamens 10. Ovary pubescent. Pods linear, sericeous, 1–3 segmented; seeds elliptic.

Flowering & Fruiting: August–March.

Distribution. India: Arunachal Pradesh, Sikkim and West Bengal.

Specimens examined: Bhutanghat, JKS 4075; Tashigaon 2, 11.10.2009, SKS & GK 46294; Marakata, 24.09.2011, AK 52875.

10. *Desmodium* Desv.

Key to the species

- 1a. Leaves all 1-foliolate; petioles broadly winged 10. *D. triquetrum*
 1b. Leaves 3-foliolate or sometimes 1-foliolate; petioles unwinged 2
- 2a. Prostrate herbs; inflorescence axillary fascicles; standard attenuate at base; staminal tube c. 1 mm; ovary ellipsoid 9. *D. triflorum*
 2b. Shrubs; inflorescence axillary or terminal racemes or panicles; staminal tube more than 1 mm; ovary linear to linear-oblong 3
- 3a. Leaves 1-foliolate; leaflets rounded or subcordate at base; staminal tube c. 2 mm long 3. *D. gangeticum*
 3b. Leaves usually 3-foliolate (often lateral leaflets reduced in *D. motorium* and rarely 1-foliolate in *D. laxiflorum*); leaflets not rounded or subcordate at base; staminal tube more than 2 mm 4
- 4a. Leaflets tuberculate above, papillose in depressed cells below; stamens 10, monoadelphous; staminal tube more than 7 mm; pods 3-5-segmented, segments sub-elliptic, villous or tomentose 2. *D. confertum*
 4b. Leaflets not as above; stamens 10, diadelphous; staminal tube less than 7 mm; pods more than 5 segments, segments not sub-elliptic, glabrous or pubescent with minute uncinata hairs 5
- 5a. Stem and branches glabrous 1. *D. caudatum*
 5b. Stem and branches pubescent 6
- 6a. Branchlets rusty pubescent; stipules caducous; terminal leaflet undulate at margins; petals papillose outside; pods moniliform, segments sub-orbicular, rusty pubescent with uncinata hairs 8. *D. sequax*
 6b. Branchlets not rusty pubescent; stipules persistent; terminal leaflet entire at margins; petals not papillose outside; pods not moniliform, segments linear-oblong/sub-quadrate, glabrous or variously pubescent 7
- 7a. Branchlets glabrous; rachis setose; stipules falcate; terminal leaflet elliptic, obtuse with mucronate tip; lateral leaflets absent, if present then reduced; stipels triangular; ovary pubescent 7. *D. motorium*
 7b. Branchlets glabrescent or appressed pubescent; rachis not setose; stipules triangular or triangular-ovate; terminal leaflet not as above; lateral leaflets present, well developed; stipels lanceolate, linear or subulate; ovary hairy at margins only or glandular 8
- 8a. Stipels subulate; inflorescences pubescent with small uncinata hairs; petals white green to white purple; pods not constricted between adjacent seeds, segments linear-oblong 6. *D. laxiflorum*
 8b. Stipels linear/ lanceolate; inflorescences tomentose or sparsely pubescent to glabrous; petals purple or pink purple; pods constricted along lower margin between adjacent seeds, segments sub-quadrate 9

9a. Branchlets appressed pubescent; stipules triangular, acuminate at apex; terminal leaflet elliptic-obovate, rounded with emarginate apex; stipels linear; inflorescence tomentose; inflorescence bracts absent; ovary glandular; pods pubescent with small uncinata hairs **4. *D. heterocarpon***

9b. Branchlets glabrescent; stipules triangular-ovate, acute at apex; terminal leaflet elliptic-lanceolate, acuminate at apex; stipels lanceolate; inflorescence bracts present; ovary hairy along edges; pods glabrous **5. *D. khasianum***

1. *Desmodium caudatum* (Thunb.) DC., Prodr. 2: 337. 1825; Sanjappa, Leg. India: 150. 1992. *Hedysarum caudatum* Thunb. in Murray, Syst. Veg., ed. 14. 675. 1784.

Shrub, to 1–2 m high. Leaves digitate, 3-foliolate; petiole winged; terminal leaflet oblong-lanceolate, 5–13.4 × 1.5–4.6 cm; lateral ones lanceolate or oblong, 4–10.3 × 1.4–2.8 cm, cuneate, entire/undulate, acuminate or acute, subcoriaceous, glaucous above, glabrescent beneath; stipels filiform. Inflorescence racemes, 10–22 cm, pubescent; floral bracts subulate; bracteoles present. Calyx campanulate, 5-lobed above, hairy; lobes unequal. Petals green-white or yellow-white; standard elliptic, shortly clawed; wings oblong, clawed; keel oblong, clawed. Stamens 10; filaments connate in a tube below, free above. Ovary falcate, pilose; stigma simple. Pods linear, flat, brown, uncinata hairy, 4–6-segmented; segments ellipsoidal.

Flowering & Fruiting: July–November.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimen examined: Tashigaon 2, 12.10.2010, SKS & GK 46315.

2. *Desmodium confertum* DC., Ann. Sci. Nat. 4: 101. 1825; Baker in Hook. f., Fl. Brit. India 2: 167. 1876. **[Plate 62c; Fig. 21a-d]**

Shrubs, 1–1.5 m high, pubescent. Leaves digitate, 3-foliolate; stipules ovate, ciliate, striated, deciduous, sparsely pubescent; lateral leaflets oblong-ovate to oblong-lanceolate, 3.5–6.5 × 1.4–2.8 cm, asymmetrically rounded at base, repand, acute or obtuse, sub-coriaceous; terminal leaflets broadly elliptic to elliptic-obovate, 5–8 × 1.5–4.6 cm, cuneate at base; stipels ovate-lanceolate, hairy. Inflorescence pubescent, uncinata hairy; inflorescence bracts ovate, ciliate, striated, pubescent, deciduous; floral bracts subulate, pubescent; bracteoles same as inflorescence bracts; pedicels pubescent. Calyx pubescent, uncinata hairy; tube short; lobes unequal, ciliate; upper pair fused, triangular-ovate; lateral pair triangular, straight or slightly curved; lowest triangular. Petals pale purple, clawed except standard; standard oblong-obovate, 8–9 × c. 4 mm; wings oblong, c. 9 × 2.5 mm, obtuse; keels oblong, 8–9 × 2–2.5 mm, obtuse. Anthers oblong-ovate. Ovary hairy; stigma capitate. Pods faintly beaked; seeds reniform.

Flowering & Fruiting: October–February.

Distribution. India: Arunachal Pradesh, Bihar, Meghalaya, Sikkim and West Bengal.

Specimen examined: Way to Mahakal cave, 20.02.2013, AK 59863.

3. *Desmodium gangeticum* (L.) DC., Prodr. 2: 327. 1825; Baker in Hook. f., Fl. Brit. India 2: 168. 1876; Prain, Bengal Pl. 1: 425. 1903. *Hedysarum gangeticum* L., Sp. Pl. 2: 746. 1753. *Desmodium gangeticum* var. *maculatum* (L.) Baker in Hook. f., Fl. Brit. India 2: 168. 1876. [Plate 62d, 63a-b; Fig. 21e-h]

Shrub, 0.8–1 m high, uncinately hairy. Leaves 1-foliolate, ovate, 2.2–2.5 × 1.8–2.4 cm, rounded, acute at apex, coriaceous, appressed pubescent; stipules triangular, acuminate, deciduous; stipels linear-subulate, striated. Inflorescence pubescent uncinately hairy. Calyx pubescent, uncinately hairy; lobes unequal; upper pair fused, bifid; lateral pair triangular, acute, straight or slightly curved; lowest oblong-lanceolate, sub-acute. Petals white or purple, clawed except standard petal; standard obovate; wings oblong, 2–2.5 mm, auriculate, obtuse; keels obovate, 2–2.5 mm, obtuse. Anthers sub-globose. Ovary hairy; stigma capitate. Pods 4–8-segmented, slightly curved, uncinately hairy; seeds reniform.

Flowering & Fruiting: February–December.

Distribution. India: Almost throughout India.

Specimens examined: Buxa to Chunabhati, 833m, 17.05.1949, VN & party 2623; Tashigaon 2, 09.10.2009, SKS & GK 46297; Hatipota, 17.02.2013, AK 59818.

4. *Desmodium heterocarpon* (L.) DC., Prodr. 2: 337. 1825. *Hedysarum heterocarpon* L., Sp. Pl. 2: 747. 1753. *Desmodium polycarpon* (Poir.) DC., Prodr. 2: 334. 1825; Baker in Hook. f., Fl. Brit. India 2: 171. 1876; Prain, Bengal Pl. 1: 425. 1903. [Plate 63c-d; Fig. 21i-l]

Shrub, 50–80 cm high. Leaves digitate, 3-foliolate; stipules ciliate; lateral leaflets oblong-obovate to obovate, 1–4.9 × 0.6–1 cm, rounded-cuneate, coriaceous, appressed pubescent below; terminal leaflet 1.5–7.5 × 1–3 cm, or else same as lateral ones; stipels striated; floral bracts ovate, ciliate, acuminate, striated; pedicels short. Calyx pubescent; tube short; lobes sub-equal, mid nerve prominent; upper pair fused, triangular-ovate, bifid; lateral pair ovate, short acuminate; lowest oblong-lanceolate, acuminate. Petals clawed; standard sub-orbicular; wings oblong-obovate, cuneate, obtuse; keels same as wings. Staminal tube 3–4 mm; anthers sub-globose. Style short; stigma capitate. Pods oblong, 5–7-segmented, straight or slightly curved; seeds reniform.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 23.09.2011, AK 52811; Marakata, 24.09.2011, AK

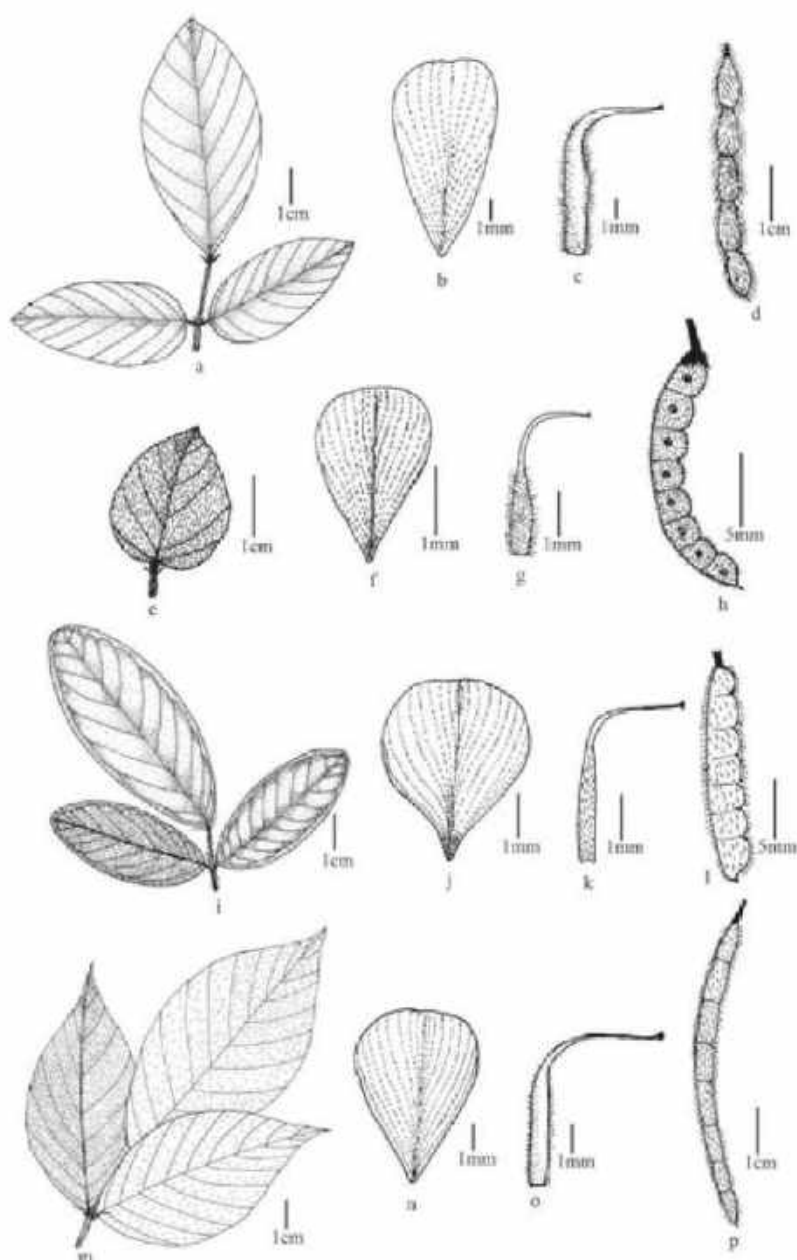


Fig. 21. *Desmodium confertum* (a-d): a. Leaf; b. Standard petal; c. Gynoecium; d. Pod (AK 59863); *Desmodium gangeticum* (e-h): e. Leaf; f. Standard petal; g. Gynoecium; h. Pod (AK 59818); *Desmodium heterocarpon* (i-l): i. Leaf; j. Standard petal; k. Gynoecium; l. Pod (AK 58614); *Desmodium laxiflorum* (m-p): m. Leaf; n. Standard petal; o. Gynoecium; p. Pod (AK 58638).

52846; Kumargram, Hathinala, 27.09.2011, AK 52959; Checko 2, 27.11.2011, GK 50584; Jainty-Phashkhawa, 02.10.2012, AK 58614; Bhutri, 05.10.2012, AK 58636; Buxa Fort to Achalung, 29.09.2013, AK 59635.

5. *Desmodium khasianum* Prain, J. Asiat. Soc. Bengal 66 (2): 395. 1897; Sanjappa, Leg. India: 156. 1992. [Plate 64a]

Shrub, 1.5–2 m high. Leaves digitate, 3-foliolate; stipules ciliate, striated, pubescent; lateral leaflets asymmetrically ovate-lanceolate, 3–4.5 × 1.4–2.2 cm, sub-rounded at base, silky pubescent; terminal leaflet 3–6 × 1.5–2.5 cm, rounded-cuneate at base, or else same as lateral leaflets; stipels ciliate, acute to acuminate, striated. Inflorescence sparsely pubescent to glabrous; inflorescence bracts same as stipules; floral bracts same as stipels, caducous. Calyx tube short; lobes sub-equal, mid nerve prominent; upper pair fused, triangular-ovate, bifid; lateral pair triangular-ovate, acute; lowest triangular-ovate, acute. Petals clawed; standard broadly obovate, auriculate, emarginate; wings elliptic-oblong, obtuse; keels ovate-falcate, acute. Staminal tube 5.5–6.5 mm. Ovary stipitate; style short; stigma capitate. Pods 3.5–4.5 cm, 4–8-segmented, curved, beaked, reticulately nerved; seed solitary in each segment, orbicular-reniform.

Flowering & Fruiting: May–October.

Distribution. India: Arunachal Pradesh, Assam, Sikkim, Meghalaya and West Bengal.

Specimen examined: Tashigaon to Rovers point, 02.10.2013, AK 59747.

6. *Desmodium laxiflorum* DC., Ann. Sci. Nat. Paris 4: 100. 1825; Baker in Hook. f., Fl. Brit. India 2: 164. 1876; Prain, Bengal Pl. 1: 425. 1903.

[Plate 64b–d; Fig. 21m–p]

Shrub, 80–90 cm high. Leaves digitate, 3-foliolate, rarely 1-foliolate; lateral leaflets broadly elliptic, 4.5–13.8 × 2.7–6.5 cm, cuneate, acuminate at apex, coriaceous, glabrous or scabrid above, appressed pubescent below; terminal leaflet same as lateral ones; stipels striated; floral bracts lanceolate, ciliate, striated; pedicels pubescent with uncinately hairy. Calyx hispid; tube short; lobes sub-equal; upper pair fused, triangular, bifid; lateral pair triangular, acute; lowest triangular, c. 3 mm, acuminate. Petals clawed; standard broadly obovate, c. 6.5 × 4–4.5 mm; wings oblong, auriculate, rounded; keels oblanceolate, slightly auriculate, sub-acute. Staminal tube 5–6 mm; anthers sub-globose. Style short; stigma capitate. Pods 6–9-segmented, pubescent, uncinately hairy; seed reniform.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 04.10.2009, SKS & GK 46130; Jainti range,

04.10.2009, SKS & GK 46137; Bhutanghat, 26.09.2011, AK 52944; Hatipota, 29.09.2012, AK 58515; Jainty-Phashkhawa, 02.10.2012, AK 58616; Hauda nala, 03.10.2012, AK 58655; Hauda nala, 03.10.2012, AK 58673; Bhutri, 05.10.2012, AK 58638; Hatipota, 17.02.2013, AK 59820; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59667.

7. *Desmodium motorium* (Houtt.) Merr., J. Arnold Arbor. 19: 345. 1938. *Hedysarum motorium* Houtt., Nat. Hist. 2, 10: 246. 1779. *Desmodium gyrans* DC., Prodr. 2: 326. 1825; Baker in Hook. f., Fl. Brit. India 2: 174. 1876; Prain, Bengal Pl. 1: 426. 1903. [Plate 65a-b; Fig. 22a-d]

Shrub, 1–1.5 m high. Leaves digitate, 3-foliolate, often 1-foliolate by reduction of lateral leaflets; stipules c. 1 cm, striated, deciduous; lateral leaflets elliptic, 1–1.6 × 0.2–0.3 cm, cuneate, obtuse at apex, appressed pubescent below; terminal leaflet 5.5–10 × 1–2.5 cm, cuneate, or else same as lateral ones; stipels striated. Inflorescence pubescent, uncinately hairy; floral bracts elliptic-ovate, ciliolate, acute to acuminate, striated, deciduous; pedicels pubescent. Calyx tube short; upper lobe 2-lobed, lower lobes dentate, acute, pubescent. Petals pale purple, clawed; standard sub-orbicular, 7.5–9 mm across, auriculate, rounded; wings oblanceolate, 6.5–9.5 × 4–5 mm, auricle not prominent, obtuse; keels falcate. Staminal tube 4.5–5 mm; anthers globose. Style short; stigma swollen. Pods constricted along one suture, 6–9-segmented, curved; seeds elliptic.

Flowering & Fruiting: September–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Hatijhora, way to Mahakal cave, 01.10.2012, AK 58566.

8. *Desmodium sequax* Wall., Pl. Asiat. Rar. 2: 46, t. 157. 1831; Baker in Hook. f., Fl. Brit. India 2: 170. 1876. *Desmodium sinuatum* (Miq.) Blume ex Baker in Hook. f., Fl. Brit. India 2: 166. 1876. [Plate 65c-d; Fig. 22e-h]

Shrub, 1–2 m high. Leaves digitate, 3-foliolate; lateral leaflets ovate-elliptic or rhomboid, 1.9–4 × 1.2–2.5 cm, cuneate, short acuminate at apex, coriaceous, pubescent; terminal ones ovate-elliptic, 3.2–7.8 × 1.3–4 cm, or else same as lateral ones; stipels subulate, pubescent. Inflorescence bracts triangular, pubescent; floral bracts linear-subulate, pubescent; pedicels short, pubescent. Calyx reddish, pubescent; tube short; lobes sub-equal; upper pairs fused, ovate, notched; lateral pair triangular; lowest same as lateral pair. Petals purple, clawed except standard; standard with 2 creamy yellow spots at base, broadly obovate, c. 6 × 4 mm, slightly notched; wings oblong, 6–7 mm, auriculate, obtuse; keels oblanceolate, 5–6 mm, auriculate, obtuse. Staminal tube 5–6 mm; anthers sub-globose. Ovary pubescent; style short; stigma capitate. Pods moniliform; seed solitary in each segment, reniform.

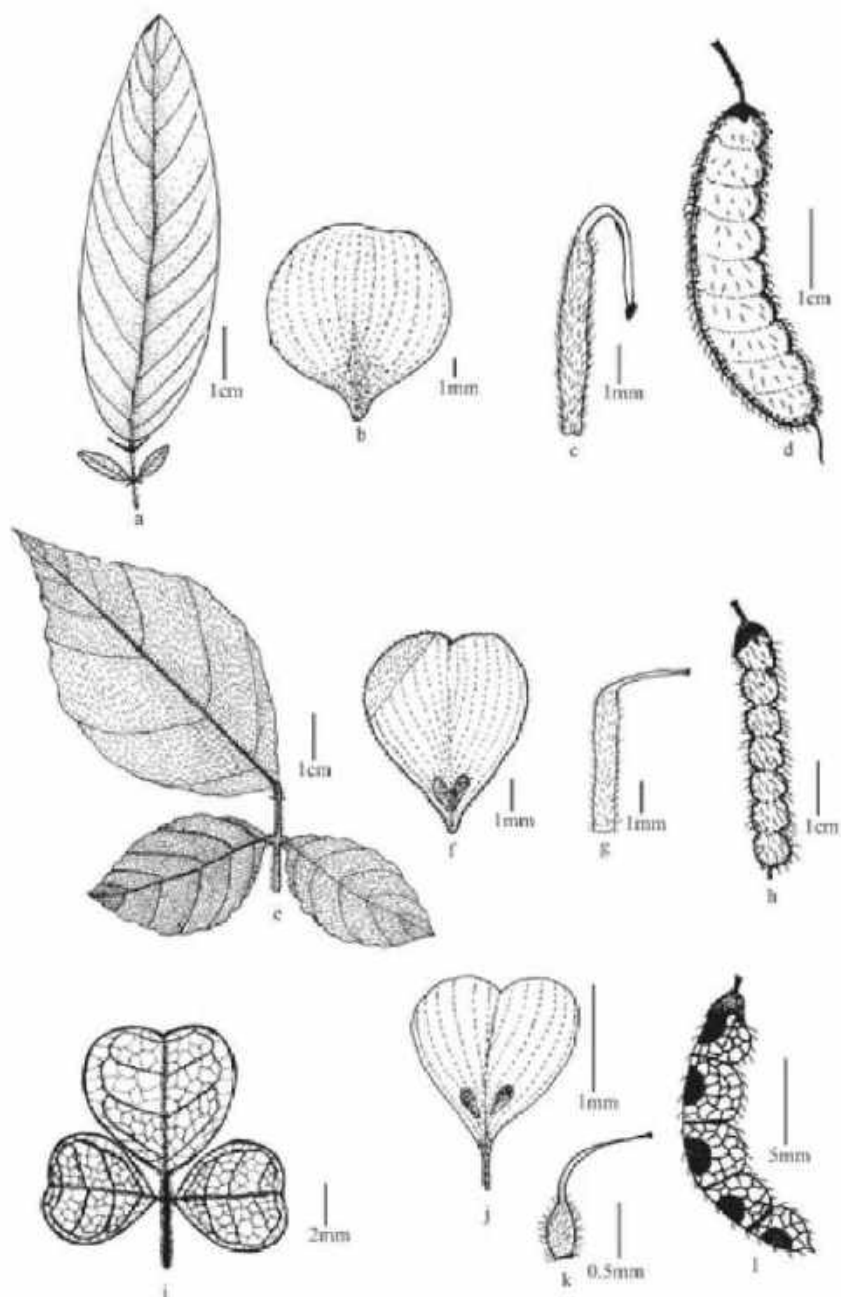


Fig. 22. *Desmodium motorium* (a-d): a. Leaf; b. Standard petal; c. Gynoecium; d. Pod (AK 58566); *Desmodium sequax* (e-h): e. Leaf; f. Standard petal; g. Gynoecium; h. Pod (AK 58664); *Desmodium triflorum* (i-l): i. Leaf; j. Standard petal; k. Gynoecium; l. Pod (AK 52852).

Flowering & Fruiting: October–December.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Sikkim, Manipur, Maharashtra, Meghalaya, Mizoram, Nagaland, Punjab, Uttarakhand and West Bengal.

Specimen examined: Hauda nala, 03.10.2012, AK 58664.

9. *Desmodium triflorum* (L.) DC., Prodr. 2: 334. 1825; Baker in Hook. f., Fl. Brit. India 2: 173. 1876; Prain, Bengal Pl. 1: 426. 1903. *Hedysarum triflorum* L., Sp. Pl. 2: 749. 1753. [Plate 66a-b; Fig. 22i-l]

Herb, 5–8 cm long, hairy. Leaves digitate, 3-foliolate; stipules ovate, acuminate, striated; lateral leaflets broadly obovate, 4–4.5 × 5–6 mm, subcordate, emarginate at apex, sub-coriaceous; terminal leaflet same as lateral ones; stipels linear-lanceolate, sparsely hairy or glabrous; floral bracts same as stipules but smaller and ciliate; pedicels 6–8 mm, pubescent. Calyx pubescent; lobes sub-equal; upper pair fused, triangular-ovate, bifid; others linear-lanceolate or triangular, acute. Petals purple pink, clawed; standard broadly obovate, auriculate, notched; wings obliquely oblong, c. 2 mm, obtuse; keels same as wings. Anthers sub-globose. Ovary pubescent; style short; stigma capitate. Pods linear-oblong, lower suture constricted, beaked, slightly curved, reticulately veined, glabrous or sparsely uncinately hairy; seeds solitary in each segment, reniform.

Flowering & Fruiting: September–November.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Bihar, Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Tashigaon 2, 11.10.2009, SKS & GK 46290; Marakata, 24.09.2011, AK 52852.

10. *Desmodium triquetrum* (L.) DC. in A. DC., Prodr. 2: 326. 1825; Baker in Hook. f., Fl. Brit. India 2: 163. 1876; Prain, Bengal Pl. 1: 425. 1903. *Hedysarum triquetrum* L., Sp. Pl. 2: 746. 1753. *Hedysarum alatum* Roxb., Fl. Ind. 3: 348. 1832.

Shrub, 50–70 cm high, white hairy. Leaves 1-foliolate, ovate-lanceolate to oblong-lanceolate, 7.2–11.3 × 2.5–4 cm, subcordate at base, ciliate, acute to short acuminate; stipules ovate-lanceolate, acuminate, striated; petioles winged, 1.5–2.7 cm. Inflorescence axillary or terminal racemes; floral bracts lanceolate, ciliolate, striated; bracteoles same as floral bracts; pedicels short. Calyx campanulate; lobes unequal, ciliate; upper pair fused, ovate, bifid; lateral pair oblong-lanceolate, acuminate; lowest oblong-lanceolate, acuminate. Petals pale purple, clawed; standard c. 6 mm across, auriculate, rounded; wings oblong-falcate, auriculate, acute; keels ovate, auriculate, acute. Stamens diadelphous; staminal tube 3.5–4 mm; disk membranous. Ovary oblong, stipitate, hairy along edges; style short;

stigma capitate. Pods oblong, 7–8-segmented, upper suture constricted, reticulately nerved, white pubescent; seed solitary in each segment, elliptic.

Flowering & Fruiting: August–October.

Distribution. India: Almost throughout India.

Specimens examined: Sankosh, 28.09.2011, AK 52966; Bhutri, 05.10.2012, AK 58627.

11. *Dysolobium* (Benth.) Prain

Dysolobium pilosum (Willd.) Marechal, Bull. Jard. Bot. Nat. Belg. 47: 483. 1977.

Dolichos pilosus Willd., Sp. Pl. 3: 1043. 1802. *Vigna pilosa* (J. G. Klein ex Willd.)

Baker in Hook. f., Fl. Brit. India 2: 207. 1876; Prain, Bengal Pl. 1: 389. 1903.

[Plate 66c-d]

Climbing herb, pilose. Leaves digitate, 3-foliolate; stipules triangular, striated, pilose; lateral leaflets asymmetrically ovate-lanceolate, 9–14.3 × 2.5–7.2 cm, cuneate, repand, acuminate, sub-coriaceous, hispid; terminal leaflet rhombic-ovate to rhombic-lanceolate or oblong-lanceolate, 9.3–15.5 × 2.7–8 cm, or else same as lateral ones; stipels subulate, pilose. Inflorescence racemes; floral bracts triangular-ovate, pilose. Calyx brown pubescent; tube short; lobes unequal; upper pair, fused, ovate, notched; lateral pair triangular; lowest one triangular-falcate. Petals clawed; standard sub-orbicular, c. 1.3 × 1.6 cm, auriculate, emarginate, slightly reflexed; wings obovate, c. 10 × 5 mm, auriculate, obtuse; keels c. 2 × 0.2 cm, acute. Stamens diadelphous; staminal tube c. 1.5 cm; anthers oblong. Ovary falcate, pubescent; style c. 1 cm; stigma swollen. Pods subcylindric, beaked, coriaceous; seeds 5–12, oblong.

Flowering & Fruiting: September–February.

Distribution. India: Andaman & Nicobar Islands, Assam, Chhattisgarh, Jharkhand, Karnataka, Kerala, Mizoram, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Santrabari, 27.09.2013, AK 59604; Santrabari, 18.02.2017, AK 59996.

12. *Erythrina* L.

Erythrina stricta Roxb., Fl. Ind. 3: 251. 1832; Baker in Hook. f., Fl. Brit. India 2: 189. 1876; Prain, Bengal Pl. 1: 284. 1903. [Plate 67a]

Tree, 7–12 m high. Leaves digitate, 3-foliolate; stipules caducous; lateral leaflets triangular-ovate, rhomboid, 7–19 × 7–24.5 cm, nearly cordate to truncate, acute to acuminate at apex, coriaceous; terminal leaflet same as lateral ones; stipels sub-globose, gland-like; floral bracts spatulate, tomentose; bracteoles ligulate, tomentose; pedicels tomentose. Calyx 1–1.2 cm, striated, pubescent. Petals granular; standard broadly ovate, bifid; wings falcate, 5–6 mm; keels oblong-lanceolate, 4–4.5 × c. 1 cm. Staminal tube 2–2.2 cm; anthers linear-lanceolate.

Ovary oblong, stipitate; style pubescent laterally; stigma swollen. Pods strap-shaped, slightly curved; seeds 1–3 or more.

Flowering & Fruiting: February–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Odisha, Rajasthan, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55781.

13. *Flemingia* Roxb. ex W. T. Aiton

Flemingia stricta Roxb. in W. T. Aiton, Hort. Kew., ed. 2. 4: 349. 1812; Baker in Hook. f., Fl. Brit. India 2: 228. 1876; Prain, Bengal Pl. 1: 377. 1903. [Plate 67b-c]

Shrub, 80–90 cm high, sparsely appressed pubescent. Leaves digitate, 3-foliolate; stipules acuminate at apex, striated, deciduous, appressed pubescent; lateral leaflets lanceolate, 21–31 × 5.5–9 cm, unequally sub-circular, repand, short acuminate, coriaceous; terminal leaflet cuneate at base, or else same as terminal ones. Inflorescence terminal or axillary racemes, pubescent; inflorescence bracts same as stipules; floral bracts subulate or linear-lanceolate, ciliate, striated, deciduous, appressed pubescent; pedicels short, silky tomentose. Calyx black gland-dotted and white-silky tomentose; tube short; lobes unequal; upper pair and lateral pair similar, lanceolate, caudate-acuminate; lower one triangular. Petals clawed; standard broadly obovate or sub-orbicular, 7–8 × c. 5 mm, auriculate, rounded; wings magenta, oblanceolate, auriculate, lobed or appendaged at lower margins, acute; keels obliquely ovate-elliptic, obtuse. Staminal tube 6–7 mm; anthers elliptic. Ovary oblong-ovate, stipitate, silky tomentose; style hairy at base; stigma swollen. Pods elliptic-ovate, beaked, appressed silky pubescent; seeds orbicular-reniform.

Flowering & Fruiting: February–November.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Karnataka, Kerala, Mizoram, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Santrabari, 04.10.2009, SKS & GK 46122; Panbari 8, 12.03.2011, GK 50550; Panbari 8–9, 27.11.2011, GK 50598; Checko-1, 09.02.2013, AK 58820; Santrabari to Chunabhati, 04.10.2013, AK 59780.

14. *Gliricidia* Kunth

Gliricidia sepium (Jacq.) Kunth in Walp., Repert. Bot. Syst. 1 (4): 679. 1842; Sanjappa, Leg. India: 181. 1992. *Robinia septium* Jacq., Enum. Syst. Pl.: 28. 1760.

[Plate 67d]

Tree, 7–10 m high. Leaves imparipinnate, bipinnate; stipules triangular-ovate, acuminate, caducous, pubescent; lateral leaflets unequal, elliptic to elliptic-obovate or sub-orbicular, 2.4–5 × 2.4–2.8 cm, cuneate to rounded, short acuminate at apex,

coriaceous, sparsely appressed pubescent below; terminal leaflet elliptic to elliptic-obovate, 4.5–5 × 2.4–2.8 cm, cuneate, or else same as terminal leaflet; floral bracts ovate, pubescent; pedicels angular. Calyx maroon, sparsely pubescent; tube 6–7 mm; lobes sinuate or truncate, hairy. Petals clawed; standard 1.5–1.7 cm across, emarginate; wings oblong, c. 1.6 × 0.5 cm, rounded; keels broadly falcate, c. 1.2 × 0.3 cm. Staminal tube c. 1.5 cm; anthers elliptic. Ovary stipitate; stigma capitate. Pods strap-shaped, undulate along sutures, beaked; seeds 9–11.

Flowering & Fruiting: February–September.

Distribution. India: Almost throughout India (introduced).

Specimen examined: Rydak, Tiamari, 23.02.2012, AK 55908.

15. Indigofera L.

Key to the species

- 1a. Prostrate herbs; branchlets sericeous; leaves 1-foliolate; leaflets linear-oblong to oblanceolate, cuneate at base, obtuse with mucronate tip at apex; lateral veins inconspicuous; inflorescences 1–4-flowered racemes, sericeous; standard circular with mucronate tip; anthers sub-globose, connective produced in apiculate tip above, glabrous at base; pods globose, sericeous; seed solitary, broadly obovate or sub-orbicular, puncticulate
1. *I. linifolia*
- 1b. Shrubs; branchlets appressed pubescent; leaves 11–19-foliolate; leaflets lanceolate to oblanceolate, cuneate to sub-circular at base, short acuminate at apex; lateral veins conspicuous; inflorescences many flowered racemes, appressed rusty pubescent; anthers elliptic, connective not produced in apiculate tip above, few hairs at base; pods cylindric, appressed rusty pubescent; seeds 10–16, discoid, rugose
2. *I. zollingeriana*

I. Indigofera linifolia (L. f.) Retz., *Observ. Bot.* 4: 29. 1786; Baker in Hook. f., *Fl. Brit. India* 2: 92. 1876. *Hedysarum linifolium* L. f., *Suppl.*: 331. 1781.

[Plate 68a-b]

Herb, 25–40 cm, sericeous. Leaves 1-foliolate, linear-oblong to oblanceolate, 4–9 × 1–2.5 mm, sub-coriaceous; stipules acuminate, midvein prominent; floral bracts ovate-lanceolate, acuminate, deciduous; pedicels angular, short. Calyx tube short; lobes unequal; upper pair fused, triangular, bifid; lateral pair triangular, acuminate; lowest one slightly longer than lateral ones. Petals shortly clawed (except standard); standard obovate, cuneate at base, keeled, slightly reflexed; wings oblanceolate, auriculate, bilobed; keels obovate, linear appendage at base, sub-acute. Staminal tube c. 2.5 mm. Ovary faintly trigonous; stigma capitate. Pods globose, sericeous; seed solitary, obovate or sub-orbicular, puncticulate.

Flowering & Fruiting: September–October.

Distribution. India: Almost throughout India.

Specimens examined: Jainti river, 13.10.2009, SKS & GK 46338; Bhutanghat, Mainabari, 26.09.2011, AK 52894; Jainty-Phashkhawa, 02.10.2012, AK 58618.

2. *Indigofera zollingeriana* Miq., Fl. Ned. Ind. 1: 310. 1855; Sanjappa, Leg. India: 198. 1992. *Indigofera teysmannii* Miq., Fl. Ned. Ind. 1 (1): 1083. 1858.

Shrub, 1–2 m high, subsericeous with minute brown or white, biramous, appressed hairs. Leaves imparipinnate, 15–30 cm; leaflets 4–5.5 × 1.5–2 cm, sub-coriaceous, appressed pubescent; stipels triangular. Inflorescence many-flowered raceme, 10–20 cm; floral bracts triangular, brownpubescent; pedicels 2–3 mm, pubescent. Calyx brown-sericeous; tube short; lobes triangular. Corolla whitish, pink, red or dark purple; standard broadly ovate or sub-orbicular, dorsally sericeous, 6.5–8 mm across, appressed rusty pubescent; wings as long as standard, ciliate; keels 7–7.5 mm, rusty pubescent. Staminal tube 5–6.5 mm. Ovary oblong; style short; stigma capitate. Pods cylindrical, beaked; seeds light brown, 10–16, discoid, like a pile of coins, rugose.

Flowering & Fruiting: September–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Gujarat, Karnataka, Kerala, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Jainty-Phashkhawa, 02.10.2012, AK 58618.

16. *Millettia* Wight. & Arn.

Key to the species

- 1a. Large trees; terminal leaflet repand at margins; seeds 2–3, reniform 2. *M. glaucescens*
- 1b. Large scandent shrubs or scrambler; terminal leaflet entire at margins; seeds 5–7, broadly elliptic 2
- 2a. Leaves 5–9-foliolate; standard pubescent or sericeous dorsally; pods oblong, strap shaped, tomentose 1. *M. extensa*
- 2b. Leaves 11–17-foliolate; standard glabrous dorsally; pods ovoid, glabrous or pubescent when young 3. *M. pachycarpa*

1. *Millettia extensa* (Benth.) Baker in Hook. f., Fl. Brit. India 2: 109. 1876. *Orosema extensa* Benth., Pl. Jungh. 2: 249. 1852. *Millettia auriculata* Baker ex Brandis, For. Fl. Ind.: 138. 1874; Baker in Hook. f., Fl. Brit. India 2: 108. 1876; Prain, Bengal Pl. 1: 407. 1903. [Plate 68c-d]

Kurku (N).

Climbing shrub. Leaves imparipinnate, 16–22 cm long; stipules ovate, densely appressed pubescent; lateral leaflets broadly ovate to rhombic-ovate, 5.2–13 × 3.5–7.2 cm, rounded or cuneate, abruptly acuminate at apex, glabrous or pubescent above, pubescent below; terminal leaflet 9.5–13 × 4–9 cm; stipels subulate, pubescent; floral bracts triangular, pubescent. Calyx campanulate, pubescent. Petals clawed; standard sub-orbicular, 7–8 mm across, emarginate; wings broadly falcate, c. 8 × 3 mm, auriculate, obtuse; keels falcate, c. 7 × 3 mm, auriculate, obtuse. Staminal tube 4–5.5 mm; anthers elliptic-oblong. Ovary stipitate, pubescent; stigma capitate. Pods strap-shaped, shortly beaked.

Flowering & Fruiting: May–October.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, Mainabari, 26.09.2011, AK 52897; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58592; Santrabari to Buxaduar, 18.05.2014, AK 62625.

2. *Millettia glaucescens* Kurz, J. Asiat. Soc. Beng. 42 (2): 67. 1873; Baker in Hook. f., Fl. Brit. India 2: 107. 1876. *Pongamia angustifolia* Buch.-Ham. ex Wall., Numer. List: n. 5917. 1832; Baker in Hook. f., Fl. Brit. India 2: 110. 1876.

[Plate 69a-b; Fig. 23]

Tree, 10–12 m high. Leaves imparipinnate, 9–15 cm long; stipules orbicular, pubescent; lateral leaflets ovate to ovate-lanceolate, 5–11 × 1.8–2.7 cm, asymmetrically cuneate, repand, acuminate; terminal leaflet 8–10 × 1.8–2 cm, or else same as lateral ones; floral bracts ovate, pubescent; pedicels short, pubescent. Calyx cupular, pubescent. Petals clawed; standard broadly obovate, auriculate, slightly emarginate, pubescent inside; wings oblong-lanceolate, c. 1 cm, auriculate, acute, slightly curved; keels falcate, auriculate, acute, pubescent inside at apex. Staminal tube 4.5–5.5 mm; anthers elliptic-oblong. Ovary oblong, shortly stipitate, pubescent; stigma capitate. Pods strap-shaped, shortly beaked.

Flowering & Fruiting: May–October.

Distribution. India: Assam, Sikkim and West Bengal.

Specimen examined: Hatipota, Phashkhawa river belt, 30.09.2012, AK 58557.

3. *Millettia pachycarpa* Benth., Pl. Jungh.: 250. 1852; Baker in Hook. f., Fl. Brit. India 2: 106. 1876.

[Plate 69c]

Bishloti (B); *Kurkus* (N).

Lianas, yellow brown tomentose. Leaves imparipinnate, 28–33 cm; leaflets 11–17, elliptic-oblong to oblong-lanceolate, 5.5–10 × 2–2.5 cm, cuneate, entire, acuminate, chartaceous, yellow brown tomentose beneath. Inflorescence racemose, 8–14 cm, rusty tomentose; pedicels 6–8 mm; bracts, triangular-ovate, tomentose; bracteoles same as bracts. Calyx 5-lobed above, tubular below, brown tomentose outside; tube 4–5 × 3–3.5 mm; lobes triangular-ovate. Petals purplish; standard broadly-elliptic, c. 3 × 2 cm, bilobed; wings oblong, 2.5–2.7 × 0.7–0.8 cm; keel oblong, 2.5–2.7 × 0.7–0.8 cm, glabrous, auricled. Stamens 10, filaments connate at tube; anthers oblong-ovate. Ovary falcate, silky tomentose; style c. 8 mm, setose; stigma sticky. Pods constricted between seeds; seeds reniform.

Flowering & Fruiting: March–May.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

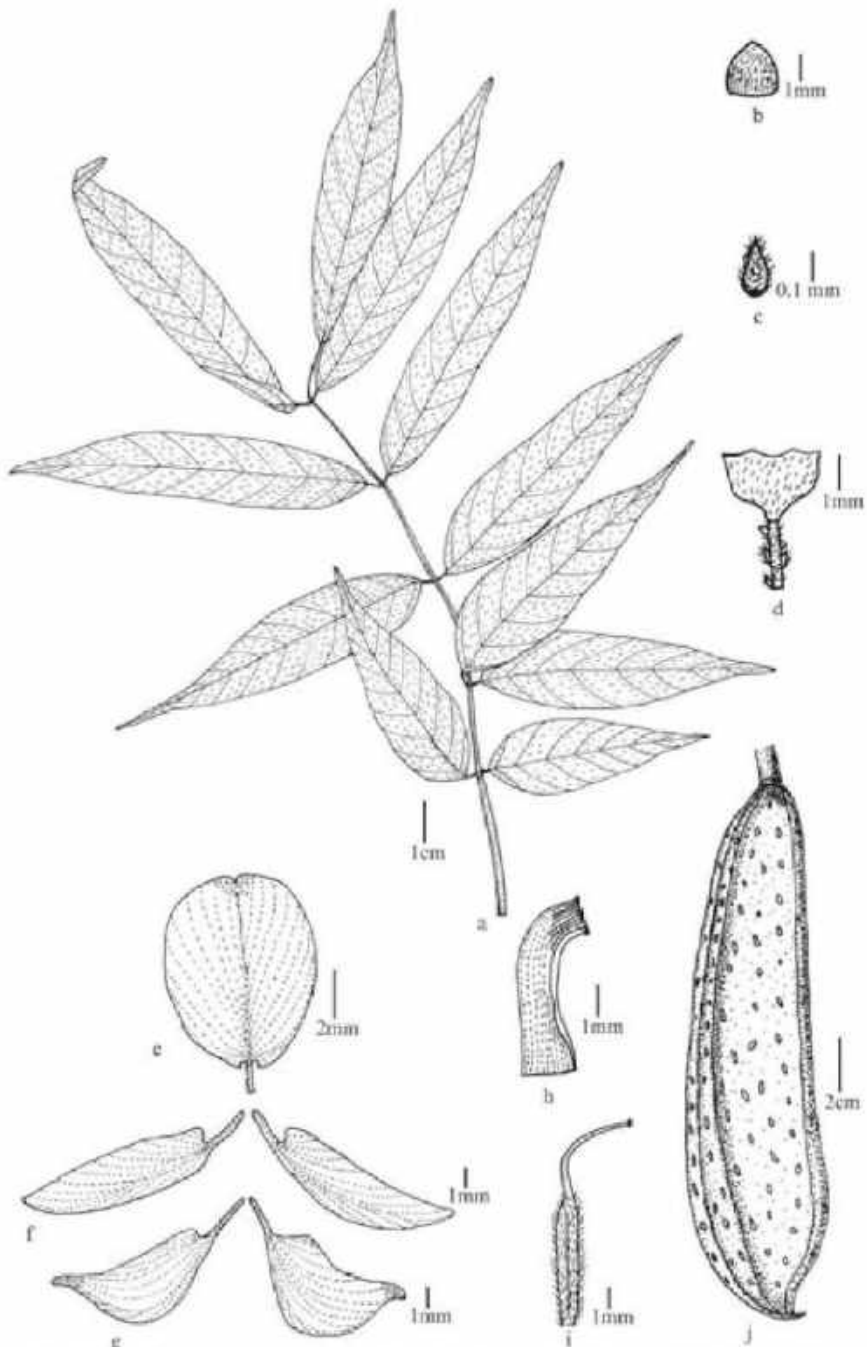


Fig. 23. *Millettia glaucescens*: a. Leaf; b. Stipule; c. Floral bract; d. Calyx; e. Standard petal; f. Wing petals; g. Keel petals; h. Staminal tube; i. Gynoecium; j. Pod (AK 58557).

Specimens examined: Rajabhatkhawa depot Road, 15.05.1949, VN & party 2444; South Rajabhatkhawa, Bala River, SRVK 6, 29.03.2012, GK 50633.

Uses: The root bark is used in fishing by the Bhutia tribe.

17. *Mucuna* Adanson

Key to the species

- 1a. Inflorescences tomentose; floral bracts circular, tomentose; pods oblong-elliptic to elliptic-ovate, slightly compressed, plaited obliquely on surface and winged all around, without calyx; seeds brown, 2, discoid **1. *M. imbricata***
- 1b. Inflorescences white appressed pubescent; floral bracts linear-lanceolate, white appressed pubescent; pods sub-cylindric, sigmoid, sub-terete, faintly median keeled on surface, not winged, with persistent calyx; seeds black, 3-6, reniform **2. *M. pruriens***

1. *Mucuna imbricata* DC. ex Baker in Hook. f., Fl. Brit. India 2: 185. 1876. *Mucuna nigricans* (Lour.) Steud., Nom. Bot., ed. 2. 2: 163. 1841; Sanjappa, Leg. India: 217. 1992.

Climbing shrub, sparsely brown pubescent. Leaves digitate, 3-foliolate; stipules caducous; lateral leaflets asymmetrically ovate or elliptic-ovate, 8.5-10.5 × 5-6.2 cm, rounded at base, hairy, glabrous or hairy below; terminal leaflet elliptic-ovate, sub-circular at base, similar to lateral leaflets in other features; stipules subulate; pedicels silky tomentose. Calyx campanulate, silky pubescent with brown bristles; lobes sub-equal; upper pair fused, triangular-ovate, notched; lateral pair triangular-ovate; lowest one triangular. Petals clawed; standard ovate, c. 3 × 2 cm, auriculate, obtuse; wings oblong, 4-4.2 × c. 0.8 cm, auriculate, sub-acute, pubescent at base, ciliate; keels oblong-falcate, 4.5-5 × c. 0.6 cm, slightly auriculate, papillose at margins, beaked. Staminal tube 3.5-4 mm. Ovary oblong-lanceolate; style 4.5-5.5 mm, pubescent; stigma capitate. Pods oblong-elliptic, plaited obliquely and winged all around; seeds 2, brown, discoid.

Flowering & Fruiting: April-October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Manipur, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59707.

2. *Mucuna pruriens* (L.) DC., Prodr. 2: 405. 1825; Baker in Hook. f., Fl. Brit. India 2: 187. 1876; Prain, Bengal Pl. 1: 400. 1903. *Dolichos pruriens* L., Herb. Amboin.: 23. 1754. **[Plate 70a]**

Kauso, Kautcho (N).

Climbing shrub, pubescent. Leaves digitate, 3-foliolate; stipules lanceolate, pubescent, caducous; lateral leaflets asymmetrically triangular-ovate, 11-14 ×

7–8.5 cm, truncate-rounded, repand, white pubescent; terminal leaflet 11–15 × 6.5–9 cm, cuneate at base, or else same as lateral ones; floral bracts acuminate, caducous; bracteoles same as floral bracts; pedicels white pubescent. Calyx campanulate, white appressed pubescent, orange brown bristly; tube short; lobes sub-equal; upper pair fused, triangular, 7–8 × 5–6 mm, obtuse or slightly notched; lateral pair and the lowest one triangular. Petals clawed; standard ovate, c. 2 × 1.5 cm, slightly notched; wings oblanceolate, c. 3 × 1 cm, obtuse, hairy along margins; keel oblong-falcate, auriculate, beaked. Staminal tube 3.8–4 mm. Ovary oblong; style c. 3 cm, pubescent, brown bristly; stigma capitate. Pods sub-cylindric, sigmoid, sub-terete with persistent calyx; seeds black, 3–6, reniform.

Flowering & Fruiting: September–April.

Distribution. India: Almost throughout plains and Terai Himalayas, Assam, Meghalaya and West Bengal.

Specimen examined: Bhutanghat, 25.02.2012, AK 55940.

18. *Pachyrhizus* Rich. ex DC.

Pachyrhizus erosus (L.) Urb., *Symb. Antill.* 4: 311. 1905. *Dolichos erosus* L., *Sp. Pl.* 2: 726. 1753. *Pachyrhizus angulatus* Rich. ex DC., *Prodr.* 2: 402. 1825; Baker in Hook. f., *Fl. Brit. India* 2: 207. 1876. [Plate 70b]

Sankalu (B).

Climbing herb, appressed pubescent. Leaves digitate, 3-foliolate; stipules narrowly triangular, pubescent, caducous; lateral leaflets very oblique, ovate, 9–14 × 6–12 cm, cuneate, lower margins dentate or lobed, acute; terminal leaflet rhombic-ovate, 10.5–16 × 10.5–18 cm, or else same as lateral ones. Inflorescence axillary racemes, brown yellow pubescent; floral bracts linear-lanceolate, pubescent, caducous; bracteoles same as floral bracts; pedicels short, pubescent. Calyx campanulate, appressed brown pubescent; tube short; lobes sub-equal; upper pair fused, triangular, bifid; lateral pair triangular-ovate; lowest one same as lateral ones. Petals clawed; standard 1.2–1.3 × 0.9–1 cm, slightly notched; wings ovate-lanceolate, c. 1.3 × 0.3–0.4 cm, auriculate, obtuse; keels elliptic-ovate, acute. Stamens diadelphous; anthers sub-globose. Ovary stipitate, surrounded by shallowly lobed membranous disk, pubescent; style 6–7 mm; stigma capitate. Pods beaked; seeds 8–10.

Flowering & Fruiting: October–February.

Distribution. India: Almost throughout (cultivated).

Specimen examined: Marakata, 22.02.2012, AK 55876.

Notes: The root tubers used as a vegetable. It is also used in Saraswati pooja.

19. *Pueraria* DC.

Key to the species

- 1a. Climbing herbs; plants bearing leaves at flowering time; stems terete when young; stigma hairy; pods linear-oblong, c. 3 mm wide; seeds 15–20, sub-truncate
1. *P. phaseoloides*
- 1b. Scandent shrubs; plants leafless at flowering time; stems angular when young, leafless in flowering; stigma glabrous; pods moniliform, 5–9 mm wide; seeds 1–3, sub-truncate at one end
2. *P. sikkimensis*

1. *Pueraria phaseoloides* (Roxb.) Benth., J. Linn. Soc., Bot. 9: 125. 1865; Baker in Hook. f., Fl. Brit. India 2: 199. 1876; Prain, Bengal Pl. 1: 396. 1903. *Dolichos phaseoloides* Roxb., Fl. Ind. 3: 316. 1832.

Climbing herb, brown hirsute. Leaves alternate, digitate, 3-foliolate; stipules ovate to ovate-lanceolate, ciliate, short acuminate, striated, glabrous or appressed brown pubescent; lateral leaflets asymmetrically ovate to broadly ovate, 4–7 × 3.6–5.6 cm, cuncate, entire or repand and hairy, lower margin slightly extended below, acute or obtuse, appressed hirsute; terminal leaflet 4.7–8.5 × 4.5–8 cm, or else same as lateral ones; stipels linear-subulate, hairy. Inflorescence axillary racemes; floral bracts lanceolate, appressed hirsute; bracteoles same as floral bracts; pedicels short, hirsute. Calyx hirsute; tube short; lobes unequal; upper pair fused, triangular-ovate, bifid; lateral pair triangular-ovate, acuminate; lowest one ovate, c. 3.5 mm, long acuminate. Petals clawed; standard c. 10 × 8 mm, auriculate; wings obovate-oblong, c. 10 × 4 mm, auriculate, obtuse; keels broadly falcate, 9–9.5 × c. 4.5 mm, acute with short beak. Staminal tube 6–7 mm. Ovary stipitate, surrounded by shallowly lobed membranous disk, pubescent; style short; stigma capitate. Pods beaked, brown hirsute.

Key to the varieties

- 1a. Leaves unlobed; pods cylindrical with unthickened sutures 1. 1. var. *phaseoloides*
1b. Leaves 3-lobed; pods not cylindrical with thickened sutures 1. 2. var. *subspicata*

1.1. var. *phaseoloides*

[Plate 70c-d]

Flowering & Fruiting: August–November.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Bihar, Chhattisgarh, Jharkhand, Kerala, Manipur, Meghalaya, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Santrabari, 04.10.2009, SKS & GK 46138; Narathali, 23.09.2011, AK 52802; Bhutanghat, 26.09.2011, AK 52905; Bhutan border, Kalikhola river belt, 27.09.2011, AK 52957; Sankosh, 28.09.2011, AK 52984; Hauda nala, 03.10.2012, AK 58668;

12. var. **subspicata** (Benth.) Maesen, Agric. Univ. Wageningen Pap. 85 (1): 84. 1985. *Neustanthus subspicata* Benth. in Miq., Pl. Jungh.: 234. 1852. *Pueraria subspicata* Benth., J. Linn. Soc., Bot. 9: 125. 1865; Prain, Bengal Pl. 1: 396. 1903. [Plate 71a-b]

Flowering & Fruiting: August–November.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimen examined: Hauda nala, 03.10.2012, AK 58674.

2. ***Pueraria sikkimensis*** Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 419. 1897; Sanjappa, Leg. India: 235. 1992. [Plate 71c-d]

Birali Lahara (N).

Scandent shrub, pubescent. Leaves 3-foliolate; leaflets ovate, c. 15 × 12 cm, rounded or truncate, entire, acute or shortly acuminate at apex, sub-coriaceous, sparsely pubescent. Inflorescence raceme, brownish tomentose; pedicels 4–5 mm, filiform, tomentose; bracts lanceolate, hispid outside, glabrous inside; bracteoles ovate, hispid outside, glabrous inside. Calyx green purplish, campanulate, rusty tomentose outside; tube c. 4 × 5 mm; lobes oblong-ovate, 4–5 × 1.5–2 mm, acute. Petals pale blue, yellow spotted; standard sub-orbicular; wings oblong, c. 3 mm broad; keel upcurved, 4–5 mm broad. Stamens 10, connate in a tube; anthers oblong, dorsifixed. Ovary falcate, hairy; style slightly curved; stigma clavate.

Flowering & Fruiting: February–April.

Distribution. India: Himachal Pradesh, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Jainti 3, Jainti river, 03.03.2011, GK 47212; Newlands, 15.02.2012, AK 53046; Kumargram, 18.02.2012, AK 55737; Adma, Panbari, 12.02.2013, AK 58878.

20. *Shuteria* Wight & Arn.

Key to the species

- 1a. Stipules oblong-lanceolate, acuminate, hairy; terminal leaflet obovate-rhomboid, acuminate at apex; veins 3 from base; flowers purple to bluish; pods black with distinct stalk and beak, septate between closely set adjacent seeds; seeds 7–12, sub-terete, without dots
1. *S. hirsuta*
- 1b. Stipules triangular-lanceolate to triangular-ovate, acute, glabrous; terminal leaflet sub-orbicular, slightly emarginate with short mucronate at apex; veins pinnate; flowers pink purple; pods greenish with pinkish red spots with no distinct stalk or beak; not septate between distantly set seeds; seeds 3–7, compressed, dotted
2. *S. involucrata*

1. *Shutteria hirsuta* Baker in Hook. f., Fl. Brit. India 2: 182. 1876; Sanjappa, Leg. India: 244. 1992. [Plate 72a-c; Fig. 24]

Climbing herb, retrorsely hirsute. Leaves digitate, 3-foliolate; stipules striated; lateral leaflets asymmetrically ovate-elliptic, 6–8.6 × 3.2–5.3 cm, cuneate, slightly repand and hairy, acuminate, coriaceous, white appressed hirsute; terminal leaflet 8.5–11.2 × 5.4–7.8 cm, or else same as lateral ones; stipels unequal, subulate, hairy. Inflorescence axillary, simple or branched racemes, retrorsely hirsute; floral bracts subulate to linear-lanceolate; bracteoles linear-subulate, hairy; pedicels short, glabrous or sparsely hairy. Calyx light purple, sparsely hairy; tube short; lobes unequal, acuminate, mid nerve prominent; upper pair fused, ovate; lateral pair triangular-ovate; lowest one triangular. Petals clawed; standard attenuate; wings oblong, auriculate; keels oblong-falcate, auriculate, obtuse. Staminal tube 9–10 mm. Ovary c. 1 cm; style short; stigma capitate. Pods black, oblong, beaked, hirsute.

Flowering & Fruiting: October–February.

Distribution. India: Meghalaya, Sikkim and West Bengal.

Specimens examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59728; Buxaduar to Tashigaon, 11.02.2014, AK 59916.

2. *Shutteria involucrata* (Wall.) Wight & Arn., Prodr. Fl. Ind. Orient.: 207. 1834. *Glycine involucrata* Wall., Pl. Asiat. Rar. 3: 33, t. 241. 1832. *Shutteria vestita* (Wall.) Wight & Arn. var. *involucrata* Baker in Hook. f., Fl. Brit. India 2: 182. 1876. [Plate 72d, 73a]

Climbing herb, spreading or retrorsely hairy. Leaves digitate, 3-foliolate; stipules striated; lateral leaflets slightly asymmetrically ovate-elliptic, 2–5 × 1.3–4 cm, slightly subcordate-rounded, slightly repand with marginal vein along margins, slightly emarginate, sub-coriaceous, white appressed pubescent below; terminal leaflet 2.2–5 × 1.6–4.8 cm, rounded to cuneate-rounded at base, or else same as lateral ones; stipels dimorphic, linear-subulate and linear-lanceolate, striated, hairy. Inflorescence axillary racemes, pubescent; floral bracts lanceolate, striated, hairy or glabrous; bracteoles same as floral bracts; pedicels short, pubescent. Calyx pinkish red, pubescent; tube short; lobes unequal; upper pair fused, ovate, acuminate; lateral pair triangular, acute; lowest one triangular, acute. Petals clawed; standard 8–9 × 4–4.5 mm, attenuate at base; wings oblong-falcate, auriculate, obtuse; keels obovate, slightly auriculate, acute. Staminal tube 6–7 mm. Ovary stipitate, pubescent; style short; stigma capitate. Pods greenish with pink/red spots; seeds 3–7, compressed, septate, dotted.

Flowering & Fruiting: October–February.

Distribution. India: Almost throughout India.

Specimens examined: Pana, 11.02.2013, AK 58863; way to Mahakal cave, 20.02.2013, AK 59858; Buxaduar to Achalung, 14.02.2014, AK 59936.

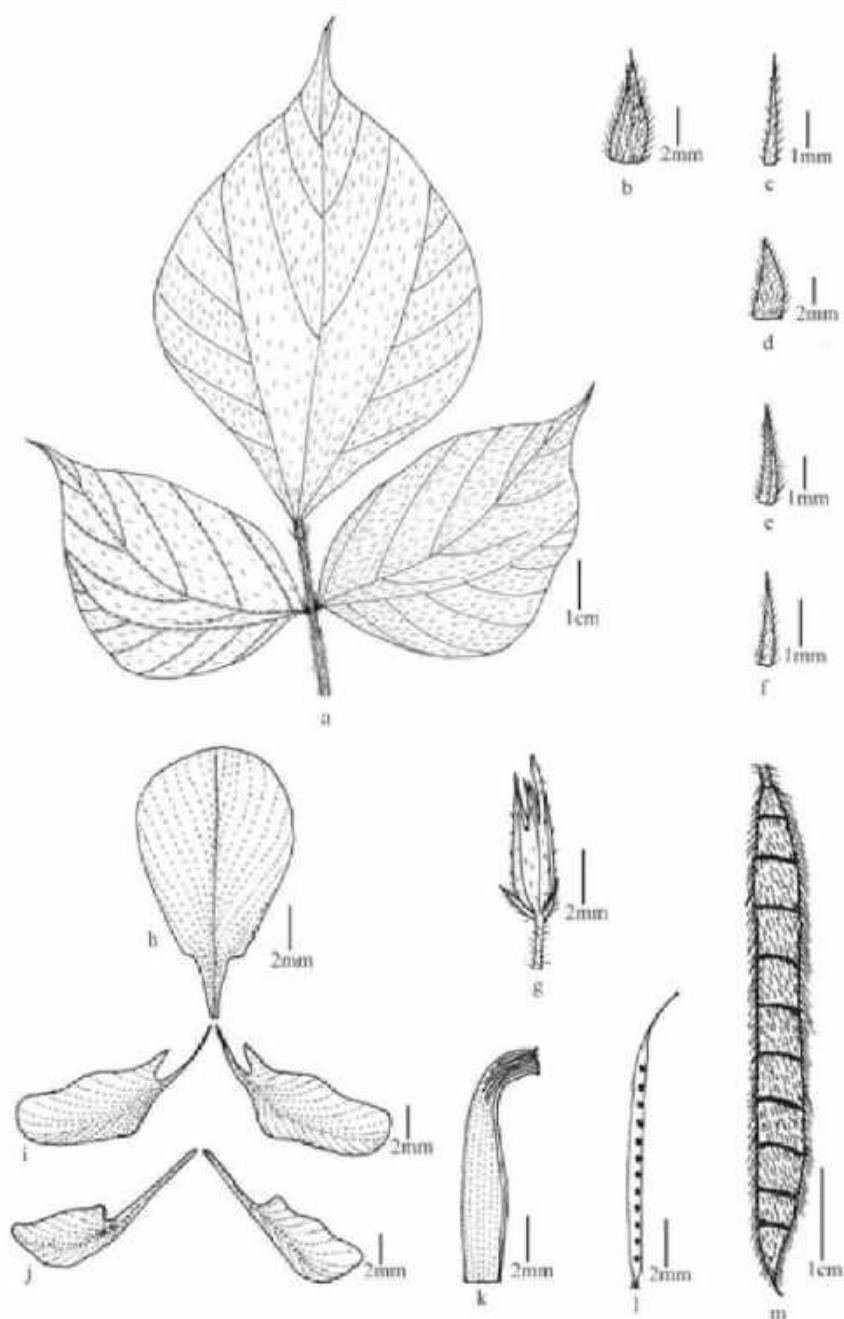


Fig. 24. *Shuteria hirsuta*: a. Leaf; b. Stipule; c. Stipel; d. Inflorescence bract; e. Floral bract; f. Bracteole; g. Calyx; h. Standard petal; i. Wing petals; j. Keel petals; k. Staminal tube; l. Gynoecium; m. Pod (AK 59728).

21. *Smithia* Aiton

Smithia sensitiva Aiton, Hort. Kew., ed. 1. 3: 496. 1789; Baker in Hook. f., Fl. Brit. India 2: 148. 1876; Prain, Bengal Pl. 1: 417. 1903. [Plate 73b-c]

Herb, 15–20 cm high. Leaves paripinnate; stipules ovate, acuminate, scarious, striated, spurred; spurs auriculate, or else same as stipules; leaflets 3–6 pairs, oblong-elliptic, 3–4.5 mm, obliquely rounded-cuneate at base, trichomes at margins, rounded with awn at apex. Inflorescence axillary, 3–4-flowered racemes; floral bracts ovate, awned, striated, scarious, with few yellow trichomes; bracteoles same as floral bracts; pedicels short, with few minute trichomes. Calyx upper lip ovate; lower lip ovate-lanceolate. Petals clawed; standard with reddish splash near base, obovate, attenuate, emarginate; wings oblong, auriculate, rounded; keels oblong-falcate, auriculate, obtuse. Stamens in two bundles of 5 each; staminal sheath c. 4 mm. Ovary linear; stigma swollen; disk shallowly lobed. Pods plicate loment, shortly stipitate; seed solitary in each segment.

Flowering & Fruiting: September–April.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 20.02.2012, AK 55789; Hatipota, 29.09.2012, AK 58535.

22. *Spatholobus* Hassk.

Spatholobus parviflorus (Roxb. ex DC.) Kuntze, Rev. Gen. Pl. 1: 205. 1891. *Butea parviflorus* Roxb. ex DC., Prodr. 2: 415. 1825. *Spatholobus roxburghii* Benth. in Miq., Pl. Jungh. 2: 238. 1852; Baker in Hook. f., Fl. Brit. India 2: 193. 1876; Prain, Bengal Pl. 1: 401. 1903. [Plate 73d; 74a-b]

Birali, Lahara, Gaunji Lahara, Debri Lahara, Baldengra (N).

Climbing shrub. Leaves digitate, 3-foliolate; stipules triangular, deciduous, white appressed pubescent; lateral leaflets asymmetrically ovate-oblong, 10–17 × 5.5–11.2 cm, rounded-truncate, repand, obtuse, sub-coriaceous, appressed hairy below; terminal leaflet obovate or broadly elliptic, 11.5–20 × 7–12 cm, rounded-cuneate to cuneate at base, or else same as lateral ones; stipels subulate, hairy; pedicels silky tomentose. Calyx campanulate, silky pubescent; tube short; upper lobe fused, triangular-ovate, winged along margins, obtuse with slightly notched; others triangular, winged along one side of margin. Petals clawed; standard obovate attenuate, rounded; wings oblong, auriculate, obtuse; keels oblanceolate, auriculate, acute. Stamens diadelphous; staminal tube 8–9 mm; anthers elliptic. Ovary lanceolate, stipitate; stigma swollen. Pods falcate-oblong, thick, apex rounded, velutinous; stipe terete, velutinous; seeds orbicular or reniform.

Flowering & Fruiting: September–May.

Distribution. India: Almost throughout India.

Specimens examined: Bhutia pond, 07.04.2012, GK 56049; Sankosh, 28.09.2011, AK 52978; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58564.

23. *Tephrosia* Pers.

Key to the species

- 1a. Leaflets 17–23, elliptic-oblong, acute with mucronate tip at apex, glabrous above; lateral veins 30–50 pairs; inflorescences not leaf-opposed racemes, tomentose; flowers white; pedicels 6–10 mm, greyish white tomentose; calyx greyish brown appressed pubescent; calyx tube c. 5 mm; standard rounded at apex; keels slightly beaked; pods brown pubescent; seeds 10–15 1. *T. candida*
- 1b. Leaflets 9–17, obovate, rounded to slightly emarginate with mucronate tip at apex, sparsely appressed pubescent above; lateral veins 18–28 pairs; inflorescences leaf-opposed racemes, pubescent; flowers pink purple; pedicels 3–3.5 mm, white pubescent; calyx white appressed pubescent; calyx tube c. 1.5 mm; standard emarginate at apex; keels obtuse; pods white appressed pubescent; seeds 3–4 2. *T. purpurea*

1. *Tephrosia candida* DC., Prodr. 2: 249. 1825; Baker in Hook. f., Fl. Brit. India 2: 111. 1876; Prain, Bengal Pl. 1: 405. 1903. [Plate 74c, 75a]

Bun Mara (N).

Erect shrub, 1–2 m high, greyish white tomentose. Leaves imparipinnate, 7.2–11.2 cm long; stipules triangular-falcate, 6–6.5 mm; leaflets 2–5.2 × 0.7–2 cm, cuneate at base, hairy, coriaceous, sericeous below; floral bracts linear-lanceolate. Calyx campanulate; lobes unequal; upper pair fused, ovate, bifid; lateral pair ovate, obtuse; lowest ovate. Petals clawed; standard broadly obovate, c. 2 × 1.8 cm, faintly auriculate, reflexed, sericeous outside; wings ovate-falcate, c. 2 × 0.8 cm, obtuse; keels ovate-falcate, c. 2 × 1 cm. Stamens diadelphous; staminal tube c. 1 cm; disk membranous, lobed. Ovary white silky tomentose; style sparsely hairy. Pods brown, linear-oblong or strap-shaped, beaked; seeds sub-reniform.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: NRVK6a, 09.02.2010, SKS & GK 46383; Newlands, 15.02.2012, AK 53057; Hauda nala, 03.10.2012, AK 58654.

2. *Tephrosia purpurea* (L.) Pers., Syn. Pl. 2 (2): 329. 1807; Baker in Hook. f., Fl. Brit. India 2: 112. 1876; Prain, Bengal Pl. 1: 405. 1903. *Cracca purpurea* L., Sp. Pl. 2: 751. 1753. *Tephrosia purpurea* var. *pubescens* Baker in Hook. f., Fl. Brit. India 2: 112. 1876. [Plate 75b]

Shrub, 1–1.5 m high, hairy. Leaves imparipinnate, 2.7–6.5 cm long; stipules triangular-falcate, striated, pubescent; leaflets 1–2 × 0.4–0.9 cm, cuneate at base,

hairy at margins, coriaceous, sericeous below; floral bracts linear-lanceolate, white pubescent. Calyx campanulate; lobes upper pair fused, ovate, bifid; others triangular-ovate, acuminate. Petals clawed; standard obovate or sub-orbicular, *c.* 7 × 6 mm, slightly auriculate, reflexed, pubescent; wings oblong, *c.* 6 mm, slightly auriculate, obtuse; keels broadly obovate, faintly auriculate. Stamens diadelphous; staminal tube 4–4.5 mm; anthers elliptic. Ovary white tomentose. Pods brown, oblong, beaked; seeds reniform.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimen examined: Newlands, Sukno river belt, 22.09.2011, AK 52760.

24. *Vicia* L.

Key to the species

- 1a. Leaflets glabrous below; inflorescences axillary, 2–3-flowered, racemes; flowers white; calyx appressed white pubescent; standard obtuse; pods elliptic-oblong, 6–9 mm, hirsute; seeds 2 1. *V. hirsuta*
- 1b. Leaflets sparsely hairy below; inflorescences axillary, solitary; flowers pink; calyx sparsely hairy; standard emarginate with mucronate tip; pods oblong, 2.5–3.5 cm, hairy; seeds 5–8 2. *V. sativa*

1. *Vicia hirsuta* (L.) Gray, Nat. Arr. Brit. Pl. 2: 614. 1821; Baker in Hook. f., Fl. Brit. India 2: 177. 1876; Prain, Bengal Pl. 1: 367. 1903. *Ervum hirsutum* L., Sp. Pl. 2: 738. 1753.

Twining herb, sparsely hairy. Leaves paripinnate, 3.5–4 cm long; stipules semisagittate, 2–3-toothed, sparsely hairy; leaflets linear to oblong, 3–8 mm, cuneate at base; pedicels short, white pubescent. Calyx campanulate; tube short; lobes triangular-subulate, mid nerve prominent. Petals clawed; standard obovate or sub-orbicular, *c.* 3.5 × 2 mm, reflexed; wings oblanceolate-falcate, *c.* 3 mm, auriculate, rounded; keels elliptic-ovate, slightly auriculate, obtuse, curved. Stamens diadelphous; staminal tube oblique and split near to base; anthers subglobose. Ovary pubescent; stigma capitate. Pods brown, beaked; seeds obovate-spheroid.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Bihar, Chhattisgarh, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Maharashtra, Manipur, Punjab, Rajasthan, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Kumargram, 18.02.2012, AK 55721.

2. *Vicia sativa* L., Sp. Pl. 2: 736. 1753; Baker in Hook. f., Fl. Brit. India 2: 178. 1876; Prain, Bengal Pl. 1: 366. 1903. [Plate 75c]

Twining herb, sparsely hairy. Leaves paripinnate, 2.5–3 cm long; stipules semisagittate or lanceolate, 2-toothed, acuminate, sparsely hairy; leaflets linear to

oblong, 1–2 cm, cuneate at base, hairy; pedicels short, hairy. Calyx campanulate; tube short; lobes triangular, acuminate, mid nerve prominent. Petals clawed; standard broadly obovate or sub-orbicular, c. 4 mm, reflexed; wings oblanceolate-falcate, c. 3.5 mm, auriculate, rounded; keels elliptic-ovate, c. 3.5 mm, slightly auriculate, obtuse. Stamens diadelphous; staminal tube oblique and split near to base; anthers sub-globose. Ovary pubescent; stigma capitate. Pods brown, beaked; seeds squarish.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Bihar, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Manipur, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Rydak river belt, 26.02.2012, AK 55956.

25. *Vigna Savi*

Key to the species

- 1a. Flowers blue, purple or white; stipules auriculate at base 1. *V. pilosa*
1b. Flowers yellow; stipules rounded at base 2. *V. radiata* var. *sublobata*

1. *Vigna pilosa* (J. G. Klein ex Willd.) Bakerin Hook. f., Fl. Brit. India 2: 207. 1876; Prain, Bengal Pl. 1: 389. 1903; Sanjappa, Leg. India: 275. 1992. *Dolichos pilosus* J. G. Klein ex Willd., Sp. Pl., ed. 4. 3 (2): 1043. 1802.

Jhikrai, Malkonia (B).

Twining herb, pilose. Leaves digitate, 3-foliolate; terminal leaflet ovate or triangular-ovate, c. 10 × 6.5 cm, obtuse, acuminate at apex; lateral leaflets subequal, elliptic-ovate, 7–8 × 4 cm, acuminate apex, oblique-cuneate at base, subcoriaceous, pubescent. Inflorescence raceme, 3–10 cm. Calyx campanulate, pubescent, 5-lobed; upper 2-lobed, connate, middle lower lobe c. 4 mm; tube c. 4 mm. Petals white or purplish; standard broadly ovate, c. 1.4 × 1.6 cm, apex emarginate, slightly reflexed, shortly clawed and with auricle at base; wings obovate, c. 2 × 1.2 cm, apex obtuse, emarginate, base clawed, with auricles; keels falcate, base wider, upper acute, near base with a triangular dentiform auricle, clawed. Stamens 10, subequal; staminal tube c. 1.8 cm. Ovary falcate, hairy. Pods leathery, brown villous, apex beaked, dehisce along 2-sutures, 5–12 seeded; seeds black.

Flowering & Fruiting: September–November.

Distribution. India: Andaman & Nicobar Islands, Assam, Chhattisgarh, Jharkhand, Karnataka, Kerala, Mizoram, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Tashigaon 1, 11.10.2009, SKS & GK 46308.

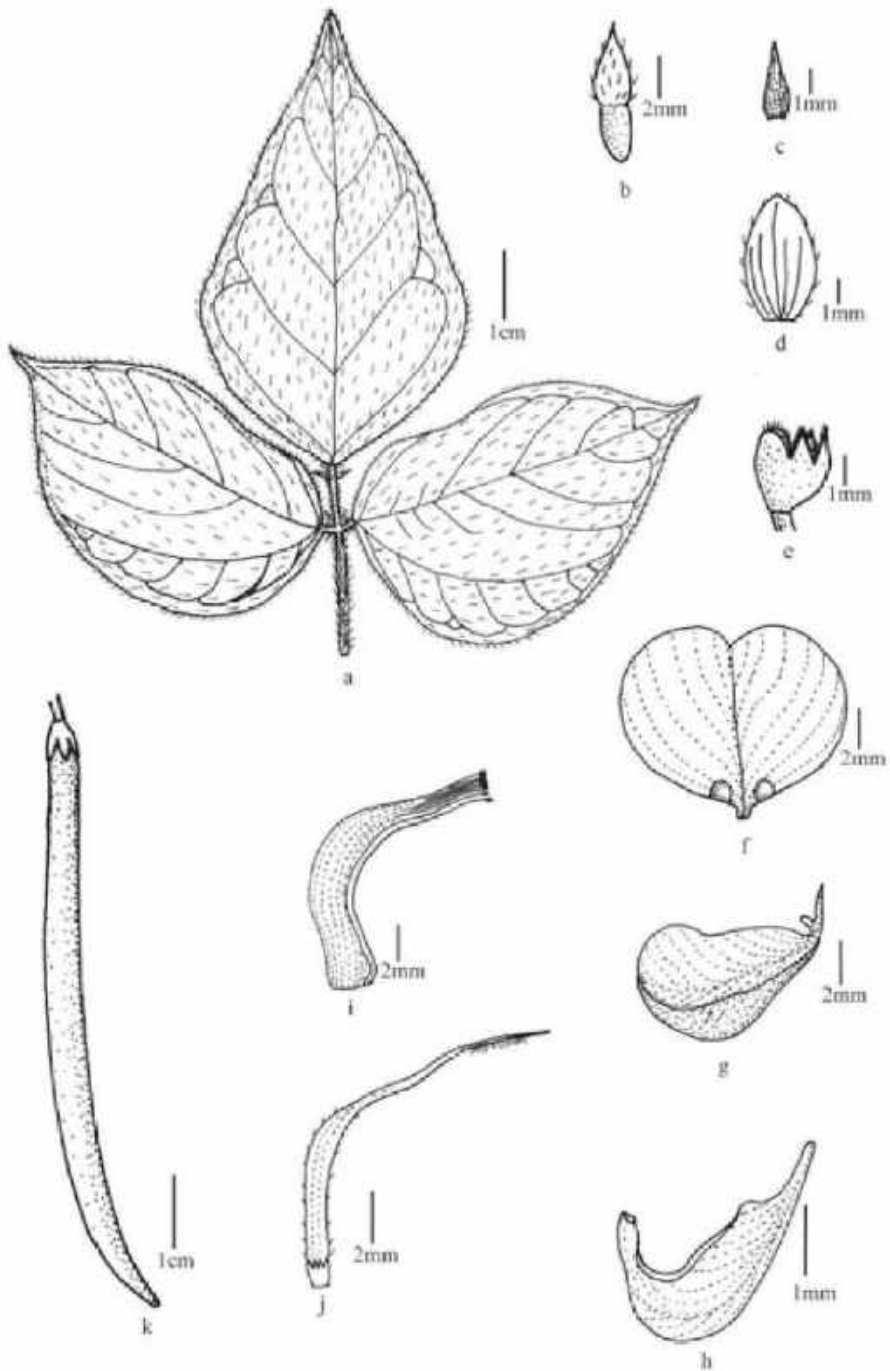


Fig. 25. *Vigna radiata* var. *sublobata*: a. Leaf; b. Stipule; c. Stipel; d. Floral bract; e. Calyx; f. Standard petal; g. Wing petal; h. Keel petals; i. Staminal tube; j. Gynocccium; k. Pod (AK 58565).

2. *Vigna radiata* (L.) R. Wilczek var. *sublobata* (Roxb.) Verdc., Kew Bull. 24 (3): 559. 1970. *Phaseolus sublobatus* Roxb., Fl. Ind. 3: 288. 1832. *Phaseolus calcaratus* Roxb., Fl. Ind. 3: 289. 1832; Baker in Hook. f., Fl. Brit. India 2: 203. 1876.

[Plate 75d; Fig. 25]

Ghori-mung (B).

Straggling herb, deflexed hirsute. Leaves digitate, 3-foliolate; stipules medifixed, ovate-elliptic, 7–12 × 3–4 mm, spurred; spurs oblate, rounded or obtuse at apex, sparsely hispid. Leaflets unequally 3-lobed; leaflets ovate, 4–10 × 2.5–7 cm, rounded or cuneate, entire or undulate, shortly acuminate; stipels linear-lanceolate, 3–6 mm. Flowers 5–15 terminally clustered on racemes. Calyx 2–3 mm. Petals 7–12 mm. Pods 4–7 × 0.5–0.6 cm, shortly brown pubescent; seeds green or blackish, 10–15, hilum not protuberant, not grooved.

Flowering & Fruiting: September–November.

Distribution. India: Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 04.10.2009, SKS & GK 46138; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58565.

Rosaceae

Key to the genera

- 1a. Acaulescent, rhizomatous prostrate herb; stolons present; inflorescences solitary; calyx villous outside; epicalyx present; petals yellow; fruits an aggregate of dark purplish red (magenta), dry achenes 1. *Potentilla*
- 1b. Caulescent, non-rhizomatous, erect or scandent shrubs or trees; stolons absent; inflorescences racemes/panicles/fascicles; calyx not villous outside; epicalyx absent; petals various colored, not yellow; fruits not as above 2
- 2a. Erect or scandent shrubs, armed; leaves compound or simple, if simple then lobed; stipules linear/ovate; floral bracts elliptic/lanceolate; petals clawed; carpels many; fruits an aggregate of fleshy drupelets 3. *Rubus*
- 2b. Trees, unarmed; leaves simple, not lobed; stipules linear-pinnatifid/lanceolate; floral bracts ovate/lanceolate; petals not clawed; carpel 1; fruits drupes 2. *Prunus*

1. *Potentilla* L.

Potentilla indica (Andrews) Th. Wolf in Ascherson & Graebner, Syn. Mitteleur. Fl. 6 (1): 660, 661. 1904. *Fragaria indica* Andrews, Bot. Repos. 7 (99): t. 479. 1807; Hook. f., Fl. Brit. India 2: 343. 1878; Prain, Bengal Pl. 1: 465. 1903.

[Plate 76a-b]

Herb. Leaves in rosettes, 3-foliolate; leaflets obovate, cuneate, crenately-serrate, obtuse, chartaceous, appressed pubescent. Inflorescence axillary, solitary; pedicels

2.5–5 cm, hispid. Epicalyx obovate, usually shorter than calyx lobes, villous, bluntly 3–5-toothed at apex. Calyx cupular below, villous, 5-lobed above; lobes ovate, entire. Petals yellow, 5-lobed; lobes obovate, obtuse, slightly clawed at base, nerves faintly visible, chartaceous, glabrous. Stamens 20–30; filaments subulate, glabrous; anthers ovoid. Carpels many, free, on convex receptacle; style adaxial or subterminal, deciduous; stigma entire. Aggregate fruit formed from an enlarged receptacle, hemispheric or turbinate, purplish red, dehiscent. Achenes compressed ovoid; seeds reniform.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Jainti, near 23 milewatch tower, 10.02.2010, SKS & GK 46397; Jainti 8, 05.03.2011, GK 47264. Sankosh, 17.02.2012, AK 55646; Narathali, 20.02.2012, AK 55827; Marakata, 22.02.2012, AK 55894.

2. *Prunus* L.

Key to the species

- 1a. Leaves glandular serrate at margins; petioles reddish, 2–3 glands at apex; inflorescences fascicles on old branches; floral bracts ovate, glandular-serrate, acuminate, glabrous; petals pink; stigma disciform, bilobed; seed pitted
1. *P. cerasoides*
- 1b. Leaves eglandular, entire at margins; petioles green, not glandular; inflorescences axillary, terminal, racemes; floral bracts lanceolate, entire, acute, brown tomentose; petals white; stigma truncate, not bilobed; seed smooth
2. *P. ceylanica*

1. *Prunus cerasoides* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 239. 1825. *Prunus pudum* (Roxb. ex Ser.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2 (2): 90. 1865. *Maddenia pedicellata* Hook. f., Fl. Brit. India 2: 318. 1878.

[Plate 76c-d; Fig. 26a-h]

Palyun (N).

Tree, 3–4 m high, pubescent when young. Leaves ovate to ovate-elliptic, 8–13 × 5–7 cm, rounded at base, acuminate at apex, sub-coriaceous; stipules caducous. Inflorescence bracts sub-orbicular, toothed, persistent in fruits. Calyx green with pinkish to red hue, tubular-campanulate; tube ribbed; lobes ovate, reticulately nerved. Petals obovate, 1.5–1.8 × c. 0.8 cm, obtuse to notched. Stamens many; anthers elliptic. Ovary ellipsoid; style 1.2–1.4 cm. Drupes pendent, globose-ovoid, beaked; seed solitary, ovoid.

Flowering & Fruiting: November–March.

Distribution. India: Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram,

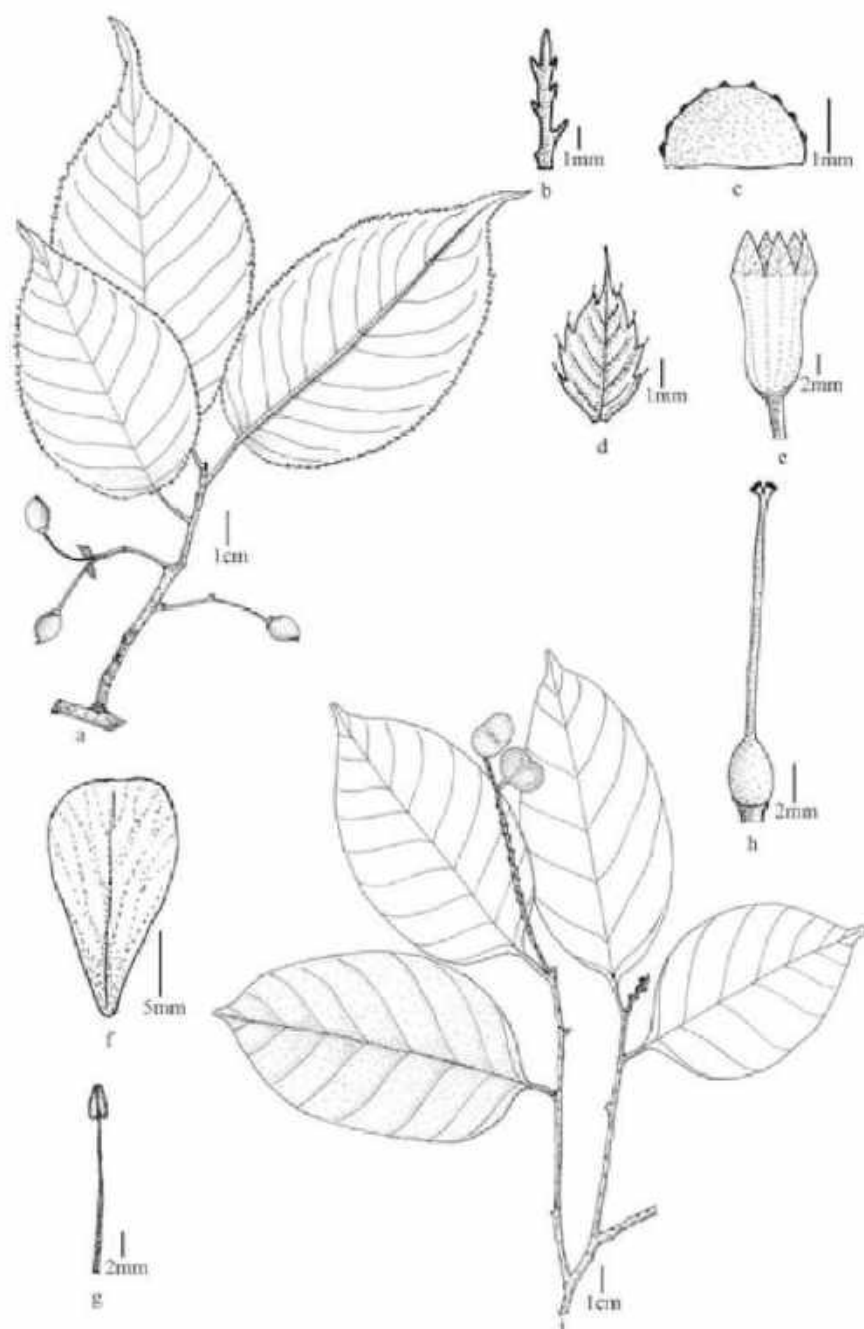


Fig. 26. *Prunum cerasoides*: a. Fruiting branchlet; b. Stipule; c. Inflorescence bract; d. Floral bract; e. Calyx; f. Petal; g. Stamen; h. Gynoecium (AK 59960); *Prunum ceylanica*: i. Fruiting branchlet (AK 58815).

Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59960.

2. *Prunus ceylanica* (Wight) Miq., Fl. Ind. Bat. 1, 1: 365. 1855. *Polydonta ceylanica* Wight, Ill. Ind. Bot. 1: 203. 1840. *Pygeum glaberrimum* Hook. f., Fl. Brit. India 2: 319. 1878. *Pygeum acuminatum* Colebr., Trans. Linn. Soc. London 12 (2): 306, t. 18. 1819; Prain, Bengal Pl. 1: 464. 1903. [Plate 77a; Fig. 26i]

Dharani (N).

Tree, 10–15 m high. Leaves elliptic or elliptic-ovate, 11.5–13.5 × 5.7–7 cm, cuneate at base, acuminate at apex, coriaceous; stipules caducous; floral bracts caducous; pedicels short, brown tomentose. Calyx cupular, brown pubescent; tube short; lobes triangular. Petals oblong to elliptic-oblong, villous at margins, obtuse, brown tomentose. Stamens many; filaments short; anthers ellipsoid. Ovary globose; style short. Drupes oblate, bilaterally compressed, shallowly bilobed; seed 1 or 2, ellipsoid.

Flowering & Fruiting: October–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Panbari 9, 14.02.2010, SKS & GK 47094; Checko 2, 27.11.2011, GK 50580; Checko-1, 09.02.2013, AK 58815.

Notes: Cited in IUCN Red list as endangered.

3. *Rubus* L.

Key to the species

- 1a. Large scandent shrubs; branchlets not striated, short recurved prickly; leaves simple, 3–5-lobed, cordate at base; veins 5 from base; stipules ovate, lacinate
1. *R. calycinoides*
- 1b. Sub-erect shrubs; branchlets striated, straight prickles with reddish brown bristles; leaves compound, not lobed, rounded at base; veins pinnate; stipules linear, not lacinate at apex
2
- 2a. Leaves mostly 3-foliolate; leaflets never ovate, sparsely pubescent below
2. *R. ellipticus*
- 2b. Leaves mostly 5-foliolate; leaflets ovate, gland dotted below
3. *R. rosifolius*

1. *Rubus calycinoides* Kuntze, Mch. Sp.-Besch. Rubus: 67, 78. 1879. *Rubus moluccanus* var. *calcinodes* (Kuntze) Kuntze, Revis. Gen. Pl. 1: 222. 1891. *Rubus moluccanus* sensu Hook. f., Fl. Brit. India 2: 330. 1878, non L. 1753. [Plate 77b–c]

Aselu (N).

Scandent shrub, pale brown pubescent, armed. Leaves sub-orbicular, 8–19 × 7–17 cm, serrate and hairy, acute to acuminate at apex, sparsely stiff bulbous hairy above, tomentose below; stipules caducous, pubescent. Inflorescences axillary clusters of short racemes; pedicels tomentose. Calyx cupular; tube short; lobes triangular-ovate to triangular-lanceolate, 0.8–1.2 cm, acuminate to toothed, pubescent outside, sericeous inside. Petals white, sub-orbicular, 5–7 mm, toothed. Stamens many; filaments short; anthers elliptic-oblong. Style sub-terminal, short; stigma bilobed. Receptacle conical. Seed reniform, pitted and ridged.

Flowering & Fruiting: September–October.

Distribution. India: Arunachal Pradesh, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59717.

2. *Rubus ellipticus* Sm. in Rees, Cycl. 30: Rubus no. 16. 1815; Hook. f., Fl. Brit. India 2: 336. 1878. [Plate 77d]

Aselu (N).

Scandent shrub, prickly, reddish brown bristly. Leaves digitate, 3-foliolate; stipules villous; lateral leaflets obovate or sub-orbicular, 4–4.5 × 3.5–4 cm, unequally rounded, serrulate, rounded, sparsely pubescent; terminal leaflet elliptic to elliptic-ovate, 5.3–7.5 × 4.2–6.2 cm, or else same as lateral ones. Inflorescence axillary, terminal panicles, pubescent; pedicels tomentose, bristly. Calyx cupular; tube short, tomentose with bristles; lobes ovate or elliptic-ovate, 4–4.5 mm, ciliate, obtuse, mucronate tipped, tomentose and faintly keeled, bristly at base outside, tomentose inside. Petals white, obovate, 4–6 mm, rounded and finely toothed, sparsely pubescent. Stamens many; filaments short; anthers sub-globose or ovate. Style short; stigma minute. Receptacle globose, tomentose. Seed triangular-ovoid, rugulose.

Flowering & Fruiting: March–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Way to Sinchu, JKS 6958; Rydak river belt, 26.02.2012, AK 55969.

3. *Rubus rosifolius* Sm., Pl. Icon. Ined. 3: pl. 60. 1791 (as "*rosaeifolius*").

Scrambling shrub, 1–2 m high, prickly, thinly pilose. Leaves pinnately (3)–5-foliolate; leaflets ovate, 1–3 × 0.7–2 cm, base rounded, margins shallowly lobed and sharply serrate, apex acute or shortly acuminate, sparsely pubescent on upper surface, lowers surface gland-dotted, pubescent on veins; stipules linear.

Flowers 1–2, terminal on leafy shoots. Calyx pubescent and sessile-glandular; lobes lanceolate 10–11 mm. Petals white, 10–15 mm. Stamens many; filaments short; anthers elliptic-oblong. Style sub-terminal, short; stigma bilobed. Receptacle conical. Fruit orange red, drupaceous; drupelets 6–20, pubescent; seed reniform.

Flowering & Fruiting: March–June.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimen examined: Rajabhatkhawa Range, 12.03.2011, GK 50543.

Saxifragaceae

Itea L.

Itea macrophylla Wall., Fl. Ind. 2: 419. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 2: 408. 1878. [Plate 78a-c; Fig. 27]

Tilki (N).

Tree, 3–6 m high. Leaves broadly elliptic to broadly ovate, 11–21.5 × 5.5–11.5 cm, rounded to rounded-cuneate, glandular serrate, acuminate, coriaceous. Inflorescence axillary, 1–5-clustered, racemes, puberulent; inflorescence bracts oblate, short acuminate, deciduous; floral bracts lanceolate, deciduous, sparsely hispid; pedicels angular, sparsely hispid. Calyx cupular; tube short, sparsely hispid; lobes triangular-lanceolate, acute and gland tipped. Petals white, triangular-lanceolate, 3–4 mm, spreading to reflexed, obscurely 1-nerved. Filaments short; anthers elliptic-oblong, apiculate; disk orange yellow, annular, shallowly 10-lobed. Carpels 2, fused, conical, striated, with a prominent median groove; style short; stigma capitate. Capsules conical, striated, dehiscent, spreading to reflexed; seeds many, linear-lanceolate or fusiform.

Flowering & Fruiting: May–January.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimens examined: On way to Sinchu, JKS 4677; Santrabari to Buxaduar, 16.02.2014, AK 59984; Buxaduar to Achalung, 19.05.2014, AK 62641.

Haloragaceae

Myriophyllum L.

Myriophyllum tetrandrum Roxb., Fl. Ind. 1: 470. 1820. *Myriophyllum indicum* Wall. ex C. B. Clarke in Hook. f., Fl. Brit. India 2: 432. 1878; Prain, Bengal Pl. 1: 474. 1903. [Plate 78d]

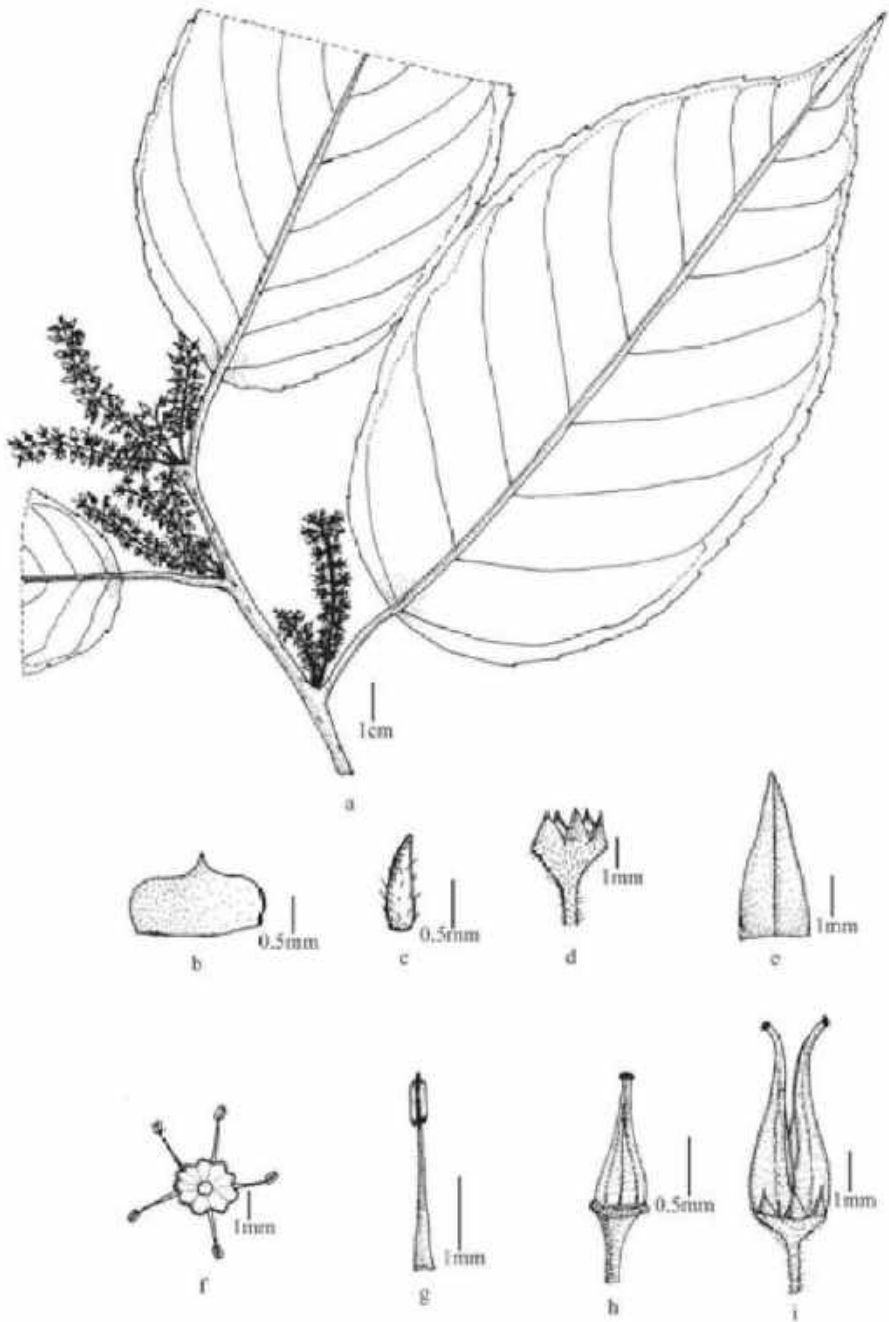


Fig. 27. *Itea macrophylla*: a. Flowering branchlet; b. Inflorescence bract; c. Floral bract; d. Calyx; e. Petal; f. Disk with stamens; g. Stamen; h. Gynoecium; i. Capsule (AK 62641).

Aquatic herb, above water surface, glandular. Leaves sessile, dimorphic; submerged leaves 5–6, pectinate, 5–10 × 2–8 mm; segments linear to filiform or triangular to oblong, up to 4 mm; emergent leaves 4–6, oblanceolate, 5–12 mm, 7–9 toothed, obtuse at apex. Flowers in spikes; floral bracts reddish, digitate; lobes linear or filiform; bracteoles ovate, toothed. Male: calyx minute; lobes 4, triangular; petals white, 4, boat-shaped or oblanceolate to spatulate, obtuse; stamens 4; filaments minute; anthers oblong; pistillode globose, with 4-fid rudimentary stigma. Female: calyx tube fused with ovary; lobes minute; petals minute, absent or caducous; staminodes 4; ovary 4-angular; stigmas 4, reflexed, plumose. Mericarps subglobose, 4-lobed, tuberculate; seed solitary in each mericarp, ellipsoid.

Flowering & Fruiting: August–November.

Distribution. India: Assam, Bihar, Jammu & Kashmir, Maharashtra, Manipur, Odisha, Uttar Pradesh and West Bengal.

Specimen examined: Chuniajhora, 28.09.2012, AK58509.

Rhizophoraceae

Carallia Roxb.

Carallia brachiata (Lour.) Merr., Philipp. J. Sci. 15: 249. 1919. *Diatoma brachiata* Lour., Fl. Cochinch. 1: 296. 1790. *Carallia lucida* Roxb., Pl. Coromandel 3: 8, t. 211. 1811; Prain, Bengal Pl. 1: 477. 1903. *Carallia lanceaefolia* Roxb., Fl. Ind. 2: 481. 1832; G. Hensl. in Hook. f., Fl. Brit. India 2: 439. 1878. *Carallia integerrima* DC., Prodr. 3: 33. 1828; G. Hensl. in Hook. f., Fl. Brit. India 2: 439. 1878.

[Plate 79a-b]

Palamkath (N).

Tree, to 15 m high. Leaves obovate-elliptic, 8–15 × 4–8.4 cm, attenuate, entire, acuminate, leathery, glossy, glabrous; stipules lanceolate, 1–1.5 cm. Inflorescences 2 or 3-chotomously branched cymes; peduncles 5–8 mm; bracts triangular ovate, 1–1.5 mm. Flowers sessile or subsessile. Calyx 6-lobed, campanulate. Petals maroon, 6-lobed; lobes triangular or lanceolate, inserted on disk, bifid, toothed. Stamens 12; 6 exerted and attached with calyx, 6 attached in disk; filaments c. 2 mm, pubescent; anthers very small. Ovary bulbous, enclosed by disk; style c. 2.5 mm; stigma c. 2 mm, 6-lobed. Fruits globose, indehiscent; seed solitary, subreniform.

Flowering & Fruiting: November–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Checko-2, 27.11.2011, GK 50590; Newlands, 15.02.2012, AK 53024; Narathali, 20.02.2012, AK 55766; Buxaduar to Tashigaon, 11.02.2014, AK 59901.

Combretaceae

Key to the genera

- 1a. Climbing shrubs; leaves opposite or in whorls of 3s; petioles eglandular; flowers bisexual; petals present **1. Combretum**
- 1b. Trees; leaves alternate or subopposite; petioles glandular; flowers usually bisexual sometimes unisexual petals absent **2. Terminalia**

1. *Combretum* Loeffl.

Key to the species

- 1a. Stems glabrous when young; leaves opposite, equal, rounded-cuneate at base; inflorescence panicles of compound, sub-capitate spikes; inflorescence bracts present; petals oblanceolate, not clawed, abruptly mucronate at apex disk 5-lobed; fruits glabrous between wings **2. C. punctatum** subsp. **squamosum**
- 1b. Stems pubescent when young; leaves opposite or in whorls of 3, unequal, subcordate at base; inflorescences panicles of simple spikes; inflorescence bracts absent; petals obovate, clawed, rounded at apex; disk not lobed; fruits laciniate scaly or glandular between wings **2**
- 2a. Leaves papillose above; veins glabrous, tuft of hairs at junction of midvein and lateral veins below; fruits glandular between wings **1. C. griffithii**
- 2a. Leaves white or brown peltate scaly above; veins hairy and peltate scaly, glabrous at junction of midvein and lateral veins below; fruits laciniate scaly between wings **3. C. wallichii** var. **flagrocarpum**

1. *Combretum griffithii* Van Heurck & Müll. Arg., *Observ. Bot.*: 231. 1871. *Combretum wallichii* DC. var. *griffithii* (Van Heurck & Müll. Arg.) M. Gangop. & Chakrab., *J. Econ. Taxon. Bot.* 17 (3): 681. 1993. [Plate 79b-c]

Shrub, peltate scaly when young. Smaller leaves obovate, larger ones elliptic to elliptic-ovate, 5.5–20 × 2.3–7.4 cm, sometimes obliquely cordate, caudate-acuminate. Flowers sessile; floral bracts subulate, pubescent, Calyx campanulate, peltate scaly; tube short; lobes triangular, villous inside. Petals white, 4. Filaments 6–6.5 mm; anthers elliptic; disk adnate to calyx-tube, villous. Style 6–7 mm; stigma truncate. Fruits 2.5–3 cm across, 4-winged, yellow-brown, peltate scaly between wings.

Flowering & Fruiting: January–April.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and West Bengal.

Specimens examined: Adma, Panbari, 12.02.2013, AK 58874; Hatipota, 18.02.2013, AK 59822.

2. *Combretum punctatum* subsp. **squamosum** (Roxb. ex D. Don) Exell in Steenis, *Fl. Males.* 4: 539. 1958. *Combretum squamosum* Roxb. ex D. Don, *Trans. Linn.*

Soc. London 15: 419, 438. 1827; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 456. 1878; Prain, *Bengal Pl.* 1: 483. 1903. [Plate 80a-b]

Shrub, brown peltate scaly. Leaves broadly elliptic, 1.8–10 × 0.4–3.5 cm, repand, caudate-acuminate, sub-coriaceous, silver and few scattered brown peltate scaly. Inflorescences spikes; bracts foliaceous. Flowers deciduous proximally; floral bracts linear-lanceolate, caducous, scaly. Calyx campanulate, scaly; tube short; lobes triangular, faintly keeled, villous. Petals white, 4. Stamens below the disk, exerted; filaments short; anthers elliptic; disk membranous, villous. Style short; stigma swollen, truncate. Fruits 1.5–3 cm, notched.

Flowering & Fruiting: August–January.

Distribution. India: Andaman & Nicobar Islands, Assam, Manipur, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59677.

3. *Combretum wallichii* DC. var. *flagrocarpum* (C. B. Clarke) M. Gangop. & Chakrah., *J. Econ. Taxon. Bot.* 17 (3): 681. 1993. *Combretum flagrocarpum* C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 455. 1878; Prain, *Bengal Pl.* 1: 483. 1903. [Plate 80c-d]

Shrub, peltate scaly when young. Smaller leaves obovate, larger ones elliptic to elliptic-ovate, 5.5–20 × 2.3–7.4 cm, sometimes obliquely cordate, caudate-acuminate at apex, coriaceous. Flowers sessile; floral bracts subulate, pubescent. Calyx campanulate, peltate scaly; tube short; lobes triangular, villous. Petals white, 4. Filaments 5–6 mm; anthers elliptic; disk adnate to calyx tube, villous. Style 5–6 mm; stigma truncate. Fruits c. 2.8 cm across.

Flowering & Fruiting: January–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Buxaduar, JKS 962; way to Tobgaon, JKS 4622; Santrabari, 04.10.2009, SKS & GK 46129; NRVK 6, 05.03.2011, GK 47280; Gadadhar range, 31.03.2012, GK 50687; Rangamati to Bharnabari, 06.10.2012, AK 58699; Buxa Fort to Achalung, 29.09.2013, AK 59650; Buxaduar to Tashigaon, 20.05.2014, AK 62694.

2. *Terminalia* L.

Key to the species

- 1a. Inflorescences pubescent or white tomentose; fruits winged 2
- 1b. Inflorescences brown pubescent or ferruginous tomentose; fruits not winged 4
- 2a. Leaves acuminate at apex; inflorescences axillary, terminal panicles of elongate spikes, white tomentose; stamens in one whorl; filaments absent; fruits pink, 2-winged, small, compressed 5. *T. myriocarpa*

Botanical Survey of India

- 2b. Leaves not acuminate at apex; inflorescences axillary, terminal panicles of short spikes, pubescent; stamens in 2 whorls; filaments present; fruits green, (4-)5-winged, large, not compressed 3
- 3a. Petioles with prominent stalked glands near the base of leaves 4. *T. elliptica*
3b. Petioles with inconspicuous, usually sessile glands 1. *T. arjuna*
- 4a. Leaves clustered towards end of branchlets, obovate to broadly elliptic, without glands at base, broadly acute at apex; petioles 2-7.5 cm; inflorescences ferruginous tomentose; fruits sub-globose to obovoid, velvety 2. *T. bellirica*
4b. Leaves not clustered towards end of branchlets, elliptic to elliptic-oblong or oblong, ovate-elliptic, with 2 inconspicuous glands at base, acuminate at apex; petioles 1.4-2.2 cm; inflorescences brown pubescent; fruits ellipsoid, glabrous 3. *T. chebula*

1. *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 314. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 2: 447. 1878; Prain, Bengal Pl. 1: 481. 1903. *Pentaptera arjuna* Roxb. ex DC., Prodr. 3: 15. 1828. [Plate 81a]

Arjhan (B).

Trees, 10-15 m high. Leaves elliptic-oblong, 3.5-10.5 × 1.8-4.7 cm, bluntly sub-acute to obtuse or rounded at apex, coriaceous; floral bracts lanceolate, pubescent. Calyx campanulate; tube short, brown pubescent at base; lobes triangular, 1-nerved. Filaments 3-5 mm, 5 at base of calyx tube, 5 others between calyx lobes; anthers ellipsoid; disk brownish hairy. Style short; stigma capitate. Drupes 3.2-4.2 cm.

Flowering & Fruiting: April-September.

Distribution. India: Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Newlands, Sukno river, 22.09.2011, AK 52737.

2. *Terminalia bellirica* (Gaertn.) Roxb., Pl. Coromandel 2: 54, t. 198. 1805; C. B. Clarke in Hook. f., Fl. Brit. India 2: 445. 1878; Prain, Bengal Pl. 1: 481. 1903. *Myrobalanus bellirica* Gaertn., Fruct. Sem. Pl. 2: t. 97, 90. 1790. [Plate 81b]

Barra (N).

Tree, 12-16 m high. Leaves clustered towards ends of branches, elliptic to obovate, 14-19.2 × 10-11 cm, obliquely cuneate, coriaceous, pubescent when young. Calyx campanulate, tomentose; tube short, villous inside; lobes triangular. Filaments 4-5 mm, exerted; anthers ellipsoid; disk hairy. Style short; stigma swollen. Drupes subglobose to obovoid, 2-2.5 cm.

Flowering & Fruiting: April-November.

Distribution. India: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: NRVK 6, 12.10.2009, SKS& GK 46311; East Damanpur range, 08.04.2012, GK 56066; Marakata, 24.09.2011, AK 52880; North Rydak, 26.09.2011, AK 52930; North Rydak, 26.09.2011, AK 52942; Jainty-Phashkhawa, 02.10.2012, AK 58624.

3. Terminalia chebula Retz., *Observ. Bot.* 5: 31. 1789; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 446. 1878; Prain, *Bengal Pl.* 1: 481. 1903. [Plate 82a-b]

Harra (N).

Tree, 10–15 m high. Leaves ovate-oblong or elliptic, 7.5–13.5 × 3.5–5.8 cm, obtuse or rounded at base, glabrous or hairy, coriaceous, glabrous or sparsely brown hairy above; petioles with or without stalk glands, glabrous or brown pubescent. Flowers sessile; floral bracts oblong-lanceolate, caducous. Calyx campanulate; tube short; lobes triangular, villous inside. Filaments 5–6 mm; anthers ovoid; disk brownish hairy. Style short; stigma swollen. Drupes smooth or 5-ridged, subglobose.

Flowering & Fruiting: June–September.

Distribution. India: Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Pana, 08.10.2012, AK 58718.

4. Terminalia elliptica Willd., *Sp. Pl.*, ed. 4. 4 (2): 969. 1806. *Terminalia alata* B. Heyne ex Roth, *Nov. Pl. Sp.*: 379. 1821. *Terminalia crenulata* Roth, *Nov. Pl. Sp.*: 380. 1821. *Pentaptera crenulata* Roxb., *Fl. Ind.* 2: 438. 1832. *Terminalia tomentosa* Wight & Arn. var. *crenulata* C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 448. 1878. *Terminalia tomentosa* Wight & Arn., *Prodr. Fl. Ind. Orient.* 1: 314. 1834, *nom. illeg.*; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 447. 1878; Prain, *Bengal Pl.* 1: 481. 1903.

Saj, Asan, Asna (B); *Paka Saj* (N).

Tree, to 40 m high. Leaves opposite or subopposite, oblong or oblong-elliptic, 12.5–21 × 6–10 cm, slightly oblique, crenate, obtuse, coriaceous. Inflorescences axillary or terminal panicles, simple or branched, 8–17 cm. Calyx 5-lobed above, cupular below; cup 2–3 mm, tomentose; lobes triangular. Petals absent. Stamens 8 or 10; disk hairy. Drupes 4–5 cm, (4–)5-winged, reddish-brown, glabrous, striated.

Flowering & Fruiting: June–November.

Distribution. India: Andhra Pradesh, Bihar, Gujarat, Jharkhand, Karnataka,

Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Panbari 6, 72m, 01.12.2011, GK 47183; Newlands, 15.02.2012, AK 53055.

5. *Terminalia myriocarpa* Van Heurck. & Mull. Arg. in Van Heurck., *Observ. Bot.* : 215. 1871; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 448. 1878. [**Plate 82c**]

Pani Saj (N).

Tree, 10–15 m high, brownish hirsute. Leaves elliptic-oblong, 14.5–19 × 3.8–7.8 cm, slightly unequal, truncate to subcordate, crenate, coriaceous. Flowers sessile; floral bracts ovate, tomentose. Calyx cupular, tomentose outside, villous inside; tube minute; lobes triangular-ovate. Anthers ovate; disk glabrous or sparsely hairy. Style short; stigma capitate. Fruit a nut, 5–10 mm, 2-winged, hairy.

Flowering & Fruiting: February–December.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Without any precised locality, VN & party 2681; Panbari 6, 72 m, 29.11.2011, GK 52305; Marakata, 22.02.2012, AK 55896.

Myrtaceae

Syzygium Gaertn.

Key to the species

- | | |
|--|--------------------------|
| 1a. Leaves sessile, usually in whorls of 3 towards end of branchlets, sometimes opposite, subcordate at base, obtuse at apex; flowers large, 5–6 cm across; fruits white when ripe | 3. <i>S. formosum</i> |
| 1b. Leaves petiolate, opposite, cuneate or rounded-cuneate at base, acuminate at apex; flowers small, 1–3 cm across; fruits not white when ripe | 2 |
| 2a. Floral bracts linear, persistent; calyx lobes 5–6; petals 6–8 | 3 |
| 2b. Floral bracts not linear, caducous; calyx lobes 4, rarely 5 or inconspicuous; petals 4 | 4 |
| 3a. Petioles 4–7 mm; calyx tube 7–15 mm | 1. <i>S. claviflorum</i> |
| 3b. Petioles 10–20 mm; calyx tube 3–5 mm | 2. <i>S. cumini</i> |
| 4a. Branchlets compressed to grooved when young; flowers sessile | 5 |
| 4b. Branchlets terete to sub-angular; flowers pedicellate | 6 |
| 5a. Leaves glandular below; inflorescence bracts present; calyx lobes inconspicuous; petals eglandular; filaments 1.8–2 mm; anthers gland tipped | 4. <i>S. fruticosum</i> |
| 5b. Leaves eglandular below; inflorescence bracts absent; calyx lobes prominent; petals glandular; filaments 1–1.5 cm; anthers not gland tipped | 8. <i>S. smalianum</i> |

- 6a. Branchlets sub-angular; pedicels articulate, tuberculate with impressed glands
5. *S. kurzii*
- 6b. Branchlets terete; pedicels not articulate, smooth
7
- 7a. Pedicels 2–3 mm; calyx tube c. 2.5 mm; petals ovate, sub-acute at apex; filaments 1.5–3.5 mm, gland-dotted; style c. 3.5 mm; fruits smooth
6. *S. oblatum*
- 7b. Pedicels 5–11 mm; calyx tube 10–12 mm; petals sub-orbicular, rounded at apex; filaments 1.5–1.8 cm, eglandular; style 1.8–2 cm; fruits gland-dotted
7. *S. ramosissimum*

1. *Syzygium claviflorum* (Roxb.) Wall. ex Steud., Nomencl. Bot., ed. 2. 2: 657. 1841. *Eugenia claviflora* Roxb., Fl. Ind. 2: 488. 1832; Duthie in Hook. f., Fl. Brit. India 2: 484. 1878; Prain, Bengal Pl. 1: 490. 1903. [Plate 82d]

Harre, Jamuna (N).

Tree, 6–10 m high. Leaves elliptic-oblong to elliptic-lanceolate, 7.5–12 × 2.2–4 cm, glandular. Inflorescences umbellate cymes; inflorescence bracts elliptic-ovate, obtuse, mucronulate at tip, caducous. Flowers sessile. Calyx funnelform-campanulate, glandular; tube 0.8–1.2 cm; lobes sub-acute to obtuse or sub-entire, caducous. Petals sub-orbicular, 2.5–3 mm across, concave, glandular, caducous. Stamens many; filaments short; anthers elliptic. Style 4–7 mm; stigma indistinct. Berries red to red maroon, ellipsoid to obconic.

Flowering & Fruiting: February–June.

Distribution. India: Andaman & Nicobar Islands, Karnataka, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimens examined: Santrabari to Buxaduar, 16.02.2014, AK 59976; Buxaduar to Achahung, 19.05.2014, AK 62644.

Uses: Fruits are edible.

2. *Syzygium cumini* (L.) Skeels, Bull. Bur. Pl. Industr. U. S. D. A. 25: 248. 1912. *Myrtus cumini* L., Sp. Pl. 1: 471. 1753; Duthie in Hook. f., Fl. Brit. India 2: 462. 1878; Prain, Bengal Pl. 1: 488. 1903 (as "*communis*"). [Plate 83a-b]

Belati-menhd (B).

Tree, 6–20 m high. Leaves elliptic 6–12 × 3.5–7 cm, base broadly cuneate to rarely rounded, apex rounded to obtuse and with a short cusp, leathery, slightly pale above and brownish green to blackish brown and slightly glossy beneath when dry, gland-dotted; lateral veins gradually extending into margin, petioles 1–2 cm. Inflorescences paniculate cymes. Hypanthium obconic or long pyriform, 4–8 mm. Calyx lobes inconspicuous. Petals 4, white or light purple, coherent, ovate and slightly circular, c. 2.5 mm. Stamens 3–4 mm. Style as long as stamens. Berries red to black, ellipsoid to urceolate, 1-seeded.

Flowering & Fruiting: March–September.

Distribution. India: Almost throughout India.

Specimen examined: Jainty 6, 31.03.2012, GK 56018.

3. *Syzygium formosum* (Wall.) Masam., Enum. Phan. Born.: 528. 1942. *Eugenia formosa* Wall., Pl. Asiat. Rar. 2: 6, t. 108. 1830; Duthie in Hook. f., Fl. Brit. India 2: 471, 1878. [Plate 83c]

Ambake, Ambarke (N).

Tree, 10–15 m high, with scars of fallen leaves. Leaves obovate, elliptic-oblong, 9–23 × 9.2–4 cm, undulate, coriaceous, gland-dotted. Inflorescence 4–7-flowered, cymes on older branchlets; floral bracts linear, caducous; pedicels 0.5–1 cm. Calyx funnelform-campanulate; tube 1–1.2 cm; lobes 4, sub-orbicular, obtuse. Petals pinkish white, 4, sub-orbicular, c. 1.2 cm across. Stamens many; filaments 2–2.5 cm; anthers oblong. Style 3–3.5 cm. Berries white when ripe, sub-globose, 2–3 cm across.

Flowering & Fruiting: February–April.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: SRVK 11, 30.03.2012, GK 50666; Hatipota, 18.02.2013, AK 59837.

4. *Syzygium fruticosum* Roxb. ex DC., Prodr. 3: 260. 1828. *Eugenia fruticosa* (DC.) Roxb., Fl. Ind. 2: 487. 1832; Duthie in Hook. f., Fl. Brit. India 2: 499. 1878; Prain, Bengal Pl. 1: 491. 1903. [Plate 84a]

Ban-jamb (B).

Tree, 10–15 m high. Leaves elliptic to elliptic-oblong, 5.5–16 × 2.8–5.4 cm, gland-dotted. Inflorescences axillary or in axils of fallen leaves, paniculate cymes; inflorescence bracts ovate, triangular-ovate, caducous. Calyx funnelform-campanulate, glandular; tube short. Petals sub-orbicular, concave, membranous, caducous. Stamens many; anthers elliptic. Style short; stigma indistinct. Berries reddish to red maroon, obliquely urceolate and glandular when unripe, ellipsoid when ripe, 6–10 × 4–10 mm.

Flowering & Fruiting: April–June.

Distribution. India: Assam, Meghalaya, Odisha, Tripura and West Bengal.

Specimens examined: Panbari 8–9, 31.03.2012, GK 56018; Santrabari to Buxaduar, 18.05.2014, AK 62610.

Uses: Fruits are edible.

5. *Syzygium kurzii* (Duthie) N. P. Balakr., Bull. Bot. Surv. India 22: 174. 1980 (1982). *Eugenia kurzii* Duthie, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 46 (2): 68. 1877; Duthie in Hook. f., Fl. Brit. India 2: 478. 1878. [Plate 84b-c]

Jaman (N).

Tree, 8–10 m high. Leaves elliptic-oblong, obovate to oblanceolate, 5–14 × 2–5.5 cm, scattered glandular above, prominently glandular below. Inflorescences axillary, terminal or lateral below leaves, paniculate cymes; floral bracts ovate to lanceolate, caducous; pedicels angular, 0.4–1.2 cm. Calyx funnellform-campanulate, glandular; tube 8–9 mm; lobes rounded, 2.5–3 × 5–7 mm. Petals white, sub-orbicular, 5–8 mm across, concave, membranous. Stamens many; filaments 1–1.5 cm; anthers elliptic. Style short; stigma indistinct. Berries sub-globose, glandular.

Flowering & Fruiting: October–February.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimens examined: Tashigaon to Rovers point, 03.10.2013, AK 59766; Rovers point to Bhutan Border, 15.02.2014, AK 59956.

6. *Syzygium oblatum* (Roxb.) Wall. ex A. M. Cowan & Cowan, Trees N. Bengal: 68. 1929. *Eugenia oblata* Roxb., Fl. Ind. 2: 493. 1832; Duthie in Hook. f., Fl. Brit. India 2: 492. 1878. [Plate 84d]

Gulam (B).

Tree, 12–16 m high. Leaves elliptic to elliptic-oblong, 6–15 × 2.4–4.5 cm, coriaceous, glandular. Inflorescences paniculate cymes; pedicels sub-angular. Calyx funnellform; tube gland-dotted above; lobes triangular. Petals white, c. 5 mm. Stamens many; filaments gland-dotted; anthers oblong. Stigma indistinct. Berries globose.

Flowering & Fruiting: February–April.

Distribution. India: Andaman & Nicobar Islands, Assam, Meghalaya, Mizoram and West Bengal.

Specimens examined: Tashigaon, JKS 4020; SRVK 11, 31.03.2012, GK 56018; Jainti river bank, 07.04.2012, GK 56054; Checko-1, 09.02.2013, AK 58805.

Uses: Fruits are edible.

7. *Syzygium ramosissimum* (Blume) N. P. Balakr., Fl. Jowai 1: 200. 1981. *Clavimyrthus ramosissima* Blume, Mus. Bot. 1 (8): 113, t. 115. 1850. *Eugenia ramosissima* (Blume) Wall. ex Duthie in Hook. f., Fl. Brit. India 2 (5): 480. 1878. [Plate 85a]

Harre Jamuna (N).

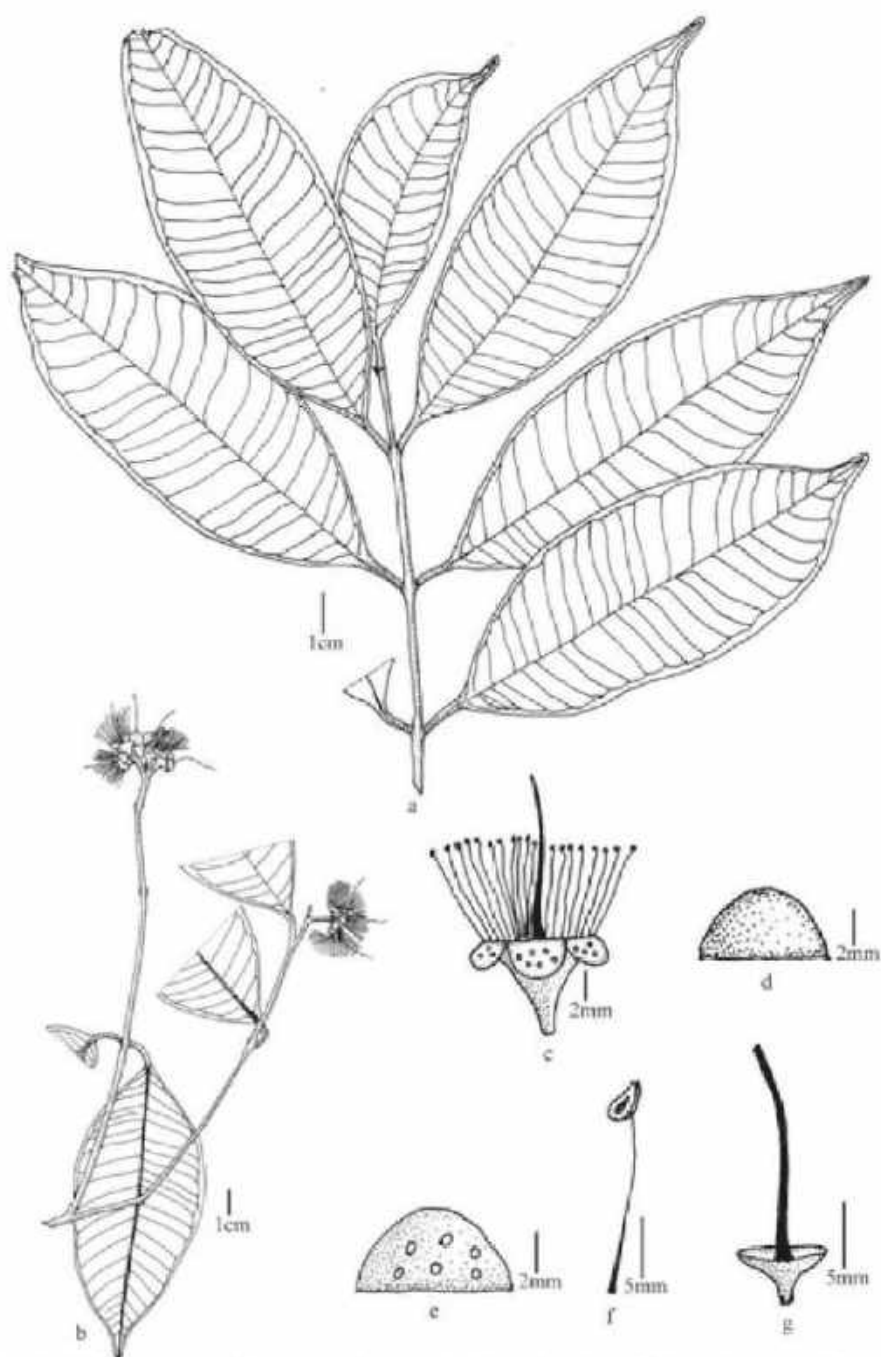


Fig. 28. *Syzygium smalianum*: a. Leaves; b. Flowering branchlet; c. Flower; d. Sepal; e. Petal; f. Stamen; g. Gynoecium (AK 59902).

Tree, 10–12 m high. Leaves elliptic or elliptic-ovate to elliptic-oblong, 7–11.5 × 2.5–3.5 cm, coriaceous, gland-dotted. Inflorescences terminal, paniculate cymes; inflorescence and floral bracts caducous. Calyx funnelform, gland-dotted; tube short; lobes 4, circular. Petals white, c. 7 × 4 mm, concave, gland-dotted. Stamens many; anthers oblong or elliptic. Stigma indistinct. Berries globose, 1.2–1.5 cm across.

Flowering & Fruiting: February–May.

Distribution. India: Meghalaya, Sikkim and West Bengal.

Specimens examined: Panbari, Adma, 12.02.2013, AK 58877; Santrabari to Buxaduar, 16.02.2014, AK 59972; Santrabari to Buxaduar, 18.05.2014, AK 62628.

8. *Syzygium smalianum* (Brandis) D. G. Long, *Edinburgh J. Bot.* 47: 357 1990; Anant Kumar & Venu, *Indian Forester* 145 (8): 779. 2019. *Eugenia smaliana* Brandis, *Ind. Trees*: 320. 1906. [Plate 85b; Fig. 28]

Tree, 8–10 m high. Leaves elliptic, 5.5–16 × 2.8–5.4 cm. Inflorescences terminal and in axils of upper leaves, few to many flowered cymes. Calyx funnelform; tube 5–6.5 mm; lobes circular, 2–4 mm across, unequal, caducous. Petals white, sub-orbicular, 3–4 mm, concave, membranous, caducous. Stamens many; anthers elliptic-ovate. Style short; stigma indistinct. Fruits not seen.

Flowering: February–April.

Distribution. India: Assam and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 11.02.2014, AK 59902.

Lecythidaceae

Careya Roxb.

Careya arborea Roxb., *Pl. Coromandel* 3: 14, t. 218. 1811; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 511. 1879; Prain, *Bengal Pl.* 1: 492. 1903.

[Plate 85c-d; Fig. 29]

Kumbhi, Kumbi (B, N).

Tree, to 18 m high. Leaves whorled, broadly obovate to oblong-obovate, 15–30 × 10–19 cm, attenuate, decurrent onto petioles, crenate, acute or obtuse, coriaceous, glabrous, old leaves often red or purple. Inflorescences in racemes, 10–15 cm, 3–8-flowered. Flowers sessile; bracts elliptic-lanceolate or ovate. Calyx tubular below, 4-lobed above; lobes circular, thick, coriaceous; tube 10–15 mm, glabrous, persistent. Petals greenish-white with pink red patches at the base, 4-lobed; lobes oblong-spathulate, obtuse, revolute at margins, caducous. Stamens many, epipetalous, many seriate, outer and inner seriate in calyx cup; filaments flattened,

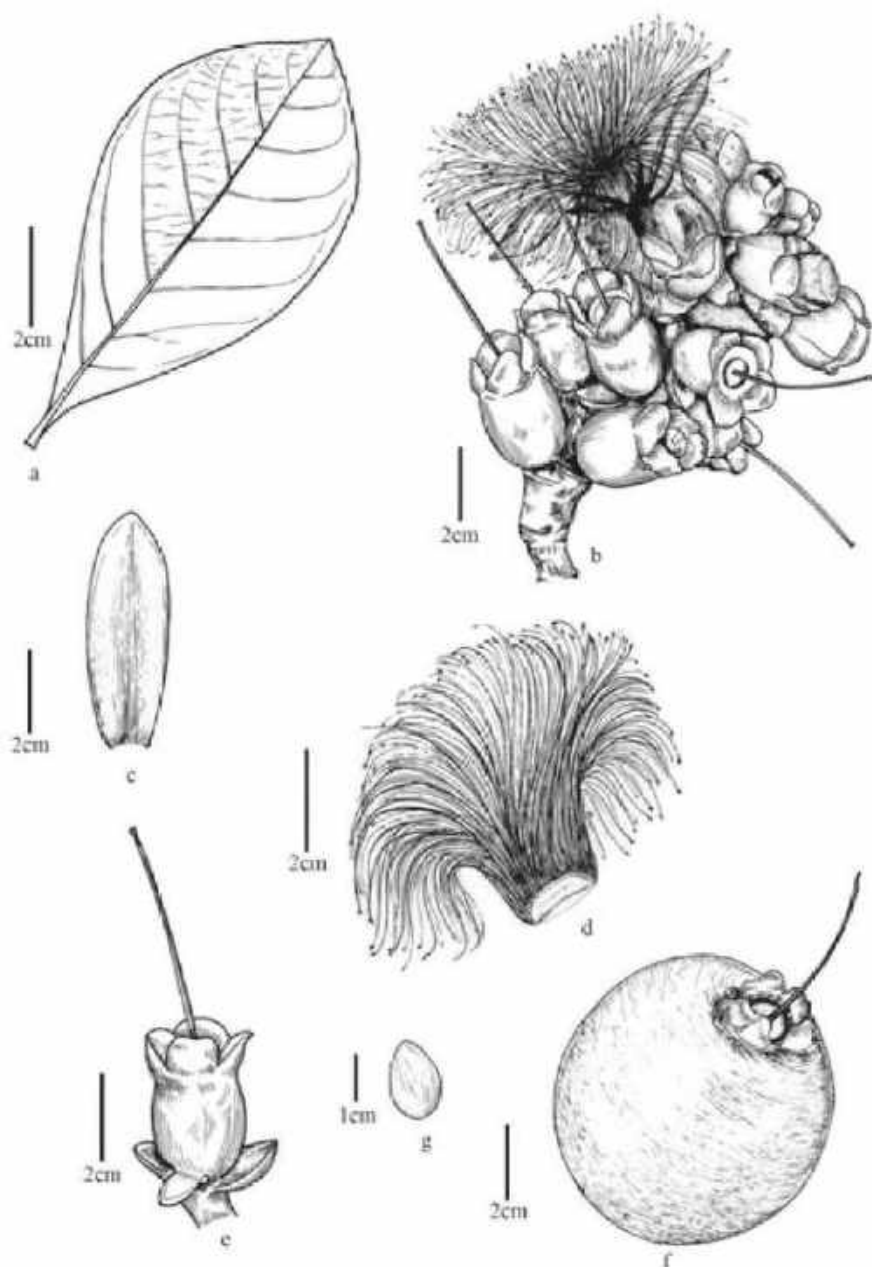


Fig. 29. *Careya arborea*: a. Leaf; b. Flowering branchlet; c. Sepal; d. Stamens; e. Gynoecium with persistent sepals; f. Fruit (GK 50625).

2.5–5 cm, adanate at base; anthers ovoid. Ovary embedded in calyx cup; stigma capitate. Berries green, ovoid-globose, glabrous; seed compressed, ellipsoid.

Flowering & Fruiting: April–June.

Distribution. India: Almost throughout India.

Specimens examined: Jainti Ga, GK 56096; Rajabhatkhawa range, 29.03.2012, GK 50625.

Melastomataceae

Key to the genera

- 1a. Epiphytic shrubs; stems and petioles glabrous; leaves succulent, glabrous; veins and petioles reddish; inflorescences 2–3-flowered, lateral cymes in axils of fallen leaves; seeds straight 1. *Medinilla*
- 1b. Terrestrial shrubs or undershrubs; stems and petioles hairy; leaves not succulent, hairy; veins and petioles green; inflorescences terminal, axillary, panicles or 2–3-flowered cymes; seeds curved 2
- 2a. Anthers dissimilar, purple ones with horn-like 2 lobes at base; fruits baccate, dehiscent irregularly 2. *Melastoma*
- 2b. Anthers usually similar, if dissimilar, then purple ones without horn-like 2 lobes at base; fruits capsules, dehiscent by apical pores 3
- 3a. Stems solid when young, variously hairy; leaves entire or sinuate at margins; inflorescences 2–3-flowered cymes, variously hairy, not stellate hairy; stamens equal; anthers all similar, without spur; stigma not fimbriate; capsules not reflexed; seeds variously shaped, not t-shaped 3. *Osbeckia*
- 3b. Stems hollow when young, stellate hairy; leaves dentate at margins; inflorescences panicles, stellate hairy; stamens unequal; anthers dissimilar, with spur; stigma fimbriate; capsules reflexed; seeds t-shaped 4. *Oxyapora*

I. *Medinilla* Gaudich.

Medinilla rubicunda (Jack) Blume, Flora 14: 512. 1831; C. B. Clarke in Hook. f., Fl. Brit. India 2: 547. 1879. *Melastoma rubicundum* Jack, Trans. Linn. Soc. London 14: 18. 1823. [Plate 86a-b; Fig. 30]

Shrub, 50–70 cm high. Leaves elliptic, 3.5–10 × 1.3–3.7 cm, cuneate, reddish margined, acuminate, coriaceous; floral bracts triangular-ovate, caducous; pedicels short, articulate. Calyx urceolate; tube short; lobes reddish, indistinct, undulate to truncate. Petals pinkish white, 4, asymmetrically obovate. Stamens 8; filaments 6–7 mm; anthers linear, swollen connective at base. Style 1–1.3 cm; stigma indistinct. Fruits baccate, sub-globose; seeds many, ovate, compressed.

Flowering & Fruiting: July–October.

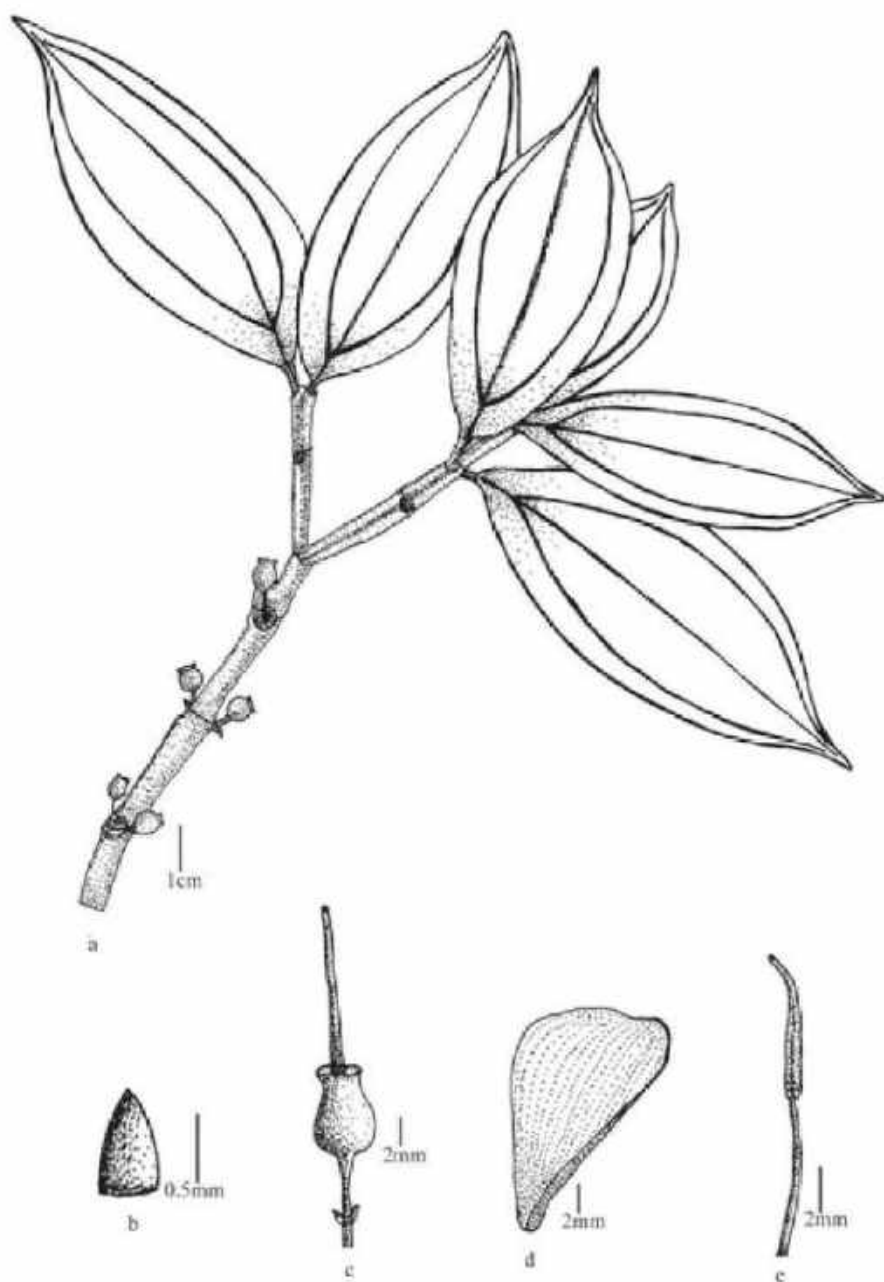


Fig. 30. *Medinilla rubicunda*: a. Fruiting branchlet; b. Floral bract; c. Calyx with style; d. Petal; e. Stamen (AK 59763).

Distribution. India: Arunachal Pradesh, Assam, Mizoram, Sikkim and West Bengal.

Specimens examined: On way to Sinchu, JKS 4696; Tashigaon to Rovers point, 03.10.2013, AK 59763.

2. *Melastoma* L.

Melastoma malabathricum L., Sp. Pl. 1: 390, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2: 523, 1879; Prain, Bengal Pl. 1: 496, 1903. [Plate 86c]

Tulasi (N).

Shrub, 2–2.5 m high, appressed hairy. Leaves elliptic to elliptic-lanceolate, 2.5–11 × 1–4 cm, cuneate or rounded at base, acute at apex, coriaceous, appressed hairy; pedicels 0.7–1 cm, white appressed hairy. Calyx cupular, strigose; tube c. 8 mm; lobes linear-oblong, c. 5 mm, acute. Petals mauve or pink purple, obovate, 2.2–2.7 × 1.8–2 cm, connate, ciliate. Stamens 10; anthers dimorphic, yellow, linear-oblong, 0.8–1 cm, beaked. Style c. 2 cm; stigma knob-shaped. Fruits sub-globose, strigose; seeds many.

Flowering & Fruiting: August–February.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Buxaduar, JKS 7107; Santrabari, 08.10.2009, SKS & GK 46233; SRVK 5, 16.02.2010, SKS & GK 47119; Checko 2, 27.11.2011, GK 50591; Newlands, Sukno river, 22.09.2011, AK 52780; Kumargram, 18.02.2012, AK 55704; Narathali, 20.02.2012, AK 55751.

3. *Osbeckia* L.

Key to the species

- 1a. Floral bracts ovate to sub-orbicular; calyx with tufted hairs on terete appendages, appear stellate; petals 4; stamens 8 2
- 1b. Floral bracts lanceolate to oblong-lanceolate; calyx without tufted hairs on terete appendages; petals 5; stamens usually 10 3
- 2a. Leaves eglandular above; veins 5–7 from base; floral bracts ovate to sub-orbicular; calyx urocelate; seeds reniform, papillose 1. *O. crinita*
- 2b. Leaves glandular above; veins 5 from base; floral bracts broadly ovate; calyx campanulate; seeds clavate, verruculose 4. *O. stellata*
- 3a. Shrubs; leaves oblong-ovate or elliptic-oblong, more than 1 cm wide, sinuate at margins, appressed hairy; veins 5 from base; floral bracts lanceolate; petals white; anthers without spurs; ovary appressed hairy; seeds tubercled 2. *O. nepalensis*

- 3b. Undershrubs; leaves lanceolate, less than 1 cm wide, entire at margins, glabrous; veins 3 from base; floral bracts oblong-lanceolate; petals pink; anthers with short spurs; ovary stiff erect hairy; seeds verruculose 3. *O. nutans*

1. *Osbeckia crinita* Benth. ex Naudin, Ann. Sci. Nat. Bot. ser. 3, 14: 72. 1850; C. B. Clarke in Hook. f., Fl. Brit. India 2: 517. 1879.

Shrub, 0.5–1 m high, stiff hairy. Leaves ovate to elliptic-ovate, lanceolate, 4.3–11 × 1.2–4 cm, cuneate at base, ciliate, acute or acuminate appressed hairy; floral bracts ciliate, acute to mucronate, hairy; pedicels short, hairy. Calyx lobes dark purple, 4, linear, 6–7.5 mm, ciliate, tufted hairy. Petals pinkish white or red purple, obovate, 1.5–2 × 1–1.2 cm. Filaments 9–10 mm; anthers sagittate, sigmoid, swollen connective at base. Ovary hairy at apex; style 1.2–1.4 cm, curved; stigma capitellate. Capsules urceolate, tufted or erect long hairy; seeds many.

Flowering & Fruiting: November–March.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Way to Sinchu, JKS 6942; way to Mahakal cave, 20.02.2013, AK 59865; Buxa Fort to Achalung, 29.09.2013, AK 59644.

2. *Osbeckia nepalensis* Hook. f., Exot. Fl. 1 (2): t. 31. 1823; C. B. Clarke in Hook. f., Fl. Brit. India 2: 521. 1879; Prain, Bengal Pl. 1. 495. 1903. [Plate 87a]

Shrub, 1–1.5 m high, appressed hispid. Leaves oblong-lanceolate to ovate-lanceolate, 3–8 × 1–2.8 cm, subcordate or rounded at base, acute or obtuse at apex, coriaceous, appressed hairy; floral bracts pubescent; pedicels white hairy. Calyx cupular, appressed hispid; lobes ovate-elliptic, ciliate. Petals obovate, connate at base, ciliate at apex. Filaments c. 7 mm; anthers oblong, beaked. Ovary ellipsoid, appressed white hairy; stigma capitellate. Capsules ovoid-globose, hispid; seeds many.

Flowering & Fruiting: August–November.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Manipur, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Checko 2, 55m, 27.11.2011, GK 50588; Checko-1, 26.09.2012, AK 56165.

3. *Osbeckia nutans* Wall. ex C. B. Clarke in Hook. f., Fl. Brit. India 2: 521. 1879. [Plate 87b-d]

Undershrub, 0.8–1 m high, appressed hairy. Leaves lanceolate, 1.5–5.5 × 0.3–0.7 cm, rounded to cuneate at base, acute with mucronate tip, sub-coriaceous; floral bracts ciliate, acuminate, 3-nerved, often caducous, nerves hairy; pedicels sub-

angular, articulate, appressed hairy. Calyx cupular; tube 4–6 mm, hispid at base; lobes ovate-lanceolate, ciliate, tuft of hairs at apex, hairy appendages in between lobes, caducous. Petals obovate, 1.3–1.7 × 1.2–1.5 cm, nerved. Stamens 10, rarely 11–12, additional ones deformed, with 8–9 linear appendages; filaments 6–7 mm; anthers falcate, beaked, swollen appendaged at base of connective. Style 1.3–1.5 cm; stigma capitellate. Capsules sub-globose; seeds many.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxaduar, JKS 4051; NRVK 5a, 144m, 06.12.2011, GK 52357; Kumargram, 18.02.2012, AK 55735; Hauda nala, 03.10.2012, AK 58662; Santrabari to Chunabhati, 04.10.2013, AK 59783.

4. *Osbeckia stellata* Buch.-Ham. ex D. Don, Bot. Reg. 8: t. 674. 1822; Wall., Numer. List: n. 4062. 1831; C. B. Clarke in Hook. f., Fl. Brit. India 2: 517. 1879; Prain, Bengal Pl. 1: 495. 1903. *Osbeckia rostrata* D. Don, Prodr. Fl. Nepal.: 221. 1825; C. B. Clarke in Hook. f., Fl. Brit. India 2: 517. 1879. [Plate 88a]

Lal angeri (N).

Shrub, 1–2 m high, appressed hairy. Leaves lanceolate or elliptic-oblong to oblong-lanceolate, 3.5–9.5 × 1.2–2.7 cm, rounded to cuneate, ciliate at margins, acute to acuminate, appressed hispid above, sparsely hispid mainly on veins with impressed glands below. Inflorescences 2–3-flowered, terminal cymes, hispid; floral bracts ciliate; pedicels short, sparsely hispid. Calyx tube 1–1.2 cm, minute appendages at base; lobes 4, triangular-lanceolate, ciliate, tufted hairy at apex. Petals pink, obovate, 1.5–2.2 × 1–1.2 cm. Filaments 9–10 mm; anthers sigmoid, swollen connective at base. Style 1.8–2 cm; stigma capitellate. Capsules urceolate, tufted or erect hairy at apex; seeds many.

Flowering & Fruiting: September–February.

Distribution. India: Himachal Pradesh, Manipur, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Tashigaon to Rovers point, 03.10.2013, AK 59762.

4. *Oxyspora* DC.

Oxyspora paniculata (D. Don) DC., Prodr. 3: 123. 1828; C. B. Clarke in Hook. f., Fl. Brit. India 2: 525. 1879. *Arthrostemma paniculatum* D. Don, Mem. Wern. Nat. Hist. Soc. 4 (2): 299. 1823. [Plate 88b]

Tulasi (N).

Shrub, 1–2 m high. Leaves broadly ovate to elliptic-ovate, 11.5–24.5 × 6–13.5 cm, rounded at base, acuminate at apex, sub-coriaceous, punctate. Inflorescence bracts foliaceous, 3-veined; floral bracts lanceolate, acuminate, ciliate, stellate hairy; pedicels short, articulate, stellate pubescent. Calyx tubular, stellate hairy; lobes 4, triangular. Petals pink to deep red, 4, ovate-oblong, mucronate, punctate. Stamens 8; filaments 0.8–1.2 cm; anthers sagittate, connective hairy; short anthers oblong, hairy above. Capsules urceolate or ellipsoid or ovoid, 6–8 × 4–5 mm, keeled, tuberculate or glabrous; seeds many.

Flowering & Fruiting: August–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Way to Sinchu, JKS 4687; Pana, 11.02.2013, AK 58852; Tashigaon to Rovers point, 02.10.2013, AK 59752.

Lythraceae

Key to the genera

- 1a. Marshy herbs; stems narrowly winged (except *Rotala indica*); leaves opposite, decussate, oblanceolate to linear-oblong or obovate to sub-orbicular, thick; lateral veins indistinct; petals present or absent; stamens 4 2
- 1b. Trees, shrubs or herbs, not marshy; stems not winged; leaves not as above; lateral veins distinct; petals present; stamens more than 4 3
- 2a. Inflorescences axillary, 5–6-flowered, fascicle cymes; flowers buds pyramidal; petals absent; capsules dehisced irregularly, devoid of persistent calyx; seeds tuberculate
1. *Ammannia*
- 2b. Inflorescences spikes; flowers buds sub-globose; petals present; capsules dehisced by 2 or 4-valves, with persistent calyx; seeds not tuberculate 4. *Rotala*
- 3a. Herbs; stems glandular hairy; stipules present; flowers in solitary or in pairs; calyx cylindrical, striated; petals dark pink or crimson; stamens 12, within calyx tube; seeds 5, obovate to orbicular, punctate 2. *Cuphea*
- 3b. Trees or shrubs; stems not glandular hairy; stipules absent; flowers in panicles or paniculate cymes; calyx not cylindrical, not striated; petals not as above; stamens many (12 in *Woodfordia*), exserted; seeds many, not obovate to orbicular, not punctate 4
- 4a. Shrubs; leaves obliquely subcordate at base, black gland-dotted above, tomentose below; inflorescences condensed, paniculate cymes; flowers asymmetric, obconic in buds; calyx orange red, appendages between lobes; petals subulate, entire at margins, not clawed; stamens 12; capsules dehisced irregularly, capsules enclosed in persistent calyx; seeds triangular, not winged 5. *Woodfordia*
- 4b. Trees; leaves rounded at base, not gland-dotted above, glabrous below; inflorescences panicles; flowers symmetric, not obconic in buds; calyx green, not appendaged; petals ovate-orbicular or sub-orbicular, wavy at margins, clawed; stamens more than 12; capsules dehisced by 2 or 3–4-valves, not enclosed in persistent calyx; seeds falcate or oblong, winged 3. *Lagerstroemia*

1. *Ammannia* L.

Ammannia baccifera L., Sp. Pl. 1: 120. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2: 569. 1879; Prain, Bengal Pl. 1: 500. 1903. [Plate 89a-b]

Herb, 15–25 cm high. Leaves sessile, 0.3–2 cm, attenuate, revolute, mucronate, coriaceous, tuberculate; floral bracts linear; pedicels short. Calyx campanulate; tube short, keeled; lobes 4, triangular, sharply acute, tuberculate. Filaments short; anthers sub-globose. Ovary globose to sub-globose; style columnar; stigma minute. Capsules globose, calyx persistent; seeds many, ovate.

Flowering & Fruiting: January–March.

Distribution. India: Bihar, Jammu & Kashmir, Madhya Pradesh, Odisha, Uttarakhand and West Bengal.

Specimen examined: Newlands, 15.02.2012, AK 55644.

2. *Cuphea* P. Browne

Cuphea carthagenensis (Jacq.) J. F. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 8: 124. 1930; T. K. Paul & Anant Kumar, Fleione 6: 244. 2012. *Lythrum carthagenense* Jacq., Enum. Syst. Pl.: 22. 1760.

Herb, 20–30 cm high. Leaves ovate-lanceolate, 0.6–3 × 0.3–1.4 cm, cuneate, acute at apex, sub-coriaceous, appressed hairy above, puberulous below; stipules linear-lanceolate. Flowers asymmetric; pedicels pubescent. Calyx hairy; tube c. 4.5 mm; lobes 6, triangular. Petals 6, oblanceolate, clawed, obtuse. Stamens in two rows, unequal, 2 uppermost larger; filaments short; anthers small. Ovary oblong; style minute; stigma capitate. Capsules oblong-obovoid, 3–4 mm; seeds compressed, slightly winged.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh and West Bengal.

Specimens examined: Jainti range, 14.02.2010, SKS & GK 47090; Checko-1, 25.09.2012, AK 56138.

3. *Lagerstroemia* L.

Key to the species

- 1a. Branchlets pubescent; leaves sub-sessile; floral bracts linear-lanceolate, acute at apex, tomentose; bracteoles lanceolate, tomentose; pedicels not articulate; petals white; capsules 3–4-valved; seeds falcate 1. *L. parviflora*
- 1b. Branchlets glabrous; leaves petiolate; floral bracts oblong, obtuse at apex, dusty pubescent; bracteoles ovate, dusty pubescent; pedicels articulate; petals purple pink; capsules 6-valved; seeds oblong 2. *L. speciosa*

1. *Lagerstroemia parviflora* Roxb., Pl. Coromandel 1: 47, t. 66. 1795; C. B. Clarke in Hook. f., Fl. Brit. India 2: 575. 1879; Prain, Bengal Pl. 1: 503. 1903.

[Plate 89c]

Sida (B); *Sida*, *Sidha*, *Burri Damera* (N).

Tree, 10–15 m high. Leaves ovate-elliptic or ovate-lanceolate, 4.5–11.5 × 1.8–5 cm, undulate, acuminate or acute at apex, coriaceous. Flowers pedicellate; pedicels 1–1.5 cm, tomentose. Calyx cupular, tomentose; lobes 6, triangular-ovate, 7–8 mm, thick. Petals 6, c. 2 cm across, obtuse. Stamens many, in 2 whorls, outer 6 longer than others; filaments 1–2 cm; anthers oblong. Ovary globose; style 2–2.3 cm; stigma discoid. Capsules sub-globose, 1.5–2.2 cm, woody; seeds many.

Flowering & Fruiting: April–July.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Marakata, 24.09.2011, AK 52859; Hatipota, 29.09.2012, AK 58521.

2. *Lagerstroemia speciosa* (L.) Pers., Syn. Pl. 2: 72. 1806. *Munchausia speciosa* L., Hausvater 5 (1): 357, pl. 2. 1770. *Lagerstroemia flos-reginae* Retz., Observ. Bot. 5: 25. 1788; C. B. Clarke in Hook. f., Fl. Brit. India 2: 577. 1879; Prain, Bengal Pl. 1: 504. 1903.

[Plate 90a]

Jarool (B, N).

Tree, 10–12 m high. Leaves elliptic-oblong, ovate to elliptic-ovate, 11–17 × 3.2–7.4 cm, acute or short acuminate at apex, coriaceous. Flower pedicellate; pedicels 6–8 mm, dusty pubescent. Calyx campanulate, pubescent; tube 6–8 mm, keeled; lobes 6, triangular-ovate, 6–7 × 4–4.5 mm, keeled up to half of length. Petals 6, 1–1.2 cm across. Stamens many, in 2 whorls, outer 6 longer than others; filaments 5–7 mm; anthers globose. Ovary ovoid or globose; style 1.5–1.7 cm; stigma capitate. Capsules sub-globose, woody, beaked, many seeded.

Flowering & Fruiting: April–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Central Moraghat, 31.05.1975, JKS 430; SRVK 6, 02.12.2011, GK 52308; Newlands, Sukno river, 22.09.2011, AK 52781.

4. *Rotala* L.

Key to the species

- 1a. Stems winged, branched, striated; leaves obovate, attenuate at base; inflorescences congested spikes, subtended by foliaceous bracts; petals white, oblanceolate, c. 0.5 mm, attenuate at base, obtuse at apex; ovary ovoid, not lobed; stigma not lobed; capsules dehiscent by 2-valves; seeds ovate **1. *R. indica***
- 1b. Stems not winged, not branched, not striated; leaves sub-orbicular, rounded or subcordate at base; inflorescences lax spikes, not subtended by foliaceous bracts; petals pink, obovate or sub-orbicular, c. 1.5 mm, shortly clawed, rounded at apex; ovary globose, 4-lobed; stigma shallowly 2-lobed; capsules dehiscent by 4-valves; seeds elliptic **2. *R. rotundifolia***

1. *Rotala indica* (Willd.) Kochne in Engl., Bot. Jahrb. 1: 172. 1880. *Peplis indica* Willd., Sp. Pl. 2: 244. 1799. *Ammannia nana* Roxb., Fl. Ind. 1: 448. 1832. *Ammannia peplodes* Spreng., Syst. Veg., ed. 16. 1: 444. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 2: 566. 1879; Prain, Bengal Pl. 1: 500. 1903. [Plate 90b]

Erect or decumbent herb, 7–10 cm high. Leaves sessile, obovate, 4.5–8 × 1.5–3.5 mm, obtuse with mucronate tip. Flowers sessile; floral bracts foliaceous; bracteoles linear. Calyx cupular; tube short; lobes 4, triangular-ovate, scarious. Petals 4. Filaments short; anthers sub-globose. Style short; stigma discoid. Capsules obovoid, faintly 4-grooved, scarious; seeds many, slightly concave.

Flowering & Fruiting: November–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Sikkim, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Kumargram, Hathinala, 21.02.2012, AK 55862.

2. *Rotala rotundifolia* (Buch.-Ham. ex Roxb.) Kochne, Bot. Jahrb. Syst. 1(2): 175. 1880. *Ammannia rotundifolia* Buch.-Ham. ex Roxb., Fl. Ind. 1: 446. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 2: 566. 1879; Prain, Bengal Pl. 1: 500. 1903. [Plate 90c, 91a]

Decumbent herb, 5–15 cm high. Leaves sessile to sub-sessile, suborbicular, 0.4–1 × 0.5–0.8 cm, obtuse or rounded at apex, some leaves verrucose above and black gland-dotted beneath. Flowers sessile; floral bracts ovate, rounded or subcordate, acute, clawed; bracteoles linear. Calyx cupular; tube short; lobes 4, ovate. Petals 4. Filaments short; anthers ellipsoid. Style columnar; stigma discoid. Capsules ellipsoid, 4-lobed; seeds many, curved.

Flowering & Fruiting: February–August.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal

Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Sikkim, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Marakata, 22.02.2012, AK 55903.

5. *Woodfordia* Salisb.

Woodfordia fruticosa (L.) Kurz, J. Asiat. Soc. Bengal, Part 2, Nat. Hist. 40 (2): 56. 1871. *Lythrum fruticosum* L., Syst. Nat., ed. 10. 2: 1045. 1759. *Woodfordia floribunda* Salisb., Parad. Lond.: t. 42. 1806; C. B. Clarke in Hook. f., Fl. Brit. India 2: 572. 1879; Prain, Bengal Pl. 1: 502. 1903. [Plate 91b]

Dhanyaro, Dhas, Dhani (B, N).

Bushy shrub, 2–3 m high. Leaves lanceolate or ovate-lanceolate, 5–9.5 × 1.8–2 cm, rounded to subcordate at base, acute at apex, slightly curved, coriaceous; floral bracts lanceolate; pedicels short. Calyx tubular-campanulate; tube c. 2 cm, constricted at base; lobes 6, triangular-ovate, ciliate, pubescent. Petals light pink, 6, 2–3 mm. Filaments 1–1.5 cm, hairy; anthers elliptic. Ovary ellipsoid; style c. 1.2 cm. Capsules ellipsoid, c. 8 × 4 mm; seeds reddish brown.

Flowering & Fruiting: February–May.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Sikkim, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: NRVK 12, 6, 08.03.2011, GK 50508; Newlands, 15.02.2012, AK 55608.

Sonneratiaceae

Duabanga Buch.-Ham.

Duabanga grandiflora (Roxb. ex DC.) Walp., Repert. Bot. Syst. 2: 114. 1843. *Lagerstroemia grandiflora* Roxb. ex DC., Mem. Soc. Hist. Nat. Genev. 32: 84. 1824. *Duabanga sonneratioides* Buch.-Ham., Trans. Linn. Soc. London 17 (2): 177. 1835; C. B. Clarke in Hook. f., Fl. Brit. India 2: 579. 1879; Prain, Bengal Pl. 1: 504. 1903. [Plate 91c]

Lampate (B, N).

Tree, 20–30 m high; branches drooping. Leaves ovate or oblong-ovate, 8–13.5 × 4–6.5 cm, subcordate to cordate, entire, acute, coriaceous, pale-white beneath. Inflorescences branched cymes at the ends of drooping branches, 10–20-flowered; pedicels stout, glabrous. Sepals green, 5–6, ovate, acute to obtuse, thick, glabrous. Petals cream-white, 5–6, obovate, 3–4 cm, obtuse, clawed, chartaceous. Stamens white, many, in two rows, on the margin of perigynous disk; filaments 5–6 cm, glabrous; anthers oblong, recurved over one end of connective; disk large, depressed. Ovary 5–8 loculed; style 6–8 cm; stigma capitate, 5–8-lobed. Capsules sub-globose, dividing into 6–8 locules; seeds many, filiform, 4–6 mm, 2-tailed.

Flowering & Fruiting: December–March.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Buxa to Chunabhati, 933m, 17.05.1949, VN & party 2645; SRVK 4–5, 10.02.2010, SKS & GK 47012; Newlands, 15.02.2012, AK 55638; Rydak, Tiamari, 23.02.2012, AK 55913.

Uses: Wood is used in making of tea chests; boiled fruits edible and leaves & fruits yield a black dye.

Onagraceae

Ludwigia L.

Key to the species

- 1a. Leaves glabrous; petals 2–2.5 mm, apiculate, nerves not prominent; flowers sessile; capsules equal or less than 2 cm, puberulent; seeds ovoid, arranged in one row, embedded in endocarp 1. *L. hyssopifolia*
- 1b. Leaves appressed hairy; petals 0.5–1.7 cm, retuse, nerves prominent; flowers pedicellate; capsules more than 2 cm, hairy; seeds oblong-ovate, arranged in several rows, not embedded in endocarp 2. *L. octovalvis*

1. *Ludwigia hyssopifolia* (G. Don) Exell, *Garcia de orta* 5: 471. 1957. *Jussiaea hyssopifolia* G. Don, *Gen. Hist.* 2: 693. 1832. [Plate 92a]

Herb, 1–1.5 m high. Leaves lanceolate, elliptic-lanceolate, oblong or ovate, 0.8–6.5 × 0.1–1 cm, attenuate or cuneate, ciliate, short acuminate or bluntly acute with mucronate tip. Flowers axillary; solitary. Calyx cylindric; tube 6–8 mm, puberulous; lobes 4, lanceolate, ciliate, puberulent. Petals yellow, 4, obovate. Stamens 8, in 2 whorls, 4 larger and 4 smaller, alternate to each other, episealous one longer with tuft of hairs around filaments; filaments short; anthers ellipsoid. Style columnar; stigma clavate. Capsules oblong or cylindric, 1.2–2 cm, striated, dehiscent, crowned by persistent calyx, puberulent; seeds many.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 11.03.2011, GK 50539; Kumargram, 18.09.2011, AK 52610; Marakata, 24.09.2011, AK 52842; Newlands, 15.02.2012, AK 53039; Sankosh, 17.02.2012, AK 55682; Narathali, 20.02.2012, AK 55826.

2. *Ludwigia octovalvis* (Jacq.) P. H. Raven, *Kew Bull.* 15: 476. 1962. *Oenothera octovalvis* Jacq., *Enum. Syst. Pl.*: 19. 1760. *Jussiaea suffruticosa* L., *Sp. Pl.* 1: 338. 1753; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 587. 1879. [Plate 92b]

Herb, 18–27 cm high. Leaves whorled, linear-lanceolate, 1.6–4.6 × 0.3–0.7 cm,

cuneate, entire, ciliate, acute, sub-coriaceous. Flowers axillary, solitary or in clusters; pedicels short, hairy. Calyx tubular; tube 3-nerved; lobes 4, ovate, ciliate. Petals yellow, 4, obovate, more or less clawed. Stamens 8, in 2 whorls, 4 larger and 4 smaller, alternate to each other; filaments minute; anthers ovoid. Style columnar; stigma clavate. Capsules cylindric, hairy; seeds brown, many, in 2 or more rows in each locule.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 14.02.2010, SKS & GK 47099; Rajabhatkhawa range, 11.03.2011, GK 50538; Narathali, 23.09.2011, AK 52815; Marakata, 24.09.2011, AK 52861.

Trapaceae

Trapa L.

Trapa natans L., Sp. Pl. 1: 120. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2: 590. 1879. [Plate 92c-d]

Aquatic herb. Leaves rhomboid-ovate or deltoid-rhombic, 1.6–2.6 × 1.2–2.5 cm, cuneate, dentate, acute, coriaceous, pubescent below. Flowers axillary, solitary; floral bracts lanceolate, reduced or developed; pedicels 1.8–2.6 cm. Calyx cupular; tube short; lobes 4, lanceolate. Petals white, 4, elliptic-oblong or elliptic-ovate, 1–1.5 cm. Stamens 4; filaments 6–7 mm; anthers ellipsoid. Ovary sub-globose; style short; stigma discoid; disk annular. Fruits obconical, c. 1.5 × 2.5 cm, surfaces irregular; seed solitary.

Flowering & Fruiting: May–November.

Distribution. India: Bihar, Jammu & Kashmir, Jharkhand, Odisha and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55808.

Passifloraceae

Adenia Forssk.

Adenia trilobata (Roxb.) Engl., Bot. Jahrb. Syst. 15 (5): 573. 1893. *Modecca trilobata* Roxb., Pl. Coromandel 3 (4): 93. 1820; Mast. in Hook. f., Fl. Brit. India 2: 602. 1879; Prain, Bengal Pl. 1: 513. 1903. [Plate 93a]

Akand-phul (L, N).

Monoecious, climbing herb. Leaves 3-lobed, cordate with 2 glands at base; lobes elliptic to lanceolate, 3.5–15 × 0.6–3.5 cm, acuminate; blade glands 2, rounded at centre of leaves; stipular appendages toothed. Inflorescences axillary, pedunculate cymose, central flower replaced by a tendril; many flowered in males, 4–8-flowered in females; tendrils cochleate; inflorescence bracts golden brown, ovate; floral

bracts same as inflorescence bracts; pedicels short, articulate. Male: calyx tubular; tube 5–7 mm; lobes sub-circular; petals obovate, 6–7 mm, obtuse and laciniate; filaments flat, short, connate at base; anthers linear-oblong, connective produced in linear appendages; disk glands sub-circular; pistillode minute. Female: calyx, petals and disk glands same as in male flowers; staminodes subulate; ovary ellipsoid, stipitate; style short, connate at base, 3-fid above; stigma capitate, laciniate. Berries reddish, ellipsoid, pulpy; seeds many, reniform-orbicular, pitted, arillate.

Flowering & Fruiting: June–October.

Distribution. India: Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 62677.

Cucurbitaceae

Key to the genera

- 1a. Corolla lobes fimbriate (entire in *Trichosanthes costata*), white at least within 2
1b. Corolla lobes entire, mostly yellow, sometimes white 3
- 2a. Leaves coriaceous; calyx tube 7–10 cm; fruit globose, 7–15 cm in diameter; ovules 12, seeds usually 6, each with 1 abortive seed attached to its side 3. *Hodgsonia*
2b. Leaves chartaceous; calyx tube 1.5–5 cm; fruit oblong/ovoid-oblong, 1–12.5 cm; ovules and seeds numerous 8. *Trichosanthes*
- 3a. Stem terete; leaves palmately 5-lobed; female flowers in fascicles; berries red or green with white spots, clustered 2. *Diplocyclos*
3b. Stem angular; leaves shallowly or pedately lobed; female flowers usually solitary (sometimes fascicles in *Mukia maderaspatana*); berries variously coloured without white spots, not clustered 4
- 4a. Plants usually dioecious (except *Solena* where it is dioecious or monoecious); stems keeled; floral bracts sub-orbicular 5
4b. Plants usually monoecious rarely dioecious (except *Mukia*); stems furrowed; floral bracts absent or present, if present then, not sub-orbicular 6
- 5a. Flowers solitary; corolla lobes fairly large, 2–3 cm 5. *Momordica*
5b. Flowers usually several to many; corolla lobes smaller, 0.5–0.7 mm 7. *Solena*
- 6a. Flowers yellow 7
6b. Flowers white 8
- 7a. Plants monoecious; tendrils branched; leaves shallowly 5–7-lobed; anther cells flexuous; berries green when ripe, oblong-cylindric, dehisced by an apical lid, fibrous within 4. *Luffa*

- 7b. Plants dioecious; tendrils simple; leaves shallowly 3-lobed; anther cells straight or curved; berries red when ripe, globose, indehiscent, not fibrous within **6. Mukia**
- 8a. Stems scabrous; tendrils hispid; leaves orbicular or cordate-ovate, shallowly 3-5-lobed; male inflorescences fascicles; anther cells conduplicate, connective produced, tuft of yellow scales absent outside; berries large; seeds lanceolate, rounded at base **1. Cucumis**
- 8b. Stems glabrous; tendrils glabrous; leaves triangular-ovate, shallowly 3-lobed; male inflorescences corymbose or sub-umbellate cymes or solitary or 2-3-flowered racemes; anther cells straight or curved, connective not produced, tuft of yellow scales outside; berries small; seeds ovate, attenuate at base **9. Zehneria**

1. Cucumis L.

Cucumis melo L., Sp. Pl. 2: 1011. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2: 620. 1879; Prain, Bengal Pl. 1: 522. 1903.

Karbuḥ, kakri (H).

Climbing herb; tendrils axillary. Leaves suborbicular or reniform, 4-7 × 4.8-8 cm, cordate, dentate, hairy, obtuse, with mucronate tip, scabrous above, puberulent below; pedicels short, pubescent. Male: calyx campanulate, pubescent; tube c. 5 mm; lobes linear, pubescent; corolla campanulate, pubescent on nerves; tube short; lobes orbicular; filaments flat, short, pubescent; anthers ellipsoid, glandular crest above, fused; pistillode urceolate. Female: calyx and corolla same as in male flowers; ovary globose or ellipsoid, hairy; style short; stigma 3-lobed; disk annular. Berries variable in size, shape, color, pubescent when young; seeds many, yellow-white, ovate-oblong, compressed.

Flowering & Fruiting: September-October.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Newlands, Sukno river, 22.09.2011, AK 52775.

2. Diplocyclos (Endl.) T. Post & Kuntze

Diplocyclos palmatus (L.) C. Jeffrey, Kew Bull. 15(3): 325. 1962. *Bryonia palmata* L., Sp. Pl. 2: 1012. 1753. **[Plate 93b-c]**

Bon Kakra (N).

Climbing herb; tendrils bifid, coiled. Leaves broadly ovate, 8-12 cm across, membranous, glabrescent; middle lobe oblong-lanceolate, 8-10 × 2-3.5 cm, acuminate or obtuse; lateral lobes short, lanceolate or oblong-lanceolate. Inflorescences usually fascicles in male and female from same axil. Male: calyx

short tubular; lobes subulate; corolla yellowish, campanulate; tube c. 5 mm; lobes ovate; filaments short; anthers ovoid. Female: pedicels, calyx and corolla same as in male flowers; staminodes 3; style short, 3-fid; stigma 2-lobed. Berries globose; seeds many, ovate, compressed.

Flowering & Fruiting: June–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Lakshadweep, Madhya Pradesh, Chhattisgarh, Maharashtra, Manipur, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Tashigaon, JKS 4031; Jainti range, 09.10.2009, SKS & GK 46260; Sankosh, 28.09.2011, AK 52990.

3. *Hodgsonia* Hook. f. & Thomson

Hodgsonia heteroclita (Roxb.) Hook. f. & Thomson, Proc. Linn. Soc. London 2: 257. 1854; C. B. Clarke in Hook. f., Fl. Brit. India 2: 606. 1879; Prain, Bengal Pl. 1: 516. 1903. *Trichosanthes heteroclita* Roxb., Fl. Ind. 3: 705. 1832. [Plate 93d]

Gulur (B).

Climbing shrub. Leaves suborbicular, 15–17 × 16.5–22 cm, palmately 3–5-lobed; lobes ovate-oblong, 3.5–10.2 × 3.3–6 cm, cordate, entire, acuminate, leathery. Male inflorescences racemes; rachis 10–15 cm, striate, puberulent, stout; bracts triangular ovate, acute, gland-dotted; pedicels glabrous or puberulent. Calyx tubular below, 5-toothed above; tube 8–10 cm, brown tomentose, gland-dotted outside; lobes triangular-lanceolate. Petals yellow-cream outside, white inside, 5-lobed; lobes fimbriate. Female: flower solitary; pedicels robust, short. Sepals and petals as in male flowers. Ovary sub-globose; stigma 3-lobed, lobes bifid. Berries reddish brown, compressed globose, shallowly grooved, brown tomentose; seeds many, ellipsoid.

Flowering & Fruiting: June–April.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura and West Bengal.

Specimens examined: 21st mile road, 13.05.1949, VN & party 2325; Jainti 6a–7, 05.03.2011, GK 47266.

4. *Luffa* Mill.

Key to the species

- 1a. Tendrils 4 or 5-fid, pubescent; leaves 5–7-lobed, scabrous above; corolla lobes obovate, emarginate; stamens 3; filaments 3–4 mm, pubescent; ovary angular, glabrous; berries angular, 8–10-keeled; seeds creamy white, not winged

1. *L. acutangula*

Botanical Survey of India

- 1b. Tendrils 3-fid, glabrous; leaves 5-lobed, glabrous above; corolla lobes obovate, rounded; stamens 5, rarely 3; filaments c. 7 mm, glabrous; ovary terete, puberulent; berries terete, smooth; seeds black, winged at margins **2. *L. cylindrica***

1. *Luffa acutangula* (L.) Roxb., Fl. Ind. 3: 713. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2: 615. 1879; Prain, Bengal Pl. 2: 520. 1903. *Cucumis acutangula* L., Sp. Pl. 2: 1011. 1753. *Luffa amara* Roxb., Fl. Ind. 3: 713. 1832. *Luffa acutangula* var. *amara* (Roxb.) C. B. Clarke in Hook. f., Fl. Brit. India 2: 615. 1879.

Jhinga (B).

Climbing herb, pubescent when young; tendrils axillary, striated, pubescent. Leaves 8–9 × 7.5–8 cm, cordate, dentate, short acuminate, scabrous below. Inflorescences axillary, elongated racemes in males; pedicels angular, pubescent; floral bracts obovate or spatulate, pubescent. Male: calyx campanulate, pubescent; tube short; lobes lanceolate; corolla campanulate; tube short; lobes nerved; anthers fused, puberulent. Female: calyx and corolla same as in male flowers; staminodes 3; ovary oblong; style short; stigma 2-lobed. Berries 12–20 cm; seeds many, elliptic, compressed.

Flowering & Fruiting: September–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Jharkhand, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Lakshadweep, Madhya Pradesh, Chhattisgarh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Narathali, 23.09.2011, AK 52826.

2. *Luffa cylindrica* (L.) M. Roem., Fam. Nat. Syn. Monogr. 2: 63. 1846. *Momordica cylindrica* L., Sp. Pl. 2: 1009. 1753. *Luffa aegyptiaca* Mill., Gard. Dict., ed. 8. 1768.

Dhundul (B).

Climbing herb, sparsely pubescent; tendrils axillary. Leaves c. 13 × 14 cm, cordate, coriaceous, scabrous below; lobes triangular-ovate, 3–7 × 3.4–5 cm, denticulate or entire, acute. Inflorescences racemes in males; pedicels hispid. Calyx tubular below; tube short; lobes oblong-ovate. Corolla campanulate; tube short; lobes 2–4 × 2–2.8 cm; anthers fused, puberulent. Female: calyx and corolla same as in male flowers; staminodes 5, rarely 3; ovary cylindrical; style short; stigma 2-lobed. Berries 10–dark green lined longitudinally; seeds many, elliptic, compressed.

Flowering & Fruiting: July–December.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Lakshadweep, Madhya Pradesh, Chhattisgarh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Jainti range, 06.10.2009, SKS & GK 46187; Sankosh, 28.09.2011, AK 52985; Santrabari to Chumabhathi, 04.10.2013, AK 59777.

5. *Momordica* L.

Key to the species

- 1a. Plants monoecious; leaves suborbicular, pedately 5-7-lobed; bract on middle of male pedicel 1 *M. charantia*
1b. Plants dioecious; leaves ovate, lobed or not; bract at apex of male pedicel 2. *M. dioica*

1. *Momordica charantia* L., Sp. Pl. 2: 1009. 1753. *Momordica charantia* var. *muricata* (Willd.) Chakrav., Fasc. Fl. India 11: 92. 1982.

Karela (B, N).

Monoecious, climbing herb, pubescent; tendrils axillary, simple, c. 10 cm, coiled, puberulent. Leaves ovate or suborbicular, 1.5-6 × 1.5-6 cm, cordate, pedately 5-7-lobed, chartaceous, white pubescent at first, later glabrescent, green, pubescent; lobes ovate-oblong, 8-36 × 5-20 mm, obtuse or acute at apex, crenate or irregularly lobed, chartaceous, green, pubescent. Male: flower solitary in axils of leaves; pedicels slender, puberulent, with median bract; bracts suborbicular, c. 5 × 5 mm, entire, puberulent; calyx lobes ovate-lanceolate, white pubescent, acute apex; petals yellow; lobes oblong, obtuse at apex, pubescent; stamens 3; anthers free. Female: flower solitary; pedicel 4-6 cm, bracteate; ovary c. 7 mm, verrucose; stigmas 2-lobed. Fruits ellipsoid, tuberculate; seeds many, oblong, sub-compressed, sculptured, embedded in red pulp.

Flowering & Fruiting: March-October.

Distribution. India: Andhra Pradesh, Bihar, Goa, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Karnataka, Kerala, Tamil Nadu and West Bengal.

Specimens examined: Rajabhatkhawa, 21 mile road, 13.05.1949, VN & party 2344; Rajabhatkhawa Depot Road, 14.05.1949, VN & party 2386; Rajabhatkhawa range, 12.03.2011, GK 50543; Santrabari, 05.10.2009, SKS & GK 46151.

2. *Momordica dioica* Roxb. ex Willd., Sp. Pl. 4 (1): 605. 1805; C. B. Clarke in Hook. f., Fl. Brit. India 2: 617. 1879; Prain, Bengal Pl. 1: 521. 1903.

Climbing herb, pubescent; tendrils coiled, puberulent. Leaves ovate or sub-orbicular, pedately 5-7-lobed, 1.5-6 cm across, cordate, pubescent; lobes ovate-oblong, 0.8-3.5 × 0.5-2 cm, crenate or irregularly lobed. Inflorescence axillary, solitary. Male: floral bracts puberulent; pedicels 1-4.5 cm, puberulent; calyx campanulate; tube short; lobes ovate-lanceolate, white pubescent; corolla yellow, campanulate; lobes oblong-obovate, pubescent; filaments short; anthers fused. Female: floral bracts same as in male flowers; pedicels 4-6 cm, puberulent; calyx

and corolla same as in male flowers; ovary c. 7 mm; style short; stigma 2-lobed. Berries yellow when ripe, ellipsoid, beaked, pulpy; seeds many, oblong, sub-compressed.

Flowering & Fruiting: May–October.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Phashkhawa, 27.09.2012, AK 56190.

6. *Mukia* Arn.

Mukia maderaspatana (L.) M. Roem., *Fam. Nat. Syn. Monogr.* 2: 47. 1846. *Cucumis maderaspatanus* L., *Sp. Pl.* 2: 1012. 1753. *Mukia scabrella* Arn. in Hook., *J. Bot.* 3: 276. 1841; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 623. 1879.

[Plate 94a-b]

Bilari (B, N).

Climbing herb, hispid. Leaves broadly ovate, shallowly 3-lobed, 3.5–7 × 3.5–7 cm, cordate, toothed, obtuse or acuminate, sub-coriaceous, scabrous. Inflorescence solitary or sometimes fascicles in females. Flowers sessile or sub-sessile. Male: calyx campanulate; tube short; lobes subulate, reflexed; corolla campanulate; tube short; lobes ovate-oblong, obtuse; filaments short, sparsely pilose; anthers oblong, ciliate; pistillode globose. Female: calyx and corolla same as in male flowers; ovary hispid; style short; stigma 2 or 3-lobed. Berries red, globose, hispid; seeds many, ovate, scrobiculate, indistinctly marginate, rough.

Flowering & Fruiting: August–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Goa, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Rajasthan, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Sankosh, 28.09.2011, AK 52986; Hauda nala, 03.10.2012, AK 58675.

7. *Solena* Lour.

Solena heterophylla Lour., *Fl. Cochinch.* 2: 514. 1790.

[Plate 94c]

Perennial, climbing herb, pilose; tendrils leaf opposed, simple. Leaves ovate, sub-orbicular, lanceolate, sagittate, 8–15.5 × 3.1–8 cm, cordate, remotely denticulate at margin, acute, echinate above, glabrous beneath. Male flowers axillary, fascicles; pedicel 7–10 mm, angled, hairy; calyx tube campanulate, glabrous; lobes 5, subulate; corolla 5-lobed; lobes 0.5–0.7 mm; tube c. 1.5 mm; stamens 3; filaments

flattened, 2.5–3 mm; anthers sub-orbicular. Female flower solitary, axillary, with few male flowers. Fruits oblong, brown, many seeded; seeds grey, 5–7 × 4–5 mm.

Flowering & Fruiting: March–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 08.10.2009, SKS & GK 46221; Rajabhatkhowa range, Bala river, SRVK 6, 09.03.2011, GK 50522.

8. *Trichosanthes* L.

Key to the species

- | | |
|--|---------------------------|
| 1a. Berries longitudinally 10-keeled; seeds rugulose | 2. <i>T. costata</i> |
| 1b. Berries smooth; seeds rugose or not | 2 |
| 2a. Leaves acute at apex; veins 5 from base; petioles punctate; calyx glabrous outside; corolla glabrous outside; anthers c. 1 cm; filaments villous; ovary angular, glabrous | 4. <i>T. tricuspidata</i> |
| 2b. Leaves acuminate at apex; veins 3 from base; petioles not punctate; calyx variously hairy; corolla papillose or sparsely puberulent outside; filaments glabrous; anthers less than 1 cm; ovary terete, pubescent | 3 |
| 3a. Leaves not lobed, scabrous and punctate above; floral bracts toothed towards apex; calyx tube pubescent inside; corolla papillose outside; style solitary; berries globose; seeds convoluted | 1. <i>T. cordata</i> |
| 3b. Leaves shallowly 3-lobed, glabrous above; floral bracts entire throughout; calyx tube glabrous inside; corolla sparsely puberulent outside; styles 3; berries ovoid or fusiform; seeds not convoluted | 3. <i>T. ovigera</i> |

1. *Trichosanthes cordata* Roxb., Fl. Ind. 3: 703. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2: 608. 1879; Prain, Bengal Pl. 2: 518. 1903.

Climbing herb; stems swollen and hairy at nodes, glabrous to glabrescent; tendrils axillary, angular, glabrous or glabrescent. Leaves broadly ovate, 5–12 × 2.3–10 cm, cordate, crenate-dentate and hairy, scabrous below; petioles angular, 4–7.2 cm, striated, sparsely hairy. Inflorescence axillary, elongate racemes in males; floral bracts obovate or elliptic-oblong, acuminate, glabrous to pilose; pedicels short, pubescent. Male: calyx tubular, pubescent; tube 4–4.2 cm; lobes oblong-lanceolate, 1.5–2 × 0.4–0.5 cm, acuminate; corolla campanulate; tube short; lobes obovate, 1.4–1.5 × 1.2–1.4 cm; filaments flat, short; anthers oblong, fused, pubescent. Female: calyx and corolla same as in male flowers; ovary linear-oblong; style short; stigma 2-lobed. Berries red when ripe, 4–5 cm across; seeds many, obovoid.

Flowering & Fruiting: August–November.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Checko-1, 26.09.2012, AK 56161.

2. *Trichosanthes costata* Blume, Bijdr. Fl. Ned. Ind. 15: 933. 1826. *Gymnopetalum cochinchinense* (Lour.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 40 (1): 57. 1871; C. B. Clarke in Hook. f., Fl. Brit. India 2: 611. 1879; Prain, Bengal Pl. 2: 518. 1903. [Plate 94d]

Climbing herb, pilose; tendrils striated, sparsely pilose. Leaves cordate, membranous, white stiff scabrous hairy above, pilose or puberulent below; lobes lanceolate, 4–7 × 4.8–8 cm, distantly dentate, acuminate. Inflorescence 2–3-flowered racemes in males; floral bracts pilose; pedicels short, pilose. Male: calyx tubular; tube c. 1.3 cm, pubescent; lobes linear, pubescent; corolla campanulate; tube cylindric, 3–3.5 mm, pilose inside; lobes obovate, 1.8–2.2 × 0.5–0.8 cm, sparsely pilose; filaments short; anthers fused, c. 5 mm; pistillodes bifid. Female: calyx and corolla same as in male flowers; staminodes 3; ovary oblong, 0.8–1 cm, villous; style 5–6 mm; stigma 3-lobed. Berries yellowish green to orange red, 4.5–5 × 2.5–3 cm, pilose on keels; seeds many, ovate, compressed.

Flowering & Fruiting: July–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52717; Newlands, Sukno river, 22.09.2011, AK 52744; Checko-1, 26.09.2012, AK 56169.

3. *Trichosanthes ovigera* Blume, Bijdr. Fl. Ned. Ind. 15: 934. 1826. *Trichosanthes himalensis* C. B. Clarke in Hook. f., Fl. Brit. India 2: 608. 1879 (incl. var. *glabrior*).

Climbing herb, pilose or sparsely puberulent; tendrils angular, striated, pilose. Leaves broadly sub-orbicular, cordate at base; lobes triangular or ovate, 6–21.5 × 3.5–15.5 cm, dentate or crenate-dentate and hairy, acuminate, sparsely hairy below. Inflorescences axillary, racemes in male; floral bracts oblong or oblong-lanceolate, acuminate or acute; pedicels 0.4–1.4 cm. Male: calyx tubular; tube 3.8–4.2 cm, papillose or puberulent; lobes oblong-lanceolate, 5–6 mm, puberulent; corolla campanulate; tube short; lobes 4 or 5, lanceolate or oblong-lanceolate, 5–7 mm, sparsely puberulent inside; filaments short; anthers fused. Female: pedicels 1–1.2 cm, striated, pubescent; calyx and corolla same as in male flowers; ovary

ovoid-oblong, 1–1.2 cm; stigma 2-lobed. Berries 4.5–8 × 1.7–2.7 cm, pulpy; seeds many, ellipsoid.

Flowering & Fruiting: October–March.

Distribution. India: Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 46253; Pana, 08.10.2012, AK 58725; Buxa Fort to Tashigaon, 01.10.2013, AK 59716.

4. *Trichosanthes tricuspidata* Lour., Fl. Cochinch. 2: 589. 1790. *Trichosanthes palmata* Roxb., Fl. Ind. 3: 704. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2: 606. 1879; Prain, Bengal Pl. 1: 518. 1903.

Climbing herb; tendrils axillary. Leaves broadly ovate-cordate, shallowly 3-lobed, 9–14 × 6.5–11.4 cm, cordate, dentate, sub-coriaceous, punctate above, glabrous or pubescent below. Inflorescences axillary, elongated racemes in males. Flowers sub-sessile. Male: floral bracts obovate-oblong, puberulous; calyx tubular; tube cylindrical, 4–5 cm, striated; lobes 1.2–1.5 × 0.3–0.4 cm, acuminate, denticulate; corolla campanulate; tube short; lobes 4 or 5, oblong-lanceolate, sparsely puberulent; filaments short; anthers fused. Female: calyx and corolla same as in male flowers; staminodes 3; ovary cylindrical; styles 3; stigma 2-lobed. Berries red when ripe, globose or ellipsoid, 5–10.8 × 2–8.5 cm, pulpy; seeds many, elliptic, compressed.

Flowering & Fruiting: June–October.

Distribution. India: Arunachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Buxa-Bhutan road, 20.05.1949, VN 2770; Kumargram, 19.09.2011, AK 52638; Narathali, 23.09.2011, AK 52822; Checko-1, 25.09.2012, AK 56129.

9. *Zehneria* Endl.

Key to the species

- 1a. Leaves punctate above; veins 3 from base; male inflorescence solitary or 2–3-flowered racemes; calyx lobes puberulent; anthers rhomboid, acuminate at apex, glabrous
1. *Z. japonica*
- 1b. Leaves not punctate above; veins 5–7 from base; male inflorescence corymb; calyx lobes glabrous; anthers elliptic, not acuminate at apex, pubescent along edges
2. *Z. maysorensis*

1. *Zehneria japonica* (Thunb.) H. Y. Liu, Bull. Natl. Mus. Nat. Sci., Taichung. 1: 40. 1989. *Bryonia japonica* Thunb. in Murray, Syst. Veg., ed. 14. 870. 1784. *Melothria indica* Lour., Fl. Cochinch. 1: 35. 1790; C. B. Clarke in Hook. f., Fl. Brit. India 2: 626. 1879; Prain, Bengal Pl. 2: 526. 1903.

Climbing herb. Leaves 2–6.5 cm across, truncate or subcordate, dentate, acute or acuminate, scaly above. Male: calyx campanulate; tube short; lobes linear; corolla campanulate, puberulent; tube short; lobes ovate; filaments short; anthers incurved; pistillodes obovate. Female: calyx and corolla same as in male flowers. staminodes minute; ovary ellipsoid; style short; stigma 3-lobed; disk annular, faintly grooved. Berries red when ripe, ellipsoid to sub-globose, 6–9 mm, corolla persistent; seeds many.

Flowering & Fruiting: August–March.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Meghalaya, Nagaland, Punjab, Sikkim, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Tashigaon, JKS 4023; Newlands, 15.02.2012, AK 55633; Checko-1, 25.09.2012, AK 56143; Buxa Fort to Chunabhati, 30.09.2013, AK 59699.

2. *Zehneria maysorensis* (Wight & Arn.) Arn. in Hook., J. Bot. 3: 275. 1841. *Bryonia maysorensis* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 345. 1834.

Climbing herb. Leaves triangular-ovate, shallowly lobed, 3.5–7 × 2.8–7 cm, sub-truncate or subcordate, dentate and hairy, acute or acuminate, glabrous or scaly pubescent; pedicels short. Male: calyx campanulate; tube short; lobes linear; corolla campanulate, puberulent; tube short, pilose inside; lobes ovate. filaments flat, short; anthers small; pistillodes globose. Female: calyx and corolla same as in male flowers; staminodes small; ovary ellipsoid; style short; stigma 3-lobed; disk annular, faintly grooved. Berries red when ripe, globose, c. 5 mm across, corolla persistent, pulpy; seeds many.

Flowering & Fruiting: August–November.

Distribution. India: Andhra Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu and West Bengal.

Specimens examined: Rangamati to Bharnabari, 06.10.2012, AK58715; Buxa Fort to Chunabhati, 30.09.2013, AK 59698.

Begoniaceae

Begonia L.

Key to the species

- | | |
|---|-------------------------|
| 1a. Capsule turbinate, blotched pink, not winged | 4. <i>B. roxburghii</i> |
| 1b. Capsules not turbinate, not blotched distinctly winged | 2 |
| 2a. Stems well develop, zig-zag; radical leaves absent, asymmetric, strongly oblique at base; female flowers symmetric; male perianth 2; female perianth usually 2, rarely 3; lateral wings of fruits narrow, not prominent | 2. <i>B. nepalensis</i> |

- 2b. Stems very short, straight; radical leaves present, symmetric, slightly oblique at base (except *B. xanthina*); female flowers asymmetric; male perianth 4; female perianth 5; lateral wings of fruits broad, prominent. 3
- 3a. Tuberous; leaves green below; stipules minute; inflorescence bracts not spatheaceous; outer male perianth pink or white. 3. *B. ovatifolia*
- 3b. Rhizomatous; leaves not green below; stipules large; inflorescence bracts spatheaceous; outer male perianth not pink or white. 4
- 4a. Stems branched; leaves reddish and red brown floccose including veins below, cauline leaves present; outer male perianth reddish, inner pinkish white; stamens free, unequal; anthers linear-oblong, connective produced in prominently sub-rounded apex. 1. *B. hatacoa*
- 4b. Stems unbranched; leaves variegated reddish-green and glabrous except veins below, cauline leaves absent; outer male perianth orange yellow, inner yellow; stamens connate at base, equal; anthers obovate, connective produced in apiculate to mucronate apex. 5. *B. xanthina*

1. *Begonia hatacoa* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 223. 1825. *Begonia rubrovenia* Hook., Bot. Mag. 79: t. 4689. 1853; C. B. Clarke in Hook. f., Fl. Brit. India 2: 645. 1879. [Plate 95a-c]

Succulent herb, 10–30 cm high, reddish brown floccose. Leaves broadly ovate, 6–17 × 3–10.5 cm, subcordate, denticulate, acuminate, succulent; stipules ovate to lanceolate, obtuse to acuminate, 1-nerved. Inflorescences in cymes; inflorescence bracts elliptic, concave, caducous; floral bracts same as inflorescence bracts; pedicels red, c. 5 mm, articulate. Male: perianth in 2 whorls; outer pair obovate, connate at base, red parallel nerved; inner pair elliptic-obovate to oblong-obovate; stamens many; filaments yellow. Female: perianth unequal, outer ones larger than inner ones; outer ovate; inner oblong or lanceolate; ovary reddish, yellowish spotted, 3-winged, sparsely hairy to glabrous; style yellow, bifid above, pubescent; stigma yellow, tortuously branched, setose. Capsules reddish, yellow spotted, ellipsoid, 0.9–1.4 × 0.4–0.6 cm, unequally 3-winged, reflexed later; lateral wings triangular, reticulately nerved; central wing falcate, obtuse, keeled; seeds many.

Flowering & Fruiting: April–September.

Distribution. India: Arunachal Pradesh, Sikkim and West Bengal.

Specimens examined: Bhutan road, JKS 2576; Tobgaon, 18.05.1949, VN & Party 2692; Buxaduar, JKS 4050; Jainti range, Jainti 5a, 09.10.2009, SKS & GK 46259; Buxa Fort to Achalung, 29.09.2013, AK 59631; Buxaduar to Achalung, 19.05.2014, AK 62653.

2. *Begonia nepalensis* (A. DC.) Warb., Nat. Pflanzenfam. 3 (6a): 142. 1894. *Mezierea nepalensis* A. DC., Ann. Sci. Nat., Bot. IV, 11: 144. 1859. *Begonia gigantea* (A. DC.) Wall. ex C. B. Clarke in Hook. f., Fl. Brit. India 2: 643. 1879, *nom. superfl.* [Plate 95d, 96a-b]

Succulent herb, 70–80 cm high. Leaves ovate to lanceolate, 10–24 × 25–8 cm, asymmetrically rounded at base in young leaves, asymmetrically cordate-rounded at base in mature leaves, shallowly toothed, caudate-acuminate, punctate below. Inflorescences terminal cymes; inflorescence bracts spathaceous, elliptic to ovate-lanceolate, ciliate, sub-acute, concave, membranous, caducous; floral bracts same as inflorescence bracts; pedicels red, pubescent. Male: perianth pinkish white, broadly ovate, 4–8 × 3–7 cm, subcordate and slightly connate at base, many nerved, pubescent near base when young; stamens many, unequal; filaments short; anthers obdeltoid, connective truncate. Female: perianth sometimes 3, or else same as in male flowers; ovary ellipsoid, 3-lobed, pubescent; style bifid; stigma tortuously branched, setose. Capsules reddish green, ellipsoid, unequally 3-winged, reflexed; lateral wings small; central wing triangular, sub-acute to obtuse, nerves prominent; seeds many.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Sikkim and West Bengal.

Specimens examined: Way to Buxaduar, *KPB* 1930; on way to Buxaduar, 26.11.1975, *JKS* 934; *NRVK* 5a, 06.12.2011, *GK* 52350; Bhutri, 13.02.2013, *AK* 58889; Santrabari to Buxa Fort, 28.09.2013, *AK* 59628; Hauda nala, 19.02.2013, *AK* 59844.

3. *Begonia ovatifolia* A. DC., *Ann. Sci. Nat., Bot., Ser. 4*, 11: 132. 1859; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 642. 1879. [Plate 96c-d]

Herb, 10–15 cm high. Leaves sub-orbicular to broadly ovate, 4–10 × 4.4–8.5 cm, subcordate or rounded at base, crenate-dentate, acute to acuminate, punctate; stipules lanceolate, acuminate, deciduous. Inflorescences axillary, terminal cymes or directly emerge from rhizomes; inflorescence bracts ovate, ciliate; floral bracts same as inflorescence bracts; pedicels 1.2–1.7 cm. Male: perianth in 2 whorls, unequal; outer pair obovate, slightly connate at base; inner pair obovate to oblong-obovate; stamens many, connate at base; filaments minute; anthers obovoid to sub-orbicular, connective verruculose, produced in rounded apex. Female: perianth asymmetric; outer elliptic; inner oblong; largest one ovate, c. 4 × 5 mm; ovary elliptic-oblong; style bifid above; stigma tortuously branched, setose. Capsules reddish green, ellipsoid, unequally 3-winged; lateral wings circular to triangular, c. 6 × 8–9 mm, obtuse, nerves prominent; central wing falcate, c. 1.5 × 0.8–1 cm, sub-acute, nerves prominent; seeds many.

Flowering & Fruiting: August–October.

Distribution. India: Sikkim and West Bengal.

Specimens examined: Tashigaon 1, 05.10.2009, *SKS* & *GK* 46171; Hatijhora, on way to Mahakal cave, 01.10.2012, *AK* 58567; Hatijhora, on way to Mahakal cave, 01.10.2012, *AK* 58597; Santrabari, 27.09.2013, *AK* 59610.

4. *Begonia roxburghii* (Miq.) A. DC., Prodr. 15 (1): 398. 1864; C. B. Clarke in Hook. f., Fl. Brit. India 2: 635. 1879. *Diploclinium roxburghii* Miq., Fl. Ned. Ind. 1 (1): 692. 1856. [Plate 97a-b]

Succulent herb, 30–120 cm high. Leaves asymmetrically ovate-cordate, 4.5–16 × 2.7–9.4 cm, acuminate at apex, remotely denticulate, obliquely cordate at base, chartaceous, sparsely pubescent above or glabrous; stipules oblong-lanceolate, c. 1 cm, acuminate. Inflorescence short axillary cymes; bracts ovate-lanceolate, c. 1 cm. Male: Perianth light pink to white, 4, in opposite decussate; stamens many; filaments short; anthers clavate, 4.3–4.5 mm. Female: Perianth light pink to white, 4, as in male flowers but larger than male flowers; outer 2, ovate, 2.5–3.2 × 1.8–2 cm; inner 2, obovate or oblong, 1.8–2 × 0.7–1 cm; ovary obovoid, 4-locular, subglabrous; styles 4, bifid from the base; stigma spiral with 3 turns, yellow. Capsules pedant, 4-angular, succulent, red spotted with greenish yellow base, each angle distinctly ribbed but without wings; fruiting pedicels 10–20 mm.

Flowering & Fruiting: April–November.

Distribution. India: Arunachal Pradesh, Mizoram, Sikkim and West Bengal.

Specimen examined: SRVK 12, 29.11.2011, GK 47172.

5. *Begonia xanthina* Hook., Bot. Mag. 78: t. 4683. 1852; C. B. Clarke in Hook. f., Fl. Brit. India 2: 644. 1879. [Plate 97c; Fig. 31]

Herb, 20–35 cm high, floccose. Leaves sub-orbicular to broadly ovate, 8–17 × 6–11.5 cm, cordate, sinuate-denticulate, acuminate, succulent, variegated green above, punctate; stipules oblong-ovate. Inflorescence axillary, terminal cymes or directly emerge from rhizomes; inflorescence bracts elliptic-ovate, concave; floral bracts same as inflorescence bracts; pedicels 1–2 cm, articulate, puberulous to glabrescent. Male: perianth reddish tinged outside, in 2 whorls, unequal; outer pair reddish, parallel nerved, obovate to elliptic-obovate, slightly connate at base; inner pair elliptic, c. 6 × 3–3.5 mm; stamens many; filaments minute; anthers obovate. Female: perianth yellow, asymmetric; outer obovate or sub-orbicular; inner obovate; largest one reddish yellow, obovate or sub-orbicular, c. 8 × 7 mm; ovary obovoid, unequally 3-winged, sparsely puberulous; style bifid above; stigma tortuously branched, setose. Capsules reddish yellow, obovoid, 1.3–1.6 × 0.7–0.8 cm, unequally 3-winged, reflexed, hairy, turn glabrous; lateral wings transversally oblong; central wing triangular-falcate, obtuse, keeled; seeds many.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal.

Specimens examined: On way to Sinchu, JKS 4018; Tashigaon to Rovers point, 03.10.2013, AK 59757.

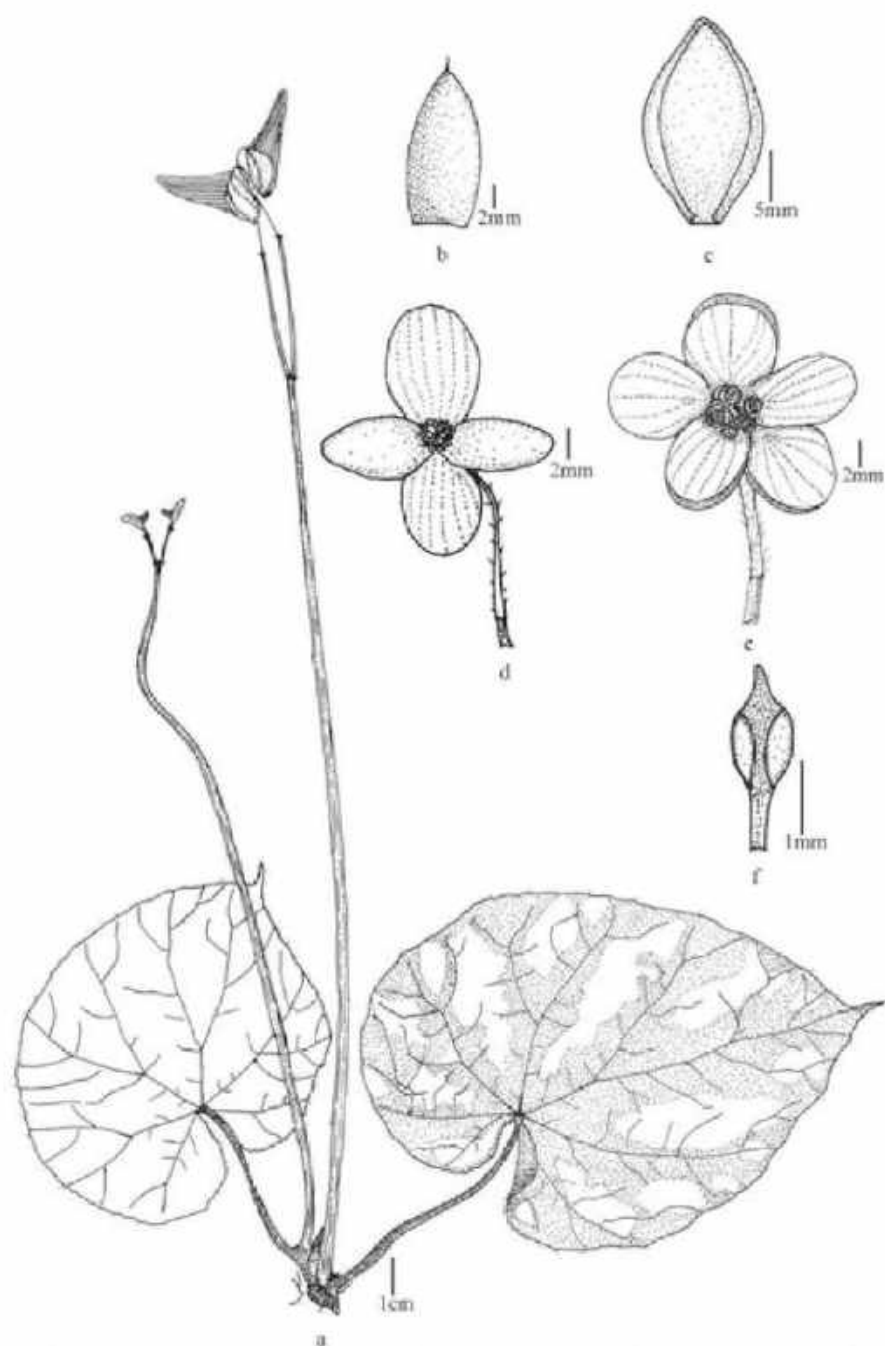


Fig. 31. *Begonia xanthina*: a. Habit with fruits; b. Stipule; c. Floral bract; d. Male flower; e. Female flower; f. Stamen (AK 59757).

Datiaceae

Tetrameles R. Br.

Tetrameles nudiflora R. Br., Pl. Jav. Rar.: 79, pl. 17. 1838; C. B. Clarke in Hook. f., Fl. Brit. India 2: 657. 1879; Prain, Bengal Pl. 1: 530. 1903.

Maina-kath, Moira (B, N).

Deciduous tree, to 50 m high, dioecious; root buttress. Leaves broadly ovate-orbicular, 6–15 × 5–14 cm, acute at apex, serrate, cordate at base, incision c. 1 cm, subcoriaceous, pubescent. Male: inflorescence terminal, lax panicles, c. 15 cm; rachis pubescent; pedicels c. 1 mm; bracts spatulate; sepals 5-lobed above, connate below; lobes unequal, triangular ovate, acute, entire, 3-nerved; petals absent; disk conspicuous; stamens 5; filaments c. 1 mm; anthers sub-globose, tetrahectous. Female: inflorescences pendulous; rachis c. 20 cm; sepals and petals as in male flowers; staminode absent; ovary 1-celled; style exerted; stigma obliquely club-shaped. Capsules obovoid, ribbed; seeds c. 1 mm.

Flowering & Fruiting: March–June.

Distribution. India: Andaman Islands, Sikkim, Western Ghats, Maharashtra, Tamil Nadu, Karnataka, Kerala and West Bengal.

Specimen examined: SRVK 11–12, 06.04.2012, GK 56044.

Notes: The flowers are very similar to that of *Bischofia javanica* (Euphorbiaceae); however, flowers appear (in *Tetrameles nudiflora*) when trees turn deciduous.

Molluginaceae

Key to the genera

- 1a. Stems terete, pubescent when young; petioles with out scarious membrane; inflorescences axillary, fascicles; stamens 3–15; ovary ovoid or ellipsoid, lobed
1. Glinus
- 1b. Stems angular, glabrous when young; petioles with scarious membrane; inflorescences terminal, leaf-opposed, branched cymes; stamens 3; ovary globose, not lobed
2. Mollugo

1. Glinus L.

Key to the species

- 1a. Stems stellate pubescent; leaves obovate, cuneate at base, stellate tomentose; floral bracts absent; pedicels stellate pubescent; perianth stellate tomentose outside; stamens 3–15; ovary ovoid, 5-lobed; styles 5; capsules 5-valved; seeds not tubercled
1. G. lotoides
- 1b. Stems sparsely pubescent; leaves oblanceolate, attenuate at base, glabrous; floral bracts present; pedicels glabrous; perianth glabrous outside; stamens 8; ovary ellipsoid, 3-lobed; styles 3; capsules 3-valved; seeds tubercled **2. G. oppositifolius**

1. *Glinus lotoides* L., Sp. Pl. 1: 463. 1753. *Mollugo hirta* Thunb., Prodr. Pl. Cap. 1: 24. 1794; C. B. Clarke in Hook. f., Fl. Brit. India 2: 662. 1879; Prain, Bengal Pl. 1: 533. 1903.

Herb, 10–15 cm, stellate pubescent when young, glabrous later. Leaves opposite or apparently whorled, obovate, 0.3–2 × 0.3–1 cm, acute at apex, coriaceous. Perianth oblong-lanceolate, 4–5 mm, scarious. Filaments short; anthers oblong. Styles short; stigma indistinct. Capsules ovoid, scarious; seeds many, reniform.

Flowering & Fruiting: December–March.

Distribution. India: Andhra Pradesh, Dadra, Goa, Karnataka, Madhya Pradesh, Maharashtra, Nagar Haveli, Rajasthan, Uttar Pradesh and West Bengal.

Specimen examined: Bhutanghat, 25.02.2012, AK 55926.

2. *Glinus oppositifolius* (L.) A. DC., Bull. Herb. Boissier, Ser. 2, 1: 559. 1901. *Mollugo oppositifolia* L., Sp. Pl. 1: 89. 1753. *Mollugo spergula* L., Syst. Nat., ed. 10. 2: 881. 1759; C. B. Clarke in Hook. f., Fl. Brit. India 2: 662. 1879; Prain, Bengal Pl. 1: 533. 1903.

Herb, 5–10 cm high, sparsely pubescent. Leaves opposite or apparently whorled, oblanceolate, 3–11 × 1–4 mm, hairy, acute at apex; floral bracts linear, sparsely pubescent. Perianth white, oblong-lanceolate, 3–3.5 mm, 1-nerved, scarious. Filaments flat, short; anthers elliptic-oblong. Stigma minute. Capsules ellipsoid, membranous; seeds many, reniform.

Flowering & Fruiting: September–February.

Distribution. India: Andhra Pradesh, Daman, Diu, Goa, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55797.

Mollugo L.

Mollugo pentaphylla L., Sp. Pl. 1: 89. 1753. *Mollugo stricta* L., Sp. Pl., ed. 2. 1: 131. 1762; C. B. Clarke in Hook. f., Fl. Brit. India 2: 663. 1879; Prain, Bengal Pl. 1: 533. 1903.

Khet papra (B).

Herb, 4.5–17.5 cm high. Leaves lanceolate or linear-lanceolate, 0.6–2.4 × 0.1–0.3 cm, attenuate at base, acute; floral bracts lanceolate or ovate, scarious; pedicels short. Perianth white, elliptic, scarious. Filaments short; anthers minute. Styles 3; stigma indistinct. Capsules globose, scarious; seeds many, reniform, tuberculate.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andhra Pradesh, Daman, Goa, Karnataka, Madhya Pradesh, Maharashtra, Nagar Haveli, Rajasthan, Uttar Pradesh and West Bengal.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52748; Kumargram, 18.02.2012, AK 55720; Phashkhawa river belt, 30.09.2012, AK 58545.

Apiaceae

Key to the genera

- 1a. Leaves simple, margins entire or toothed, sometimes shallowly lobed, but not more than half the width of the leaf 2
- 1b. Leaves compound, 1-5 × ternately or pinnately divided, or, if simple, then very lobed or basal 4. *Oenanthe*
- 2a. Aromatic plants; stems grooved; leaves sessile, radical and cauline, radical ones form rosette, cauline ones opposite, oblanceolate to oblong-oblanceolate or spatulate, sheathing at base, spinulose-serrate at margins; inflorescence an ovoid-oblong compact head, sessile 2. *Eryngium*
- 2b. Non-aromatic plants; stems not grooved; leaves petiolate, usually cauline, if radical ones present, then not form rosette, cauline ones alternate, sub-orbicular to reniform, not sheathing at base, not spinulose-serrate at margins; inflorescence a globose umbel, peduncled 3
- 3a. Stems puberulous; leaves reniform, dentate at margins; inflorescences simple umbels, surrounded by sheathing bracts, villous; petals 4; stamens 4; schizocarps ellipsoid to orbicular 1. *Centella*
- 3b. Stems glabrous; leaves not reniform, crenate at margins; inflorescences simple or compound umbels, not surrounded by sheathing bracts, glabrous; petals 5; stamens 5; schizocarps globose to sub-globose 3. *Hydrocotyle*

1. *Centella* L.

Centella asiatica (L.) Urb., Fl. Bras. 11 (1): 287. 1879. *Hydrocotyle asiatica* L., Sp. Pl. 1: 234. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2: 668. 1879; Prain, Bengal Pl. 1: 535. 1903. [Plate 98a]

Brahmamanduki (B, N).

Prostrate herb, 10-15 cm high. Leaves rosette, reniform, 1-2.5 × 1.5-5 cm, cordate at base, obtuse at apex, shallowly lobed or not. Inflorescence bracts oblong-ovate, puberulous. Flowers sub-sessile. Calyx obsolete or absent. Petals pinkish, triangular-ovate. Filaments short; anthers globose. Ovary flattened. Stylopodium dome-shaped. Schizocarps compressed, primary ridges prominent, secondary forming a network, glabrous to hirsute.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Lepchakhawa, JKS 945; Gadadhar range, 01.04.2012, GK 56012; Kumargram, 19.09.2011, AK 52640.

2. *Eryngium* L.

Eryngium foetidum L., Sp. Pl. 1: 232. 1753; P. K. Mukh. & Constance, Umbelliferae India: 19. 1993. [Plate 98b]

Jangli dhaniya (H, N).

Spreading herb, 15–20 cm high. Radical leaves lanceolate or oblanceolate, 3.5–8 × 1.5–2.5 cm, cuneate to decurrent, obtuse to rounded; cauline leaves same as radical ones. Inflorescence surrounded by a whorl of involucrel bracts; involucrel bracts 5–9, linear-lanceolate or elliptic, 1.3–2 × 0.2–0.4 cm, connate at base, 3–5 spiny toothed, acute and spine tipped, 3–5-nerved from base. Flowers sessile. Sepals ovate, concave, short acuminate, 1-nerved. Petals greenish white, oblanceolate to obovate, clawed, incurved, keeled inside, grooved outside. Filaments short; anthers ovate. Stylopodium 5-lobed. Ovary inferior; style bifid; stigma obscure. Schizocarps sub-globose to obovoid, bilobed, distinctly median grooved, compressed, verrucose.

Flowering & Fruiting: May–July.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Odisha, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa, 21 mile road, 13.05.1949, VN & party 2364; C. Morghat, 30.05.1975, JKS 410; Panbari 8, 31.03.2012, GK 50676; Santrabari to Buxaduar, 18.05.2014, AK 62617.

3. *Hydrocotyle* L.

Key to the species

- 1a. Stems not rooting from nodes; leaves radical and cauline, ovate-orbicular, distinctly 5–7-lobed, glabrous beneath; stipules present; umbels 10–15; shizocarps subcordate at base, rugose
1. *H. javanica*
- 1b. Stems rooting from nodes; leaves cauline only, orbicular-reniform, indistinctly lobed, strigose beneath; umbel solitary; shizocarps rounded at base, smooth
2. *H. sibthorpioides*

1. *Hydrocotyle javanica* Thunb., Diss. Hydrocot. No. 17, Pl. 2. 1798; C. B. Clarke in Hook. f., Fl. Brit. India 2: 667. 1879. [Plate 98c, 99a]

Herb, 8–12 cm high. Leaves radical as well as cauline, similar, orbicular to reniform, shallowly 5–7-lobed, 2–4.5 × 3–5.5 cm, cordate at base; lobes triangular to rounded; stipules ovate to lanceolate, membranous. Involucrel bracts ovate to lanceolate; pedicels short. Petals white, lanceolate, membranous. Filaments short; anthers globose. Ovary inferior; styles 2, short; stigma clavate to capitate. Stylopodium dome-shaped. Shizocarps reddish brown to blackish, bilobed, distinctly median grooved, compressed.

Flowering & Fruiting: July–October.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, JKS 4671; on way to Sinchu, JKS 6964; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59672.

2. *Hydrocotyle sibthorpioides* Lam., *Encycl.* 3: 153. 1789; C. B. Clarke in Hook. f., *Fl. Brit. India* 2: 669. 1879. *Hydrocotyle rotundifolia* Roxb. ex DC., *Prodr.* 4: 64. 1830; Prain, *Bengal Pl.* 1: 535. 1903. [Plate 99b-c]

Prostrate herb, 10–20 cm. Leaves reniform, 5–7-lobed, reniform-rounded, 5–16 × 7–20 mm, cordate, rounded; lobes circular. Inflorescence bracts ovate, membranous, yellow brown marked. Flowers sessile or sub-sessile; floral bracts ovate-lanceolate. Calyx cupular; tube short; lobes acute. Petals greenish white, ovate, faintly keeled inside. Filaments short; anthers ellipsoid. Ovary inferior; styles 2; stigma capitate. Shizocarps compressed, keeled.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Sankosh, 17.02.2012, AK 55679.

4. *Oenanthe* L.

***Oenanthe javanica* (Blume) DC.,** *Prodr.* 4: 138. 1830; P. K. Mukh. & Constance, *Umbelliferae India:* 79. 1993, *p. p. Sium javanicum* Blume, *Bijdr. Fl. Ned. Ind.* 15: 881. 1826. *Oenanthe stolonifera* DC., *Prodr.* 4: 138. 1830. *Phellandrium stoloniferum* Roxb., *Fl. Ind.* 2: 93. 1832. [Plate 99d]

Pan-turas (B).

Stoloniferous herb, 60–120 cm. Leaves up to 30 cm, bi-pinnate; lobes ovate, 2–5 × 0.75–2.5 cm, cuneate, serrate, acute, chartaceous, glabrous. Inflorescence umbels, 5–8 cm across; peduncles 3.5–14 cm; bracteoles ovate, c. 1 × 4 mm, acute, chartaceous. Sepals 4-lobed, free above, connate below; lobes subulate, acute. Petals white or greenish-yellow, obovate, emarginated, glabrous. Stylopodium conic; styles patent, 1.2–2 mm. Fruits ellipsoid or ovoid; dorsal and intermediate ribs corky-thickened.

Flowering & Fruiting: April–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Rajabhatkhawa range, 29.04.1961, GP 24057.

Araliaceae

Key to the genera

- 1a. Stems with v-shaped scars of fallen leaves; leaves simple, sub-orbicular, 5-7-lobed, cordate at base, punctate below; veins 5-7 from base; petioles slightly swollen at base; inflorescences stellate tomentose; petals persistent; style connate throughout
2. Brassaiopsis
- 1b. Stems with other than v-shaped scars of fallen leaves; leaves compound; leaflets not sub-orbicular, not lobed, obliquely rounded or cuneate at base, not punctate below; veins pinnate; petioles strongly swollen at base; inflorescences glabrous; petals deciduous; style absent or slightly connate at base
2
- 2a. Small trees; stems armed; leaves bipinnately compound; stipules absent; leaflets obliquely rounded at base, serrate at margins; inflorescence prickly; flowers polygamo-monoecious; calyx 5-lobed; petals imbricate in buds, scarious at margins, keeled; style present; fruits smooth
1. Aralia
- 2b. Climbing shrubs; stems unarmed; leaves digitately compound; stipules present; leaflets cuneate at base, entire at margins; inflorescence not prickly; flowers bisexual; calyx not lobed; petals valvate in buds, not scarious at margins, not keeled; style absent; fruits 5-keeled
3. Schefflera

1. Aralia L.

Aralia foliolosa Seem. ex C. B. Clarke in Hook. f., Fl. Brit. India 2: 723. 1879; Prain, Bengal Pl. 1: 542. 1903. *Aralia foliolosa* Wall. ex C. B. Clarke var. *sikkimensis* C. B. Clarke in Hook. f., Fl. Brit. India 2: 723. 1879. [Plate 100a]

Somri (N).

Tree, 4-6 m high, armed. Leaves occasionally 4-pinnate; pinnae 7-11-foliolate; leaflets ovate-lanceolate, 4-10.5 × 1.5-3.7 cm, acuminate, sub-coriaceous. Inflorescence terminal panicles of globose umbels; inflorescence bracts lanceolate to oblong-lanceolate, ciliate; floral bracts lanceolate; pedicels short, articulate, sparsely pubescent. Pistillodes absent in male flowers, staminodes absent in female flowers, or else same as bisexual flowers. Bisexual: calyx cupular; tube fused with ovary; lobes triangular. Petals white, ovate to ovate-oblong. Filaments short; anthers elliptic. Ovary inferior; styles 5, slightly connate at base, reflexed; stigma discoid. Berries ovoid to globose, striated, calyx lobes and stigma persistent; seeds 5, lunate, compressed.

Flowering & Fruiting: November-March.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Mizoram and West Bengal.

Specimen examined: Santrabari to Buxaduar, 16.02.2014, AK 59979.

2. *Brassaiopsis* Decne. & Planch.

Brassaiopsis hainla (Buch.-Ham. ex D. Don) Seem., J. Bot. 2: 291. 1864; C. B. Clarke in Hook. f., Fl. Brit. India 2: 735. 1879. *Hedera hainla* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 187. 1825. [Plate 100b-c; Fig. 32]

Chaletro (N).

Tree, 4–8 m high, armed. Leaves 8–15 cm across, coriaceous; lobes triangular-ovate, distantly serrate, acuminate; stipules adnate to petiole at base, triangular. Inflorescence panicles, dense, globose umbels; inflorescence bracts ovate, stellate pubescent; floral bracts lanceolate, acuminate, stellate tomentose; pedicels stellate tomentose. Calyx cupular; tube fused with ovary, stellate tomentose; lobes triangular. Petals greenish yellow, ovate, acute and slightly hooded, reflexed, keeled inside, stellate tomentose. Filaments short; anthers elliptic. Ovary yellowish, faintly 5–10-grooved; stigma indistinct. Fruits ellipsoid; seeds 2, faintly compressed.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Manipur and West Bengal.

Specimens examined: Rovers point to Bhutan Border, 15.02.2014, AK 59955.

3. *Schefflera* J. R. Forst. & G. Forst.

Schefflera bengalensis Gamble, Bull. Misc. Inform. Kew 1919 (5): 229. 1919. [Plate 101a-b]

Kursimlo Lahara (N).

Climbing shrub. Leaves 5–8-foliolate; stipules adnate to petioles, broadly ovate, sheath-like; leaflets elliptic, 4–13.5 × 2.7–6.6 cm, short acuminate to caudate-acuminate, coriaceous. Inflorescence panicles, globose umbels; inflorescence bracts deciduous; pedicels reddish maroon, 3–6 mm, swollen at base. Calyx cupular; tube fused with ovary, truncate above. Petals pale reddish brown, ovate-oblong. Filaments short; anthers elliptic-oblong. Ovary inferior; stigma minute. Fruits orange yellow, ellipsoid; seeds solitary in each locule, compressed.

Flowering & Fruiting: April–August.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Punjab, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Santrabari to Buxaduar, 18.05.2014, AK 62623.

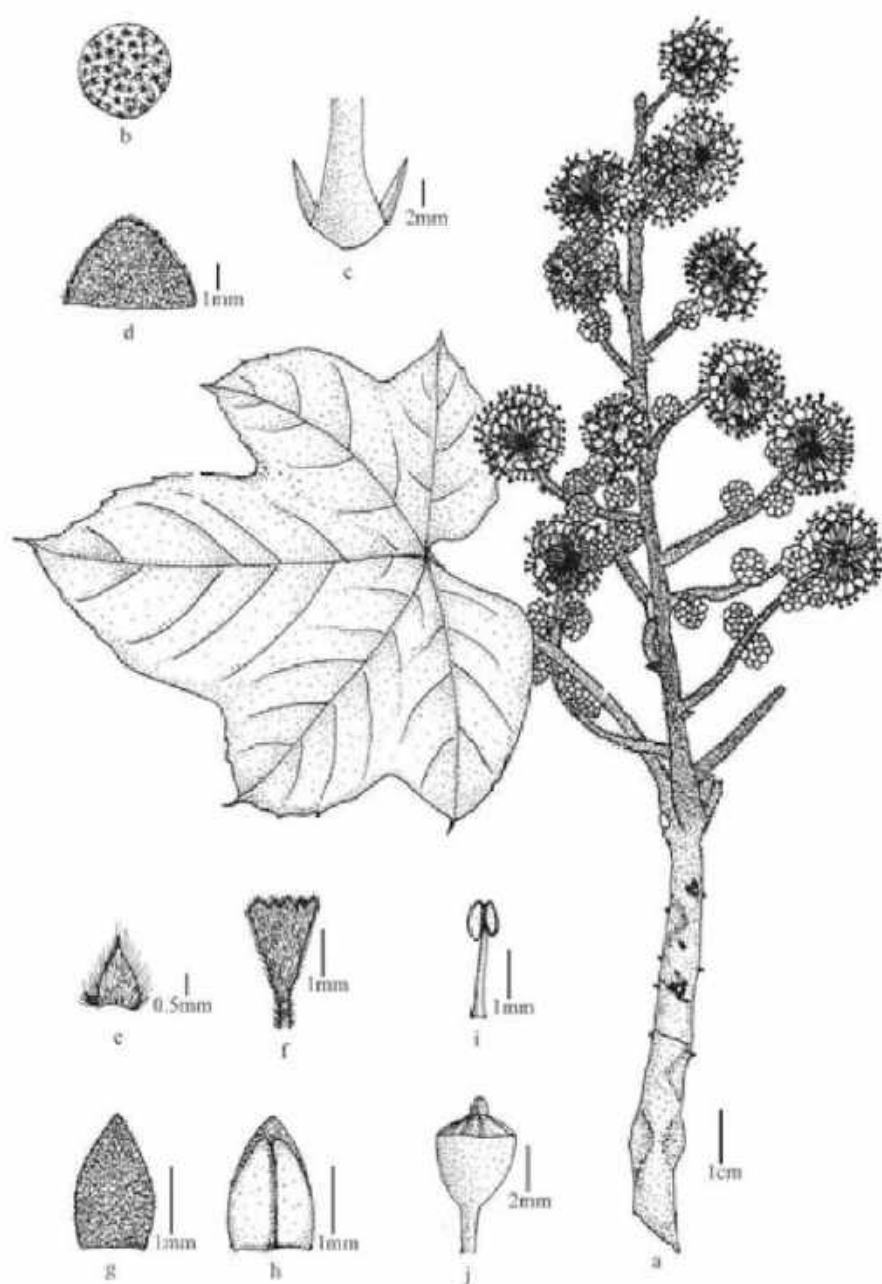


Fig. 32. *Brassaiopsis hainla*: a. Flowering branchlet; b. Stellate hairs of inflorescence, inflorescence bract, calyx and petal; c. Stipule with petiole base; d. Inflorescence bract; e. Floral bract; f. Calyx; g. Dorsal view of petal; h. Ventral view of petal; i. Stamen; j. Gynoecium (AK 59955).

Alangiaceae

Alangium Lam.

Alangium chinense (Lour.) Harms, Ber. Deutsch. Bot. Ges. 15: 24. 1897. *Stylidium chinense* Lour., Fl. Cochinch. 1: 221. 1790. *Marlea begoniifolia* Roxb., Pl. Coromandel 3 (4): 80, t. 283. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 2: 743. 1879. [Plate 101c-d]

Okane, Akhane, Singari (N).

Tree, 6–10 m high, appressed pubescent when young. Leaves broadly ovate to sub-orbicular, 4–10.5 × 1.5–3.7 cm, obliquely truncate, entire or irregularly acutely pointed lobed, acute to acuminate, sub-coriaceous, glabrescent to pilose below. Inflorescence axillary, corymbose cymes; floral bracts linear, pubescent; pedicels 4–7 mm, articulate, appressed pubescent. Calyx cupular, sparsely appressed pubescent; tube short; lobes 4–10, triangular, sometimes truncate. Petals white, 4–10, linear, 1.2–1.5 cm, coiled. Stamens 4–10; filaments flat, short, ciliate; anthers linear, 8–9 mm, connective produced above, verrucose. Ovary dome-shaped; style 1–1.4 cm, ciliate above; stigma 4-lobed. Drupes ellipsoid, 6–8 × 4–5 mm, striated, sparsely hairy; seed solitary, elliptic, compressed.

Flowering & Fruiting: April–August.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa-Santrabari, 23.05.1949, VN & party 2934; Gadadhar range, 31.03.2012, GK 56003; Santrabari to Buxaduar, 18.05.2014, AK 62632; Buxaduar to Tashigaon, 20.05.2014, AK 62672.



Plate 102: a. *Viburnum colobrookianum*; b-d. *Sambucus adnata*



Plate 103: a. *Benkara fasciculata*; b. *Catnaregam longispina*; c. *Coriscoides campanulata*; d. *Coffea benghalensis*



Plate 104: a. *Dentella repens* var. *repens*; b. *Dentella repens* var. *serpyllifolia*; c. *Hedyotis scandens*; d. *Hymenodictyon crizense*



Plate 103: a-b. *Hyptianthera stricta*; c-d. *Izora sthroantha*

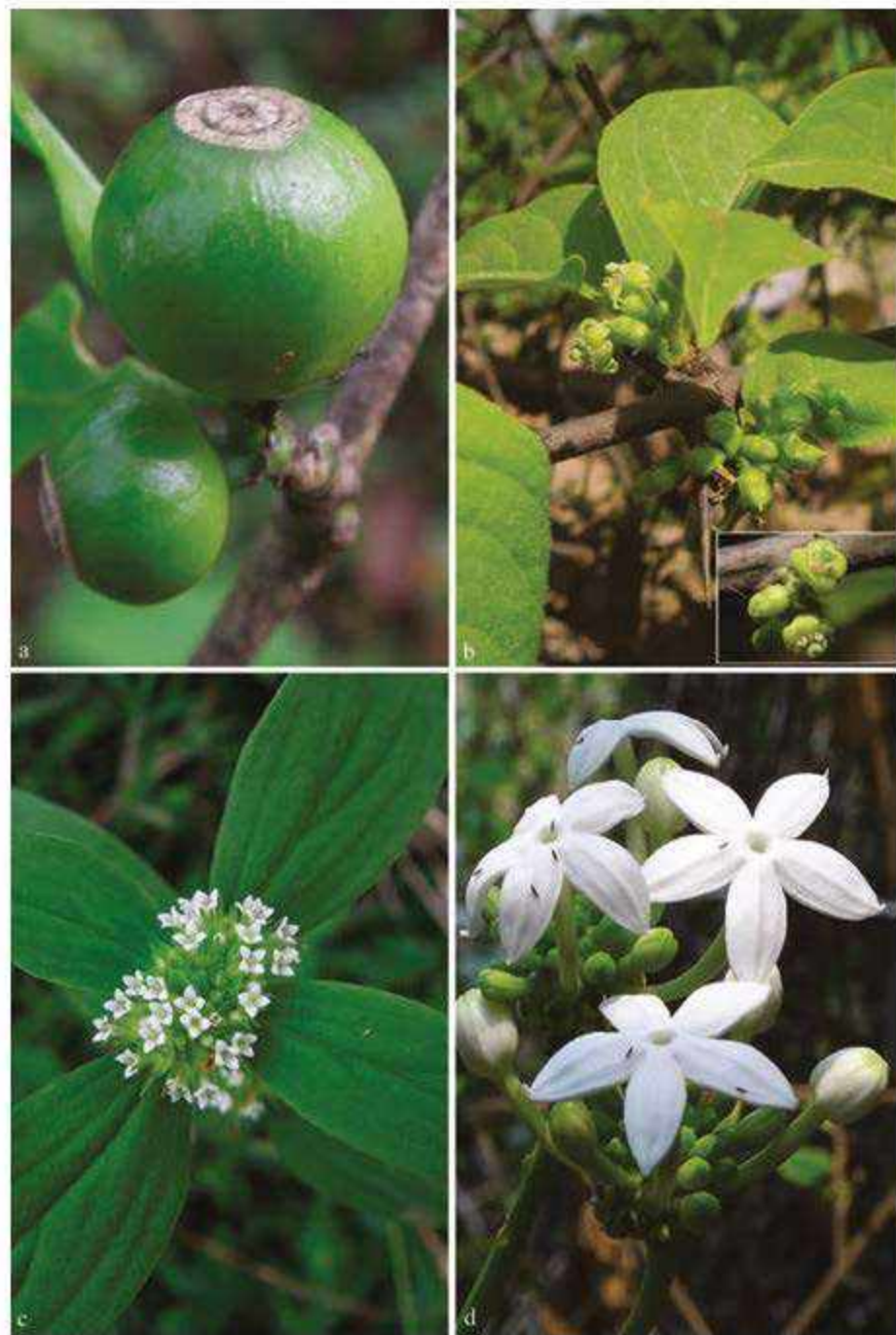


Plate 106: a. *Meyna pubescens*; b. *Meyna spinosa*; c. *Mitracarpus hirtus*; d. *Marinda angustifolia*



Plate 107: a. *Morinda angustifolia*; b. *Mussaenda glabra*; c. *Mussaenda roxburghii*; d. *Oldenlandia octyrrhynchos*



Plate 108: a. *Oldenlandia diffusa*; b. *Oldenlandia erecta*; c. *Oldenlandia verticillata*; d. *Ophiorrhiza fasciculata*



Plate 109: a-b. *Faederia cruddasiana*; c. *Pavetta indica* var. *glabrescens*

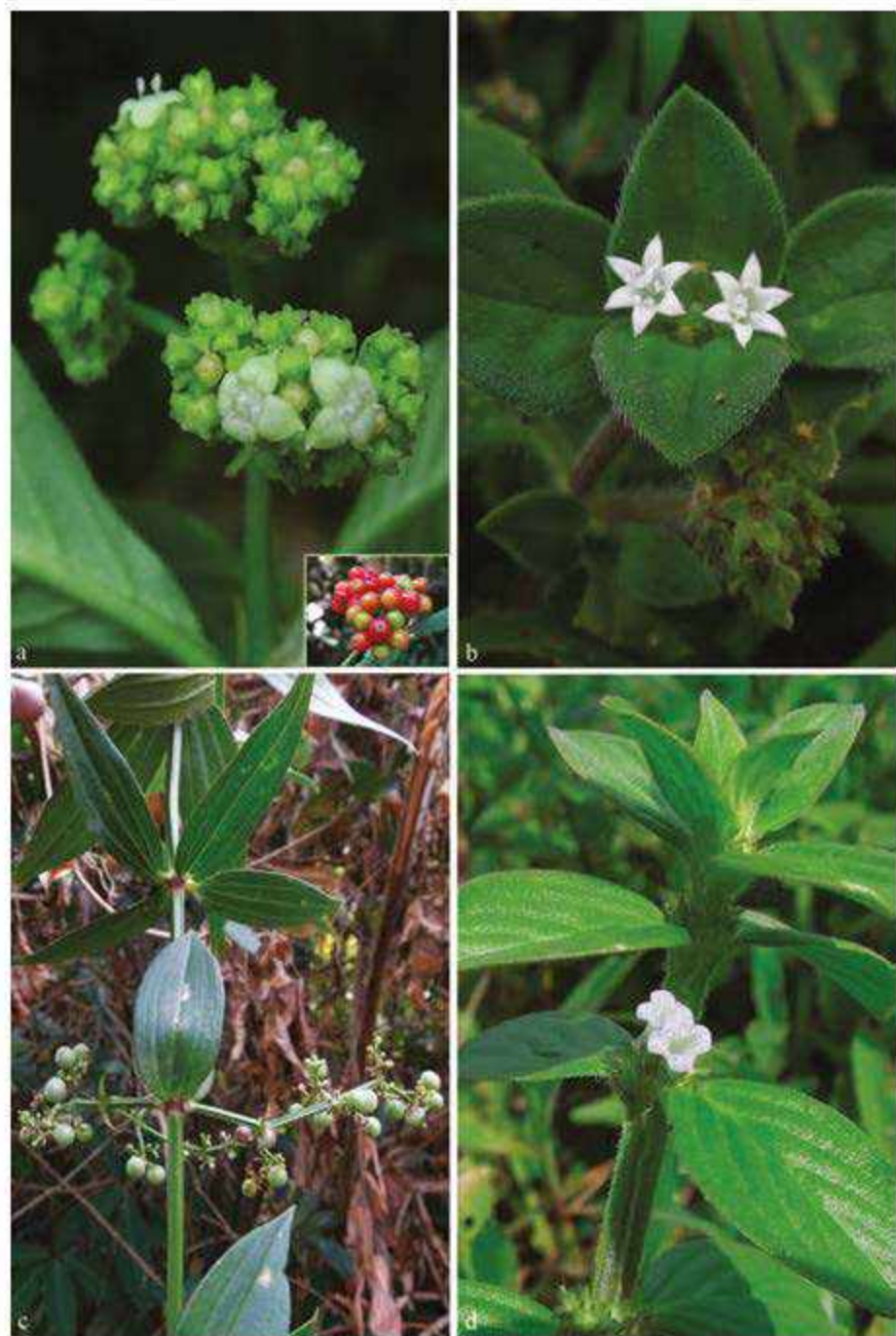


Plate 110: a. *Psychotria erraticica*; b. *Richardia scabra*; c. *Rubia alikkimensis*; d. *Spornococcus latifolia*.



Plate 111: a. *Spermacoce exilis*; b. *Spermacoce hispida*; c. *Spermacoce acymoides*; d. *Uncaria scandens*



Plate 112: a. *Uncaria sessilifructus*; b. *Wendlandia pandula*; c. *Wendlandia tinctoria*; d. *Carlismannia griffithii*



Plate 113: a. *Acnella calva*; b. *Acnella paniculata*; c. *Adanostemma laevia*; d. *Ageratum conyzoides*



Plate 114: a. *Ageratum honstonianum*; b. *Artemisia austroyunnanensis*; c. *Eideaea pilosa*; d. *Elymus laevis*



Plate 115: a. *Blumea fasciculata*; b. *Blumea lanceolaria*; c. *Centipeda minima*; d. *Chromolaena odorata*



Plate 116: a. *Cirsium arvense*; b. *Cirsium abanaleense*; c. *Conyza leucantha*; d. *Cotula leucisphaerica*



Plate 117: a. *Crassocephalum crepidioides*; b. *Cyanthillium cinereum*; c. *Dichrocephala integrifolia*; d. *Koliptia prostrata*



Plate 118: a. *Elephantopus scaber*; b. *Emilia sonchifolia*; c. *Eaydra fluctuans*; d. *Galinsoga quadriradiata*



Plate 119: a. *Gnaphalium flaccidum*; b. *Gnaphalium pennsylvanicum*; c. *Grangea maderaspatana*; d. *Gyzara nepalensis*



Plate 120: a. *Ixeris polyccephala*; b. *Lipotlepharis urticifolia*



Plate 121: a. *Pseudognaphalium affine*; b. *Saussurea lyrata*; c. *Sigesbeckia orientalis*; d. *Synodus wightianus*



Plate 122: a. *Sphaeranthus indicus*; b. *Synedrella nodiflora*; c. *Synotis bhut*; d. *Tithonia diversifolia*



Plate 123: a. *Lobelia alsinoides*; b-c. *Lobelia nymphaeifolia*; d. *Lobelia rosea*



Plate 124: a. *Lobelia zeylanica*; b. *Wahlenbergia marginata*; c. *Agapetes bhutanica*; d. *Agapetes uliginosa*.



Plate 125: a. *Agapetes sikkimensis*; b. *Androsace umbellata*; c. *Antistrophe oxantha*; d. *Ardisia involucrata*



Plate 126: a. *Ardisia macrocarpa*; b. *Ardisia solanacea*; c. *Maesa indica*; d. *Maesa macrophylla*



Plate 127: a-b. *Madhuca longifolia* var. *latifolia*; c. *Styrax serrulatus*; d. *Jasminum multiflorum*



Plate 128: a. *Jasminum nervosum*; b. *Jasminum sambac*; c. *Myzopyrus amilacifolium*;



Plate 129: a. *Agaveana gracilis*; b. *Beaumontia grandiflora*; c. *Chonemorpha fragrans*



Plate 130: a-h. *Holarrhiza pubescens*; c. *Ichnocarpus frutescens*; d. *Rauvolfia serpentina*.

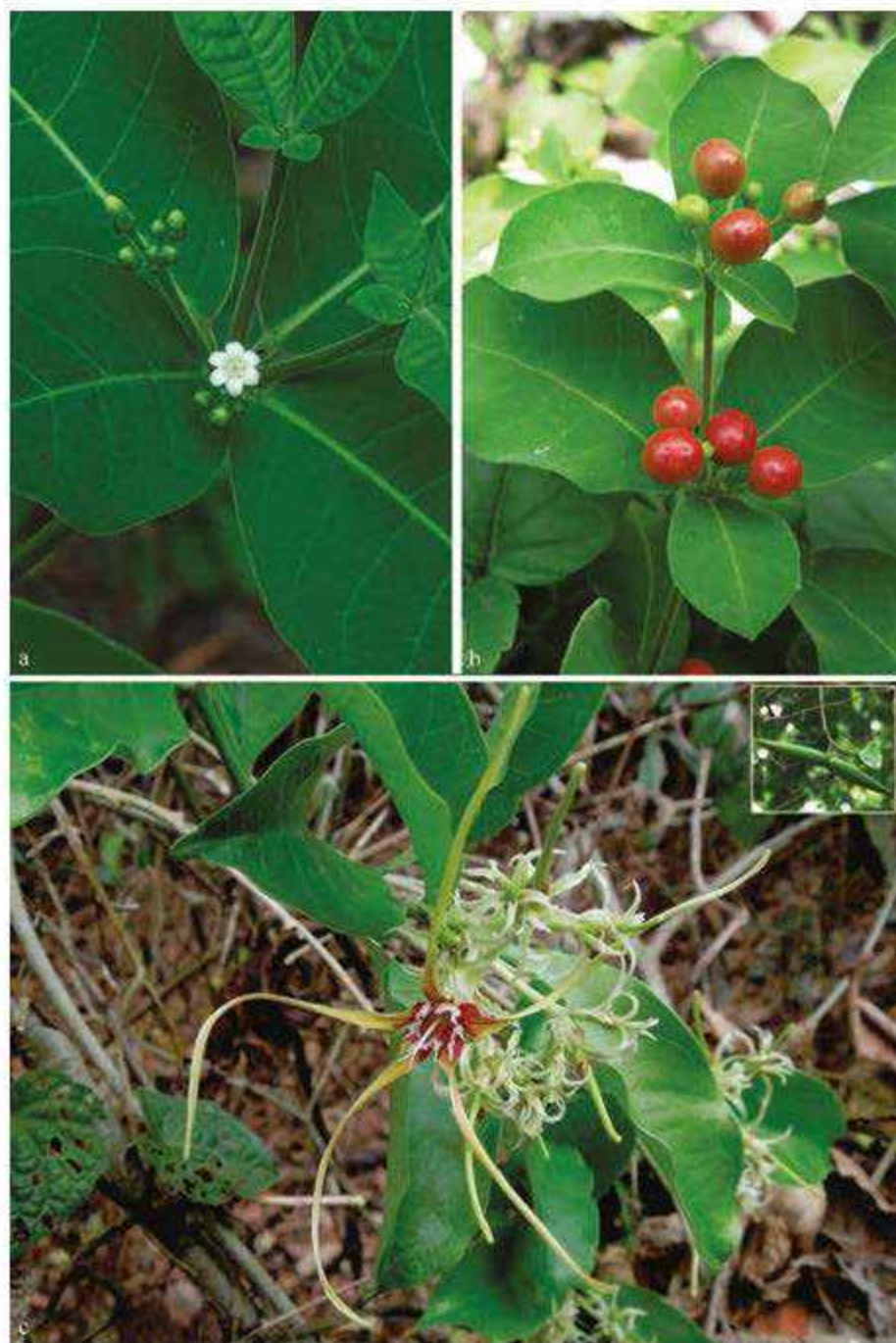


Plate 131: a-b. *Rauvolfia tetraphylla*; c. *Strophanthus wallichii*

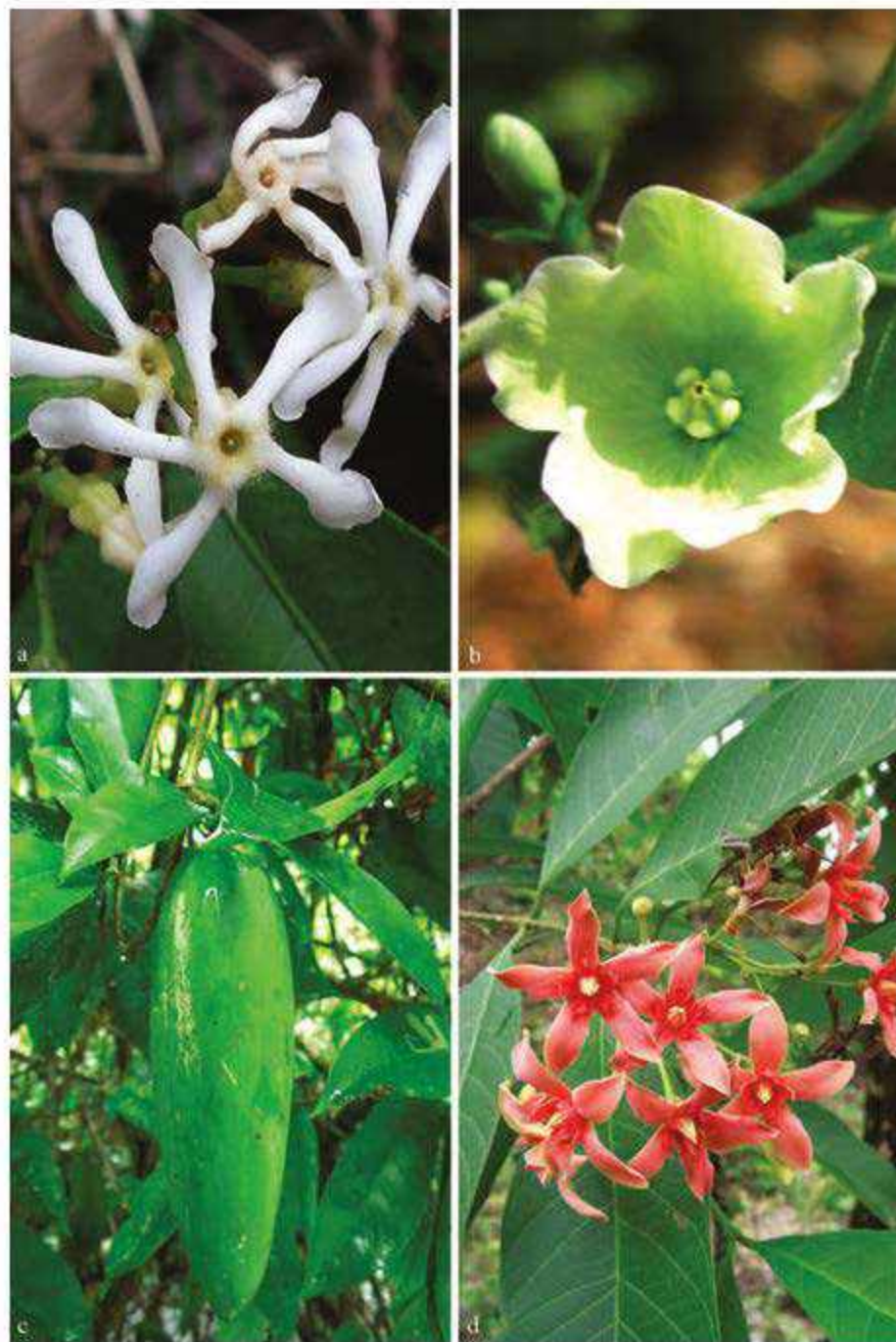


Plate 132: a. *Trachelospernum annamense*; b-c. *Vallaris solanacea*; d. *Wrightia arborea*



Plate 133: a-b. *Wrightia coccinea*; c. *Wrightia tinctoria*; d. *Asclepias curassavica*

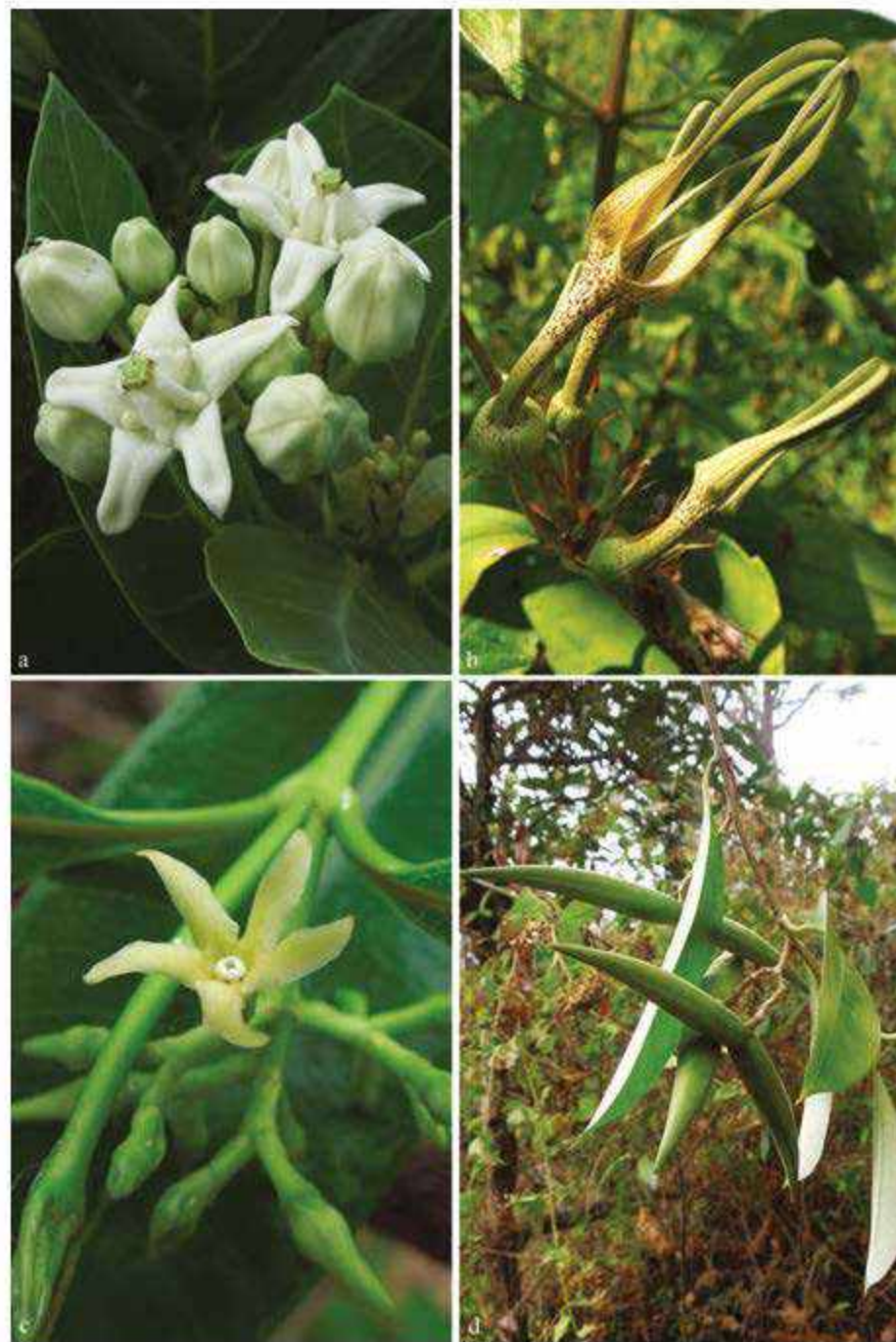


Plate 134: a. *Calotropis gigantea*; b. *Ceropogon macrantha*; c-d. *Cryptolepis dubia*



Plate 135: a. *Cryptolepis sinensis*; b. *Dischidia bengalensis*; c-d. *Drosera volubilis*



Plate 136: a. *Gymnema latifolium*; b. *Hoya lanceolata*; c. *Hoya longifolia*



Plate 137: a. *Hoya parasitica*; b. *Maradenia calcicola*; c-d. *Maradenia tinctoria*



Plate 138: a. *Toxocarpus himalensis*; b. *Vincetoxicum hirsutum*; c. *Buddleja asiatica*

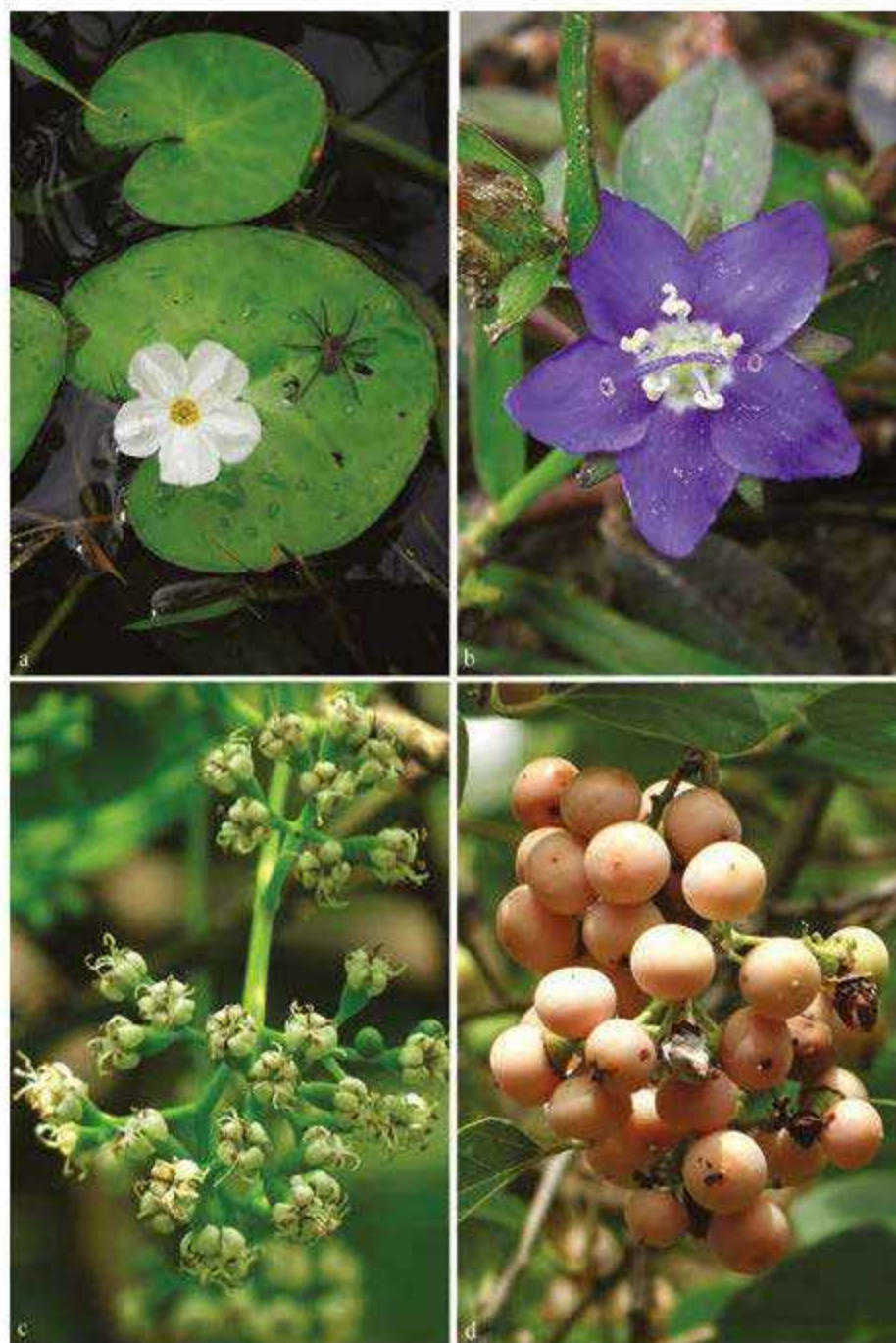


Plate 139: a. *Nymphoides cristata*; b. *Hydroclea zeylanica*; c-d. *Cordia dichotoma*



Plate 140: a-b *Cordia grandis*; c-d. *Cynoglossum lanceolatum*



Plate 141: a-b. *Khretia acuminata*; c-d. *Khretia pallostephon*

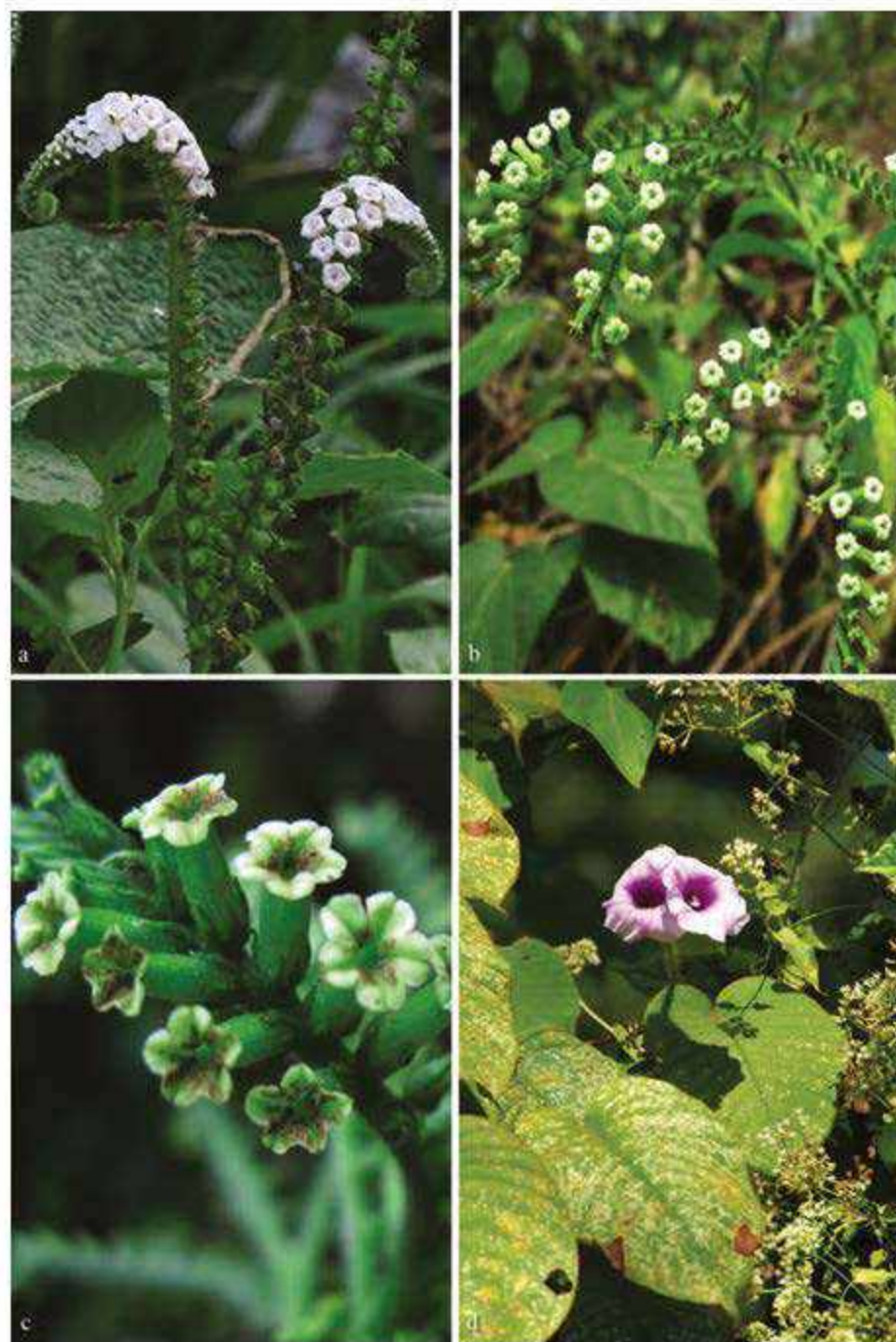


Plate 142: a. *Hallotroplum indicum*; b-c. *Tournefortia hookeri*; d. *Argyreia capitiiformis*

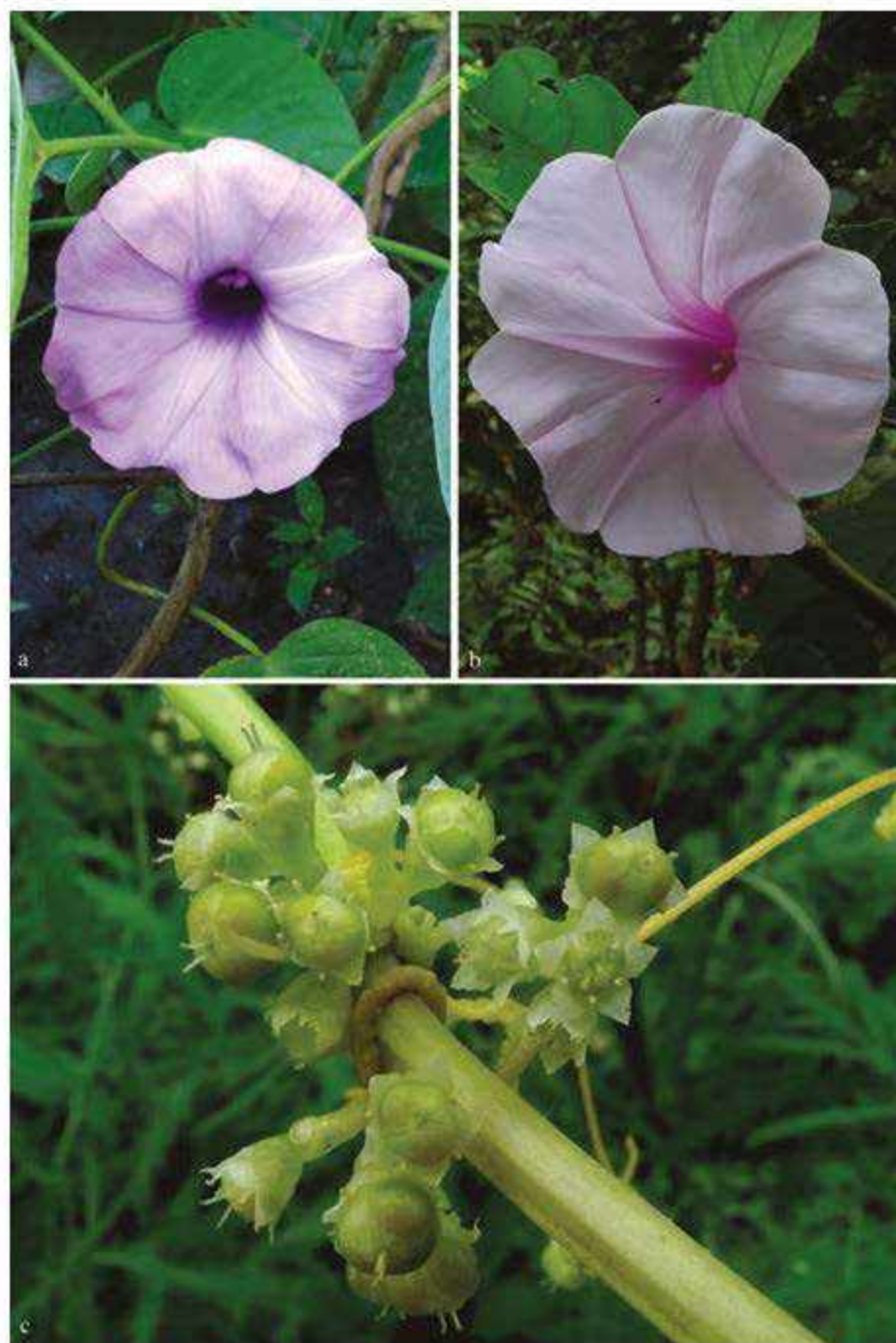


Plate 143: a. *Argyrea hookeri*; b. *Argyrea roxburghii*; c. *Cuscuta reflexa*



Plate 144: a-b *Dinetus racemosus*; c. *Erycibe paniculata*; d. *Evolvulus mammularius*



Plate 145: a. *Ipomoea batatas*; b. *Ipomoea carnea* subsp. *fistulosa*; c. *Ipomoea hederifolia*; d. *Ipomoea triloba*

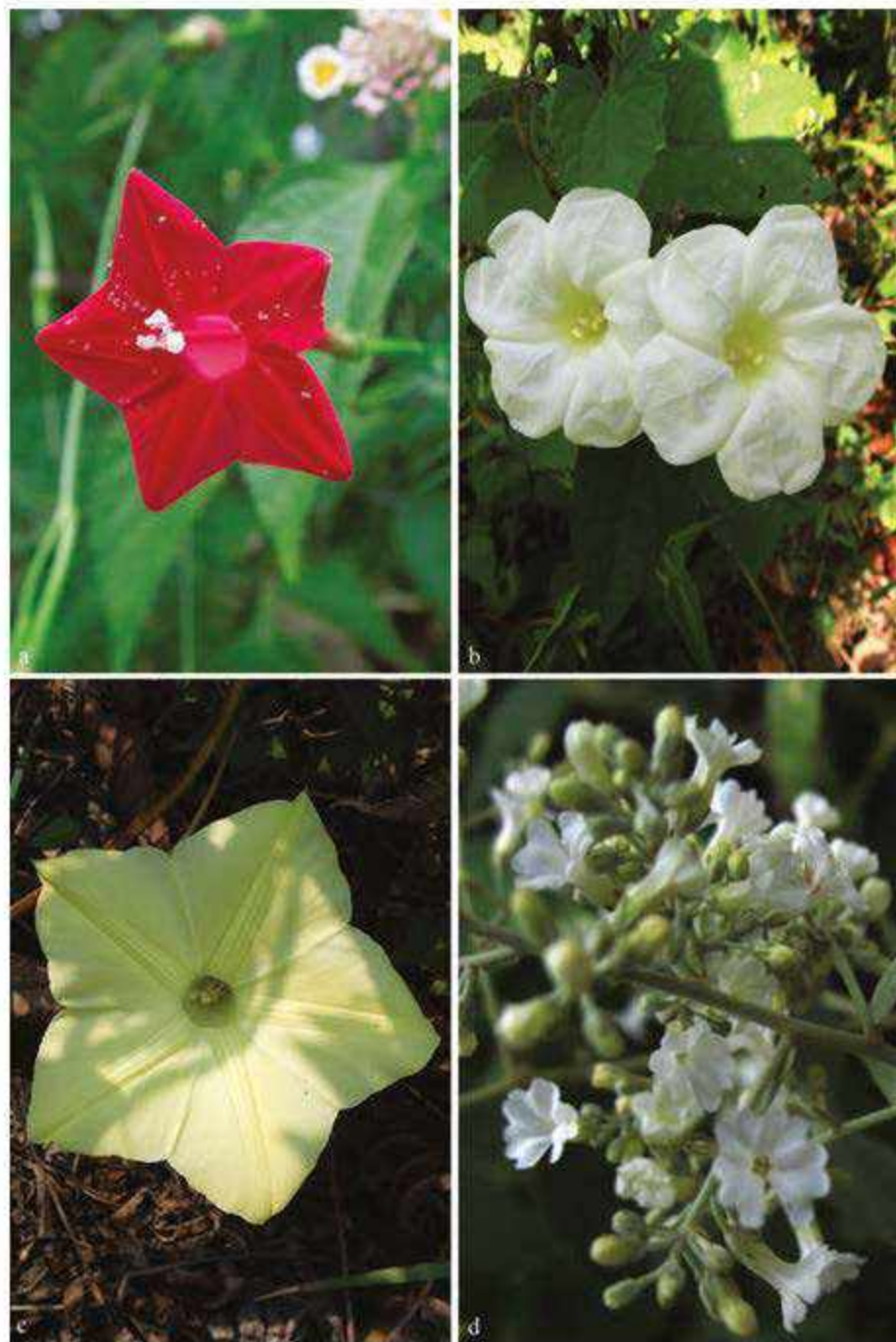


Plate 146: a. *Ipomoea quamoclit*; b. *Merremia umbellata*; c. *Merremia vitrifolia*; d. *Portia paniculata*



Plate 147: a. *Porana paniculata*; b-c. *Brugmansia suaveolens*; d. *Datura metel*



Plate 148: a-b. *Lycianthes crassipetala*; c. *Physalis angulata*; d. *Solanum americanum*



Plate 149: a-b *Solanum erianthum*; c-d *Solanum spirale*

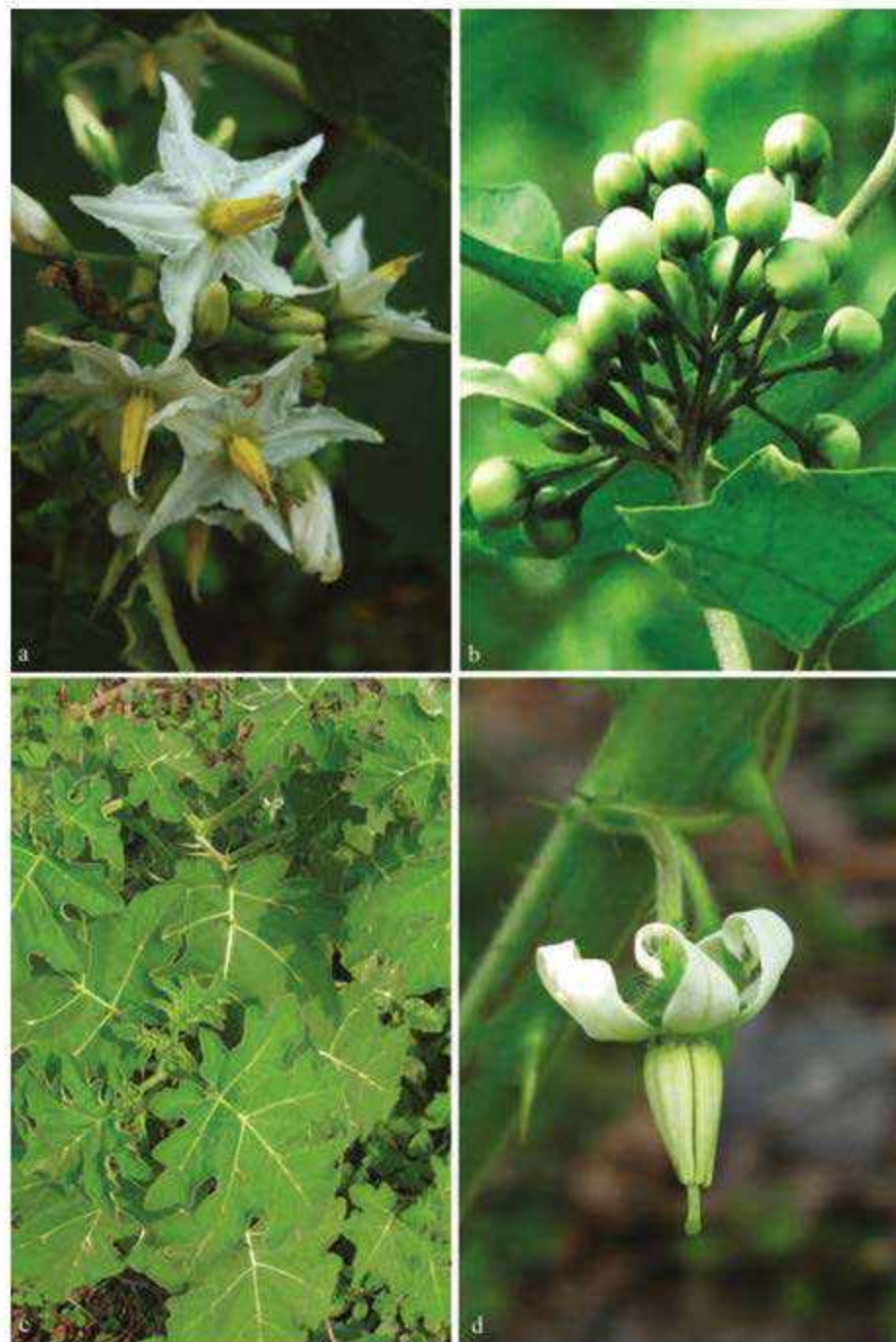


Plate 150: a-b *Solanum torvum*; c-d. *Solanum vilarum*



Plate 151: a-b *Solanum violaceum*; c *Adenosma indianum*; d *Centranthera grandiflora*



Plate 152: a. *Limmophila chinensis*; b. *Limmophila sessiliflora*; c. *Lindenberglia hookeri*;
d. *Lindenberglia tauraria*



Plate 153: a. *Lindenbergia titensis*; b. *Lindenbergia antipoda*; c. *Lindenbergia ciliata*; d. *Lindenbergia crustacea*



Plate 154: a. *Lindernia pusilla*; b. *Lindernia rotundifolia*; c. *Mazus pumilus*; d. *Mecardonia procumbens*



Plate 155: a. *Mimulus bhutanicus*; b. *Scoparia dulcis*; c. *Torenia cordifolia*; d. *Torenia diffusa*

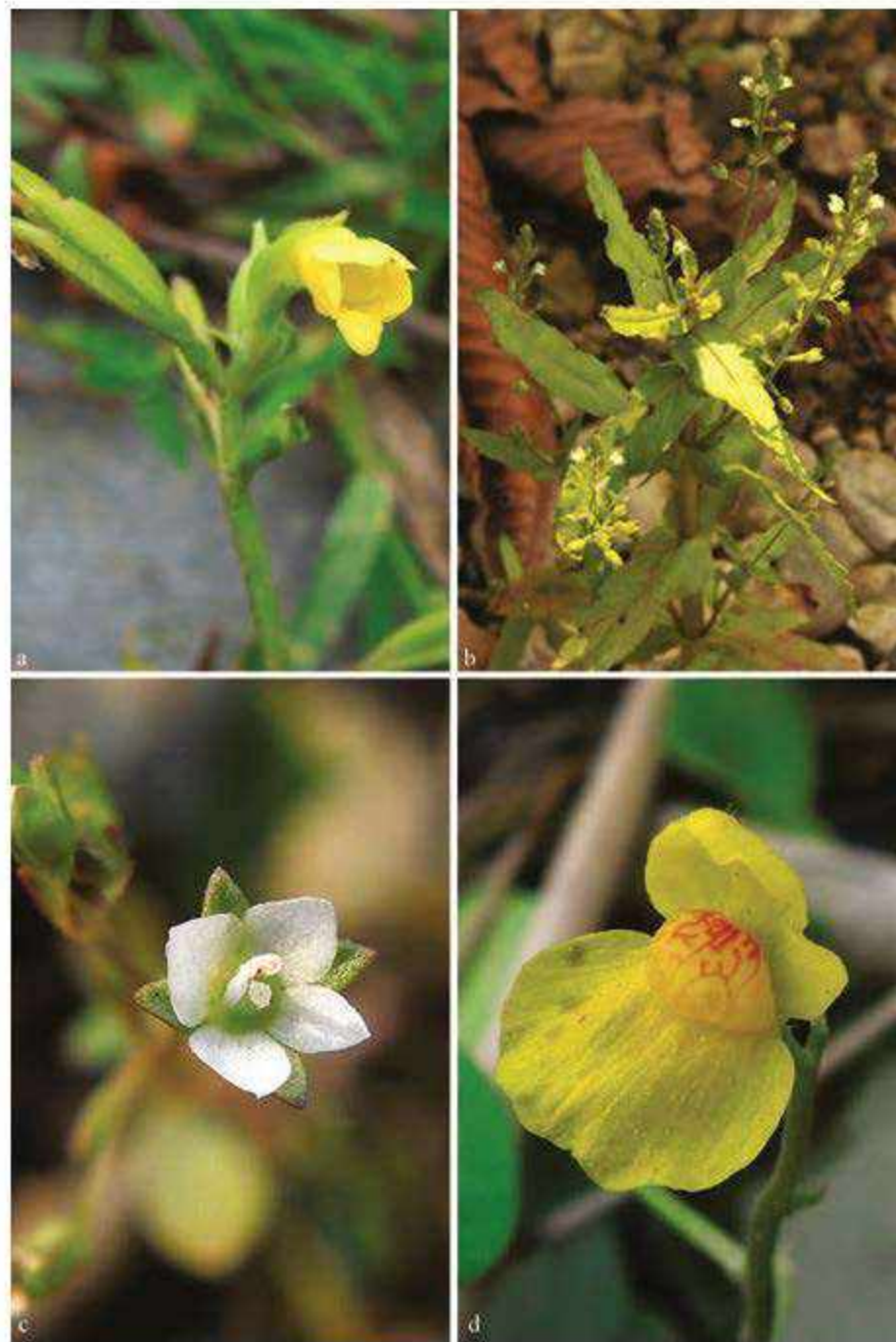


Plate 156: a. *Torenia flava*; b. *Veronica anagallis-aquatica*; c. *Veronica javanica*; d. *Utricularia aurea*



Plate 157: a-b. *Utricularia striatula*; c. *Aeschynanthus micranthus*; d. *Aeschynanthus parasiticus*

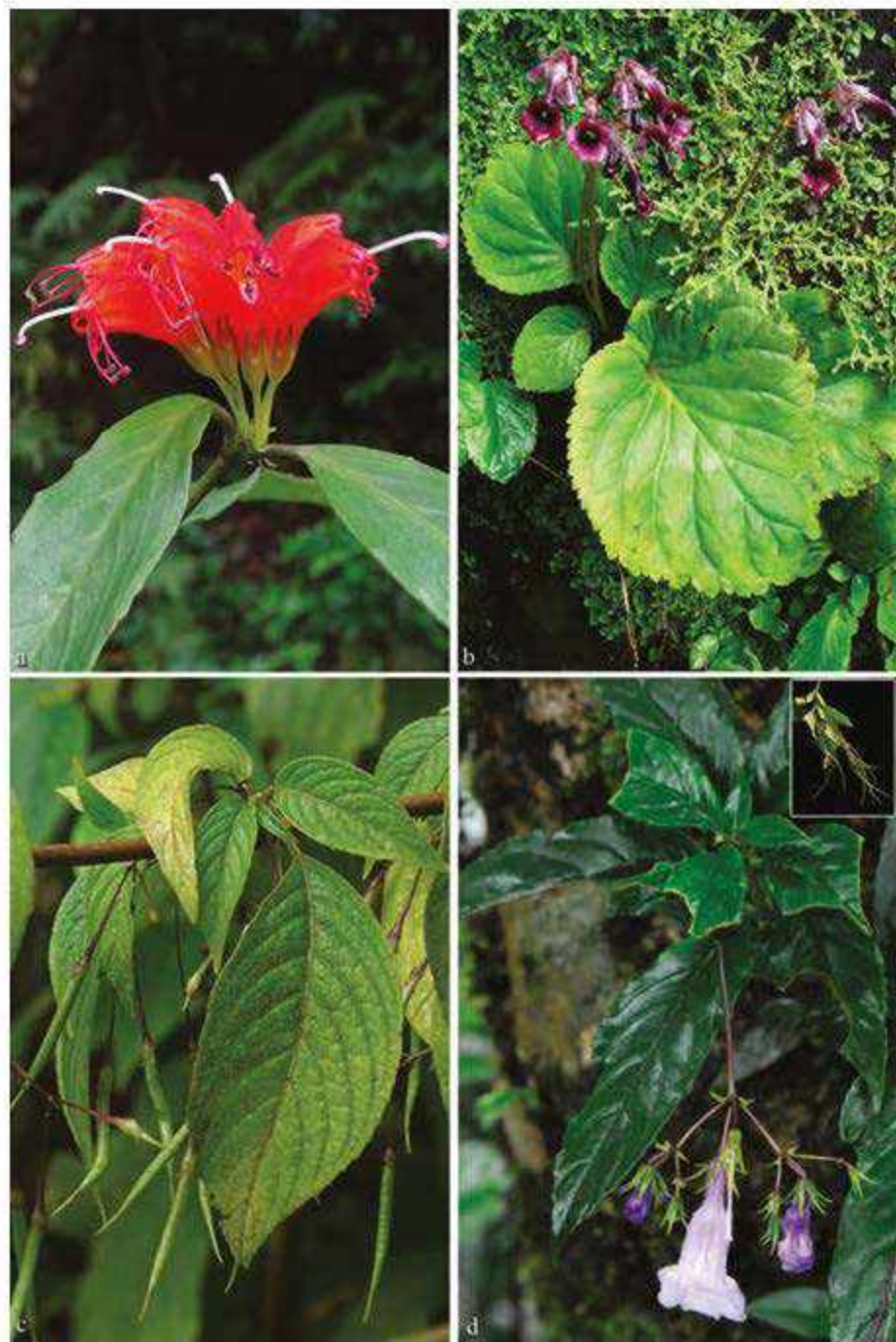


Plate 158: a. *Aeschynanthus parviflorus*; b. *Didymocarpus pedicellatus* [Photo credit: J.S. Jalal]; c. *Leptoboea multiflora*; d. *Lycioctenium serratum*



Plate 139: a-b. *Middletonia multiflora*; c-d. *Rhynchosyces obliquum*



Plate 160: a. *Markhamia tomentosa*; b. *Croxylum indicum*; c. *Stereospermum colais*; d. *Acauthus carduaceus*



Plate 161: a-b. *Acanthus carduosus*; c. *Asystasia macrocarpa*; d. *Barleria cristata*.



Plate 162: a. *Barleria strigosa*; b. *Dicliptera eupatorioides*; c. *Dicliptera chinensis*; d. *Brantleya scythrochilum*

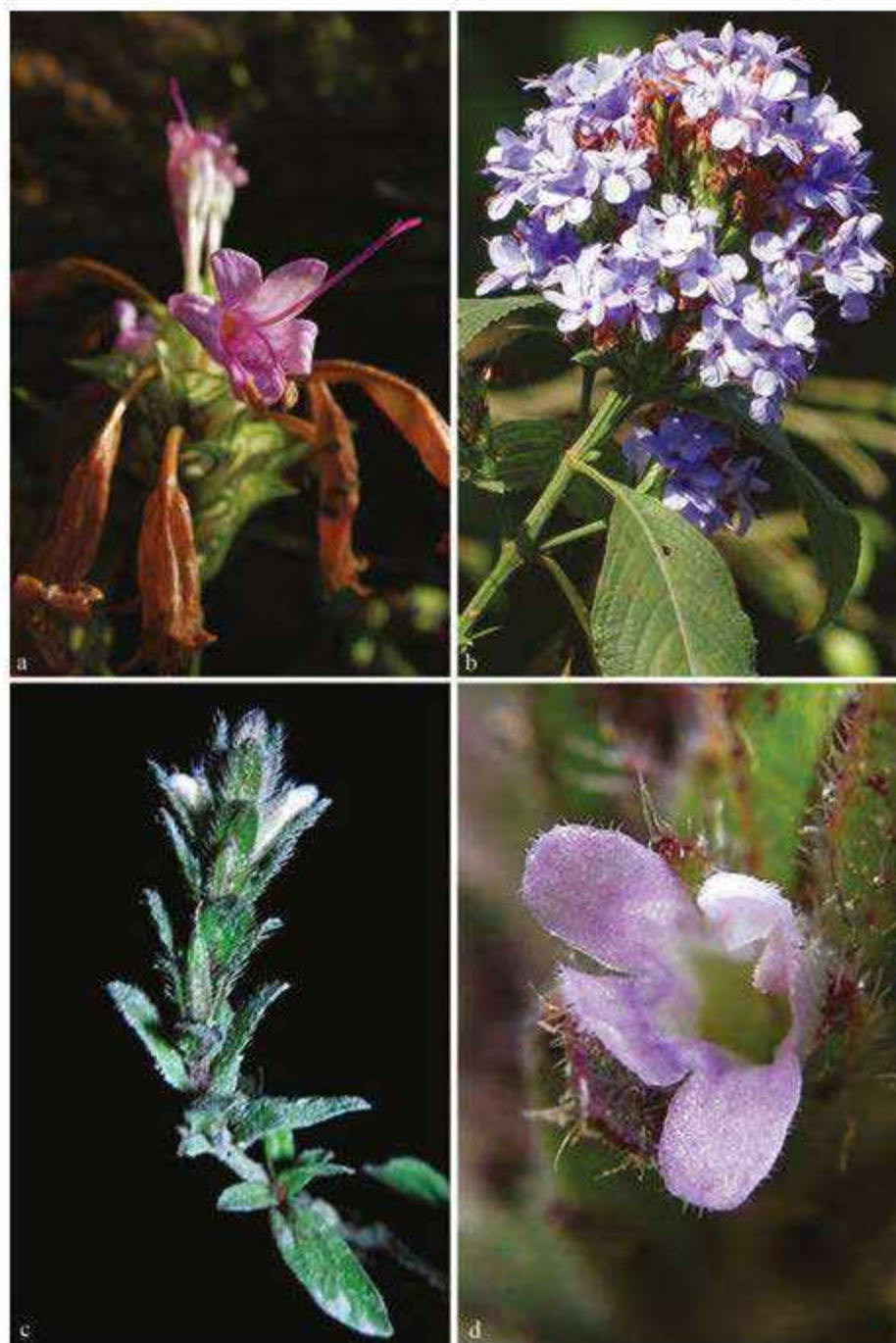


Plate 163: a. *Eranthemum griffithii*; b. *Eranthemum pulchellum*; c-d. *Hygrophilla polystroma*



Plate 164: a. *Hygrophila ringans*; b. *Justicia adhatoda*; c. *Justicia gaudaruasa*



Plate 163: a-b. *Justicia pectinata*; c-d. *Justicia virgata*



Plate 166: a. *Lapidagathis incurva*; b. *Mackaya indica*; c-d. *Nelsonia canescens*



Plate 167: a. *Peristrophe speciosa*; b. *Phaulopsis imbricata*; c-d. *Phlogacanthus thyriformis*



Plate 168: a. *Paederanthemum latifolium*; b. *Strobilanthes hamiltoniana*; c. *Strobilanthes peruvifolia*; d. *Strobilanthes pubiflora*



Plate 169: a. *Strobilanthes sabiniana*; b-c. *Strobilanthes tomentosa*; d. *Thunbergia coccinea*.



Plate 170: a. *Thunbergia erecta*; b. *Thunbergia grandiflora*



Plate 171: a. *CalliCARPA arborea*; b-c. *CalliCARPA macrophylla*; d. *Cleodendrum chinensis*



Plate 172: a. *Clerodendrum cordatum*; b. *Clerodendrum glandulosum*; c. *Clerodendrum indicum*



Plate 173: a. *Clorodendrum indicum*; b. *Clorodendrum japonicum*; c. *Clorodendrum laevifolium*; d. *Gaussia arborea*



Plate 174: a. *Phylla nodiflora*; b-c. *Premna barbata*; d. *Premna mollisima*



Plate 175: a. *Premna mollissima*; b. *Rotheca serrata*; c-d. *Vitex negundo*



Plate 176: a. *Actyrospermum wallichianum*; b. *Ajuga macrosperma*; c. *Antiochilus pallidus*; d. *Antiochilus indicus*



Plate 177: a-c. *Colebrockia oppositifolia*; d. *Elakotzia blanda*



Plate 178: a. *Gomphostemma ovatum*; b. *Gomphostemma parviflorum*; c. *Hyptis brevipes*



Plate 179: a. *Hyptis suaveolens*; b. *Leonurus sibiricus*; c-d. *Leonas lavandulifolia*



Plate 180: a. *Ocimum americanum*; b. *Pogostemon auricularis*; c-d. *Pogostemon benghalensis*



Plate 181: a. *Pogostemon elsholtzioides*; b. *Pogostemon pumilus*; c-d. *Pogostemon stolonatum*



Plate 182: a. *Salvia coccinea*; b. *Temcrinum viscidum*; c. *Plantago asiatica* subsp. *erosa*

The Flora of Buxa Tiger Reserve, West Bengal, India

2. Gamopetalae

Key to the families

- 1a. Ovary inferior; stamens equal and alternate to corolla lobes (rarely fewer than corolla lobes) 2
- 1b. Ovary superior; stamens equal and alternate to corolla lobes if ovary inferior or half inferior then stamens numerous, opposite or attached to corolla lobes 7
- 2a. Stamens free from corolla; flowers actinomorphic or zygomorphic; ovary 2-many loculed; ovules many in each locule; placentation axile **Campanulaceae**
- 2b. Stamens attached to corolla; flowers actinomorphic; ovary 1-many-loculed; ovules 1-many in each locule; placentation axile or not 3
- 3a. Calyx reduced to pappus or obsolete; anthers synergous; ovary 1-locular and 1-ovuled; seeds without albumen **Asteraceae**
- 3b. Calyx toothed, lobed or partite; anthers free; ovary 2-many-locular, each locule 1-many-ovuled; seeds usually with copious albumen 4
- 4a. Inflorescences usually in corymbs or in short spikes, rarely paniculate; flowers bisexual; disk absent; ovary (1-) 2-8-locular 5
- 4b. Inflorescences usually cymes or cymose, capitate, fasciculate or solitary; flowers bisexual (rarely polygamous); disk present; ovary 2- (5)-locular 6
- 5a. Leaves compound; anthers oblong, extrorse; ovule 1 per locule **Sambucaceae**
- 5b. Leaves simple; anthers introrse; ovules 1 to many per locule **Caprifoliaceae**
- 6a. Leaves usually entire; stipules interpetiolar, prominent, sometimes early caducous; stamens 4-5(-6) **Rubiaceae**
- 6b. Leaves crenate-serrate; stipules absent; stamens 2 **Carlemanniaceae**
- 7a. Ovary 1-locular; placentation free central, sometimes basal 8
- 7b. Ovary 2-many-locular, rarely 1-locular; placentation axile or less often parietal 9
- 8a. Herbs; leaves eglandular; flowers bisexual, mono or dimorphic; corolla eglandular; fruits capsules **Primulaceae**
- 8b. Trees or shrubs; leaves often gland-dotted or with pellucid reticulations; flowers bisexual or unisexual, monomorphic; corolla glandular; fruits drupes or berries **Myrtaceae**
- 9a. Stamens 2, alternate with the three anterior lobes of corolla **Lentibulariaceae**
- 9b. Stamens equal or twice in number to and opposite the lobes of corolla 10
- 10a. Stamens free from corolla; fruits capsules **Ericaceae**
- 10b. Stamens attached to the corolla; fruits capsules or not 11
- 11a. Stamens as many as or twice as many as corolla lobes, at base of corolla; ovary 3-5-locular 12
- 11b. Stamens either equal or fewer than the corolla lobes; ovary superior or inferior, usually 2- (3), (5)-locular 13

Botanical Survey of India

12a.	Ovary superior; ovules solitary in each chamber	Sapotaceae
12b.	Ovary inferior or half inferior; ovules 2 or more in each chamber	Syraceae
13a.	Corolla actinomorphic, rarely slightly oblique	14
13b.	Corolla zygomorphic or at least oblique	22
14a.	Leaves opposite	15
14b.	Leaves alternate	19
15a.	Stamens 2 (rarely 4)	Oleaceae
15b.	Stamens 4 or more, alternate with corolla lobes	16
16a.	Carpels and styles united; stamens 4 (rarely 5)	17
16b.	Carpels free, styles united; stamens always 5	18
17a.	Leaves joined at bases by interspeticular stipules or raised horizontal lines, always opposite; ovary 2-locular; corolla-lobes valvate or imbricate, or if contorted then corolla long tubular and placentas 2-fid	Loganiaceae
17b.	Leaves without even rudimentary stipules; ovary 1-locular or if 2-locular then corolla short rotate and placentas simple; corolla lobes contorted or if valvate then leaves alternate	Menyanthaceae
18a.	Pollen granular, not aggregated; filaments usually adnate to corolla; stigma capitate or conical or lamphade-shaped; fruits berries or drupes or follicles; seeds few or many, variously shaped, comose or not	Apocynaceae
18b.	Pollen aggregated in masses (pollinia); filaments usually connate; stigma head fleshy; fruits follicles; seeds numerous, strongly compressed, comose	Asclepiadaceae
19a.	Ovules in each carpel numerous	20
19b.	Ovules in each carpel 2, less often 1, rarely 4	21
20a.	Herbs, usually aquatic; stems glabrous or pubescent, occasionally glandular, bristly, or thorny; corolla-lobes imbricate or (rarely) contorted; stamens usually 5, epipetalous, often alternating with sealy appendages; anthers dehisce longitudinally; ovary 1- (2)-locular; placentation parietal; style 2-fid or styles 2; fruits capsules	Hydrophyllaceae
20b.	Herbs, shrubs, small trees, or climbers; stems prickly, hairs simple, branched, or stellate, sometimes glandular; corolla-lobes plicate, (rarely) imbricate; anthers dehisce by apical pores; ovary 2-5-locular; placentation axile; style 1; fruits berries or capsules	Solanaceae
21a.	Trees, shrubs or herbs, usually scabrous or hispid; inflorescences usually scorpioid cymes or panicles; corolla-lobes imbricate or contorted, without petaloid bands; fruits 1-4-seeded drupes or nutlets; nutlets often ornamented; seeds vertical or oblique	Boraginaceae
21b.	Twining or climbing, glabrous or hairy; inflorescences cymes or (rarely) solitary flower; corolla lobes plicate or rarely imbricate, with petaloid bands; fruits capsules or berries; seeds usually trigonous	Convolvulaceae
22a.	Carpels 1-ovuled, or rarely 2-ovuled; fruits always 1-seeded, indehiscent	23
22b.	Carpels 2 or more ovuled, usually ovules many, but if only 2 then the ovules superposed, or if ovules 2 collateral the fruit a 2-valved capsule	24

The Flora of Buxa Tiger Reserve, West Bengal, India

- 23a. Herbs (aromatic or not) or shrubs or trees; inflorescences racemose or cymose; calyx more cupular, never bilipped; fruit a drupe or indehiscent capsule, sometimes breaking up into nutlets; seeds non-endospermous **Verbenaceae**
- 23b. Aromatic herbs or shrubs; inflorescences verticillasters, subtended by leaves or bracts, sometimes flower solitary; calyx tubular, often bilipped; fruits 4, dry nutlets; seeds with or without endosperm **Lamiaceae**
- 24a. Ovary inferior, 1-locular, placentation parietal **Gesneriaceae**
- 24b. Ovary superior, 2-locular, placentation usually axile 25
- 25a. Bracts prominent; fruit open from the apex by 2 loculicidal valves; seeds usually on retinacula **Acanthaceae**
- 25b. Bracts prominent or not; fruit dehiscent but not opening elastic valves or rarely indehiscent; seeds not on retinacula 26
- 26a. Trees; leaves compound, leaf scars of the rachis on the stem when they fall off; flowers large, zygomorphic; fruit capsular or indehiscent; seeds with a broad membranous marginal wings **Bignoniaceae**
- 26b. Herbs; leaves simple, petiolar scars absent; flowers small, zygomorphic or actinomorphic; fruit a capsule or rarely a drupe or berry; seeds without wings 27
- 27a. Leaves alternate, opposite, whorled, or basally opposite and apically alternate; calyx 2-5-lobed; corolla usually bilabiate, rarely actinomorphic; stamens didynamous; anthers without apical appendage; nectary often present at base of ovary **Scrophulariaceae**
- 27b. Leaves spirally alternate, usually in a basal rosette, rarely opposite or whorled; calyx usually 4-lobed; corolla usually regular, rarely zygomorphic; stamens not didynamous; anthers with apical appendage; nectar absent **Plantaginaceae**

Caprifoliaceae

Viburnum L.

Viburnum colebrookeanum Wall. ex DC., Prodr. 4: 325. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3: 5. 1880. [Plate 102a; Fig. 33]

Shrub, 3-4 m high, deciduous. Leaves obovate, elliptic-obovate or oblong-elliptic, 7-19 × 2.5-8.5 cm, cuneate, serrate, acuminate, coriaceous. Inflorescence axillary umbels, stellate pubescent. Calyx campanulate; lobes ovate. Corolla creamy white, rotate; lobes ovate-oblong. Stamens 5, adnate at base of corolla tube; filaments short; anthers elliptic-oblong. Ovary inferior; style columnar; stigma capitate, 3-lobed. Drupes purplish black, oblong-ellipsoid, 4-5.5 mm, slightly compressed, fleshy; seed solitary.

Flowering & Fruiting: January-April.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

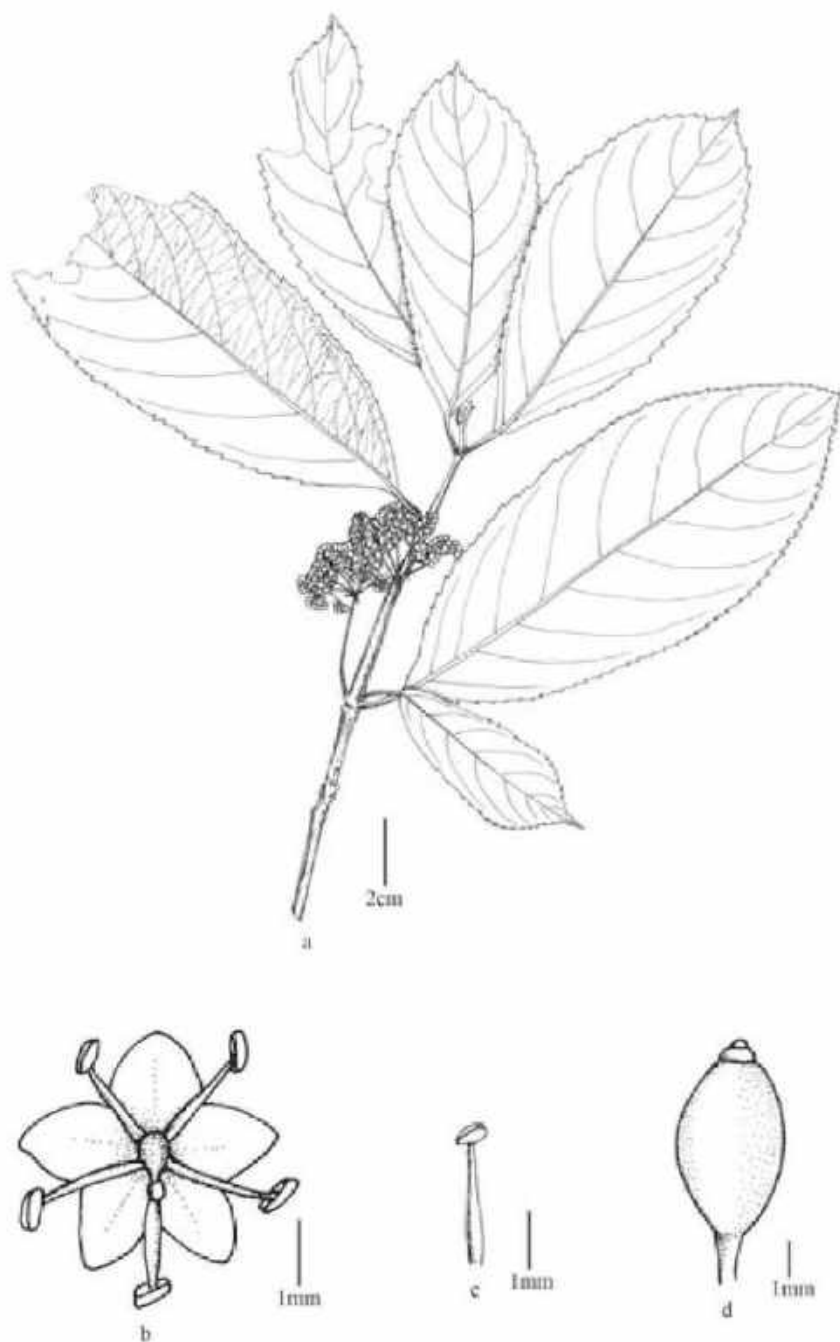


Fig. 33. *Viburnum colebrookeanum*: a. Flowering branchlet; b. Flower; c. Stamen; d. Fruit (SKS & GK 47113).

Specimens examined: Garam, JKS 865; North Rajabhatkhawa, JKS 6998; Buxaroad, KPB 1711; 21 miles from Rajabhatkhawa, VN 2353; Rajabhatkhawa range, 15.02.2010, SKS & GK 47113; Panbari 8, 31.03.2012, GK 50682; Checko-1, 09.02.2013, AK 58804.

Sambucaceae

Sambucus L.

Key to the species

- | | |
|--|-------------------------|
| 1a. Uppermost pair of leaflets connate to winged leaf rachis | 1. <i>S. adnata</i> |
| 1b. Uppermost pair of leaflets never connate | 2. <i>S. canadensis</i> |

1. *Sambucus adnata* Wall. ex DC., Prodr. 4: 322. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3: 3. 1880. [Plate 102b-d]

Shrub, 4–6 m high. Leaves 3–9-foliolate; leaflets variable, elliptic, lanceolate to oblanceolate, oblong-lanceolate, pendurate, 9–16 × 2.2–5.5 cm, obliquely rounded or cuneate, serrate, acuminate; uppermost pair connate to winged rachis; 2 glands at insertion of petiolules of lowest pairs of leaflets. Inflorescence terminal, lax corymbs, pubescent. Flowers sessile to subsessile. Calyx campanulate; lobes triangular-ovate. Corolla white, cupular; lobes 4–5, triangular-ovate. Stamens 4–5, between corolla lobes; anthers subglobose. Ovary inferior; style short; stigma capitate, 3-lobed, verrucose. Berries black, subglobose, 3–5 mm across, pulpy, calyx lobes persistent; seeds 2–3, ovate, faintly trigonous, slightly compressed, rugose.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59692.

2. *Sambucus canadensis* L., Sp. Pl. 1: 269. 1753.

Shrub or small tree, 3–4 m high. Leaves 11–17 cm long; 2–3 pairs of leaflets, never connate with rachis; leaflets elliptic-ovate, 3.6–7 × 1–24 cm, terminal leaflet equal to or only slightly broader than lateral ones, serrate, acuminate, glabrous above except veins, scattered brown hairy below. Inflorescence corymbs, glabrous or papillose. Calyx campanulate; lobes triangular-ovate. Corolla rotate, 3.5–4 mm; lobes circular. Stamens 4–5, between corolla lobes; anthers subglobose. Ovary inferior; style short; stigma capitate, 3-lobed. Berries black purple, globose, 4–5 mm across; seeds 2–3, ovate.

Flowering & Fruiting: February–August.

Distribution. India: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal.

Specimen examined: Buxaduar, 1100m, JKS 4029.

Rubiaceae

Key to the genera

- | | | |
|------|--|-------------------------|
| 1a. | Trees | 2 |
| 1b. | Herbs or shrubs | 3 |
| 2a. | Leafless when fruiting; branchlets unarmed; inflorescences pendulous, racemiform to spiciform; flowers green; fruits capsules, ellipsoid, reflexed | 8. <i>Hymenodictyon</i> |
| 2b. | Leafy when fruiting; branchlets armed; inflorescences cymose to fasciculate; flowers white; fruits baccate, globose to subglobose, not reflexed | 2. <i>Catnanargam</i> |
| 3a. | Shrubs | 4 |
| 3b. | Herbs | 19 |
| 4a. | Climbing shrubs | 5 |
| 4b. | Erect shrubs | 8 |
| 5a. | Stems retrorsely prickly; leaves in whorls of 4, ovate-lanceolate, sessile; veins palmate, 3-5 from base; calyx truncate; fruits berries | 23. <i>Rubia</i> |
| 5b. | Stems without prickles; leaves opposite, broadly elliptic, ovate, elliptic-lanceolate, petiolate; veins pinnate; inflorescences not in cymose panicles; calyx toothed; fruits capsule or drupes | 6 |
| 6a. | Branchlets with 2 laterally recurved hooks; inflorescences globose heads; anthers with 2 basal bristles; seeds sagittate | 26. <i>Uncaria</i> |
| 6b. | Branchlets without hooks; inflorescences not globose heads; anthers without basal bristles; seeds not sagittate | 7 |
| 7a. | Leaves tufted hairy at junctions of lateral and mid vein below; calyx reddish green; corolla violet outside, tubular, 1-1.2 cm; lobes white, red at throat, 3-toothed at apex; drupes ovoid, laterally flattened | 19. <i>Paderia</i> |
| 7b. | Leaves without tufted hairy at junctions of lateral and mid vein below; calyx green; corolla white, campanulate, c. 1.5 mm; lobes white, not toothed at apex; capsules globose or ellipsoid, not flattened | 7. <i>Hedyotis</i> |
| 8a. | One calyx lobe transformed into a large, petiolate, brilliant white petaloid structure; flowers orange yellow; corolla lobes acuminate at apex | 15. <i>Mussaenda</i> |
| 8b. | Calyx lobe not as above; flowers not orange yellow; corolla lobes not acuminate at apex | 9 |
| 9a. | Branchlets armed | 10 |
| 9b. | Branchlets unarmed | 11 |
| 10a. | Flowers unisexual; ovules more than one in each locule | 3. <i>Corissoides</i> |
| 10b. | Flowers bisexual; ovules solitary in each locule | 12. <i>Meyna</i> |
| 11a. | Stigma fusiform | 1. <i>Bankara</i> |
| 11b. | Stigma 2-lobed | 12 |

The Flora of Buxa Tiger Reserve, West Bengal, India

- 12a. Leaves shining with prominent impressed veins, stipules axils glandular hairy; bracts subtending flowers rather well developed 21. *Psychotria*
- 12b. Leaves not shining without prominent impressed veins (except *Chassalia*); stipules axile simple hairs or glabrous; bracts subtending flowers developed or reduced 13
- 13a. Inflorescences at branch ends but usually soon displaced, appearing lateral and leaf opposed; fruits a cluster of drupelets 14. *Merinda*
- 13b. Inflorescences various, not leaf opposed; fruits not a cluster of drupelets 14
- 14a. Inflorescences solitary or in clusters 15
- 14b. Inflorescences panicles 16
- 15a. Deciduous; stems terete; stipules cuspidate at apex; flowers axillary or terminal, solitary; corolla salver-shaped; tube 1.5–2 cm; anthers linear, glabrous; fruits drupes 5. *Coffea*
- 15b. Evergreen; stems angular; stipules acute at apex; flowers in axillary clusters; corolla subcampanulate; tube c. 1.8 mm; anthers triangular-ovate, villous; fruits berries 9. *Hyptianthera*
- 16a. Inflorescence bracts 3-toothed at apex, middle tooth much larger; corolla lobes 5; stamens at mouth of corolla tube 27. *Wendlandia*
- 16b. Inflorescence bracts not as above; corolla lobes 4, stamens at mouth of corolla tube if corolla lobes 5 then stamens at middle of the corolla tube 17
- 17a. Stems succulent, hollow; stipules bifid at apex; inflorescence bracts evenly 2 or 3-toothed at apex; calyx lobes 5; corolla lobes 5; stamens at middle of corolla tube 4. *Chassalia*
- 17b. Stems woody, solid; stipules cuspidate at apex; inflorescence bracts entire; calyx lobes 4; corolla lobes 4; stamens at mouth of corolla tube 18
- 18a. Stipules fringed at margins; leaves below inflorescence reduced; inflorescence bracts subulate; anthers oblong-lanceolate, 2 white glands at base, white acute at apex 10. *Exco*
- 18b. Stipules not fringed at margins; leaves below inflorescence well developed; inflorescence bracts ovate; anthers linear, without white glands at base of anther cells, not white acute at apex 20. *Pavetta*
- 19a. Prostrate or diffuse herbs 20
- 19b. Erect or decumbent herbs 22
- 20a. Leaves acicular or very narrowly linear; inflorescences capitate verticillasters of 3 to several flowers 24. *Scleromitrium*
- 20b. Leaves spatulate or oblong-oblancoolate, broadly ovate to ovate-elliptic; inflorescences not as above 21
- 21a. Leaves spatulate or oblong-oblancoolate, succulent, not scabrous; flowers axillary, solitary; corolla pubescent inside; style bifid above; fruits capsules, glabrous or hairy 6. *Dactyloctenium*

Botanical Survey of India

- 21b. Leaves broadly ovate to ovate-elliptic, not succulent, scabrous; flowers in terminal heads; corolla glabrous inside; style 3-fid above; fruits in 3 mericarps, scabrous
22. *Richardia*
- 22a. Bracts foliaceous to ligulate and make a ring around inflorescences; bracteoles connate in pairs at base of each flower
18. *Leptodermis*
- 22b. Bracts and bracteoles not as above
23
- 23a. Stipules filiform from triangular-ovate base; inflorescences helicoid cymes; calyx 5-lobed; capsules obcordate, dehiscent by two broad gaping valves
18. *Ophiorrhiza*
- 23b. Stipules pectinate, 3-12-toothed (cuspidate in *Oldenlandia corymbosa*); inflorescences not helicoid cymes; calyx 4-lobed; capsules not obcordate, dehiscent variously, not by two broad gaping valves
24
- 24a. Floral bracts linear-subulate, connate at base; calyx lobes unequal; capsules circumscissile; seeds cruciform scarred on ventral face
13. *Mitracarpus*
- 24b. Floral bracts not as above; calyx lobes equal; capsules not circumscissile; seeds without cruciform scar on ventral face
25
- 25a. Plants fetid smell when rubbed; stems not winged; floral bracts linear-lanceolate; calyx glabrous, not lineolate; capsules rhomboid
16. *Neanotis*
- 25b. Plants not fetid smell when rubbed; stems narrowly winged along edges (except in *Oldenlandia verticillata* and *O. diffusa*); floral bracts absent, if present then not linear-lanceolate; calyx hairy (if glabrous then lineolate); capsules not rhomboid
26
- 26a. Leaves linear-oblanccolate to elliptic; flowers pedicellate (sometimes sessile in *Oldenlandia verticillata*); seeds many, ovoid, trigonous, not grooved or striated
17. *Oldenlandia*
- 26b. Leaves not as above; flowers sessile; seeds 2, not ovoid, plano-convex, grooved or finely horizontally striated.
25. *Spermascoce*

I. Benkara Adans.

Benkara fasciculata (Roxb.) Ridsdale, Reinwardtia 12 (4): 298. 2008. *Posoqueria fasciculata* Roxb., Fl. Ind. 2: 568. 1824. *Randia fasciculata* DC., Prodr. 4: 386. 1830; Hook. f., Fl. Brit. India 3: 109. 1880; Prain, Bengal Pl. 1: 567. 1903.

[Plate 103a]

Shrub, 1-2 m high, armed. Leaves elliptic-lanceolate or ovate-oblong, 2.2-7 × 1.2-2.9 cm, rounded or cuneate, entire, acuminate to caudate, chartaceous, pubescent when young; stipules caducous. Inflorescence in axillary cymes, 3-5-flowered or solitary sometime. Flowers fragrant. Calyx tubular; teeth linear, pubescent. Corolla white, salver-shaped, hairy inside at throat; lobes linear-lanceolate. Stamens 5; filaments short; anthers linear-oblong. Ovary oblong; stigma fusiform. Berries dark blue-purple, globose, articulated stalked.

Flowering & Fruiting: November-May.

Distribution. India: Bihar, Odisha, Sikkim and West Bengal.

Specimens examined: Panbari-3, 04.03.2011, GK 47234; Panbari-9, 30.03.2012, GK 50645.

2. *Catunaregam* Wolf

Catunaregam longispina (Link) Tirveng., Edinburgh J. Bot. 53: 95. 1996.
Posoqueria longispina Link, Enum. Pl. 1: 225. 1821. *Randia dumetorum* sensu
Hook. f., Fl. Brit. India 3: 110. 1880 non Lam. 1819; Prain, Bengal Pl. 1: 567.
1903. [Plate 103b]

Maidalu, Maidal, Kankra jar (N).

Tree, 3–5 m high, armed. Leaves often clustered on short lateral shoots, elliptic-ovate or obovate, 7–11 × 2.5–4 cm, cuneate, entire, short acuminate, coriaceous; stipules ovate, ciliate. Inflorescence 2–6-flowered, terminal on short spurs, cymose to fasciculate. Calyx cupular, pubescent; lobes spatulate. Corolla creamy white or greenish white, campanulate, tomentose outside; lobes obovate. Stamens at mouth of corolla tube; anthers linear. Ovary inferior; style c. 6 mm; stigma ellipsoid, 2-lobed. Fruits baccate, globose to subglobose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Marakata, 24.09.2011, AK 52860; Sankosh, 17.02.2012, AK 55670; Rajabhatkhawa range, 05.04.2012, GK 56028; Bhutri, 05.10.2012, AK 58653.

3. *Corisoides* (Benth. & Hook. f.) Tirveng.

Corisoides campanulata (Roxb.) Tirveng., Bull. Mus. Natl. Hist. Nat., Sér. 3, Bot. 35: 16. 1978. *Gardenia campanulata* Roxb., Fl. Ind. 2: 556 1824; Hook. f., Fl. Brit. India 3: 118. 1880; Prain, Bengal Pl. 1: 565. 1903. [Plate 103c]

Shrub, c. 2.5 m high, armed. Leaves elliptic to ovate-elliptic, 7–9 × 3.5 cm, tapered at base, entire, acuminate; stipules triangular, cartaceous. Flowers unisexual, dioecious or polygamo-monoecious; pistillate flowers solitary, staminate ones fasciculate. Male flowers in fascicles. Calyx cupuliform, c. 3 × 3 mm; corolla white or greenish white to fading yellow, fragrant, campanulate; lobes 5–(6), ovate, 2.2–3.6 × 1.8–2.3 mm, acute, tip inflexed; stamens 5; anthers subsessile; ovary abortive; style with fusiform tip. Female flowers sessile, solitary. Calyx oblong to spatulate; corolla same as male flowers; ovary 1-locular; style with head. Fruits baccate, ellipsoid or subglobose; seeds many.

Flowering & Fruiting: April–May.

Distribution. India: Assam, Bihar, Nagaland, Sikkim and West Bengal.

Specimen examined: Jainti 7–8, 08.04.2012, GK 56074.

4. *Chassalia* Comm. ex Poir.

Chassalia ophioclyoides (Wall.) Craib, Gard. Bull. Straits Settlements 6: 474. 1930. *Psychotria ophioclyoides* Wall., Fl. Ind. 2: 167. 1824. *Chassalia curviflora* (Wall.) Thwaites, Enum. Pl. Zeyl.: 150. 1859; Hook. f., Fl. Brit. India 3: 176. 1880.

Shrub, 2–2.5 m high. Leaves elliptic to elliptic-oblong, 27–32 × 11–12 cm, cuneate, entire, acuminate, subcoriaceous; stipules triangular-ovate, connate. Inflorescence terminal, trichotomously branched, compound cymes, pubescent. Calyx cupular; lobes triangular. Corolla white, purplish lobed; tube, curved; lobes triangular-ovate. Stamens at middle of corolla tube; filaments pubescent at base; anthers linear. Ovary inferior; style filiform; stigma bifid. Fruits globose; seed solitary in each lobe, orbicular, concave.

Flowering & Fruiting: May–October.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Buxa-Bhutan Road, 16.05.1949, VN & party 2570; Tobgaon, 18.05.1949, VN & party 2673; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59665.

5. *Coffea* L.

Coffea benghalensis B. Heyne ex Schult., Syst. Veg., ed. 15 bis 5: 200. 1819; Hook. f., Fl. Brit. India 3: 153. 1880; Prain, Bengal Pl. 1: 572. 1903. [Plate 103d]

Chitu, Morichi-kat (N).

Shrub, to 1 m high. Leaves ovate-elliptic, 2–10 × 0.7–3.5 cm, attenuate, entire, acuminate, subcoriaceous; stipules triangular, cuspidate, sparsely hairy or glabrous. Flowers scented, subsessile. Calyx cupular, sparsely hairy or glabrous; lobes irregularly toothed. Corolla white, salver-shaped, pubescent; lobes elliptic, obtuse. Stamens at middle of corolla tube; filaments short; anthers linear. Ovary inferior; style short; stigma bifid. Drupes red, ellipsoid; seeds 2, plano-convex, longitudinal groove on ventral face.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Odisha, Karnataka, Rajasthan, Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa range, 15.02.2010, SKS & GK 47112; Jainti range, 12.03.2011, GK 50556; Kumargram, Kalikhola river belt, 21.09.2011, AK 52715; Newlands, Sukno river, 22.09.2011, AK 52754; Kumargram, 18.02.2012, AK 55711; Narathali, 20.02.2012, AK 55786; Mainabari, 24.02.2012, AK 55916.

6. *Dentella* J. R. Forst. & G. Forst.

Dentella repens (L.) J. R. Forst. & G. Forst., Char. Gen. Pl.: 26, t. 13. 1776; Hook. f., Fl. Brit. India 3: 42. 1880; Prain, Bengal Pl. 1: 555. 1903. *Oldenlandia repens* L., Mart. Pl. 1: 40. 1767.

Prostrate herb, 10–20 cm. Leaves spatulate or oblong-oblancoate, 2–5 × 1.5–2 mm, attenuate, entire, glabrous or few white hairy, acute, lineolate; stipules triangular, fringed, scarious. Inflorescence axillary, solitary. Flowers subsessile. Calyx cupular, glabrous or sparsely white hairy; lobes triangular. Corolla white, infundibuliform; lobes ovate to triangular-ovate. Stamens 5, at middle of corolla tube; filaments short; anthers linear. Ovary inferior; style short; stigma bifid. Fruits compressed globose, glabrous or white hairy; seeds many, angular.

Key to the the varieties

- 1a. Leaf margins, calyx tube and capsules white hairy 6.1. var. *repens*
1b. Leaf margins, calyx tube and capsules glabrous 6.2. var. *serpyllifolia*

6.1. var. *repens* [Plate 104a]

Flowering & Fruiting: February–September.

Distribution. India: Almost throughout India.

Specimen examined: Rydak river belt, 26.02.2012, AK 55974.

6.2. var. *serpyllifolia* (Wall. ex Craib) Verdc., Kew Bull. 37: 545. 1983. *Dentella serpyllifolia* Wall. ex Craib, Fl. Siam. Enum. 2: 27. 1932. [Plate 104b]

Flowering & Fruiting: April–September.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam and West Bengal.

Specimen examined: Kumargram, 19.09.2011, AK 52655.

7. *Hedyotis* L.

Hedyotis scandens Roxb., Fl. Ind. 1: 369. 1820; Hook. f., Fl. Brit. India 3: 57. 1880; Prain, Bengal Pl. 1: 556. 1903. [Plate 104c; Fig. 34]

Baksi lahara, Kanchiru, Bokri lahara (N).

Climbing shrub. Leaves elliptic to elliptic-oblong, 5–14 × 1.8–3 cm, attenuate, entire, caudate-acuminate, coriaceous; stipules connate, fringed, cuspidate, glabrous or sparsely puberulent. Inflorescence axillary, terminal panicles of umbellate cymes, puberulent. Calyx cupular, puberulent; lobes 4 or 5, triangular, 1 to 3 linear appendages in between lobes. Corolla white, campanulate; lobes 4 or 5, oblong, white villous inside except apex. Stamens 4 or 5, at mouth of corolla

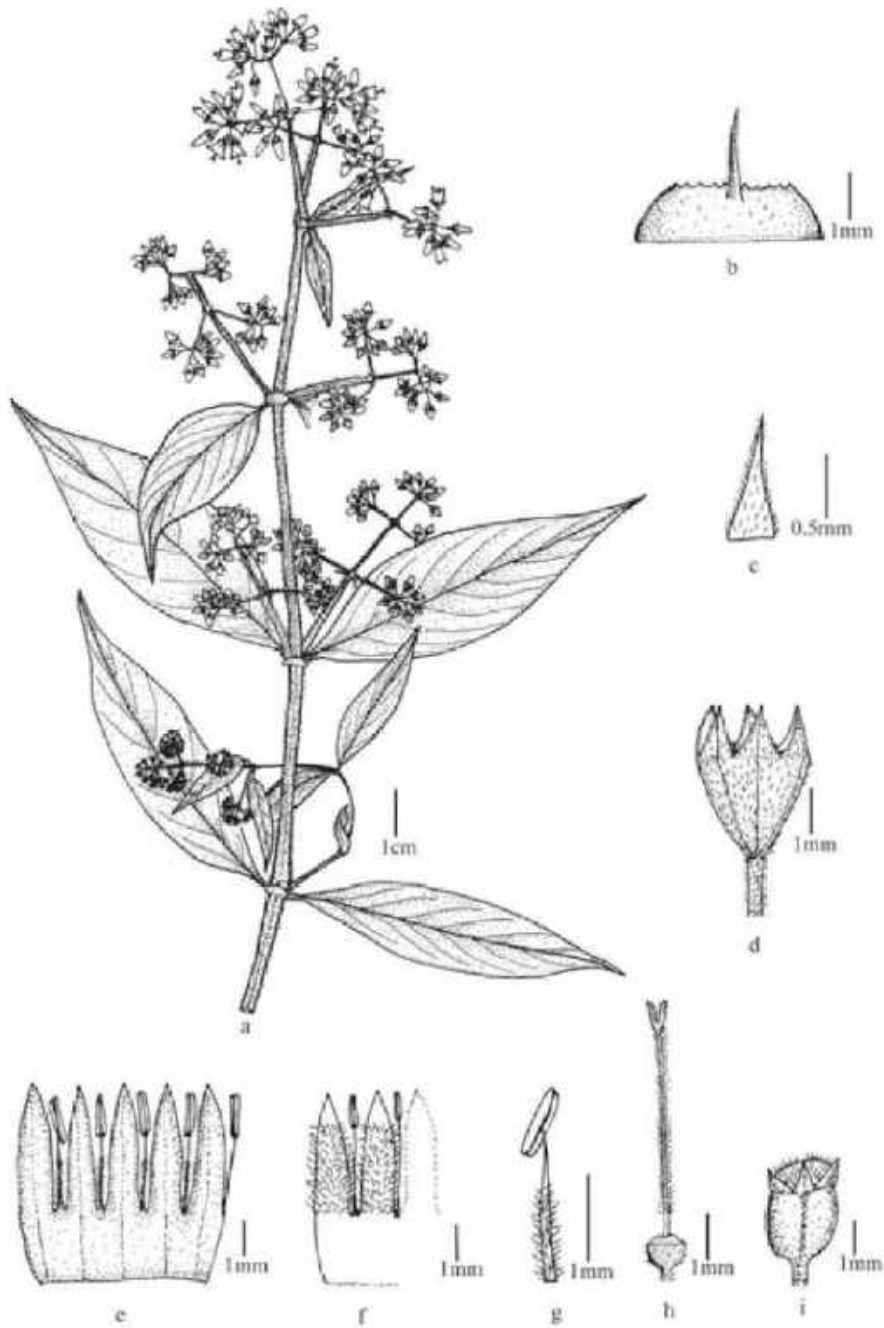


Fig. 34. *Hedyotis scandens*: a. Flowering branchlet; b. Stipule; c. Inflorescence bract; d. Calyx; e. Corolla split open with stamens; f. Corolla lobes inside with stamens; g. Stamen; h. Gynoecium; i. Capsule (AK 59724).

tube; filaments villous at base; anthers oblong. Ovary inferior; style villous; stigma 2-lobed, linear, papillose. Capsules globose or ellipsoid, dehiscent, glabrous except exposed apical part; seeds dark brown, circular, with an irregular wing-like margins, plano-convex, stipitate at other side, slightly raised at another side.

Flowering & Fruiting: October–February.

Distribution. India: Meghalaya, Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa, 25.02.1934, *KPB* 1554; Poro, 22.11.1975, *JKS* 834; Adma, Panbari, 12.02.2013, *AK* 58880; Santrabari to Buxa Fort, 28.09.2013, *AK* 59621; Buxa Fort to Tashigaon, 01.10.2013, *AK* 59724.

8. *Hymenodictyon* Wall.

Hymenodictyon orixense (Roxb.) Mabb., *Taxon* 31: 66. 1982. *Cinchona orixensis* Roxb., *Bot. Descr. Swietenia*: 21. 1793. *Hymenodictyon excelsum* Wall., *Fl. Ind.* 2: 149. 1824; Hook. f. in Hook. f., *Fl. Brit. India* 3: 35. 1880; Prain, *Bengal Pl.* 1: 555. 1903. [Plate 104d]

Latikaram, Latijhara (N).

Tree, 15–20 m high, deciduous. Leaves ovate to elliptic-lanceolate, 10–18 × 4–10 cm, cuneate, entire, short acuminate, coriaceous; stipules ovate to triangular-ovate, caducous, hairy. Inflorescence terminal, racemiform to spiciform, pendulous in axils of uppermost leaves, pubescent. Calyx cupular, puberulent; lobes triangular. Corolla greenish white, tubular below, ventricose above, pubescent; lobes elliptic-oblong. Stamens at mouth of corolla tube; filaments short; anthers oblong-elliptic, connective produced above. Ovary inferior; style exerted; stigma globose. Capsules ellipsoid, dehiscent, lenticellate, reflexed; seeds many, brown, rhombic-ovate or elliptic, winged, flat, papery; wings irregularly denticulate.

Flowering & Fruiting: May–February.

Distribution. India: Almost throughout India excluding Jammu & Kashmir.

Specimens examined: Tobgaon, 18.05.1949, *VN & party* 2685; NRVK 11, 04.12.2011, *GK* 52338; Narathali, 20.02.2012, *AK* 55777.

9. *Hyptianthera* Wight & Arn.

Hyptianthera stricta (Roxb. ex Schult.) Wight & Arn., *Prodr. Fl. Ind. Orient.*: 399. 1834; Hook. f., *Fl. Brit. India* 3: 121. 1880; Prain, *Bengal Pl.* 1: 568. 1903. *Macrocnemum strictum* Roxb. ex Schult., *Syst. Veg.* 5: 6. 1819. [Plate 105a-b]

Akle kat, Haldi kat (N).

Shrub, 1–2 m high. Leaves lanceolate or oblong-lanceolate, 10–14 × 1.7–3.7 cm, cuneate to cuneate-rounded at base, entire, acuminate, coriaceous; stipules triangular, ciliate at base. Inflorescence axillary clusters. Flowers sessile. Calyx cupular, puberulent; lobes 4 or 5, triangular-ovate, ciliate, short acuminate. Corolla

creamy white; lobes 4 or 5, ovate, villous inside. Stamens 4 or 5, at mouth of corolla tube; filaments short; anthers triangular-lanceolate, villous. Ovary inferior; style columnar; stigma 2-lobed, stigmatic lobe ellipsoid, exserted, villous. Berries green, pyriform to subglobose; seeds elliptic, compressed, striate fibrous.

Flowering & Fruiting: May–October.

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Tripura and West Bengal.

Specimens examined: On the way to Buxaduar, 28.02.1934, *KPB* 1780; Buxa, 19.05.1949, *VN & party* 2732; Jainti range, 05.03.2011, *GK* 47283; Panbari-9, 10.04.2012, *GK* 56087; Bhutri, 05.10.2012, *AK* 58628; Achalung to Lepchakhawa, 29.09.2013, *AK* 59661; Buxaduar to Tashigaon, 20.05.2014, *AK* 62681.

10. *Ixora* L.

Key to the species

- 1a. Corolla hairy at throat; tube 2.5–4.5 cm; fruits crowned by persistent calyx
1. *I. athroantha*
- 1b. Corolla glabrous at throat; tube 0.8–1.5 cm; fruits not crowned by persistent calyx
2. *I. nigricans*

1. *Ixora athroantha* Bremek., *Indian Forester* 85: 372. 1959.

[Plate 105c-d; Fig. 35]

Chiwaripat (N).

Shrub, 2–3 m high. Leaves oblong-elliptic to elliptic or elliptic-ovate, 17–43 × 6.5–13.5 cm, cuneate, entire, acuminate, coriaceous; stipules oblate, connate, fringed at base, cuspidate. Inflorescence terminal, compound corymbs, pubescent. Flowers sessile to pedicellate. Calyx cupular; lobes 4 or 5, triangular-subulate. Corolla creamy white, salver-shaped, hairy at throat; lobes 4 or 5, oblanceolate to oblong-elliptic. Stamens 4 or 5, at mouth of corolla tube, exserted; filaments curved; anthers yellow, oblong-lanceolate, 2 white glandular. Ovary inferior; style cylindrical; stigma 2-lobed, oblong. Fruits green, ovoid; seeds solitary in each lobe, elliptic, wrinkled.

Flowering & Fruiting: May–October.

Distribution. India: Assam, Sikkim and West Bengal.

Specimens examined: Jainty-Phashkhawa, 02.10.2012, *AK* 58623; Santrabari to Buxaduar, 18.05.2014, *AK* 62609; Buxaduar to Chunabhati, 21.05.2014, *AK* 65915.

2. *Ixora nigricans* R. Br. ex Wight & Arn., *Prodr. Fl. Ind. Orient.* 1: 428. 1834; Hook. f., *Fl. Brit. India* 3: 148. 1880.

Shrub, 1–3 m high. Leaves oblong-obovate or oblong-elliptic, 6–20 × 2–7.5 cm, cuneate, entire, acute or very shortly acuminate; stipules ovate, cuspidate,

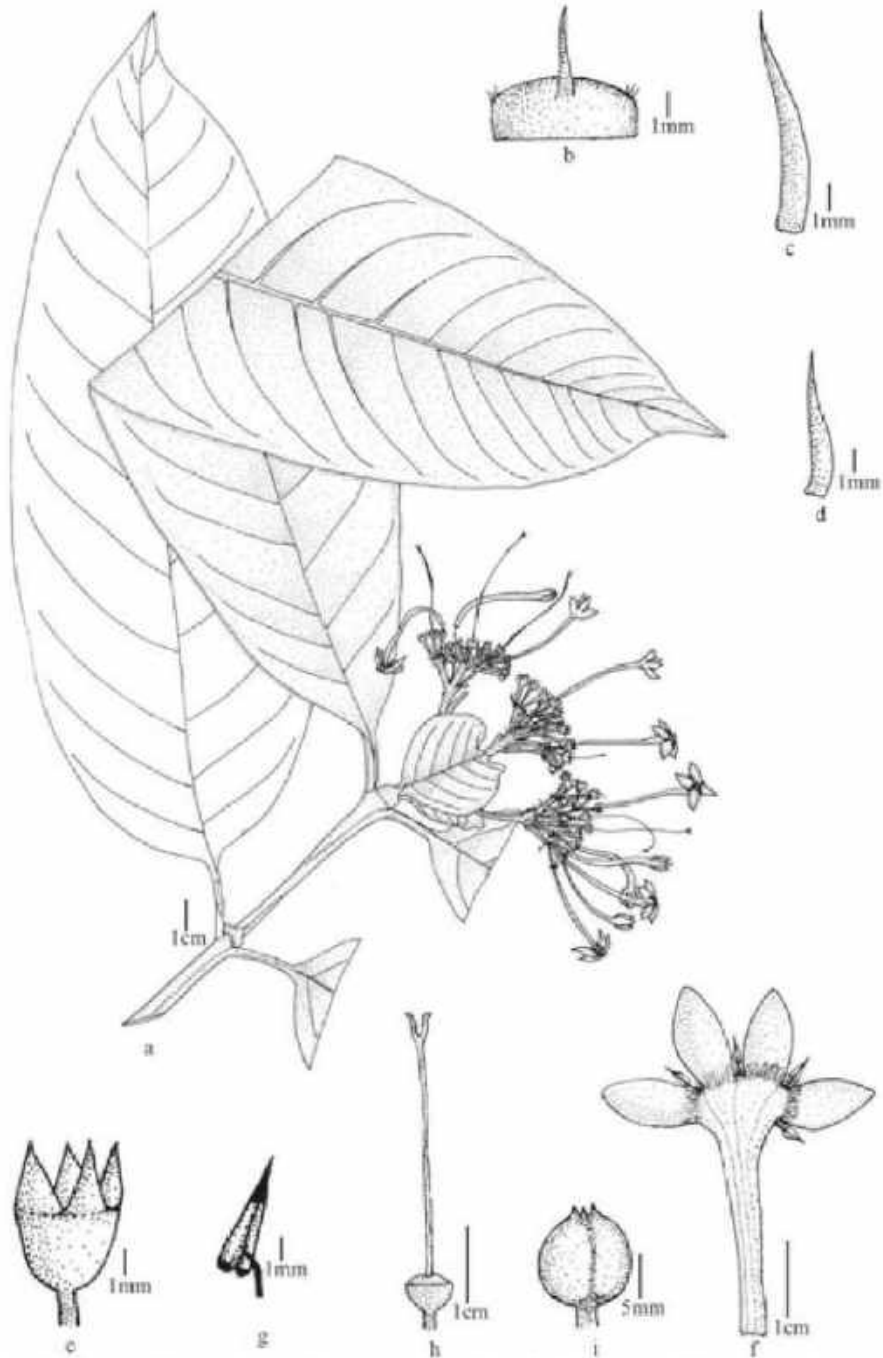


Fig. 35. *Ixora athroantha*: a. Flowering branchlet; b. Stipule; c. Inflorescence bract; d. Floral bract; e. Calyx; f. Corolla split open showing stamens; g. Stamen; h. Gynoecium; i. Capsule (AK 62609).

terminating in a long hair-point. Inflorescence shortly pedunculate, usually branched, forming lax panicles, sparsely pubescent. Calyx cupular; lobes triangular. Corolla white, salver-shaped; lobes oblong, deflexed. Anthers 3.5–4 mm. Ovary inferior; style exerted; stigma 2.5–3 mm. Fruits black, globose, calyx not persistent.

Flowering & Fruiting: December–March.

Distribution. India: Maharashtra, Odisha, Tamil Nadu and West Bengal.

Specimen examined: Poro, 16 km from Rajabhatkhawa, BK 457.

11. *Leptodermis* Wall.

Leptodermis lanceolata Wall., Fl. Ind. 2: 191. 1824; Hook. f., Fl. Brit. India 3: 198. 1880; Sikdar & R. S. Rao, J. Bombay Nat. Hist. Soc. 81: 133. 1984.

Spreading, much branched shrub, 0.9–1.2 m high. Leaves ovate, elliptic-lanceolate, 2.5–8.5 × 0.6–3.5 cm, attenuate, entire, acuminate, membranous, sparsely hairy beneath, particularly on veins; stipules triangular, villous. Inflorescence terminal, axillary on short shoots, capitate cymose or in fascicles. Flowers sessile. Calyx tubular; lobes triangular. Corolla white, infundibular, hairy within; lobes ovate. Stamens at corolla throat; filaments short; anthers linear. Ovary inferior; stigma 5-fid, lobes subulate, pubescent. Capsules oblong or cylindric, crowned by the persistent calyx lobes.

Flowering & Fruiting: September–February.

Distribution. India: Himachal Pradesh, Kashmir, Meghalaya, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: On way to Sinchu, 1600m, s. d., KPB 2017.

12. *Meyna* Roxb. ex Link

Key to the species

- | | |
|--|------------------------|
| 1a. Plants pubescent or tomentose; flower bud always pilose | 2. <i>M. pubescens</i> |
| 1b. Plants mostly glabrous or rarely glabrescent; flower bud always glabrous | 2 |
| 2a. Inflorescence stalked, peduncled cymes | 1. <i>M. laxiflora</i> |
| 2b. Inflorescence subsessile, subumbellate cymes | 3. <i>M. spinosa</i> |

1. *Meyna laxiflora* Robyns, Bull. Jard. Bot. Etat Bruxelles 11: 228. 1928; Sikdar & R. S. Rao, J. Bombay Nat. Hist. Soc. 81: 133. 1984.

Small tree, armed or unarmed. Leaves elliptic-ovate, ovate-elliptic, 3–7 × 2–4 cm, oblique to rounded, entire, obtuse-acuminate; stipules subglobose or subtriangular, caudate, cuspidate. Inflorescence peduncled cymes. Flowers sometimes arranged on spine. Calyx campanulate; lobes oblong-lanceolate, reflexed. Corolla cylindrical,

pubescent at throat; lobes oblong-lanceolate, reflexed. Anthers oblong, rounded at base and at apex. Ovary inferior; stigma horn-shaped, apiccs 5-lobed. Drupes red, subglobose.

Flowering & Fruiting: August–December.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Buxa, north-west & north-east, 800m, VN 2722.

2. *Meyna pubescens* (Kurz) Robyns, Bull. Jard. Bot. Etat Bruxelles 11: 235. 1928. *Vangueria pubescens* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41 (2): 314. 1872. *Vangueria spinosa* Roxb. var. *mollis* Hook. f., Fl. Brit. India 3: 136. 1882.

[Plate 106a]

Shrub, 1–2 m high, armed, pubescent, curved hairy when young, sparsely pubescent to glabrescent later. Leaves elliptic to ovate-elliptic, 2.7–8 × 1.3–3.6 cm, cuneate, entire, short acuminate, coriaceous; stipules triangular, keeled, pubescent. Inflorescence 2–3-flowered, fasciculate cymes or solitary. Flowers sessile, attached on squamate foliate pads or spurs on old wood. Calyx cupular, pubescent; lobes subulate. Corolla pale green, salver-shaped, pubescent outside, hairy inside above; lobes ovate, reflexed. Stamens at throat of corolla tube; anthers oblong. Ovary inferior; stigma clavate, 4–5-lobed. Fruits yellow, baccate, globose, sparsely appressed hairy; seeds angular, rugose.

Flowering & Fruiting: June–October.

Distribution. India: Andhra Pradesh, Assam, Bihar, Odisha, Madhya Pradesh, Meghalaya, Tripura and West Bengal.

Specimens examined: Checko-1, 25.09.2012, AK 56121; Bhutri, 05.10.2012, AK 58651.

3. *Meyna spinosa* Roxb. ex Link, Jahrb. Gewachsk. 1: 32. 1820. *Vangueria spinosa* (Roxb. ex Link) Roxb., Fl. Ind. 2: 172. 1824; Hook. f., Fl. Brit. India 3: 136. 1880; Prain, Bengal Pl. 1: 575. 1903.

[Plate 106b]

Mandalu kanrha (N).

Deciduous shrub, 1–2 m high, armed. Leaves in whorl of 3, ovate or ovate-oblong, 1.7–9.5 × 0.9–4.7 cm, cuneate, entire, acute or obtuse, subcoriaceous. Inflorescence 3–4-flowered cymes or solitary. Flowers subsessile, on squamate foliate pads or spurs on old wood. Calyx pale-green, cupular, shallowly 5-lobed. Corolla pale green, shallowly cylindrical or suburceolate, hairy within on upper half; lobes ovate, reflexed. Stamens at top of tube; anthers oblong. Ovary inferior; stigma clavate, 4–5-lobed. Fruits turned yellow when mature, baccate, globose.

Flowering & Fruiting: March–June.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Tripura and West Bengal.

Specimens examined: Buxa, 800 m, VN 2722; Jainti range, 05.10.2009, SKS & GK 46174; Jainti-6a, 01.12.2011, GK 47180.

Notes: Crushed fruits are used as fish poison.

13. *Mitracarpus* Zucc.

Mitracarpus hirtus (L.) DC., Prodr. 4: 572. 1830. *Spermacoce hirta* L., Sp. Pl., ed. 2. 1: 148. 1762. [Plate 106c]

Erect herb, 20–35 cm high. Leaves sessile, elliptic-ovate to ovate-lanceolate, 1.3–3 × 0.5–1.2 cm, attenuate, entire and hairy, acute, mucro, coriaceous, scabrous; stipules ovate, with 8–10-toothed, white bristly. Inflorescence many flowered, axillary, congested cymes or head. Flowers sessile. Calyx cupular, setose; lobes 4, unequal in pairs; smaller pair triangular or subulate, ciliate, acuminate; larger pair oblong-lanceolate, or else same as smaller pair. Corolla white, salver-shaped; lobes 4, ovate. Stamens 4, at throat of corolla tube; anthers elliptic-oblong. Ovary inferior; stigma bifid. Capsules subglobose, circumscissile, scarious; seeds 2, solitary in each lobe, oblate, cruciform scar on ventral face.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Bihar, Karnataka, Kerala, Odisha, Tamil Nadu and West Bengal.

Specimens examined: Rydak river belt, 20.09.2011, AK 52670; Newlands, Sukno river, 22.09.2011, AK 52749; Marakata, 24.09.2011, AK 52853; Newlands, 15.02.2012, AK 55635.

14. *Morinda* L.

Morinda angustifolia Roxb., Pl. Coromandel 3 (2): 32. 1815; Hook. f., Fl. Brit. India 3: 156. 1880; Prain, Bengal Pl. 1: 573. 1903. [Plate 106d, 107a]

Hardi-kat, Haldi kath (N).

Evergreen shrub, 2–3 m high. Leaves oblanceolate or elliptic to elliptic-obovate, 12.5–22.5 × 4.5–8.8 cm, attenuate, repand, acuminate, coriaceous; stipules free or slightly fused to petioles, triangular. Flowers sessile. Calyx cupular or urceolate, truncate at apex. Corolla white, salver-shaped; lobes 4 or 5, ovate-lanceolate. Stamens 4 or 5, inserted at middle of corolla tube; anthers oblong. Ovary inferior; stigma bifid. Fruits a cluster of drupelets; drupelets bluish white, subglobose, partially fused at base, pulpy.

Flowering & Fruiting: February–September.

Distribution. India: Assam, Jharkhand, Meghalaya, Mizoram, Sikkim, and West Bengal.

Specimens examined: Rajabhatkhawa, VN 2382; Buxa to Santrabari, VN 2860; Poro, JKS 763; Garam, JKS 864; South Rajabhatkhawa, JKS 4262; Panbari-6, 01.12.2011, GK 47184; SRVK-5, 04.03.2011, GK 47231; Kumargram, Kalikhola river belt, 21.09.2011, AK 52726; North Rydak, 26.09.2011, AK 52932; Kumargram, 18.02.2012, AK 55705.

15. *Mussaenda* L.

Key to the species

- 1a. Inflorescence lax; corolla lobes 2–5 mm wide 1. *M. glabra*
1b. Inflorescence very dense or subcapitate; corolla lobes 2–3 mm wide 2. *M. roxburghii*

1. *Mussaenda glabra* Vahl, *Symb. Bot.* 3: 38. 1794; Hook. f., *Fl. Brit. India* 3: 90. 1880; Prain, *Bengal Pl.* 1: 562. 1903. *Mussaenda andersonii* Soumen K. Basu & T. K. Paul, *J. Bombay Nat. Hist. Soc.* 86 (3): 430. 1990. [Plate 107b]

Timberh-rik (L); *Kange lahara*, *Dhobine phul* (N).

Shrub, 2.5–4 m high. Leaves oblong-elliptic, 4.5–10 × 1–4.5 cm, cuneate at base, entire, acute, rarely shortly acuminate, pilose; stipules triangular, 4–8 mm. Inflorescence lax, terminal, branched corymbs. Calyx cupular; lobes triangular, sparsely pilose, one lobe transformed into a large, petiolate, brilliant white petaloid structure, similar in size and shape to leaves. Corolla orange yellow, salver-shaped; tube 1.3–1.8 cm, pilose upwards; lobes ovate, acute or shortly apiculate at apex. Stamens at middle of corolla tube; anthers oblong. Ovary inferior; stigma bifid. Berries globose, 0.8–1 cm across, crowned by persistent calyx lobes; seeds brown, near orbicular, pitted.

Flowering & Fruiting: April–May.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Meghalaya, Nagaland, Mizoram, Nicobar Islands, Sikkim, and West Bengal.

Specimens examined: SRVK-6, 31.03.2012, GK 56001.

2. *Mussaenda roxburghii* Hook. f., *Fl. Brit. India* 3: 87. 1880; Prain, *Bengal Pl.* 1: 562. 1903. [Plate 107c]

Dhobi kat, *Dhobine ghas*, *Dhobine* (N).

Shrub, 1–2 m high. Leaves elliptic to ovate-elliptic, 6–20 × 3–7 cm, attenuate, repand and hairy, acuminate, coriaceous, scabrous; stipules triangular, bifid, deciduous, appressed hairy. Inflorescence axillary, terminal, pedunculate cymes, appressed pubescent. Calyx cupular; lobes triangular-subulate, appressed pubescent, one lobe transformed into a large, petiolate, brilliant white petaloid structure, similar in size and shape to leaves. Corolla orange yellow, salver-shaped; tube 1.9–2.8 cm, appressed hairy outside, villous inside; lobes triangular-ovate, sharply pointed. Stamens at middle of corolla tube; anthers oblong. Ovary inferior; stigma bifid. Berries subglobose or ellipsoid, crowned by persistent calyx lobes; seeds brown, near orbicular, pitted.

Flowering & Fruiting: May–February.

Distribution. India: Arunachal Pradesh, Assam and West Bengal.

Specimens examined: 21 mile from Rajabhatkhawa, 13.05.1949, VN & party 2378; North Rajabhatkhawa, 23.05.1976, JKS 6990; Checko-1, 26.09.2012, AK 56171; Hatipota, 29.09.2012, AK 58524; Bhutri, 05.10.2012, AK 58626; Buxa Fort to Achalung, 29.09.2013, AK 59642; Buxa Fort to Chumabhati, 30.09.2013, AK 59686; Buxa Fort to Chumabhati, 30.09.2013, AK 59696; Santrabari to Buxaduar, 18.05.2014, AK 62616.

16. *Neanotis* W. H. Lewis

Neanotis wightiana (Wall. ex Wight & Arn.) W. H. Lewis, Ann. Missouri Bot. Gard. 53: 40. 1966. *Hedyotis wightiana* Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 410. 1834.

Erect herb, 8–12 cm high. Leaves ovate to ovate-lanceolate, 1.4–2.7 × 0.6–1.5 cm, attenuate, repand and hairy, acute, lineolate, sparsely scabrous above; stipules triangular, 5–7-toothed, hairy. Inflorescence axillary, terminal, pedunculate, umbellate cymes. Calyx cupular, sparsely lineolate; lobes 4, triangular, ciliate. Corolla white, salver-shaped; lobes 4, triangular-ovate. Stamens 4, at throat of corolla tube; anthers oblong. Ovary inferior; style filiform; stigma bifid. Capsules rhomboid, compressed, apex slightly emarginate and apiculate, enclosed by persistent calyx, dehisced loculicidally in 2-valves; seeds black, boat-shaped, plano-convex, pitted above, depressed and median keel below.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Poro, JKS 802; Garam, JKS 867; Bhutanghat, JKS 4118; Buxa Fort to Tashigaon, 01.10.2013, AK 59734.

17. *Oldenlandia* L.

Key to the species

- | | |
|---|---------------------------|
| 1a. Stipules with 8–14 bristles; calyx hispid; lobes ciliolate at margins; corolla lobes spinulose hairy; filaments 4–4.5 mm; capsules hispid | 5. <i>O. verticillata</i> |
| 1b. Stipules with not more than 5 bristles; calyx glabrous; lobes scabrid at margins; corolla lobes glabrous; filaments not more than 0.5 mm; capsules glabrous | 2 |
| 2a. Ring of hairs at the throat of corolla tube; seeds tubercled | 3 |
| 2b. Glabrous at throat of corolla tube; seeds not tubercled | 4 |
| 3a. Inflorescences 3–5-flowered cymes; pedicels slender, 1–2.5 mm, not winged; stamens near base of corolla tube; anthers ovoid | 1. <i>O. corymbosa</i> |

- 3b. Inflorescences solitary or 2-flowered cymes; pedicels angular, 2.5–6 mm, narrowly winged; stamens at throat of corolla tube; anthers oblong **3. O. erecta**
- 4a. Stems rooting from lower nodes; pedicels 0.8–1 mm; corolla tube 1.5–1.8 mm; lobes not scabrid at margins, acute; anthers oblong, 0.8–1 mm; style c. 2 mm, fimbriate **2. O. diffusa**
- 4b. Stems not rooting from lower nodes; pedicels 1.5–2.5 mm; corolla tube c. 0.6 mm; lobes scabrid at margins, obtuse at apex; anthers ovoid to subglobose, minute; style 0.8–1 mm, glabrous **4. O. herbacea**

1. *Oldenlandia corymbosa* L., Sp. Pl. 1: 119. 1753; Hook. f., Fl. Brit. India 3: 64. 1880; Prain, Bengal Pl. 1: 559. 1903. [Plate 107d]

Khet-papra, Dhaman-papar (B, H).

Erect herb, 5–15 cm high. Leaves sessile, linear-oblongate, 1.5–2.6 × 0.2–0.5 cm, attenuate, entire, acute, lineolate below; stipules fused to petiole base, membranous, 5 linear bristly. Inflorescence axillary, 3–5-flowered pedunculate cymes. Calyx cupular, lineolate; lobes 4, triangular-ovate, ciliate. Corolla white, campanulate, ring of hairs at throat inside; lobes often 4, sometimes 3, triangular, pubescent inside. Stamens 4, near base of corolla tube; anthers ovoid. Ovary inferior; stigma 2-lobed. Capsules subglobose, truncate or slightly raised, enclosed in persistent calyx, lineolate; seeds brown black, ovoid, trigonous, reticulate, tubercled.

Flowering & Fruiting: July–October.

Distribution. India: Andaman & Nicobar Islands, Kerala, Jharkhand, Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: Jainti range, 27.11.2011, GK 47150; Kumargram, 18.09.2011, AK 52612; Kumargram, Kalikholra river belt, 21.09.2011, AK 52711.

2. *Oldenlandia diffusa* (Willd.) Roxb., Fl. Ind. 1: 444. 1820; Hook. f., Fl. Brit. India 3: 65. 1880. *Hedyotis diffusa* Willd., Sp. Pl. 1 (2): 566. 1797. [Plate 108a]

Decumbent herb, 5–10 cm high. Leaves sessile, linear-lanceolate, 5–16 × 0.6–1.2 mm, attenuate, entire and scabrous, acute, sparsely lineolate below; stipules tubular, 2–5 linear bristly, sparsely hairy. Inflorescence axillary, solitary or 2-flowered cymes. Calyx cupular, lineolate; lobes 4, triangular, scabrid. Corolla white, campanulate; lobes 4, ovate. Stamens 4, at throat of corolla tube; anthers oblong. Ovary inferior; style angular, fimbriate above; stigma 2-lobed. Capsules subglobose, enclosed in persistent calyx, grooved, lineolate; seeds light brown, angular, reticulate.

Flowering & Fruiting: August–October.

Distribution. India: Almost throughout India.

Specimen examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59732.

Notes: Style usually glabrous but, in present instance it is fimbriate above.

3. *Oldenlandia erecta* (Manilal & Sivar.) R. R. Mill, Edinburgh J. Bot. 53: 104. 1996. *Hedyotis erecta* Manilal & Sivar., Bot. Not. 129: 191. 1975. [Plate 108b]

Decumbent herb, 5–10 cm high. Leaves sessile, narrowly linear-oblongate, 6–13 × 0.7–1.5 mm, attenuate, entire and scabrous, acute, lineolate below; stipules fused to petiole, tubular, 3–5-linear bristly, sparsely hairy. Inflorescence axillary, solitary or 2-flowered pedunculate cymes. Calyx cupular, lineolate; lobes 4, narrowly triangular, scabrid. Corolla white or pinkish white, campanulate, ring of hairs at throat; lobes 4, ovate, scabrous. Stamens 4, at throat of corolla tube; anthers oblong. Ovary inferior; stigma 2-lobed. Capsules subglobose, truncate or slightly raised at apex, enclosed in persistent calyx, grooved, lineolate; seeds brown black, ovoid, trigonous, reticulate, tubercled.

Flowering & Fruiting: August–October.

Distribution. India: Kerala and West Bengal.

Specimen examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59731.

4. *Oldenlandia herbacea* (L.) Roxb., Fl. Ind. 1: 445. 1820. *Hedyotis herbacea* L., Sp. Pl. 1: 102. 1753. *Oldenlandia heyneii* G. Don, Gen. Hist. 3: 531. 1834; Hook. f., Fl. Brit. India 3: 65. 1880.

Erect to decumbent herb, 4–7 cm high. Leaves sessile, linear-oblongate, 2.5–10 × 0.3–1.2 mm, attenuate, entire and scabrous, acute, lineolate below; stipules fused to petiole, tubular, triangular, 2–3-linear bristly, minute hairy. Inflorescence axillary, 1–3-flowered fasciculate cymes. Calyx subglobose, cupular, sparsely lineolate; lobes 4, triangular, scabrid. Corolla white, campanulate; lobes 4, triangular-ovate, scabrous, obtuse. Stamens 4, at throat of corolla tube; anthers ovoid to subglobose. Ovary inferior; stigma 2-lobed. Capsules subglobose, enclosed in persistent calyx, grooved, sparsely lineolate; seeds brown black, ovoid, trigonous, reticulate.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 20.02.2012, AK 55802; Marakata, 22.02.2012, AK 55898.

5. *Oldenlandia verticillata* L., Mant. Pl: 40. 1767. *Hedyotis hispida* Retz., Observ. Bot. 4: 23. 1786; Hook. f., Fl. Brit. India 3: 60. 1880; Prain, Bengal Pl. 1: 557. 1903. [Plate 108c]

Erect herb, 20–45 cm high. Leaves elliptic or elliptic-lanceolate, 3.5–6.5 × 0.5–1.4 cm, cuneate, entire and scabrous, acute with mucronate tip, coriaceous, scabrous

below; stipules variable, cupular, triangular to subtruncate, 8–14-linear bristly, hispid. Inflorescence axillary, many flowered, congested cymes. Flowers sessile to subsessile. Calyx obconic, hispid; lobes 4, triangular-ovate or lanceolate, ciliolate, acuminate. Corolla white, infundibular; lobes 4, lanceolate, acute, spinulose hairy, reflexed. Stamens 4, at throat of corolla tube; anthers oblong. Ovary inferior; stigma 2-lobed, papillate. Capsules subglobose, crustaceous, indehiscent, hispid; seeds brown, triangular, faintly reticulate.

Flowering & Fruiting: May–September.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa range, 13.02.2010, SKS & GK 47068; Sankosh, 28.09.2011, AK 52981; Panbari-8, 31.03.2012, GK 56022; Checko-1, 25.09.2012, AK 56137.

18. *Ophiorrhiza* L.

Key to the species

- 1a. Bracts falcate and bracteoles lanceolate, 1-veined, pubescent, persistent
1. *O. fasciculata*
- 1b. Bracts and bracteoles filiform, not veined, glabrous, quickly deciduous
2. *O. heterostyla*

1. *Ophiorrhiza fasciculata* D Don, Prodr. Fl. Nepal.: 136. 1825; Hook. f., Fl. Brit. India 3: 83. 1880. [Plate 108d; Fig. 36]

Erect herb, 30–45 cm high. Leaves elliptic-lanceolate or ovate-lanceolate or lanceolate, 5.5–11.5 × 2.5–4.5 cm, obliquely attenuate, entire and hairy, short acuminate, glabrous or scattered pilose above, lineolate below; stipules lanceolate, filiform, acute, sometimes bifid, glabrous or pubescent. Inflorescence terminal or axillary, pedunculate helicoid cymes. Calyx urceolate, pubescent; lobes 5, ovate to triangular-ovate, ciliate. Corolla white, infundibuliform, glabrous or puberulous; tube pink; lobes 5, ovate to suborbicular, mucronulate, ciliolate. Stamens 5, at base of corolla tube; anthers linear. Ovary inferior; style included; stigma bifid. Capsules obcordate, dehiscent by two broad gaping valves, puberulent; seeds brown, angled, wrinkled.

Flowering & Fruiting: May–October.

Distribution. India: Odisha, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Pana, 08.10.2012, AK 58720; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59668; Buxaduar to Tashigaon, 20.05.2014, AK 62679.

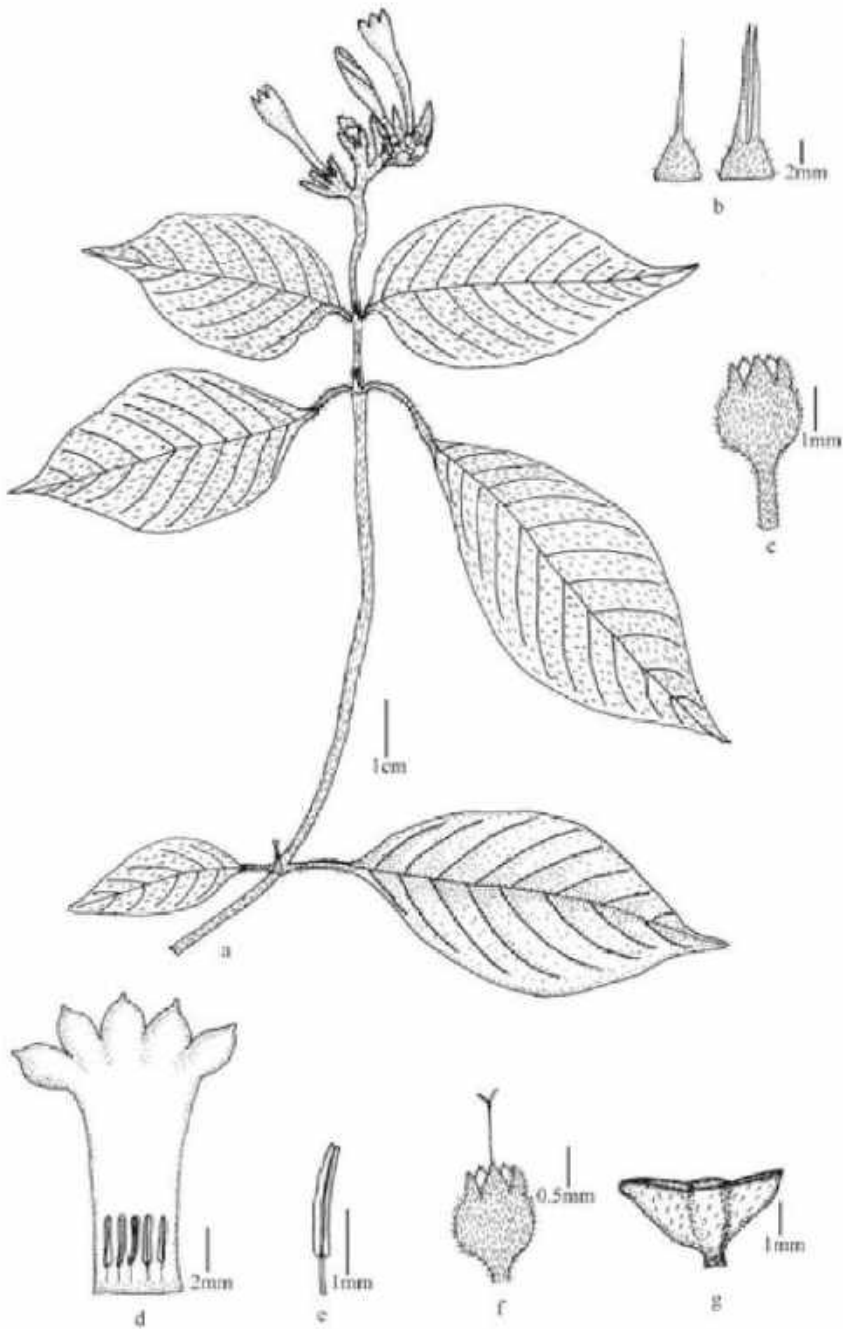


Fig. 36. *Ophiorrhiza fasciculata*: a. Flowering branchlet; b. Stipules; c. Calyx; d. Corolla split open showing stamens; e. Stamen; f. Gynoecium with calyx; g. Capsule (AK 62679).

2. *Ophiorrhiza heterostyla* Dunn, Bull. Misc. Inform. Kew 1920: 133. 1920.
Ophiorrhiza seshagiriana Sikdar & Maiti, J. Bombay Nat. Hist. Soc. 78: 143. 1981.

Erect herb, 0.5–1.5 m high. Leaves unequal, lanceolate or oblong-elliptic, falcate, 4–16 × 1–4.5 cm, attenuate, entire, shortly acuminate, dark green above, paler beneath; stipules filiform from a broad base. Inflorescence terminal cymes, glabrous or scurfy, with distinct scorpioid branches. Calyx teeth not persistent on capsule. Corolla white, infundibuliform, glabrous outside, pubescent and a ring of hairs inside; lobes 5, oblong, reflexed. Capsule obcordate, dehiscing by two broad gaping valves, glabrous.

Flowering & Fruiting: February–May.

Distribution. India: Arunachal Pradesh and West Bengal.

Specimen examined: Way to Sinchu, 1800m, JKS 4681.

19. *Paederia* L.

Paederia cruddasiana Prain, J. Asiat. Soc. Bengal, Pt. 2., Nat. Hist. 67: 295. 1898.
Paederia foetida L. var. *microcarpa* Kurz, J. Asiat. Soc. Bengal, Pt. 2. Nat. Hist. 45: 139. 1876; Hook. f., Fl. Brit. India 3: 195. 1881. [Plate 109a-b]

Biri (N).

Climbing shrub. Leaves ovate to ovate-lanceolate, 3.8–9.5 × 1.6–4.7 cm, truncate or subcordate, wavy and hairy, acuminate, tip mucronate, subcoriaceous; stipules triangular-ovate, sometimes bifid, acute, lacinate. Inflorescence axillary, terminal or lateral, pedunculate, thyrroid or lax panicles. Flowers sessile to subsessile. Calyx reddish green, cupular; lobes 5, triangular-ovate, ciliate, acute. Corolla pink, with red throat, funnellform, vesicular outside, villous inside; lobes 5, white, suborbicular, 3-lobed or toothed. Stamens 5, at middle of corolla tube; anthers linear-oblong. Ovary inferior; stigma bifid. Drupes light pink, ovoid, laterally flattened, crowned by persistent calyx lobes, crustaceous; seeds ovate-elliptic, winged, black at centre.

Flowering & Fruiting: September–February.

Distribution. India: Sikkim and West Bengal.

Specimens examined: NRVK-12, 09.10.2009, SKS & GK 46254; NRVK-13, 04.12.2011, GK 52326; Newlands, 15.02.2012, AK 53025; Checko-1, 26.09.2012, AK 56159; Hatipota, 29.09.2012, AK 58514; Buxa Fort to Achalung, 29.09.2013, AK 59643.

Notes: Leaves are used as vegetable.

20. Pavetta L.

Pavetta indica L. var. *glabrescens* (Kurz) Deb & R. C. Rout, J. Bombay Nat. Hist. Soc. 89: 351. 1992. *Ixora tomentosa* var. *glabrescens* Kurz, Forest Fl. Burma 2: 19. 1877. *Pavetta indica* L. var. *polyantha* Hook. f., Fl. Brit. India 3: 150. 1880.

[Plate 109c]

Shrub, 1–2 m high. Leaves elliptic to elliptic-oblong, elliptic-ovate to elliptic-lanceolate, 10–17 × 3.5–7.7 cm, cuneate, repand, caudate-acuminate, coriaceous, pubescent beneath; stipules ovate-triangular, connate, cuspidate, glabrous or sparsely hairy. Inflorescence terminal, pedunculate, trichotomously branched, corymbose cymes, pubescent. Calyx cupular, angular, pubescent; lobes 4, triangular. Corolla white, salver-shaped; lobes 4, elliptic-oblong, obtuse, mucronulate tip. Stamens 4, at mouth of corolla tube, exserted; anthers linear. Ovary inferior; stigma obscurely 2-lobed. Drupes black, globose to subglobose; seeds black, globose, one face flattened; isodiametric cells present.

Flowering & Fruiting: June–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.

Specimen examined: Bhutri, 05.10.2012, AK 58629.

21. Psychotria L.

Key to the species

- 1a. Stipules forked at apex; seeds smooth or single grooved on dorsal surface **1. P. denticulata**
1b. Stipules not forked at apex; seeds 4–8-grooved on dorsal surface **2. P. erratica**

1. Psychotria denticulata Wall., Fl. Ind. 2: 166. 1824; Hook. f., Fl. Brit. India 3: 173. 1880.

Bon golcul (N).

Shrub, 2–3 m high. Leaves oblong-ovate, ovate-elliptic or lanceolate, 10–15 × 4–8 cm, attenuate, entire, acuminate, coriaceous; stipules triangular-ovate, forked, hairy, caducous. Inflorescence terminal cymes, puberulent. Flowers sessile. Calyx cupular; teeth 5, triangular. Corolla white, scaly, hairy inside at the base; lobes 5, ovate, recurved. Stamens 5, inserted at corolla tube; anthers oblong. Ovary inferior; stigma 2-lobed. Fruits reddish, ellipsoid, calyx teeth deciduous; seeds smooth or single grooved on dorsal surface.

Flowering & Fruiting: June–July.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Nagaland, Sikkim and West Bengal.

Specimens examined: East Damanpur range, 27.11.2011, GK 50586; Checko-2, 31.03.2012, GK 56025.

2. Psychotria erratica Hook. f., Fl. Brit. India 3: 168. 1880. [Plate 110a]

Shrub, up to 1 m high. Leaves elliptic, ovate-lanceolate, 3–14.5 × 1.4–5.5 cm, attenuate, entire, acute, coriaceous; stipules ovate, villous or pubescent at base beneath, caducous. Inflorescence axillary and terminal cymes, puberulent. Flowers subsessile. Calyx cupular; lobes 5, lanceolate. Corolla white; lobes 5, triangular, villous inside, reflexed. Stamens 5; anthers oblong. Ovary inferior; stigma 2-lobed. Drupes globose, 6–8 × 4–6 mm, calyx teeth deciduous; seeds grooved on dorsal surface.

Flowering & Fruiting: March–December.

Distribution. India: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa range, 10.02.2010, SKS & GK 47004; Jainti range, 12.10.2010, SKS & GK 46328; Checko-2, 09.03.2011, GK 50524.

22. Richardia L.

Richardia scabra L., Sp. Pl. 1: 330. 1753; J. G. Srivast., J. Bombay Nat. Hist. Soc. 52: 659. 1954. [Plate 110b]

Rhizomatous prostrate herb, 8–15 cm. Leaves broadly ovate to ovate-elliptic, 0.8–1.5 × 0.4–1.4 cm, attenuate, entire and hairy, acute to obtuse, chartaceous, scabrous; stipules tubular, 3–5 subulate bristles at margins, hirsute. Inflorescence axillary, terminal, congested head-like cymes, terminally subtended by leaves. Flowers sessile. Calyx obovoid, hispidulous; lobes 5–6, triangular-lanceolate or lanceolate, ciliate. Corolla white, campanulate; lobes 5–6, ovate. Stamens 5–6, in between corolla lobes, exserted; anthers lanceolate. Ovary inferior; style 3-fid above; stigma subcapitate, exserted. Fruits obovoid, of 3 mericarps, 3-locular with 1 narrow vertical groove, crowned by persistent calyx lobes, hispidulous.

Flowering & Fruiting: January–March.

Distribution. India: Assam, Bihar, Andhra Pradesh, Karnataka, Kerala, Meghalaya, Odisha, Tamil Nadu and West Bengal.

Specimen examined: Kumargram, 13.02.2012, AK 53010.

23. Rubia L.

Rubia sikkimensis Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43 (2): 188. 1874; Hook. f., Fl. Brit. India 3: 203. 1881. [Plate 110c]

Manjito (N).

Climbing shrub, 4–6 m, prickly. Leaves sessile, 4 in whorls, elliptic to elliptic-lanceolate, 4–12 × 1.8–2.8 cm, cuncate-rounded, scabrid, acuminate, scabrid. Inflorescence terminal and axillary paniced cymes. Calyx fused to ovary, lobes absent. Corolla yellowish green, campanulate; lobes 5, lanceolate. Stamens 5,

inserted at base of corolla tube, exerted; anthers minute. Ovary inferior; style 2, free or partly united at base; stigma 2-lobed, exerted. Berries reddish, globose, apex subterminal, pulpy, smooth; seeds plano-convex.

Flowering & Fruiting: November–March.

Distribution. India: Arunachal, Assam, Manipur, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxaduar, Lepchakhawa, 27.11.1975, JKS 983; Buxa Fort to Chunabhati, 30.09.2013, AK 59687; Tashigaon to Rovers point, 03.10.2013, AK 59760; Tashigaon to Rovers point, 12.02.2014, AK 59920.

Notes: Stems are the good source of dye.

24. *Scleromitron* (Wight & Arn.) Meisn.

Scleromitron pinifolium (Wall. ex G. Don) R. J. Wang, J. Trop. Subtrop. Bot. 22: 440. 2014. *Hedyotis pinifolia* Wall. ex G. Don, Gen. Hist. 3: 526. 1834; Hook. f., Fl. Brit. India 3: 60. 1880 (incl. var. *caespitosa*); Prain, Bengal Pl. 1: 556. 1903.

Diffuse, much-branched herb. Leaves sessile, narrowly linear, 5–37 × 0.4–1 mm, revolute, acuminate at apex, scabrid; stipules connate, with many unequal filiform bristles. Flowers subsessile. Inflorescence subsessile, axillary, capitate verticillasters of 3 to several flowers. Calyx flask-shaped in fruits, long stiff hairy; lobes spreading; tips recurved. Corolla white, pink dot at apex of each lobe; lobes obovate-elliptic, subacute. Stamens subequalling corolla lobes; filaments at corolla lobe sinuses. Ovary inferior; stigma bifid. Capsules hispid.

Flowering & Fruiting: September–October.

Distribution. India: Andhra Pradesh, Bihar, Madhya Pradesh, Manipur, Odisha, Uttar Pradesh and West Bengal.

Specimen examined: Rajabhatkhawa, s. d., CRD 31.

25. *Spermacoce* L.

Key to the species

- | | | |
|-----|---|------------------------|
| 1a. | Calyx obconic or obovoid; corolla with ring of hairs at the throat | 2 |
| 1b. | Calyx ellipsoid or ovoid; corolla glabrous at the throat | 3 |
| 2a. | Leaves pilose below; lateral veins relatively distinct; inflorescences axillary, few flowered cymes; calyx obconic; corolla not enclosed by calyx lobes; tube 2–4 mm; seeds grooved, keeled on dorsal surface, punctate | 3. <i>S. latifolia</i> |
| 2b. | Leaves glabrous below; lateral veins not distinct; inflorescences axillary or terminal, congested heads; calyx obovoid; corolla enclosed by calyx lobes; tube 0.2–0.3 mm; seeds striated horizontally, not keeled on dorsal surface, not punctate | 1. <i>S. exilis</i> |

- 3a. Leaves obovate or spatulate; calyx ellipsoid; corolla tube 4.5–5 mm long
2. *S. hispida*
- 3b. Leaves ovate-lanceolate, elliptic-lanceolate; calyx ovoid; corolla tube c. 0.5 mm long
4. *S. ocyroides*

1. *Spermacoce exilis* (L. O. Williams) C. D. Adams ex W. C. Burger & C. M. Taylor, *Fieldiana Bot.*, n. s. 33: 316. 1993. *Borreria exilis* L. O. Williams, *Phytologia* 28: 277. 1974. *Spermacoce decandollei* Deb & Ratna Dutta, *J. Econ. Taxon. Bot.* 5: 1044. 1984, *nom. superfl.* [Plate 111a]

Erect herb, 40–60 cm high. Leaves ovate to ovate-elliptic, 1–2 × 0.5–1.2 cm, attenuate, entire and scabrous, acute or mucronate, chartaceous; stipules tubular, with 5–8 linear bristles. Inflorescence axillary, terminal, congested heads. Flowers sessile. Calyx obovoid, pubescent; lobes 4, linear, ciliate. Corolla minute, enclosed within calyx lobes, ring of hairs at throat; lobes 4, triangular. Stamens 4, at throat of corolla tube; anthers elliptic. Ovary inferior; stigma 2-lobed. Capsules urceolate, with 2 recurved calyx lobes, pubescent; seeds brownish yellow, ellipsoid, plano-convex, striated.

Flowering & Fruiting: September–December.

Distribution. India: Andaman Islands, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Kumargram, 19.09.2011, AK 52633; Bhutanghat, 26.09.2011, AK 52907.

2. *Spermacoce hispida* L., *Sp. Pl.* 1: 102. 1753; Hook. f., *Fl. Brit. India* 3: 200. 1881; Prain, *Bengal Pl.* 1: 580. 1903. [Plate 111b]

Decumbent herb, 10–20 cm high. Leaves obovate or spatulate, 5–15 × 2–7 mm, attenuate, entire, revolute and scabrous, acute to obtuse, hispidulous above; stipules tubular, with 5–7 linear bristles and hairy at margins, glabrous to hispidulous. Inflorescence axillary, 1–3-flowered cymes. Flowers sessile. Calyx ellipsoid, pubescent; lobes 4, linear-lanceolate, ciliate, acute. Corolla purple, funnelform; lobes 4, elliptic-oblong, acute. Stamens 4, at throat of corolla tube; anthers lanceolate. Ovary inferior; stigma 2-lobed. Capsules ellipsoid to subglobose, with persistent calyx lobes, hispidulous; seeds brown black, elliptic-oblong, grooved, granular.

Flowering & Fruiting: September–November.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, 27.11.1975, JKS 947; Tashigaon, JKS 4057; Narathali, 23.09.2011, AK 52812; Phashkhawa river belt, 30.09.2012, AK 58542.

3. *Spermacoce latifolia* Aubl., *Hist. Pl. Guiane* 1: 55, t. 19. 1775; Deb & Ratna Dutta, *J. Econ. Taxon. Bot.* 5: 1051. 1984. [Plate 110d]

Erect herb, 40–60 cm high. Leaves sessile to petiolate, ovate to broadly elliptic, 3–5 × 1.8–2.3 cm, attenuate, scabrid at margins, mucronate, pilose; stipules tubular, 5–8 bristly, hispidulous. Inflorescence axillary, few flowered cymes; flowers sessile. Calyx obconic, sparsely to densely pubescent; lobes 4, lanceolate, acute. Corolla white, tinged with blue, funnelform, pilose outside, ring of hairs at throat; lobes 4, ovate to triangular, reflexed. Stamens 4, at throat of corolla tube; anthers elliptic. Ovary inferior; stigma 2-lobed. Capsules ellipsoid, crowned by persistent calyx, crustaceous, pubescent; seeds black, elliptic, plano-convex, grooved and keeled, punctate.

Flowering & Fruiting: August–December.

Distribution. India: Assam, Kerala, Meghalaya, Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa range, 14.02.2010, SKS & GK 47097; Newlands, Sukno river, 22.09.2011, AK 52747.

4. *Spermaceoe ocymoides* Burm. f., Fl. Ind.: 34, t. 13, f. 1. 1768; Hook. f., Fl. Brit. India 3: 200, 1881. [Plate 111c]

Decumbent herb, 10–35 cm high. Leaves subsessile, ovate-lanceolate, elliptic-lanceolate, 1–4.5 × 0.2–1.3 cm, narrowed, entire, acute to acuminate, glabrous or scabrid above, pubescent on nerves beneath; stipules tubular, 6–7 filiform bristly, pubescent. Inflorescence many-flowered cymes; flowers subsessile. Calyx ovoid; lobes 4, lanceolate, unequal. Corolla white, pubescent above; lobes 4, ovate-triangular, obtuse, ring of hairs inside. Stamens 4, attached at sinuses of corolla-lobes. Capsules compressed, wrinkled.

Flowering & Fruiting: July–October.

Distribution. India: Gujarat, Kerala, Tamil Nadu and West Bengal.

Specimen examined: Jainti range, 05.10.2009, SKS & GK 46159.

26. *Uncaria* Schreb.

Key to the species

- | | |
|--|-----------------------------|
| 1a. Flowers distinctly pedicellate; fruits fusiform | 1. <i>U. macrophylla</i> |
| 1b. Flowers sessile or subsessile; fruits obovoid or narrowly ovoid | 2 |
| 2a. Branchlets terete or obscurely angled, pilose, lenticellate; hooked peduncles slender; leaves broadly ovate, subcordate at base, pilose, without tuft of hairs at junction of mid vein and lateral veins below; inflorescences axillary, terminating in solitary head; peduncles robust, pilose; fruits obovoid, pilose | 2. <i>U. scandens</i> |
| 2b. Branchlets 4-angled, glabrous, not lenticellate; hooked peduncles robust; leaves elliptic, narrowed at base, glabrous, tuft of hairs at junction of mid vein and lateral veins below; inflorescences terminal, axillary, terminating in 3 or many heads; peduncles slender, appressed pubescent; fruits ovoid, appressed pubescent | 3. <i>U. sessilifructus</i> |

1. *Uncaria macrophylla* Wall., Fl. Ind. 2: 132. 1824; Hook. f., Fl. Brit. India 3: 32. 1880; Prain, Bengal Pl. 1: 553. 1903.

Climbing shrub, climbing by recurved hooked. Leaves ovate or elliptic, 10–16 × 6–12 cm, rounded or subcordate to cordate, entire, acute or shortly acuminate, thinly leathery and yellowish brown tomentose; stipules ovate, caducous, 2-lobed. Inflorescence axillary in heads, tomentulose to glabrescent; heads 1.5–2 cm across. Calyx obconic, lobed above; lobes 5, linear-oblong, obtuse to rounded. Corolla white, salverform, strigillose to tomentulose outside; lobes 5, oblong to ligulate, obtuse to rounded. Fruiting heads 8–10 cm across; fruits fusiform, strigose.

Flowering & Fruiting: March–December.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa road, 26.02.1934, KPB 1676; Rajabhatkhawa, 23.04.1959, CRD 46.

2. *Uncaria scandens* (Sm.) Hutch. in C. S. Sargent, Pl. Wilson. 3 (2): 406. 1916. *Nauclea scandens* Sm. in A. Rees, Cycl. 24: n. 9. 1819. *Uncaria pilosa* Roxb., Fl. Ind. 2: 520. 1832; Hook. f., Fl. Brit. India 3: 32. 1880; Prain, Bengal Pl. 1: 553. 1903. [Plate 111d]

Bhainsi kanra (N).

Climbing shrub, climbing by recurved hooks. Leaves ovate to ovate-oblong, 5.2–10.5 × 2.7–6 cm, subcordate, entire and hairy, caudate-acuminate, pilose; stipules ovate, bilobed, deciduous, pilose. Inflorescence axillary, pedunculate, globose heads; heads 2.2–2.7 cm across. Flowers sessile. Calyx obconic, pubescent; lobes 5, linear, obtuse. Corolla white, salverform, sparsely pilose; lobes 5, linear-spathulate, rounded. Stamens 5, at throat of corolla tube; anthers oblanceolate, with 2 basal minute apiculate tip. Ovary inferior; stigma clavate. Fruiting heads 1.5–1.7 cm across; fruits many, sessile, obovoid, crowned by persistent calyx, pilose; seeds orange yellow, fusiform, flattened, with apical bifid winged.

Flowering & Fruiting: April–July.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 62698.

3. *Uncaria sessilifructus* Roxb., Fl. Ind. 2: 520. 1832; Hook. f., Fl. Brit. India 3: 30. 1880; Prain, Bengal Pl. 1: 553. 1903. [Plate 112a]

Ban kadam (N).

Climbing shrub, climbing by recurved hooks. Leaves elliptic to elliptic-ovate, 6.5–13 × 3.5–7.5 cm, attenuate, entire, short acuminate, thinly coriaceous; stipules lanceolate, bifid, deciduous, puberulent. Inflorescence pedunculate, globose heads; heads 2–2.5 cm across. Flowers sessile. Calyx obconic, appressed pubescent; lobes 5, triangular, subacute to obtuse. Corolla yellowish white, salverform; lobes 5, ovate-lanceolate, subacute. Stamens 5, at throat of corolla tube; anthers oblanceolate, with 2 basal minute apiculate tip. Ovary inferior; style exerted; stigma clavate. Fruiting heads 2.5–3.5 cm across; fruits sessile, ovoid, 9–12 mm, crowned by persistent calyx lobes, appressed pubescent; seeds orange yellow, fusiform, flattened, winged.

Flowering & Fruiting: November–February.

Distribution. India: Assam, Bihar, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: South Bholka, JKS 4208; Panbari-8, 01.12.2011, GK 47187; Newlands, 15.02.2012, AK 53068; Newlands, 15.02.2012, AK 53097.

27. *Wendlandia* Bartl. ex DC.

Key to the species

- 1a. Branchlets trigonous, scandent, glabrous; leaves sessile, opposite or often whorls of 3, rounded at base, denticulate at margins; inflorescences hispid; corolla red; lobes oblong-ovate, subacute; capsules ellipsoid, glabrous **1. *W. pendula***
- 1b. Branchlets terete or quadrangular, erect, puberulent; leaves petiolate, opposite, attenuate at base, entire at margins; inflorescences brown pubescent; corolla white; lobes suborbicular, circular; capsules subglobose, pubescent **2. *W. tinctoria***

1. *Wendlandia pendula* (Wall.) DC., Prodr. 4: 412. 1830; Hook. f., Fl. Brit. India 3: 41. 1880. *Rondeletia pendula* Wall., Fl. Ind. 2: 140. 1824. [Plate 112b]

Shrub, 1–3 m high. Leaves sessile, opposite or often whorls of 3, ovate or ovate-lanceolate, 7.5–10 × 3.2–4 cm, rounded, denticulate, acuminate; stipules brown, triangular, mucronate, glabrescent. Inflorescence axillary, terminal panicles, hispid. Calyx cupular; lobes 5–6, triangular, obtuse. Corolla red, funnelform, hairy above inside; lobes 5, oblong-ovate, subacute. Stamens 5, at throat of corolla tube; anthers oblong. Ovary inferior; stigma clavate. Capsules ellipsoid, crowned by persistent calyx lobes, dehiscent; seeds angled, reticulate-striated.

Flowering & Fruiting: November–February.

Distribution. India: Manipur, Mizoram, Nagaland and West Bengal.

Specimens examined: Chunabhati, JKS 986, 987; way to Mahakal cave, 20.02.2013, AK 59864; Buxaduar to Chunabhati, 17.02.2014, AK 59988.

2. *Wendlandia tinctoria* (Roxb.) DC., Prodr. 4: 411. 1830; Hook. f., Fl. Brit. India 3: 38. 1880; Prain, Bengal Pl. 1: 554. 1903. *Rondeletia tinctoria* Roxb., Fl. Ind. 1: 522. 1820. [Plate 112c]

Tilki (N).

Shrub or small tree, 3–6 m high. Leaves elliptic to elliptic-oblong, 11–16.5 × 4–7 cm, attenuate, entire, acuminate, coriaceous; stipules triangular-ovate, cuspidate, puberulent. Inflorescence axillary, terminal panicles, brown pubescent. Flowers sessile, fragrant. Calyx cupular, pubescent; lobes 5, triangular, subacute. Corolla white, funnelform, hairy inside; lobes 5, suborbicular, circular, reflexed. Stamens 5, at throat of corolla tube; anthers oblong-ovate. Ovary inferior; stigma bilobed. Capsules subglobose, crowned by persistent calyx lobes, dehiscent, pubescent; seeds brownish, reticulate-striated.

Flowering & Fruiting: February–April.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Odisha, Uttar Pradesh, Tamil Nadu and West Bengal.

Specimens examined: Adma, Panbari, 12.02.2013, AK 58884; Santrabari to Buxaduar, 16.02.2014, AK 59967.

Carlemanniaceae

Carlemannia Benth.

***Carlemannia griffithii* Benth. in Hook., J. Bot. Kew Gard. Misc. 5: 308. 1853; Hook. f., Fl. Brit. India 3: 85. 1880. [Plate 112d]**

Erect herb, c. 1 m high. Leaves unequal in pairs, obliquely elliptic, 6–15 × 2–6 cm, asymmetrical, cuneate, serrate, acuminate, glabrous except on veins beneath. Inflorescence lax, terminal cymes, strigose. Calyx subglobose, strigose; lobes 4, linear-lanceolate, unequal. Corolla white, funnelform, puberulous; lobes 4, suborbicular, subequal. Stamens 2, about middle of corolla tube, included; anthers oblong. Ovary inferior; stigma bifid. Capsules subglobose, 4-lobed, crowned by persistent calyx lobes, sparsely puberulous; seeds brown black, ovoid, rough, surface honeycombed.

Flowering & Fruiting: September–November.

Distribution. India: Sikkim and West Bengal.

Specimen examined: Lepchkha to Buxa Fort, 29.09.2013, AK 59665/2.

Asteraceae

Key to the genera

- | | |
|--|---|
| 1a. Plants with milky latex; heads homogamous with bisexual ray florets | 2 |
| 1b. Plants with watery latex; heads heterogamous with disk and ray florets or homogamous with disk florets; ray florets female or neuter | 5 |

Botanical Survey of India

- 2a. Upper leaves linear, narrower, elongate; achenes winged 3
 2b. Upper leaves broader; achenes not winged 4
- 3a. Upper leaves sagittate-auriculate, prominently lobed at base; phyllaries 1-seriate; capitula with yellow ray florets; achenes beak c. 1.5 mm 24. *Ixeris*
 3b. Upper leaves sagittate, narrowly lobed at base; phyllaries 2 to many seriate; capitula with bluish ray florets; achenes beak 2.5-4.5 mm 25. *Lactuca*
- 4a. Stems glabrous or sparsely glandular hairy; basal leaves cartilaginous and denticulate at margins; cauline leaves semi-amplexicaul with obtuse auricles at base; achenes obconic, compressed, rugulose 33. *Sonchus*
 4b. Stems sparsely hairy; basal leaves not cartilaginous and undulate at margins; cauline leaves not semi-amplexicaul with obtuse auricles at base; achenes ovoid, angular, not rugulose 42. *Youngia*
- 5a. Heads heterogamous; corolla often yellow or white (pale pink in *Erechtites*); achenes usually black (brownish in *Erechtites*, *Pseudoconyza*) 6
 5b. Heads homogamous (heterogamous in *Synotis*); corolla variously coloured, sometimes yellow; achenes variously coloured 21
- 6a. Heads dioecious; female florets 2 in female heads; inner phyllaries fused, hooked bristly, 2 hooked beaks at apex; corolla absent; achenes beaked, glochidiate; pappus absent 41. *Xanthium*
 6b. Heads monoecious; filaments free; female florets not as above; inner phyllaries not as above; corolla present; achenes not as above; pappus present (absent in *Enydra*, *Sigesbeckia*) 7
- 7a. Pappus absent 8
 7b. Pappus present 9
- 8a. Marshy herbs; stems succulent; phyllaries foliaceous; outer phyllaries suborbicular and inner ones elliptic; palea pouch-like, enclosing corolla and ovary 18. *Enydra*
 8b. Terrestrial herbs; stems not succulent; phyllaries variously shaped, outer and inner ones not as above; palea not pouch like, corolla and ovary open 32. *Sigesbeckia*
- 9a. Leaves opposite 10
 9b. Leaves alternate 15
- 10a. Leaves attenuate; petioles relatively long; heads yellow; achenes dimorphic or not; pappus modified in setae or awns 11
 10b. Leaves cuneate; petioles usually short; heads yellow or white; achenes uniform; pappus not modified in setae or awns 13
- 11a. Leaves mucronate tip at apex; inflorescences panicles of heads, rarely solitary; disk florets epaleate; pappus modified in 2 or 3 setae 1. *Acmella*
 11b. Leaves acuminate at apex; inflorescences solitary or in pairs; disk florets palcate; pappus modified in awns, sometimes absent 12

The Flora of Buxa Tiger Reserve, West Bengal, India

- 12a. Leaves 3-veined from base; inflorescences in stalked heads, solitary; achenes uniform; pappus a denticulate corona or 1-2 short awned, sometimes absent
26. *Lipoblepharis*
- 12b. Leaves pinnately veined; inflorescences sessile heads, solitary or in pairs; achenes dimorphic; pappus modified into awns; 2-awned in ray achenes, 2 to 4-awned in disk achenes
35. *Synedrella*
- 13a. Leaves sessile to subsessile, elliptic to oblong-elliptic, crenate at margins, acute at apex, pellucid glands and appressed hirsute; ligule oblong, 2-lobed at apex; stamens 4; pappus a ring of thick, ciliate, partially or completely united scales forming a cone
15. *Eclipta*
- 13b. Leaves petiolate, not elliptic or oblong-elliptic, distantly serrate or serrate-dentate at margins, acuminate at apex, not pellucid glands and appressed hirsute; ligule ovate or suborbicular, 3-lobed at apex; stamens 5; pappus not as above
14
- 14a. Leaves distantly serrate at margins; inflorescences long peduncled, solitary head; outer phyllaries elliptic-oblong, short acuminate, hirsute; inner ones obovate-oblong, obtuse, apiculate tip; ligule ovate; palea of disk florets oblong-elliptic, glabrous at margins; achenes puberulous; pappus filiform, plumose
39. *Tridax*
- 14b. Leaves serrate-dentate at margins; inflorescences heads in axillary or terminal corymbs; outer phyllaries ovate, subacute, sparsely glandular hairy; inner ones ovate to elliptic-ovate, subacute; ligule suborbicular; palea of disk florets oblanceolate, hairy at margins; achenes pubescent; pappus modified in scales
20. *Galinsoga*
- 15a. Outer female flowers without corolla; pappus of c. 10 bristles
37. *Thespis*
- 15b. Outer female flowers with corolla; pappus of many capillary bristles or 2-3 bristles or scales or cupular
16
- 16a. Leaves pinnately compound, 3-5-foliolate, rarely 7-foliolate, not lobed; phyllaries 2-seriate; outer ones linear-lanceolate to oblanceolate, hairy at margins; disk florets epaleate; anthers apiculate at apex; achenes dimorphic; pappus modified in 2-3 short bristles
5. *Bidens*
- 16b. Leaves simple, lobed; phyllaries 1 or 2-3-seriate or 5-6-seriate; outer ones not as above; disk florets paleate; anthers acute or obtuse at apex; achenes uniform; pappus scaly, hairy or cupular, bristly in *Pseudoconyza*
17
- 17a. Plants glandular pubescent; phyllaries 5-6-seriate; pappus 1-seriate, white capillary bristles
29. *Pseudoconyza*
- 17b. Plants not glandular pubescent; phyllaries 1 or 2-3-seriate; pappus scaly, hairy or cup-shaped
18
- 18a. Diffuse herbs; capitula few in compact leafy terminal or axillary corymbs; pappus cup-shaped
22. *Grangea*
- 18b. Erect herbs or undershrubs; capitula in lax or dense panicles or solitary; pappus scaly or hairy
19

Botanical Survey of India

- 19a. Capitula pale pink, campanulate in dense corymbose panicles; pappus many seriate hairy 19. *Brocchites*
- 19b. Capitula white or yellow, disciform in lax panicles or solitary; pappus modified into scales 20
- 20a. Inflorescences heads in lax panicles, puberulous; heads white, small; neuter flower absent and female flower creamy white of ray florets; phyllaries 1-seriate; achenes obovate, median ribbed, glabrous; pappus scales deciduous 28. *Parthenium*
- 20b. Inflorescence axillary, solitary heads, glabrous; heads orange yellow, large; neuter flower orange yellow and female flower absent in ray florets; phyllaries 2-3-seriate; achenes oblong-obconic, without a median rib, puberulent; pappus scales persistent 38. *Tithonia*
- 21a. Leaves usually spinous; phyllaries more than 8-seriate; corolla tube divided 22
- 21b. Leaves not spinous; phyllaries 1-8-seriate; corolla tube not divided 23
- 22a. Leaves sessile, throughout stems, irregularly lobed, spinescent at margins, arachnoid above, lanate below; heads more cylindric, globose when young; solitary or rarely branched; outer phyllaries elliptic, spinescent without appendages; stamens 4; achenes 4-angled; pappus feathery 9. *Cirsium*
- 22b. Leaves petiolate, confined to lower portion of stem, lyrate pinnatisect, not spinescent, glabrous above, appressed white cottony below; heads ovoid at young and on maturity, in corymbose cymes; outer phyllaries ovate, acute, appendaged; stamens 5; achenes terete; pappus not feathery 31. *Saussurea*
- 23a. Leaves pinnatisect; phyllaries dry, distinct scarious margins, never herbaceous and green throughout; pappus absent 24
- 23b. Leaves usually entire; phyllaries herbaceous, all or at least outer ones green throughout, (except *Gnaphalium* and *Pseudognaphalium*); pappus usually present 25
- 24a. Erect shrubs; segments of pinnatisect leaves acute, mucronate tip; inflorescence heads in axillary panicles; heads obconical; female flowers well developed; stamens 5, near base of corolla tube; achenes uniform, not glandular 4. *Artemisia*
- 24b. Suberect herbs; segments of pinnatisect leaves aristate; inflorescence leaf-opposed, solitary head; heads hemispherical; female flowers vestigial; stamens 4, at middle of corolla tube; achenes dimorphic, glandular 11. *Cotula*
- 25a. Herbs shrubs, climbers or trees; heads usually pink purple; corolla pseudo-ligulate or tubular 26
- 25b. Usually herbs; heads white to pale purple or variously coloured; corolla perfectly tubular 28
- 26a. Basal leaves sessile, form rosettes, oblanceolate; heads of 4 disk florets only, surrounded by 3 ovate foliaceous bracts; phyllaries 2-seriate; corolla tube one sided 5-lobed; pappus 5 16. *Elephantopus*
- 26b. Basal leaves present or absent, if present then petiolate, not form rosettes; heads with many disk florets, not surrounded by foliaceous bracts; phyllaries 3 or 5-8-seriate; corolla tube regular; pappus many 27

The Flora of Buxa Tiger Reserve, West Bengal, India

- 27a. Erect or decumbent herbs; phyllaries 3-seriate, hairy at margins, aristate; disk florets dimorphic; achenes with ring of small white bristles at apex; pappus deciduous, 1-seriate **13. Cyanthillium**
- 27b. Diffuse herbs or small trees; phyllaries 5-8-seriate, fimbriate at margins, not aristate; disk florets uniform; achenes without ring of small white bristles at apex; pappus persistent, 2-seriate **40. Vernonia**
- 28a. Leaves opposite; heads white to pale purple; stigma longer than style 29
- 28b. Leaves alternate; heads yellow to variously coloured; stigma shorter than style 32
- 29a. Heads subcylindric; phyllaries 1 or 5-6-seriate; disk present; pappus filiform 30
- 29b. Heads subspherical or hemispherical; phyllaries 2 or 3-seriate; disk absent; pappus not filiform 31
- 30a. Erect shrubs; heads pale purple, many flowered; phyllaries 5-6-seriate; corolla cylindric, c. 4 mm; stamens near base of corolla tube; achenes compressed, hairy at edges, pappus persistent **8. Chromolaena**
- 30b. Climbing herbs; heads white, 4-flowered; phyllaries 1-seriate; corolla tubular-campanulate, c. 2 mm; stamens at throat of corolla tube; achenes tetragonous, sparsely vesicular, pappus deciduous **27. Mikania**
- 31a. Stems glandular pubescent; veins pinnate; heads white; phyllaries 2-seriate; outer ones oblanceolate, subacute to obtuse; inner ones elliptic, acute; achenes faintly trigonous, 3 gland tipped bristly **2. Adenostemma**
- 31b. Stems puberulous; veins 3-5 from base; heads pale purple to bluish or bluish; phyllaries 3-seriate; outer ones oblong-oblanceolate or lanceolate, spinous at apex; inner ones linear-oblong or linear-lanceolate, spinous at apex; achenes 5-angled, 5 awned pappus scales **3. Ageratum**
- 32a. Flowers minute, usually in hemispherical heads 33
- 32b. Flowers prominent, in campanulate or cylindric heads 35
- 33a. Diffuse herbs; inflorescences axillary, solitary head; heads green at periphery, reddish at centre; phyllaries spatulate; achenes elliptic, glandular; pappus absent **7. Centipeda**
- 33b. Erect or decumbent herbs; inflorescences heads in axillary, terminal panicles; heads not as above; phyllaries not spatulate; achenes not elliptic, not glandular; pappus present or modified in bristles 34
- 34a. Stems sparsely pubescent; heads white at periphery, green at centre, hemispherical; outer phyllaries ovate-lanceolate; inner ones elliptic-oblanceolate, acute; stamens 4; anthers obtuse, mucronate tip; achenes obovate, compressed, thick at edges, glabrous; pappus modified in 3 bristles **14. Dichrocephala**
- 34b. Stems viscid; heads light pink, campanulate; outer phyllaries linear-lanceolate; inner phyllaries linear-lanceolate, acuminate; stamens 5; anthers acuminate at apex; achenes oblong, angular, not thick at edges, hairy; pappus many, filiform **10. Conyza**
- 35a. Stems not branched; heads cylindric; head bracts present; phyllaries 1-seriate, connate, free later; female flowers absent; style usually swollen at base 36

Botanical Survey of India

- 35b. Stems much branched (except *Blumea*); heads campanulate or globose; head bracts absent; phyllaries more than 1-seriate, free; female flowers present; style not swollen at base 39
- 36a. Leaves dimorphic; lower ones attenuate or lyrate lobed at base; upper ones amplexicaul at base; heads pink purple; head bracts absent; anthers acuminate at apex; achenes angular 17. *Emilia*
- 36b. Leaves not as above; heads yellow or scarlet; head bracts present; anthers acute or cuspidate at apex; achenes subterete 37
- 37a. Stems grooved, araneose; leaves araneose; head bracts elliptic-oblong, c. 1 cm, araneose; phyllaries elliptic-oblong, not scarious at margins, mid vein present, araneose; anthers sterile caudate auricled at base; stigma papillose 36. *Synotis*
- 37b. Stems faintly grooved or smooth, not araneose; leaves not araneose; head bracts linear-oblong, 4-5 mm, puberulous or glandular hairy; phyllaries linear-oblong to linear-lanceolate, scarious at margins, mid vein not present, puberulous or sparsely glandular hairy; anthers without sterile caudate auricles at base; stigma puberulent throughout 38
- 38a. Inflorescences heads in axillary, terminal, lax racemes, glandular pubescent; heads scarlet, reflexed; head bracts glandular hairy; phyllaries linear-oblong; stamens at near base; anthers cuspidate at apex; achenes appressed pubescent; pappus longer than flowers 12. *Crassocephalum*
- 38b. Inflorescences heads loosely arranged in terminal corymbs, white puberulous; heads yellow, not reflexed; head bracts puberulous; phyllaries linear-lanceolate; stamens at throat of corolla tube; anthers acute at apex; achenes glabrous; pappus slightly smaller than flowers 23. *Gynura*
- 39a. Stems winged; leaves decurrent on stem, succulent; inflorescences terminal, globose, 3-4-flowered glomerate heads, dark maroon; heads subtended by bracts; pappus absent 34. *Sphaeranthus*
- 39b. Stems not winged; leaves not decurrent on stem, not succulent; inflorescences not as above; heads campanulate; pappus present 40
- 40a. Leaves not spatulate, variously hairy, not floccose or white cottony; inflorescences heads in lax panicles, glandular or simple pubescent or intermixed; phyllaries 4-seriate (5-seriate in *Blumea lanceolaria*); anthers obtuse at apex; achenes hairy, ribbed 6. *Blumea*
- 40b. Leaves spatulate, floccose or white cottony; inflorescences heads in terminal clusters, white woolly tomentose; phyllaries 2-3 or 3-4-seriate; anthers acute at apex; achenes sparsely vesicular or papillose, not ribbed 41
- 41a. Stems much branched from base; phyllaries 2-3-seriate, not golden yellow; pappus free (except *Gnaphalium pensylvanicum*) 21. *Gnaphalium*
- 41b. Stems unbranched; phyllaries 3-4-seriate, golden yellow; pappus connate at base 30. *Pseudognaphalium*

1. *Acmella* Rich. ex Pers.

Key to the species

- 1a. Achenes glabrous, pappus absent 1. *A. calva*
1b. Achenes moderately to densely hairy, pappus of 2 or 3 setae 2. *A. paniculata*

1. *Acmella calva* (DC.) R. K. Jansen, Syst. Bot. Monogr. 8: 41. 1985. *Spilanthes calva* DC., Contr. Bot. Ind.: 19. 1834. *Spilanthes acmella* (L.) L. var. *calva* (DC.) C. B. Clarke in Hook. f., Fl. Brit. India 3: 307. 1881. [Plate 113a]

Jangjurbi, Osilijat (N).

Erect or decumbent herb, 10–15 cm high. Leaves opposite, ovate, 1.3–5 × 0.8–3.2 cm, truncate, crenate-serrate at margins, acute, subcoriaceous, scabrous, shortly hairy above, puberulous beneath. Head terminal, solitary, ovate, 7–10 mm, heterogamous; phyllaries in 2 whorls, ovate-lanceolate. Ray florets: corolla yellow, ligulate, 2-lobed above, tubular below. Disk florets: corolla yellow, campanulate; lobes 5, ovate-triangular. Achenes obovate, trigonous, glabrous; pappus absent.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimen examined: Near 23rd Mile Watch Tower, 10.02.2010, SKS & GK 46304.

2. *Acmella paniculata* (Wall. ex DC.) R. K. Jansen, Syst. Bot. Monogr. 8: 67. 1985. *Spilanthes paniculata* Wall. ex DC., Prodr. 5: 625. 1836. *Spilanthes acmella* (L.) L. var. *paniculata* (DC.) C. B. Clarke in Hook. f., Fl. Brit. India 3: 307. 1881. [Plate 113b]

Erect or decumbent herb, 20–30 cm high. Leaves opposite, ovate or ovate-lanceolate, 1.6–7.6 × 0.7–4.3 cm, attenuate, distantly serrate, acute, mucronate tip, subcoriaceous. Heads subglobose or ovoid; phyllaries 2-seriate, acute to obtuse; outer ones elliptic-lanceolate; inner ones oblong-elliptic, 1-nerved. Ray florets: Female: corolla yellow, ligulate, hairy outside; ligules obconic, 3-toothed. Disk florets: Bisexual: corolla yellow or greenish, funnelform; lobes 5, ovate. Achenes dimorphic, periphery ones trigonous, central ones oblong-elliptic, ciliate, setae at apex; pappus modified in 2 or 3 small setae.

Flowering & Fruiting: July–October.

Distribution. India: Almost throughout India.

Specimens examined: Lepchakhawa, JKS 954; Tashigaon, JKS 4039; South Rajabhatkhawa, JKS 4275; 23rd Mile watch tower, 13.02.2010, SKS & GK 47061; Kumargram, 19.09.2011, AK 52651; Bhutanghat, 26.09.2011, AK 52924; North Rydak, 26.09.2011, AK 52937; Kumargram-Bhutan border, Kalikhola river belt, 27.09.2011, AK 52954; Newlands, 15.02.2012, AK 53036; Kumargram, Hathinala, 21.02.2012, AK 55837; Newlands, 15.02.2012, AK 53088; Sankosh, 17.02.2012, AK 55698; Checko-1, 09.02.2013, AK 58808.

2. *Adenostemma* J. R. Forst. & G. Forst.

Adenostemma lavenia (L.) Kuntze, Revis. Gen. Pl. 1: 304. 1891. *Verbesina lavenia* L., Sp. Pl. 2: 902. 1753. *Adenostemma viscosum* J. R. Forst. & G. Forst. var. *elata* Hook. f., Fl. Brit. India 3: 242. 1881. [Plate 113c; Fig. 37]

Erect herb, 30–60 cm high. Leaves opposite, ovate, 3–7 × 1.7–4 cm, attenuate, serrate, acute. Heads subglobose in terminal, lax panicles, homogamous, glandular pubescent; phyllaries 2-seriate, glandular hairy; sparsely hairy; outer oblanceolate; inner oblong-elliptic. Disk florets: Bisexual: corolla white, funnellform, sparsely glandular pubescent outside; lobes 5, subequal, triangular, villous outside. Achenes greyish brown, oblanceolate, faintly trigonous, pappus at apex, muriccate; pappus 3-gland tipped bristles.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Poro, JKS 822; Damanpur, JKS 915; Tashigaon, JKS 4014; Balapara, JKS 4192; Jainati-8, 12.10.2010, GK 46325; Bhutri, 05.10.2012, AK 58641.

3. *Ageratum* L.

Key to the species

- 1a. Heads white or mauve; phyllaries glabrous; corolla shorter than pappus, glabrous; style exerted c. 1 mm from corolla 1. *A. conyzoides*
- 1b. Heads mauve; phyllaries puberulous; corolla longer than pappus, puberulous; style exerted 2–2.2 mm from corolla 2. *A. houstonianum*

1. *Ageratum conyzoides* L., Sp. Pl. 2: 839. 1753; Hook. f., Fl. Brit. India 3: 243. 1881; Prain, Bengal Pl. 1: 591. 1903. [Plate 113d]

Oochunti (B).

Erect herb, 30–60 cm high. Leaves opposite, ovate, 1.4–7 × 1–5.2 cm, truncate or rounded, serrate-dentate, acute, sparsely puberulous. Heads subglobose in terminal, branched corymbs, homogamous; phyllaries 3-seriate, scarious and hairy, spinous; outer and middle oblong-oblanceolate; inner linear-oblong. Disk florets: Bisexual: corolla white, funnellform; lobes 5, triangular. Achenes black, oblong-obconic, 5-angled, slightly curved, sparsely minute hairy at angles; pappus scales 5, stramineous, oblong, slightly connate at base, lacerate, barbellate at apex.

Flowering & Fruiting: August–March.

Distribution. India: Almost throughout India.

Specimens examined: Poro, BK 214; Tashigaon, JKS 4055; South Bholka, JKS

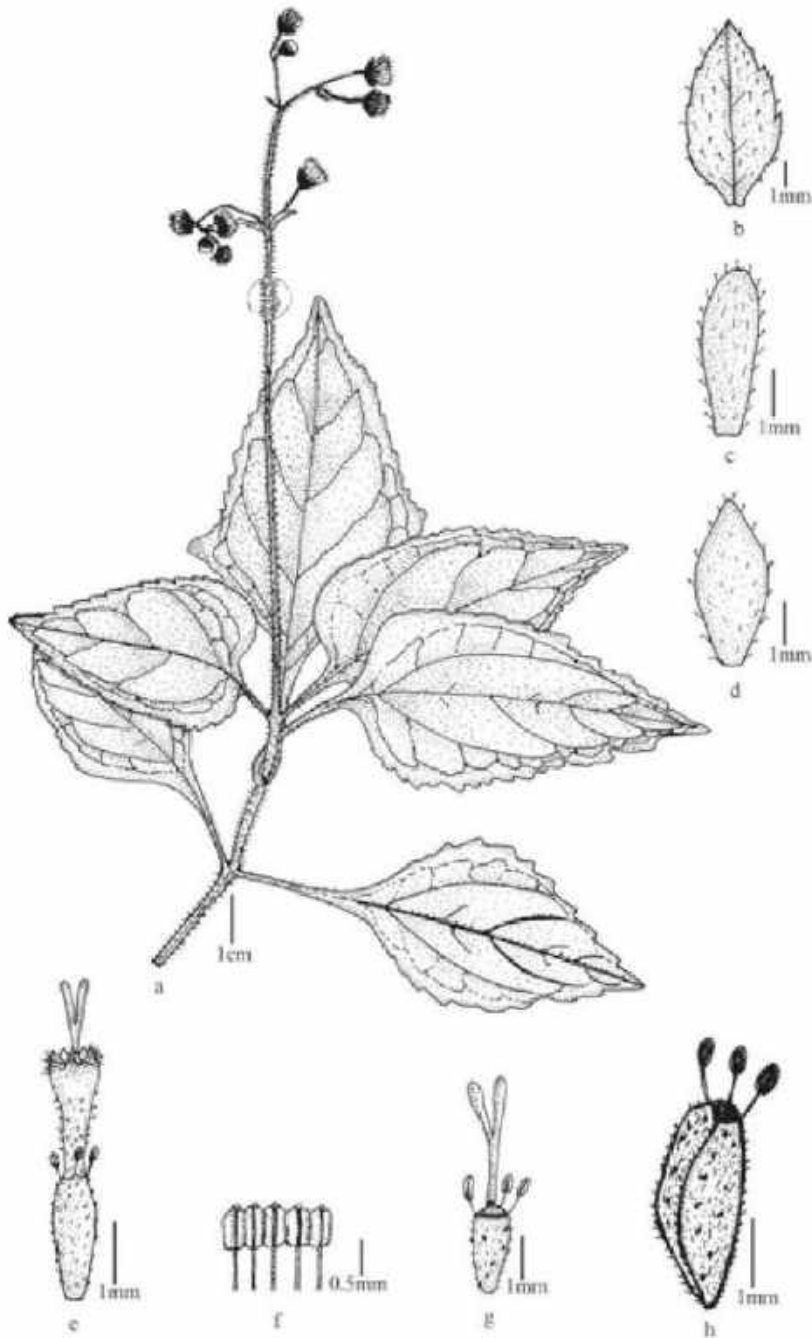


Fig. 37. *Adenostemma lavenia*: a. Flowering branchlet; b. Inflorescence bract; c. Outer phyllary; d. Inner phyllary; e. Disc floret; f. Stamens; g. Gynoecium with gland tipped bristles; h. Achene with gland tipped bristles (AK 62609).

4193; Kumargram, 18.09.2011, AK 52619; Sankosh, 28.09.2011, AK 52967; Panbari-6, 29.11.2011, GK 47174; Newlands, 15.02.2012, AK 53063, 55605; Pana, 08.10.2012, AK 58733.

Notes: The decoction or infusion of the stem and leaves are given in cuts, eczema and eye trouble.

2. *Ageratum houstonianum* Mill., Gard. Dict., ed. 8. n. 2. 1768; Uniyal in Hajra & al., Fl. India 12: 349. 1995. [Plate 114a]

Etami-paat (N).

Erect herb, 30–60 cm high. Leaves opposite, ovate, 2–7.2 × 1.2–5 cm, truncate or subcordate, rarely oblique, serrate-dentate, acute, puberulous. Heads subglobose in terminal, branched corymbs, homogamous; phyllaries 3-seriate, scarious and hairy, spinous, puberulous; outer and middle lanceolate; inner linear-lanceolate. Disk florets: Bisexual: corolla mauve, funnelform, sparsely puberulous outside; lobes 5, triangular. Stamens 5, at middle of corolla tube; anthers fused, apiculate. Ovary brown, oblong, sparsely minute hairy. Achenes black, oblong-obconic, 5-angled, slightly curved, sparsely minute hairy at edges; pappus scales stramineous, 5, ovate-oblong, slightly connate at base, lacerate, barbellate at apex.

Flowering & Fruiting: August–March.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52701; Kumargram, 13.02.2012, AK 53009; Marakata, 22.02.2012, AK 55871.

4. *Artemisia* L.

Artemisia austroyunnanensis L. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4 (2): 20, f. 4, 10-18. 1984; B. D. Naithani in Hajra & al., Fl. India 12: 46. 1995.

[Plate 114b]

Shrub, 1–2 m high. Leaves sessile, pinnatisect, 3–7 cm, 5–7-lobed; segments oblong, 1.2–1.8 cm, entire, acute, mucronate tip, chartaceous, pitted gland or smooth above, tomentose below. Heads in axillary panicles, obconical, 3–4 × c. 2.5 mm, homogamous; phyllaries 2–3-seriate, puberulous; outer ones elliptic-ovate, middle ones oblanceolate, inner ones same as middle ones. Ray florets absent. Disk florets: female flowers present at periphery and bisexual flowers at centre. Female: corolla mauve, tubular; lobes 5, triangular. Bisexual: corolla mauve, infundibular; lobes 5, triangular. Achenes light brown, oblong; pappus absent.

Flowering & Fruiting: October–February.

Distribution. India: Almost throughout India.

Specimens examined: Bhutri, 05.10.2012, AK 58625; Hatipota, 17.02.2013, AK 59809.

5. *Bidens* L.

Bidens pilosa L., Sp. Pl. 2: 832. 1753; Hook. f., Fl. Brit. India 3: 309. 1881; Prain, Bengal Pl. 1: 616. 1903. [Plate 114c]

Kuro (N).

Herb, 15–60 cm high. Leaves pinnately 3–5-foliolate, rarely 7-foliolate; leaflets ovate to ovate-elliptic, 1–3.5 × 0.5–1.6 cm, cuneate or rounded, serrate and hairy, acuminate, subcoriaceous, sparsely hairy. Inflorescence axillary, terminal, solitary heads. Heads cup-shaped, heterogamous; phyllaries 2-seriate; outer ones linear-lanceolate to oblanceolate; inner ones lanceolate. Ray florets: Female: corolla white or light yellow, cylindric, sparsely glandular hairy, appendage at throat; ligule obovate-oblong or oblong-elliptic, 3-toothed, pilose above. Disk florets: Bisexual: corolla yellow, funnelform; lobes 5, triangular. Achenes dimorphic; achenes of female flowers brownish, linear, obscurely 2-grooved, antorsely hispidulous or smooth, 2 retrorsely hairy persistent awned; achenes of bisexual flowers blackish, linear-cuniform, tetragonous, 4-grooved, antorsely hispidulous or smooth, 2–3 retrorsely hairy persistent awned; pappus smaller than corolla, retrorsely barbellate, 2 in female flowers and 3 in bisexual flowers.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 15.02.2010, GK 47111; Bhutanghat, 26.09.2011, AK 52915; Newlands, 15.02.2012, AK 55611; Sankosh, 17.02.2012, AK 55661; Phashkhawa, 27.09.2012, AK 56193; Hauda nala, 03.10.2012, AK 58684; Santrabari to Buxa Fort, 28.09.2013, AK 59623.

6. *Blumea* DC.

Key to the species

- | | |
|---|--------------------------|
| 1a. Leaves lyrate-pinnatifid | 2 |
| 1b. Leaves not lyrate-pinnatifid | 4 |
| 2a. Outer phyllaries lanceolate; receptacles hairy | 4. <i>B. laciniata</i> |
| 2b. Outer phyllaries linear to linear-lanceolate; receptacles glabrous | 3 |
| 3a. Phyllaries glandular; floral bracts present; corolla lobes without sessile gland at apex; style glabrous and stigma hairy in bisexual flowers; pappus smaller than corolla | 3. <i>B. lacera</i> |
| 3b. Phyllaries not glandular; floral bracts absent; corolla lobes with sessile gland at apex; style appressed hairy and stigma glabrous in bisexual flowers; pappus nearly equal to corolla | 6. <i>B. membranacea</i> |
| 4a. Stems angular, long septate hairy; inflorescences heads arranged laxly in panicles; receptacles pubescent; corolla lobes with sessile glands at apex in bisexual flowers | 1. <i>B. clarkii</i> |

4b. Stems terete, without long septate hairy; inflorescences heads arranged compactly in panicles; receptacles sparsely pubescent; corolla lobes without sessile glands in bisexual flowers 5

5a. Leaves dimorphic; inflorescences glandular hairy; phyllaries 4-seriate, outer one linear; corolla glabrous in female flowers; corolla funnelform; filaments minute; anthers c. 0.5 mm and style c. 1.2 mm in bisexual flowers; pappus persistent

2. *B. fistulosa*

5b. Leaves not dimorphic; inflorescences not glandular hairy; phyllaries 5-seriate, outer one lanceolate; corolla hairy in female flowers; corolla cylindrical; filaments c. 1 mm; anthers c. 2 mm and style c. 2 mm in bisexual flowers; pappus deciduous

5. *B. lanceolaria*

1. *Blumea clarkei* Hook. f., Fl. Brit. India 3 (8): 267. 1881. *Blumea malabarica* Hook. f., Fl. Brit. India 3: 267. 1881.

Erect herb, 0.5–1 m high. Leaves sessile, whorled at base, alternate above, elliptic-oblancoate to oblanceolate or lanceolate to oblong-lanceolate, 2.2–20 × 0.4–6 cm, attenuate, serrate-dentate, short acuminate, chartaceous, hirsute intermixed with glandular hairs. Heads yellow, cup-shaped, 7–10 × 7–12 mm, homogamous; phyllaries 4-seriate; outer ones linear; inner ones oblong-lanceolate. Ray florets absent. Disk florets: Female: corolla yellow, filiform, 2–3-lobed. Bisexual: corolla yellow, cylindrical; lobes 5, triangular, sessile glands at apex. Achenes brownish, oblong, c. 1 mm, ribbed, appressed hairy; pappus white, filiform, 5–6 mm, persistent in mature achenes, spreading, barbellate.

Flowering & Fruiting: January–April.

Distribution. India: Andaman & Nicobar Islands, Assam, Karnataka, Maharashtra, Sikkim and West Bengal.

Specimens examined: Buxaduar to Tashigaon, 11.02.2014, AK 59914; Rovers point to Bhutan Border, 15.02.2014, AK 59948.

2. *Blumea fistulosa* (Roxb.) Kurz, J. Asiat. Soc. Bengal 46 (2): 187. 1877. *Conyza fistulosa* Roxb., Fl. Ind. 3: 429. 1832. *Blumea glomerata* DC. in Wight, Contr. Bot. Ind.: 15. 1834; Hook. f., Fl. Brit. India 3: 262. 1881; Prain, Bengal Pl. 1: 598. 1903. *Blumea nodiflora* Hook. f., Fl. Brit. India 3: 262. 1881.

Erect herb, 60–80 cm high. Leaves sessile, dimorphic; lower leaves obovate, 3–16 × 0.5–6.5 cm, attenuate, serrate-dentate, obtuse, chartaceous, sparsely pilose above, densely below; upper leaves oblong-lanceolate to oblanceolate, attenuate, coarsely serrate-dentate with mucronate teeth, acute to apiculate, pilose. Inflorescence compact globose clusters of heads arranged in axillary or terminal interrupted spicate panicles, pubescent intermixed with glandular hairs. Heads yellow, cup-shaped, 5–8 × 2.5–6 mm, homogamous; phyllaries 4-seriate; outer ones linear; inner ones oblong. Ray florets absent. Disk florets: Female: corolla

yellow, filiform, c. 3 mm, 2–3-lobed. Bisexual: corolla yellow, funnellform; lobes 5, triangular. Achenes brownish, oblong, 0.8–1 mm, ribbed, appressed hairy; pappus white, filiform, 3–3.5 mm, persistent in mature achenes, barbellate.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimen examined: Rangamati, 14.02.2013, AK 59801.

3. *Blumea lacera* (Burm. f.) DC. in Wight, Contr. Bot. Ind.: 14. 1834; Hook. f., Fl. Brit. India 3: 263. 1881; Prain, Bengal Pl. 1: 598. 1903. *Conyza lacera* Burm. f., Fl. Ind.: 180, t. 59, f. 1. 1768. [Plate 114d]

Kukursunga, Bara-suksung, Bara-koksing (B).

Aromatic erect herb, 40–80 cm high. Leaves obovate or spatulate, 2.2–7 × 1.2–4 cm, lyrate-lobed, coarsely dentate, acute or obtuse, chartaceous, glandular, densely villous when young, sparsely hairy above, pubescent below. Inflorescence heads in axillary or terminal panicles, glandular, villous. Heads yellow, cupular, 4–5 × 5–9 mm, homogamous; phyllaries 4-seriate; outer ones linear-lanceolate; inner ones oblong-lanceolate. Ray florets absent. Disk florets: Female: corolla yellow, filiform, 1.6–1.8 mm, 2–3-lobed. Bisexual: floral bracts linear-ligulate, 2–4-lobed, hairy. Corolla yellow, funnellform; lobes 5, triangular. Achenes brownish, oblong, terete, c. 0.5 mm, ribbed, hairy; pappus white, filiform, unequal, 1–2.5 mm, smaller than corolla, deciduous in mature achenes, spreading, barbellate.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimens examined: Tashigaon, Bhutia Pond, 06.03.2011, GK 47294; Kumargram, 19.09.2011, AK 52650; Kumargram, Hathinala, 21.02.2012, AK 55838; Bhutanghat, Mainabari, 24.02.2012, AK 55922.

4. *Blumea laciniata* DC., Prodr. 5: 436. 1836; Hook. f., Fl. Brit. India 3: 264. 1881; Prain, Bengal Pl. 1: 598. 1903. [Plate 115a]

Erect herb, 25–50 cm high. Leaves sessile, obovate or oblanceolate, lyrate dissected, 4–11 × 1–6 cm, attenuate, denticulate, acute or obtuse, chartaceous, glandular and sparsely pubescent above, glandular and pubescent below. Inflorescence heads in axillary or terminal, lax panicles, glandular, pubescent. Heads yellow, cupular, 6–8 × 4–10 mm, homogamous; phyllaries 4-seriate; outer ones lanceolate; inner ones oblong-lanceolate. Ray florets absent. Disk florets: Female: corolla yellow, filiform, c. 4 mm, 2–3-lobed. Bisexual: corolla yellow, funnellform; lobes 5, triangular. Achenes light brown, oblong, c. 1 mm, ribbed, appressed hairy; pappus white, filiform, 4–5.5 mm, deciduous in mature achenes, barbellate.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 13.02.2012, AK 53012; Newlands, 15.02.2012, AK 53070; Kumargram, 18.02.2012, AK 55717; Marakata, 22.02.2012, AK 55870, 55897; Pana, 11.02.2013, AK 58846; Adma, Panbari, 12.02.2013, AK 58879; Hatipota, 17.02.2013, AK 59814; Buxaduar to Chunabhati, 17.02.2014, AK 59987.

5. *Blumea lanceolaria* (Roxb.) Druce, Rep. Bot. Exch. Club Brit. Isles 4: 6. 1917. *Conyza lanceolaria* Roxb., Fl. Ind. 3: 432. 1832. *Blumea myriocephala* DC., Prodr. 5: 445. 1836; Hook. f., Fl. Brit. India 3: 269. 1881; Prain, Bengal Pl. 1: 598. 1903. [Plate 115b]

Shrub, 0.8–1 m high. Leaves spirally arranged, elliptic-ob lanceolate to elliptic-lanceolate, 8–19 × 1.1–3.4 cm, attenuate, serrate-dentate, acute, coriaceous, pubescent below. Inflorescence clusters of heads in panicles, pubescent. Heads yellow, cupular, 5–7 × 4–6 mm, homogamous; phyllaries 5-seriate; outer ones lanceolate; inner ones oblong-lanceolate. Ray florets absent. Disk florets: Female: corolla yellow, filiform, c. 3 mm, 2–3-lobed, hairy. Bisexual: corolla yellow, cylindrical; lobes 5, triangular. Achenes stramineous, oblong, c. 0.5 mm, ribbed, hairy; pappus white to yellowish white, unequal, filiform, 2–3 mm, deciduous in mature achenes, barbellate.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: On way to Buxaduar, KPB 1793; Jainti 5–9, 29.03.2012, GK 50629; Newlands, 15.02.2012, AK 53084.

6. *Blumea membranacea* DC., Prodr. 5: 440. 1836; Hook. f., Fl. Brit. India 3: 265. 1881; Prain, Bengal Pl. 1: 598. 1903.

Erect herb, 25–40 cm. Leaves obovate, 4–18 × 1–6 cm, lower leaves lyrate at base, upper ones attenuate, serrate-denticulate, obtuse, chartaceous, sparsely pilose above, appressed pilose below. Inflorescence heads clustered at the ends of branches, in terminal lax panicles, glandular pubescent. Heads yellow, cupular, 3–5 × 2.5–3 mm, homogamous; phyllaries 4-seriate; outer ones linear; inner ones oblong-lanceolate. Ray florets absent. Disk florets: Female: corolla yellow, filiform, 3–4 mm, 2–3-lobed. Bisexual: corolla yellow, cylindrical; lobes 5, triangular. Achenes brownish, oblong, c. 1 mm, ribbed, appressed hairy; pappus white, filiform, 3.5–5 mm, deciduous in mature achenes, barbellate.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, 15.02.2012, AK 53069; Newlands, 15.02.2012, AK 53071; Kumargram, 18.02.2012, AK 55722.

7. *Centipeda* Lour.

Centipeda minima (L.) A. Braun & Asch., Index Seminum [Berlin] App. 1: 6. 1867. *Artemisia minima* L., Sp. Pl. 2: 849. 1753. *Centipeda orbicularis* Lour., Fl. Cochinch. 2: 493. 1790; Hook. f., Fl. Brit. India 3: 317. 1881; Prain, Bengal Pl. 1: 620. 1903. [Plate 115c]

Mechitta (B).

Decumbent herb, 8–10 cm high. Leaves sessile, oblanceolate, 1–1.2 × c. 0.3 cm, attenuate, distantly toothed, acute, chartaceous, arachnoid below. Inflorescence axillary, solitary head. Heads green at periphery, reddish at centre, sessile or subsessile, hemispherical, 2.5–4 mm across, homogamous; phyllaries 2-seriate; outer and inner ones spatulate. Ray florets absent. Disk florets: Female: corolla green, cylindrical; lobes 4, minute. Bisexual: corolla reddish, campanulate; lobes 4, elliptic-ovate. Achenes brownish, elliptic, c. 0.8 mm, narrowed at base, ribbed, glandular, enclosed in appendages; appendages 4, linear, free below, fused above, linear and bilobed tip at apex, hairy; pappus absent.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52646; Kumargram, Hathinala, 21.02.2012, AK 55859.

8. *Chromolaena* DC.

Chromolaena odorata (L.) R. M. King & H. Rob., Phytologia 20: 204. 1970. *Eupatorium odoratum* L., Syst. Nat., ed. 10. 1205. 1759; Prain, Bengal Pl. 1: 592. 1903. *Eupatorium conyzoides* Vahl, Symb. Bot. 3: 96. 1794; Hook. f., Fl. Brit. India 3: 244. 1881. [Plate 115d]

Shrub, 1–1.5 m high. Leaves ovate, 3–8 × 1.8–4.5 cm, cuneate, dentate and puberulous, acuminate, chartaceous, golden yellow glands below, puberulous. Inflorescence heads in terminal corymbs, puberulous. Heads whitish purple, campanulate, 8–9 × 3–4 mm, homogamous; phyllaries 5–6-seriate; outer ones ovate; inner ones ovate-oblong to oblong. Ray florets absent. Disk florets: female flowers absent. Bisexual: corolla whitish purple, funnelform; lobes 5, triangular, papillose at apex. Achenes light brown, linear-oblong, c. 4 mm, ribbed, pubescent; pappus white, 5–5.5 mm, persistent in mature achenes, barbellate.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Near Poro rest house, BK 238; Garam, JKS 869; Bhutanghat, 02.12.1975, JKS 4112; Poro, 22.11.1975, JKS 787; Tashigaon, JKS 4054; South Rajabhatkhawa, JKS 4256; Rajabhatkhawa range, 04.12.2011, GK 52343; Rydak river belt, 20.09.2011, AK 52669; Rangamati to Bharnabari, 06.10.2012, AK 58701.

9. *Cirsium* Mill.

Key to the species

- 1a. Flowers usually unisexual; corolla divided to base of limb 1. *C. arvense*
1b. Flowers bisexual; corollas divided to half length of limb 2. *C. shansiense*

1. *Cirsium arvense* (L.) Scop., Fl. Carniol., ed. 2: 2: 126. 1772. *Serratula arvensis* L., Sp. Pl. 2: 820. 1753. *Cnicus arvensis* (L.) Hoffm., Deutschl. Fl. 2: 130. 1804; Hook. f., Fl. Brit. India 3: 362. 1881. [Plate 116a]

Subdioecious, erect herb, 30–50 cm high. Leaves oblanceolate, 4.5–8 × 1.6–3 cm, pinnately lobed; lobes suborbicular, spinescent, decurrent on the stem, woolly tomentose beneath. Inflorescence in cymose heads. Heads campanulate, 0.5–3.5 cm; phyllaries multiseriate, lanceolate, 8–18 × 1.5–2.2 mm, sparsely araneous, shortly spine-tipped. Male and female flowers on separate plants. Male flowers: corolla pink to purplish, funnelliform, c. 1 cm. Female flowers: corolla pinkish to purplish, linear, c. 14 mm; lobes 5, linear, c. 3 mm. Achenes obovoid, 4-angled, c. 1.5 × 0.75 mm, glabrous; pappus multiseriate, 12–15 mm, feathery.

Flowering & Fruiting: February–May.

Distribution. India: Himachal Pradesh, Jammu & Kashmir, Punjab, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Jainti 7, 12.03.2011, GK 50555.

2. *Cirsium shansiense* Petr., Mitth. Thüring. Bot. Vereins n. s., 50: 176. 1943; Anant Kumar & Venu, Indian Forester 145 (8): 778. 2019. *Cnicus sinensis* C. B. Clarke, Compos. Ind.: 219. 1876 (as "*chinense*"); Hook. f., Fl. Brit. India 3: 364. 1881. [Plate 116b; Fig. 38]

Erect herb, 0.8–1.2 m high. Leaves sessile, oblong-lanceolate, irregularly lobed, 4.5–8 × 1.6–3 cm, decurrent, spinescent, acute, chartaceous, arachnoid above, lanate below. Inflorescence in cymose heads. Heads purplish, campanulate, 1.5–3 × 1.2–1.8 cm, homogamous; phyllaries multiseriate; outer ones elliptic; inner ones oblong-lanceolate to oblong. Ray florets absent. Disk florets: Bisexual: corolla pink purple, campanulate; tube cylindric, c. 1.5 cm, broad at apex; lobes 5, oblong, 3–3.5 mm, acute. Achenes obconic, 1.5–2 mm, 4-angled, pappus at apex; pappus white, 1.2–1.5 cm, feathery.

Flowering & Fruiting: February–April.

Distribution. India: Meghalaya, Uttarakhand and West Bengal.

Specimen examined: Rydak, Tiamari, 23.02.2012, AK 55907.

10. *Conyza* Less.

Conyza leucantha (D Don) Ludlow & Raven, Kew Bull. 17: 71. 1963. *Erigeron leucanthus* D. Don, Prodr. Fl. Nepal.: 171. 1825. *Conyza viscidula* Wall. ex DC.,

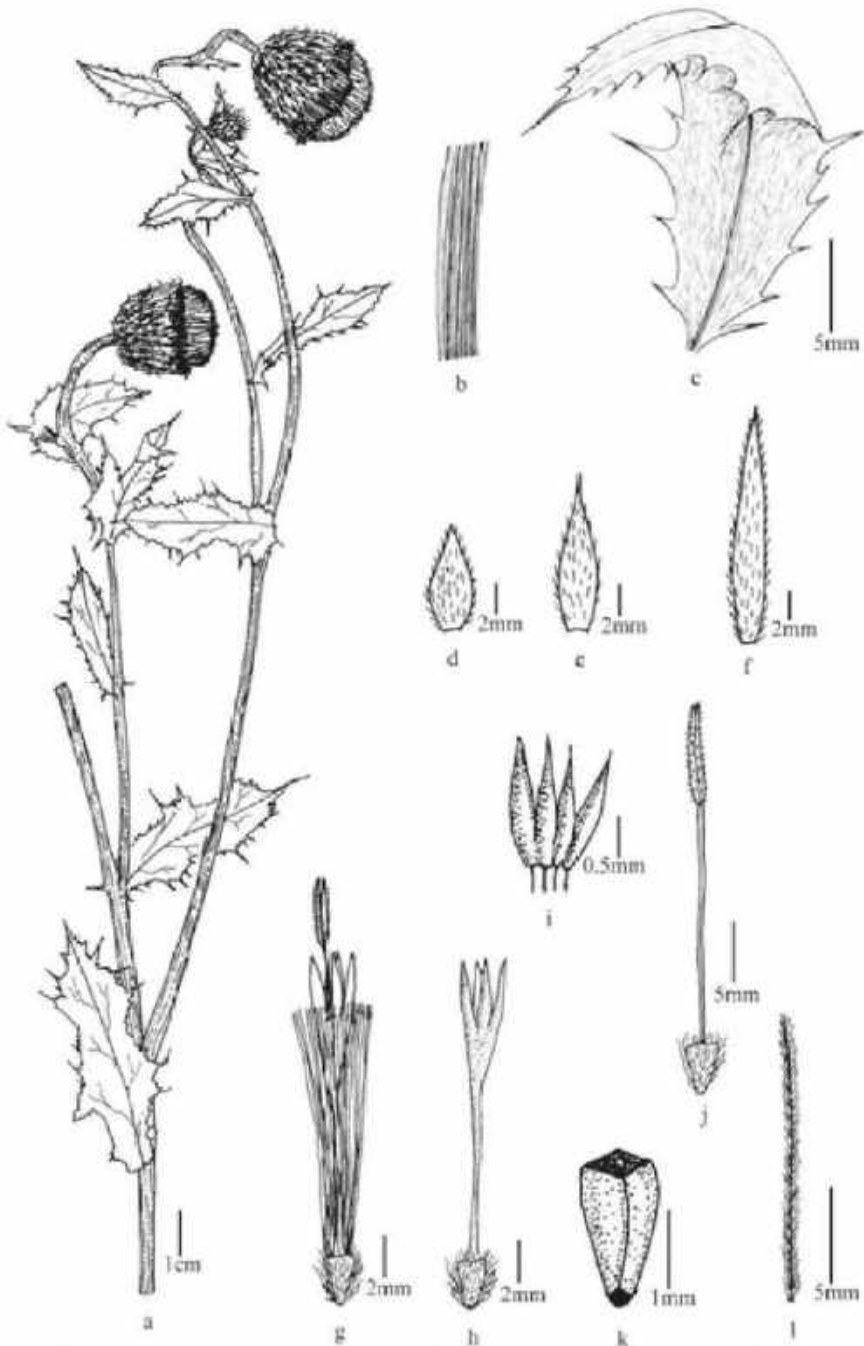


Fig. 38. *Cirsium shansiense*: a. Flowering branchlet; b. Portion of stem; c. Leaf; d. Outer phyllary; e. Middle phyllary; f. Innermost phyllary; g. Disc floret; h. Corolla with immature achene; i. Stamens; j. Gynoeceium; k. Achene; l. Pappus (AK 55907).

Prodr. 5: 383. 1836; Hook. f., Fl. Brit. India 3: 258. 1881; Prain, Bengal Pl. 1: 595. 1903. [Plate 116c]

Erect herb, 0.8–1m high. Leaves sessile, elliptic-lanceolate to oblong-lanceolate, 2.5–10.4 × 0.8–2.8 cm, attenuate at base, crenate-serrate, acute, short acumens at tip, chartaceous, sticky, pubescent above, pubescent, minute glandular below. Inflorescence heads in axillary, terminal corymbose panicles, pubescent. Heads light pink, campanulate, 4–5 × 3–6 cm, homogamous; phyllaries 2 or 3-seriate; outer and inner ones linear-lanceolate; innermost ones linear-subulate. Ray florets absent. Disk florets: Female: corolla light pink, cylindrical; tube c. 0.5 mm; lobes 5, linear. Bisexual: corolla light pink, funnelliform; tube angular, c. 2.3 mm, hairy above; lobes 5, triangular, c. 0.5 mm, reflexed, acute, hairy at apex only. Achenes light brown, oblong, c. 0.5 mm, hairy; pappus dirty white, many, c. 4 mm, barbellate.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimen examined: Adma, 12.02.2013, AK 58872.

11. *Cotula* L.

Cotula hemisphaerica (Roxb.) Wall. ex C. B. Clarke, Compos. Ind.: 150. 1876; Prain, Bengal Pl. 1: 620. 1903. *Artemisia hemisphaerica* Roxb., Fl. Ind. 3: 422. 1832; Hook. f., Fl. Brit. India 3: 316. 1881. [Plate 116d]

Suberect herb, 8–12 cm high. Leaves sessile, pinnatisect, 1–6 cm, lower leaves larger than upper ones, chartaceous, glabrous to long hairy; pinnae 10–15, oblong, 2–10 mm, attenuate, lobed; segments subulate, 2–10, aristate. Inflorescence leaf opposed, solitary heads, glabrous to long hairy. Heads green at periphery, yellow at centre, hemispherical, 2.5–6 mm across, homogamous; phyllaries 2-seriate; outer and inner ones oblong to oblong-lanceolate. Ray florets absent. Disk florets: Female: flowers green, vestigial, represented by a pistil. Bisexual: corolla yellow, funnelliform; tube c. 0.5 mm; lobes 4, triangular. Achenes dimorphic; achenes of female flowers light brown, oblong, c. 1 mm, style and stigma persistent, compressed, thick at edges, glandular; achenes of bisexual flowers light brown, oblong, c. 0.6 mm, faintly trigonous, glandular; pappus absent.

Flowering & Fruiting: January–April.

Distribution. India: Assam, Bihar, Manipur, Meghalaya, Uttarakhand and West Bengal.

Specimen examined: Checko-1, 10.02.2013, AK 58837.

12. *Crassocephalum* Moench.

Crassocephalum crepidioides (Benth.) S. Moore, J. Bot. 1: 211. 1912; R. Mathur in Hajra & al., Fl. India 13: 201, f. 64. 1995. *Gymura crepidioides* Benth. in Hook. f., Fl. Niger: 438. 1849. [Plate 117a]

Erect herb, 40–70 cm high. Leaves elliptic to elliptic-lanceolate, 2.5–6.5 × 1–2.5 cm, attenuate, serrate-dentate and hairy, acute to acuminate, chartaceous, sparsely pilose. Inflorescence heads in axillary, terminal, lax racemes, glandular pubescent. Heads reddish, campanulate, 8–15 × 6–10 mm, pendulous, homogamous; head bracts linear; phyllaries 1-seriate, linear-oblong. Disk florets: Bisexual: corolla reddish, cylindrical; tube 9–10 mm; lobes 5, linear, 1–1.5 mm, subacute, puberulent. Achenes brownish, oblong, c. 2 mm, ribbed, appressed pubescent; pappus white, 11–12 mm, barbellulate.

Flowering & Fruiting: February–October.

Distribution. India: Almost throughout India.

Specimens examined: Damanpur, CRD 41; Jainti 7B, 03.03.2011, GK 47223; Newlands, 15.02.2012, AK 53067; Kumargram, 18.02.2012, AK 55713; Hauda nala, 03.10.2012, AK 58672.

13. *Cyanthillium* Blume

Cyanthillium cinereum (L.) Robinson, Proc. Biol. Soc. Wash. 103 (1): 252. 1990. *Conyza cineria* L., Sp. Pl. 2: 862. 1753. *Vernonia cineria* (L.) Less., Linnaea 4: 291. 1829; Hook. f., Fl. Brit. India 3: 233. 1881; Prain, Bengal Pl. 1: 590. 1903.

[Plate 117b]

Kukshim, Kala-jhira (B).

Erect or decumbent herb, 10–60 cm high. Leaves sessile to petiolate, variable, elliptic, lanceolate to elliptic-lanceolate, 1–6.5 × 0.3–4.5 cm, attenuate, serrate-dentate and hairy, acute, apiculate tip, coriaceous, pellucid glandular, sparsely pubescent above, densely greyish pubescent. Inflorescence heads in terminal, corymbose panicles, pubescent. Heads mauve, campanulate, 5–6 × 5–10 mm, homogamous; phyllaries 3-seriate, linear-lanceolate. Disk florets: Bisexual: flowers dimorphic; corolla mauve, funnelform; tube 2.5–5 mm; lobes 5, linear, 1–1.5 mm, subacute, hairy. Achenes brownish, oblong, 1.5–2 mm, faintly ribbed, ring of white bristles at apex, silky pubescent; pappus white, 5–6 mm, deciduous in mature achenes, barbellate.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 28.05.1949, VN & party 3090; Garam, JKS 853, 860; Kumargram, Kalikhola river belt, 21.09.2011, AK 52702; Kumargram, 13.02.2012, AK 53007; Newlands, 15.02.2012, AK 53064; Narathali, 20.02.2012, AK 55828; Phashkhawa, 27.09.2012, AK 56186; Hauda nala, 03.10.2012, AK 58681; Ranganmati to Bharnabari, 06.10.2012, AK 58709.

14. *Dichrocephala* L'Herit ex DC.

Dichrocephala integrifolia (L. f.) Kuntze, Revis. Gen. Pl. 1: 333. 1891. *Hippia integrifolia* L. f., Suppl. Pl.: 389. 1781. *Cotula latifolia* Pers., Syn. Pl. 2 (2): 464. 1805; Hook. f., Fl. Brit. India 3: 245. 1881. [Plate 117c]

Erect or decumbent herb, 10–20 cm high. Leaves dimorphic, lower ones obovate, upper ones lyrate or pinnatisect, 2–7 × 1–4.5 cm, attenuate, serrate-dentate with mucronate tip and hairy, obtuse, coriaceous, pellucid glandular above, sparsely hairy. Inflorescence heads in axillary, terminal, lax panicles. Heads white at periphery and green at centre, hemispherical, 3–4 mm across, homogamous; phyllaries 2-seriate; outer ones lanceolate; inner one elliptic-oblongate. Disk florets: Female: corolla white, cylindrical, 2–3-lobed. Bisexual: corolla green, funnelform; lobes 5, elliptic, acute. Achenes brownish, obovate, c. 1 mm, compressed, thick at edges; pappus modified in 3 bristles around the rim at apex, deciduous in mature achenes.

Flowering & Fruiting: August–November.

Distribution. India: Almost throughout India.

Specimens examined: Santrabari to Buxa Fort, 28.09.2013, AK 59613; Buxa Fort to Tashigaon, 01.10.2013, AK 59722.

15. *Eclipta* L.

Eclipta prostrata (L.) L., Mant. Pl. Altera: 286. 1771. *Verbesinia prostrata* L., Sp. Pl. 2: 902. 1753. *Eclipta alba* (L.) Hassk., Pl. Jav. Rar.: 528. 1848; Hook. f., Fl. Brit. India 3: 304. 1881; Prain, Bengal Pl. 1: 610. 1903. [Plate 117d]

Kesari, Kesuti (B); *Mochkand, Bhangra, Babri* (H).

Decumbent herb, 5–15 cm high. Leaves sessile to subsessile, elliptic to oblong-elliptic, 1–2.5 × 0.3–0.5 cm, cuneate, crenate and hairy, acute, chartaceous, pellucid glands and appressed hirsute. Inflorescence axillary, terminal, heads solitary or in pairs, hirsute. Heads white, campanulate, c. 5 × 4–6 mm, heterogamous; phyllaries 2-seriate; outer and inner ones elliptic-ovate. Ray florets: Female: corolla white, tubular; tube c. 0.5 mm, appendages at throat; ligule oblong, c. 1.8 mm, 2-lobed. Disk florets: Bisexual: corolla white, funnelform; tube c. 1 mm; lobes 4, triangular-ovate, acute. Achenes greyish brown, oblong, 2–2.2 mm, compressed, sharply angled, the apical ridge few small hairy, tubercled at central ridge; pappus of a ring of thick, ciliate, partially or completely united scales forming a cone on the top of the achene.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Balapara, JKS 4228; North Rajabhatkhawa, JKS 6993; Rydak river belt, 20.09.2011, AK 52667, 52693; Kumargram, Hathinala, 21.02.2012, AK 55847.

16. *Elephantopus* L.

Elephantopus scaber L., Sp. Pl. 2: 814. 1753; Hook. f., Fl. Brit. India 3: 242. 1881; Prain, Bengal Pl. 1: 590. 1903. [Plate 118a]

Samdulun (B, H).

Erect herb, 15–25 cm high. Leaves basal and cauline, sessile; basal leaves form rosettes, oblanceolate, 7–19 × 2–4.5 cm, attenuate, serrate and hairy, acute, coriaceous, pellucid glandular and hirsute above, appressed pubescent below; cauline leaves oblong-lanceolate, 1.5–4.2 × 0.6–1.2 cm, attenuate, crenate and hairy, acute, coriaceous, pellucid glandular, hirsute above, pubescent below. Inflorescence heads clustered into glomerules, subtended by leaf-like bracts, pubescent; glomerules campanulate, 0.6–0.8 × 1.3–2 cm; glomerule bracts 3, ovate, cordate, serrate, acuminate, keeled, pellucid glandular, hirsute above, appressed pubescent below. Heads mauve, with 4 disk florets, cupular, 6–8 × 4–7 mm, homogamous; phyllaries 2-seriate, elliptic-lanceolate. Disk florets: Bisexual: corolla mauve, tubular-campanulate; tube 5–6 mm, slightly broad above; lobes 5, linear, c. 2 mm, one sided spreading, acute. Achenes oblong-obovoid, 2–3 mm, 10-ribbed, silky pubescent; pappus white, 5, subulate, 4.5–5 mm, broad at base, barbellate.

Flowering & Fruiting: July–November.

Distribution. India: Almost throughout India.

Specimens examined: Buxa Camp, 24.05.1949, VN & party 2957; Bhutanghat, 28.05.1949, VN & party 3093; Buxa Division-5, Kodalbasti, 06.12.1995, C & M 1052; Poro, JKS 817; Tashigaon I, 04.10.2009, SKS & GK 46136; Kumargram, Kalikhola river belt, 21.09.2011, AK 52728; Hauda nala, 03.10.2012, AK 58678.

Notes: The root decoction is used to treat dysentery and stomach troubles.

17. *Emilia* Cass.

Emilia sonchifolia (L.) DC. in Wight, Contr. Bot. Ind.: 24. 1834; Hook. f., Fl. Brit. India 3: 336. 1881; Prain, Bengal Pl. 1: 605. 1903. *Cacalia sonchifolia* L., Sp. Pl. 2: 1835. 1753. [Plate 118b]

Sadi-modi (B).

Erect to suberect herb, 20–40 cm high. Leaves sessile except lower leaves, dimorphic; lower ones ovate to suborbicular, 3–10 × 0.5–4 cm, attenuate or lyrate lobed at base, rarely cordate, crenate-dentate, acute or obtuse, membranous, sometimes sparsely puberulous; upper leaves lanceolate to oblong-lanceolate, 3.2–

8.5 × 0.5–2.5 cm, variously lobed and amplexicaul, dentate, acute or subobtuse, thinly coriaceous, glabrous or sparsely puberulous. Inflorescence heads in loosely branched corymb or subumbellate. Heads pink purple, cylindric, 7–9 × 2.5–3 mm, homogamous; phyllaries 1-seriate, linear-lanceolate. Disk florets: Bisexual: corolla purple, cylindric-campanulate; tube 5–6 mm; lobes 5, linear, 1.2–1.5 mm, acute, puberulent at apex only. Achenes light brown, oblong, 3–3.2 mm, 5-angled, ribbed, pubescent; pappus white, filiform, 6–7 mm, deciduous in mature achenes, barbellate.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: Garam, JKS 856; Newlands, Sukno river, 22.09.2011, AK 52777; Sankosh, 17.02.2012, AK 55645, 55651; Checko-1, 26.09.2012, AK 56160; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58595.

18. *Enydra* Lour.

Enydra fluctuans Lour., Fl. Cochinch. 2: 511. 1790; Hook. f., Fl. Brit. India 3: 304. 1881; Prain, Bengal Pl. 1: 610. 1903. [Plate 118c]

Hingcha, Hinche, Helencha (B).

Marshy submerged herb. Leaves sessile to subsessile, linear-oblong, 1.5–4.5 × 0.4–1 cm, auriculate and connate, crenate-serrate, acute to obtuse, subcoriaceous, gland-dotted. Inflorescence axillary or terminal heads. Heads greenish yellow, hemispherical, c. 8 mm across, heterogamous; phyllaries 2-seriate, 2 in each series, foliaceous; outer ones ovate or suborbicular; inner ones ovate-oblong. Ray florets: Female: corolla greenish, tubular-campanulate; tube 1.2–1.5 mm; lobes 3, triangular, c. 0.5 mm, obtuse. Disk florets: Bisexual: corolla greenish, campanulate; tube c. 1.5 mm; lobes 5, triangular, c. 0.8 mm, acute, puberulent. Achenes blackish, oblong-obconic, 2.5–3 mm, compressed, enclosed in palca; palca pouch-like, 2–3 mm, membranous, toothed and ciliated at apex; pappus absent.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Bhutia pond, 14.02.2010, GK 47082; Narathali, 20.02.2012, AK 55750.

Notes: Leaves are edible and used as vegetable.

19. *Erechtites* Raf.

Erechtites valerianifolius (Link ex Spreng.) DC., Prodr. 6: 295. 1838. *Senecio valerianifolius* Link ex Spreng., Syst. Veg., ed. 16. 3: 565. 1826.

Erect herb, 0.5–1 m high. Leaves ovate-elliptic or ovate-lanceolate, 6–30 × 4–16 cm, cuneate, irregularly incised dentate or pinnatisect, acuminate, glabrous; segments oblong-lanceolate, serrate. Heads many in terminal and upper axillary dense corymbose panicles. Heads pink or mauve, 3–5 mm across, heterogamous; phyllaries 1-seriate, linear, connate. Ray florets absent. Disk florets: Female: corolla filiform, 7–9 mm; lobes 5, triangular, 2–3 mm. Bisexual: corolla campanulate, 8–9 mm, 5-lobed above, glandular. Achenes brown, cylindrical, 3–3.5 mm, sparsely puberulous; pappus pink above, white at the base, c. 7.5 mm.

Flowering & Fruiting: December–June.

Distribution. India: Almost throughout India.

Specimens examined: Poro, BK 233; 21st miles from Rajabhatkhawa, VN 2309; North Bholka, JKS 4167.

20. *Galinsoga* Ruiz & Pav.

Galinsoga quadriradiata Ruiz & Pav., Syst. Veg. Fl. Peruv. Chil. 1: 198. 1798; H. J. Chowdhery in Hajra & al., Fl. India 12: 388, f. 106. 1995. *Galinsoga ciliata* S. F. Blake, Rhodora 24: 35. 1922. [Plate 118d]

Decumbent or suberect herb, 7–30 cm high. Leaves ovate-lanceolate to lanceolate, 2.5–3.5 × 0.7–1.8 cm, cuneate, serrate-dentate and puberulous, acuminate, chartaceous, obscurely gland-dotted below in apical leaves, sparsely puberulous. Inflorescence heads in axillary, terminal corymbs, puberulous mixed with glandular hairs. Heads white yellow, campanulate, 2.5–3.5 × 2.5–4.5 mm, heterogamous; phyllaries 2-seriate; outer ones ovate; inner ones ovate to elliptic-ovate. Ray florets: Female: corolla white; tube c. 1 mm, hairy; ligule suborbicular, c. 0.8 mm across, 3-lobed. Disk florets: Bisexual: corolla yellow, funnelliform; tube c. 1 mm, pubescent; lobes 5, triangular, acute, papillose at apex, sparsely pubescent. Achenes black, obconic, 1.2–1.5 mm, ribbed, pubescent; pappus scales white, linear-lanceolate, 0.6–1.6 mm, pappus scales of ray florets smaller than disk florets, hairy, awn tipped.

Flowering & Fruiting: February–October.

Distribution. India: Almost throughout India.

Specimens examined: Rydak river belt, 26.02.2012, AK 55958; Buxa Fort to Tashigaon, 01.10.2013, AK 59720.

21. *Gnaphalium* L.

Key to the species

- | | |
|--|----------------------------|
| 1a. Heads in leafless corymbose clusters | 2. <i>G. luteoalbum</i> |
| 1b. Heads in leafy spikes or in axillary or terminal clusters | 2 |
| 2a. Phyllaries acuminate; ovary not papillose; achenes sparsely vesicular; pappus connate in a ring, deciduous | 3. <i>G. pensylvanicum</i> |

- 2b. Phyllaries acute or obtuse; ovary papillose; achenes papillose; pappus free, deciduous separately 3
- 3a. Leaves slightly semiamplexicaul; phyllaries obtuse, with dark spots at base; inflorescences heads subtended by shorter leaves 1. *G. flaccidum*
- 3b. Leaves not semiamplexicaul; phyllaries acute, without dark spots at base; inflorescences heads not subtended by shorter leaves 4. *G. polycaulon*

1. *Gnaphalium flaccidum* Kurz in C. B. Clarke, *Compos. Ind.*: 115. 1876; Hook. f., *Fl. Brit. India* 3: 290. 1881; Prain, *Bengal Pl.* 1: 603. 1903. [Plate 119a]

Decumbent herb, 9–16 cm high. Leaves sessile, oblanceolate, 10–20 × 2.5–3.5 mm, attenuate with slightly semiamplexicaul, entire, rounded with apiculate tip, coriaceous, floccose above, loosely cottony tomentose below. Inflorescence heads in terminal clusters, subtended by shorter leaves, white, cottony tomentose. Heads brownish, campanulate, 2.5–3 × 3–3.5 mm, homogamous, white cottony hairy; phyllaries 2–3-seriate; outer ones light brown, ovate; inner ones oblong-lanceolate. Disk florets: Female: corolla white, tubular, c. 2 mm, shallowly 2–3-lobed; bisexual: corolla white brown, funnellform; tube c. 1 mm; lobes 5, triangular, papillose at apex. Achenes brown, oblong, c. 0.5 mm, terete, papillose; pappus white, 1–1.2 mm, deciduous, barbellate.

Flowering & Fruiting: February–April.

Distribution. India: West Bengal.

Specimen examined: Kumargram, Hathinala, 21.02.2012, AK 55834.

2. *Gnaphalium luteoalbum* L., *Sp. Pl.* 2: 851. 1753; Hook. f., *Fl. Brit. India* 3: 288. 1881.

Woolly erect herb, 15–25 cm high. Leaves linear-oblong to oblanceolate, 1–4.5 × 0.4–0.8 cm, cuneate at base, entire, mucro-acute, chartaceous, white woolly. Inflorescence in terminal or axillary corymbs, heterogamous; phyllaries 2–4-seriate, oblanceolate to elliptic. Disk florets: Female: corolla filiform, c. 2 mm, 3–4-toothed. Bisexual: corolla funnellform; tube c. 1.5 mm; lobes 5, triangular-ovate. Achenes oblong or obovoid, 0.5–0.6 mm, tuberculate; pappus hairs white, 1-seriate, 1–1.5 mm, caducous.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Buxa-Bhutan, 35th mile road, 16.05.1949, VN & party 2542; Tobgaon, 18.05.1949, VN & party 2678; Bhutia Pond, 11.02.2010, SKS & GK 47041; Jainti 9, 05.03.2011, GK 47250; Panbari 8, 31.03.2012, GK 56020.

3. *Gnaphalium pennsylvanicum* Willd., *Enum. Pl.* 2: 867. 1809. *Gnaphalium purpureum* sensu Hook. f., *Fl. Brit. India* 3: 289. 1881, non L. 1753. [Plate 119b]

Decumbent or erect herb, 15–30 cm high. Leaves sessile, spatulate, 3–7.5 × 0.6–1.6 cm, long attenuate, entire, rounded, apiculate tip, coriaceous, floccose above, loosely lanate below. Inflorescence heads in axillary and terminal clusters, white, woolly tomentose. Heads brownish, campanulate, c. 4 × 2.5 mm, homogamous, white cottony pubescent; phyllaries 2–3-seriate; outer series light brown, ovate-lanceolate; inner ones oblong-lanceolate. Disk florets: Female: corolla white, tubular, c. 2 mm, shallowly 2–3-lobed. Bisexual: corolla green yellow, funnelform; tube c. 2 mm; lobes 5, triangular, reflexed, papillose at apex. Achenes brown, elliptic-oblong, 5–6 mm, sparsely vesicular; pappus white, 2.2–2.5 mm, connate, deciduous in ring, slightly longer than flowers, barbellate.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimen examined: Newlands, 15.02.2012, AK 55603.

4. *Gnaphalium polycaulon* Pers., Syn. Pl. 2: 421. 1807. *Gnaphalium indicum* auct. non L. 1753; Hook. f., Fl. Brit. India 3: 289. 1881; Prain, Bengal Pl. 1: 602. 1903. *Gnaphalium strictum* Roxb., Fl. Ind. 3: 424. 1832. *Gnaphalium multicaule* Roxb., Fl. Ind. 3: 425. 1832.

Erect herb, 15–20 cm high. Leaves sessile, spatulate, 1–2 × 0.3–0.6 cm, attenuate, entire, rounded, apiculate at tip, coriaceous, floccose above, loosely lanate below. Inflorescence heads in axillary, terminal clusters, white, woolly tomentose. Heads brownish, campanulate, c. 3 × 2.5 mm, homogamous, white cottony pubescent; phyllaries 2–3-seriate; outer series light brown, ovate-lanceolate; inner ones oblong-lanceolate. Disk florets: Female: corolla white, tubular, c. 1 mm, shallowly 2–3-lobed. Bisexual: corolla green yellow, funnelform; tube c. 1 mm; lobes 5, triangular, acute, papillose at apex. Achenes brown, elliptic-oblong, papillose; pappus white, 1.2–1.5 mm, deciduous separately, slightly longer than flowers, barbellate.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimen examined: Sankosh, 17.02.2012, AK 55657.

22. *Grangea* Adans.

Grangea maderaspatana (L.) Desf., Tabl. École Bot.: 95. 1804; Hook. f., Fl. Brit. India 3: 247. 1881; Prain, Bengal Pl. 1: 593. 1903. *Artemisia maderaspatana* L., Sp. Pl. 2: 849. 1753. [Plate 119c]

Namuti (B); *Mastaru* (H).

Erect herb, 20–50 cm high. Leaves lyrate, 1.5–5 × 0.75–2.5 cm, subauriculate,

lobed, acute; lobes ovate or oblong, coriaceous, scabrous. Inflorescence axillary or terminal, solitary head, rarely in pairs, subglobose, c. 6 × 8 mm; phyllaries 2-seriate, triangular-ovate. Disk florets: Female: corolla yellow, filiform, 3-lobed. Bisexual: corolla yellow, campanulate; tube c. 1 mm; lobes 5, triangular-ovate. Achenes oblong, c. 2 × 0.4–0.5 mm, flattened; pappus cupular, cartilaginous, fimbriate margined.

Flowering & Fruiting: March–November.

Distribution. India: Almost throughout India.

Specimen examined: Panbari 8, 10.04.2012, GK 56088.

23. *Gynura* Cass.

Gynura nepalensis DC., Prodr. 6: 300. 1838; Hook. f., Fl. Brit. India 3: 333. 1881. *Gynura foetens* Wall. ex DC., Prodr. 6: 300. 1838. *Gynura nepalensis* var. *thomsoni* C. B. Clarke, Compos. Ind.: 171. 1876. [Plate 119d]

Tong kribi (N).

Undershrub, 1–1.5 m high. Leaves elliptic-lanceolate, 3–20 × 1–6 cm, attenuate, distantly serrate, acute to acuminate, chartaceous, white puberulous. Inflorescence heads loosely arranged in terminal corymbs, white puberulous. Heads yellow, campanulate, 1–1.7 × 0.8–1.1 cm, homogamous, surrounded by bracts; head bracts linear, 4–5 mm, puberulous; phyllaries 1-seriate, linear-lanceolate. Disk florets: Bisexual: corolla yellow, tubular-campanulate; tube 10–11 mm; lobes 5, triangular, c. 1 mm, acute, papillose at apex. Achenes brown, cylindrical, c. 4 mm, ribbed; pappus white, filiform, 8–11 mm, deciduous, slightly smaller than flowers, barbellate.

Flowering & Fruiting: February–May.

Distribution. India: Himachal Pradesh, Meghalaya, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Pana, 11.02.2013, AK 58850.

24. *Ixeris* Cass.

Ixeris polycephala Cass., Dict. Sci. Nat. 24: 50. 1822. *Lactuca polycephala* (Cass.) Benth. & Hook. f., Gen. Pl. 2: 526. 1873; Hook. f., Fl. Brit. India 3: 410. 1881; Prain, Bengal Pl. 1: 628. 1903. [Plate 120a]

Erect herb, 6–20 cm high. Leaves basal and cauline, chartaceous; basal leaves sessile, spirally arranged, lyrate-pinnatisect, 4–11 × 0.3–0.5 cm; lobes triangular-lanceolate, 1–2 mm, acute; cauline leaves sessile, linear-lanceolate, 4–5 cm, sagittate-amplexicaul, denticulate to subentire, acute. Inflorescence heads in usually subumbellate corymbs. Heads yellow, cylindrical, 4–7 × 1.2–1.5

mm, homogamous; head bracts ovate; phyllaries 1-seriate, oblong-lanceolate. Ray florets: Bisexual: corolla yellow; tube 1.8–2 mm; ligule oblanceolate, c. 4 mm, 5-toothed. Achenes brown, elliptic, c. 4 mm, 10-winged, long beaked with discoid tip, puberulent at wings; pappus white, filiform, c. 4 mm, deciduous in mature achenes, barbellate.

Flowering & Fruiting: February–May.

Distribution. India: Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Punjab, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Newlands, 15.02.2012, AK 55622; Newlands, 15.02.2012, AK 55630, 55634.

25. *Lactuca* L.

Lactuca dolichophylla Kitam., Res. Kyoto Univ. Sci. Exped. Karak. & Hinduk. 1955, 8 (Addit. & Corr. Fl. Afghan.): 150, 1966. *Lactuca longifolia* DC., Prodr. 7: 135. 1838; Hook. f., Fl. Brit. India 3: 405. 1881.

Erect herbs, c. 1 m high. Leaves variable, 5–25 × 0.5–1.5 cm, sessile; lower cauline leaves linear to linear-lanceolate, sagittate, 2-aucicled, undivided or pinnately lobed, acuminate; lobes linear if present; upper cauline leaves undivided, smaller, or else similar to lower leaves. Heads in broad or narrow panicles; phyllaries 2-seriate, purplish red at apex; outer ones triangular-ovate; inner ones linear-oblong or linear-lanceolate. Flowers ligulate only; ligule pale blue; tube 4.5–5.5 mm, hairy above; lobes 5, triangular. Achenes pale or dark brown, elliptic or oblanceolate, 5–7 mm, smooth; pappus white, 4–6 mm.

Flowering & Fruiting: September–October.

Distribution. India: Himachal Pradesh, Jammu & Kashmir, Uttarakhand and West Bengal.

Specimen examined: On way to Buxaduar, 850 m, JKS 7825.

26. *Lipoblepharis* Orchard

Lipoblepharis urticifolia (Blume) Orchard, Nuytsia 23: 440. 2013. *Verbesina urticifolia* Blume, Bijdr. Fl. Ned. Ind. 15: 911. 1826. *Wedelia urticifolia* DC. in Wight, Contr. Bot. India: 18. 1834; Hook. f., Fl. Brit. India 3: 306. 1881.

[Plate 120b]

Erect or decumbent herb, 20–80 cm high. Leaves elliptic-ovate, 3–6 × 2–4 cm, truncate or rounded, serrate, acute, pilose. Heads yellow, 2–3 cm across, 1–4 together from upper nodes or axils, sometimes solitary; phyllaries 2-seriate; outer ones elliptic; inner ones rhomboid-lanceolate. Ray florets: corolla oblong, c. 7 × 5 mm, 3-lobed. Disk florets: Bisexual: corolla yellow, funnelform; tube 3–4 mm; lobes 5, triangular. Achenes obovoid, 3–3.5 × 2–2.5 mm, triquetrous, tip truncate; pappus absent, rarely of 1–2 bristles.

Flowering & Fruiting: Throughout the year.

Distribution. India: Chhatisgarh, Maharashtra, Tamil Nadu and West Bengal.

Specimens examined: Bhutanghat, JKS 4110; Balapara, JKS 4189; North Rajabhatkhawa, JKS 6982.

27. *Mikania* Willd.

Mikania micrantha Kunth, Nov. Gen. Sp. 4 (15): 134. 1820. *Mikania scandens* auct. non (L.) Willd. 1803: C. B. Clarke, Compos. Ind.: 34. 1876; Hook. f., Fl. Brit. India 3: 244. 1881; Prain, Bengal Pl. 1: 592. 1903.

Large twining herbs. Leaves deltoid-ovate, 1.8–5.4 × 1–3 cm, usually cordate, truncate in young leaves, crenate-dentate, acuminate, chartaceous. Inflorescence heads clustered in corymbose panicles. Heads white, campanulate, 4–6 × 2–3 mm, few flowered, homogamous; phyllaries 1-seriate, elliptic-oblongate. Disk florets: Bisexual; corolla white, tubular-campanulate; tube c. 2 mm; lobes 5, triangular-ovate, obtuse, reflexed. Achenes brownish, tetragonous, oblong, 1.5–2 mm, sparsely vesicular; pappus white, filiform, 2–2.2 mm, connate, barbellate.

Flowering & Fruiting: January–May.

Distribution. India: Assam, Kerala, Sikkim, Tripura, Uttarakhand and West Bengal (naturalized).

Specimens examined: Poro, 22.11.1975, JKS 812; SRVK 5, 27.11.2011, GK 47140; Kumargram, 13.02.2012, AK 53018; Newlands, 15.02.2012, AK 55606.

28. *Parthenium* L.

Parthenium hysterophorus L., Sp. Pl. 2: 988. 1753; H. J. Chowdhery in Hajra & al., Fl. India 12: 403, f. 113. 1995.

Erect herb, 40–80 cm high. Leaves variable, chartaceous, scabrous; lower ones petiolate, pinnately dissected, 4–5 × 1–2 cm, cuneate at base; segments triangular to oblong, entire, acute to subacute; upper ones sessile, oblong to linear-lanceolate, 12–22 × 1.5–3 mm, cuneate, entire, obtuse at apex. Inflorescence heads in lax panicle, puberulous. Heads creamy white, campanulate, 1.5–2 × 2–3 mm, heterogamous; phyllaries 1-seriate, elliptic. Ray florets: one female and 2 disk flowers covered by palea. Female: corolla creamy white; ligule ovate-orbicular, c. 0.5 × 0.8 mm, shallowly bilobed. Disk florets: bisexual, corolla white, funnelform; tube 1–1.5 mm; lobes 5, triangular-ovate, subacute, reflexed. Achenes black, obovate, c. 2 × 1 mm, median ribbed; pappus scales ovate, acute, puberulous, deciduous.

Flowering & Fruiting: January–May.

Distribution. India: Almost throughout India.

Specimen examined: Bhutanghat, 26.09.2011, AK 52903.

Notes: Whole plants are used in making broom.

29. *Pseudoconyza* Cuatrec.

Pseudoconyza viscosa (Mill.) D'Arcy, Phytologia. 25: 281. 1973. *Conyza viscosa* Mill., Gard. Dict., ed. 8. n. 8. 1768. *Laggera aurita* Sch. Bip. ex Schweinf., Beitr. Fl. Aethiop.: 151. 1867; Hook. f., Fl. Brit. India 3: 271. 1881; Prain, Bengal Pl. 1: 599. 1903.

Aromatic, erect herb, up to 90 cm high. Leaves obovate or oblanceolate, 4–9 × 0.5–1 cm, base sometimes auricled, toothed, lobed or pinnatifid, decurrent, membranous, viscid pubescent; upper leaves much smaller, often bract like, sessile or subsessile. Heads in corymbose or diffused panicle; phyllaries multiseriate, linear, acute. Ray florets: Female: corolla pink, filiform, toothed. Disk florets: Bisexual: corolla pink, tubular, 5-fid above. Achenes dark red, subcompressed, obscurely ribbed, thinly hairy; pappus white, 4–4.5 mm.

Flowering & Fruiting: March–April.

Distribution. India: Almost throughout India.

Specimen examined: Near poro rest house, BK 495.

30. *Pseudognaphalium* Kirpich.

Pseudognaphalium affine (D. Don) Ander., Opt. Bot. 104: 146. 1991. *Gnaphalium affine* D. Don, Prodr. Fl. Nepal.: 173. 1825. *Gnaphalium luteo-album* L. var. *multiceps* (DC.) Hook. f., Fl. Brit. India 3: 288. 1881; Prain, Bengal Pl. 1: 602. 1903. [Plate 121a]

Hookiphul (N).

Erect herb, 15–20 cm high. Leaves sessile, spatulate, 4–5 × 0.3–0.7 cm, attenuate, entire, rounded, apiculate tipped, coriaceous, floccose above, cottony below. Inflorescence heads terminal, in corymbs, white cottony tomentose. Heads yellowish, campanulate, c. 2.5 × 1.5–2 mm, homogamous; phyllaries 3–4-seriate; outer series golden yellow, ovate; inner series oblong-lanceolate. Disk florets: Female: corolla white, tubular, c. 1.5 mm, shallowly 2–3-lobed. Bisexual: corolla white, tubular; tube c. 1.5 mm; lobes 5, triangular, acute, papillose at apex. Achenes brown, oblong, papillose; pappus white, 1.5–2 mm, slightly connate and hairy at base, barbellate, deciduous, equal to longer than flowers.

Flowering & Fruiting: January–May.

Distribution. India: Sikkim, Meghalaya and West Bengal.

Specimens examined: Buxa-Bhutan Road, 25th mile, 16.05.1949, VN & party 2542; Tobgaon, 18.05.1949, VN & party 2678; Kumargram, Hathinala, 21.02.2012, AK 55833.

31. *Saussurea* DC.

Saussurea lyrata Franch., Mém. Soc. Sci. Nat. Math. Cherbourg 24: 229. 1884. *Hemistepta lyrata* Bunge, Dorpater Jahrb. Litt. 1: 221. 1833. *Saussurea affinis* Spreng. ex DC., Prodr. 6: 540. 1838; Hook. f., Fl. Brit. India 3: 373. 1881; Prain, Bengal Pl. 1: 624. 1903. [Plate 121b]

Erect herb, 40–80 cm high. Leaves basal and cauline; basal leaves lyrate-pinnatisect, 8–10 × 4–5 cm, chartaceous, appressed white cottony below; lobes lanceolate, 2.5–3 × 0.8–1.5 cm, attenuate, serrate-dentate, acute to acuminate; cauline leaves sessile, 4–6-lobed, 4–4.5 × 1–1.5 cm, attenuate at base; lobes linear-lanceolate, entire, acuminate. Inflorescence heads peduncled, paniced corymbs. Heads pink purple, campanulate, 0.9–2 × 0.7–1.7 cm, homogamous; phyllaries multiseriate; outer ones ovate; inner ones oblong-lanceolate to oblong. Disk florets: bisexual: corolla pink purple, funnellform; tube 10–11 mm; lobes 5, linear, c. 2 mm, acute. Achenes brown, oblong, c. 3 mm, terete, ribbed, few white bristles at apex; pappus white, 9–13 mm, connate, deciduous in ring.

Flowering & Fruiting: February–April.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Marakata, 22.02.2012, AK 55872; Bhutanghat, 25.02.2012, AK 55942.

32. *Sigesbeckia* L.

Sigesbeckia orientalis L., Sp. Pl. 2: 900. 1753; Hook. f., Fl. Brit. India 3: 379. 1881. [Plate 121c]

Erect herb, up to 1.5 m high. Leaves ovate or triangular, 5–12 × 3–10 cm, cuneate, coarsely toothed, acute and apiculate to obtuse, pubescent, glandular beneath. Heads in leafy panicles; phyllaries 2-seriate, spatulate, glandular hairy. Ray florets: Female: corolla yellow, reddish beneath, 1.5–2 mm, bi or trilobed; tube up to 1 mm. Disk florets: Bisexual: corolla yellow, 1–2 mm, tubular, 5-lobed above. Achenes dark brown or blackish, up to 5 mm, curved, angled, blunt at base, enclosed by pappus scales; pappus scales 4–5 mm, pubescent, sometimes glandular, generally persistent around the achenes.

Flowering & Fruiting: March–December.

Distribution. India: Almost throughout India.

Specimens examined: Lapchakhawa, 1200m, JKS 958; Buxaduar, 1100m, JKS 4035; Tashigaon, 1000m, JKS 4060.

33. *Sonchus* L.

Sonchus wightianus DC., Prodr. 7: 187. 1838. *Sonchus arvensis* auct. non L. 1753; Hook. f., Fl. Brit. India 3: 414. 1881; Prain, Bengal Pl. 1: 629. 1903.

Rhizomatous erect herb, 50–80 cm high. Leaves sessile, dimorphic; basal leaves forming rosettes, oblanceolate, runcinate-pinnatifid, 8.5–32 × 2–5 cm, long attenuate, cartilaginous denticulate, obtuse to acute, thinly coriaceous; cauline leaves oblong-lanceolate, 6–11 × 0.5–1.2 cm, semiamplexicaul, obtuse, auricled, acute, or else same as lower leaves. Inflorescence terminal, in corymbs, simple or glandular pubescent. Heads yellow; campanulate, 9–15 mm across, heterogamous, white tomentose; phyllaries 4-seriate; outer series lanceolate, simple or densely glandular pubescent; inner ones linear-lanceolate to oblong-lanceolate. Ray florets: Bisexual: corolla yellow; tube 7–9 mm; ligule oblong, 4–6 mm, 5-toothed. Disk florets: Bisexual: corolla yellow; tube 6–7 mm, hairy above; lobes 5, minute, acute. Achenes brown, ellipsoid, compressed, 2.5–3.5 mm, 5-ribbed on each side, rugulose; pappus white, filiform, 6–7 mm, persistent, barbellate.

Key to the subspecies

- 1a. Peducles and involucre glandular hairy 33.1 subsp. *wightianus*
1b. Peducles and involucre simple hairy 33.2 subsp. *wallichianus*

33.1 subsp. *wightianus*

[Plate 121d]

Flowering & Fruiting: December–April.

Distribution. India: Almost throughout India.

Specimen examined: Newlands, 15.02.2012, AK 53030.

33.2 subsp. *wallichianus* (DC.) Bonlous, Bot. Not. 125: 197. 1972. *Sonchus wallichianus* DC., Prodr. 7: 185. 1838.

Flowering & Fruiting: February–August.

Distribution. India: Almost throughout India.

Specimen examined: Hatipota, 17.02.2013, AK 59811.

34. *Sphaeranthus* L.

Sphaeranthus indicus L., Sp. Pl. 2: 927. 1753; Hook. f., Fl. Brit. India 3: 275. 1881; Prain, Bengal Pl. 1: 601. 1903. [Plate 122a]

Erect, spreading herb, 15–35 cm high. Leaves sessile, oblanceolate to oblong-oblanceolate, 1.5–2.3 × 0.3–0.8 cm, decurrent, serrate-dentate, obtuse to subacute, awned at apex, coriaceous, hirsute. Inflorescence heads in terminal glomerules, hirsute; glomerules dark red, globose, 9–16 mm across; heads sessile, grey pubescent, subtended by bracts; phyllaries 4-seriate; outer series linear-lanceolate; inner series oblanceolate. Disk florets: Female: Corolla tubular, c. 1.8 mm, few glands at base, 2–3-lobed, dark red; Bisexual: Corolla tubular; tube c. 1.5 mm, few glands at base; lobes 5, triangular, acute, dark red. Achenes brown, oblong, c. 1 mm, hairy; pappus absent.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Bholka, JKS 4237; Kumargram, Hathinala, 21.02.2012, AK 55839.

35. *Synedrella* Gaertn.

Synedrella nodiflora (L.) Gaertn., *Fruct. Sem.* 2: 456, t. 171, f. 7. 1791; Hook. f., *Fl. Brit. India* 3: 308. 1881; Prain, *Bengal Pl.* 1: 615. 1903. *Verbesina nodiflora* L., *Cent. Pl.* 1: 28. 1755. [Plate 122b]

Jamjobi (N).

Erect herb, 30–50 cm high. Leaves ovate-lanceolate, 2.5–6.5 × 1–3.2 cm, attenuate, serrate, acuminate, subcoriaceous, hispid. Inflorescence axillary, sessile heads, solitary or in pairs, hirsute. Heads yellow, campanulate, 6–9 mm across, heterogamous; phyllaries 2-seriate; outer ones elliptic-lanceolate; inner series oblong-lanceolate. Ray florets: Female: corolla yellow; tube c. 2 mm, hispid at apex; ligules oblong, c. 4 × 1.5 mm, bilobed. Disk florets: Bisexual: corolla yellow, funnel-form; tube 2.8–3 mm; lobes 4, triangular, c. 0.8 mm, acute, sparsely hispid. Achenes dimorphic; achenes of ray florets black at centre, pale, elliptic-oblong, compressed, thick at edges, puberulent, upwardly pointing sharp appendaged, with 2 apical short pappus awns; achenes of disk florets oblong-obconic, compressed or angled, with sharp pappus awns, rugose; pappus awns 2 in ray achenes, 2 to 4 in disk achenes, sharp, 1.2–4 mm, divergent, puberulent

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: South Rajabhatkhawa, JKS 755; Tashigaon, JKS 4079; Bhutanghat, JKS 4258; Buxaduar, JKS 4629; Jainti range, 05.10.2009, SKS & GK 46152; Newlands, Sukno river, 22.09.2011, AK 52773.

36. *Synotis* (C. B. Clarke) C. Jeffrey & Y. L. Chen

Synotis bhot (C. B. Clarke) C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 288. 1984. *Senecio bhot* C. B. Clarke, *Compos. Ind.*: 187. 1876; Hook. f., *Fl. Brit. India* 3: 355. 1881. [Plate 122c; Fig. 39]

Erect herb, 30–50 cm high. Leaves sessile, oblanceolate, 3–15 × 1–7 cm, asymmetrically attenuate, serrate or denticulate, short acuminate, subcoriaceous, araneous. Inflorescence pedunculate heads, in axillary, terminal, lateral corymbs, araneous. Heads cupular, 1.5–2 cm across, heterogamous; head bracts foliaceous,

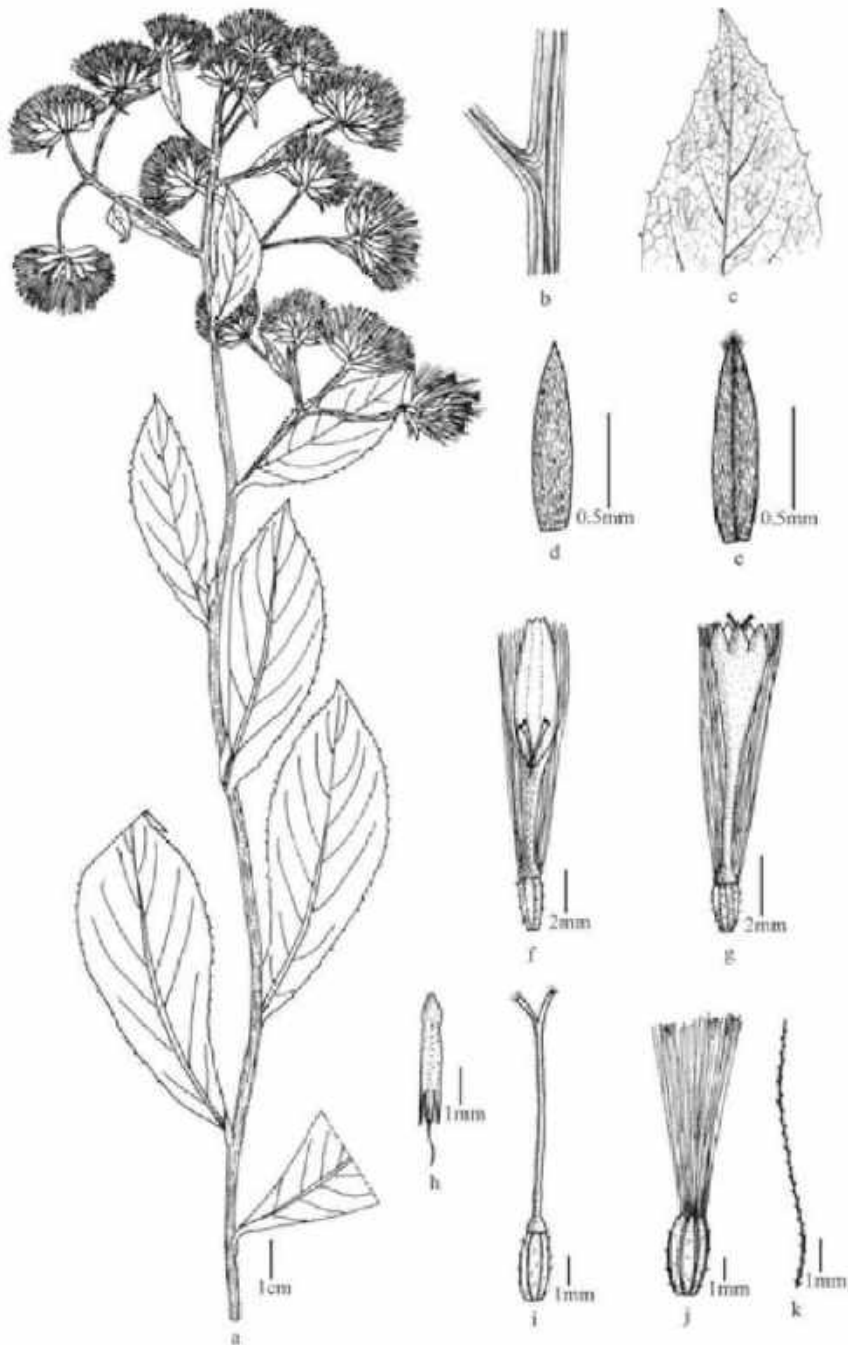


Fig. 39. *Synotis bhot*: a. Flowering branchlet; b. Portion of stem; c. Portion of leaf showing hairs; d. Outer phyllary; e. Inner phyllary; f. Ray floret; g. Disc floret; h. Stamen; i. Gynoeceum; j. Achene with pappus; k. Pappus (AK 59925).

sometimes absent; phyllaries 2-seriate, oblong-lanceolate. Ray florets: Female: corolla white; tube c. 5 mm; ligules oblong, 5-7 × c. 2 mm, 3-toothed. Disk florets: Bisexual: corolla funnelliform; tube 6-7 mm; lobes 5, lanceolate, c. 1.5 mm, acute, papillate at apex. Achenes brown; ribs oblong, c. 3.5 mm, sparsely papillose; pappus white, 5-8 mm, barbellate.

Flowering & Fruiting: December-February.

Distribution. India: Meghalaya and West Bengal.

Specimens examined: Buxaduar, 27.11.1975, JKS 973; Ramiti, 29.11.1975, JKS 4017; Tashigaon, JKS 4068; Tashigaon to Rovers point, 12.02.2014, AK 59925.

37. *Thespis* DC.

Thespis divaricata (Wall. ex DC.) DC., Prodr. 5: 375. 1836; Hook. f., Fl. Brit. India 3: 259. 1881; Prain, Bengal Pl. 1: 595. 1903. *Cotula divaricata* Wall. ex DC., Prodr. 5: 375. 1836.

Erect, spreading herb, 7-60 cm high. Leaves elliptic to oblong or obovate, 1.5-4.5 × 0.5-1.8 cm, attenuate, toothed, acute or obtuse, pubescent on veins or glabrous. Heads heterogamous, subglobose in fascicles; phyllaries 2-seriate, ovate-oblong. Disk florets: Female: corolla usually absent, represented by carpel. Bisexual: corolla yellow, funnelliform, c. 1 mm, 5-toothed. Achenes very small, slightly margined, papillose; pappus filiform, barbellate.

Flowering & Fruiting: May-June.

Distribution. India: Assam, Meghalaya, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimen examined: Rajabhatkawa, JKS 6977.

38. *Tithonia* Desf.

Tithonia diversifolia (Hemsl.) A. Gray, Proc. Amer. Acad. Arts 19: 5. 1883; H. J. Chowdhery in Hajra & al., Fl. India 12: 416, f. 118. 1995. *Mirasolia diversifolia* Hemsl., Biol. Cent.-Amer., Bot. 2: 168. 1881. [Plate 122d]

Shrub, 1-1.5 m high. Leaves deltoid-ovate, 3-5-lobed, attenuate, crenate-serrate and hairy, acuminate, hispid above, tomentose below; lateral lobes triangular-lanceolate, 2-3 cm; middle ones lanceolate, 4-5 cm. Inflorescence heads, yellow orange, campanulate or hemispherical, c. 3 × 2 cm, heterogamous; phyllaries 2-3-seriate; outer ones elliptic-ovate; inner series oblong-lanceolate. Ray florets: Neuter: corolla orange yellow; tube cylindric, 2-3 mm, hairy; ligules oblong-elliptic, 2.5-3 × 0.4-0.5 cm, 3-lobed. Disk florets: Bisexual: corolla bright yellow, tubular; tube 6-8 mm, pubescent at base; lobes 5, triangular, c. 1.5 mm, acute. Achenes brown, oblong-obconic, 6-7 × 1.5-2.5 mm, subcompressed, puberulent; pappus scales connate, lacerate, 2 puberulent awned.

Flowering & Fruiting: November–January.

Distribution. India: Sikkim, Manipur, Mizoram (naturalised) and West Bengal.

Specimens examined: Buxaduar, JKS 978; Bhutanghat, JKS 4105; Bhutanghat, 25.02.2012, AK 55929.

39. *Tridax* L.

Tridax procumbens L., Sp. Pl. 2: 900. 1753; Hook. f., Fl. Brit. India 3: 311. 1881; Prain, Bengal Pl. 1: 618. 1903.

Decumbent herb, 20–40 cm high. Leaves opposite, elliptic-ovate or lanceolate, 1.5–2.5 × 0.4–0.8 cm, cuneate, distantly serrate, short acuminate, coriaceous, hirsute. Inflorescence solitary, long peduncled head, hirsute. Heads yellow, campanulate, 8–9 × 7–12 mm, heterogamous; phyllaries 2–3-seriate; outer ones lanceolate to oblong-ovate; inner series obovate-oblong. Ray florets: Female: corolla yellow; tube 2–3 mm; ligule ovate, 3.5–4.5 × 2.5–3 mm, 3-lobed, hirsute below. Disk florets: bisexual: corolla yellow, funnellform; tube 4–4.5 mm, hairy at base; lobes 5, triangular-ovate, 0.8–1 mm, acute, reflexed, hairy. Achenes oblong-obconic, 2.2–2.5 × c. 1 mm, puberulous; pappus white, 4–6 mm, plumose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Garam, JKS 882; NRVK 7, Bala river, 04.12.2011, GK 52337; Newlands, Sukno river, 22.09.2011, AK 52785; Phashkhawa river belt, 30.09.2012, AK 58548.

Notes: Crushed leaves applied on cuts and wounds.

40. *Vernonia* Schreb.

Key to the species

- | | | |
|-----|--|------------------------------|
| 1a | Trees; achenes without pellucid glands in ribs | 3. <i>V. volkameriifolia</i> |
| 1b | Herbs; achenes with pellucid glands in ribs | 2 |
| 2a. | Diffuse herbs; leaves linear-lanceolate, serrate at margins, acuminate at apex; pappus 2-seriate | 1. <i>V. attenuata</i> |
| 2b. | Erect herbs; leaves elliptic-oblong or ovate-lanceolate, denticulate at margins, acute, mucronate tipped; pappus 1-seriate | 2. <i>V. saligna</i> |

1. *Vernonia attenuata* DC., Prodr. 5: 33. 1836; Hook. f., Fl. Brit. India 3: 231. 1881. [Fig. 40]

Diffuse herb, 60–80 cm. Leaves elliptic-oblong to lanceolate, 7.5–15 × 0.9–3 cm, cuneate, denticulate, acuminate, subcoriaceous, sparsely hairy, pellucid gland-



Fig. 40. *Vernonia attenuata*: a. Flowering branchlet; b. Outer phyllary; c. Middle phyllary; d. Innermost phyllary; e. Disc floret; f. Stamens; g. Gynoecium; h. Achene with pappus; i. Pappus of outer whorl; j. Pappus of inner whorl (AK 58881).

dotted. Inflorescence heads in axillary, solitary or 2–3 together, pubescent. Heads pinkish, campanulate, 5–8 mm across, homogamous; phyllaries 7–8-seriate, reddish purple in upper part; outer ones triangular-ovate; inner series oblanceolate; innermost ones oblong-elliptic. Disk florets: Bisexual: corolla pinkish, funnelform; tube 5–6 mm; lobes 5, oblong-lanceolate, 1.8–2 mm, acute. Achenes brownish, oblong-obconic, c. 3 mm, ribbed, pellucid gland in between ribs, pubescent; pappus white, 2-seriate, outer whorl smaller than inner whorl, 1–6 mm, barbellate.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Adma, Panbari, 12.02.2013, AK 58881.

2. *Vernonia saligna* DC., Prodr. 5: 33. 1836; Hook. f., Fl. Brit. India 3: 235. 1881; Prain, Bengal Pl. 1: 590. 1903.

Perennial herb, 1–2 m high. Leaves elliptic-oblong or ovate-lanceolate, c. 3 × 0.8 cm, rounded, denticulate, acute, mucro at apex, subcoriaceous, scabrous, glandular pubescent. Inflorescence heads in terminal or axillary panicles; heads 5–8 mm across; phyllaries 5–6-seriate, reddish purple in upper part, triangular ovate or ovate-lanceolate. Disk florets: Bisexual: corolla pinkish, 5-lobed; tube 5–6 mm; lobes 5, lanceolate. Achenes oblong-obovate, c. 3 × 1 mm, striate, ribbed, pellucid glandular in ribs; pappus white, 1-seriate, 5–6 mm, scabrid-barbellate.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar (?), Jharkhand, Manipur, Meghalaya, Mizoram and West Bengal.

Specimens examined: Tashigaon, 1000m, JKS 4049; Bhutanghat, 300m, JKS 4113; Tashigaon 2, Bhutia Pond, 300m, 06.03.2011, GK 47295.

3. *Vernonia volkameriifolia* DC., Prodr. 5: 32. 1836; Hook. f., Fl. Brit. India 3: 240. 1881. [Fig. 41]

Nundheki, Nanriki (N).

Tree, 3–5 m high. Leaves elliptic to elliptic-oblong, 16–24 × 5–8.5 cm, cuneate, repand, denticulate, acute, subcoriaceous, sparsely minute hairy with pellucid glands below. Inflorescence heads in terminal panicles, strigose. Heads purple, campanulate, 4–5 × 12–13 mm, homogamous; phyllaries 5–7-seriate, purple in upper part; outer ones ovate; inner series ovate to elliptic-ovate; innermost series oblong-elliptic. Disk florets: Bisexual: corolla purple, funnelform; tube 5–6 mm; lobes 5, oblong-lanceolate, c. 3 mm, acute. Achenes light brownish, oblong, c. 4 mm, angled, ribbed, sparsely hairy; pappus white, 2-seriate, outer whorl smaller than inner whorl, 1–8 mm, barbellate.

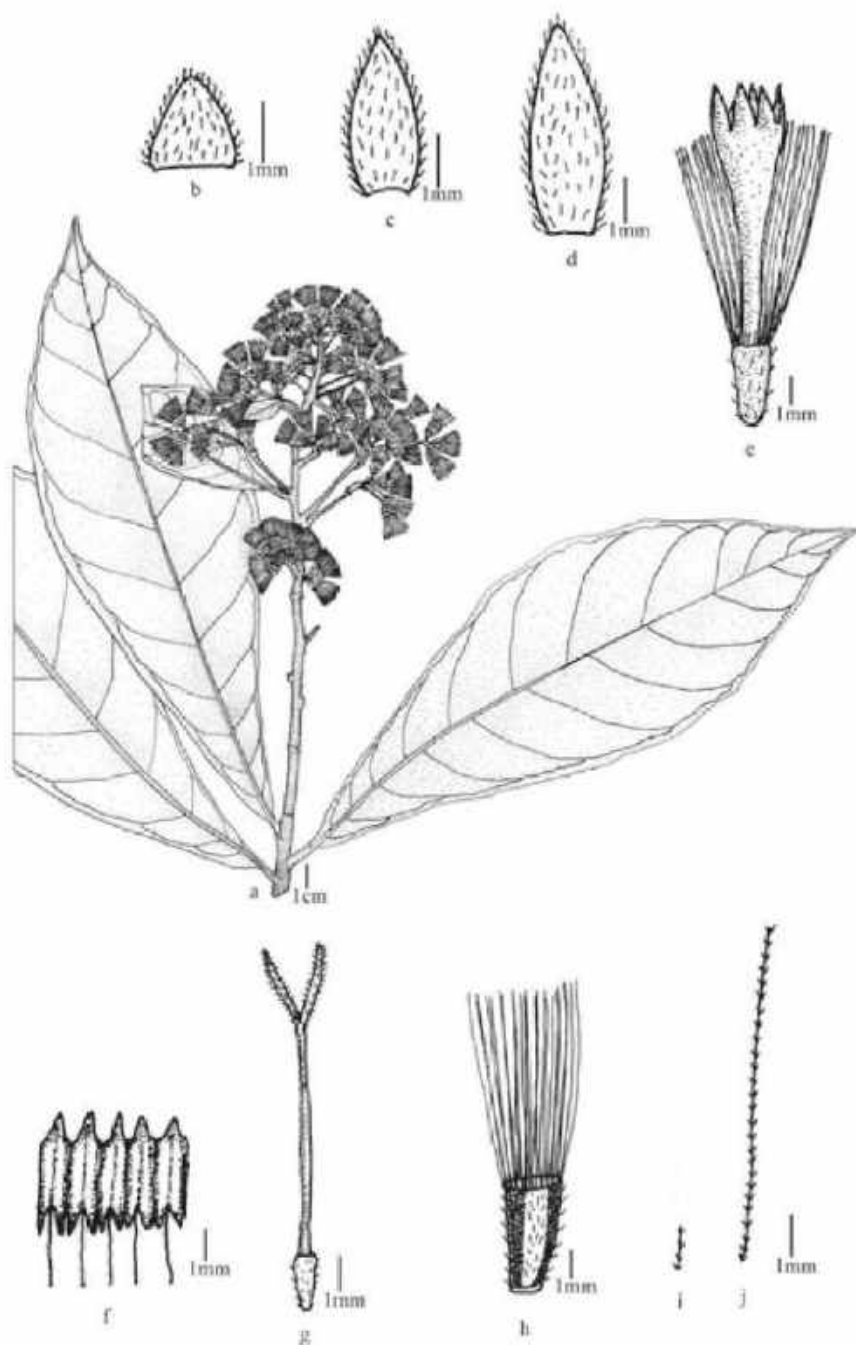


Fig. 41. *Vernonia volkameriifolia*: a. Flowering branchlet; b. Outer phyllary; c. Middle phyllary; d. Innermost phyllary; e. Disc floret; f. Stamens; g. Gynoecium; h. Achene with pappus; i. Pappus of outer whorl; j. Pappus of inner whorl (AK 59958).

Flowering & Fruiting: November–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Way to Sinchu, 1700m, JKS 6949; Tashigaon to Rovers point, 03.10.2013, AK59774; Rovers point to Bhutan Border, 15.02.2014, AK 59958.

41. *Xanthium* L.

Xanthium indicum Koenig in Roxb., Fl. Ind. 3: 60L. 1832. *Xanthium strumarium* L., Sp. Pl. 2: 987. 1753; Hook. f., Fl. Brit. India 3: 303. 1881; Prain, Bengal Pl. 1: 607. 1903.

Chhota-gokhru, Ban-okra (B).

Erect herb, 25–30 cm high, monoecious. Leaves broadly ovate, 3–5-lobed, 1.8–5.2 × 1.6–5.2 cm, subcordate to truncate, dentate, acute, subcoriaceous, golden yellow pellucid glands below, scabrid. Inflorescence terminal or axillary heads, scabrid. Heads unisexual, globose in males, ovoid in females. Male heads: phyllaries 1-seriate, linear. Corolla campanulate; tube c. 2 mm; lobes 5, triangular, c. 0.4 mm, acute. Female heads: florets 2; phyllaries 2-seriate; outer ones lanceolate; inner series many, fused; achenes hooked bristley, terminating into 2 strong, hooked divergent beaks; corolla absent. Achenes black/brown, elliptic, 1–1.5 × 2–3.5 mm, beaked, smooth, enclosed in burs; burs obovoid to ellipsoid, 10–18 × 6–12 mm, puberulent, 2-chambered; pappus absent.

Flowering & Fruiting: May–December.

Distribution. India: Almost throughout India.

Specimens examined: Poro, BK 495; Bhutanghat, 02.12.1975, JKS 4094; Balariver, 10.04.2012, GK 56089; Kumargram, Kalikhola river belt, 21.09.2011, AK 52730; Kumargram-Bhutan border, Kalikhola river belt, 27.09.2011, AK 52952; Jainty-Phashkhawa, 02.10.2012, AK 58613.

42. *Youngia* Cass.

Youngia japonica (L.) DC., Prodr. 7: 194. 1838. *Prenanthes japonica* L., Mant. Pl.: 107. 1767. *Crepis japonica* Benth. in Hook. f., Fl. Brit. India 3: 395. 1881; Prain, Bengal Pl. 1: 627. 1903.

Erect herb, 10–30 cm high. Leaves dimorphic; basal forming rosettes, oblanceolate, 6–19 × 2–5 cm, runcinate-pinnatifid, undulate, obtuse, membranous, sparsely hairy below; upper ones lanceolate, 2.5–10 × 0.5–4 cm, acute. Inflorescence heads

in loose corymbs. Heads yellow, cylindric, 4–6 mm, homogamous; phyllaries green with purple hue, 2-seriate; outer series ovate; inner series oblong. Ray florets: bisexual; corolla yellow, ligulate; tube c. 2 mm, hairy above; ligules oblong-ob lanceolate, c. 3.5 × 1–1.2 mm, 4–5-toothed, membranous. Achenes reddish brown, oblong-lanceolate, c. 2 mm, angled, narrow at apex, ribbed, puberulent; pappus white, filiform, 3–3.5 mm, persistent, barbellate.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, JKS 6923; Kumargram, Kalikhola river belt, 21.09.2011, AK 52706; Kumargram, 13.02.2012, AK 53017; Pana, 08.10.2012, AK 58737; Adma, Panbari, 12.02.2013, AK 58871.

Campanulaceae

Key to the genera

- 1a. Flowers resupinate; corolla asymmetric; anthers fused at anthesis 1. *Lobelia*
1b. Flowers not resupinate; corolla symmetric; anthers free at anthesis 2. *Wahlenbergia*

1. *Lobelia* L.

Key to the species

- 1a. Prostrate herbs, rooting from nodes; flowers axillary, solitary 2
1b. Erect herbs, not rooting from nodes; flowers in axillary racemes 3
- 2a. Leaves ovate, cuneate, subacute at apex, glabrous; veins pinnate; corolla bluish purple with 2 white patches between lobes; fruits capsules; seeds elliptic, trigonous, smooth 4. *L. zeylanica*
2b. Leaves suborbicular to reniform, obliquely cordate at base, obtuse to rounded at apex, sparsely puberulous; veins 5–7 from base; corolla pink; fruits berries; seeds suborbicular, compressed, pitted 2. *L. nummularia*
- 3a. Small herbs; stems angular, succulent, glabrous; leaves suborbicular to broadly ovate, rounded to subcircular at base, obtuse at apex, glabrous; veins 5 from base; inflorescences glabrous; flowers small, not reflexed; corolla pale blue, white patched between lobes; seeds trigonous 1. *L. alsinoides*
3b. Large herbs; stems terete, not succulent, pubescent; leaves lanceolate, cuneate at base, gradually acuminate or acute at apex, pubescent; veins pinnate; inflorescences pubescent; flowers large, reflexed; corolla pale pink; seeds elliptic, compressed 3. *L. rosea*

1. *Lobelia alsinoides* Lam., *Encycl.* 3: 588. 1791. *Lobelia trigona* Roxb., *Fl. Ind.* 2: 111. 1824; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 423. 1881; Prain, *Bengal Pl.* 1: 633. 1903. [Plate 123a]

Erect herb, 3–10 cm high. Leaves sessile to subsessile, suborbicular to broadly ovate, 5–8 × 4–7.5 mm, rounded to subcircular, distantly serrate, obtuse, membranous. Inflorescence axillary, terminal, lax racemes; floral bracts lanceolate. Calyx cupular; tube 2–2.5 mm; lobes 5, subulate. Corolla bluish white, bilabiate; upper lobes 3, lanceolate, 1–1.5 × 0.5–0.7 mm, bluntly acute, brown marked, hairy; lower lobes 2, lanceolate, 1–1.5 × 0.5–0.6 mm, acute, curved. Stamens 5; filaments fused above, c. 2.5 mm; anthers fused, barbate at tip. Ovary inferior; style 2.5–3 mm; stigma minute, hairy. Capsules ovoid or ellipsoid, 4–6 × 2.5–3 mm, ribbed, stalked; seeds light brown, trigonous, smooth.

Flowering & Fruiting: January–March.

Distribution. India: Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra and West Bengal.

Specimens examined: Narathali, 20.02.2012, AK 55824; Marakata, 22.02.2012, AK 55882.

2. *Lobelia nummularia* Lam. in Lam. & al., *Encycl.* 3 (2): 589. 1789. *Pratia begoniaefolia* Lindl., *Edward's Bot. Reg.* 16: t. 1373. 1830; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 422. 1881. [Plate 123b-c; Fig. 42]

Prostrate herb, 20–30 cm. Leaves suborbicular to reniform, 6–12 × 7–13 mm, obliquely cordate, serrate at margins, obtuse to rounded, apiculate tipped, chartaceous, sparsely puberulous. Inflorescence axillary, solitary. Calyx ellipsoid or urceolate; tube c. 4 mm; lobes 5, linear-triangular, 2–3 pairs of denticles at margins, sharply acute. Corolla pink, bilabiate; tube compressed, 2–3 mm; lobes acute, 2.5–3 mm, 1-nerved; upper lobes 2, linear-triangular; lower lobes 3, lanceolate. Stamens 5; filaments 1–5 mm; anthers black, fused, 1–1.5 mm, villous at back, lower anthers barbate at apex. Ovary inferior; style 1–5 mm; stigma bilobed. Berries purple red, ellipsoid to globose, crowned by persistent calyx lobes, fleshy; seeds dull brownish yellow, suborbicular, compressed, pitted.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Buxa-Bhutan Road, 36th mile, 16.05.1949, VN & party 2502; Lepchakhawa, 27.11.1975, JKS 945; Buxa Fort to Tashigaon, 01.10.2013, AK 59729; Buxaduar to Achalung, 19.05.2014, AK 62654.

3. *Lobelia rosea* Wall., *Fl. Ind.* 2: 115. 1824; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 427. 1881. [Plate 123d]

Erect herb, 1–1.5 m high. Leaves sessile, lanceolate, 3–7 × 0.7–1.5 cm, cuneate, distantly serrate, gradually acuminate or acute, pubescent. Inflorescence axillary, terminal, branched racemes, pubescent; floral bracts lanceolate to linear-

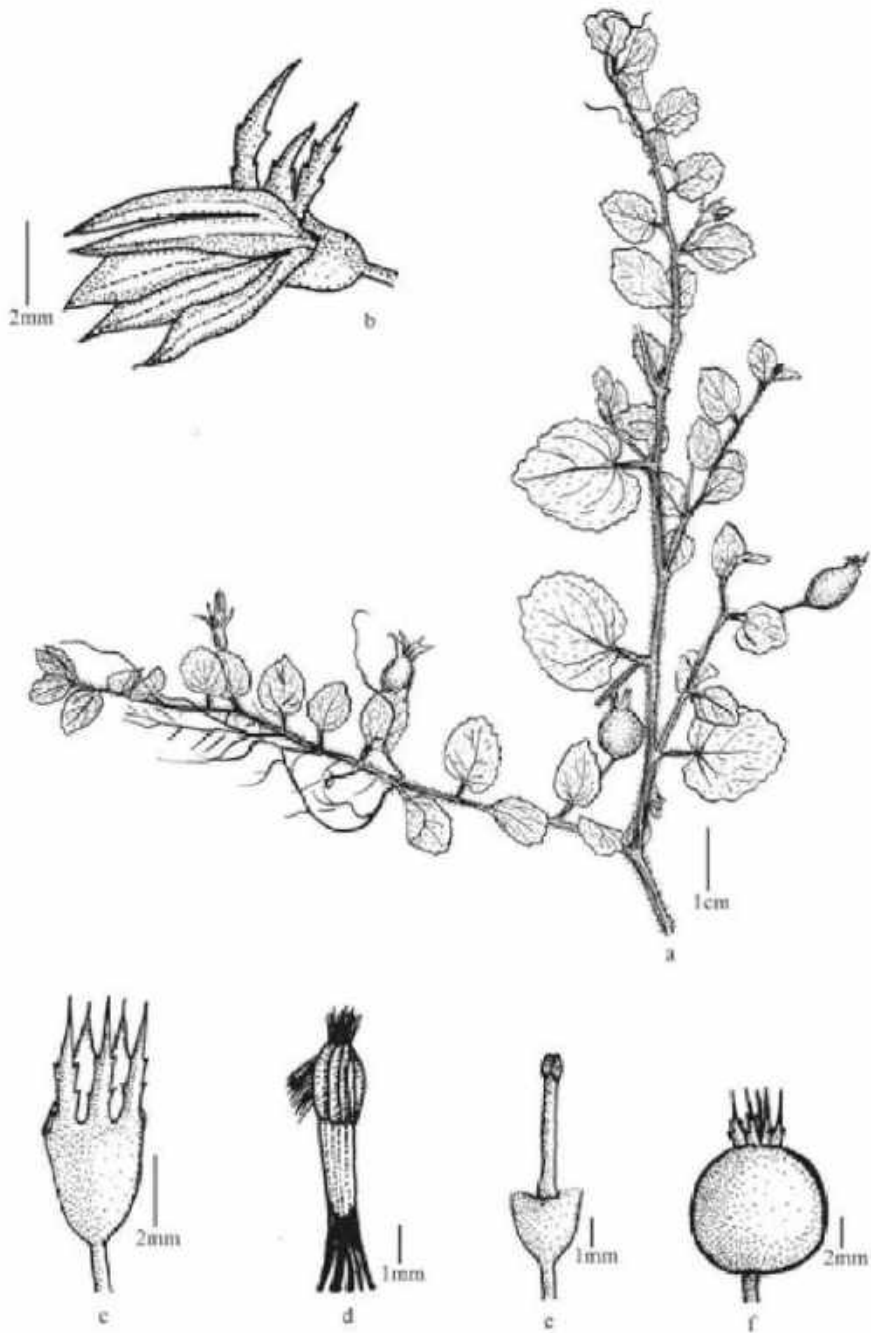


Fig. 42. *Lobelia nummularia*: a. Fruiting branchlet; b. Flower; c. Calyx; d. Stamens; e. Gynoecium; f. Berry (AK 59729).

lanceolate. Calyx cupular, pubescent; tube 3–8 mm, ribbed; lobes 5, linear or subulate. Corolla pinkish, bilabiate; tube 9–10 mm, pubescent; lobes pubescent outside; upper lobes 3, lanceolate or subulate, 5–7 × c. 2 mm, acute, nerved; lower lobes 2, linear, 10–13 × c. 1 mm. Stamens 5; filaments c. 8 mm, fused above, hairy; anthers black, fused, bristly, lower anthers barbate at tip. Ovary inferior; style 12–14 mm; stigma bilobed. Capsules ovoid or ellipsoid, ribbed, pubescent; seeds pale yellow, elliptic, dorso-ventrally compressed, smooth.

Flowering & Fruiting: December–April.

Distribution. India: Almost throughout India.

Specimen examined: Pana, 11.02.2013, AK 58857.

4. *Lobelia zeylanica* L., Sp. Pl. 2: 932. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 3: 425. 1881. *Lobelia affinis* auct. non Mirbach 1805; C. B. Clarke in Hook. f., Fl. Brit. India 3: 424. 1881; Prain, Bengal Pl. 1: 633. 1903. [Plate 124a]

Prostrate herb, 10–20 cm. Leaves ovate, 1.4–2.3 × 0.9–1.7 cm, cuneate, crenate-dentate, subacute, chartaceous. Inflorescence axillary, solitary. Calyx campanulate; tube c. 2 mm, puberulous; lobes 5, linear-lanceolate. Corolla bluish purple, 2 white patches between lobes, bilabiate; tube 2–3 mm; upper lobes 2, obovate-oblong, c. 4 × 1 mm, acute tip apiculate, reflexed; lower lobes 3, lateral lobes elliptic, central one triangular, c. 4 × 1 mm, acute, apiculate tip, reflexed above, hairy along mid vein outside. Stamens 5; filaments 3–4 mm, hispid at base; anthers black, fused, bearded at apex, hispid on back. Ovary inferior; style c. 2 mm; stigma globose, bilobed, puberulent. Capsules ellipsoid to obovoid, 5–6 × 3–4 mm, crowned by persistent calyx, vertically nerved, puberulous; seeds dull brownish yellow, ellipsoid, trigonous, smooth.

Flowering & Fruiting: August–October.

Distribution. India: Assam, Arunachal Pradesh, Bihar, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa, JKS 4263; Tashigaon I, 06.10.2009, SKS & GK 46185; Newlands, Sukno river, 22.09.2011, AK 52746; Sankosh, 28.09.2011, AK 52983; Bhutri, 05.10.2012, AK 58644; Buxa Fort to Achalung, 29.09.2013, AK 59633.

2. *Wahlenbergia* Schrad. ex Roth

Wahlenbergia marginata (Thunb.) A. DC., Monogr. Campan.: 143. 1830. *Campanula marginata* Thunb., Fl. Jap.: 89. 1784. *Wahlenbergia gracilis* (G. Forst.) A. DC., Monogr. Campan.: 142. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3: 429. 1881; Prain, Bengal Pl. 1: 636. 1903. [Plate 124b]

Erect herb, 12–22 cm high. Leaves sessile, linear to oblong, spatulate or oblanceolate, 5–35 × 1–5 mm, attenuate, undulate or sinuate or serrate, tubercled

or sometimes hairy, acute or obtuse, membranous. Inflorescence lax racemes; floral bracts foliaceous. Calyx cupular; tube 1.8–2.5 mm; lobes 5, subulate or oblong. Corolla pale purple or bluish white, campanulate; tube 1.8–2 mm; lobes 5, ovate to obovate, 2–2.2 × 1.5–2 mm, acute. Stamens 5; filaments flat with hairy margins at base, filiform above, c. 1.5 mm; anthers ellipsoid. Ovary inferior; style 1.6–1.8 mm; stigma 3-lobed, ciliate. Capsules conical, 4–5 × 3–4 mm, ribbed, dehisced by 2-valves; calyx persistent; seeds ellipsoid, light brown.

Flowering & Fruiting: December–March.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 20.02.2012, AK 55807; Marakata, 22.02.2012, AK 55873.

Ericaceae

Agapetes D. Don ex G. Don

Key to the species

- 1a. Leaves sessile, 3 in whorls, subcordate at base, distantly shallowly crenate at margins; marginal veins prominent; inflorescences 8–11-flowered, short racemes; corolla tube slightly open; lobes green, slightly curved **3. A. sikkimensis**
- 1b. Leaves petiolate, alternate, spirally arranged, repand or entire at margins; marginal veins not prominent; inflorescences fascicles or long racemes; corolla tube widely open; lobes pale pink or red, reflexed **2**
- 2a. Leaves oblong-lanceolate, 12–18 cm, repand with sessile glands at margins, short acuminate at apex; inflorescences 2–9-flowered fascicles; floral bracts glandular pubescent throughout; pedicels glandular pubescent; corolla pale pink, glandular pubescent at edges outside; anthers dorsally spurred **L. A. bhutanica**
- 2b. Leaves lanceolate to elliptic-lanceolate, 4.5–7.5 cm, entire and not glandular at margins, caudate-acuminate at apex; inflorescences 8–12-flowered racemes; floral bracts glandular pubescent at margins only; pedicels glabrous; corolla red, glabrous at edges outside; anthers not dorsally spurred **2. A. saligna**

1. *Agapetes bhutanica* N. P. Balakr. & Sud. Chowdhury, Reinwardtia 7: 287. 1966; D. Banik & Sanjappa in Sanjappa & Sastry, Fasc. Fl. India 25: 262. 2015.

[Plate 124c; Fig. 43a-d]

Epiphytic shrub. Leaves elongate oblanceolate, 12–18 × 2.3–3.4 cm, cuneate, repand with sessile glands at margins, short acuminate, coriaceous. Inflorescence 2–9-flowered fascicles in axils of fallen leaves, glandular pubescent; floral bracts triangular-ovate. Calyx pale green, pinkish tinged, cupular, glandular pubescent outside; tube 2–2.5 mm; lobes 5, triangular-ovate. Corolla light pink, transverse irregular red lined, subcylindric, sparsely glandular pubescent at edges; tube 5-angular, 15–17 mm; lobes 5, lanceolate, 5–7 × 2–2.5 mm, keeled, reflexed. Stamens 10; filaments strap-shaped, connate, free above, appressed pilose; anthers

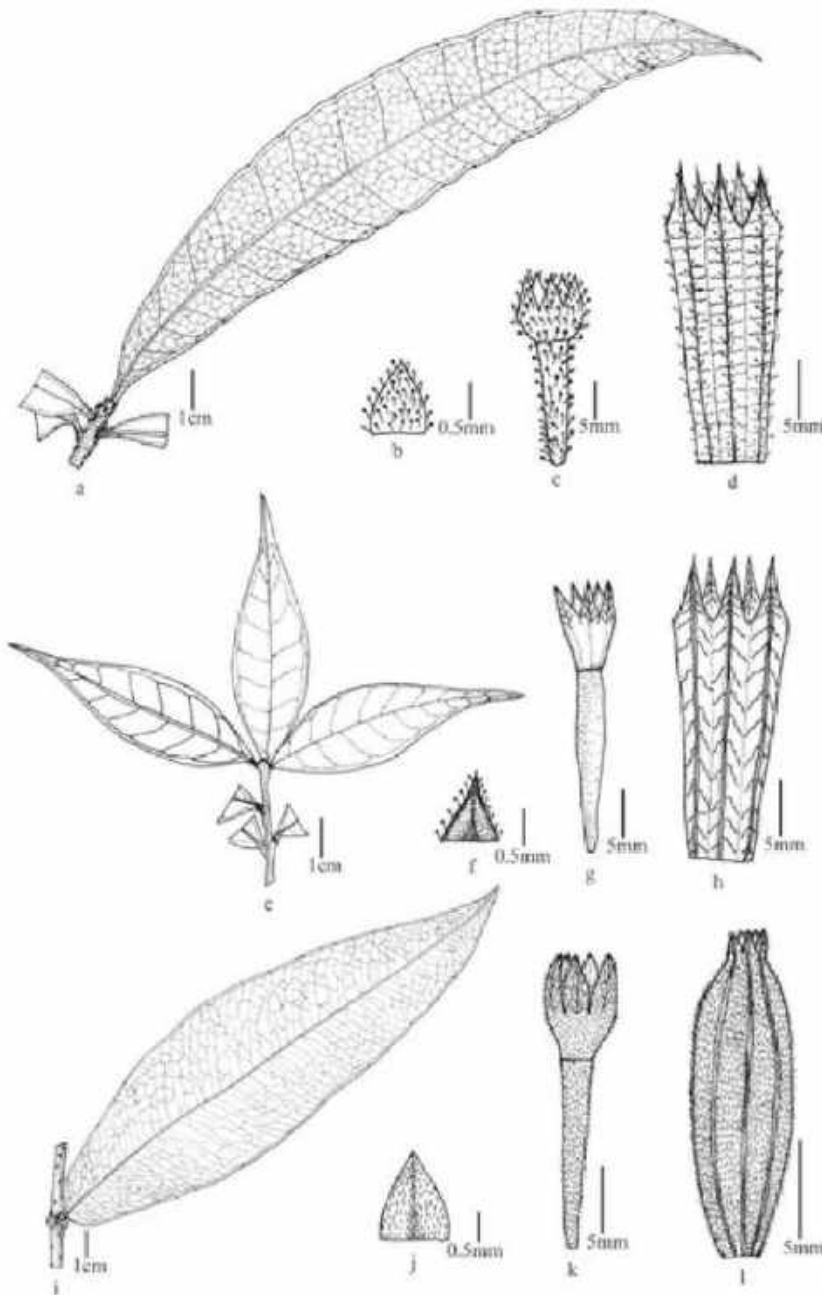


Fig. 43. *Agapetes bhutanica* (a-d): a. Leaf; b. Floral bract; c. Calyx with pedicel; d. Corolla (AK 62604); *Agapetes saligna* (e-h): e. Leaves; f. Floral bract; g. Calyx with pedicel; h. Corolla (AK 59931); *Agapetes sikkimensis* (i-l): i. Leaf; j. Floral bract; k. Calyx with pedicel; l. Corolla (AK 59970).

orange yellow, spurred; spurs 2 on each anther, gland tipped, verruculose. Ovary inferior; style 2.5–2.9 cm, 5-ribbed; stigma discoid. Berries transversely globose, 5–5.5 × 6–6.5 mm, glandular hairy; seeds obovoid, 1.5–2 × c. 1 mm, reticulately nerved.

Flowering & Fruiting: March–May.

Distribution. India: West Bengal.

Specimens examined: Tashigaon 2, Bhutia Pond, 07.04.2012, GK 56047; Santrabari to Buxaduar, 18.05.2014, AK 62604.

2. *Agapetes saligna* (Hook. f.) Hook. f. in Benth. & Hook. f., Gen. Pl. 2: 571. 1876; C. B. Clarke in Hook. f., Fl. Brit. India 3: 444. 1881. *Vaccinium salignum* Hook. f., Ill. Himal. Pl.: t. 15, fig. A. 1855. [Plate 124d; Fig. 43e-h]

Amile, Ongarey (N).

Epiphytic shrub. Leaves lanceolate to elliptic-lanceolate, 4.5–7.5 × 1.3–2 cm, cuneate, entire, caudate-acuminate, subcoriaceous, glabrous. Inflorescence 8–12-flowered racemes in axils of fallen leaves on old stems; floral bracts brown green, triangular-ovate. Calyx red, cupular; tube 2–2.5 mm, keeled outside; lobes 5, triangular-ovate, glandular tipped. Corolla red with transverse irregular red lines, subcylindric; tube 5-angular, 17–18 mm; lobes 5, lanceolate, 7.5–8.5 × 2–3.2 mm, acute, reflexed, keeled outside. Stamens 10; filaments strap-shaped, connate, free above, geniculate, hispid above; anthers orange yellow, nail-shape at base. Ovary inferior; style c. 2.7 cm, 5-ribbed; stigma discoid. Berries red, globose, 6–8 × 5.5–6.5 mm, glandular; seeds obovoid, 0.5–1 × 0.3–0.5 mm, reticulately nerved.

Flowering & Fruiting: March–August.

Distribution. India: Sikkim and West Bengal.

Specimens examined: Tobgaon, VN 2698; way to Sinchu, JKS 4691; Buxaduar to Lepchakhawa, 13.02.2014, AK 59931.

3. *Agapetes sikkimensis* Airy Shaw, Bull. Misc. Inform. Kew 1935 (1): 29. 1935. *Agapetes auriculata* sensu C. B. Clarke in Hook. f., Fl. Brit. India 3: 444. 1881, non Hook. f. 1876. [Plate 125a; Fig. 43i-l]

Epiphytic shrub. Leaves sessile, 3 in whorls, lanceolate to oblong-lanceolate, 18.5–21.5 × 5–6 cm, subcordate, distantly crenate, short acuminate, subcoriaceous. Inflorescence 8–12-flowered, short racemes in axils of fallen leaves; floral bracts green, triangular-ovate. Calyx red, cupular; tube 3–4.5 mm, faintly keeled outside, pubescent; lobes red with greenish hue at apex, 5, lanceolate to oblong-lanceolate, glandular tipped, pubescent. Corolla red, inconspicuous transverse irregular red lined, subcylindric, pubescent; tube 5-angular, 12–14 mm; lobes green, 5, lanceolate, c. 2.5 × 1.2 mm, toothed or crenulate, subacute. Stamens 10; filaments

strap-shaped, 2.5–3 mm, connate, hispid; anthers orange yellow, fused above, nail-shaped at base, densely to sparsely glandular verruculose. Ovary inferior; style c. 1.8 cm, faintly 5-ribbed; stigma discoid. Berries red, ovoid, 6–7 × 6.5–7 mm, puberulous; seeds obovoid, 1–2 × c. 1.5 mm, obscurely reticulately nerved.

Flowering & Fruiting: October–April.

Distribution. India: Arunachal Pradesh, Sikkim and West Bengal.

Specimens examined: On the way to Sinchula, 02.03.1934, *KPB* 2009; Tashigaon to Rovers point, 03.10.2013, *AK* 59770.

Primulaceae

Androsace L.

Androsace umbellata (Lour.) Merr., Philipp. J. Sci. 15: 237. 1919. *Drosera umbellata* Lour., Fl. Cochinch. 1: 186. 1790. *Androsace saxifragifolia* Bunge, Enum. Pl. China Bor.: 53. 1833; Hook. f., Fl. Brit. India 3: 496. 1882; Prain, Bengal Pl. 1: 640. 1903. [Plate 125b]

Erect herb, 10–15 cm high. Leaves subradical, forming rosette, cauline leaves absent, reniform, 0.9–2 × 1–2.5 cm, cordate, crenate, rounded, subcoriaceous, appressed hairy. Inflorescence scapose umbel, pubescent; floral bracts ovate-lanceolate. Calyx green, cupular; tube 1.5–2 mm, pubescent; lobes 5, ovate to lanceolate, 2–3 × 1–2 mm, ciliate, acute, 5–7-nerved, pubescent. Corolla white, salverform; tube c. 2 mm; lobes 5, oblong-obovate, 2.5–3 × 1.5–2 mm, rounded. Stamens 5, subsessile; filaments included; anthers circular. Ovary subglobose; style short; stigma capitate. Capsules globose, 3–4 mm across; seeds dark brown, subglobose, smooth.

Flowering & Fruiting: January–February.

Distribution. India: Bihar, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Odisha, Punjab, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 7, 09.03.2011, *GK* 50520; Narathali, 20.02.2012, *AK* 55799; Hatipota, 17.02.2013, *AK* 59807.

Myrsinaceae

Key to the genera

- 1a. Flowers in dense or lax fascicles on very short scaly or peg like branchlets, in leaf axils or on old wood 1. *Antistrophe*
- 1b. Flowers in umbels or panicles 2
- 2a. Inflorescences umbels; flowers pinkish; bracteoles absent; sepals and petals free; anthers connate; ovary superior; fruits drupes; seed solitary, subglobose, smooth 2. *Ardisia*

- 2b. Inflorescences panicles; flowers white; bracteoles present; sepals and petals fused; anthers free; ovary semi-inferior; fruits berries; seeds many, not subglobose, not smooth 3. *Maesa*

1. *Antistrophe* A. DC.

Antistrophe oxyantha A. DC., *Ann. Sci. Nat., Bot. sér. 2*, 16: 84. 1841; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 532. 1882; M. P. Nayar & G. S. Giri, *Bull. Bot. Surv. India* 14 (1-4): 81. 1976. [Plate 125c]

Shrub, c. 2 m high. Leaves oblong-elliptic or oblong-lanceate, 9-15 × 2.5-3.5 cm, cuneate at base, entire or denticulate, acuminate, glabrate, gland-dotted. Inflorescence 3-7-flowered axillary fascicles on very short scaly or peg like branches. Calyx pale green, cupular; tube short; lobes 5, ovate-lanceolate, scarious, puberulous, gland-dotted. Petals creamy white, 5, lanceate, 6-7 × 1.5-2 mm, acuminate, gland-dotted. Stamens 5; filaments short; anthers yellowish, gland-dotted. Ovary ovoid; style filiform; stigma punctiform. Drupes red when ripe, globose, 1.2-1.5 cm across, 1-seeded.

Flowering & Fruiting: May-July.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Buxaduar to Chunabhati, 21.05.2014, AK 65906.

2. *Ardisia* Sw.

Key to the species

- 1a. Leaves attenuate at base, a line of glands at margins; inflorescences and pedicels brown glandular hairy; sepals obovate 2. *A. macrocarpa*
- 1b. Leaves cuneate at base, without glands at margins; inflorescences and pedicels not brown glandular hairy; sepals ovate or suborbicular 2
- 2a. Leaves oblanceolate or obovate, acuminate at apex, gland-dotted; sepals pinkish, ovate, boat-shaped, acute at apex; petals gland-dotted; drupes enclosed in persistent sepals 1. *A. involucrata*
- 2b. Leaves elliptic or elliptic-obovate, acute at apex, not gland-dotted; sepals light green, suborbicular, rounded at apex; petals not gland-dotted; drupes not enclosed in persistent sepals 3. *A. solanacea*

1. ***Ardisia involucrata*** Kurz, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 40 (2): 68. 1871; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 528. 1882. [Plate 125d]

Chumlani (N).

Shrub, 2-5 m high. Leaves oblanceolate or obovate, 10-18 × 3-5.2 cm, cuneate, entire to weakly crenate, acuminate, subcoriaceous, gland-dotted. Inflorescence axillary, terminal, pedunculate umbels; inflorescence bracts suborbicular, caducous; floral bracts obovate or elliptic, caducous when fruiting, gland-dotted.

Sepals pinkish, 5, ovate, boat-shaped, 10–15 × 5–8 mm, overlapping, gland-dotted, succulent. Petals pink purple, 5, ovate, slightly shorter than sepals, acute, gland-dotted. Stamens 5; filaments short; anthers acute, punctate. Ovary ovoid; style cylindrical; stigma capitate. Drupes ovoid or subglobose, 8–10 × 5–7 mm, gland-dotted, with persistent style and enclosed by persistent sepals; seed solitary, subglobose, c. 5 mm across, smooth.

Flowering & Fruiting: June–February.

Distribution. India: Andaman & Nicobar Islands, Sikkim and West Bengal.

Specimens examined: Buxa-Bhutan Road, 36th mile, 16.05.1949, VN & party 2582; Bhutri, 05.10.2012, AK 58642; Way to Mahakal cave, 20.02.2013, AK 59856.

2. *Ardisia macrocarpa* Wall., Fl. Ind. 2: 277. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 3: 524. 1882. [Plate 126a]

Damai gera, Khalo argale, Damai phal (N).

Shrub, 1–2 m high. Leaves crowded at apex, oblanceolate to oblong-elliptic, 4–15 × 1.1–2.6 cm, attenuate, weakly crenate, a line of raised glands, acute, subcoriaceous, brown peltate glands below. Inflorescence terminal or in upper axils, 2–5-flowered umbels, brown glandular hairy; inflorescence bracts obovate or elliptic, gland-dotted. Sepals 5, obovate, 1.8–2.8 × 1–1.5 mm, slightly connate, rounded, gland-dotted. Petals pinkish white, 5, ovate, 4–6 × 2–2.5 mm, acute, gland-dotted. Stamens 5; filaments short; anthers lanceolate, dorsally black punctate. Ovary ovoid, faintly raised black glandular; style 2.8–3 mm; stigma inconspicuous. Drupes globose, 5–9 mm across, black gland-dotted, sepals persistent; seed solitary, subglobose, 5–5.5 × c. 7 mm, smooth.

Flowering & Fruiting: June–November.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimen examined: Tashigaon to Rovers point, 03.10.2013, AK 59768.

3. *Ardisia solanacea* Roxb., Pl. Coromandel 1: 27, t. 27. 1795. *Ardisia humilis* auct. non Vahl 1794; C. B. Clarke in Hook. f., Fl. Brit. India 3: 529. 1882; Prain, Bengal Pl. 1: 645. 1903. [Plate 126b]

Ban-jam (B); *Bisi* (H).

Shrub, 2–4 m high. Leaves elliptic or elliptic-obovate, 6–12.5 × 2–4.3 cm, cuneate, entire, acute, coriaceous. Inflorescences axillary, 3–8-flowered umbels. Sepals light green, 5, suborbicular, 3–4 × 2–3 mm, slightly connate, rounded, gland-dotted. Petals pink, 5, ovate, 10–13 × 5–5.5 mm, slightly connate, acute, thick. Stamens 5, fused; filaments flat, c. 3 mm; anthers fused forming a cone, c. 5.5 mm, gland-dotted. Ovary globose, c. 2.5 mm across; style 11–12 mm; stigma simple.

Drupes purplish red or blackish, subglobose, 6–8 mm across, black punctate; seed solitary, subglobose, 4–5 mm across, smooth.

Flowering & Fruiting: April–September.

Distribution. India: Almost throughout India.

Specimens examined: On the way to Tobgaon, 18.05.1949, VN & party 2694; Panbari 8–9, 29.03.2012, GK 50609; Checko-1, 25.09.2012, AK 56120.

3. *Maesa* Forssk.

Key to the species

- 1a. Branchlets angular, pellucid punctate; leaves oblong-lanceolate or lanceolate, cuneate or subcircular, acute to acuminate at apex, glabrous above; petioles and pedicels glabrous; flower buds ovoid or ellipsoid; corolla tube and lobes 1–1.2 mm; stamens at middle of corolla tube; seeds subtrapezoid, rugose L. *M. indica*
- 1b. Branchlets terete, smooth; leaves ovate or suborbicular, subcordate or rounded, obtuse or retuse at apex, puberulous above; petioles and pedicels puberulous; flower buds globose; corolla tube and lobes c. 0.5 mm; stamens at base of corolla tube; seeds hexagonal, gland-dotted 2. *M. macrophylla*

1. *Maesa indica* (Roxb.) A. DC., Trans. Linn. Soc. London 17: 134. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 3: 509. 1882; Prain, Bengal Pl. 1: 473. 1903. *Baeobotrys indica* Roxb., Fl. Ind. 2: 230. 1824. [Plate 126c]

Ranjani (B); *Bilaune*, *Kanchirna*, *Phiksangme* (N).

Shrub, 1–3 m high. Leaves oblong-lanceolate or lanceolate, 3.5–12.5 × 1.8–2.8 cm, cuneate, serrate-dentate or denticulate, acute to acuminate, subcoriaceous. Inflorescence axillary or subterminal, panicles, glabrescent or vesicular; floral bracts triangular-ovate; bracteoles ovate. Calyx cupular; tube c. 0.3 mm; lobes 5, ovate, c. 0.7 × 0.4 mm, sparsely ciliate, obtuse to rounded, pellucid punctate. Corolla white, campanulate; tube 1–1.2 mm; lobes 5, ovate, 1–1.2 × c. 0.5 mm, repand, acute. Stamens 5, at middle of corolla tube; filaments c. 0.5 mm; anthers circular. Ovary ovoid-globose; style c. 1 mm; stigma lobed. Berries globose or subglobose, c. 3 mm across, smooth or faintly longitudinally striated, calyx lobes persistent; seeds black, subtrapezoid, 0.5–1 mm, rugose.

Flowering & Fruiting: April–November.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Manipur, Maharashtra, Meghalaya, Mizoram, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimens examined: Poro, BK 482; Rajabhatkhawa, KPB 1555; On the way to Buxaduar, 28.02.1934, KPB 1797; Garam, JKS 892; South Bholka, JKS 4221; way to Sinchu, JKS 6941; Santrabari, 26.11.1975, JKS 6942; Sinchu, JKS 6952; way

to Buxaduar, JKS 6945; Bhutia pond, 06.10.2009, SKS & GK 46192; Newlands, 15.02.2012, AK 53078; Sankosh, 17.02.2012, AK 55653, 55688; Checko-1, 26.09.2012, AK 56168.

2. *Maesa macrophylla* (Wall.) A. DC., Trans. Linn. Soc. London 17: 134. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 3: 510. 1882. *Baeobotrys macrophylla* Wall., Fl. Ind. 2: 234. 1824. [Plate 126d; Fig. 44a-c]

Bogote (N).

Shrub, 2–3 m high. Leaves broadly ovate or suborbicular, 7–11.6 × 5–9 cm, subcordate or rounded, serrate-dentate, obtuse or retuse, coriaceous, puberulous above, glabrous or puberulous below. Inflorescence axillary, panicles, puberulous; floral bracts lanceolate; bracteoles ovate. Calyx cupular; tube c. 0.5 mm; lobes 5, triangular-ovate, c. 0.5 × 1 mm, scarious, acute. Corolla white, campanulate; tube c. 0.5 mm; lobes 5, subcircular, c. 0.5 mm across. Stamens 5, at base of corolla tube; filaments short; anthers ellipsoid. Ovary globose; style c. 0.5 mm; stigma subcapitate. Berries globose, c. 2.5 mm across; seeds dark brown, hexagonal, c. 1 × 0.5 mm, gland-dotted.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Sikkim and West Bengal.

Specimens examined: Buxa-Bhutan Road, 36th mile, 16.05.1949, VN & party 2491; Tashigaon, 326m, 08.10.2009, SKS & GK 46209; Hauda nala, 03.10.2012, AK 58667; Pana, 11.02.2013, AK 58858; Hauda nala, 19.02.2013, AK 59853.

Sapotaceae

Madhuca Buch.-Ham. ex J. F. Gmel.

Madhuca longifolia (J. Koenig ex L.) J. F. Macbr. var. *latifolia* (Roxb.) A. Chev., Rev. Int. Bot. Appl. Agric. Trop. 23: 149. 1943. *Bassia latifolia* Roxb., Pl. Coromandel 1: 20, t. 19. 1795; C. B. Clarke in Hook. f., Fl. Brit. India 3: 544. 1882. [Plate 127a-b]

Deciduous tree, 15–20 m high. Leaves clustered, elliptic or elliptic-oblong, 3–12 × 1.5–7 cm, rounded, entire, short acuminate, coriaceous, rusty tomentose when young. Inflorescence dense fascicles at the end of branches or from the axils of fallen leaves, drooping, rusty tomentose; floral bracts lanceolate, rusty tomentose. Sepals 4, biseriate, slightly connate at base, rusty tomentose; outer pair ovate, 1–1.2 × 0.6–0.7 cm; inner pair broadly ovate to suborbicular, 1.4–1.6 × 1–1.2 cm. Corolla creamy white, campanulate; tube 6–8 mm; lobes usually 8–9, sometimes 7–14, ovate-lanceolate, 7–9 × 5–7 mm. Stamens 20–30 in 3 series; filaments indistinct; anthers lanceolate, mucronate. Ovary ovoid, hirsute; style c. 2.5 cm, hairy at base; stigma truncate. Berries greenish, ovoid, 2.5–3 cm across, pubescent; seeds ellipsoid, compressed.

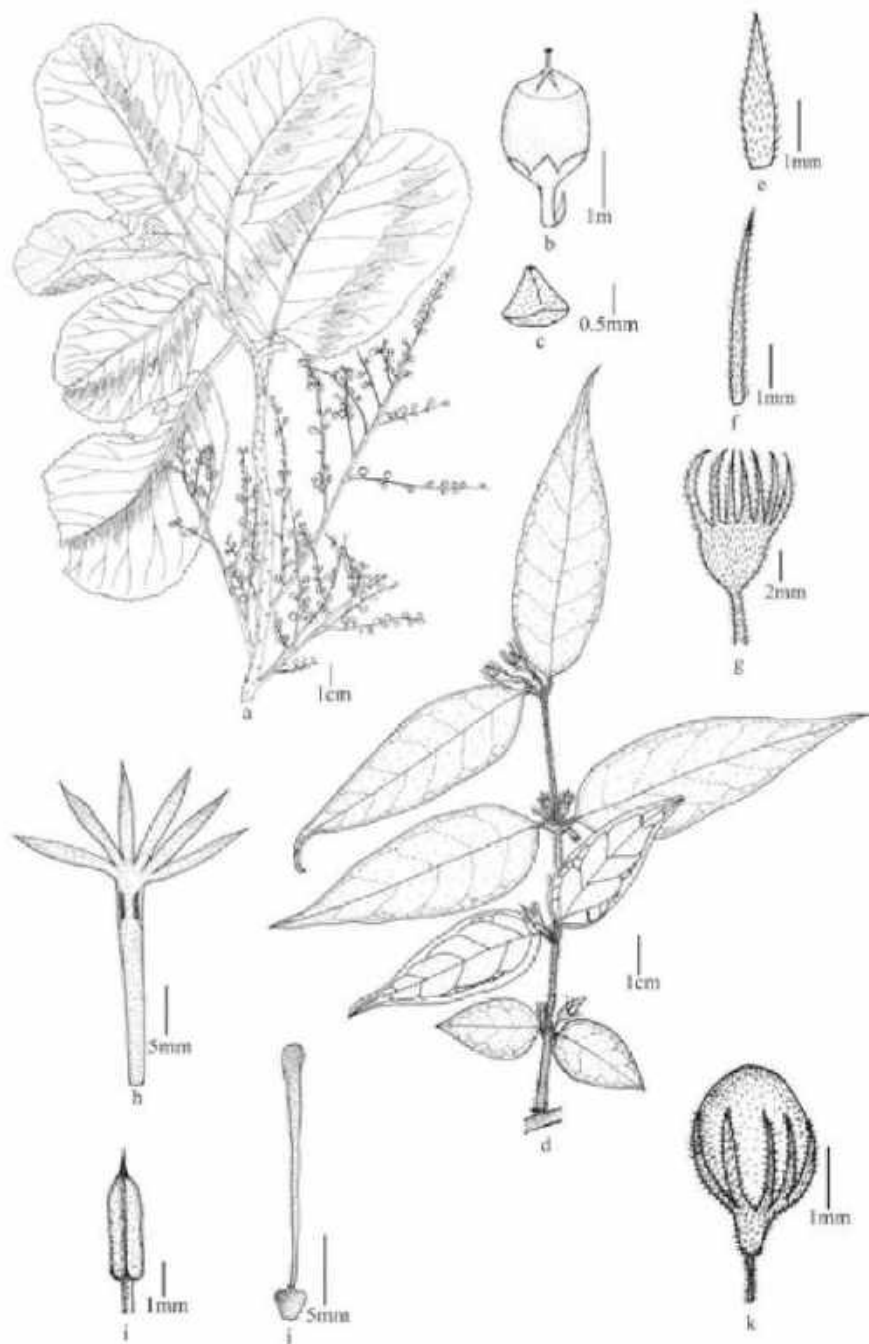


Fig. 44. *Maesa macrophylla*: a. Fruiting branchlet; b. Fruit; c. Seed (SKS & GK 46209); *Jasminum sambac*: d. Flowering branchlet; e. Floral bract; f. Bracteole; g. Calyx split open; h. Corolla split open showing stamens; i. Stamen; j. Gynoecium; k. Berry (AK 59934).

Flowering & Fruiting: April–August.

Distribution. India: Andhra Pradesh, Bihar, Goa, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Buxaduar to Achalung, 19.05.2014, AK 62642.

Styracaceae

Styrax L.

Styrax serrulatus Roxb., Fl. Ind. 2: 415. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 3: 588. 1882 (as "*serrulatum*"); Prain, Bengal Pl. 1: 656. 1903. [Plate 127c]

Kum-jameva (B); *Khari* (N).

Tree, 5–7 m high. Leaves ovate to ovate-elliptic, 4–9 × 1.6–4 cm, cuneate to slightly oblique, serrate, shortly acuminate, thinly coriaceous, glabrous. Inflorescence axillary or terminal racemes, sometimes solitary; floral bracts linear, stellate tomentose. Calyx campanulate; tube 3–4 mm, stellate tomentose; lobes 5, triangular, c. 0.5 × 0.3 mm. Corolla white to creamy yellow, 5, puberulous outside; tube 2–3 mm; lobes elliptic-oblong, 7–9 × 2–3 mm. Stamens 10, 1-seriate; filaments short, stellate tomentose at base; anthers yellow, linear, c. 4 mm. Ovary stellate tomentose, 3–1-loculed; style c. 9 mm; stigma capitate. Capsules ellipsoid, c. 1.5 × 1 cm, grey-brown stellate tomentose, sometimes sparsely stellate villose; seeds smooth or rugose.

Flowering & Fruiting: March–December.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: Panbari 9, 12.03.2011, GK 50553; East Damanpur, Checko 2, 27.11.2011, GK 50589.

Oleaceae

Key to the genera

- 1a. Trees/erect shrubs 2
- 1b. Scandent shrubs 3
- 2a. Leaves closely serrate at margins; flowers polygamous; corolla absent in female flowers; fruits drupes 4. *Olea*
- 2b. Leaves entire at margins; flowers bisexual; corolla always present; fruits berries 3. *Nyctanthes*
- 3a. Leaves entire or undulate at margins; inflorescences cymes; flowers not tetramerous; calyx lobes linear to linear-subulate; corolla salver-shaped; stamens at middle of corolla tube 1. *Jasminum*
- 3b. Leaves distantly serrate at margins; inflorescences panicles; flowers tetramerous; calyx lobes triangular-ovate; corolla campanulate; stamens at base of corolla tube 2. *Myxopyrum*

1. *Jasminum* L.

Key to the species

- | | |
|--|--------------------------|
| 1a. Calyx glabrous or sparsely pubescent | 2 |
| 1b. Calyx distinctly hairy, particularly the teeth | 3 |
| 2a. Leaves subcoriaceous; calyx teeth less than 10 mm | 2. <i>J. multiflorum</i> |
| 2b. Leaves chartaceous; calyx teeth more than 10 mm | 3. <i>J. nervosum</i> |
| 3a. Calyx teeth short, less than 5 mm (10 mm in fruits), reflexed to spreading | 5. <i>J. scandens</i> |
| 3b. Calyx teeth longer, 6–13 mm, not reflexed to spreading | 4 |
| 4a. Leaves ovate-lanceolate, smaller, 2.8–8.5 × 1.7–3.5 cm; corolla not double | 1. <i>J. elongatum</i> |
| 4b. Leaves elliptic to ovate, large, 3–12 × 2.5–7 cm; corolla conspicuously double | 4. <i>J. sambac</i> |

1. *Jasminum elongatum* (Bergius) Willd., Sp. Pl. 1: 37. 1797. *Nyctanthes elongata* Bergius, Phil. Trans. 61: 289, t. 11. 1772. *Jasminum undulatum* Ker-Gawl., Bot. Reg. 6: t. 436. 1820, non Willd. 1797; C. B. Clarke in Hook. f., Fl. Brit. India 3: 592. 1882.

Maidal, Sanumaidal (N).

Scandent shrub. Leaves ovate to ovate-lanceolate, 8–30 × 5.5–15 mm, rounded, entire and hairy, acute, mucronate tipped, chartaceous. Inflorescence 5–6-flowered, lax cymes; floral bracts linear to linear-lanceolate. Calyx cupular; tube 1.5–2 mm, faintly keeled, glabrous to pilose outside; lobes 5–7, linear, 6–10 mm, pilose. Corolla white, salverform, fragrant; tube cylindric, 1.5–2 cm; lobes 6–7, oblanceolate, 9–12 × 2–3.5 mm, mucronate. Stamens 2; filaments short; anthers linear-oblong, c. 4 mm, mucronate. Ovary ovoid; style c. 1.6 cm; stigma oblong. Berries black on ripening, globose to ellipsoid, 8–10 × 7–8 mm, often paired, sometimes 1-cell aborted; seed elliptic, smooth.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Odisha, Sikkim and West Bengal.

Specimens examined: Buxaduar, 1000m, JKS 955; South Rajabharkhawa, JKS 4251; Santrabari, 27.09.2013, AK 59608; Buxaduar to Tashigaon, 11.02.2014, AK 59905.

2. *Jasminum multiflorum* (Burm. f.) Andrews, Bot. Repos. 8: t. 496. 1807. *Nyctanthes multiflora* Burm. f., Fl. Ind.: 5, t. 3, f. 1. 1768. *Jasminum pubescens* (Retz.) Willd., Sp. Pl. 1: 37. 1797; C. B. Clarke in Hook. f., Fl. Brit. India 3: 592. 1882; Prain, Bengal Pl. 1: 659. 1903. [Plate 127d]

Scandent shrub. Leaves ovate or ovate-elliptic, 1.5–4.5 × 1–2.4 cm, truncate or rounded or shortly oblique, undulate, acute, mucronate tipped, subcoriaceous. Inflorescence terminal, 5–6-flowered, lax cymes; floral bracts foliaceous, ovate. Calyx cupular; tube c. 2 mm, hairy; teeth 6–8, linear, c. 1 cm, pubescent. Corolla white, salverform, fragrant; tube cylindrical, c. 2.5 cm; lobes 6–8, lanceolate, 1–1.3 cm, acute. Stamens 2; filaments c. 8 mm; anthers oblong. Ovary ovoid; style c. 4 mm; stigma oblong. Berries black when ripe, globose/ellipsoid, 5–6 × 2–3 mm, in persistent calyx; seed elliptic, smooth.

Flowering & Fruiting: September–April.

Distribution. India: Assam, Bihar, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Manipur, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 04.10.2009, SKS & GK 46125; Jainti range, 09.10.2009, SKS & GK 46258; Chuniajhora, 28.09.2012, AK 58507; Phashkhawa river belt, 30.09.2012, AK 58551.

3. *Jasminum nervosum* Lour., Fl. Cochinch. 1: 20. 1790. *Jasminum astomosans* DC., Prodr. 8: 305. 1844; C. B. Clarke in Hook. f., Fl. Brit. India 3: 596. 1882.

[Plate 128a]

Scandent shrub. Leaves ovate or ovate-lanceolate, 3.2–7.3 × 1.6–3.5 cm, cuneate, entire, acuminate, chartaceous, glabrous. Inflorescence 1–5-flowered cymes; floral bracts foliaceous, ovate; bracteoles linear. Calyx cupular; tube 2–3 mm; teeth filiform, 10–15 mm, subulate. Petals white, salverform, fragrant; tube 10–13 mm; lobes 7–10, linear-lanceolate, 10–12 × 1–1.5 mm, acute. Stamens 2; filaments c. 1 mm; anthers linear-oblong. Ovary c. 1.5 mm; style 1.5–2 mm; stigma clavate. Berries ellipsoid, 1.2–1.8 cm, in often thickened calyx, divaricate.

Flowering & Fruiting: April–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Tripura, Sikkim and West Bengal.

Specimen examined: Panbari 3, 05.03.2011, GK 47253.

4. *Jasminum sambac* (L.) Aiton, Hort. Kew. 1: 8. 1789; C. B. Clarke in Hook. f., Fl. Brit. India 3: 591. 1882; Prain, Bengal Pl. 1: 659. 1903. *Nyctanthes sambac* L., Sp. Pl. 1: 6. 1753.

[Plate 128b; Fig. 44d-k]

Ban-mallika, Mogra (H).

Scandent shrub. Leaves ovate to ovate-lanceolate or lanceolate, 2.2–8.2 × 1.2–2.8 cm, cuneate to rounded, entire, acute to acuminate, mucronate tipped, chartaceous, gland-dotted. Inflorescence axillary, 2–3-flowered cymes; inflorescence bracts lanceolate; floral bracts linear-lanceolate; bracteoles linear. Calyx cupular; tube 1.5–2 mm, hispid; lobes 6, linear-subulate, 3.5–7 mm, incurved, hispid. Corolla

white, salverform, fragrant; tube cylindrical, *c.* 2 cm; lobes 6, linear-oblong, *c.* 12 × 2.5 mm, acute. Stamens 2; filaments *c.* 1 mm; anthers linear-oblong. Ovary obovoid, truncate; style *c.* 1.6 cm; stigma clavate. Berries black when ripe, 1–2, globose, *c.* 3 mm across, calyx teeth persistent; seed orbicular, smooth.

Flowering & Fruiting: January–May.

Distribution. India: Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Buxaduar to Achalung, 14.02.2014, AK 59934.

5. *Jasminum scandens* (Retz.) Vahl, *Symb. Bot.* 3: 2. 1794; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 595. 1882; Prain, *Bengal Pl.* 1: 659. 1903. *Nyctanthes scandens* Retz., *Observ. Bot.* 5: 9. 1788.

Hara lahara (N).

Scandent shrub. Leaves oblong-ovate, 8.5–11 × 3.5–8 cm, rounded or slightly cuneate, entire, acuminate, thinly coriaceous, glabrous. Inflorescence 1-flowered, axillary or terminal or contracted cymes. Calyx cupular; tube *c.* 2 mm; lobes 7, linear, *c.* 2 mm, hairy. Petals white, fragrant; tube cylindrical, 15–20 mm; lobes 6–7, oblong, 12–16 × 1.5–2.5 mm, acute. Stamens 2; filament subsessile; anthers lanceolate, beaked. Ovary 1–1.5 mm; style *c.* 0.5 mm; stigma indistinct. Berries ellipsoid, 6–13 mm, ripening black, single or often paired.

Flowering & Fruiting: November–March.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Odisha, Rajasthan, Sikkim, Tripura and West Bengal.

Specimens examined: Poro, BK 478; Checko 2, 27.11.2011, GK 50583.

2. *Myxopyrum* Blume

***Myxopyrum smilacifolium* (Wall.) Blume**, *Mus. Bot.* 1: 320. 1850; C. B. Clarke in Hook. f., *Fl. Brit. India* 3: 618. 1882; Prain, *Bengal Pl.* 1: 662. 1903. *Chionanthus smilacifolium* Wall., *Fl. Ind.* 1: 108. 1820. [Plate 128c; Fig. 45]

Scandent shrub. Leaves elliptic to elliptic-oblong or ovate, 16.7–19.6 × 7–8 cm, cuneate or subcircular, distantly serrate, acuminate, coriaceous, gland-dotted. Inflorescence panicles; inflorescence bracts linear. Calyx cupular, divided near to base; lobes 4, triangular-lanceolate, *c.* 0.5 × 0.2 mm, acute. Corolla campanulate; tube 0.5–0.8 mm; lobes 4, oblong, *c.* 10 mm, obtuse, spreading. Stamens 2; filaments flat, *c.* 0.5 mm; anthers elliptic. Ovary ovoid; style short; stigma minute. Berries globose or oblate or faintly bilobed, 7–8 × 7–12 mm, in persistent calyx, pulpy; seeds white, globose, *c.* 5 mm across, smooth.

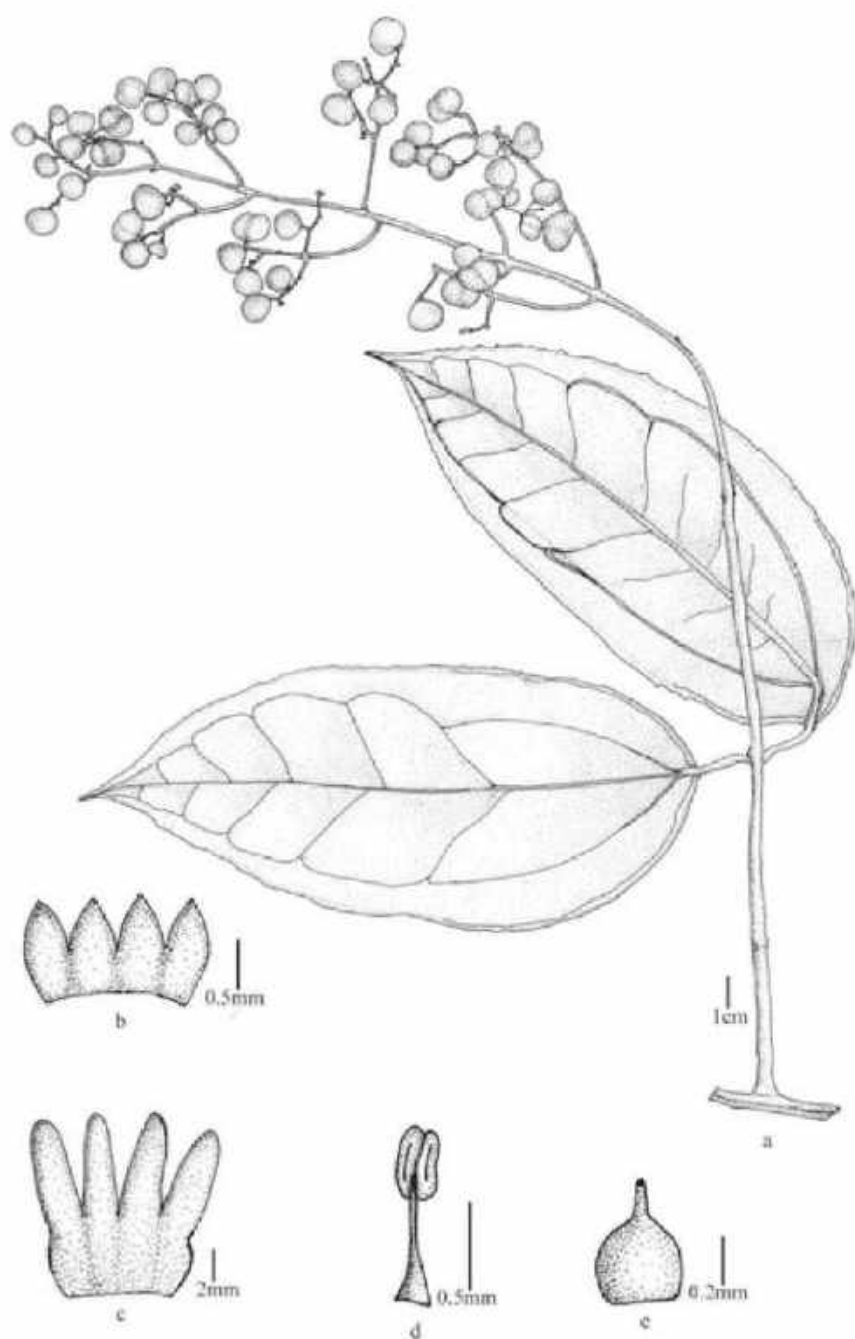


Fig. 45. *Myxopyrum smilacifolium*: a. Fruiting branchlet; b. Calyx split open; c. Corolla split open; d. Stamen; e. Gynoecium (AK 56107).

Flowering & Fruiting: June–September.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Kerala, Manipur, Mizoram, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56107.

3. *Nyctanthes* L.

Nyctanthes arbor-tristis L., Sp. Pl. 1: 6. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 3: 603. 1882; Prain, Bengal Pl. 1: 660. 1903.

Shiuli (B).

Small tree, 3–4 m high. Leaves ovate, 3.7–11.5 × 1.3–5 cm, rounded to slightly oblique, entire, mucro-acute, coriaceous, scabrous. Inflorescence terminal cymes, pubescent; floral bracts elliptic or obovate. Calyx cupular, unlobed or subentire above; tube c. 7 mm, puberulous. Corolla white, tube orange red, salver shaped, fragrant; tube cylindric, c. 7 mm; lobes 4–8, lanceolate, 7–10 mm. Stamens 2; filament subsessile, hairy; anthers oblong. Ovary c. 1 mm; style cylindric; stigma shortly 2-fid. Capsules elliptic or suborbicular, 15–18 × 14–15 mm, 2-lobed.

Flowering & Fruiting: July–January.

Distribution. India: Almost throughout India.

Specimen examined: NRVK 6, 10.04.2012, GK 56095.

4. *Olea* L.

Olea dioica Roxb., Fl. Ind. 1: 105. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 3: 612. 1882; Prain, Bengal Pl. 1: 661. 1903.

Kalo kymuna (N).

Small tree, 6–8 m high, monoecious. Leaves elliptic, obovate to oblanceolate, 14–17 × 5.7–7.3 cm, cuneate, serrate, acuminate, coriaceous, gland-dotted. Inflorescence panicles; inflorescence bracts ovate or suborbicular. Flowers polygamous. Male: calyx cupular; tube short, fused at base; lobes 4, triangular-ovate, c. 0.5 mm across, hairy, acute. Corolla cupular; tube short; lobes 4, triangular-ovate, minute, acute. Stamens 2; filaments absent or short; anthers minute. Female: calyx same as in male flowers. Corolla absent. Ovary ovoid; style short; stigma clavate. Drupes ellipsoid, 10–13 × 4–5 mm, apiculate, calyx persistent; seeds elliptic, 6–8 × 2–3 mm, smooth.

Flowering & Fruiting: March–November.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Checko-1, 10.02.2013, AK 58836.

Apocynaceae

Key to the genera

- 1a. Herbs; leaves crowded at the end of branchlets; petioles with axillary glands; anthers papillose; fruits drupes, bilobed 7. *Rauvolfia*
- 1b. Climbing shrubs or trees; leaves not crowded at the end of branchlets (except *Alstonia scholaris*); petioles without axillary glands; anthers not papillose at apex; fruits follicles, not bilobed 2
- 2a. Climbing shrubs; disk present (except *Strophanthus*) 3
- 2b. Trees or shrubs; disk absent 9
- 3a. Calyx lobes horizontally spreading; corolla tube angular; colleters present outside around corolla tube 1. *Aganosma*
- 3b. Calyx lobes erect, not spreading; corolla tube terete; colleters absent outside around corolla tube 4
- 4a. Corolla subrotate or infundibular; lobes triangular-ovate or elliptic or suborbicular; follicle solitary, forming by 2 fused follicles 5
- 4b. Corolla not subrotate or infundibular (except *Strophanthus*); lobes not as above; follicles paired, free 6
- 5a. Leaves obovate or elliptic-oblong, abruptly acuminate at apex, not pellucid gland-dotted above; corolla infundibular, large; lobes acute; filaments c. 5.5 cm, connectives without dome-shaped gland; follicles elliptic 3. *Beaumontia*
- 5b. Leaves ovate-lanceolate or elliptic-lanceolate, short acuminate at apex, pellucid gland-dotted above; corolla subrotate, small; lobes slightly emarginate; filaments short, connectives with dome-shaped gland; follicles oblong-lanceolate 11. *Vallis*
- 6a. Corolla green, crimson tinge at base; lobes thread like 8. *Strophanthus*
- 6b. Corolla white; lobes not thread like 7
- 7a. Leaves suborbicular, cordate at base, rounded, abruptly apiculate tipped, punctate and pubescent above; stigma 2-cleft; disk annular 4. *Chonemorpha*
- 7b. Leaves lanceolate or elliptic, cuneate at base, short acuminate at apex, not punctate and glabrous above; stigma entire; disk not annular 8
- 8a. Leaves lanceolate, sparsely hairy below; corolla tube villous at throat; lobes lanceolate, acute, with side spur, twisted; stigma columnar or conical; disk with 4 or 5 linear, erect appendages 6. *Ichnocarpus*
- 8b. Leaves elliptic, glabrous below; corolla tube pubescent at throat; lobes elliptic, obtuse, without side spur, not twisted; stigma 5-lobed; disk without appendages 10. *Trachelospermum*
- 9a. Shrubs; seeds in fleshy arils 9. *Tabernaemontana*
- 9b. Trees; seeds without arils 10

- 10a. Leaves whorled, obtuse at apex, punctate below; corolla small; follicles not lenticellate; seeds brown-ciliated at both ends 2. *Alstonia*
- 10b. Leaves opposite, acuminate at apex, not punctate below; corolla large; follicles lenticellate; seeds with coma at apex 11
- 11a. Coronal scales present; tube cylindrical; lobes glabrous; anthers included in corolla, free from clavuncula, glabrous; follicles usually slender; seeds puberulent 5. *Holarrhena*
- 11b. Coronal scales absent; tube cupular; lobes glandular pubescent; anthers exerted from mouth of corolla, fused with clavuncula, pilose; follicles thick; seeds not puberulent 12. *Wrightia*

1. *Aganosma* (Blume) G. Don

***Aganosma gracilis* Hook. f., Fl. Brit. India 3: 664. 1882. [Plate 129a; Fig. 46]**

Climbing shrub. Leaves obovate to elliptic-oblong, 5–7.8 × 1.7–3.4 cm, cuneate to cuneate-rounded, entire, abruptly acuminate, chartaceous. Inflorescence terminal, corymbose cymes; floral bracts early deciduous. Calyx divided to base; lobes 5, lanceolate to linear-lanceolate, 1.4–1.8 × 1.5–3.5 cm, acute, horizontally spreading, tomentose; colleters linear, pubescent. Corolla white, orange yellow at centre, infundibular; tube angular, 1.4–1.6 cm, tomentose, pubescent at base near stamens; lobes 5, elliptic-lanceolate to oblanceolate, 1.5–5 × 1.2–3 cm, acute, slightly curved. Stamens 5, subsessile; anthers forming a cone and fused to clavuncula, c. 6 mm. Carpels 2; style divided at the base, fused at apex into the 5-ribbed club-like clavuncula, c. 3 mm; stigma fused, acuminate; disk 5-lobed; follicles paired, terete, 10–15 cm, divaricate; seeds linear-oblong, 5–10 mm, flattened, comose, smooth.

Flowering & Fruiting: December–May.

Distribution. India: Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Chunabhati, 1600m, JKS 4660; Buxaduar to Tashigaon, 20.05.2014, AK 62696.

2. *Alstonia* R. Br.

***Alstonia scholaris* (L.) R. Br., Mem. Wern. Nat. Hist. Soc. 1: 76. 1811; Hook. f., Fl. Brit. India 3: 642. 1882; Prain, Bengal Pl. 2: 672. 1903. *Echites scholaris* L., Mant. Pl. 1: 53. 1767.**

Chhattin (B); *Satiun* (H); *Chatiwan* (N).

Large tree, 20–25 m high. Leaves whorled, elliptic-obovate, 11.3–15 × 4.5–5.2 cm, attenuate at base, entire, obtuse, coriaceous, punctate below. Inflorescence terminal, short peduncled, corymbose cymes. Calyx cupular; tube 2–2.5 mm; lobes 5, ovate-lanceolate, 1.8–3 mm, puberulent. Corolla white, salverform, fragrant; tube 6–10 mm, puberulent; lobes 5, ovate or broadly obovate, 2–4 mm across, undulate, rounded, puberulent. Stamens 5, sessile; anthers ovate. Carpels

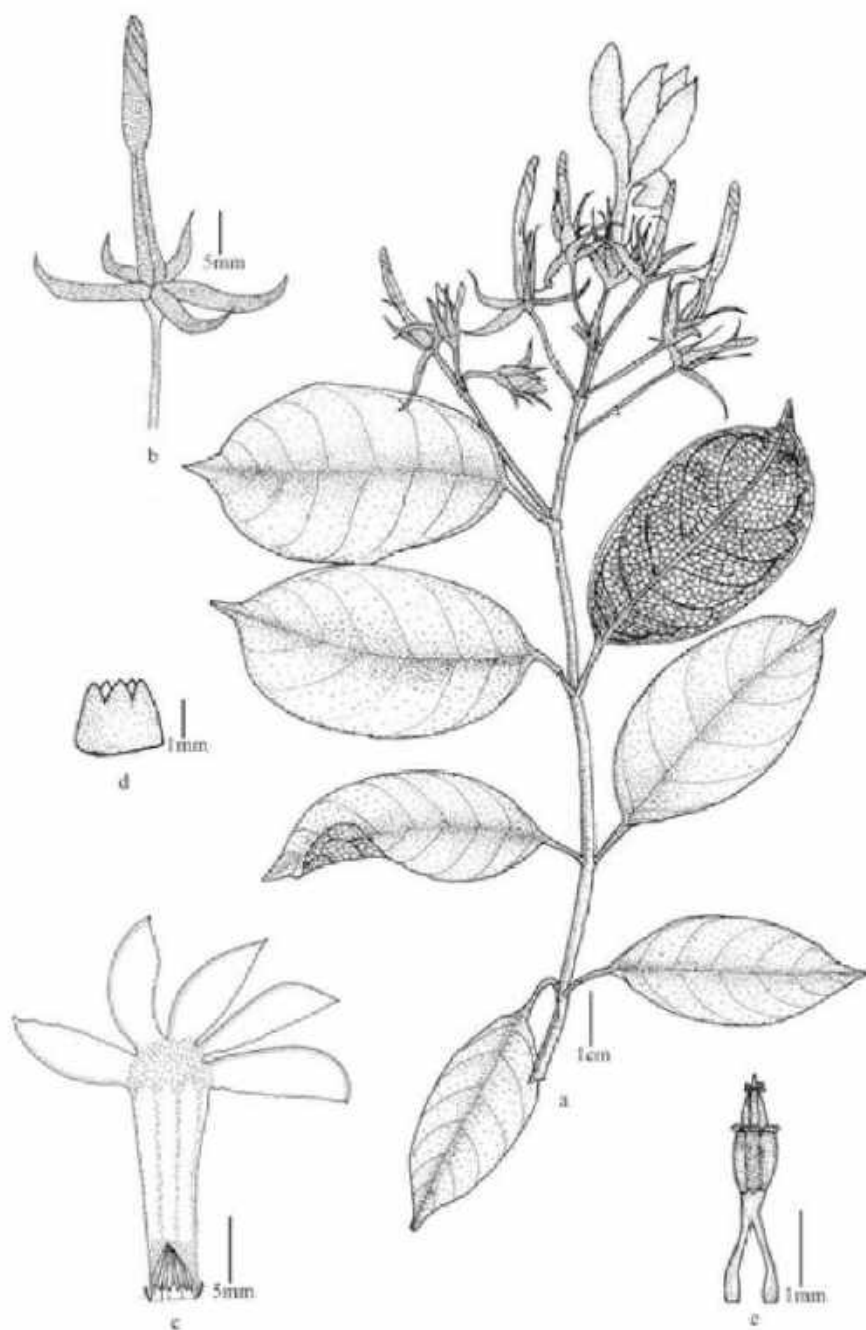


Fig. 46. *Aganosma gracilis*: a. Flowering branchlet; b. Flowering bud; c. Corolla split open showing stamens; d. Disk; e. Carpels (AK 62696).

2, distinct; style 4–7 mm; stigma minute. Follicles cylindrical, 24–44 × 0.5–0.6 cm, smooth; seeds linear, c. 8 mm, brown ciliated at both ends.

Flowering & Fruiting: November–April.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Poro, BK 498; Jainti 5a, 08.04.2012, GK 56061; Kumargram, 19.09.2011, AK 52641.

3. *Beaumontia* Wall.

Beaumontia grandiflora Wall., Tent. Fl. Nepal. 1: 15. 1824; Hook. f., Fl. Brit. India 3: 660. 1882; Prain, Bengal Pl. 2: 678. 1903. [Plate 129b; Fig. 47a–d]

Gautali phul, Gathale phul, Gotale phul (N).

Large climbing shrub. Leaves obovate or elliptic-oblong, 4.5–25.5 × 1.4–11.3 cm, cuneate at base, entire, abruptly acuminate, chartaceous. Inflorescence terminal cymes; floral bracts foliaceous. Calyx divided to base; tube 4–5 mm, tomentose outside; lobes 5, obovate to elliptic-oblong, 4–4.5 × 1.2–2.2 cm, acuminate, tomentose. Corolla white, infundibular; tube 6.5–11 cm, succulent, sparsely pilose outside; lobes 5, triangular-ovate or elliptic or suborbicular, 1.5–5 × 1.2–3 cm, acute, sparsely pubescent outside. Stamens 5; filaments c. 5.5 cm; anthers sagittate, 14–15 mm, fused with stigma and form a conical head. Ovary inserted into disk; style c. 9 cm, pilose; stigma fusiform, 10–13 mm; disk 5-lobed. Follicle solitary, elliptic, 22–31 × 5–6 cm, woody, stout, formed by fused follicles; seeds ovoid-oblong, c. 2 × 1 cm, flattened, white comose.

Flowering & Fruiting: December–May.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Hatipota, 18.02.2013, AK 59826.

4. *Chonemorpha* G. Don

Chonemorpha fragrans (Moon) Alston, Ann. Roy. Bot. Gard. Peradeniya 11: 203. 1929. *Echites fragrans* Moon, Cat. Pl. Ceylon: 20. 1824. *Chonemorpha macrophylla* G. Don, Gen. Syst. 4: 76. 1837; Hook. f., Fl. Brit. India 3: 661. 1882; Prain, Bengal Pl. 2: 678. 1903. [Plate 129c; Fig. 47e–f]

Chomik, Khola bohar (N).

Large climbing shrub. Leaves suborbicular, 16–19 × 12.5–15 cm, cordate, entire, rounded, abruptly apiculate, chartaceous, punctate above, pubescent. Inflorescence terminal, corymbose cymes; inflorescence bracts ovate; floral bracts lanceolate. Calyx cupular; tube 5–7 mm, sparsely pubescent outside, glandular inside; lobes 5,

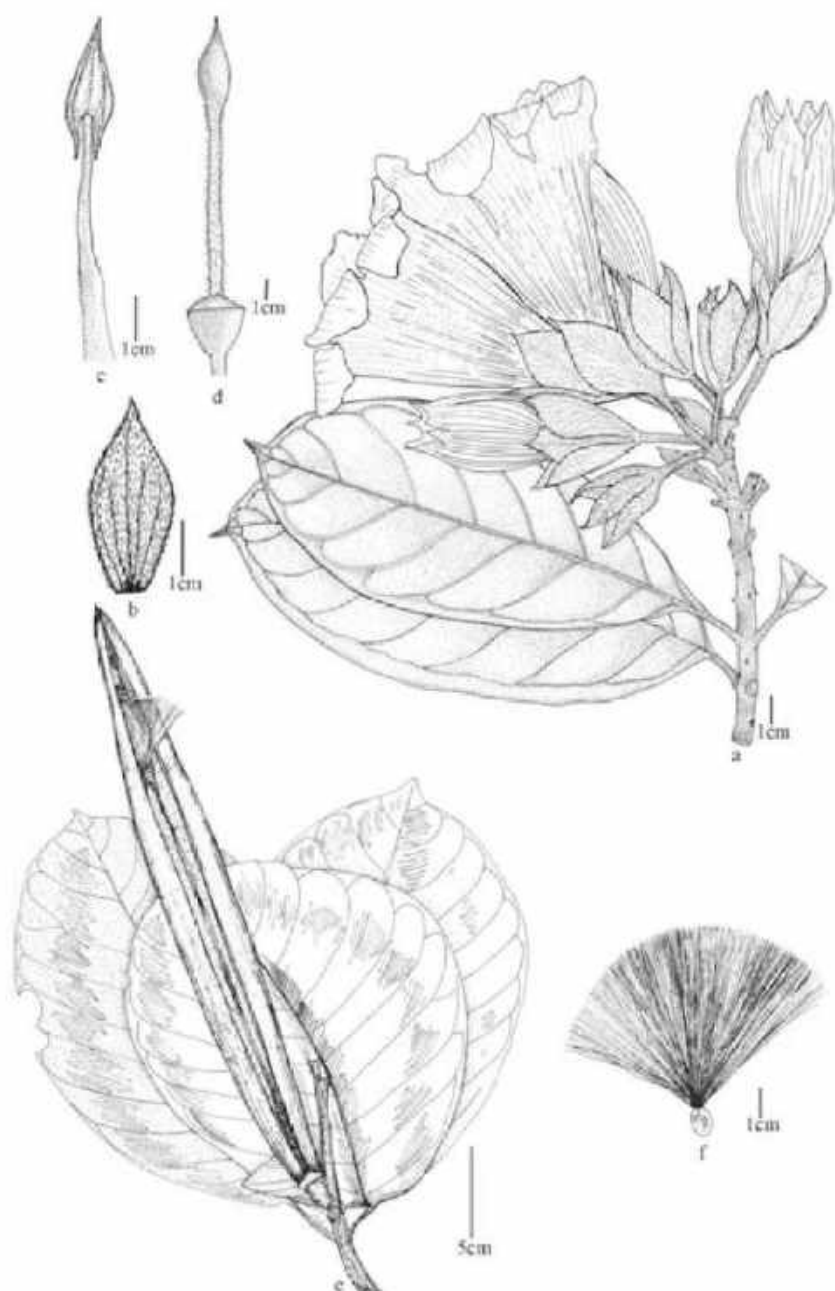


Fig. 47. *Beaumontia grandiflora*: a. Flowering branchlet; b. Floral bract; c. Stamen; d. Gynoecium (AK 59826); *Chonemorpha fragrans*: e. Fruiting branchlet; f. Seed with coma (GK 47177).

triangular-ovate, 3–3.5 × c. 3 mm, acute, pubescent outside. Corolla white, orange yellow at centre, infundibular; tube c. 3.5 cm, pubescent inside; lobes 5, obovate-triangular or flabellate, 3.4–3.7 × 3–3.2 cm, undulate. Stamens 5, subsessile; anthers forming a cone and fused to clavuncula, 8–10 mm. Carpels 2, c. 1 mm; style 3–4 mm, thickened into club-like clavuncula; stigma 2-cleft; disk ring-like, 5-lobed. Follicles reddish green, paired, trigonous, 30–42 × c. 1.8 cm, smooth; seeds brown, ovate, c. 2.1 × 0.7 cm, flattened, beaked, white comose, punctate.

Flowering & Fruiting: May–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: RajabhatIhawa Depot Road, 14.05.1949, VN & party 2419; Buxaduar, 1100m, JKS 7042; Panbari 7–8, 29.11.2011, GK 47177; Santrabari to Buxaduar, 16.02.2014, AK 59983.

5. *Holarrhena* R. Br.

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don, Gen. Syst. 4: 78. 1837. *Echites pubescens* Buch.-Ham., Trans. Linn. Soc. London 13: 524. 1821. *Holarrhena antidysenterica* Wall. ex A. DC. in DC., Prodr. 8: 413. 1844; Hook. f., Fl. Brit. India 3: 644. 1882; Prain, Bengal Pl. 2: 674. 1903. [Plate 130a-b]

Kurchi (B, H); *Khissa*, *Khkira* (N).

Tree, 10–12 m high. Leaves subsessile, ovate-oblong or ovate, 10–21 × 3–9 cm, obliquely cuneate, entire, short acuminate, coriaceous, appressed pubescent below. Inflorescence axillary, terminal, branched cymes. Calyx divided to base; lobes 5, elliptic-linear, c. 2 mm, slightly comate, acute. Corolla white, salver-shaped, fragrant; tube 9–12 mm; lobes 5, oblanceolate, 10–20 × 3–8 mm, rounded, slightly recurved. Stamens 5, subsessile; anthers lanceolate. Carpels 2, distinct; style short; stigma oblong-fusiform, 2-toothed. Follicles paired, cylindrical, 24–30 × 0.5–0.7 cm, white lenticellate; seeds ellipsoid, 15–17 × 3–4 mm, white comose, puberulent.

Flowering & Fruiting: August–December.

Distribution. India: Andhra Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa to Chunabhati, VN & party 2642; Way to Buxaduar, JKS 4598; Santrabari range, 04.10.2009, SKS & GK 46144; Tashigaon 2, 11.10.2010, SKS & GK 46307; Bhutanghat, Mainabari, 26.09.2011, AK 52882;

Bhutanghat, Mainabari, 26.09.2011, AK 52891; Sankosh, 28.09.2011, AK 52976; Hatipota, 29.09.2012, AK 58520; Rangamati to Bharnabari, 06.10.2012, AK 58705; Santrabari to Buxaduar, 18.05.2014, AK 62619.

Notes: Stem bark decoction with honey is given to cure dysentery and fever. Dried seed powder is given to children in stomach complaints.

6. *Ichnocarpus* R. Br.

Ichnocarpus frutescens (L.) R. Br. in Aiton, Hort. Kew., ed. 2. 2: 69. 1811; Hook. f., Fl. Brit. India 3: 669. 1882; Prain, Bengal Pl. 2: 680. 1903. *Apocynum frutescens* L., Sp. Pl. 1: 213. 1753. [Plate 130c; Fig. 48a-e]

Dude lahara (N).

Climbing shrub. Leaves lanceolate, 3–9.5 × 1–3 cm, cuneate, entire, short acuminate, coriaceous, sparsely hairy below. Inflorescence axillary, terminal, cymes, appressed hairy or tomentose; inflorescence bracts lanceolate or ovate; floral bracts triangular-ovate. Calyx urceolate, appressed pubescent; tube c. 0.5 mm; lobes 5, triangular-ovate, 0.5–0.6 × 0.4–0.5 mm, acute. Corolla salver-shaped, fragrant; tube 2–2.5 mm, villous at throat; lobes 5, linear-lanceolate, 3–5 × 0.8–1.2 mm, acute, twisted, with side spur, spreading, villous inside. Stamens 5; filaments short; anthers sagittate, fused at tip with stigma and form a conical head; disk 5-lobed with 4 or 5 linear, erect appendages. Carpels 2, ellipsoid, hirsute; style 0.8–1.0 mm; stigma columnar or conical. Follicles cylindrical, paired, 5–14 cm; seeds flat, white comose.

Flowering & Fruiting: September–February.

Distribution. India: Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: South Bholka, JKS 4216; Tashigaon 2, Bhutia Pond, 11.10.2009, SKS & GK 46285; Kumargram, Kalikhola river belt, 21.09.2011, AK 52721; Narathali, 23.09.2011, AK 52810; Marakata, 24.09.2011, AK 52874; Kumargram, 18.02.2012, AK 55707, 55726; Jainty-Phashkhawa, 02.10.2012, AK 58608; Rangamati to Bharnabari, 06.10.2012, AK 58697.

7. *Rauvolfia* L.

Key to the species

- 1a. Leaves elliptic, usually 2 at each node, glabrous; calyx lobes lobulated; corolla tube 10–20 mm, lobes not lobulated 1. *R. serpentina*
- 1b. Leaves broadly obovate or elliptic, usually 4 at each node, tomentose when young; calyx lobes not lobulated; corolla tube 2–3 mm, lobes further lobulated at apex 2. *R. tetraphylla*

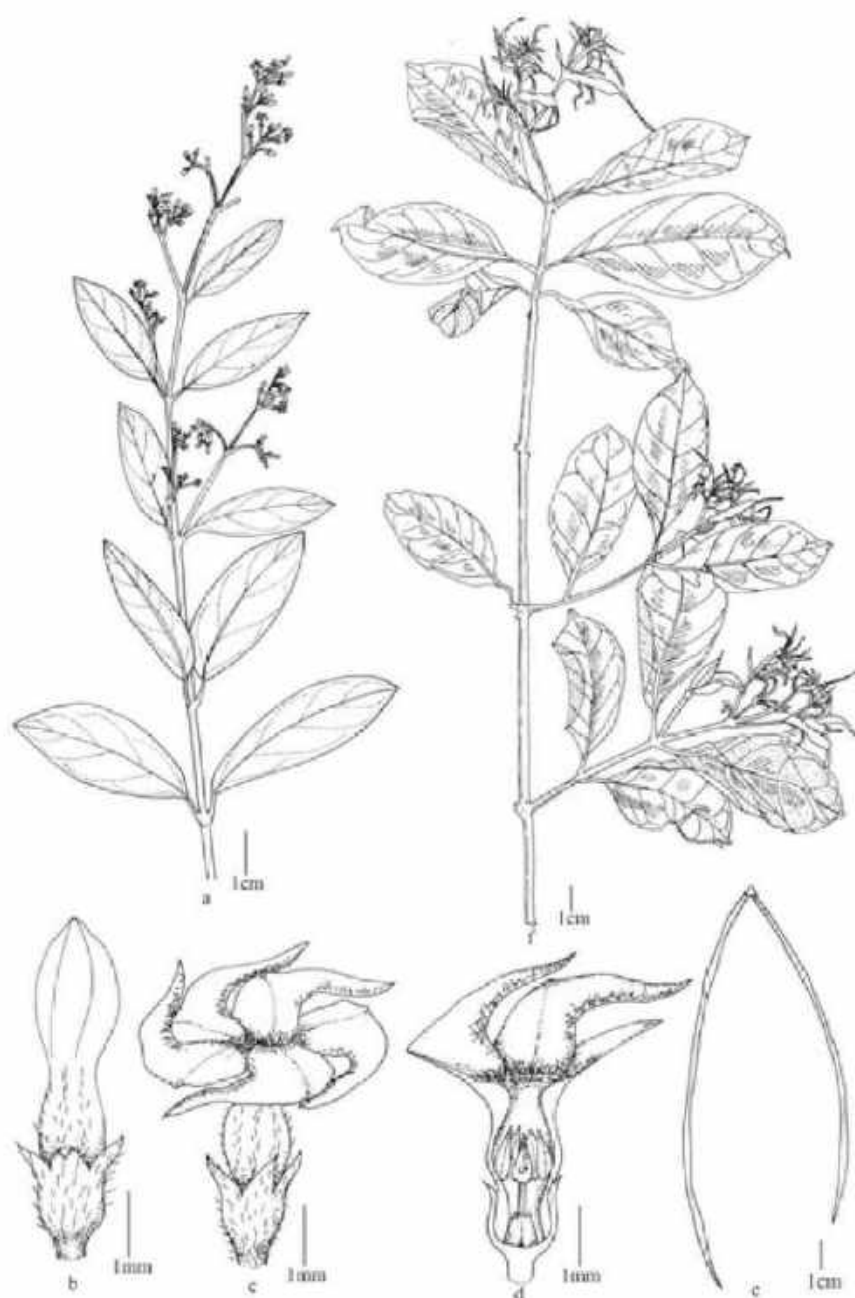


Fig. 48. *Ichnocarpus frutescens*: a. Flowering branchlet; b. Flower bud; c. Flower; d. Corolla split open; e. Follicles (SKS & GK 46285); *Strophanthus wallichii*: f. Flowering branchlet (GK 56029).

1. *Rauvolfia serpentina* (L.) Benth. ex Kurz, Forest Fl. Burma 2: 171. 1877; Hook. f., Fl. Brit. India 3: 632. 1882; Prain, Bengal Pl. 2: 671. 1903 (as "*Rauwolfia*").
Ophioxylon serpentinum L., Sp. Pl. 2: 1043. 1753. [Plate 130d]

Chandra (B); *Sarpagandha*, *Chota-chand* (H).

Erect herb, 15–20 cm high. Leaves crowded at end of branchlets, ovate to ovate-elliptic, 7–10 × 2.5–6.5 cm, attenuate, entire, acute or short acuminate, chartaceous. Inflorescence terminal cymes. Calyx reddish or green, divided to base; lobes 5, lanceolate, 1.5–2 × 0.5–0.7 mm, acute. Corolla white, with pinkish hue, salverform; tube c. 4 mm, inflated at middle, hairy at neck; lobes 5, oblong-elliptic, c. 2 × 1 mm, obtuse or rounded. Stamens 4, subsessile; anthers sagittate, c. 1 mm, papillose at apex; disk shallowly lobed. Carpels 2, distinct; style c. 0.7 mm; stigma with a conical base, tip bifid. Drupes blackish, obovoid, 5–8 × 3–4 mm, bilobed; seed solitary, ovoid, 2–3 × c. 2 mm, smooth.

Flowering & Fruiting: April–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Karnataka, Meghalaya, Mizoram, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Bhutanghat, JKS 4086; Santrabari range, 04.10.2009, SKS & GK 46102; Jainti 5–9, 05.04.2012, GK 56036; Jainti 8, 08.04.2012, GK 56064; Mainabari, Bhutanghat, 26.09.2011, AK 52890; Bhutanghat, 25.02.2012, AK 55933; Santrabari to Buxaduar, 18.05.2014, AK 62624.

2. *Rauvolfia tetraphylla* L., Sp. Pl. 1: 208. 1753. *Rauvolfia canescens* L., Sp. Pl. 1: 208. 1753; Prain, Bengal Pl. 2: 671. 1903 (as "*Rauwolfia*"). [Plate 131a-b]

Shrub, 1–1.5 m high. Leaves in whorls of 3–4, ovate or oblong, 1.8–11 × 1–5 cm, cuneate to rounded, entire, acute or obtuse, membranous. Inflorescence axillary cymose; floral bracts triangular ovate. Calyx cupular; tube c. 1 mm; lobes 5, triangular-ovate, c. 1 × 1 mm, bifid at apex, ciliate. Corolla greenish white, urceolate; tube c. 4 mm, pubescent; lobes 5, suborbicular, c. 1 mm across, lobulate. Stamens 5; filaments fused with corolla tube; anthers c. 0.5 mm; disk angled. Ovaries enclosed in calyx tube; style short; stigma with a broad calyprate base. Drupes subglobose, 5–10 mm across, faintly lobed, immature green, red when mature, sparsely pubescent, 1–2-seeded.

Flowering & Fruiting: April–August.

Distribution. India: Andhra Pradesh, Bihar, Jharkhand, Karnataka, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: SRVK 4, 16.02.2010, SKS & GK 47121.

8. *Strophanthus* DC.

Strophanthus wallichii A. DC., Prodr. 8: 418. 1844; Hook. f., Fl. Brit. India 3: 655. 1882; Prain, Bengal Pl. 2: 677. 1903. [Plate 131c; Fig. 48f]

Lianas. Leaves elliptic-obovate, 5.2–13 × 2.5–6 cm, attenuate, entire, abruptly acuminate, chartaceous, turned pale when dry, glabrous. Inflorescence lax, many-flowered, dichotomously branched cymes; floral bracts linear-lanceolate. Calyx divided to base; lobes 5, linear-lanceolate, c. 19 × 2 mm, ciliate. Corolla infundibular; tube 2–6 mm, puberulent inside; lobes green, crimson tinge at base and middle of lobes, linear, 6–14 cm, puberulent. Corona lobes white, 5, each bifurcated into two lobes, 2.8–6.5 mm high. Stamens 5, subsessile; anthers sagittate, connivent, forming a cone, spurred at base. Follicles in pairs, cylindrical-lanceolate, 17–19 × 1.8–2.3 cm, lenticellate, beaked; seeds elliptic, c. 15 × 2 mm, creamy white, comose.

Flowering & Fruiting: April–December.

Distribution. India: Andaman & Nicobar Islands, Assam, Bihar, Meghalaya, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: NRVK 7, 04.12.2011, GK 52327; NRVK 7, 05.04.2012, GK 56029.

9. *Tabernaemontana* L.

Tabernaemontana divaricata (L.) R. Br., Syst. Veg. 4: 427. 1819. *Nerium divaricatum* L., Sp. Pl. 1: 209. 1753. *Tabernaemontana coronaria* (Jacq.) Willd., Enum. Pl. 1: 275. 1809; Hook. f., Fl. Brit. India 3: 646. 1882; Prain, Bengal Pl. 2: 673. 1903.

Togar (B); *Tagar*, *Assamey* (N).

Shrub, 2–3 m high. Leaves elliptic-lanceolate to lanceolate, 4.2–9.5 × 1.6–2.3 cm, cuneate, entire, acuminate, subcoriaceous. Inflorescence dichotomously branched cymes, 1–8-flowered; floral bracts scaly. Calyx cupular; tube 1.5–2 mm; lobes 5, variable in shape, c. 1 mm, rounded to acuminate. Corolla white, salver-shaped; tube 16–20 mm, pilose inside below stamens; lobes obovate, 15–22 × 10–20 mm. Stamens 5, subsessile; anthers oblong, c. 5 mm. Carpels 2; style short; stigma 2-lobed. Follicles green, orange-red when mature, divaricated, ellipsoid, 4–5 × 0.9–1.5 cm, fleshy; seeds red or orange fleshy arillate, c. 9 × 4 mm.

Flowering & Fruiting: August–June.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Haryana, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Santrabari, JKS 924; Bhutanghat, 350m, JKS 4119; South Rajabhatkawa, JKS 4252; Santrabari range, 04.10.2009, SKS & GK 46114.

10. *Trachelospermum* Lem.

Trachelospermum assamense Woodson, *Sunyatsenia* 3: 80. 1936; G. Krishna & al., *Pleione* 8(1): 195. 2014. [Plate 132a; Fig. 49]

Climbing shrub. Leaves elliptic, 2.5–6 × 1.5–3 cm, cuneate, entire, short acuminate, mucronate tipped. Inflorescence terminal or lateral corymbose cymes. Calyx divided to base; lobes 5, triangular-ovate, 2–3 × 1 mm, ciliate. Corolla white, salverform; tube c. 6 mm; lobes 5, oblanceolate, 5–8 mm, obtuse, hairy at base. Stamens 5; filaments short; anthers sagittate. Carpels 2; style slender, 2.5–3 mm; stigma 5-lobed; disk lobed. Follicles paired, cylindric, 10–15 cm; seeds many, oblong, 1–2 cm, white comose.

Flowering & Fruiting: April–February.

Distribution. India: Assam and West Bengal.

Specimens examined: 23rd mile road, 29.03.2012, GK 50620; Checko-1, 09.02.2013, AK 58821.

11. *Vallaris* Burm. f.

Vallaris solanacea (Roth) Kuntze, *Rev. Gen. Pl.*: 417. 1891. *Peltanthera solanacea* Roth, *Nov. Pl. Sp.*: 132. 1821. *Vallaris heynei* Spreng., *Syst. Veg.* 1: 635. 1824; Hook. f., *Fl. Brit. India* 3: 650. 1882; Prain, *Bengal Pl.* 2: 675. 1903. [Plate 132b-c]

Hapar, Mali (B); *Dudhe lahara* (N).

Climbing shrub. Leaves ovate-lanceolate or elliptic-lanceolate, 2.3–6.5 × 1.1–2.5 cm, cuneate, entire, short acuminate, chartaceous, pellucid gland-dotted above, sparsely hairy when young. Inflorescence axillary, terminal, many flowered, branched cymes, pubescent; floral bracts ovate-lanceolate. Calyx divided to base, pubescent; lobes 5, ovate, 3.5–4 × 1–1.2 mm, acute. Corolla creamy white, subrotate; tube campanulate, c. 4 mm; lobes 5, suborbicular, 7–9 × 5–9 mm, faintly emarginate. Stamens 5; filaments flattened, hairy at base; anthers fused to form cone-like structure, dome-shaped glands at connective. Carpels 2, fused; style c. 2.5 mm, hairy; stigma globose; disk 5-lobed, hairy. Follicle solitary, oblong-lanceolate, c. 7.5 × 1.8 cm, stout, grooved one side; seeds ellipsoid-ovate, c. 7 × 4 mm, beaked, white comose, rugose.

Flowering & Fruiting: February–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 2a, 04.03.2011, GK 47240; Kumargram, 18.02.2012, AK 55733.



Fig. 49. *Trachelospermum assamense*: a. Flowering branchlet; b. Flower bud; c. Corolla split open showing stamens and style with calyx; d. Stamen; e. Follicles (GK 50620, AK 58821).

12. *Wrightia* R. Br.

Key to the species

- 1a. Corolla white; coronal scales white, 2-seriate; follicles fused at tip 3. *W. tinctoria*
1b. Corolla red or orange red to reddish green; coronal scales red or orange red to reddish green, rarely white in *W. arborea*, 1-seriate; follicles fused throughout 2
- 2a. Leaves pubescent above, tomentose below; floral bracts lanceolate, pubescent; corolla orange red to reddish green; lobes oblong or elliptic-oblong, 2–3 mm wide, acute or obtuse, glandular pubescent; coronal scales orange red to reddish green, lacerate at apex; follicles taper in acute apex 1. *W. arborea*
2b. Leaves glabrous; floral bracts ovate-lanceolate to broadly ovate, glabrous; corolla red; lobes suborbicular, c. 2 cm wide, rounded, glabrous; coronal scales red, crenulate at apex; follicles taper in bilobed apex 2. *W. coccinea*

1. *Wrightia arborea* (Dennest.) Mabb., Taxon 26: 533. 1977. *Periploca arborea* Dennst., Schlüssel Hortus Malab.: 13, 23, 25. 1818. *Wrightia tomentosa* Roem. & Schult., Syst. Veg. 4: 414. 1819; Hook. f., Fl. Brit. India 3: 653. 1882; Prain, Bengal Pl. 2: 674. 1903. [Plate 132d]

Dudh-koraiya (B); *Khirra*, *Dudhi* (N).

Deciduous tree, 5–10 m high. Leaves elliptic or ovate, 5.8–14.8 × 2.8–5.6 cm, cuneate, entire and hairy, acuminate, chartaceous, pubescent above, tomentose below. Inflorescence terminal, peduncled cymes, pubescent; inflorescence bracts ovate to lanceolate; floral bracts lanceolate. Calyx cupular; tube 2–2.5 mm, tomentose outside; lobes 5, triangular-ovate or circular, 1–1.5 mm across, acute, tomentose outside. Corolla greenish-white or orange-red; tube cupular, 3.5–4.5 mm, sparsely pubescent at apex outside, glabrous at base inside; lobes 5, oblong or elliptic-oblong, c. 10 × 2–3 mm, acute or obtuse, glandular pubescent. Stamens 5, subsessile; anthers 5, coherent, lanceolate, 5–7 mm, pilose outside. Coronal scales orange-red, 4–5 mm, connate, lacerate. Carpels 2; style 4–5 mm; stigma elliptic. Follicles black, fused, linear, 15.5–22.5 × 1–1.6 cm, subterete, tapering in acute end, grooved, woody, lenticellate; seeds linear-oblong, 12–15 mm, pitted, white comose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andhra Pradesh, Bihar, Jharkhand, Gujarat, Karnataka, Kerala, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Buxa to Tobgaon, 18.05.1949, VN & party 2661; North Rajabhatkhawa, JKS 6989; Panbari 6, 05.10.2009, SKS & GK 46179; Marakata, 24.09.2011, AK 52857; Sankosh, 17.02.2012, AK 55685; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58593; Santrabari to Buxaduar, 18.05.2014, AK 62615; Santrabari to Buxaduar, 18.05.2014, AK 62620.

2. *Wrightia coccinea* (Roxb. ex Hornem.) Sims, Bot. Mag. 53: t. 2696. 1826; Hook. f., Fl. Brit. India 3: 654. 1882; Prain, Bengal Pl. 2: 674. 1903. *Nerium coccineum* Roxb. ex Hornem., Hort. Bot. Hafn. Suppl.: 126. 1819.

[Plate 133a-b; Fig. 50]

Deciduous tree, 8–15 m high. Leaves elliptic to ovate-lanceolate, 6.5–12 × 2.5–4.5 cm, cuneate, entire to slightly repand, caudate-acuminate, chartaceous, verruculose. Inflorescence terminal, short pedunculate cymes; inflorescence bracts lanceolate; floral bracts ovate-lanceolate to ovate. Calyx cupular, divided up to base, glandular inside; lobes 5, ovate to suborbicular, 6–7 mm across. Corolla red, deciduous; tube cupular, c. 10 mm, fused with coronal scales, glandular pubescent; lobes 5, suborbicular, c. 2 cm across, rounded, spreading, succulent, glandular pubescent. Stamens 5, subsessile; anthers 5, fused and form a cone around to clavuncula, c. 10 mm, pubescent. Coronal scales red, cupular, 5-lobed, crenulate. Carpels 2; style c. 6 mm; stigma ovoid. Follicles fused, strap-shaped, 13–15 × 3.5–4 cm, compressed, woody, grooved, lenticellate; seeds linear-lanceolate, 15–17 × 1.5–2 mm, compressed, isodiametric cells on surfaces, with white long coma.

Flowering & Fruiting: April–September.

Distribution. India: Arunachal Pradesh, Assam, Mizoram, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa to Chunabhati, 17.05.1949, VN 2612; Way to Buxaduar, 12.05.1976, JKS 4597; Way to Buxaduar, JKS 7167; Buxa Fort to Chunabhati, 30.09.2013, AK 59695; Buxaduar to Achalung, 19.05.2014, AK 62651.

3. *Wrightia tinctoria* R. Br., Mem. Wern. Nat. Soc. 1: 74. 1811; Hook. f., Fl. Brit. India 3: 653. 1882.

[Plate 133c]

Deciduous tree, 8–10 m high. Leaves elliptic to elliptic-oblancheolate, 15–19 × 4.7–6.2 cm, cuneate, repand, abruptly acuminate to caudate-acuminate, chartaceous. Inflorescence terminal, dichotomously branched cymes; inflorescence and floral bracts lanceolate. Calyx cupular, divided up to base, glandular inside; lobes 5, ovate to suborbicular, 2.5–3 mm across, obtuse to rounded, pubescent. Corolla white; tube cupular, c. 5 mm, fused with coronal scales, glandular pubescent outside; lobes 5, oblanceolate, 12–15 × 4–5 mm, subacute, spreading, glandular pubescent. Stamens 5, subsessile; anthers 5, fused and forming a cone around to clavuncula, c. 5 mm, pubescent. Coronal scales white, many in 2 series, inner one linear, outer one divided, 8–10 mm, vesicular. Carpels 2; style 2.5–4.5 mm; stigma clavate. Follicles fused at tip, linear-cylindric, 13–15 × 3.5–4 cm, taper in acute ends, woody, lenticellate; seeds linear, 13–15 × 1–1.5 mm, compressed, verruculose, white long comose.

Flowering & Fruiting: April–September.

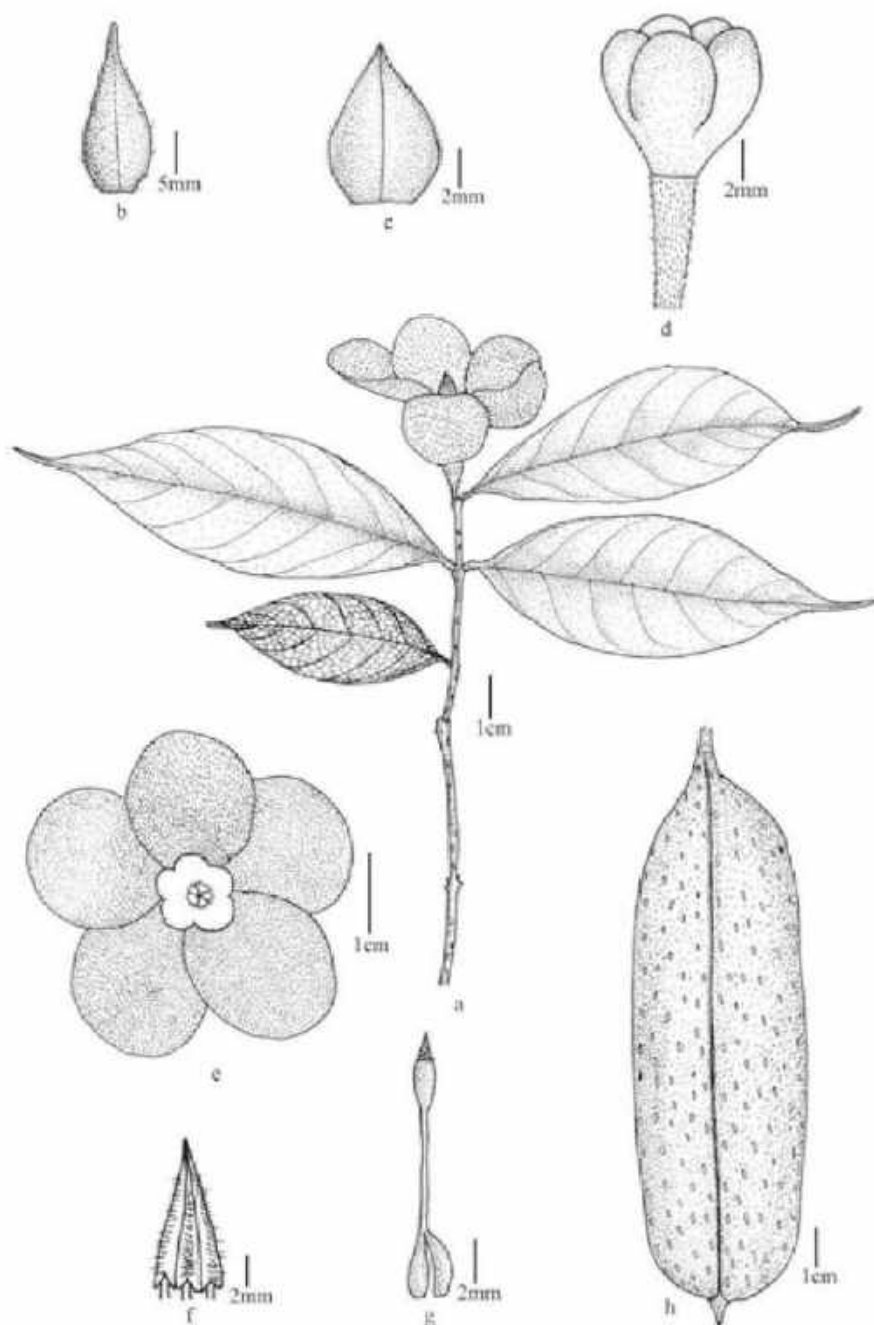


Fig. 50. *Wrightia coccinea*: a. Flowering branchlet; b. Inflorescence bract; c. Floral bract; d. Calyx; e. Front view of flower showing coronal scales and stamens; f. Stamens; g. Carpels; h. Follicle (AK 62651).

Distribution. India: Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Dadar & Nagar Haveli, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Buxa to Bhutan Road, 16.05.1949, VN & party 2496; Buxa Fort to Chunabhati, 30.09.2013, AK 59693.

Asclepiadaceae

Key to the genera

- | | | |
|-----|--|-----------------------|
| 1a. | Erect shrubs | 2 |
| 1b. | Climbing shrubs (except <i>Hoya lanceolata</i>) | 3 |
| 2a. | Corolla crimson; lobes not revolute at margin, strongly reflexed; corona yellow; coronal scales form nectar pouches; follicle solitary, fusiform, erect, not inflated, tapering in sharp tip | 1. <i>Asclepias</i> |
| 2b. | Corolla white; lobes revolute at margin, slightly reflexed; corona white; coronal scales not form nectar pouches; follicles paired, obliquely elliptic to oblong-lanceolate, divaricate, inflated, tapering in curved tip | 2. <i>Calotropis</i> |
| 3a. | Epiphytic; leaves succulent; corolla usually white | 4 |
| 3b. | Terrestrial; leaves not succulent; corolla variously coloured | 5 |
| 4a. | Leaves with extra-floral nectaries, gland-dotted above; inflorescences axillary fascicles or umbels; corolla globose, with a ring of hairs at throat; lobes erect; corona lobes membranous, erect, bifid with recurved arms | 5. <i>Dischidia</i> |
| 4b. | Leaves without extra-floral nectaries, not gland-dotted above; inflorescences umbellate cymes; corolla cupular, without a ring of hairs at throat; lobes reflexed; corona lobes fleshy, not erect, not bifid with recurved arms | 8. <i>Hoya</i> |
| 5a. | Corolla tubular; lobes connivent at tip formig a crown; coronal scales 10, staminal, biseriata | 3. <i>Ceropegia</i> |
| 5b. | Corolla and corona not as above | 6 |
| 6a. | Stems unbranched, rusty brown pubescent; inflorescences rusty brown pubescent; coronal scales obovate with elongate tip, crenulate at apex, membranous, overlapping the anther lobes; pollen masses two in each anther cell | 10. <i>Toxocarpus</i> |
| 6b. | Stems branched, not rusty brown pubescent; inflorescences not rusty brown pubescent; corona not as above; pollen masses solitary in each anther cell | 7 |
| 7a. | Lateral veins closely parallel to each other; inflorescences dichotomously branched cymes; corolla pale yellow, twisted; pollens attached to sticky, elongate, spoon-shaped end of minute, erect translator arm with white corpusculum | 4. <i>Cryptolepis</i> |
| 7b. | Plants not as above | 8 |
| 8a. | Inflorescences long pedunculate, head-like clusters of umbellate cymes; follicies paired or not | 9 |

- 8b. Inflorescences not as above; follicle solitary 10
- 9a. Leaves broadly ovate-cordate; corolla green; corona staminal; follicles paired, divaricate, tapering in straight blunt apex, brown tomentose 6. *Dregea*
- 9b. Leaves not broadly ovate-cordate; corolla creamy white; corona corolline; follicle solitary, pendulous, tapering in straight sharp or curved blunt apex, not tomentose 7. *Gymnema*
- 10a. Leaves not oblong-lanceolate, without nectary; not glandular; inflorescences erect spicate or branched umbellate cymes; corolla creamy white or reddish brown, tubular or urceolate, not spreading, sericeous or glabrous inside; coronal scales creamy white or greenish, not swollen 9. *Marsdenia*
- 10b. Leaves oblong-lanceolate, with nectary scales, glandular; inflorescences panicles of umbels; corolla pale crimson, campanulate, spreading, villous inside; coronal scales maroon, gibbous 11. *Vincetoxicum*

1. *Asclepias* L.

Asclepias curassavica L., Sp. Pl. 1: 215. 1753; Hook. f., Fl. Brit. India 4: 18. 1883; Prain, Bengal Pl. 2: 689. 1903. [Plate 133d]

Shrub, 1–1.5 m high. Leaves linear-lanceolate, 6–10 × 0.7–2 cm, asymmetrically attenuate, entire, acute, chartaceous, glabrous except near margins. Inflorescence terminal, 7–10-flowered, umbellate cymes, pubescent; inflorescence bracts linear; floral bracts linear. Calyx divided to base, pubescent; lobes 5, lanceolate, c. 2.5 × 1 mm, ciliate, acute, pubescent. Corolla crimson, divided up to base; lobes 5, oblong-obovate, c. 5 × 2 mm, slightly connate, acute, strongly reflexed. Coronal scales yellow, erect and spoon-shaped, form nectar pouches; coronal horn projecting vertically from inner surface. Stamens held level with cup of coronal scales; anthers with a membranous apical projection inflexed over stigmatic surface. Stigma 5-angled. Follicles fusiform, c. 4.8 × 1 cm, beaked; seeds ovate-elliptic, c. 5 × 3 mm, white comose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 5a, GK 46287; Narathali, 20.02.2012, AK 55782.

Notes: Leaf paste is applied in leucoderma.

2. *Calotropis* R. Br.

Calotropis gigantea (L.) W. T. Aiton, Hort. Kew., ed. 2: 78. 1811; Hook. f., Fl. Brit. India 4: 17. 1883; Prain, Bengal Pl. 2: 688. 1903. *Asclepias gigantea* L., Sp. Pl. 1: 214. 1753. [Plate 134a]

Akanda, Gurtakand (B); *Aank* (N).

Shrub, 1–2 m high. Leaves elliptic-oblong to elliptic, 6–19 × 3.5–9.5 cm, rounded to cordate, undulate, acute to obtuse, subcoriaceous, white tomentose. Inflorescence axillary, terminal corymbs, tomentose. Calyx divided up to base; lobes 5, ovate-lanceolate, c. 5 × 2.5 mm, connate, acute. Corolla white, cupular; tube short; lobes 5, ovate, 1–1.5 × 0.6–1 cm, revolute, acute. Coronal scales white, laterally compressed, spur at base, bilobed at apex. Anthers cartilaginous triangular yellow appendaged, apical membranous projection cover stigmatic surface. Stigmatic head green, depressed, 5-angled. Follicles paired, obliquely elliptic to oblong-lanceolate, 5–10 × 2.5–4 cm, divaricate, ends incurved; seeds ovate, 5–7 × 3–4 mm, white comose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Jainti river bank, 13.10.2009, SKS & GK 46351; Rydak river belt, 20.09.2011, AK 52668; Phashkhawa, 27.09.2012, AK 56188.

Notes: The powdered leaves help in the fast healing of wounds; hot poultices are applied to the stomach to relieve pain, and stop headaches.

3. *Ceropegia* L.

Ceropegia macrantha Wight, Contr. Bot. India: 31. 1834; Hook. f., Fl. Brit. India 4: 74. 1883; Prain, Bengal Pl. 2: 701. 1903. [Plate 134b; Fig. 51]

Climbing herb. Leaves ovate or lanceolate, 6–14 × 1.8–3.4 cm, cuneate at base, entire and hairy, acuminate, membranous, hispid above. Inflorescence axillary, subumbellate cymes, hispid; floral bracts linear-lanceolate. Calyx spreading, divided to base; lobes 5, lanceolate or linear-lanceolate, 4–7 × 0.5–1 mm, acuminate. Corolla yellowish green or creamy white, black-purple spotted, funnellform; tube 10–23 mm, hispid, a ring of hairs at mouth inside; lobes 5, connivent to form a crown, ovate, c. 7 × 3 mm, pubescent; apices linear-oblong, c. 12 × 1 mm, pubescent throughout. Coronal scales 10, staminal, biseriate; outer ones yellowish, black purple spotted, deltoid, c. 1.5 × 1 mm, bifid and reddish, barbate; inner lobes yellowish, reddish at apex, erect, linear, c. 3.5 × 0.5 mm. Stamens 5, fused to carpels. Gynostegium angular, c. 1.5 mm across. Follicles horizontally paired, cylindric, 10–12 cm, terete, smooth; seeds white comose.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Assam, Jammu & Kashmir, Himachal Pradesh, Madhya Pradesh, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Bhutanghat, 26.09.2011, AK 52899; Phashkhawa, 27.09.2012, AK 56192.

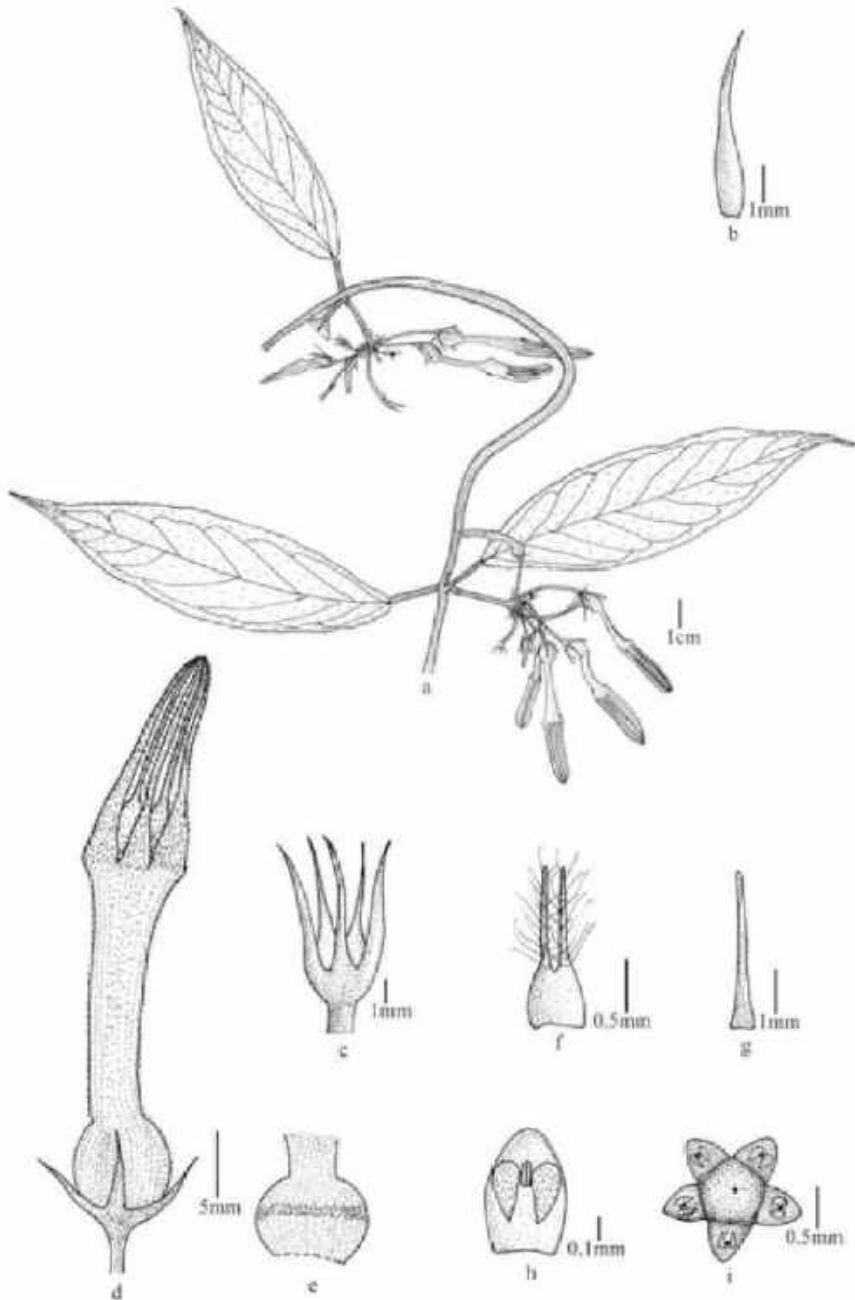


Fig. 51. *Ceropogia macrantha*: a. Flowering branchlet; b. Floral bract; c. Calyx; d. Corolla with calyx; e. Base of corolla tube split open showing transverse row of hairs; f. Outer coronal scale; g. Inner coronal scale; h. Anther cell showing pollinia; i. Gynostegium (AK 56192).

4. *Cryptolepis* R. Br.

Key to the species

- 1a. Branchlets producing sticky milky latex; leaves ovate-elliptic or oblong-ovate, attenuate, undulate, acute at apex, pellucid glands below; lateral veins inconspicuous; inflorescence extra-axillary; corolla persistent; lobes c. 5 mm, not reflexed; follicles triquetrous, tapering in sharp end 1. *C. dubia*
- 1b. Branchlets producing sticky watery latex; leaves elliptic-oblong to oblong-lanceolate, truncate to subcircular, entire, rounded to obtuse at apex, pellucid glands absent; lateral veins prominent; inflorescence axillary; corolla deciduous; lobes 1.5–1.7 cm, reflexed; follicles subterete, tapering in blunt end 2. *C. sinensis*

1. *Cryptolepis dubia* (Burm. f.) M. R. Almeida, Fl. Maharashtra 3: 221. 2001. *Periploca dubia* Burm. f., Fl. Ind.: 70. 1768. *Cryptolepis buchananii* R. Br. ex Roem. & Schult., Syst. Veg. 4: 409. 1819 (as "*buchanani*"); Hook. f., Fl. Brit. India 4: 5. 1883; Prain, Bengal Pl. 2: 685. 1903. [Plate 134c-d]

Karanta (H); *Dude lahara* (N).

Climbing shrub. Leaves ovate-elliptic or oblong-ovate, 4.6–8.7 × 1.7–3 cm, attenuate, undulate, acute, mucro, subcoriaceous, pellucid glands below. Inflorescence extra axillary, pedunculate, dichotomously branched cymes; inflorescence bracts linear; floral bracts triangular-ovate. Calyx divided to base; lobes 5, ovate, 1.3–1.5 × c. 1.3 mm, ciliate, obtuse, membranous. Corolla creamy yellow, divided to base; tube 2–3 mm; lobes 5, linear-lanceolate, c. 4 × 1 mm, acute. Corona corolline, 5-lobed, arising from the base of corolla, c. 1 mm. Gynostegium conical, c. 1.5 mm. Follicles paired, lanceolate, 2.5–11.4 × 0.3–2 cm, triquetrous, divaricate, sharply acute, smooth; seeds ovate-oblong, 5–8.5 × 2.5–3 mm, long silky white comose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa, KPB 1717; Jainti 3, Jainti river, 08.04.2012, GK 56062; Newlands, Sukno river, 22.09.2011, AK 52776; Phashkhawa river belt, 30.09.2012, AK 58546; Hatipota, 18.02.2013, AK 59836.

2. *Cryptolepis sinensis* (Lour.) Merr., Philipp. J. Sci. 15: 254. 1919. *Pergularia sinensis* Lour., Fl. Cochinch. 1: 169. 1790. *Cryptolepis elegans* Wall. ex G. Don, Gen. Hist. 4: 82. 1838; Hook. f., Fl. Brit. India 4: 6. 1883; Prain, Bengal Pl. 2: 685. 1903. [Plate 135a; Fig. 52]

Dude lahara (N).

Climbing shrub. Leaves elliptic-oblong to oblong-lanceolate, 3.2–5.3 × 1.3–2.5 cm, truncate to subcircular, entire, rounded to obtuse, apiculate tip, coriaceous. Inflorescence axillary, terminal, lax, few flowered, dichotomously branched cymes; inflorescence and floral bracts elliptic-ovate. Calyx cupular, divided to

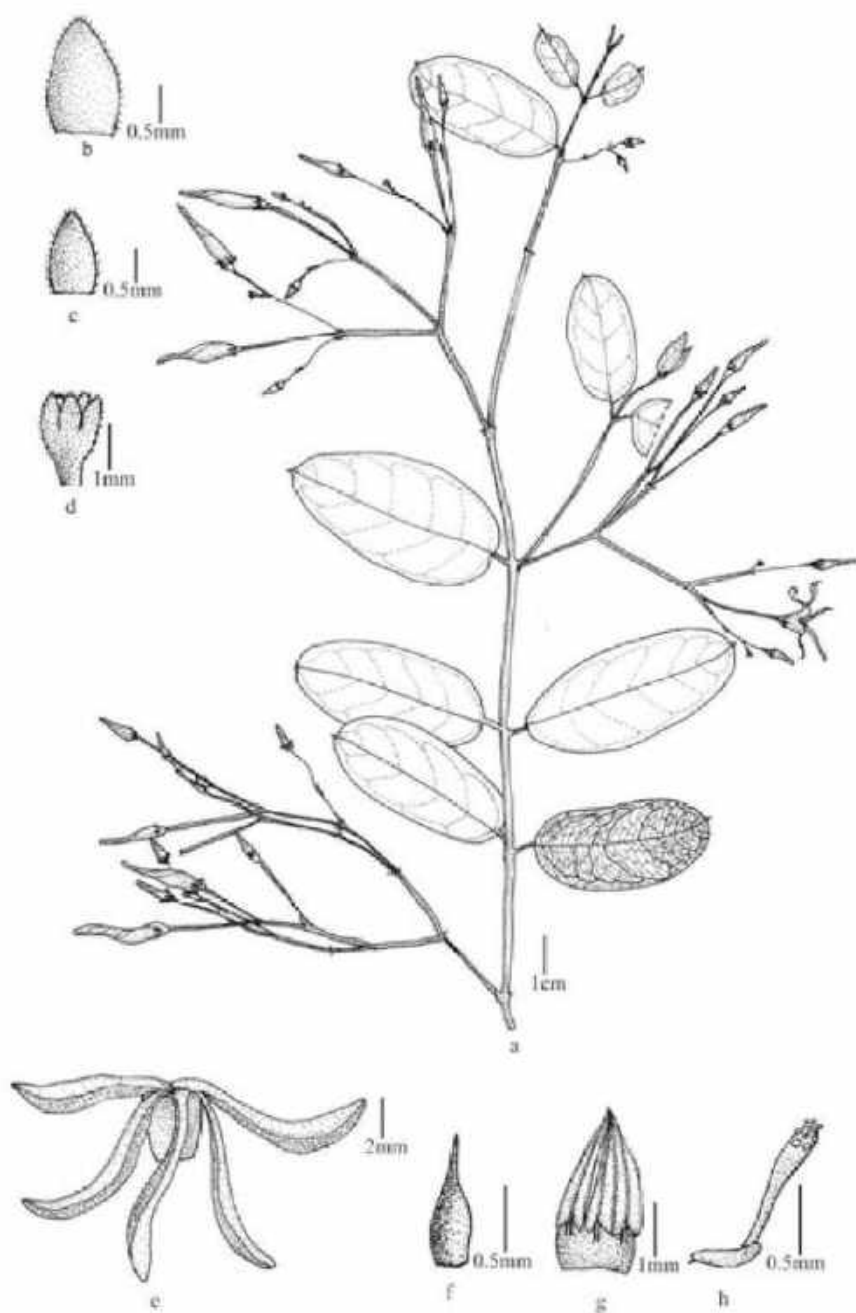


Fig. 52. *Cryptolepis sinensis*: a. Flowering branchlet; b. Inflorescence bract; c. Floral bract; d. Calyx; e. Corolla; f. Coronal scale; g. Gynostegium; h. Pollens with translator arm and corpusculum (AK 65909).

base; lobes 5, ovate to ovate-lanceolate, $c. 2 \times 1-1.5$ mm, scarious and ciliolate at margins, subacute, vesicular. Corolla greenish yellow, campanulate, deciduous; tube 3.5-4 mm; lobes 5, linear, $15-17 \times 1.8-2$ mm, acute to obtuse, twisted, reflexed; coronal scales 5, adnate at middle of corolla tube, lanceolate, $c. 1$ mm, acuminate. Stamens 5; filaments fused at base; anthers saggitate. Gynostegium conical, 5-angled, $2-3 \times c. 1$ mm, bifid. Follicles paired, lanceolate, $12-14 \times 0.6-0.8$ cm, subterete, bluntly acute at apex, divaricate; seeds brown, oblong, $6-7 \times c. 2$ mm, compressed, long white comose.

Flowering & Fruiting: May-December.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: Buxa to Chunabhati, VN 2656; Rajabhatkhawa, KPB 1561; Buxa road, KPB 1654; Buxaduar to Chunabhati, 21.05.2014, AK 65909.

5. *Dischidia* R. Br.

Dischidia bengalensis Coleb., Trans. Linn. Soc. 12: 357, t. 15. 1818; Hook. f., Fl. Brit. India 4: 50: 1883. [Plate 135b]

Epiphytic shrub. Leaves elliptic-oblong, $2.2-6.5 \times 0.5-1.7$ cm, cuneate, entire, acute, coriaceous, extra floral nectaries present at base, gland-dotted. Inflorescence axillary fascicles. Calyx divided to base; lobes 5, oblong, $c. 1 \times 0.5$ mm, acute. Corolla creamy white, urceolate; tube globose, 2.3-2.5 mm, a ring of hairs at throat; lobes 5, triangular-ovate, $c. 1.2 \times 0.8$ mm, acute, erect. Corona staminal, 5-lobed, $c. 1.2$ mm; coronal lobes inconspicuous, not fleshy, erect. Stamens 5, $c. 1.5$ mm. Gynostegium $c. 1$ mm. Follicles paired, linear, $c. 5.5 \times 0.5$ cm, acute; seeds oblong, $2-2.5 \times 0.5-1$ mm, silky white comose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal.

Specimens examined: Buxaduar, JKS 4668; Jainti 1, 04.03.2011, GK 47227; Rydak river belt, 20.09.2011, AK 52689; Hauda nala, 19.02.2013, AK 59848; Santrabari to Buxaduar, 18.05.2014, AK 62602.

6. *Dregea* E. Meyer

Dregea volubilis (L. f.) Benth. ex Hook. f., Fl. Brit. India 4: 46. 1883; Prain, Bengal Pl. 2: 697. 1903. *Asclepias volubilis* L. f., Suppl. Pl. : 170. 1782.

[Plate 135c-d]

Titakunga (B); *Nak-chikni* (H).

Scandent shrub. Leaves broadly ovate-cordate, 8.5–15 × 5.5–12 cm, cordate, entire, acuminate, subcoriaceous. Inflorescence long pedunculate, umbel-like clusters of cymules; floral bracts linear. Calyx divided to base; lobes 5, ovate, c. 4.5 × 2.5 mm, sparsely ciliate, acute. Corolla green, rotate to cupular; tube short; lobes 5, oblong-ovate, 4–5 × c. 4 mm, ciliate, obtuse. Corona staminal, 5-lobed, free at apex; stamens 5, c. 3 mm. Gynostegium c. 3 mm. Follicles paired, ovoid, 6–15 × 1.5–3 cm, blunt at ends, divaricate, tomentose when young; seeds yellow with pinkish margins, ovate, 11–13 × 7.5–8 mm, silky white comose.

Flowering & Fruiting: March–October.

Distribution. India: Almost throughout India.

Specimens examined: Jainti river, 13.10.2009, SKS & GK 46342; Rydak, Tiamari, 23.02.2012, AK 55910.

Notes: Flowers are edible and used as vegetable.

7. *Gymnema* R. Br.

Key to the species

- 1a. Branchlets glabrous; leaves broadly ovate or oblong-ovate, subcordate at base, entire at margins, glabrous; petioles without glands at junction of lamina, glabrous; floral bracts lanceolate; corona not lobed; follicles lanceolate, tapering in straight sharp end 1. *G. inodorum*
- 1b. Branchlets pubescent; leaves broadly obovate to elliptic-obovate or suborbicular, rounded or cuneate at base, repand at margins, sparsely hairy; petioles glandular at junction of lamina, tomentose; floral bracts suborbicular; corona lobed; follicles linear, tapering in curved blunt end 2. *G. latifolium*

1. *Gymnema inodorum* (Lour.) Decue. in DC., Prodr. 8: 551. 1844. *Cynanchum inodorum* Lour., Fl. Cochinch. 1: 166. 1790. *Gymnema tingens* Roxb. ex Spreng. in DC., Prodr. 8: 623. 1844; Hook. f., Fl. Brit. India 4: 31. 1883.

Rheem (L).

Climbing shrub. Leaves broadly ovate or oblong-ovate, 5–12 × 3.5–8 cm, subcordate, entire, acuminate, subcoriaceous. Inflorescence extra axillary, pedunculate, many flowered, corymbose cymes, pubescent; floral bracts lanceolate. Calyx divided to base; lobes 5, linear-oblong, 3–4.5 × 1.5 mm, ciliate, obtuse, glandular pubescent. Corolla white, campanulate; tube c. 3.5 mm; lobes obliquely ovate, c. 3.5 × 2.5 mm, obtuse. Corona corolline, uniseriate, five-ridged, entire. Stamens 5, c. 3.5 mm. Gynostegium c. 5 mm. Follicle solitary, lanceolate, 12–14.5 × 2–2.3 cm, terete, smooth; seeds obovate, c. 13 × 6 mm, white comose.

Flowering & Fruiting: June–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Karnataka, Odisha, Sikkim, Tamil Nadu, Uttarakhand and WestBengal.

Specimens examined: Jainti 5–6, 11.10.2009, SKS & GK 46309; Newlands, Sukno river, 22.09.2011, AK 52796; Narathali, 20.02.2012, AK 55745.

2. *Gymnema latifolium* Wall. ex Wight, *Contr. Bot. India*: 45. 1834; Hook. f., *Fl. Brit. India* 4: 30. 1883; Anant Kumar & Venu, *Indian J. Forest.* 42 (3): 204. 2019. [Plate 136a; Fig. 53]

Climbing shrub. Leaves broadly obovate to elliptic-obovate or suborbicular, 6.5–12.5 × 4.5–8 cm, rounded or cuneate at base, repand and hairy, short acuminate, subcoriaceous, sparsely hairy above, glabrous later, sparsely hairy below. Inflorescence axillary, pedunculate, many flowered umbellate cymes, tomentose; floral bracts suborbicular. Calyx cupular; tube short; lobes 5, elliptic, 1–1.2 × c. 0.8 mm, ciliate, obtuse at apex, sparsely pubescent. Corolla creamy white, cupuliform; tube c. 1 mm; lobes 5, ovate, 1–1.2 × c. 0.5 mm, ciliate, acute or obtuse, thick, hairy inside; corona 5-ridged, triangular, uniseriate, corolline, ridges fleshy, lobed, alternating to corolla lobes, villous. Stamens 5, fused to carpel; staminal column c. 1 mm. Gynostegium dome-shaped, 0.8–1 × c. 0.5 mm. Follicle solitary, linear, c. 8 × 0.7 cm, beaked with curved bunt tip; seeds brownish, oblong, 14–15 × 4.5–5 mm, long silky white comose.

Flowering & Fruiting: August–January.

Distribution. India: Andaman & Nicobar Islands, Assam, Goa, Kerala, Maharashtra, Tamil Nadu and West Bengal.

Specimens examined: Bhutri, 05.10.2012, AK 58646; Santrabari, 27.09.2013, AK 59601.

8. *Hoya* R. Br.

Key to the species

- 1a. Non climbing, epiphytic shrubs; leaves lanceolate, not pendulous; corona reddish
2. *H. lanceolata*
- 1b. Climbing, epiphytic or terrestrial shrubs; leaves various, pendulous; corona white 2
- 2a. Terrestrial; leaves elliptic-oblong to oblong-oblanccolate, abruptly short acuminate at apex; lateral veins prominently visible; flowers in globose umbels; pedicels and calyx pubescent
1. *H. globulosa*
- 2b. Epiphytic; leaves ovate to ovate-lanceolate or oblanceolate, acuminate or acute at apex; lateral veins obscure; flowers in hemi-spherical umbels; pedicels and calyx glabrous
3
- 3a. Branchlets not gland-dotted; leaves oblanceolate, 1–2 cm wide, attenuate at base, acuminate at apex, not glandular below; corolla weakly reflexed; corona obovate, circular; seeds linear-lanceolate
3. *H. longifolia*
- 3b. Branchlets gland-dotted; leaves ovate to ovate-lanceolate, 4.7–5.5 cm wide, rounded, acute at apex, glandular below; corolla strongly reflexed; corona spatulate, subacute; seeds elliptic
4. *H. verticillata*

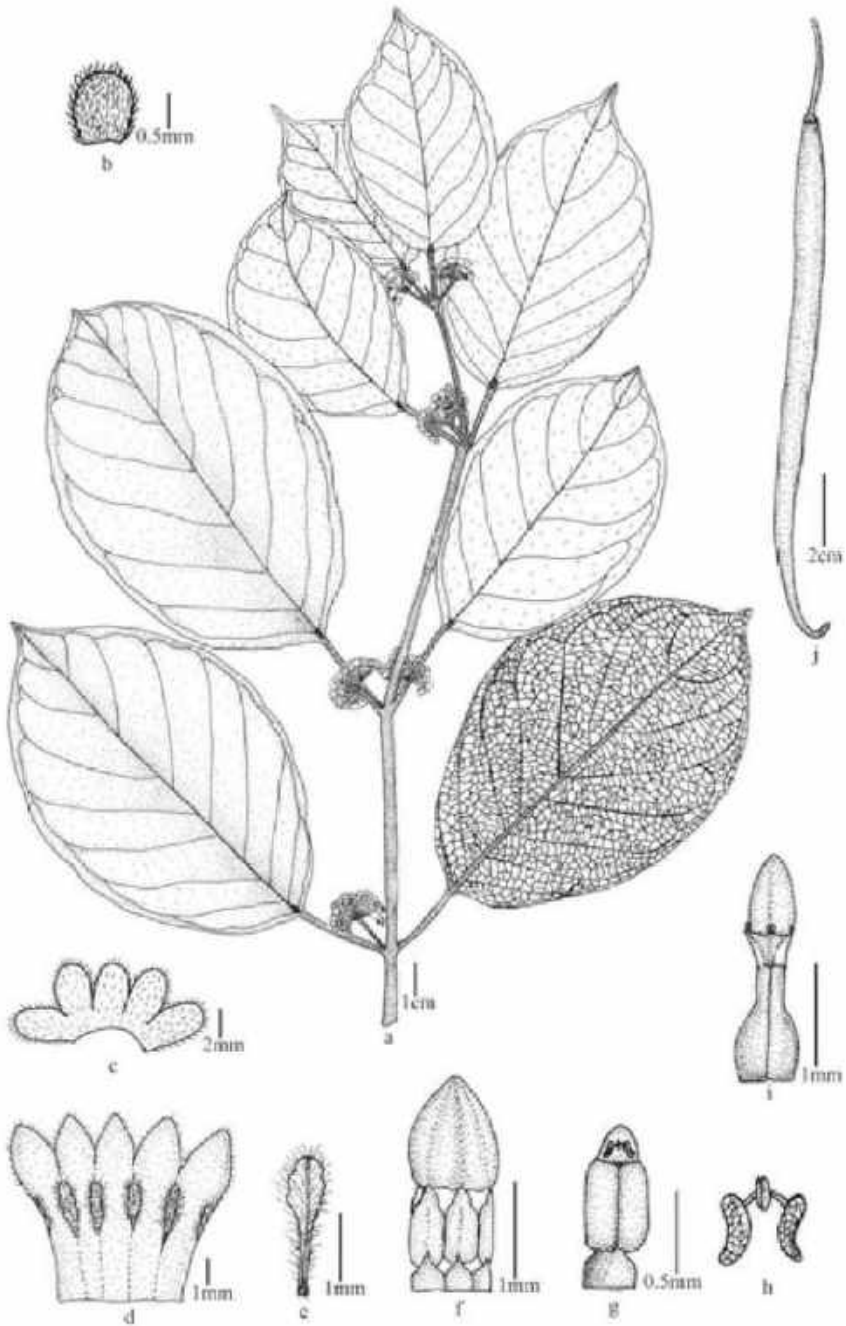


Fig. 53. *Gynnomma latifolium*: a. Flowering branchlet; b. Floral bract; c. Calyx split open; d. Corolla split open showing coronal scales; e. Coronal scale; f. Gynostegium; g. Stamen; h. Pollinia; i. Gynostegium without stamens; j. Follicle (AK 58646).

1. *Hoya globulosa* Hook. f., Gard. Chron. 2: 732, f. 115. 1882; Hook. f., Fl. Brit. India 4: 60. 1883; Prain, Bengal Pl. 2: 700. 1903.

Climbing shrub. Leaves elliptic-oblong to oblong-oblancheolate, 12–18 × 4.3–5.6 cm, rounded, repand, abruptly short acuminate, succulent, pendulous, coriaceous. Inflorescence axillary, umbellate cymes; floral bracts ovate. Calyx cupular, divided to base, pubescent; lobes 5, ovate, c. 2 × 1.5 mm, subacute, pubescent. Corolla creamy white, cupular; tube c. 1.5 mm, villous inside; lobes 5, ovate, 15–17 × 1.8–2 mm, acute, reflexed, villous; corona white, elliptic, c. 3 × 1.5 mm, 5-lobed, obtuse, staminal, uniseriate, fleshy, spurred at the base, shorter than anther tips, articulate. Stamens 5, c. 2 mm. Gynostegium c. 2 mm. Follicle solitary, linear, 20–27 × 0.5–0.9 cm, blunt at ends, smooth; seeds brown, linear to linear-lanceolate, 5–6 × 0.8–1 mm, acute at base, truncate at apex, compressed, white comose.

Flowering & Fruiting: May–November.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jammu & Kashmir, Sikkim, Tripura and West Bengal.

Specimen examined: Buxaduar to Chunabhati, 17.02.2014, AK 59986.

2. *Hoya lanceolata* Wall. ex D. Don, Prodr. Fl. Nepal: 130. 1825; Hook. f., Fl. Brit. India 4: 54. 1883. [Plate 136b; Fig. 54a-g]

Epiphytic, pendulous shrub, 30–40 cm. Leaves lanceolate to lanceolate-elliptic, 3–6 × 0.6–2 cm, cuneate, entire to revolute and glabrous to hairy, bluntly acute, succulent, coriaceous. Inflorescence axillary, umbellate cyme; floral bracts lanceolate to ovate-lanceolate. Calyx cupular, divided to base, pubescent; lobes 5, lanceolate, c. 2 × 1–1.2 mm, acute, pubescent. Corolla white, cupular; tube 2.5–3 mm, villous inside; lobes 5, ovate, c. 4 mm across, acute, apiculate tip, villous; corona reddish, elliptic, c. 2.5 × 1.2 mm, 5-lobed, obtuse, notched, staminal, uniseriate, fleshy, spurred at the base, articulate. Stamens 5, c. 3 mm. Gynostegium c. 2 mm. Follicle solitary, linear, 10–12 × 0.4–0.5 cm, blunt at ends, smooth; seeds light brown, linear-lanceolate, c. 3.5 × 1.2 mm, compressed, white comose.

Flowering & Fruiting: April–September.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimens examined: On way to Sinchula, KPB 2024; on way to Ramiti, Buxaduar, JKS 7166; Near Bhtia Pond, 07.04.2012, GK 56045; Santrabari to Buxa Fort, 28.09.2013, AK 59626; Santrabari to Buxaduar, 18.05.2014, AK 62603.

3. *Hoya longifolia* Wall. ex Wight, Contr. Bot. India: 33. 1834; Hook. f., Fl. Brit. India 4: 54. 1883. [Plate 136c; Fig. 54h-p]

Epiphytic, climbing to pendulous shrub. Leaves oblanceolate, 6.5–15 × 1–1.9 cm, attenuate, entire, usually acuminate rarely subacute, coriaceous, succulent. Inflorescence axillary, umbellate cymes; floral bracts triangular-ovate. Calyx



Fig. 54. *Hoya lanceolata*: a. Flowering branchlet; b. Calyx; c. Corolla; d. Corona; e. Stamen; f. Carpel; g. Pollinia (GK 56045); *Hoya longifolia*: h. Flowering branchlet; i. Lateral view of flower; j. Dorsal view of flower; k. Floral bract; l. Calyx; m. Stamens; n. Pollinia; o. Gynostegium without stamens; p. Follicle (AK 65910).

cupular, divided to base; lobes 5, ovate-lanceolate, 1.5–1.8 × c. 1 mm, scarious, acute. Corolla cupular, weakly reflexed, villous inside; tube 3.5–4 mm; lobes 5, triangular-ovate, 3.5–4 mm across, acute; corona white, obovate, 3–3.2 × c. 2 mm, 5-lobed, rounded, staminal, uniseriate, fleshy, articulate. Stamens 5, c. 2 mm. Gynostegium c. 2 mm. Follicle solitary, linear, 11–13 × 0.5–0.7 cm, blunt at ends, smooth; seeds light brown, linear-lanceolate, c. 3 × 1 mm, acute at base, truncate at apex, faintly median keeled, compressed, white comose.

Flowering & Fruiting: May–August.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Buxaduar to Achalung, 19.05.2014, AK 62645; Buxaduar to Chunabhati, 21.05.2014, AK 65910.

4. *Hoya verticillata* (Vahl) G. Don, Gen. Hist. 4: 128. 1837. *Sperlingia verticillata* Vahl, Skr. Naturhist.-Selsk. 6: 113. 1810. *Hoya parasitica* (Wall. ex Hornem.) Wight, Contrib. Bot. India: 37. 1834; Hook. f., Fl. Brit. India 4: 57. 1883; Prain, Bengal Pl. 2: 700. 1903. *Asclepias parasitica* Roxb., Fl. Ind. 2: 42. 1832, *nom. illeg.* [Plate 137a]

Epiphytic, climbing shrub. Leaves ovate to ovate-lanceolate, 10–13 × 4.7–5.5 cm, rounded, entire, acute, coriaceous, succulent, pendulous, glandular below. Inflorescence axillary, umbellate cymes; floral bracts triangular-ovate. Calyx cupular, divided to base; lobes 5, triangular-ovate, 1.6–2 × 1–1.2 mm, scarious, acute. Corolla cupular, strongly reflexed, villous; tube 3–3.5 mm; lobes 5, triangular-ovate, 3.2–3.5 × c. 4 mm, revolute, acute; corona white, spatulate, 4.5–5 × 1.2–1.8 mm, 5-lobed, subacute, staminal, uniseriate, fleshy, articulate. Stamens 5, c. 1.5 mm. Gynostegium c. 1.5 mm. Follicle solitary, linear, 10–12 × 0.5–0.6 cm, blunt at ends, smooth; seeds light brown, elliptic, c. 3.5 × 1 mm, acute at base, truncate at apex, faintly median keeled, compressed, white comose.

Flowering & Fruiting: September–May.

Distribution. India: Assam, Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Madhya Pradesh, Meghalaya, Manipur, Mizoram, Odisha, Tripura and West Bengal.

Specimens examined: NRVK 6, 11.10.2009, SKS & GK 46303; Santrabari, 27.09.2013, AK 59605.

9. *Marsdenia* R. Br.

Key to the species

- 1a. Leaves broadly ovate-cordate, cordate at base; veins 3-5 from base; inflorescence axillary, branched, umbellate cymes, pubescent; corolla tubular, glabrous except villous near staminal column inside, without ring of hairs at throat; lobes reddish brown; follicles glabrous **1. *M. calesiana***
- 1b. Leaves ovate-oblong or ovate or ovate-elliptic, rounded to subcordate at base; veins pinnate; inflorescences axillary or terminal, clustered on spike-like cymes, appressed hairy; corolla urceolate, sericeous, ring of hairs at throat; lobes creamy white; follicles pubescent **2. *M. tinctoria***

1. *Marsdenia calesiana* Wight, Contr. Bot. India: 41. 1834; Hook. f., Fl. Brit. India 4: 37. 1883. **[Plate 137b]**

Climbing shrub. Leaves broadly ovate-cordate, 15-19 × 11.7-13.8 cm, cordate, entire and hairy, acuminate, chartaceous, puberulous, glandular above, pubescent below. Inflorescence axillary, branched, corymbose cymes, pubescent; inflorescence bracts linear-lanceolate; floral bracts linear. Calyx cupular, divided to base, pubescent; lobes 5, rarely 4, elliptic-oblong to suborbicular, 2.5-3 × 1.5-2.5 mm, ciliate, rounded. Corolla campanulate, pubescent; tube cylindric, 4-5 mm, villous near staminal column; lobes orange brown, 5, oblong, 3-4.5 × 1.5 mm, thick, revolute, subacute. Stamens 5, fused; staminal column c. 2 mm, lateral and apical appendaged; coronal scales triangular, spur-like, compressed, fleshy. Gynostegium c. 2.5 mm. Carpels 2, c. 1 mm, pubescent at apex; stigmatic heads conical. Follicle solitary, linear-lanceolate, c. 8 × 2 cm, tapering in acuminate ends, woody, smooth; seeds ovate, 8-10 × 4-5.5 mm, beaked, marginal winged, silky white comose.

Flowering & Fruiting: May-August.

Distribution. India: Sikkim and West Bengal.

Specimen examined: Buxaduar to Chunabhati, 21.05.2014, AK 65908.

2. *Marsdenia tinctoria* R. Br., Mem. Wern. Nat. Hist. Soc. 1: 28. 1810; Hook. f., Fl. Brit. India 4: 34. 1883; Prain, Bengal PL 2: 696. 1903. **[Plate 137c-d; Fig. 55]**

Climbing shrub. Leaves ovate-oblong or ovate or ovate-elliptic, 3.7-13.6 × 1.5-6.4 cm, rounded to subcordate, entire, acuminate, chartaceous. Inflorescence axillary or terminal, crowded, 3-14 cm, spike-like cymes, appressed hairy. Calyx divided to base; lobes 5, oblong-ovate, 1-1.2 × c. 0.7 mm, ciliate, acute, pubescent. Corolla creamy white to greenish white, urceolate; tube cupular, c. 2 × 1.2 mm, sericeous inside, ring of bristles at throat; lobes 5, ovate-suborbicular, c. 1 × 0.8 mm, acute. Corona 5-lobed, c. 1 mm across; lobes lanceolate. Stigmatic head discoid. Follicle solitary, lanceolate, 7-8 cm, spreading randomly, pubescent; seeds ovate, c. 12 × 4 mm, long white comose.

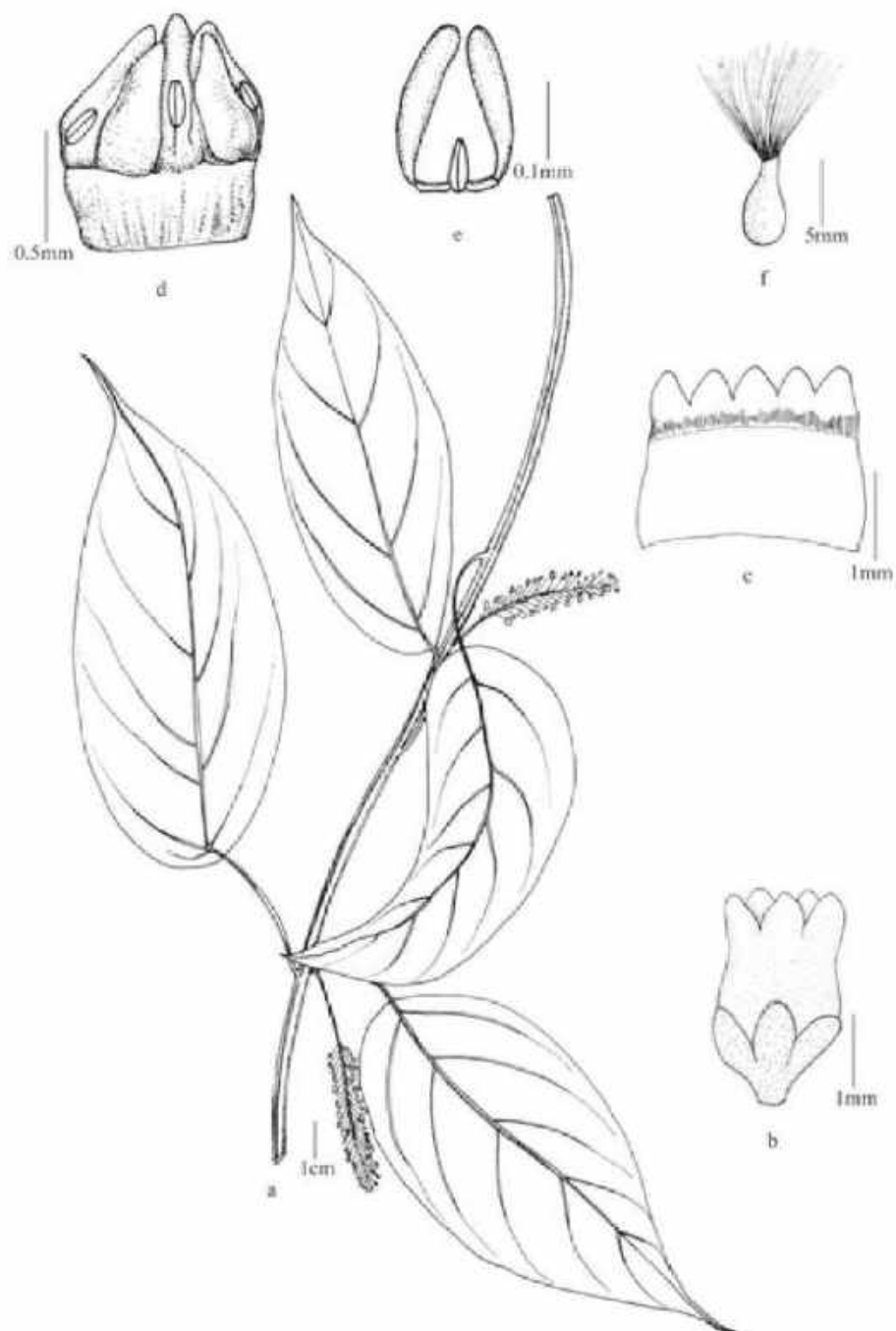


Fig. 55. *Marsdenia tinctoria*: a. Flowering branchlet; b. Flower; c. Corolla split open; d. Corona; e. Pollinia; f. Seed with coma (GK 52318).

Flowering & Fruiting: November–March.

Distribution. India: Andhra Pradesh, Assam, Arunachal Pradesh, Assam, Manipur, Nagaland, Sikkim, Tripura, Karnataka, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Buxa road, *KPB* 1684; Poro, *JKS* 807; South Rajabhatkhawa, *JKS* 4267; Jainti, 08.10.2009, *SKS* & *GK* 46211; *NRVK* 6, 09.02.2010, *SKS* & *GK* 46371; *NRVK* 6, 04.12.2011, *GK* 52318; Rydak, Tiamari, 23.02.2012, *AK* 55909; Checko-1, 25.09.2012, *AK* 56153.

Notes: Fruits used as medicine. Leaves are the good source of dye.

10. *Toxocarpus* Wight & Arn.

Toxocarpus himalensis Falc. ex Hook. f., Fl. Brit. India 4: 13. 1883. [Plate 138a]

Climbing shrub. Leaves elliptic-oblong, 10–13 × 3.8–5.4 cm, rounded-cuneate, 2 glands surrounded by hairs, entire, acuminate, coriaceous, glabrous to few scattered hairy above, puberulous below. Inflorescence axillary, dichotomously branched cymes, rusty brown pubescent; inflorescence bracts linear-subulate; floral bracts linear. Calyx cupular, divided to base, 2 nectaries present between lobes, rusty brown pubescent; lobes 5, lanceolate, *c.* 2.5 × 1 mm, scarious and hairy, obtuse. Corolla pale yellow, campanulate, villous; tube cupular, *c.* 3 mm; lobes 5, linear, *c.* 5.5 × 0.5–0.7 mm, acute to subacute, thick with revolute, twisted. Stamens 5; staminal column 0.5–0.7 mm; corona obovate with elongate tip, *c.* 1.8 × 1 mm, crenulate at apex, staminal, uniseriate, 5-lobed. Gynostegium *c.* 4 mm. Carpels 2, ovoid; style obconical; stigma fusiform, *c.* 2.5 mm. Follicles paired, linear-lanceolate, 6.5–9.8 × 0.9–1.2 cm, pointed at ends, divaricate; seeds brown, ovate-oblong, 8–10 × 4–5.5 mm, rounded at base, grooved in centre, winged, silky white comose.

Flowering & Fruiting: May–August.

Distribution. India: Assam, Himachal Pradesh, Meghalaya, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, *AK* 62680.

11. *Vincetoxicum* Wolf

Vincetoxicum hirsutum (Wall.) Kuntze, Revis. Gen. Pl. 2: 424. 1891. *Gymnema hirsutum* Wall., Tent. Fl. Nep.: 50. 1826. *Tylophora hirsuta* (Wall.) Wight, Contr. Bot. India: 49. 1834; Hook. f., Fl. Brit. India 4: 43. 1883. [Plate 138b; Fig. 56]

Climbing shrub. Leaves oblong-lanceolate, 5–13.5 × 1.5–4.7 cm, rounded-truncate to shallowly cordate, entire and hairy, acute to short acuminate, chartaceous, glandular. Inflorescence axillary, branched racemose cymes in umbellate clusters, pubescent; inflorescence and floral bracts ovate. Calyx cupular, divided to base,

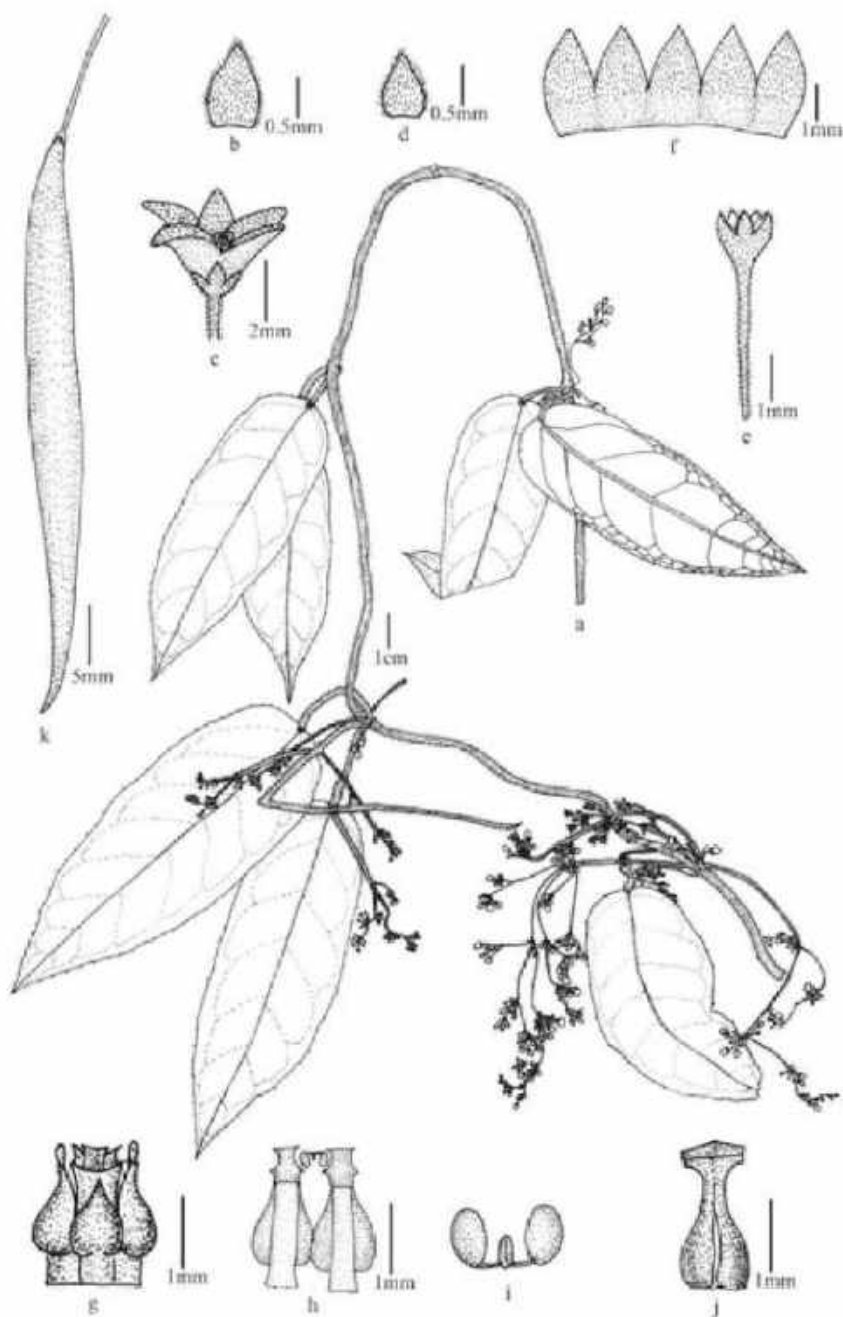


Fig. 56. *Vincetoxicum hirsutum*: a. Flowering branchlet; b. Inflorescence bract; c. Lateral view of flower; d. Floral bract; e. Calyx; f. Corolla split open; g. Gynostegium; h. Stamens showing pollinia; i. Pollinia; j. Gynostegium without stamens; k. Follicle (AK 59670).

pubescent; lobes 5, ovate-lanceolate, *c.* 1 × 0.8 mm, scarious and hairy, acute. Corolla yellow maroon, campanulate; tube cupular, 0.5–0.8 mm; lobes 5, ovate, *c.* 2 × 1.5 mm, subacute, thick, villous inside. Stamens 5, fused; staminal column *c.* 1 mm; corona maroon, ovate, acute, staminal, uniseriate, 5-lobed, gibbous. Gynostegium 1.8–2 mm. Carpels 2, ovoid; style *c.* 0.7 mm; stigmatic head truncate, 5-lobed. Follicle solitary, lanceolate, 3.4–4.8 × 0.5–1 cm, blunt at end, striated; seeds dark brown, ovate, 6–7 × *c.* 3.5 mm, rounded, winged, silky white comose.

Flowering & Fruiting: August–December.

Distribution. India: Assam, Kerala, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Lepchakhawa to Buxa Fort, 29.09.2013, AK 59670.

Loganiaceae

Key to the genera

- 1a. Shrubs; inflorescences spikes, tomentose; capsules ovoid or ellipsoid, compressed 1. *Buddleja*
- 1b. Herbs; inflorescences umbellate cymes, glabrous; capsules subglobose, not compressed 2. *Mitrasacme*

1. *Buddleja* L.

Buddleja asiatica Lour., Fl. Cochinch. 1: 72. 1790; C. B. Clarke in Hook. f., Fl. Brit. India 4: 82. 1883; Prain, Bengal Pl. 2: 703. 1903. [Plate 138c; Fig. 57]

Neemda, Bad-bhota (B).

Shrub, 1–2 m high. Leaves linear-lanceolate, 5–14 × 0.7–1.4 cm, cuneate or attenuate, undulate, acuminate with mucro at apex, coriaceous, white tomentose below. Inflorescence spikes, tomentose; floral bracts linear. Calyx campanulate; tube *c.* 1.5 mm; lobes 4, triangular-ovate, acute, tomentose. Corolla white; tube 2.5–4.8 mm, stellate pubescent; lobes 4, rarely 5, suborbicular, 1–1.7 × 1–1.5 mm, crenate, rounded. Stamens 4, included; anthers oblong. Ovary ovoid; style *c.* 5 mm; stigma clavate. Capsules ovoid to ellipsoid, 3–5 × 1.5–3 mm, compressed; seeds elliptic, 0.8–1 × 0.3–0.4 mm, narrowly winged.

Flowering & Fruiting: January–June.

Distribution. India: Almost throughout India.

Specimens examined: Jainti river, Jainti 3, 10.02.2010, SKS & GK 46388; Sankosh, 17.02.2012, AK 55675; Marakata, 22.02.2012, AK 55893.

2. *Mitrasacme* Labill.

Mitrasacme indica Wight, Icon. Pl. Ind. Orient. 4 (4): 15, t. 1601. 1850. *Mitrasacme alsinoides* auct. non R. Br. 1810: C. B. Clarke in Hook. f., Fl. Brit. India 4: 80. 1883; Prain, Bengal Pl. 2: 702. 1903.

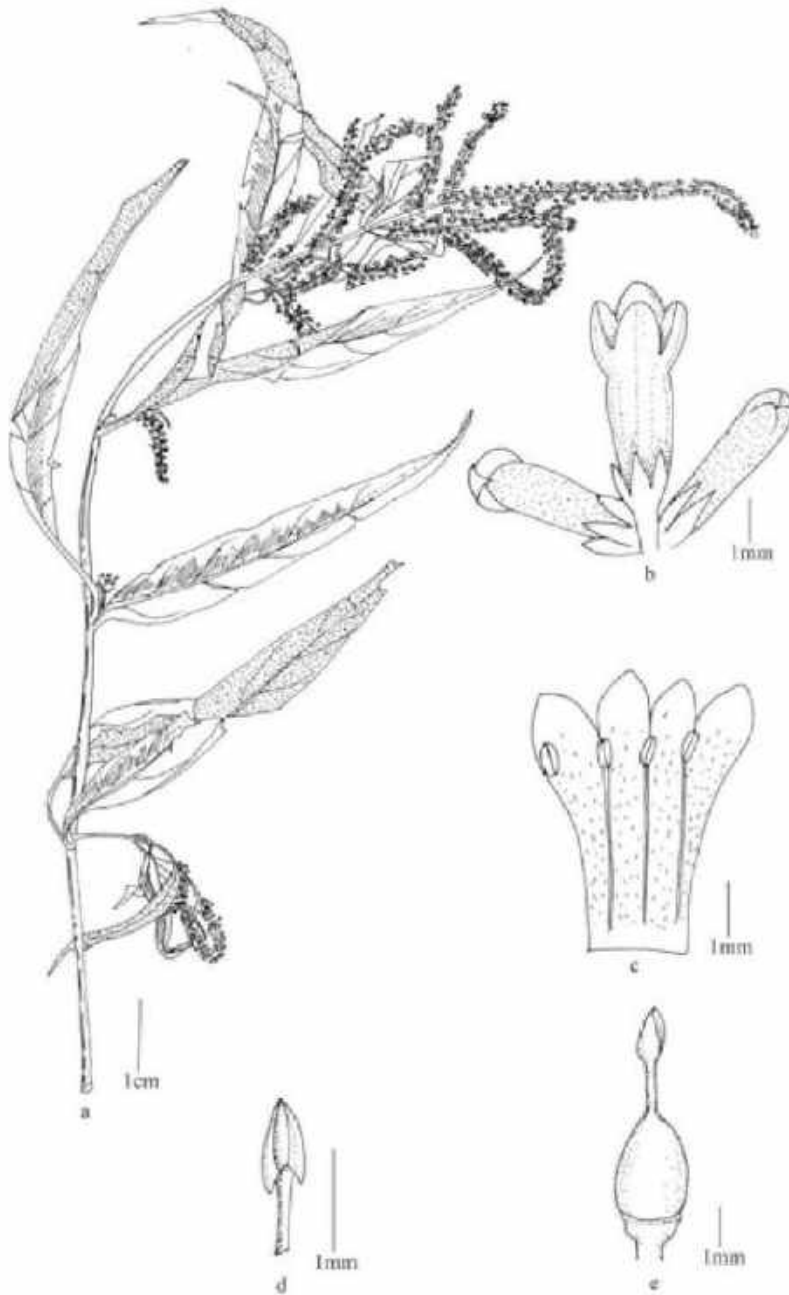


Fig. 57. *Buddleja asiatica*: a. Flowering branchlet; b. Flowers; c. Corolla split open; d. Stamen; e. Gynoecium (GK 46388).

Erect herb, 5–6 cm high. Leaves sessile, ovate or lanceolate, 3–5 × 1–3 mm, cuneate, entire, short acuminate or acute, membranous. Inflorescence axillary, few flowered umbellate cymes; inflorescence bracts foliaceous; floral bracts lanceolate. Calyx cupular; tube 1–1.5 mm; lobes 4, triangular-ovate or lanceolate, 1–1.5 × 0.5 mm, acuminate. Corolla white, campanulate; tube 3–4 mm, sparsely villous at mouth; lobes 4, subcircular, c. 1.5 mm across. Stamens 2 or 4, at base of corolla tube; anthers ovate or sagittate, apical appendaged. Ovary ovoid; style c. 1 mm; stigma truncate or bifid. Capsules subglobose, 1–1.5 mm across, dehiscent; seeds black brown, ellipsoid to ovoid, subangular, reticulately nerved.

Flowering & Fruiting: December–March.

Distribution. India: Andhra Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Marakata, 22.02.2012, AK 55886.

Menyanthaceae

Nymphoides Seg.

Nymphoides cristata (Roxb.) Kuntze, Revis. Gen. Pl. 2: 429. 1891. *Menyanthes cristata* Roxb., Pl. Coromandel 2: 3, t. 105. 1799. *Limnanthemum cristatum* (Roxb.) Griseb., Gen. Sp. Gent.: 342. 1839; C. B. Clarke in Hook. f., Fl. Brit. India 4: 131. 1883; Prain, Bengal Pl. 2: 709. 1903. [Plate 139a]

Aquatic floating herb. Leaves broadly ovate or suborbicular, 2–5.5 × 1.8–5 cm, cordate, entire, rounded or obtuse, rough, gland-dotted below. Inflorescence umbels or fascicled on petaloid stems; inflorescence bracts suborbicular. Calyx cupular, divided to base; lobes 5, oblong or lanceolate, 2–3 × 0.8–1 mm, bluntly acute. Corolla white, campanulate; tube 2–4 mm, fimbriate at throat; lobes 5, elliptic, 3–5 × 1.5–2 mm, undulate, rounded or obtuse, nerved. Stamens 5; filaments short or absent; anthers elliptic; staminodes 5, alternate to stamens. Ovary ovoid, 2–3 × 1–2 mm, 4–5 nectaries at base; stigma bifid or 3-fid. Capsules subglobose, 3–4 × 2–3 mm; seeds scabrous.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, JKS 4074; Narathali, 23.09.2011, AK 52821.

Hydrophyllaceae

Hydrolea L.

Hydrolea zeylanica (L.) Vahl, Symb. Bot. 2: 46. 1791; C. B. Clarke in Hook. f., Fl. Brit. India 4: 133. 1883; Prain, Bengal Pl. 2: 711. 1903. *Nama zeylanica* L., Sp. Pl. 1: 226. 1753. [Plate 139b]

Kasshra, Isha-langulia (B).

Procumbent herb, 8–15 cm high. Leaves sessile to subsessile, ovate to lanceolate, 0.4–1.5 × 0.3–0.8 cm, cuncate, entire, acute, chartaceous, pubescent below. Inflorescence short terminal cymes or sometimes solitary. Calyx cupular, divide to base; tube 1.5–2 mm, glandular pubescent; lobes 5, elliptic-lanceolate, c. 4.5 × 1 mm, acute, glandular pubescent. Corolla blue, campanulate-subrotate; tube 2–3 mm; lobes 5, ovate, 8–10 × 5–7 mm, obtuse. Stamens 5, at base of corolla tube; filaments swollen at base; anthers white, sagittate. Ovary 2-locular; style blue, 2-fid, c. 3 mm; stigma subcapitate. Capsules ovoid, c. 5 × 4 mm, glandular pubescent; seeds ovoid, minute.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimens examined: Poro, JKS 770; Garam, JKS 854; Rajabhatkhawa range, 17.02.2010, SKS & GK 47135; Kumargram, Hathinala, 21.02.2012, AK 55865.

Boraginaceae

Key to the genera

- | | |
|--|------------------------|
| 1a. Herbs or shrubs; inflorescences scorpioid spikes | 2 |
| 1b. Trees; inflorescences terminal, dichotomously branched corymbose cymes | 4 |
| 2a. Scrambling shrubs; style terminal | 5. <i>Tournefortia</i> |
| 2b. Erect herbs; style gynobasic (terminal in <i>Heliotropium</i>) | 3 |
| 3a. Corolla glabrous; style gynobasic; fruits glochidiate, not ribbed | 2. <i>Cynoglossum</i> |
| 3b. Corolla hairy; style terminal; fruits ribbed, not glochidiate | 4. <i>Heliotropium</i> |
| 4a. Leaves palmately veined; inflorescences tomentose; calyx not divided to base; style bifid twice; stigma indistinct | 1. <i>Cordia</i> |
| 4b. Leaves pinnately veined; inflorescences glabrous; Calyx divided to base; style bifid only; stigma distinct | 3. <i>Bhretia</i> |

1. *Cordia* L.

Key to the species

- | | |
|--|------------------------|
| 1a. Branchlets smooth; inflorescences brown tomentose; corolla hairy throughout; lobes not reflexed; drupes pinkish | 1. <i>C. dichotoma</i> |
| 1b. Branchlets lenticellate; inflorescences white tomentose; corolla hairy at insertion of filaments; lobes reflexed; drupes white | 2. <i>C. grandis</i> |

1. *Cordia dichotoma* G. Forst., Fl. Ins. Austr.: 18. 1786. *Cordia obliqua* Willd., Phytogr. 1 (4): t. 4. 1794; C. B. Clarke in Hook. f., Fl. Brit. India 4: 136. 1883; Prain, Bengal Pl. 2: 714. 1903. [Plate 139c-d]

Lashora, *Bohnari* (B); *Lasura* (H); *Bohori*, *Aule bohori*, *Jat bohori* (N).

Deciduous tree, 10–12 m high. Leaves broadly ovate or suborbicular, 6–12.8 × 4.5–9.4 cm, truncate or subcordate, entire, obtuse or abruptly acuminate, coriaceous, scabrous. Inflorescence terminal, dichotomously branched corymbose cymes, brown tomentose. Flowers sessile to subsessile. Calyx cupular; tube c. 5 mm, pubescent or glabrescent, hairy inside; lobes 5, triangular, c. 1 × 1.2 mm, subacute. Corolla white, tubular-campanulate; tube 4.5–5 mm, hairy inside; lobes 5, rarely 6, oblong-obovate, 4–5 × c. 2 mm, obtuse, 1-nerved. Stamens 5; filaments 1–2 mm; anthers dorsifixed. Ovary ovoid; style c. 2 mm, bifid; stigma inconspicuous. Drupes pinkish, 5–7 mm across, mucronate, seated on accrescent calyx, pulpy; seed solitary.

Flowering & Fruiting: February–June.

Distribution. India: Andaman & Nicobar Islands, Bihar, Delhi, Goa, Daman & Diu, Gujarat, Haryana, Kerala, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Poro, BK 470; Jainti range, 03.03.2011, GK 47206; Marakata, 22.02.2012, AK 55885; Hatipota, 18.02.2013, AK 59825.

2. *Cordia grandis* Roxb., Fl. Ind. 2: 335. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 137. 1883; Prain, Bengal Pl. 2: 714. 1903. [Plate 140a-b; Fig. 58]

Asare (N).

Large deciduous tree, 12–15 m high. Leaves variable, ovate to lanceolate, oblanceolate to obovate, elliptic-oblong, 7–16.5 × 4–8 cm, cuneate to cuneate-rounded, entire to undulate or bluntly toothed above, short acuminate, chartaceous, dotted above. Inflorescence terminal, dichotomously branched, corymb-like cymes, white tomentose. Flowers sessile. Calyx cupular, pilose, pubescent inside; tube 3.5–4 mm; lobes 4, ovate, subequal, 2–2.8 × 2–2.5 mm, subacute. Corolla white, infundibular-campanulate, fragrant; tube c. 4 mm, pubescent at insertion of filaments; lobes 4, sometimes 5, oblong-oblanceolate, 4.5–5 × 2–2.2 mm, obtuse, reflexed. Stamens 4, sometimes 5; filaments c. 5 mm; anthers oblong, verruculose. Ovary punctate; style c. 4 mm, bifid twice above; stigma inconspicuous. Drupes ovoid, 7–10 × 5–7 mm, pulpy; seeds pale brown, solitary, ovate, stony.

Flowering & Fruiting: September–June.

Distribution. India: Assam, Madhya Pradesh, Meghalaya, Mizoram, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59727; Buxaduar to Chunabhati, 21.05.2014, AK 65907.

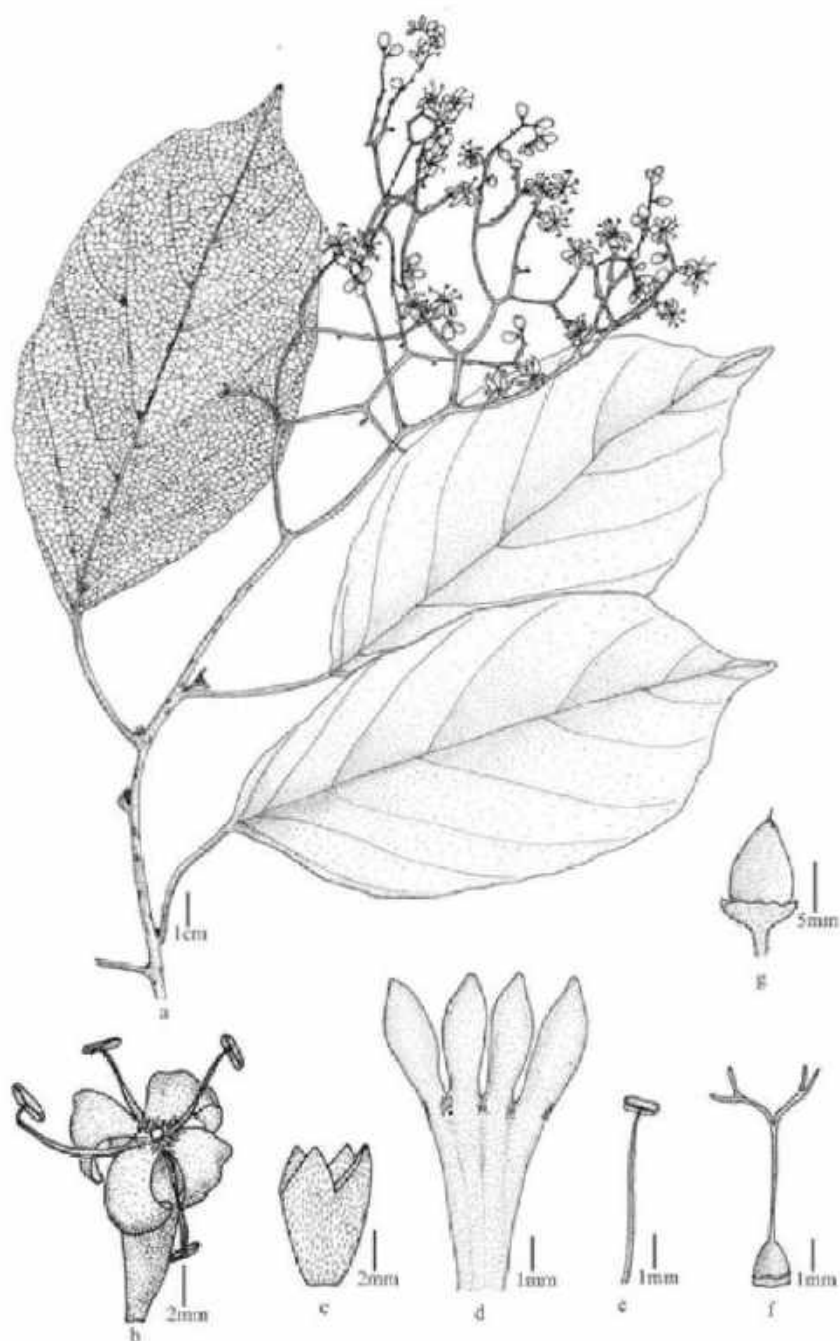


Fig. 58. *Cordia grandis*: a. Flowering branchlet; b. Flower with exserted stamens; c. Calyx; d. Corolla split open; e. Stamen; f. Gynoecium; g. Drupe (AK 59727).

2. *Cynoglossum* L.

Cynoglossum lanceolatum Forssk., Fl. Aegypt.-Arab.: 41. 1775; C. B. Clarke in Hook. f., Fl. Brit. India 4: 156. 1883; Prain, Bengal Pl. 2: 719. 1903.

[Plate 140c-d]

Khirpatey (N).

Erect herb, 20–35 cm high. Leaves ovate, elliptic-oblong or lanceolate, 7–40 × 3–17 mm, attenuate to cuneate, entire and hairy, acute to subacute, rough, appressed hairy, tubercled. Inflorescence axillary, branched, scorpioid cymes, appressed hairy, tubercled at base; inflorescence bracts foliaceous. Calyx cupular, pubescent; tube 0.5–0.8 mm; lobes 5, ovate to elliptic-ovate, obtuse, glabrous or hairy inside. Corolla white with bluish centre, campanulate; tube c. 1.2 mm, with shallowly crescent-shape cells at throat; lobes 5, suborbicular, undulate or crenate. Stamens 5; anthers subglobose or suborbicular. Ovary 4-lobed; style gynobasic; stigma capitate. Nutlets 4-lobed, 2.5–4 mm across; lobes ovate-orbicular, 1.5–2 mm across, glochidiate; seeds pale brown, solitary in each lobe, ovoid or suborbicular.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Bhutanghat, 25.02.2012, AK 55924.

3. *Ehretia* P. Browne

Key to the species

- 1a. Trees, 10–15 m high; leaves margin regularly serrate with teeth curved upward; corolla tube equalling or shorter than calyx 1. *E. acuminata*
- 1b. Erect shrub or small trees, 2–3 m high; Leaves margin entire; corolla tube longer than calyx 2. *E. pilosiphon*

1. *Ehretia acuminata* R. Br., Prodr. Fl. Nov. Holland.: 497. 1810; C. B. Clarke in Hook. f., Fl. Brit. India 4: 141. 1883; Prain, Bengal Pl. 2: 717. 1903. [Plate 141a-b]

Kula-aja (B); *Panyam* (N).

Tree, 10–15 m high. Leaves elliptic-oblong, 7–9.2 × 3.2–3.5 cm, cuneate, serrate, acuminate, coriaceous, glabrous. Inflorescence terminal or axillary, divaricately branched. Flowers fragrant, sessile or subsessile. Calyx cupular; tube c. 0.5 mm; lobes 5, triangular ovate, c. 1 × 1 mm, ciliate, obtuse. Corolla creamy white; tube equalling the calyx, c. 2 mm; lobes 5, oblong, c. 2 × 1.2 mm, obtuse, nerves prominent. Stamens 5; filaments subulate, 1.8–2 mm; anthers oblong. Ovary 0.5–0.8 × c. 0.6 mm; style bifid. Fruits subglobose, 3–5.5 mm across.

Flowering & Fruiting: March–August.

Distribution. India: Andhra Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Kashmir, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Panbari 8, 31.03.2012, GK 50671.

2. *Ehretia psilosiphon* R. R. Mill, *Edinburgh J. Bot.* 53: 260. 1996.

[Plate 141c-d; Fig. 59a-e]

Deciduous shrubs or small tree, 2–4 m high. Leaves obovate, ovate-elliptic, 4.2–18.5 × 1.6–7.2 cm, cuneate, entire, short acuminate, subcoriaceous. Inflorescence lateral or terminal, dichotomously branched, corymb-like cymes. Flowers sessile to subsessile. Calyx divided to base, minute brown glandular; tube 1.2–1.6 mm; lobes 5, subulate-lanceolate, c. 2 × 0.6 mm, ciliate, acute. Corolla white, infundibular-campanulate, minute brown glandular; tube cylindrical, 5–6.5 mm; lobes 5, elliptic-oblong, 3–4 × 1.5–1.8 mm, subacute to obtuse, reflexed. Stamens 5; filaments c. 4 mm; anthers linear. Ovary ovoid; style 4–6 mm, bifid; stigma swollen, convex. Drupes ellipsoid, 4–5 × 5–7 mm; seed solitary in each locule.

Flowering & Fruiting: February–June.

Distribution. India: West Bengal.

Specimens examined: NRVK 6, 06.03.2011, GK 47300; Tashigaon 1, 11.03.2011, GK 50542; Way to Mahakal cave, 20.02.2013, AK 59857; Buxaduar to Tashigaon, 11.02.2014, AK 59913.

4. *Heliotropium* L.

Heliotropium indicum L., *Sp. Pl.* 1: 139. 1753; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 152. 1883; Prain, *Bengal Pl.* 2: 716. 1903. [Plate 142a]

Hatisur (B).

Erect herb, 30–40 cm high. Leaves ovate, 2.2–7.3 × 1.2–4.5 cm, truncate or attenuate, crenate-dentate, acute, rough, subcoriaceous, scabrid-hispid above, hispid beneath. Inflorescence axillary or terminal helicoid cymes, 10–19 cm. Flowers sessile. Calyx 5-lobed; lobes linear, 2–2.5 mm, setose. Petals bluish; lobes 5, suborbicular; tube c. 3 mm, hispid, slightly curved. Stamens 4; filaments included; anthers oblong-sagittate. Ovary c. 0.5 mm; style c. 0.5 mm, gynobasic. Nutlets 2–3 mm, ribbed, shortly beaked.

Flowering & Fruiting: November–May.

Distribution. India: Almost throughout India.

Specimens examined: Poro, BK 497; Rajabhatkhawa Range, 29.11.2011, GK 47173.



Fig. 59. *Ehretia psilosiphon*: a. Fruiting branchlet; b. Flower bud; c. Flower; d. Stamen; e. Immature fruit with persistent style (GK 47300); *Tournefortia hookeri*: f. Flowering branchlet (GK 50554).

5. *Tournefortia* L.

Tournefortia hookeri C. B. Clarke in Hook. f., Fl. Brit. India 4: 147 1883.
Tournefortia hookeri var. *subtropica* C. B. Clarke in Hook. f., Fl. Brit. India 4: 147.
1883. [Plate 142b-c; Fig. 59f]

Arupate lahara (N).

Scrambling shrub, 2–3 m high. Leaves elliptic-lanceolate or broadly ovate, 2.8–12 × 1.4–5 cm, cuneate, entire, acute, chartaceous, few short yellowish hairs or glabrous above, glabrescent or with sparse hairs at veins below. Inflorescence 2-rowed scorpioid cymes, pubescent. Flowers sessile. Calyx cupular; tube c. 0.5 mm; lobes 5, ovate, 2.5–3 × c. 1 mm, acute, hispid. Corolla greenish-yellow; tube c. 3 mm, hairy; lobes 5, spreading, c. 0.5 mm. Stamens 5; filaments included; anthers oblong. Ovary c. 1 mm; style c. 1 mm; stigma 2-lobed. Fruits ovoid, c. 4 mm across, 2-seeded; seeds slightly curved.

Flowering & Fruiting: February–April.

Distribution. India: Sikkim and West Bengal.

Specimen examined: Jainti 8, 12.03.2011, GK 50554.

Convolvulaceae

Key to the genera

- 1a. Parasitic; stems yellow green; leaves reduced to scales; inflorescences short racemes with haustria; corolla tube with ring of fimbriate scales at throat 2. *Cuscuta*
- 1b. Nonparasitic; stems green; leaves well developed; inflorescences not as above; corolla tube without ring of fimbriate scales at throat 2
- 2a. Prostrate herbs; leaves broadly elliptic or suborbicular, rounded or slightly emarginate; inflorescences axillary, solitary or in pairs; styles 2, each bilobed 5. *Evolvulus*
- 2b. Climbing herbs or shrubs (except *Ipomoea carnea* subsp. *fistulosa*); leaves various, not broadly elliptic or suborbicular, not rounded or emarginate; inflorescences not as above; style solitary or absent 3
- 3a. Branchlets, petioles and inflorescences stellate pubescent; corolla lobes obovate; style absent; stigma 5-lobed; fruits indehiscent 4. *Erycibe*
- 3b. Branchlets, petioles and inflorescences variously hairy, not stellate pubescent; corolla lobes not obovate; style present; stigma not 5-lobed; fruits dehiscent, if indehiscent then with thin fragile walls 4
- 4a. Inflorescences dichotomously branched, compound racemes or panicles; corolla tube less than 1 cm; fruits indehiscent 5
- 4b. Inflorescences various, not dichotomously branched compound racemes or panicles; corolla tube more than 1 cm; fruits dehiscent 6

- 5a. Inflorescences dichotomously branched, compound racemes; inflorescence bracts present; stamens at different levels in corolla tube; persistent calyx lobes equal in fruits **3. Dinetus**
- 5b. Inflorescences panicles; inflorescence bracts absent; stamens at base of corolla tube; persistent calyx lobes unequal in fruits **8. Porana**
- 6a. Leaves broadly ovate-orbicular, never lobed or dissected; disk present; carpels connate in 4-celled ovary; fruits berries **1. Argyreia**
- 6b. Leaves various, usually lobed or dissected (entire in *Merremia umbellata* and *Ipomoea carnea* subsp. *fistulosa*); disk present or absent; carpels connate in 1-3 or 2-celled ovary, rarely 4-celled; fruits capsules **7**
- 7a. Corolla tube not uniformly enlarged from base to apex; inflorescences dichasial cymes (except *Ipomoea nil*); calyx lobes acuminate and cuspidate; corolla purple pink or red; anthers straight when dehisced **6. Ipomoea**
- 7b. Corolla tube usually uniformly enlarged from base to apex; inflorescences umbellate or 2-3 flowered cymes; calyx lobes obtuse, sometimes with mucronate tip; corolla yellow or white; anthers twisted when dehisced **7. Merremia**

1. *Argyreia* Lour.

Key to the species

- 1a. Calyx densely patent-hirsute outside with fulvous hairs; mid-petal bands with spreading whitish bristles; ovary 2-celled **1. *A. capitiformis***
- 1b. Calyx villous outside; mid-petal bands with sparse hairs; ovary 4-celled **2**
- 2a. Branchlets roughly pubescent; peduncles 3-6 cm **2. *A. hookeri***
- 2b. Branchlets softly hispid; peduncles 9-16 cm **3. *A. roxburghii***

1. *Argyreia capitiformis* (Poir.) Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 6 (6): 941. 1972. *Convolvulus capitiformis* Poir., Encycl. Suppl. 3 (2): 469. 1814. *Lettsomia strigosa* Roxb., Fl. Ind. 2: 80. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 193. 1883; Prain, Bengal Pl. 2: 742. 1903. **[Plate 142d; Fig. 60a]**

Twining shrub, hispid, golden yellow hairy. Leaves broadly ovate to cordate, 9-13 × 6.8-10 cm, cordate, entire, acuminate to caudate, subcoriaceous, hispid. Inflorescences capitate, 2-5-flowered, hispid; inflorescence bracts elliptic-oblong to lanceolate. Flowers sessile. Calyx 5-lobed; lobes obovate to lanceolate, 1-1.3 × 0.8 cm, glabrous inside, persistent. Corolla pale-purple, infundibular; tube c. 3 cm; lobes 5, c. 8 mm. Stamens 5, included; filaments filiform, c. 1.3 cm; anthers oblong. Ovary 2-celled; style filiform, c. 2 cm; stigma globose. Berries globose, 6-8 mm across, 4-seeded, embedded in mealy pulp.

Flowering & Fruiting: September-March.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam,

Bihar, Maharashtra, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Specimen examined: Panbari 2–6, 01.12.2011, GK 47182.

2. *Argyreia hookeri* C. B. Clarke in Hook. f., Fl. Brit. India 4: 185. 1883.

[Plate 143a]

Putokbok (L).

Climbing shrub, pubescent. Leaves broadly ovate-orbicular, 7.5–14.2 × 8.5–13.4 cm, truncate or subcordate to cordate, entire, acute to acuminate, coriaceous, appressed hairy. Inflorescence axillary, peduncled, few flowered cymes. Calyx divided to base; tube 2–5 mm; lobes 5, ovate or lanceolate, 8–9 × 3–4 mm, acute. Corolla purple pink, infundibular; tube 5–6 cm; lobes minute. Stamens 5; filaments 2–2.5 cm, hairy at base. Ovary ovoid; style 1.5–2 cm. Berries greenish, bright orange when ripe, globose, 1.5–2 cm across, 4-celled, pulpy; seeds dark brown or dull black, ovoid or ovoid-trigonal or ellipsoid-trigonal, c. 6 × 5 mm, smooth.

Flowering & Fruiting: June–February.

Distribution. India: Andaman & Nicobar Islands, Assam, Sikkim and West Bengal.

Specimens examined: Poro, JKS 838; Bhutanghat, 02.02.1975, JKS 4111; Jainti range, 29.11.2011, GK 47176; Rydak river belt, 20.09.2011, AK 52674; Narathali, 23.09.2011, AK 52813; Pana, 08.10.2012, AK 58729.

3. *Argyreia roxburghii* (Wall.) Arn. ex Choisy, Mém. Soc. Phys. Geneve 6: 419. 1833; C. B. Clarke in Hook. f., Fl. Brit. India 4: 185. 1883. *Convolvulus roxburghii* Wall., Numer. List: n. 1415. 1829.

[Plate 143b]

Climbing shrub, softly hispid. Leaves broadly ovate-orbicular, 6–9.5 × 8.2–10 cm, truncate or shallowly cordate, entire, acute to acuminate, coriaceous, appressed pubescent. Inflorescence axillary, peduncled, 2–4-flowered cymes, hispid. Calyx divided to base; tube 3–5 mm; lobes 5, ovate or lanceolate, 7–11 × 9 mm, acute. Corolla pink purple, infundibular; tube 5–6.5 cm, sparsely pubescent; lobes minute. Stamens 5; filaments 2.2–2.5 cm, hairy at base. Ovary ovoid, 4–5 mm; style 1.5–2 cm. Berries orange yellow, globose, 1–1.5 cm across, smooth; seeds yellowish white or light brown to dark brown or dull black, ovoid-trigonal to ovoid-globular, 6.5–7.5 × 5–6 mm, smooth.

Flowering & Fruiting: August–November.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Meghalaya, Mizoram, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 46252; Phashkhawa river belt, 30.09.2012, AK 58543; Buxa Fort to Chunabhati, 30.09.2013, AK 59700.

2. *Cuscuta* L.

Cuscuta reflexa Roxb., Pl. Coromandel 2: 3, t. 104. 1798; C. B. Clarke in Hook. f., Fl. Brit. India 4: 225. 1885; Prain, Bengal Pl. 2: 723. 1903. [Plate 143c]

Haldi algusi, *Algunsilata* (B); *Amarbel* (H); *Swarnlata*, *Amarlata* (N).

Parasitic, climbing, yellow green herb. Leaves reduced to scales. Inflorescence short racemes with haustria; inflorescence bracts wrapped inflorescences, suborbicular or elliptic. Calyx cupular; tube 0.8 × 1–1.2 mm; lobes 4 or 5, unequal, suborbicular, 0.3–0.4 × c. 1 mm. Corolla white green or yellow green, cupular; tube 0.8–1 × c. 1.5 mm, ring of fimbriate scales at throat; lobes 4 or 5, triangular-ovate, 0.6–0.8 × c. 0.8 mm, acute. Stamens 4 or 5; filaments flat; anthers globose. Ovary globose; styles 2; stigma capitate. Capsules globose, 2–2.5 mm across, dehisce irregularly; seeds white or creamy white, solitary in each locule, suborbicular, c. 1.5 mm across, compressed, smooth.

Flowering & Fruiting: August–December.

Distribution. India: Throughout India.

Specimens examined: Poro, BK 471; Poro, JKS 837; Balapara, JKS 4241; Narathali, 23.09.2011, AK 52828.

3. *Dinetus* Buch.-Ham. ex Sweet

Dinetus racemosus (Roxb.) Buch.-Ham. ex Sweet, Brit. Fl. Gard. 2: t. 127. 1825. *Porana racemosa* Roxb., Fl. Ind. 2: 41. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 222. 1883. [Plate 144a-b]

Somon-rik (L).

Climbing herb. Leaves ovate, 2.5–10 × 2.5–7 cm, cordate, entire, acuminate with a blunt or sharp tip at apex, chartaceous, sparsely hairy. Inflorescence few to many flowered, axillary, lax, dichotomously branched racemes; inflorescence bracts sessile, foliaceous; floral bracts subulate, pilose. Calyx divided to base, pilose; lobes 5, linear-lanceolate, 1.5–2.5 mm, acute. Corolla white, infundibular; tube c. 5 mm; lobes 5, elliptic, 4–5 × 2 mm, obtuse with mucronate tip with hairs. Stamens 5; filaments 2–2.5 mm; anthers dorsifixed. Ovary ovoid; style 1.5–2 mm; stigma clavate, 2-lobed. Capsules ovoid, 7–8 mm, mucronate, calyx persistent, smooth; seed brown, solitary, ovoid or ellipsoid, 5–6 mm, smooth.

Flowering & Fruiting: January–September.

Distribution. India: Assam, Himachal Pradesh, Maharashtra, Manipur, Meghalaya, Kerala, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Ramiti, Buxaduar, 1250m, JKS 4019; Adma, Panbari, 12.02.2013, AK 58875; Tashigaon to Rovers point, 02.10.2013, AK 59744.

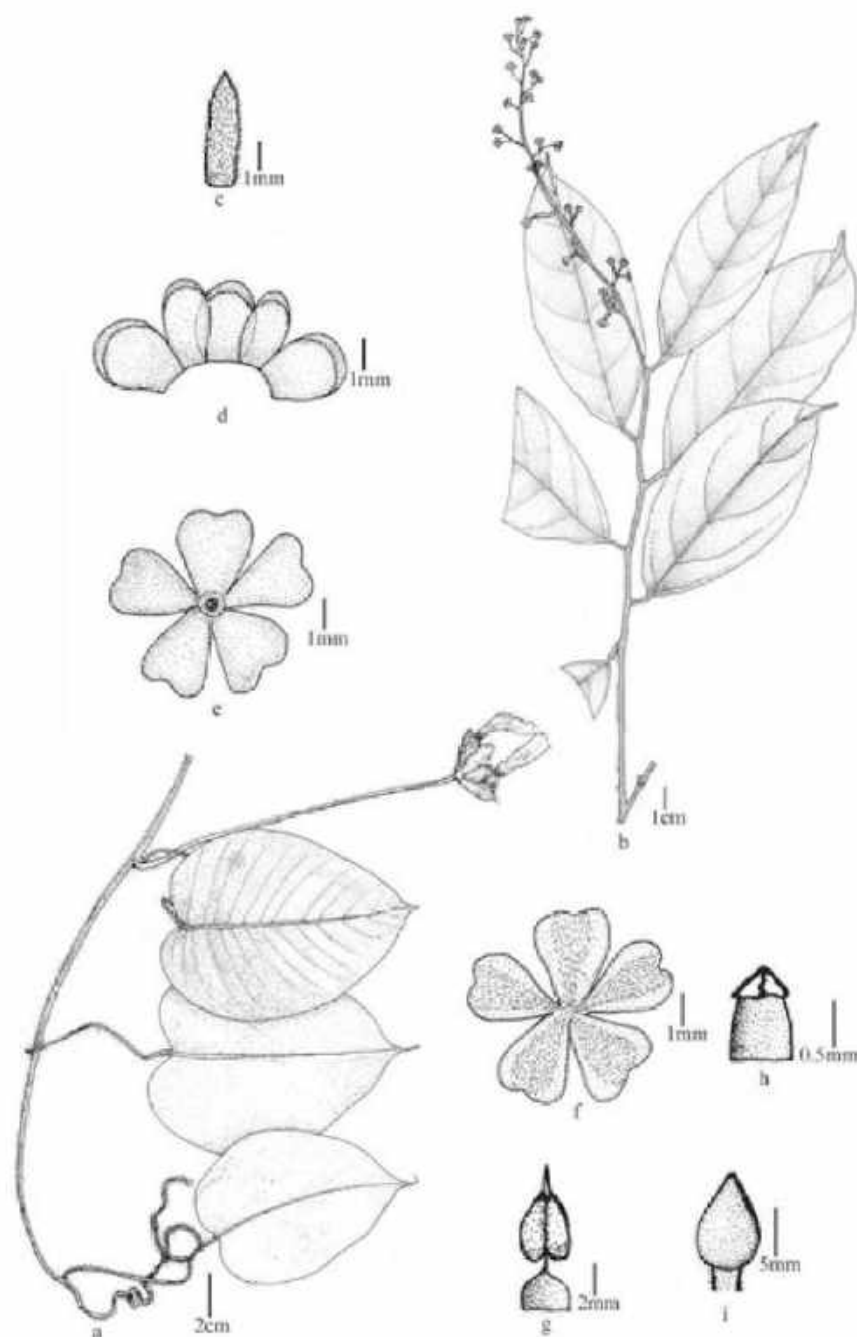


Fig. 60. *Argyroia capitiformis*: a. Flowering branchlet (GK 47182); *Brycibe paniculata*: b. Flowering branchlet; c. Floral bract; d. Calyx split open; e. Dorsal view of corolla lobes; f. Ventral view of corolla lobes; g. Stamen; h. Gynoecium; i. Berry (AK 59685).

4. *Erycibe* Roxb.

Erycibe paniculata Roxb., Pl. Coromandel 2: 31, t. 154. 1802; C. B. Clarke in Hook. f., Fl. Brit. India 4: 180. 1883; Prain, Bengal Pl. 2: 538. 1903.

[Plate 144c; Fig. 60b-1]

Evergreen climbing shrub. Leaves elliptic to elliptic-obovate, 7–13.5 × 3–5.5 cm, cuneate, entire, acuminate with blunt tip at apex, subcoriaceous. Inflorescence terminal, drooping, panicles, stellate rusty pubescent; floral bracts linear to linear-lanceolate. Calyx divided to base, rusty pubescent; lobes 5, obovate to orbicular, 2.5–3 × 2–2.5 mm, ciliate, rounded, concave. Corolla yellowish, infundibular, fragrant; tube short, rusty pubescent; lobes 5, obcordate, 2–3 mm across, thick and pubescent at centre only, membranous. Stamens 5; filaments dilated at base; anthers lanceolate. Ovary columnar; style absent; stigma subglobose, 5-lobed. Berries black when ripe, ovoid to ellipsoid, 0.7–1 cm across, somewhat leathery; seed solitary, ellipsoid, 7–8 × 5–6 mm, smooth.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59685.

5. *Evolvulus* L.

Evolvulus nummularius (L.) L., Sp. Pl., ed. 2. 1: 391. 1762; Prain, Bengal Pl. 2: 726. 1903. *Convolvulus nummularius* L., Sp. Pl. 1: 157. 1753. [Plate 144d]

Prostrate herb, 10–15 cm. Leaves broadly elliptic or suborbicular, 4–14 × 3.5–12 mm, subcordate, entire, rounded or slightly emarginate, chartaceous. Inflorescence axillary, solitary or in pairs; floral bracts lanceolate. Calyx campanulate, pilose; tube 1.5–2 mm; lobes 5, subequal, ovate, c. 3 × 2 mm, ciliate, acute. Corolla white, campanulate or subrotate; tube 5–6 mm; lobes 5, rounded, 7–8 mm across. Stamens 5; filaments c. 1.5 mm; anthers oblong. Ovary globose; styles 2, c. 3 mm, each bifid; stigmas 4, linear. Capsules globose, 2.5–3.5 mm across; seeds brown, 2–4, ovoid-triangular to ellipsoid-triangular, 2–2.5 × 1.4–1.6 mm, tuberculate.

Flowering & Fruiting: August–April.

Distribution. India: Andhra Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Puducherry, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Way to Buxa, CRD 80; Jainti range, 11.10.2009, SKS & GK 46289; Kumargram, 18.09.2011, AK 52611; Sankosh, 17.02.2012, AK 55663.

6. *Ipomoea* L.

Key to the species

- 1a. Marshy or aquatic plants; stems fistular, unbranched; leaves not lobed nor dissected
2. *I. carnea* subsp. *fistulosa*
- 1b. Terrestrial plants; stems solid, branched; leaves dentate, lobed or dissected 2
- 2a. Stigma capitate 3
- 2b. Stigma 2-3-lobed 4
- 3a. Plants tuberous; corolla pinkish, white, pale purple; stamens included 1. *I. batatas*
- 3b. Plants not tuberous; corolla scarlet; stamens exerted 3. *I. hederifolia*
- 4a. Stems glabrous; leaves 3-lobed, appressed hairy; inflorescences 1-2-flowered, peduncled cymes, hispid; inflorescence bracts absent; floral bracts present; calyx lobes linear-oblong, hispid; corolla pale purple; stamens and style included; stigma 3-lobed; disk absent 4. *I. nil*
- 4b. Stems hispid; leaves finely lobed, glabrous; inflorescences dichasial cymes, glabrous; inflorescence bracts present; floral bracts absent; calyx lobes elliptic to elliptic-oblong, glabrous; corolla crimson red; stamens and style exerted; stigma 2-lobed; disk present 5. *I. quamoclit*

1. *Ipomoea batatas* (L.) Lam., Tabl. Encycl. 1: 465. 1793; C. B. Clarke in Hook. f., Fl. Brit. India 4: 202. 1883; Prain, Bengal Pl. 2: 735. 1903. *Convolvulus batatas* L., Sp. Pl. 1: 154. 1753. [Plate 145a]

Mitha aalu (B).

Climbing herb, producing milky juice. Leaves variable, palmately 3-5-lobed or ovate, 1.5-6.5 × 2-5.5 cm, cordate, dentate or often lobed, obtuse or acute to acuminate, subcoriaceous, glabrous or hairy. Inflorescence axillary cymes; floral bracts linear. Calyx divided to base; lobes 5, unequal, oblong, 6-10 × 2-3 mm, mucro-acute, ciliate. Corolla pinkish, white, pale purple, campanulate to infundibular; tube 3-4 cm. Stamens 5; filaments c. 10 mm, hairy at base; anthers oblong. Ovary oblong-ovate; style c. 13 mm; stigma capitate. Capsules ovoid, glabrous, rarely formed.

Flowering & Fruiting: December-April.

Distribution. India: Almost throughout India (cultivated).

Specimens examined: Balapara, JKS 4195; 26½ mile tower, 29.11.2011, GK 47171.

Notes: The tubers are edible.

2. *Ipomoea carnea* Jacq. subsp. *fistulosa* (Mart. ex Choisy) D. F. Austin, Taxon 26: 237. 1977. *Ipomoea fistulosa* Mart. ex Choisy in DC., Prodr. 9: 349. 1845.

[Plate 145b]

Erect shrub, 1–2 m high. Leaves ovate, 3.5–12.5 × 1.5–4 cm, cordate, repand, acuminate, chartaceous, pubescent. Inflorescence axillary or terminal dichasial cymes, puberulent; floral bracts ovate, early caducous. Calyx divided to base; lobes 5, suborbicular, 5–6 mm across, puberulent. Corolla pale purple with dark purple centre, campanulate, puberulent; tube 5–5.7 cm; lobes 5, suborbicular, c. 5 × 10 mm, undulate. Stamens 5, unequal, 3 small, 2 bigger; filaments 1–2 cm, pubescent at base; anthers linear or oblong, sagittate. Ovary ovoid; style 1.5–1.8 cm, broad and white pubescent at base; stigma truncate or obconical; disk saucer-shaped; Capsules pale brown, ovoid, 1.5–2 × 1–1.5 cm, apiculate, smooth; seed black, ovoid, c. 10 × 5–6 mm, with long brown comose hairs.

Flowering & Fruiting: January–May.

Distribution. India: Andhra Pradesh, Bihar, Delhi, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Rydak river belt, 26.02.2012, AK 55965.

3. *Ipomoea hederifolia* L., Syst. Nat., ed. 10. 2: 925. 1759. *Ipomoea phoenicea* Roxb., Fl. Ind. 2: 92. 1824. [Plate 145c]

Twinning herb, pilose. Leaves ovate to suborbicular, 3–10 × 3–18 cm, cordate, dentate, mucro-acuminate, subcoriaceous. Inflorescence terminal and axillary cymes, pedunculate. Calyx cupular; tube c. 1.5 mm; lobes 5, linear-lanceolate, c. 3 mm, acute. Corolla scarlet, infundibular; tube c. 3 cm; limb 1.5–2 cm across, patent. Stamens 5; filaments c. 3 cm; anthers oblong. Ovary c. 1 mm across; style c. 3.5 mm; stigma capitate. Capsules globose, 7–8 across, striated; seeds ovoid-triangular, c. 4.5 × 3–3.5 mm, pubescent.

Flowering & Fruiting: October–December.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 12, 13.10.2010, SKS & GK 46348; NRVK 12, 04.12.2011, GK 52328.

4. *Ipomoea nil* (L.) Roth, Catal. Bot. 1: 36. 1797; Prain, Bengal Pl. 2: 734. 1903. *Convolvulus nil* L., Sp. Pl., ed. 2. 1: 219. 1762. *Ipomoea hederacea* Jacq., Collectanea 1: 124, pl. 36. 1787; C. B. Clarke in Hook. f., Fl. Brit. India 4: 199. 1883. [Plate 145d]

Nil-kalmi (B).

Climbing herb. Leaves broadly ovate or orbicular, 3-lobed, 4–10 × 3–8 cm, cordate, entire and hairy, subcoriaceous, appressed hairy; lobes ovate, short acuminate. Inflorescence axillary, peduncled, 1–2-flowered cymes, hispid; floral bracts linear. Calyx divided to base, hispid; lobes 5, linear-oblong, 6–7 × 1.5 mm, acute. Corolla pale purple, infundibular; tube 3–4 cm. Stamens 5; filaments c. 1 cm; anthers

oblong. Ovary 4-lobed; style c. 1 cm; stigma 3-lobed. Capsules globose, 8–10 mm across, 4–6-valved; seed ovoid-trigonal, 5–6 mm, smooth.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: East Damanpur range, 30.03.2012, GK 50638; Hauda nala, 03.10.2012, AK 58677.

5. *Ipomoea quamoclit* L., Sp. Pl. 1: 159. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 199. 1883. *Quamoclit pinnata* Bojer, Hortus Maurit.: 224. 1837; Prain, Bengal Pl. 2: 738. 1903. [Plate 146a]

Taru-lata, Kam-lata (B).

Climbing herb. Leaves ovate, 1–9 cm, dissected; segments linear, mucronate at apex. Inflorescence axillary, dichasial cymes; inflorescence bracts elliptic-ovate. Calyx divided to base; lobes 5, elliptic to elliptic-oblong, 3.5–5 × 2–2.5 mm, hyaline, obtuse with abruptly mucronate tip. Corolla crimson red, infundibular; tube 2–2.4 cm; lobes 5, triangular-ovate, 3–6 × 2–4 mm, acute. Stamens 5; filaments 1.5–1.7 cm, ciliate at base; anthers elliptic. Ovary ovoid; style 2.5–3 cm; stigma subglobose, 2-lobed, with spinescent cells; disk shallowly 5-lobed. Capsules ovoid or obconical, 8–10 × 6–8 mm, smooth; seeds black, irregular in shape or ovoid-oblong, with scattered tuft of hairs or scales.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 26.09.2011, AK 52922; Hauda nala, 03.10.2012, AK 58676.

7. *Merremia* Dennst. ex Endl.

Key to the species

- 1a. Stems softly pubescent; leaves not lobed; veins pinnate; inflorescence 5–8-flowered, umbellate cymes, pubescent; floral bracts lanceolate; corolla white; style villous at apex; capsules ovoid to conical 1. *M. umbellata*
- 1b. Stems hirsute; leaves 5–7-lobed; veins 5–7 from base; inflorescences 3–5-flowered cymes, hirsute; floral bracts subulate; corolla yellow; style glabrous; capsules globose 2. *M. vitifolia*

1. *Merremia umbellata* (L.) Hallier f., Bot. Jahrb. Syst. 16 (4–5): 552. 1893; Prain, Bengal Pl. 2: 730. 1903. *Convolvulus umbellatus* L., Sp. Pl. 1: 155. 1753. *Ipomoea cymosa* (Desr.) Roem. & Schult., Syst. Veg. 6: 241. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 4: 211. 1883. [Plate 146b]

Climbing shrub. Leaves ovate to oblong-ovate, 4–10.5 × 2.2–6.8 cm, cordate, entire and hairy, acuminate with mucro, softly pilose. Inflorescence axillary, many

flowered, umbellate cymes, pubescent; floral bracts lanceolate. Calyx divided to base; lobes 5, suborbicular to broadly elliptic-ovate, 8–10 × 7–8 mm, scarious, obtuse with abruptly mucronulate tip, concave, crustaceous, sparsely papillose inside. Corolla white, infundibular; tube c. 2 cm; lobes 5, ovate, 3–5 × c. 10 mm, subacute, with pubescent midpetaline bands. Stamens 5; filaments c. 6 mm; anthers linear-lanceolate, twisted. Ovary ovoid; style 1–1.2 cm, sparsely villous; stigma capitate, 2-lobed. Capsules ovoid to conical, 10–12 × c. 8 mm, 4-valved, dehiscent from base; seeds 2–4, ovoid-rounded, c. 5.5 × 6 mm, densely and softly pilose.

Flowering & Fruiting: February–June.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Daman & Diu, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Rajabhatkhawa, CRD 94; Jainti 3B, 13.02.2010, SKS & GK 47060; SRVK 5, 05.03.2011, GK 47284; Newlands, 15.02.2012, AK 55601; Buxaduar to Tashigaon, 11.02.2014, AK 59907.

2. *Merremia vitifolia* (Burm. f.) Hallier f., Bot. Jahrb. Syst. 16 (4–5): 552. 1893; Prain, Bengal Pl. 2: 730. 1903. *Convolvulus vitifolius* Burm. f., Fl. Ind.: 45, pl. 18, f. 1. 1768. *Ipomoea vitifolia* (Burm. f.) Sweet, Hort. Brit.: 289. 1826; C. B. Clarke in Hook. f., Fl. Brit. India 4: 213. 1883. [Plate 146c]

Climbing shrub. Leaves suborbicular, 5–7-lobed, 1.6–10.5 cm across, cordate, coarsely serrate or subentire and hairy, yellow appressed hirsute; lobes triangular or ovate-lanceolate, acuminate to obtuse at apex. Inflorescence axillary, 3–5-flowered cymes, hirsute; floral bracts subulate. Calyx divided to base; lobes 5, oblong-ovate, 13–17 × 6.5–9 mm, obtuse, subcoriaceous. Corolla yellow, funnelform; tube 2.5–5.5 cm; lobes 5, triangular, subacute. Stamens 5; filaments 2–3 mm; anthers oblong, twisted. Ovary ovate; style c. 9 mm; stigma globose. Capsules globose, c. 1.2 cm across; seeds black brown, trigonous-ovoid, c. 7 mm, smooth.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimens examined: Buxa Road, 26.02.1934, KPB 1599; SRVK 6, 12.03.2010, SKS & GK 47065; Jainti 3B, 04.03.2011, GK 47232; Marakata, 22.02.2012, AK 55881; Mainabari, 24.02.2012, AK 55920.

8. *Porana* Burm. f.

***Porana paniculata* Roxb., Pl. Coromandel 3: 31, t. 235. 1819; C. B. Clarke in Hook. f., Fl. Brit. India 4: 222. 1883; Prain, Bengal Pl. 2: 724. 1903.**

[Plate 146d, 147a]

Singhane lahara (N).

Climbing shrub. Leaves ovate, 2.5–12 × 1.7–7.8 cm, cordate, entire, acuminate, thinly coriaceous, pubescent above, tomentose below. Inflorescence axillary or terminal panicles, white silky tomentose; floral bracts linear. Calyx divided to base, tomentose; lobes 5, linear, c. 1.5 mm, acute, tomentose. Corolla creamy white, funnelform; tube c. 2.5 mm, puberulous; lobes 5, suborbicular, c. 1.5 mm across, obtuse. Stamens 5; filaments c. 1 mm, hairy at base; anthers oblong; disk annular. Ovary globose; style c. 0.3 mm; stigma globose, 2-lobed. Capsules ovoid-globose, c. 5 mm across, apiculate, calyx persistent, pubescent; fruiting calyx lobes 3 bigger and 3 smaller, alternate to each other, pubescent; seed brown, solitary, ovoid, 3–4 mm, smooth.

Flowering & Fruiting: October–April.

Distribution. India: Throughout India.

Specimens examined: Buxa Road, 26.02.1934, *KPB* 1683; Buxaduar, 30.11.1975, *JKS* 4040; Jainti 6, 14.02.2010, *SKS & GK* 47092; Panbari 6, 01.12.2011, *GK* 47186; Kumargram, 18.02.2012, *AK* 55724.

Solanaceae

Key to the genera

- 1a. Corolla double or single, erect, violet; fruits capsules, partially dehiscent, echinate or tubercled 3. *Datura*
- 1b. Corolla single, drooping, white or yellow; fruits berries, indehiscent, not echinate or tubercled 2
- 2a. Flowers pendulous; calyx tubular; tube 5–7 cm; corolla infundibular; tube 14–27 cm; lobes with curved apex; filaments 1.7–1.9 cm, pubescent except apex; anthers c. 2.5 cm; berries c. 9 cm, longitudinally grooved 1. *Brugmansia*
- 2b. Flowers erect; calyx campanulate; tube less than 3.5 mm; corolla rotate or cupular; tube less than 7 mm; lobes without curved apex; filaments less than 5 mm, usually glabrous (except *Solanum americanum*); anthers less than 7 mm; berries less than 1.2 cm, not longitudinally grooved 3
- 3a. Inflorescences axillary, solitary; anthers dehisced by longitudinal slit 4
- 3b. Inflorescences various, not solitary; anthers dehisced by apical pores 5
- 4a. Corolla cupular; anthers purple black, not connivent, free from style; berries globose; fruiting calyx accrescent, inflated, membranous, completely enclosed berries 5. *Physalis*
- 4b. Corolla rotate; anthers yellow, connivent, forming a cone or tube around style; berries oblong-ovoid; fruiting calyx not as above 2. *Capsicum*
- 5a. Leaves scattered scabrous hairy and yellow glandular; inflorescences 3–9-flowered fascicles; calyx lobes subterminal; berries red, sometimes white 4. *Lycianthes*
- 5b. Leaves variously hairy, not as above; inflorescences pedunculate cymes or racemes; calyx lobes terminal; berries yellow to orange or black 6. *Solanum*

1. Brugmansia Pers.

Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Bercht. & J. Presl, Prir. Rostlin Aneb. Rostl. 1: 45. 1823. *Datura suaveolens* Humb. & Bonpl. ex Willd., Enum. Pl. : 227. 1809. [Plate 147b-c]

Shrub, 3–4 m high. Leaves oblong-ovate or elliptic-ovate, 5.5–10.4 × 2.4–7.3 cm, attenuate, undulate, sharply acute, chartaceous, hairy below. Inflorescence axillary, solitary. Calyx tubular, puberulous; tube 5–7 cm; lobes 5, triangular-ovate, c. 14 × 7 mm, acute. Corolla white, infundibular, drooping; tube 14–27 cm; lobes 5, triangular, with curved apex. Stamens 5; filaments 1.7–1.9 cm, pubescent except apex; anthers linear-oblong, c. 2.5 cm, connivent. Ovary conical, 6–7 mm; style 1.2–1.4 cm; stigma 2-lobed. Berries oblong-ovoid, c. 9 × 3 cm, longitudinally grooved, smooth; seeds rounded, corky.

Flowering & Fruiting: September–April.

Distribution. India: Arunachal Pradesh, Assam, Gujarat, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Buxaduar, KPB 1922; NRVK 6a, 06.10.2009, SKS & GK 46215; Mainabari, 24.02.2012, AK 55914.

2. Capsicum L.

Capsicum annum L., Sp. Pl. 1: 188. 1753; Prain, Bengal Pl. 2: 748. 1903. *Capsicum frutescens* auct. non L. 1753; Roxb., Fl. Ind. 1: 574. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 239. 1883.

Lanka (B).

Erect herb, 80–120 cm high. Leaves ovate or elliptic-ovate, 3.5–14 × 1.8–6.7 cm, cuneate to attenuate, repand, acuminate, membranous, gland-dotted. Inflorescence axillary, solitary. Calyx campanulate; tube 1.2–1.5 mm, gland-dotted; lobes shallowly 5-toothed or truncate with few hairs along rim. Corolla white, rotate; tube 3–3.5 mm; lobes 5, triangular-ovate, 2.5–3 × 1.5–2 mm, acute, nerved. Stamens 5; filaments flat; anthers elliptic, notched, dehisce longitudinally. Ovary ovoid; style 3–3.5 mm; stigma truncate. Berries oblong-ovoid, c. 10 × 5 mm, smooth; seeds creamy white, circular, c. 2 mm across, compressed.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 02.12.1975, JKS 4102; Rangamati to Bharnabari, 06.10.2012, AK 58702.

Notes: Possibly cultivated species, in escape grows in the reserve.

3. *Datura* L.

Datura metel L., Sp. Pl. 1: 179. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 243. 1883. *Datura fastuosa* L., Syst. Nat., ed. 10. 2: 932. 1759; C. B. Clarke in Hook. f., Fl. Brit. India 4: 242. 1883; Prain, Bengal Pl. 2: 751. 1903. *Datura fastuosa* var. *alba* (Rumph. ex Nees) C. B. Clarke in Hook. f., Fl. Brit. India 4: 243. 1883; Prain, Bengal Pl. 2: 751. 1903. [Plate 147d]

Kala dhutra (B); *Kalo-daduna* (N).

Shrub, 50–100 cm high. Leaves broadly ovate, 3–13.5 × 3–10 cm, asymmetrically cuneate-rounded, undulate, acuminate, chartaceous. Inflorescence axillary, solitary. Calyx tubular; tube 3–3.5 cm; lobes 5, oblong-ovate, 1.2–1.5 × 0.4–0.6 cm, sharply acute. Corolla violet, double, infundibular; tube 12–13 cm; lobes lanceolate, c. 1 cm, acuminate. Stamens 5; filaments c. 4 cm; anthers oblong, c. 1.4 cm. Ovary ovoid, echinate; style 10–13 cm; stigma bifid. Capsules spherical, c. 3 × 2.8 cm, c. 4 mm long tubercled.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Notes: The paste of roasted leaves is applied over the area to relieve pain.

Specimens examined: Santrabari, 1000ft, 18.05.1976, JKS 6928; Jainti range, 12.10.2009, SKS & GK 46337; Marakata, 24.09.2011, AK 52833; Chuniajhora, 28.09.2012, AK 56196.

4. *Lycianthes* (Dunal) Hassl.

Lycianthes crassipetala (Wall.) R. R. Mill, Edinburgh J. Bot. 57: 465. 2000 (as "*crassipetalum*"). *Solanum crassipetalum* Wall., Fl. Ind. 2: 256. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 232. 1883. [Plate 148a-b; Fig. 61]

Erect shrub, 0.7–1 m high. Leaves upper ones often in false pairs and unequal, broadly elliptic to elliptic-ovate, 3.5–11 × 2–5.5 cm, obliquely attenuate, entire and hairy, acuminate, subcoriaceous, scattered scabrous hairy and yellow glandular. Inflorescence axillary, 3–9-flowered fascicles. Calyx campanulate; tube 3–3.5 mm, truncate, hairy along rim; lobes 5, sometimes 10, subterminal, subulate, 1.5–2 mm, blunt, spreading. Corolla rotate, white with green centre; tube c. 2.5 mm; lobes 5, ovate, c. 4 × 5 mm, papillose, acute. Stamens 5; filaments flat, c. 1 mm; anthers yellow, oblong, c. 3.5 mm, dehisce by apical pores, connivent. Ovary ovoid; style 6–7 mm; stigma subcapitate. Berries red when ripe, sometimes white, subglobose, 3–8 × 4–8 mm, compressed, calyx persistent, smooth; seeds dull yellow brown, triangular, c. 2.3 × 1.9 mm, obscurely reticulate.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimen examined: Tashigaon to Rovers point, 02.10.2013, AK 59741.

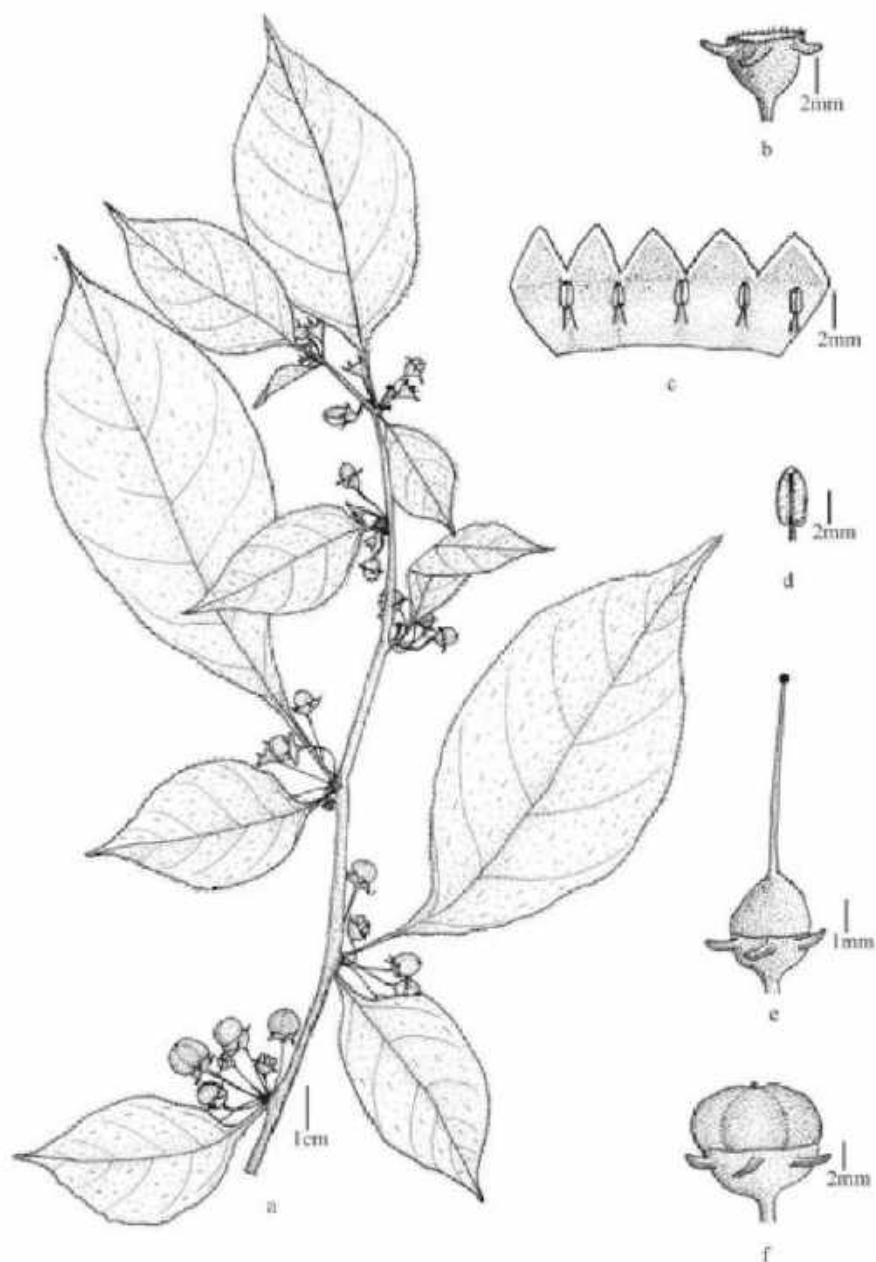


Fig. 61. *Lycianthes crassipetala*: a. Fruiting branchlet with flowers; b. Calyx; c. Corolla split open showing stamens; d. Stamen; e. Gynoecium with persistent calyx; f. Berry with persistent calyx (AK 59741).

5. *Physalis* L.

Physalis angulata L., Sp. Pl. 1: 183. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 238. 1885. *Physalis minima* L., Sp. Pl. 1: 183. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 238. 1883; Prain, Bengal Pl. 2: 750. 1903. [Plate 148c]

Ban-tipariya (B).

Erect herb, 30–70 cm high. Leaves ovate to rhomboid, 0.9–3.9 × 0.5–1.7 cm, attenuate, irregularly dentate, acute, chartaceous. Inflorescence axillary, solitary. Calyx campanulate, pubescent; tube c. 2 mm; lobes 5, triangular, c. 2 × 1 mm, ciliate, acute. Corolla yellow with brown black centre, cupular; tubes 6–7 mm; lobes 5, triangular-ovate, c. 1.5 × 2 mm, acute. Stamens 5; filaments 4.5–5 mm; anthers purple black, oblong, c. 2 mm; disk lobed. Ovary ovoid; style 4.3–5 mm; stigma capitate. Berries globose, 1.5–2.5 cm across, in accrescent calyx, pulpy; fruiting calyx inflated, membranous, nerved; seeds ovoid, c. 1 mm across.

Flowering & Fruiting: August–February.

Distribution. India: Throughout India.

Specimens examined: Bhutanghat, JKS 4099; South Bholka, JKS 4174; Rajabhatkhawa range, Near 23rd mile watch tower, 05.03.2011, SKS & GK 47249; Rajabhatkhawa range, 13.02.2010, SKS & GK 47072; Kumargram, 19.09.2011, AK 52652; Rydak river belt, 26.02.2012, AK 55968; Hauda nala, 03.10.2012, AK 58670.

6. *Solanum* L.

Key to the species

- 1a. Margins of leaves entire; inflorescences spirally arranged flowers in racemes or corymbose cymes 2
- 1b. Margins of leaves lobed; inflorescences various, not as above 3
- 2a. Branchlets yellow stellate tomentose; leaves alternate throughout; inflorescences corymbose cymes, stellate tomentose; calyx and corolla stellate tomentose; berries pubescent with scattered stellate hairs 2. *S. erianthum*
- 2b. Branchlets glabrous; leaves spirally arranged below, upper ones subopposite; inflorescences spirally arranged flowers in racemes, glabrous; calyx and corolla glabrous; berries glabrous 3. *S. spirale*
- 3a. Plants not prickly; branchlets angular; inflorescences umbellate cymes; filaments hairy at base; berries black when ripe 1. *S. americanum*
- 3b. Plants prickly; branchlets not angular; inflorescences various, not umbellate cymes; filaments glabrous; berries various, not black when ripe 4
- 4a. Corolla pale purple; stamens at middle of corolla tube; style pilose; stigma discoid; berries orange yellow when ripe 6. *S. violaceum*
- 4b. Corolla white; stamens at base of corolla tube; style glabrous; stigma capitate; berries brown or bright yellow when ripe 5

- 5a. Branchlets stellate tomentose, without glandular hairs; inflorescences 15–26-flowered, branched cymes; pedicels not glandular hairy; ovary ovoid, glandular hairy at apex; style c. 1 cm; berries brown when ripe 4. *S. torvum*
- 5b. Branchlets not stellate tomentose, with glandular hairs; inflorescences subfasciculate, 1–5-flowered cymes; pedicels glandular hairy; ovary globose, puberulent; style c. 8 mm; berries bright yellow when ripe 5. *S. viarum*

1. *Solanum americanum* Mill., Gard. Dict., ed. 8. Solanum no. 5. 1768.

[Plate 148d]

Erect herb, 20–50 cm high. Leaves ovate to ovate-rhombic, 1.5–10 × 0.6–3 cm, cuneate, lobed, acute or acuminate, subcoriaceous, sparsely pubescent. Inflorescence extra-axillary, 3–8-flowered, umbellate cymes. Calyx cupular, sparsely pubescent; tube 1–1.5 mm; lobe 5, triangular-ovate, 0.3–0.6 mm, ciliate, obtuse. Corolla white with greenish yellow centre, rotate, sparsely pubescent; tube c. 2.5 mm; lobes 5, ovate-lanceolate, c. 1 × 1 mm, hairy, acute. Stamens 5; filaments c. 0.8 mm, hairy at base; anthers yellow, 1.5–2 mm, connivent, dehisced by apical pore. Ovary subglobose; style c. 2 mm, hairy; stigma capitate. Berries black when ripe, globose, 5–9 mm across, pulpy; seeds discoid, 1–1.2 mm across.

Flowering & Fruiting: August–February

Distribution. India: Throughout India.

Specimens examined: Rajabhatkhawa range, 13.02.2010, SKS & GK 47071; Rydak river belt, 20.09.2011, AK 52692; Bhutanghat, 26.09.2011, AK 52916; Newlands, 15.02.2012, AK 55604; Sankosh, 17.02.2012, AK 55648.

2. *Solanum erianthum* D. Don, Prodr. Fl. Nepal.: 96. 1825; C. B. Clarke in Hook. f., Fl. Brit. India 4: 230. 1885. *Solanum verbascifolium* sensu C. B. Clarke in Hook. f., Fl. Brit. India 4: 230. 1883, non L., 1753. [Plate 149a-b]

Barbee (N).

Shrub, 2–3.5 m high, stellate tomentose. Leaves elliptic-lanceolate, ovate, 13–17.5 × 5.3–7.7 cm, cuneate, entire with stellate hairs, acuminate, coriaceous, stellate pubescent. Inflorescence axillary, terminal, pedunculate, corymbose cymes, yellow stellate tomentose. Calyx cupular, yellow stellate tomentose; tube 2.5–3 mm; lobes 5, triangular-ovate, 2.5–3.5 × 1–1.5 mm, acute, sparsely pubescent inside. Corolla white, rotate; tube 2.5–3 mm; lobes 5, ovate-lanceolate, 2.5–3 × 1.5–2 mm, short acuminate, stellate tomentose, glandular and sparsely pubescent near apex inside. Stamens 5; filaments flat, c. 1.5 mm; anthers elliptic-oblong, c. 2.5 mm, connivent. Ovary ovoid, silky hairy; style c. 5 mm; stigma capitate, slightly notched above. Berries globose, 8–10 mm across, pulpy, scattered stellate hairy; seeds circular, compressed.

Flowering & Fruiting: September–February.

Distribution. India: Throughout India.

Specimens examined: Buxaduar, 30.11.1975, JKS 4133; Hatipota, 29.09.2012, AK 58525; Buxa Fort to Tashigaon, 01.10.2013, AK 59708.

3. *Solanum spirale* Roxb., Fl. Ind. 2: 247. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 230. 1885; Prain, Bengal Pl. 2: 745. 1903. [Plate 149c-d; Fig. 62]

Erect shrub, 1–1.5 m high. Leaves elliptic-oblong to elliptic-ovate, 8–18 × 4–7 cm, obliquely attenuate, entire, acute to short acuminate, chartaceous, with minute yellow cystoliths. Inflorescence extra axillary, spirally arranged, many flowered racemes. Calyx campanulate, shallowly lobed; tube c. 2.5 mm, papillose inside; lobes 5, subacute. Corolla white, rotate; tube 1.6–2 mm; lobes 5, ovate-lanceolate, 4.5–6.5 × 2.5–2.8 mm, incurved, margins scarious, acute, thick. Stamens 5; filaments flat; anthers oblong, 3–3.5 mm, connivent, dehisced by apical pore. Ovary subglobose; style angular, c. 6 mm; stigma clavate. Berries yellow or orange when ripe, subglobose to globose, 3–6 × 5–7 mm, pulpy; seeds discoid, c. 4 × 3.5 mm.

Flowering & Fruiting: July–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59681.

4. *Solanum torvum* Sw., Prodr.: 47. 1788; C. B. Clarke in Hook. f., Fl. Brit. India 4: 234. 1885; Prain, Bengal Pl. 2: 746. 1903. 1984. *Solanum stramonifolium* sensu Roxb., Fl. Ind. 1: 572. 1832, non Jacq. 1781. [Plate 150a-b]

Gota-begun (B); *Bin* (N).

Shrub, 1–2 m high, prickly. Leaves ovate-elliptic, 13.5–12 × 2–8 cm, subcordate or obliquely truncate, shallowly lobed, acute, subcoriaceous, stellate tomentose. Inflorescence extra-axillary, 15–26-flowered, branched cymes. Calyx campanulate; tube c. 2 mm; lobes 5, lanceolate, 3–5 × 1 mm, acute, stellate tomentose. Corolla white, rotate; tube 7–8 mm; lobe 5, lanceolate, 10–12 × 4–5 mm, acute, midvein prominent, stellate hairy. Stamens 5; filaments 1–1.5 mm; anthers oblong, c. 6 mm, connivent, dehisced by apical pore. Ovary ovoid, c. 2 mm across, glandular hairy above; style c. 1 cm; stigma capitate. Berries brown, globose, 1–1.2 cm across, pulpy; seeds discoid, 2–3 mm across, compressed.

Flowering & Fruiting: July–December.

Distribution. India: Throughout India.

Specimens examined: Garam, JKS 847; South Bholka, JKS 4149; Balapara, JKS 4215; Panbari 8, 08.10.2009, SKS & GK 46214; Kumargram, Kalikhola river belt, 21.09.2011, AK 52731; Sankosh, 28.09.2011, AK 52974.

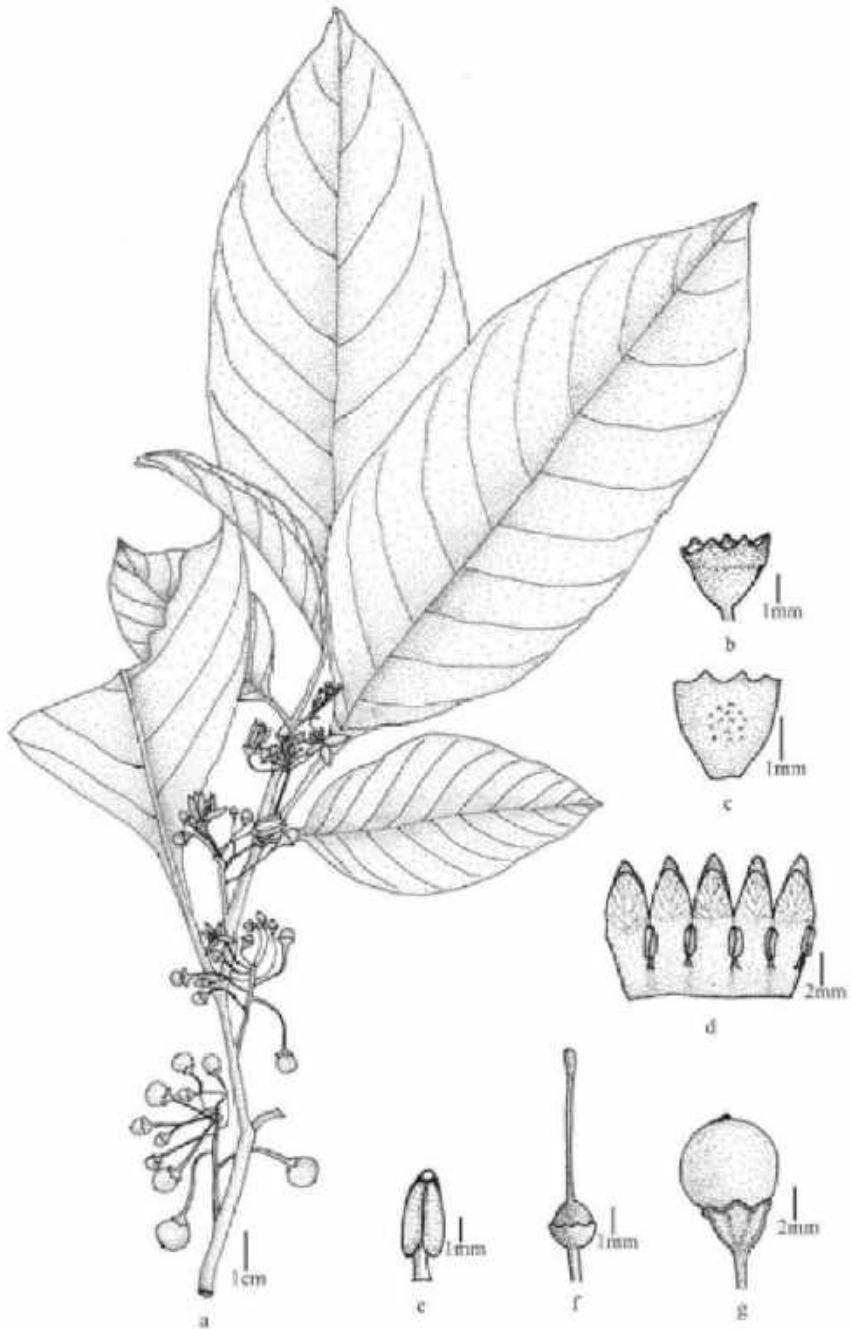


Fig. 62. *Solanum spirale*: a. Flowering branchlet with berries; b. Calyx; c. Calyx split open showing papillae; d. Corolla split open showing stamens; e. Stamen; f. Gynoecium with persistent calyx; g. Berry with persistent calyx (AK 59681).

5. *Solanum viarum* Dunal in DC., Prodr. 13 (1): 240. 1852. *Solanum khasianum* C. B. Clarke var. *chatterjeeanum* Sengupta, Bull. Bot. Surv. India 3: 413. 1961.

[Plate 150c-d]

Kachera kanra (N).

Undershrub, 1–1.5 m high, prickly. Leaves broadly ovate, 4–8 × 4–6 cm, subcordate at base, lobed, subacute, subcoriaceous, glandular hairy, tomentose above, pubescent below. Inflorescence extra-axillary, subfasciculate, 1–5-flowered cymes. Calyx campanulate; tube c. 2 mm; lobes 5, triangular, 0.6–1.2 mm, acute. Corolla white, rotate; tube c. 1.5 mm; lobes 5, lanceolate, c. 2.5 × 1 mm, acute, sparsely pubescent. Stamens 5; filaments 1–1.5 mm; anthers lanceolate, 6–7 mm, connivent, dehisced by apical pore. Ovary globose, puberulent; style c. 8 mm; stigma capitate. Berries light green mottled with dark green when immature, bright yellow when ripe, globose, 2.2–2.5 cm across, pulpy; seeds reniform, 2–2.5 mm across, flattened.

Flowering & Fruiting: September–February.

Distribution. India: Throughout India.

Specimens examined: Way to Tobgaon, KPB 2046; Jainti range, 04.10.2009, SKS & GK 46115; Jainti 7b, 09.03.2011, GK 50518; Rydak river belt, 20.09.2011, AK 52673; Marakata, 24.09.2011, AK 52844.

6. *Solanum violaceum* Ortega, Nov. Pl. Descr. Dec.: 56. 1798. *Solanum indicum* L., Sp. Pl. 1: 187. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 234. 1883; Prain, Bengal Pl. 2: 746. 1903.

[Plate 151a-b]

Byakur, Gurkamai (B).

Undershrub, c. 1 m high, prickly. Leaves broadly elliptic or elliptic-oblong, 3.5–8.5 × 2.8–5.6 cm, obliquely truncate, shallowly lobed, subacute at apex, subcoriaceous, stellate tomentose, prickly on veins. Inflorescence extra-axillary, 4–8-flowered cymes. Calyx campanulate; tube c. 2 mm; lobes 5, triangular-ovate, c. 3 mm, acute, prickly. Corolla pale purple, rotate; lobes 5, lanceolate, c. 7 mm, acute. Stamens 5; filaments c. 1 mm; anthers linear-oblong, 5–7 mm, connivent, dehisced by apical pore. Ovary ovoid, c. 1.5 mm; style c. 7 mm, pilose; stigma discoid. Berries orange yellow when ripe, globose, 8–12 mm across, pulpy; seeds rounded, c. 2 mm across.

Flowering & Fruiting: August–March.

Distribution. India: Throughout India.

Specimens examined: Rajabhatkhawa range, 13.02.2010, SKS & GK 47062; Rydak river belt, 20.09.2011, AK 52676; North Rydak, 26.09.2011, AK 52939; Narathali, 20.02.2012, AK 55771; Bhutanghat, 25.02.2012, AK 55941.

Scrophulariaceae

Key to the genera

- 1a. Aquatic or marshy herbs, often strongly aromatic; leaves in whorls throughout or at base; stigma bilamellate; capsules valves separating from placentiferous axis by 2 wings 3. *Limnophila*
- 1b. Terrestrial herbs, not strongly aromatic (except *Adenosma*); leaves not in whorls throughout (except *Scoparia dulcis*); stigma not bilamellate; capsule valves not separating from placentiferous axis by 2 wings 2
- 2a. Calyx winged; fruit a capsule, dehisce septicidally 10. *Torenia*
- 2b. Calyx not winged; fruit a capsule, dehisce septicidally or loculicidally or both 3
- 3a. Aromatic herbs; inflorescences axillary, terminal, many flowered, dense heads, villous with septate hairs; calyx with 3 large outer lobes and 2 much smaller linear-lanceolate inner lobes 1. *Adenosma*
- 3b. Non aromatic herbs; inflorescences various, not as above; calyx with all equal lobes 4
- 4a. Flowers yellow or yellow with brownish hue 5
- 4b. Flowers variously coloured, not as above 8
- 5a. Shrubs or undershrubs (except *Lindenbergia muraria*); palate prominent with coloured spots; style hairy at base 4. *Lindenbergia*
- 5b. Erect herbs; palate not prominent; style glabrous or glandular hairy throughout 6
- 6a. Erect herbs; stems and inflorescences retrorsely pubescent; calyx spathe-like; corolla tube equal or more than 4 cm; anthers spurred, connective ciliate; style glandular hairy 2. *Centranthera*
- 6b. Decumbent or prostrate herbs; stems and inflorescences not retrorsely pubescent; Calyx divided to base or campanulate; corolla tube smaller than 2 cm; anthers not spurred, connective not ciliate; style glabrous 7
- 7a. Calyx divided to base, not angled; lobes in 2 whorls; outer lobes 3, ovate-elliptic, 3-5 mm; inner lobes 2, linear, with linear appendage at base; upper corolla lip not 2-lobed; capsules dehisce septicidally; seeds elliptic, reticulate 7. *Mecardonia*
- 7b. Calyx campanulate, 5-angled; lobes not as above; upper corolla lip 2-lobed; capsules dehisce loculicidally; seeds ovoid, papillose 8. *Mimulus*
- 8a. Inflorescences usually axillary, solitary or in pairs per node; flowers symmetric; calyx lobes oblong; corolla with dense tuft of long silky white hairs; lobes reflexed upwards; anthers subsagittate 9. *Scoparia*
- 8b. Inflorescences not as above; flowers weakly to strongly zygomorphic; calyx lobes not oblong; corolla not as above; anthers various, not subsagittate 9
- 9a. Flowers weakly zygomorphic; calyx 4-lobed; corolla cupular; stamens 2; capsules compressed, emarginate, dehisce loculicidally and often also septicidally; seeds punctate or glandular 11. *Veronica*

- 9b. Flowers strongly zygomorphic; calyx 5-lobed; corolla bilabiate; stamens 4; capsules not compressed, not emarginate, dehisce loculicidally or septicidally; seeds various, not punctate or glandular 10
- 10a. Leaves arranged in a basal rosette; inflorescences scapiform racemes; capsules dehisce loculicidally 6. *Mazus*
- 10b. Leaves all cauline; inflorescences in terminal or axillary racemes, or solitary and axillary or in umbel-like clusters; capsules dehisce septicidally 5. *Lindernia*

1. *Adenosma* R. Br.

Adenosma indiana (Lour.) Merr., Trans. Amer. Philos. Soc. ser. 2, 24 (2): 351. 1935. *Manulea indiana* Lour., Fl. Cochinch. 2: 386. 1790. *Adenosma capitatum* Benth. ex Hance, J. Linn. Soc., Bot. 13: 14. 1873; Hook. f., Fl. Brit. India 4: 264. 1884; Prain, Bengal Pl. 2: 761. 1903. [Plate 151c; Fig. 63]

Erect herb, 20–30 cm high. Leaves ovate to ovate-oblong, 1–5.5 × 0.6–2.2 cm, cuneate to attenuate, serrate, subacute to obtuse, chartaceous, pilose with septate hairs above, pilose and gland-dotted below. Inflorescence axillary, terminal, many flowered, dense heads, villous with septate hairs; inflorescence bracts lanceolate or ovate-oblong. Flowers sessile to subsessile; floral bracts linear to linear-lanceolate. Calyx cupular, villous; tube 0.5–1 mm; upper lobe 3-toothed, lanceolate, c. 1.5 mm, short acuminate; lower lobe 2-toothed, triangular-ovate, c. 1 mm, acute to short acuminate. Corolla blue, violet; tube cylindric, 2.5–3 mm; upper lip suborbicular, c. 2 mm across, notched; lower lip 3-lobed, lobes suborbicular, c. 1 mm across. Stamens 4, didynamous, only 2 fertile; filaments flat, 1.8–2 mm, some trichomes at insertion of filaments; anthers elliptic, theca separate. Ovary ovoid, on a circular disk-like structure; style c. 2 mm; stigma capitate, 2-lobed. Capsules ovoid, c. 2 × 3.2 mm, 2-lobed or grooved, dehisce septicidally and loculicidally; seeds pale brown, ellipsoid, umbonate, with scales.

Flowering & Fruiting: August–December.

Distribution. India: Assam, Bihar, Jharkhand, Kerala, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Marakata, 24.09.2011, AK 52868; Hauda nala, 03.10.2012, AK 58665; Rangamati to Bharnabari, 06.10.2012, AK 58710.

2. *Centranthera* R. Br.

Centranthera grandiflora Wall. ex Benth., Scroph. Ind.: 50. 1835; Hook. f., Fl. Brit. India 4: 301. 1884. [Plate 151d; Fig. 64]

Erect herb, 50–80 cm high. Leaves sessile to subsessile, linear to linear-oblong, 3–9 × 0.3–1.2 cm, attenuate, distantly toothed, revolute and hairy, subacute, chartaceous, tuberculate; cystoliths present. Inflorescence axillary, terminal, racemes, apparently looks like spike, retrorsely pubescent; inflorescence bracts



Fig. 63. *Adenosma indianum*: a. Flowering branchlet; b. Inflorescence bract; c. Floral bract; d. Calyx split open; e. Corolla split open showing fertile & sterile stamens and trichomes; f. Gynoecium with disk; g. Dehiscent capsule (AK 58710).

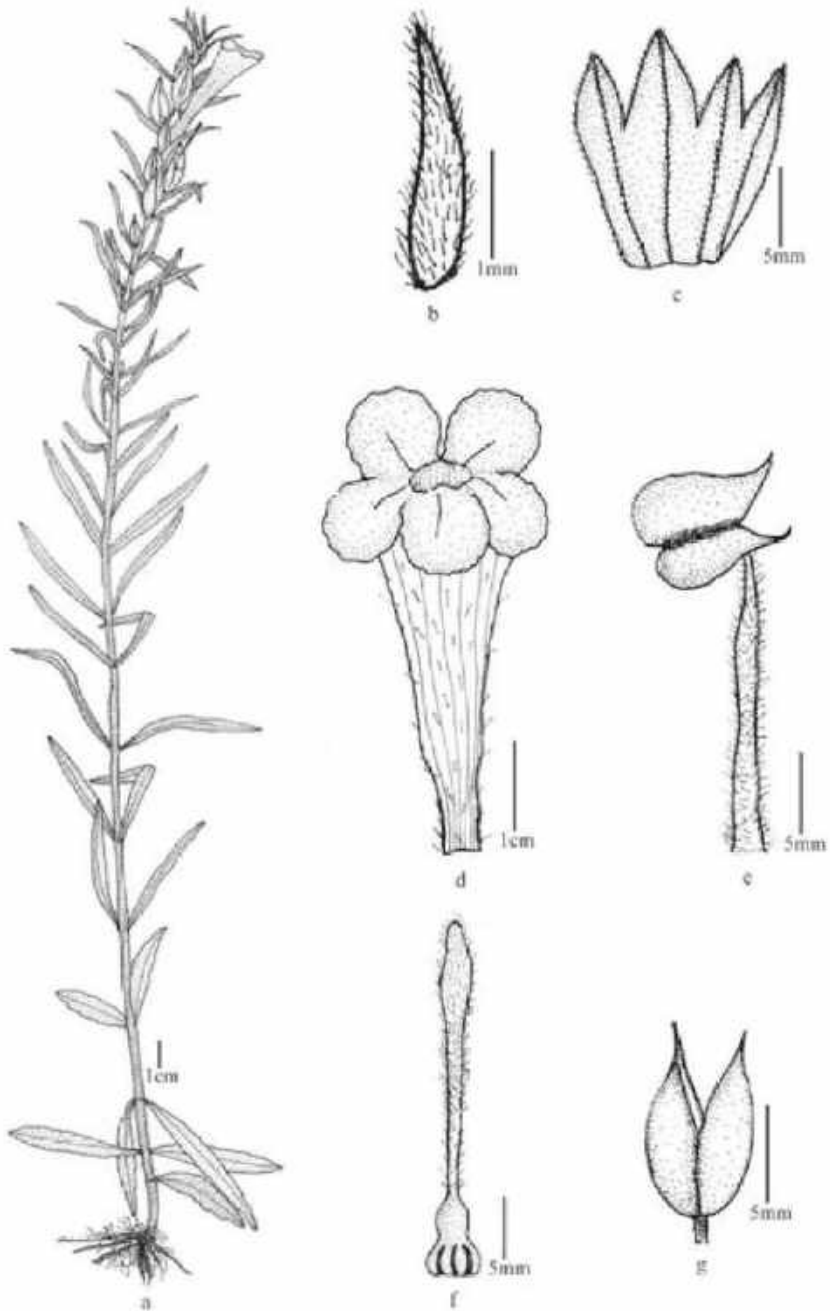


Fig. 64. *Centranthera grandiflora*: a. Habit; b. Floral bract; c. Calyx split open; d. Corolla; e. Stamen; f. Gynoecium; g. Dehisced capsule (AK 58663).

linear to linear-oblong; floral bracts subulate or lanceolate. Calyx spathe-like, scabrid on veins; tube c. 7.5 mm; lobes 4, triangular-ovate or cohering, c. 7.5 × 2 mm, acute. Corolla yellow, tubular-campanulate, bilabiate, sparsely glandular pubescent; tube 4–4.2 cm, slightly curved, saccate and dilated upwards, nerved; upper lip 3-lobed, lobes suborbicular, 7–9 mm across, undulate; lower lip 2-lobed, same as upper lobes. Stamens 4, didynamous; filaments flat, 7–20 mm, ciliate; anthers irregular in shape, spurred, theca separate, jointed at tip only, ciliate at connective. Ovary pyriform; style c. 2.5 mm, glandular hairy; stigma linguiform, glandular hairy. Capsules ovoid, 10–11 × 7–8 mm, grooved, dehisce loculicidally, smooth; seeds oblong, 1–2 mm, reticulate.

Flowering & Fruiting: July–December.

Distribution. India: Arunachal Pradesh, Mizoram and West Bengal.

Specimen examined: Hauda nala, 03.10.2012, AK 58663.

3. *Limnophila* R. Br.

Key to the species

- 1a. Marshy herbs; stems densely lanate; leaves 3, rarely 4 in whorls throughout, gland-dotted, not scabrous; submerged leaves absent; ovary ellipsoid, c. 2.5 mm; style 4.5–5 mm; capsules ellipsoid; seeds cylindrical 1. *L. chinensis*
- 1b. Aquatic herbs; stems white hirsute; leaves 3–6 in whorls at base, opposite above, not gland-dotted, scabrous; submerged leaves present; ovary ovoid, c. 1 mm; style c. 3 mm; capsules broadly oblong; seeds ellipsoid 2. *L. sessiliflora*

L. Limnophila chinensis (Osbeck) Merr., Amer. J. Bot. 3: 581. 1916. *Columnnea chinensis* Osbeck, Dagb. Ostind. Resa; 230. 1757. *Limnophila hirsuta* (Heyne ex Benth.) Benth. in DC., Prodr. 10: 388. 1846; Hook. f., Fl. Brit. India 4: 268. 1884; Prain, Bengal Fl. 2: 764. 1903. [Plate 152a]

Terrestrial, erect herb, 8–15 cm high. Leaves sessile to subsessile, usually in whorls of 3, rarely 4, ovate-lanceolate to linear-oblong, 7–20 × 3–8 mm, distinctly narrowed into semiamplexicaul base, serrulate, subacute or obtuse, subcoriaceous, gland-dotted. Inflorescence axillary, solitary or terminal cymose or paniced; floral bracts subulate. Calyx tubular-campanulate; tube c. 3 mm; lobes 5, lanceolate, c. 4 mm, acuminate, hairy. Corolla mauve; tube c. 1 cm; upper lip orbicular, c. 5 mm across, emarginate, hairy at base; lower lip 3-lobed, lobes suborbicular, c. 3 mm across, slightly emarginate. Stamens 4, didynamous; filaments 3–6 mm; anthers small. Ovary ellipsoid; style 4.5–5 mm; stigma bilamellate. Capsules ellipsoid, 4–5 mm, covered by persistent calyx, dehisce septically; seeds brown, cylindrical, c. 1.5 mm, punctate.

Flowering & Fruiting: October–April.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Damanpur, 24.11.1975, JKS 907; Gadadhar range, 13.03.2011, GK 50566; Narathali, 20.02.2012, AK 55821, 55829.

2. *Lynnophila sessiliflora* (Vahl) Blume, *Bijdr. Fl. Ned. Ind.* 14: 750. 1826 (as "*Lynnophila sessiliflora*"); Hook. f., *Fl. Brit. India* 4: 270. 1884; Prain, *Bengal Pl.* 2: 764. 1903. *Hottonia sessiliflora* Vahl, *Symb. Bot.* 2: 36. 1791. [Plate 152b]

Aquatic herb, 15–20 cm high. Submerged leaves pinnatisect, 0.8–3.2 cm; aerial leaves sessile, 3–6 in whorls below, uppermost opposite, elliptic-lanceolate, 10–15 × 2–3 mm, semiamplexicaul, serrate or dentate, acute, subcoriaceous, scabrous. Inflorescence axillary, solitary; floral bracts subulate. Calyx campanulate, sparsely gland-tipped hairy; tube c. 3 mm; lobes 5, lanceolate, 2–3 mm, acute. Corolla light pink or mauve; tube 1–1.2 mm; upper lip 2-lobed, lobes rounded, 2.5–3 mm across, hairy at base; lower lip 3-lobed, lobes rounded, obtuse. Stamens 4, didynomous; filaments 1–3 mm; anthers small. Ovary ovoid; style c. 3 mm; stigma bilamellate. Capsules broadly oblong, c. 3 mm, dehisce septically; seeds brown, ellipsoid, minute.

Flowering & Fruiting: November–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Manipur, Meghalaya, Sikkim, Tripura and West Bengal.

Specimens examined: Rajabhatkhawa, 27.02.1934, KPB 1640; Poro, JKS 752; Checko, JKS 917; North Bholka, 06.12.1975, JKS 4155; South Bholka, JKS 4229; Bhutia Pond, 17.02.2010, SKS & GK 47133; Bhutia Pond, 13.03.2011, GK 50562; Sankosh, 17.02.2012, AK 55658; Checko-1, 09.02.2013, AK 58824.

4. *Lindenbergia* Lehm.

Key to the species

- 1a. Herbs; leaves glandular hairy; inflorescences axillary, solitary; floral bracts obovate; corolla without coloured spots; palate 3-lobed 3. *L. muraria*
- 1b. Undershubs or shrubs; leaves not glandular hairy; inflorescences racemes; floral bracts linear or ovate; corolla with reddish spots; palate 2-lobed 2
- 2a. Branchlets antrorsely scabrid; leaves appressed pubescent, chartaceous; inflorescences glandular pubescent; flowers pedicellate; floral bracts linear, glandular hairy; calyx glandular pubescent; lobes acute; stamens at base of corolla tube 1. *L. hookeri*
- 2b. Branchlets not antrorsely scabrid; leaves villous, coriaceous; inflorescences villous; flowers subsessile; floral bracts ovate, villous; calyx villous; lobes acuminate; stamens at middle of corolla tube 2. *L. titensis*

1. *Lindenbergia hookeri* C. B. Clarke ex Hook. f., *Fl. Brit. India* 4: 261. 1884. *Lindenbergia bhutanica* T. Yamaz., *J. Jap. Bot.* 45: 145. 1970. [Plate 152c; Fig. 65]

Hik-shut-up (N).

Shrub, 1–2 m high. Leaves equal to unequal, elliptic-lanceolate, 10–41 × 3–10

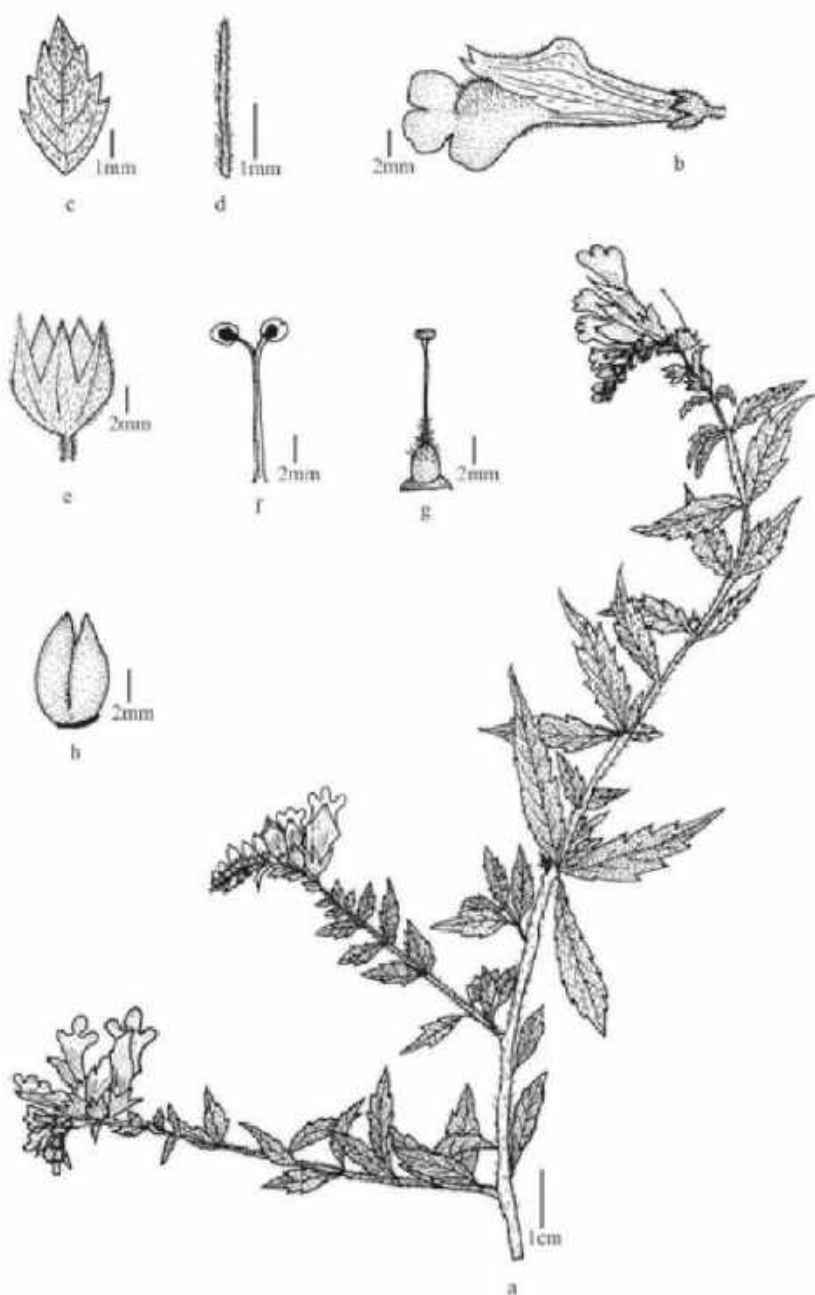


Fig. 65. *Lindenbergia hookeri*: a. Flowering branchlet; b. Flower; c. Inflorescence bract; d. Floral bract; e. Calyx; f. Stamen; g. Gynoeceium; h. Dehiscent capsule (AK 59939).

mm, attenuate, serrate, acuminate to caudate-acuminate, chartaceous, appressed pubescent, glabrescent later. Inflorescence axillary or terminal racemes, glandular pubescent, branched; inflorescence bracts ovate; floral bracts linear. Calyx cupular, glandular pubescent; tube 3–5 mm; lobes 5, triangular-ovate, 3.5–4 × 1.5–2 mm, acute. Corolla yellow with red maroon spots on throat, campanulate; tube 8–10 mm, compressed, nerved, few glandular hairs, pubescent to glabrescent inside; upper lip triangular-ovate, 5–6 × 6–7 mm, bifid, raised sac outwards, glandular hairy; lower lip 3-lobed, lobes suborbicular, c. 2.5 mm across, sparsely glandular hairy, tomentose inside at palate; palate 2-lobed, distinctly raised upwards. Stamens 4, didynamous; filaments 10–11 mm, bifid above; anthers rounded, theca separate. Ovary pyriform; style 8–9 mm, densely pubescent at base; stigma clavate. Capsules ovoid, 5–7 × 3–4 mm, dehisce loculicidally; seeds elongate-ovoid, reticulate.

Flowering & Fruiting: January–July.

Distribution. India: Arunachal Pradesh, Assam, Sikkim and West Bengal.

Specimens examined: Way to Buxaduar, *KPB* 1755; Hauda nala, 19.02.2013, *AK* 59847; Buxaduar to Achalung, 14.02.2014, *AK* 59939.

2. *Lindenbergia muraria* (Roxb. ex D. Don) Bruhl, J. Dept. Sci. Cal. Univ. (Bot.) 2: 27. 1920. *Stemodia muraria* Roxb. ex D. Don, Prodr. Fl. Nepal.: 89. 1825. *Lindenbergia urticifolia* Lehm. ex Link & Otto, Icon. Pl. Rar.: 95, t. 48. 1831 (as "*urticaefolia*"); Hook. f., Fl. Brit. India 4: 262. 1884; Prain, Bengal Pl. 2: 760. 1903. [Plate 152d]

Beduwar jhar (N).

Erect herb, 10–20 cm high. Leaves rhomboid-ovate to obovate, 1–5 × 0.6–2.5 cm, attenuate, entire below and serrate above, acute, chartaceous, simple and glandular hairy. Inflorescence axillary, solitary; floral bracts obovate. Calyx campanulate, hispid; tube c. 2 mm, hairy inside; lobes 5, oblong-ovate, c. 2 × 1.5 mm, acute, glabrescent inside. Corolla yellow maroon; tube 4–8 mm, pubescent; upper lip obcordate, c. 4 mm across, notched, glandular hairy inside; lower lip 3-lobed, lobes suborbicular, c. 2 mm across, hairy at middle; palate 3-lobed, distinctly raised upwards, each lobe 2-lobed. Stamens 4, didynamous; filaments 2–3 mm; anthers rounded. Ovary ovoid-globose, hairy; style c. 3 mm, hairy at base; stigma globose. Capsules ovoid, 2.5–4 × 2.5–3.5 mm, pilose; seeds yellow, minute.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andhra Pradesh, Assam, Bihar, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: On way to Buxaduar forest, *JKS* 946; Santrabari range, 05.10.2009, *SKS* & *GK* 46172; Kumargram, Hathinala, 21.02.2012, *AK* 55852; Hatipota, 29.09.2012, *AK* 58531; Hatijhora, way to Mahakal cave, 01.10.2012, *AK* 58588.

3. *Lindenbergia titensis* Sikdar & Maiti, J. Bombay Nat. Hist. Soc. 77: 121. 1980. [Plate 153a]

Undershrub, 1–1.5 m high. Leaves ovate to lanceolate, elliptic-lanceolate or elliptic-oblong, 11–70 × 5–25 mm, attenuate, coarsely serrate to dentate, acute to short acuminate, coriaceous, warty and villous. Inflorescence axillary, terminal, spike-like racemes, villous. Flowers subsessile; floral bracts ovate. Calyx cupular, villous; tube 2.5–3 mm; lobes 5, triangular-ovate, 1–1.8 × 1–1.5 mm, short acuminate. Corolla yellow with red spots on throat, villous; tube 4–4.5 mm, compressed, glabrescent, villous at palate; upper lip triangular-ovate, c. 4 × 2–2.8 mm, notched; lower lip 3-lobed, lobes rounded, c. 0.5 × 1 mm, sparsely villous inside; palate 2-lobed, distinctly raised upwards. Stamens 4, didynamous; filaments 3–3.5 mm; anthers rounded, theca separate. Ovary ovoid, pubescent; style c. 4 mm, pubescent at base; stigma clavate. Capsules ovoid, 5–6 × c. 4 mm, with persistent calyx and style, pubescent; seeds oblong-ovoid, reticulate.

Flowering & Fruiting: January–April.

Distribution. India: West Bengal.

Specimens examined: Hatipota, 17.02.2013, AK 59810; Hauda nala, 19.02.2013, AK 59851.

5. *Lindernia* All.

Key to the species

- 1a. Erect herbs; stamens 4, all fertile; disk present 2
1b. Decumbent herbs; stamens 4, only posterior pair fertile; disk absent 3
- 2a. Stems sparsely antrorsely hairy; veins pinnate; floral bracts absent; pedicels 1.3–2.4 cm, glabrescent or glabrous; calyx lobes triangular-ovate, glabrescent with few hairs at tip; corolla throat white or light bluish; upper lip pale purple 3. *L. crustacea*
2b. Stems sparsely white hairy to hirsute; veins 3–5 from base; floral bracts present; pedicels 0.2–1.2 cm, glandular hairy when young, glabrous later; calyx lobes lanceolate, hirsute; corolla throat yellow; upper lip brownish 5. *L. pusilla*
- 3a. Stems striated; leaves subamplexicaul or amplexicaul at base, strongly spinous-serrate or aristate-serrate at margins 4
3b. Stems not striated; leaves various, not subamplexicaul nor amplexicaul at base, not strongly spinous-serrate or aristate-serrate at margins 5
- 4a. Leaves sessile, chartaceous, not punctate above; floral bracts linear-lanceolate; calyx lobes lanceolate, acute with a spine-like tip; corolla white with pink spots at throat; tube hairy; ovary cylindrical; seeds irregularly triangular, not rugose 2. *L. ciliata*
4b. Leaves petiolate, subcoriaceous, punctate above; floral bracts linear; calyx lobes linear-subulate, finely aristate; corolla variously coloured, white, pink, lilac or pale purple; ovary ovate; seeds oblong-ovoid, rugose 7. *L. ruellioides*
- 5a. Stems narrowly winged, sparsely glandular hairy above; leaves serrate above at margins, obtuse or rounded at apex; pedicels 3–5.5 mm, glandular pubescent; calyx

tube glandular pubescent; corolla tube with few long hairs at throat of lower lip, sparsely glandular hairy; staminodes scaly; stigma linguiform, umbonate

6. *L. rotundifolia*

5b. Stems not narrowly winged, glabrous throughout; leaves serrate throughout or entire at margins, acute or subacute at apex; pedicels 5–8 mm, glabrous; calyx tube glabrous; corolla tube without few long hairs at throat of lower lip, glabrous; staminodes not scaly; stigma obconical or minute 6

6a. Leaves oblanceolate, serrate at margins, gland-dotted; veins pinnate; calyx lobes short acuminate; corolla pale purple; upper lip suborbicular; stamens at middle of corolla tube; filaments 3–4 mm; style 3.5–4 mm; capsules cylindrical, 7–9 mm; seeds brown 1. *L. antipoda*

6b. Leaves ovate to elliptic-ovate, entire at margins, not gland-dotted; veins 3 from base; calyx lobes acute; corolla white with blue spots; upper lip ovate; stamens at above middle of corolla tube; filaments and style 2–2.5 mm; capsules ovoid or ellipsoid, 2–3 mm; seeds white yellow 4. *L. parviflora*

1. *Lindernia antipoda* (L.) Aiston in Trimen, Handb. Fl. Ceylon 6: 214. 1931. *Ruellia antipoda* L., Sp. Pl. 2: 635. 1753. *Bonnaya veronicifolia* (Retz.) Spreng., Syst. Veg. ed. 16, 1: 41. 1824 (as "*veronicaefolia*"); Hook. f., Fl. Brit. India 4: 285. 1884; Prain, Bengal Pl. 2: 770. 1903. [Plate 153b]

Decumbent herb, 5–8 cm high. Leaves sessile, oblanceolate, 8–23 × 3.5–5.5 mm, attenuate, serrate, acute or subacute, chartaceous, gland-dotted. Inflorescence axillary, terminal, lax racemes or solitary; floral bracts linear-lanceolate. Calyx divided to base; lobes 5, linear-lanceolate, c. 4 mm, short acuminate. Corolla pale purple; tube c. 5 × 1–1.5 mm, compressed; upper lip suborbicular, 2–2.5 mm across, notched; lower lip 3-lobed, lobes suborbicular, c. 1.5 mm across. Stamens 4, didynamous; filaments 3–4 mm; anthers ovoid, theca separate; staminodes filiform with hooked apex. Ovary ovoid; style 3.5–4 mm; stigma obconical. Capsules cylindrical, 7–9 × 1–1.2 mm, acuminate; seeds brown, ellipsoid or triangular-ovoid, reticulate.

Flowering & Fruiting: January–June.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Goa, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Odisha, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Newlands, 15.02.2012, AK 55641, 55642; Narathali, 20.02.2012, AK 55809; Kumargram, Hathinala, 21.02.2012, AK 55861; Marakata, 22.02.2012, AK 55906.

2. *Lindernia ciliata* (Colsm.) Pennell, Brittonia 2: 182. 1936. *Gratiola ciliata* Colsm., Prodr. Descr. Gratiol.: 14. 1793. *Bonnaya brachiata* Link & Otto, Icon. Pl. Select.: 25, t. 11. 1820; Hook. f., Fl. Brit. India 4: 284. 1884; Prain, Bengal Pl. 2: 770. 1903. [Plate 153c]

Bhumi-rim (B).

Decumbent herb, 15–20 cm high. Leaves sessile, oblong to lanceolate-oblong, 0.7–4.5 × 0.3–1.2 cm, amplexicaul, aristate-serrate, acute to obtuse, chartaceous. Inflorescence terminal racemes; floral bracts linear-lanceolate. Calyx divided to base; lobes 5, lanceolate, 3–3.5 mm, acute with a spine-like tip. Corolla white with pink spots at throat, bilabiate; tube c. 4.5 mm, hairy; upper lip ovate, 2–2.5 × c. 1.5 mm, notched; lower lip 3-lobed, mid lobe larger than lateral lobes, lobes subcircular, c. 1 mm across. Stamens 4, didynamous; filaments 2–2.5 mm; anthers ovoid, theca separate; staminodes filiform with hooked apex. Ovary cylindrical; style c. 2 mm; stigma bilamellate. Capsules cylindrical, c. 1 cm, mucronate; seeds irregularly triangular, minute.

Flowering & Fruiting: April–November.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: South Rajabhatkhawa, JKS 4279; North Rajabhatkhawa, JKS 6995; Jainti Range, SS & party 79; Bhutanghat, 26.09.2011, AK 52950; Jainty-Phashkhawa, 02.10.2012, AK 58620.

3. *Lindernia crustacea* (L.) F Muell., Syst. Census Austral. Pl. 1: 97. 1882. *Capraria crustacea* L., Mant. Pl. 1: 87. 1767. *Vandellia crustacea* Benth., Scroph. Ind.: 35. 1835; Hook. f., Fl. Brit. India 4: 279. 1884; Prain, Bengal Pl. 2: 768. 1903. [Plate 153d]

Erect herb, 5–10 cm high. Leaves ovate to broadly-ovate or deltoid-ovate, suborbicular or smaller one lanceolate, 7–15 × 2–8 mm, attenuate, serrate and scabrid, subacute or obtuse, membranous, gland-dotted or smooth below. Inflorescence axillary, solitary or racemes. Calyx cupular; tube 2–3 mm, glabrous; lobes 5, triangular-ovate, c. 1 × 0.4–0.6 mm, short acuminate-caudate, glabrescent with few hairs at tip outside. Corolla pale purple; tube c. 4 mm, nerved, slightly curved; upper lip triangular-ovate, c. 1 mm across, notched; lower lip 3-lobed, lobes suborbicular, c. 1 mm across. Stamens 4, didynamous; filaments 1–3 mm, curved; anthers oblong, theca free, spurred at base. Ovary ellipsoid, into disk; style c. 2.5 mm; stigma linguiform; disk infundibuliform. Capsules ellipsoid, c. 3 × 2 mm, dehisce septicidally and loculicidally, enclosed within persistent calyx; seeds creamy yellow, ellipsoid, scrobiculate.

Flowering & Fruiting: July–December.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52639; Rydak river belt, 20.09.2011, AK 52696; Newlands, Sukno river, 22.09.2011, AK 52766.

4. *Lindernia parviflora* (Roxb.) Haines, Bot. Bihar Orissa, Pt. 4.: 635. 1922. *Gratiola parviflora* Roxb., Pl. Coromandel 3: 3, t. 203. 1819. *Ilysanthes parviflora* Benth. in DC., Prodr. 10: 419. 1846; Hook. f., Fl. Brit. India 4: 283. 1884; Prain, Bengal Pl. 2: 769. 1903.

Decumbent herb, 4–5 cm high. Leaves sessile, ovate to elliptic-ovate, 5–10 × 2–7.5 mm, attenuate, entire, acute to subacute, membranous. Inflorescence axillary, lax racemes. Calyx divided to base; lobes 5, linear-lanceolate, 1.5–2.5 × c. 0.5 mm, acute. Corolla white with blue spots; tube 3.5–4 mm, compressed; upper lip ovate, 1–1.5 × c. 1 mm, notched; lower lip 3-lobed, lobes suborbicular, 1–1.5 mm across. Stamens 4, didynamous; filaments 2–2.5 mm; anthers lanceolate, theca separate. Ovary ovoid; style 2–2.5 mm; stigma minute. Capsules ovoid or ellipsoid, 2–3 × 1.5–2 mm, dehisce loculicidally, calyx persistent; seeds white yellow, ellipsoid to ovoid, variable, reticulate.

Flowering & Fruiting: November–March.

Distribution. India: Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Kerala, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Kumargram, Hathinala, 21.02.2012, AK 55860.

5. *Lindernia pusilla* (Willd.) Bold., Zakfl. Java: 165. 1916. *Gratiola pusilla* Willd., Sp. Pl., ed. 4. 1: 105. 1797. *Vandellia scabra* Benth., Scroph. Ind.: 36. 1835; Hook. f., Fl. Brit. India 4: 281. 1884; Prain, Bengal Pl. 2: 768. 1903. [Plate 154a]

Erect herb, 5–7 cm high, sparsely white hairy to hirsute. Leaves sessile to subsessile, ovate to broadly-ovate, 4.5–12 × 2.5–8 mm, rounded to attenuate at base, serrate-crenate and scabrid, subacute to obtuse, membranous. Inflorescence axillary, terminal racemes or in fascicles; floral bracts linear to linear-lanceolate. Calyx divided to base, hirsute; lobes 5, lanceolate, 2.2–2.6 × 0.5–0.7 mm, ciliate, short acuminate. Corolla purple with yellow throat; tube 3–4 mm, compressed, nerved; upper lip brownish, triangular-ovate, 1.5–1.7 × 2–3 mm, dentate, notched; lower lip 3-lobed, lobes suborbicular, c. 1 mm across. Stamens 4, didynamous; filaments 1–2.5 mm, anterior pair curved, with sac-like structure at base; anthers oblong, theca free, spurred, anterior pair fused. Ovary globose, into disk; style 3–3.5 mm; stigma linguiform; disk infundibuliform. Capsules ellipsoid, c. 3 × 2.8 mm, dehisce septically and loculicidally, calyx persistent; seeds ellipsoid, vertically grooved or ribbed, reticulate.

Flowering & Fruiting: January–September.

Distribution. India: Andhra Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: South Rajabhatkhawa, JKS 428; Rydak river belt, 20.09.2011, AK 52697; Narathali, 20.02.2012, AK 55796.

6. *Lindernia rotundifolia* (L.) Alston, Handb. Fl. Ceylon 6 (Suppl.): 214. 1931; Anant Kumar & Venu, Indian Forester 145 (8): 778. 2019. *Gratiola rotundifolia* L., Mant. Pl. Altera: 174. 1771. *Hysanthes rotundifolia* (L.) Benth., Prodr. 10: 420. 1846; Hook. f., Fl. Brit. India 4: 284. 1884. [Plate 154b; Fig. 66]

Decumbent herb, 3–6 cm high, sparsely glandular hairy above. Leaves sessile, ovate to broadly ovate or obovate, sometimes suborbicular, 3–8 × 2.5–6 mm, attenuate, serrate above, obtuse or rounded, membranous, gland-dotted. Inflorescence axillary, terminal racemes. Calyx cupular, divided to base, glandular pubescent; lobes 5, linear-oblong or narrowly lanceolate, c. 2 × 0.5–0.6 mm, acute. Corolla white with blue spots; tube 5–6 mm, compressed, nerved, few long hairs at throat of lower lip, sparsely glandular hairy, glabrous later; upper lip triangular-ovate, c. 2 × 1.2 mm, notched; lower lip 3-lobed, lobes suborbicular, c. 2 mm across. Stamens 4, didynamous; filaments 1–1.2 mm; anthers lanceolate, theca free or slightly fused; staminodes hook-like, c. 4 mm, scaly. Ovary ovoid; style 2–2.2 mm; stigma linguiform, umbonate. Capsules ellipsoid, 2–2.2 × 1.2–1.5 mm, with persistent calyx; seeds many, minute.

Flowering & Fruiting: January–May.

Distribution. India: Kerala, Tamil Nadu and West Bengal.

Specimens examined: Narathali, 23.09.2011, AK 52823; Narathali, 20.02.2012, AK 55800.

7. *Lindernia ruellioides* (Colsm.) Pennell, Brittonia 2: 182. 1936. *Gratiola ruellioides* Colsm., Prodr. Desc. Grat.: 12. 1793. *Bonnaya reptans* (Roxb.) Spreng., Syst. Veg. 1: 41. 1824; Hook. f., Fl. Brit. India 4: 284. 1884; Prain, Bengal Pl. 2: 770. 1903.

Decumbent herb, 5–12 cm high. Leaves broadly oblong or oblong-ovate, 1–3.5 × 0.5–1.8 cm, subamplexicaul, strongly spinous-serrate, obtuse or subacute, subcoriaceous, punctate above. Inflorescence 2–10-flowered, terminal racemes; floral bracts linear. Calyx cupular, divided to base; lobes 5, linear-subulate, c. 4 mm, scarious, finely aristate. Corolla white, pink, lilac or pale purple; tube c. 4 mm, glandular; upper lip ovate, 2–3 × c. 1.5 mm, notched; lower lip 3-lobed, lobes suborbicular, 2–3 mm across. Stamens 4, didynamous; filaments 1.3–2.4 mm; anthers lanceolate, theca free; staminodes hooked-like, 2–3 mm. Ovary narrowly ovoid; style c. 2 mm; stigma bilamellate. Capsules cylindric, 1–2 cm, calyx persistent; seeds oblong-ovoid, rugose.

Flowering & Fruiting: August–December.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal.

Specimens examined: Poro, JKS 778; Jainti 8–9, 09.10.2009, SKS & GK 46272; Checko 2, 27.11.2011, GK 47146; Newlands, Sukno river, 22.09.2011, AK 52763; Kumargram, Hathinala, 27.09.2011, AK 52960; Pana, 08.10.2012, AK 58723.

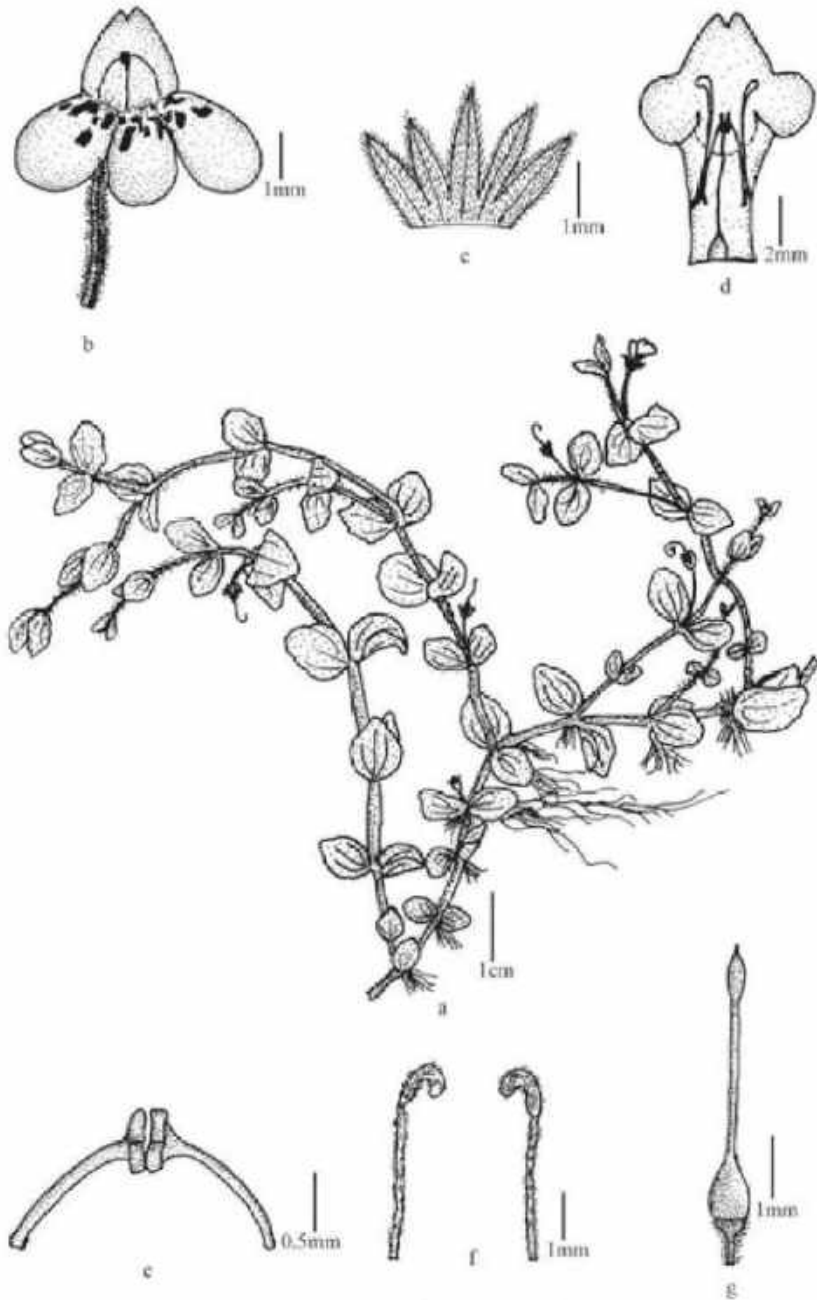


Fig. 66. *Lindernia rotundifolia*: a. Flowering branchlet; b. Flower; c. Calyx; d. Corolla split open showing stamens and gynoecium; e. Stamens; f. Stamines; g. Gynoecium (AK 52823).

6. *Mazus* Lour.

Mazus pumilus (Burm. f.) Steenis, Nova Guinea, n. s. 9 (1): 31. 1958. *Lobelia pumila* Burm. f., Fl. Ind.: 186, pl. 60, f. 3. 1768. *Mazus rugosus* Lour., Fl. Cochinch. 2: 385. 1790; Hook. f., Fl. Brit. India 4: 259. 1884; Prain, Bengal Pl. 2: 759. 1903. [Plate 154c]

Decumbent to suberect herb, 7–15 cm high; stems angular, pubescent. Leaves mostly radical, crowded, oblong or obovate-spathulate, 2.3–5.3 × 1.2–2.5 cm, decurrent, dentate, acute, chartaceous, subglabrous or with scattered hairs above. Inflorescence scapiform racemes; floral bracts linear-lanceolate. Calyx cupular; tube 3–4 mm; lobes 5, ovate-lanceolate, 3–6 × 1–1.5 mm, acute. Corolla white with pale blue hue; tube 1–2 mm; upper lip short, entire, circular; lower lip 3-lobed, mid lobe smaller than lateral lobes; palate 2-lobed, with yellow brown spots, glandular hairy. Stamens 4, didynamous; anthers locules divergent, apically connivent. Ovary obovoid; style short; stigma bilamellate. Capsules obovoid, c. 4 × 5 mm, dehisce loculicidally, calyx persistent; seeds minute, with 2 tiny projections diagonally opposite each other.

Flowering & Fruiting: Throughout year.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Buxaduar, JKS 4630; North Rajabhatkhowa, JKS 6981; Rajabhatkhowa range, 15.02.2010, SKS & GK 47117; Rajabhatkhowa range, 08.03.2011, GK 50512; Kumargram, 19.09.2011, AK 52654; Newlands, 15.02.2012, AK 55632; Narathali, 20.02.2012, AK 55817.

7. *Mecardonia* Ruiz & Rav.

Mecardonia procumbens (Mill.) Small, Fl. S. E. U. S. 1: 1065. 1903. *Erinus procumbens* Mill., Gard. Dict., ed. 8, no. 6. 1768. *Herpestis chamaedryoides* Kunth, Nov. Gen. Sp. 2: 369. 1818; Prain, Bengal Pl. 2: 765. 1903. [Plate 154d]

Diffuse herb, 4–6 cm high; stems quadrangular, slightly twisted, rooting from lower nodes. Leaves subsessile, ovate-lanceolate, 1–2.5 × 0.8–1.2 cm, obliquely cuneate, serrate, chartaceous. Inflorescence axillary, solitary or in pairs; floral bracts linear or linear-lanceolate. Calyx divided to base; posterior lobe 3-toothed, ovate, 3–5 mm, acute; anterior lobe 2-toothed, linear, with basal linear appendage. Corolla yellow with brown veins, tubular-campanulate; tube 3–4 mm, slightly exerted beyond calyx, hairy at throat; upper lip obovate, 2–3 mm across, emarginate; lower lip 3-lobed, lobes suborbicular, c. 2 mm across. Stamens 4, didynamous; filaments short; anther cells separate, stipitate. Ovary minute; style short; stigma lamellate. Capsules ovoid or ellipsoid, 5–6 × 3–4 mm, dehisce septicidally; seeds elliptic, minute, reticulate.

Flowering & Fruiting: February–September.

Distribution. India: Andhra Pradesh, Bihar, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa range, 16.02.2010, *SKS & GK* 47122; Kumargram, Kalikhola river belt, 21.09.2011, *AK* 52707; Sankosh, 28.09.2011, *AK* 52991; Newlands, 15.02.2012, *AK* 55627.

8. *Mimulus* L.

Mimulus bhutanicus T. Yamaz., *J. Jap. Bot.* 68: 23. 1993. [Plate 155a]

Prostrate herb, 5–7 cm high, pubescent, glabrous later. Leaves ovate to elliptic-ovate, 5–12 × 3–7 mm, attenuate, serrate, ciliolate or glabrous, subacute to obtuse, chartaceous. Inflorescence axillary, solitary or terminal racemes. Calyx campanulate; tube 7–8 mm, 5-angled, pubescent to glabrescent; lobes 5, triangular, minute, equal or unequal. Corolla yellow with red spots on throat, campanulate; tube 9–10 mm, glandular hairs and scales at throat; upper lip 2-lobed and lower lip 3-lobed; lobes suborbicular, c. 3.5 mm across, emarginate. Stamens 4, didynamous; filaments 5.5–6 mm; anthers rounded, theca fused slightly. Ovary ellipsoid, c. 3.5 mm; style c. 4 mm; stigma clavate, slightly lobed. Capsules ellipsoid, 7–9 × 2–3 mm; seeds ovoid, minute, papillose.

Flowering & Fruiting: January–June.

Distribution. India: West Bengal.

Specimen examined: Rydak river belt, 26.02.2012, *AK* 55947.

9. *Scoparia* L.

Scoparia dulcis L., *Sp. Pl.* 1: 116. 1753; Hook. f., *Fl. Brit. India* 4: 289. 1884; Prain, *Bengal Pl.* 2: 772. 1903. [Plate 155b]

Erect herb, 30–40 cm high. Leaves opposite or in whorls, linear-oblongate, elliptic or obovate, 0.6–3.5 × 0.3–1.9 cm, attenuate, serrate above, acute, chartaceous. Inflorescence usually axillary, solitary or in pairs per node. Calyx divided to base; lobes 4, ovate, c. 2 × 1 mm, ciliate and hyaline, acute. Corolla creamy white with purple tinge at centre, divided to base, with dense tuft of long silky white hairs; lobes 4, oblong-obovate, 2–3.5 × c. 1.5 mm, acute or obtuse, strongly reflexed. Stamens 4, subequal; filaments 1.7–2.2 mm; anthers subsagittate. Ovary ovoid; style subclavate, c. 1.5 mm; stigma truncate. Capsules ovoid, c. 3 × 2 mm, calyx persistent, dehisce septicidally and loculicidally; seeds obovoid, minute, angled.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Poro, *JKS* 793; Buxaduar, *JKS* 4037; South Bholka, *JKS*

4185; Tashigaon 2, SKS & GK 46134; NRVK 6, 13.02.2010, SKS & GK 47056; Rydak river bclt, 20.09.2011, AK 52688; Sankosh, 28.09.2011, AK 52969; Bhutri, 05.10.2012, AK 58639.

10. *Torenia* L.

Key to the species

- 1a. Leaves attenuate at base, smooth below; corolla yellow, puberulous; seeds pitted
3. *T. flava*
- 1b. Leaves cuneate or cuneate to subtruncate at base, gland-dotted or not below; corolla pale purple or white, glabrous; seeds rugose or reticulate 2
- 2a. Calyx ovoid with subcordate, truncate or obtuse base and 3 broad wings
1. *T. cordifolia*
- 2b. Calyx more or less ellipsoid with slightly cuneate or obtuse base and 5 wings 3
- 3a. Leaves cuneate to subtruncate at base, gland-dotted below; petioles and pedicels not winged; floral bracts 4–7 mm, sparsely hairy; corolla pale purple throughout; filaments with appendages at base; capsules oblong, 1–1.3 cm; seeds rugose
2. *T. diffusa*
- 3b. Leaves cuneate at base, gland-dotted or smooth below; petioles and pedicels narrowly winged; floral bracts c. 3 mm, glabrous; corolla pale purple with dark purple lobes; filaments without appendages at base; capsules ellipsoid, c. 0.6 cm; seeds reticulate
4. *T. violacea*

1. *Torenia cordifolia* Roxb., Pl. Coromandel 2: 32, t. 161. 1798; Hook. f., Fl. Brit. India 4: 276. 1884; Prain, Bengal PL 2: 767. 1903. **[Plate 155c]**

Annual herb, 10–15 cm high. Leaves ovate, 10–23 × 7–18 mm, cuneate, serrate, acute, subcoriaceous, sparsely puberulent or glabrous above, puberulent on veins below. Inflorescence umbel like and in opposite axillary pairs, 1–3-flowered. Calyx 2-lobed; one lobe 2-toothed; other lobe 3-toothed. Corolla pale purple or white with darker blotches at tips of lower lobes; upper lip obovate, emarginate; lower lip 3-lobed. Stamens 4, didynamous; filaments 1–2 mm; anthers c. 2.5 mm, spurred. Ovary bilocular; style slender, c. 15 mm; stigma linguiform. Capsules oblong, c. 8 mm, acute, enclosed by persistent calyx; seeds yellow, c. 0.3 mm across, truncate, rugose, pubescent.

Flowering & Fruiting: September–February.

Distribution. India: Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Santrabari, 04.09.2009, SKS & GK 46122; 23rd mile watch tower, 10.02.2010, SKS & GK 46390.

2. *Torenia diffusa* D. Don, Prodr. Fl. Nepal.: 86. 1825. *Torenia vagans* Roxb., Fl. Ind. 3: 96. 1832; Hook. f., Fl. Brit. India 4: 277. 1884; Prain, Bengal Pl. 2: 766. 1903. [Plate 155d]

Prostrate to suberect herb, 5–10 cm high, pilose to glabrescent. Leaves ovate to deltoid-ovate or elliptic-ovate, 8–26 × 5–19 mm, cuneate to subtruncate, serrate, subacute, chartaceous, glabrous or scabrid above, glabrous to glabrescent and gland-dotted below. Inflorescence axillary, solitary or terminal racemes; floral bracts linear. Calyx bilabiate, deeply cleft, 5-winged, ribbed, sparsely hairy; tube c. 5 mm; upper lobe 2-toothed, teeth lanceolate, c. 5.5 × 1.5 mm, acuminate, glabrous; lower lobe 3-toothed, teeth slightly bigger, or else same as lower lobes. Corolla pale purple, campanulate, bilabiate; tube 1.2–1.5 cm, nerved, slightly curved; upper lip suborbicular, 2–2.5 mm across, deeply notched; lower lip 3-lobed, lobes same as upper lip. Stamens 4, didynamous; filaments 2–6 mm, larger pair with an appendage at base; anthers ovoid, theca free. Ovary ellipsoid, in disk, scabrid; style 8–10 mm; stigma linguiform; disk infundibuliform. Capsules oblong, 10–13 × 3–4 mm, dehisce septicidally, enclosed within persistent calyx; seeds creamy yellow, globose or ellipsoid, minute, rugose.

Flowering & Fruiting: August–December.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimens examined: Poro, JKS 788; Rydak river belt, 20.09.2011, AK 52699; Kumargram, Kalikhola river belt, 21.09.2011, AK 52718; Newlands, Sukno river, 22.09.2011, AK 52784; Kumargram, Hathinala, 27.09.2011, AK 52963; Checko-1, 25.09.2012, AK 56110, 56155.

3. *Torenia flava* Buch.-Ham. ex Benth., Scroph. Ind.: 38. 1835; Hook. f., Fl. Brit. India 4: 278. 1884; Anant Kumar & Venu, Indian Forester 145 (8): 780. 2019.

[Plate 156a; Fig. 67]

Erect herb, 4–17 cm high, pilose. Leaves irregularly ovate-oblong, 8–23 × 3–10 mm, attenuate, serrate-crenate and hairy, subacute or obtuse, chartaceous, strigose above, sparsely hairy below. Inflorescence axillary, solitary or 2–3-flowered terminal racemes; floral bracts oblong-ovate to oblanceolate. Calyx cupular, bilabiate, narrowly 3-winged with ciliate hairs, puberulous; tube c. 4 mm; upper lobe 3-toothed, teeth linear-lanceolate, c. 4 mm, acuminate; lower lobe 2-toothed, teeth linear-lanceolate, c. 4.5 mm, revolute, acuminate. Corolla yellow, campanulate, bilabiate, puberulous; tube 8–9 mm, slightly curved; upper lip 2-lobed, lobes suborbicular, c. 1.5 × 1 mm, notched; lower lip 3-lobed, lobes ovate, c. 3 × 1.8 mm. Stamens 4, didynamous; filaments 1.5–4 mm, anterior pair with small appendages at base; anthers minute, theca free. Ovary oblong, c. 3 mm, on disk; style 6–7 mm, sparsely hairy; stigma linguiform; disk minute. Capsules oblong or ellipsoid, 8–10 × 2–3 mm, dehisce septicidally and loculicidally, glabrous or puberulous; seeds creamy yellow, subglobose, minute, pitted.

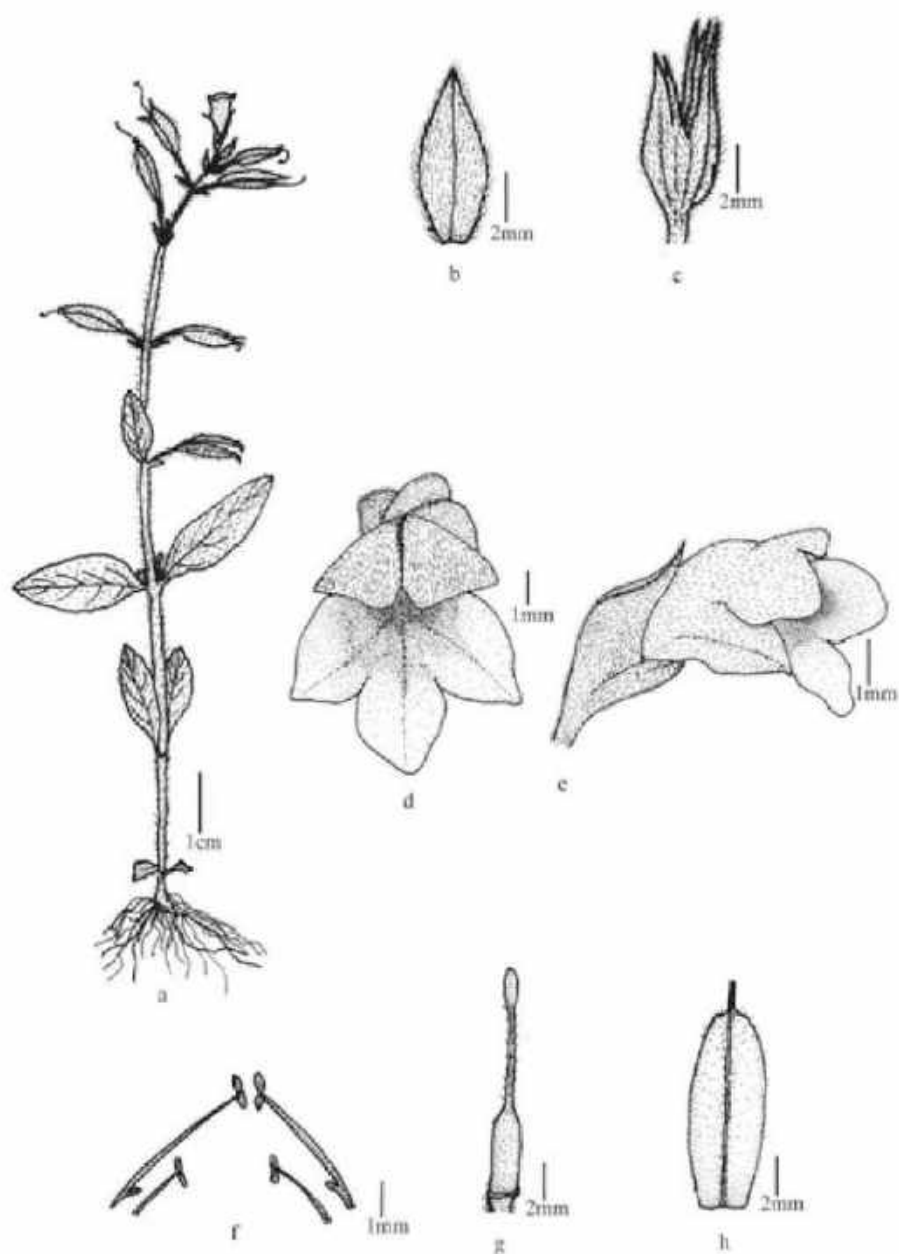


Fig. 67. *Torenia flava*: a. Habit; b. Floral bract; c. Calyx; d. Front view of flower; e. Lateral view of flower; f. Stamens; g. Gynoecium; h. Capsule (AK 58685).

Flowering & Fruiting: September–December.

Distribution. India: Assam, Meghalaya, Nagaland, Tripura and West Bengal.

Specimens examined: Hauda nala, 03.10.2012, AK 58685; Santrabari to Buxa Fort 28.09.2013, AK 59624.

4. *Torenia violacea* (Azaolo ex Blanco) Pennell, J. Arnold Arbor. 24: 255. 1943. *Mimulus violaceus* Azaolo ex Blanco, Fl. Filip., ed. 2. 357. 1845. *Torenia peduncularis* Benth. ex Hook. f., Fl. Brit. India 4: 276. 1884.

Prostrate or suberect herb, 8–10 cm high, glabrescent to pilose. Leaves ovate to elliptic-ovate or lanceolate, 7–30 × 4–20 mm, cuneate, serrate with scabrid, acute, membranous, sparsely hairy above, gland-dotted or smooth below. Inflorescence axillary, solitary or 2–3-flowered terminal racemes; floral bracts linear. Calyx bilabiate, 5-winged, ribbed, pilose of wings and calyx lobes; tube cupular, 6–7.5 × 4–5 mm; upper lobe 3-toothed, teeth lanceolate, 4.5–5 × 1–1.5 mm, acuminate; lower lobe 2-toothed, teeth slightly smaller, or else same as upper ones. Corolla pale purple with dark purple lobes, campanulate, bilabiate; tube 1.2–1.9 cm, nerved; upper lip 2-lobed, lobes suborbicular, c. 2 mm across, notched; lower lip 3-lobed, lobes same as upper lobes. Stamens 4, didynamous; filaments 2–7.5 mm; anthers ovoid, theca free, other pair fused together. Ovary ellipsoid, on infundibuliform disk; style 8–10 mm; stigma bifid, sparsely hairy. Capsules ellipsoid, c. 6.5 × 3 mm, enclosed within persistent calyx; seeds creamy yellow, ellipsoid, minute, reticulate with vertical lines.

Flowering & Fruiting: January–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jharkhand, Meghalaya, Nagaland, Odisha, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Rydak river belt, 26.02.2012, AK 55948; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58572; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58596.

11. *Veronica* L.

Key to the species

- 1b. Stems succulent, glabrous; veins pinnate; inflorescences glabrous; floral bracts elliptic, entire and glabrous; seeds ellipsoid, punctate 1. *V. anagallis-aquatica*
- 1a. Stems not succulent, pilose or with 2 rows of very dense short white hairs; veins 3–5 from base; inflorescence pilose; floral bracts linear-spathulate, shallowly toothed and ciliate; seeds obovoid or elliptic-oblong, glandular 2. *V. javanica*

1. *Veronica anagallis-aquatica* L., Sp. Pl. 1: 12. 1753. *Veronica anagallis* auct. non Bong. 1832: Hook. f., Fl. Brit. India 4: 293. 1884; Prain, Bengal Pl. 2: 773. 1903. *Veronica anagallis* L. var. *punctata* Hook. f., Fl. Brit. India 4: 293. 1884; Prain, Bengal Pl. 2: 773. 1903. [Plate 156b]

Erect herb, 10–25 cm high. Leaves distantly serrate, obtuse at apex, membranous; lower leaves petiolate, elliptic, 6–1.2 × 3–6 mm, cuneate at base; upper leaves sessile, oblong to oblong-lanceolate, 0.7–4 × 0.1–0.8 cm, cordate to semiamplexicaul at base. Inflorescence axillary, terminal, many-flowered long racemes; floral bracts elliptic. Calyx divided to base; lobes 4, ovate, 1.5–3 × c. 1 mm, subacute. Corolla white, rotate; tube 0.2–0.5 mm; lobes 4, elliptic, c. 1 × 0.5–0.6 mm, obtuse, 3-nerved. Stamens 2; filaments c. 1 mm; anthers minute, theca free. Ovary globose, sparsely glandular hairy; style c. 0.8 mm; stigma bifid. Capsules subglobose, 2–3 mm across, emarginate, compressed, dehisced septically and loculicidally, calyx and style persistent, sometimes glandular hairy, punctate; seeds ellipsoid, minute, punctate.

Flowering & Fruiting: January–March.

Distribution. India: Bihar, Gujarat, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Panbari 9, 31.03.2012, GK 50673; Marakata, 22.02.2012, AK 55904, 55905; Mainabari, 24.02.2012, AK 55923.

2. *Veronica javanica* Blume, Bijdr. Fl. Ned. Ind. 14: 742. 1826; Hook. f., Fl. Brit. India 4: 296. 1884. [Plate 156c; Fig. 68]

Decumbent herb, 10–15 cm high, pilose or with 2 rows of very dense short white hairs. Leaves sessile to subsessile, ovate, 7–16 × 6–13 cm, truncate-cuneate, serrate and hairy, subacute to obtuse, chartaceous, sparingly pilose. Inflorescence axillary, terminal, few flowered racemes, pilose; floral bracts linear-spathulate. Calyx deeply divided to base; lobes 4, oblong-oblong-lanceolate to spathulate, c. 1.5 mm, ciliate, obtuse to subacute, 1-nerved, sparingly pilose. Corolla bluish white, cupular; tube c. 0.5 mm; lobes 4, obovate to suborbicular, 0.8–1.2 × 0.6–1.2 mm, rounded. Stamens 2, glandular; filaments c. 0.7 mm; anthers subglobose. Ovary obovate, ciliate at apex, faintly grooved, glandular, on a circular disk-like structure; style c. 0.2 mm, glandular; stigma subcapitate. Capsules obcordate, 2–3 mm across, emarginate and ciliated, dehisce septically, calyx and style persistent; seeds dull yellow brown, obovate or elliptic-oblong, truncate, glandular.

Flowering & Fruiting: March–May.

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Chunabhati, 21.05.2014, AK 65905.

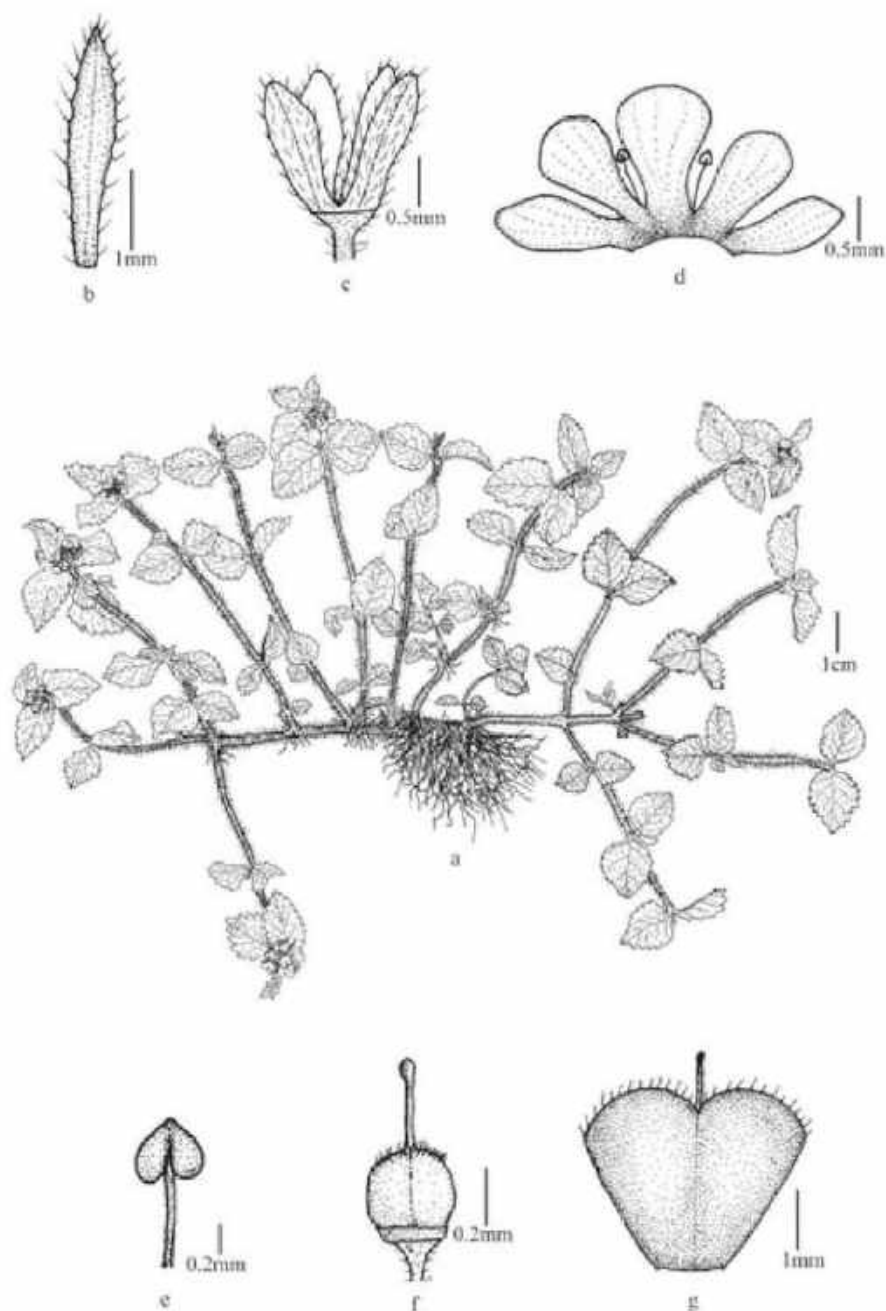


Fig. 68. *Veronica javanica*: a. Habit; b. Floral bract; c. Calyx; d. Corolla split open showing stamens; e. Stamen; f. Gynoecium; g. Capsule with persistent style (AK 65905).

Lentibulariaceae

Utricularia L.

Key to the species

- 1a. Aquatic herbs; rhizoids absent; foliar organs segmented, not punctate, eglandular; traps 1–2.5 mm, eglandular; corolla yellow with red orange nerves at palate of lower lip; lower lip not lobed, not punctate; capsules long beaked, circumscissile; seeds yellowish, rhomboid, smooth, winged **1. U. aurea**
- 1b. Terrestrial herbs; rhizoids present; foliar organs suborbicular, punctate with sessile glands; traps c. 0.5 mm, glandular; corolla pale purple, palate with yellowish hue at lower lip; lower lip 5-lobed, punctate; capsules not long beaked; dehisce by a longitudinal ventral slit; seeds brown, ovoid, glochidiate, not winged **2. U. striatula**

1. Utricularia aurea Lour., Fl. Cochinch. 1: 26. 1970. *Utricularia flexuosa* Vahl, Enum. Pl. 1: 198. 1804; C. B. Clarke in Hook. f., Fl. Brit. India 4: 329. 1884; Prain, Bengal Pl. 2: 780. 1903. [Plate 156d; Fig. 69]

Jhangi (B).

Aquatic submerged, floating herb; stolons 8–22 cm, branched. Foliar organs segmented, c. 2.5 cm. Traps obliquely ovoid, 1–2.5 × 1–2 mm, stalked, appendages 2 or more at mouth. Inflorescence 5–8-flowered racemes; floral bracts ovate. Calyx 2-lobed, unequal, lobes obovate, 2–2.5 × 1.5–2 mm, obtuse or rounded. Corolla yellow with red orange nerves at palate of lower lips; upper lip obovate, c. 8 × 6.5 mm, retuse, hairy near base, papillose; lower lip obovate, 8–10 mm across, spurred, rounded and repand, papillose throughout. Stamens 2; filaments strap-shaped, papillose; anthers minute. Ovary subglobose or ovoid; style columnar; stigma bilipped. Capsules globose, c. 3.5 mm across, beaked, circumscissile, papillose; calyx persistent; seeds yellowish, rhomboid, c. 1 mm across, winged.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 20.02.2012, AK 55792; Hathijhora, way to Mahakal Cave, 01.10.2012, AK 58558.

2. Utricularia striatula Sm. in Rees, Cyclop. 37: n. 17. 1819. *Utricularia orbiculata* Wall. ex A. DC., Prodr. 8: 18. 1844; C. B. Clarke in Hook. f., Fl. Brit. India 4: 334. 1884. [Plate 157a-b]

Terrestrial erect herb, 6–8 cm high; rhizoids few, c. 1 cm; stolons 2–3 cm, glandular. Foliar organs with pseudopetiole, suborbicular, 1–2.5 mm across, punctate, rosulate near scape or else scattered. Traps obliquely ovoid, stalked, glandular, divergent glandular hairy appendages at mouth. Inflorescence

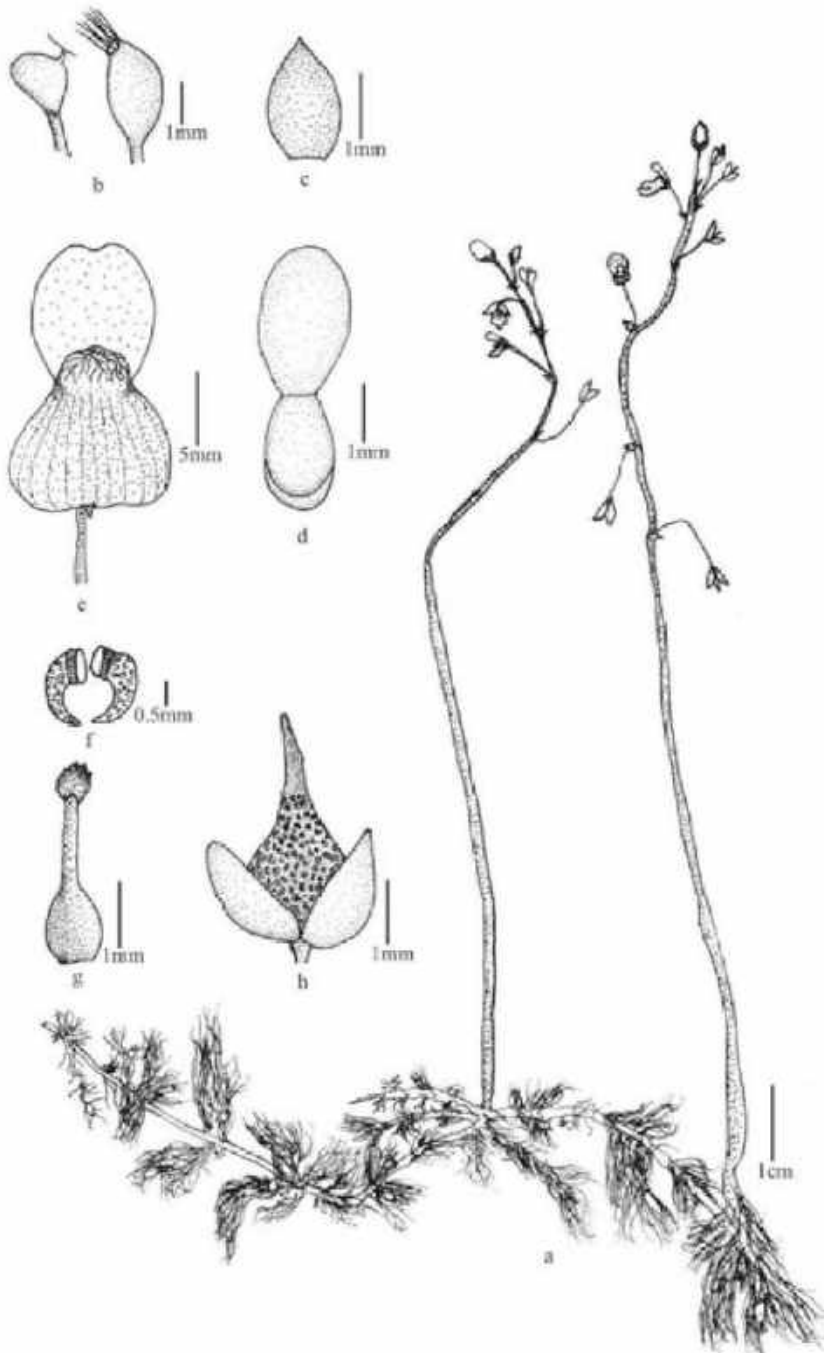


Fig. 69. *Utricularia aurea*: a. Habit; b. Traps; c. Floral bract; d. Calyx; e. Corolla; f. Stamens; g. Gynoecium; h. Capsule with persistent calyx lobes (AK 58558).

4–5-flowered racemes; floral bracts linear-lanceolate; bracteoles elliptic. Calyx 2-lobed, unequal, punctate; upper lobe obovate to obcordate, 1.5–1.8 × 1.2–1.5 mm, emarginate or obtuse; lower lobe obovate, c. 1 × 0.4–0.6 mm, notched. Corolla pale purple, palate with yellowish hue; upper lip deltoid, c. 1 × 0.6 mm, bidentate, slightly truncate, punctate or glandular; lower lip 5-lobed, obdeltoid, c. 2 × 3 mm, spurred, throat hairy, punctate. Stamens 2; filaments strap-shaped; anthers minute. Ovary obliquely ovoid; style short; stigma bilipped. Capsules obliquely ovoid or globose, c. 2 mm across, punctate or papillose, dehiscent; seeds brown, ovoid, minute, glochidiate.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimen examined: Hauda nala, way to Mahakal Cave, 03.10.2012, AK 58693.

Gesneriaceae

Key to the genera

- | | |
|---|--------------------------|
| 1a. Fertile stamens 2 | 3 |
| 1b. Fertile stamens 4 | 2 |
| 2a. Stems trailing or pendent; leaves thick and fleshy; anthers exerted | 1. <i>Aeschynanthus</i> |
| 2b. Plant either stemless or with erect or decumbent stems; leaves herbaceous or leathery; anthers either included or visible in mouth but not far-exserted | 3. <i>Leptoboea</i> |
| 3a. Corolla short, widely campanulate; tube shorter than the spreading lobes; capsule spirally twisted | 5. <i>Middletonia</i> |
| 3b. Corolla tube mostly longer than lobes; capsule not spirally twisted | 4 |
| 4a. Leaves alternate; inflorescences racemes; mouth of corolla closed | 6. <i>Rhynchoglossum</i> |
| 4b. Leaves opposite; inflorescences cymose; mouth of corolla wide open | 5 |
| 5a. Calyx variously lobed, cut to base in only one species and then no keels on or roof of corolla tube; seeds not appendaged | 2. <i>Didymocarpus</i> |
| 5b. Calyx divided nearly to base; 2 keels on floor of corolla tube; seeds apical appendaged | 3. <i>Lysionotus</i> |

1. *Aeschynanthus* Jack

Key to the species

- | | |
|---|-------------------------|
| 1a. Flowers in terminal and axillary clusters (1–5 flowers); peduncle absent; bracts inconspicuous; calyx divided to base or very nearly so | L. <i>A. micranthus</i> |
| 1b. Flowers in terminal and/or axillary pedunculate cymes; bracts conspicuous; calyx with distinct tube | 2 |

- 2a. Corolla 3.5–5 cm, coarsely hairy inside towards lower part 2. *A. parasiticus*
2b. Corolla 2.6–2.8 cm, few glandular hairy inside towards lower part 3. *A. parviflorus*

1. *Aeschynanthus micranthus* C. B. Clarke in DC., Monogr. Phan. 5: 27. 1883; C. B. Clarke in Hook. f., Fl. Brit. India 4: 340. 1884 (as "*micrantha*"). [Plate 157c]

Epiphytic, creeping shrub, 30–50 cm. Leaves elliptic, 4.5–6.7 × 2–2.7 cm, cuneate, entire, acuminate, coriaceous, succulent. Inflorescence lax cyme; floral bracts linear-lanceolate. Calyx divided to base, hairy; lobes 5, lanceolate, 1–1.2 × 3–4 mm, acute. Corolla crimson, tubular; tube 12–13 mm, curved, glandular hairy with sessile glands at near lobes; lobes 5, rounded, 2–2.5 × 2–3 mm, ciliate, sessile glands, hairy. Stamens 4, didynamous; filaments 1.7–2 cm, exserted, glandular hairy; anthers ellipsoid. Ovary fusiform, 4–5 × 0.5–1.2 mm, into disk, minute sessile glands present; style columnar, glandular pubescent; stigma truncate; diskcupular, shallowly lobed. Capsules cylindrical, 10–15 cm, curved, dehisce loculicidally, 2-valved; seeds ellipsoid, arranged one by one vertically, with two filiform hairs, one at each end.

Flowering & Fruiting: August–April.

Distribution. India: Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56123.

2. *Aeschynanthus parasiticus* (Roxb.) Wall., Numer. List.: n. 796. 1829. *Incarvillea parasitica* Roxb., Pl. Coromandel 3: 88, t. 291. 1820. *Aeschynanthus grandiflorus* Spreng, var. *parasiticus* (Roxb.) C. B. Clarke in A. DC. & C. DC., Monogr. Phan. 5: 22. 1883. [Plate 157d]

Epiphytic, creeping shrub, 30–60 cm. Leaves elliptic or elliptic-lanceolate, 4.4–9.5 × 1.6–3 cm, acuminate at apex, entire, narrowed, fleshy, coriaceous, glabrous. Inflorescence in terminal clusters; floral bracts linear-lanceolate. Calyx campanulate; tube 3–5 mm; lobes 5, linear-lanceolate, 3–5 mm, acute, glabrous. Corolla orange-red, tubular, bent and inflated upwards, glandular-pubescent, coarse gland tipped hairs inside at base of tube; tube 3.5–5 cm; lobes 5, ovate. Stamens 4, exserted; filaments c. 1 cm, glandular puberulous; anthers c. 1 mm; disk annular. Ovary linear, gland-dotted; style c. 2 cm, glandular-pubescent. Capsules linear-falcate, 10–15 cm; seeds c. 1 mm, two long tailed one at each end.

Flowering & Fruiting: September–January.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 46267; Gadadhar range, 31.03.2012, GK 50686.

3. *Aeschynanthus parviflorus* (D. Don) Spreng., Syst. Veg. 4 (2): 238. 1827. *Trichosporum parviflorum* D. Don, Edinburgh Philos. J. 7: 85. 1822. *Aeschynanthus ramosissimus* Wall., Pl. Asiat. Rar. 1: 55, t. 71. 1829; C. B. Clarke in Hook. f., Fl. Brit. India. 4: 339. 1884 (as "*ramosissima*"). [Plate 158a; Fig. 70]

Epiphytic, creeping shrub, 30–50 cm. Leaves elliptic to elliptic-lanceolate, 7–11 × 1.5–2.8 cm, cuneate, entire, long acuminate, coriaceous, succulent. Inflorescence axillary, terminal, clustered cymes; floral bracts abruptly triangular to linear-lanceolate from rectangular or semiorbicular base. Calyx cupular; tube c. 2 mm, glandular hairy at base; lobes 5, lanceolate, 3.5–4 × 1.2–1.5 mm, subacute and hairy with a gland at apex. Corolla orange red, crimson lined on each lobe up to base; tube 2.3–2.5 cm, curved, glandular hairy, few glandular hairs near base and sessile glands inside; upper lip rounded, c. 2 mm across, glandular hairy; lower lobes rounded, c. 3 × 2.5 mm, sessile glands with glandular hairs, sessile glands inside. Stamens 4, didynamous, exserted; filaments 2–2.5 cm, curved, glandular hairy; anthers oblong, fused at apex. Ovary c. 4 × 0.5–0.7 mm, in a cupular, shallowly lobed disk; style columnar, glandular pubescent; stigma discoid. Capsules 20–24 cm, stalked, dehisce loculicidally, 2-valved; seeds light yellow, ellipsoid, arranged one by one vertically, two filiform delicate hairy one at end, papillose.

Flowering & Fruiting: August–February.

Distribution. India: Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Lepchakhawa, JKS 948; Ramiti, 1400m, JKS 4700; Achalung to Lepchakhawa, 29.09.2013, AK 59663; Tashigaon to Rovers point, 12.02.2014, AK 59921.

2. *Didymocarpus* Wall.

Didymocarpus pedicellatus R. Br., Cyrtandreae: 118. 1839; C. B. Clarke in Hook. f., Fl. Brit. India 4: 345. 1884 (as "*pedicellata*"). [Plate 158b]

Suberect herb. Leaves opposite, one well developed and the other rudimentary, ovate to suborbicular, 6–16 × 3–12.5 cm, obliquely cordate, crenate-serrate, obtuse, subcoriaceous, reddish or colourless sessile glandular. Inflorescence few to many flowered, branched cymes, sparsely glandular; floral bracts ovate. Calyx campanulate, glandular; tube c. 1 cm; lobes 5, triangular-ovate, c. 2 × 1 mm, subacute. Corolla red or pink, infundibular; tube 2.5–3.5 cm; upper lip 2-lobed and lower lip 3-lobed, lobes rounded, 3–4 × 4–5 mm, obtuse. Stamens 2; filaments strap-shaped; anthers confluent, fused throughout, bearded; staminodes 3. Ovary linear, 4–5 mm, stipitate, in disk; style short; stigma obliquely 2-lipped; disk cupular. Capsules linear-oblong, 25–45 × 1–2 mm, slightly curved, loculicidally 2-valved, stalked, ridged; seeds brown, ovoid, minute, truncate at base, sharply acute, reticulate, hairy.

Flowering & Fruiting: June–October.

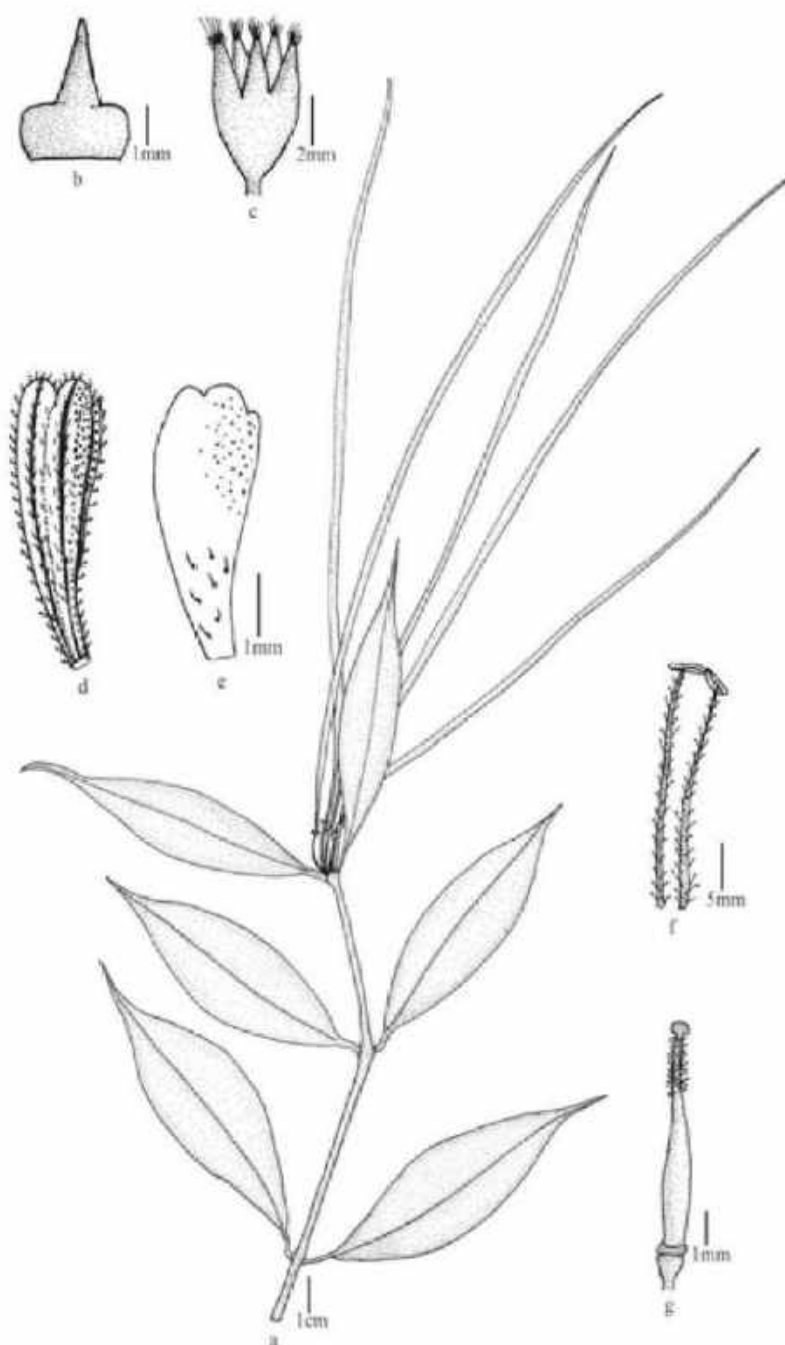


Fig. 70. *Aeschynanthus parviflorus*: a. Fruiting branchlet; b. Floral bract; c. Calyx; d. Outer view of corolla; e. Corolla split open; f. Stamens; g. Gynoecium with disk (AK 59663).

Distribution. India: Assam, Himachal Pradesh, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Hathijhora, way to Mahakal Cave, 01.10.2012, AK 58577.

3. *Leptoboea* Benth.

Leptoboea multiflora (C. B. Clarke) Benth. ex Gamble, Man. Ind. Timb.: 274. 1881; C. B. Clarke in Hook. f., Fl. Brit. India 4: 368. 1884. *Championia multiflora* C. B. Clarke, Commelyn. Cyrtandr. Bengal.: 99, t. 68. 1874. [Plate 158c; Fig. 71]

Patpati (N).

Shrub, 1–2 m high, villous to pubescent when young, glabrous later. Leaves unequal, crowded at ends of stems, elliptic, 3.5–18.5 × 2–10 cm, cuneate, serrulate and hairy, subacute to acuminate, chartaceous, pilose. Inflorescence axillary, pedunculate, many flowered, cymes, pubescent; inflorescence bracts ligulate. Calyx divided to base; lobes 5, linear-subulate to triangular, 1–1.2 mm, bluntly subacute, pubescent. Corolla shallowly campanulate, apparently bilabiate, white with red marks; tube c. 4 mm; lobes 5, rounded, 4–5 × 6–7 mm. Stamens 4; filaments minute; anthers subglobose, confluent. Ovary ovoid; style c. 1 mm; stigma capitate. Capsules linear, 1.5–3 cm, beaked, dehisce septically; seeds brown, ellipsoid, minute.

Flowering & Fruiting: June–September.

Distribution. India: Arunachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Achalung, 29.09.2013, AK 59652.

4. *Lysionotus* D. Don.

Lysionotus serratus D. Don, Edinburgh Philos. J. 7: 85. 1822; C. B. Clarke in Hook. f., Fl. Brit. India 4: 344. 1884 (as "*serrata*"). *Lysionotus ternifolius* Wall., Pl. Asiat. Rar. 2: 20, t. 118. 1830. [Plate 158d; Fig. 72a–d]

Kolojhan (N).

Epiphytic, suberect shrub, 30–50 cm. Leaves elliptic-ovate or ovate-lanceolate or ovate, 7.3–13.8 × 4.2–4.5 cm, slightly obliquely cuneate, crenate-serrate, acute or short acuminate, subcoriaceous, succulent. Inflorescence 4–10-flowered terminal cymes; inflorescence bract ovate to orbicular; floral bracts lanceolate. Calyx divided to base; lobes 5, linear-lanceolate, 7–10 × 1–1.2 mm, acute. Corolla white with purple nerves, yellow bars on lower lip, tubular-campanulate; tube 2.2–3 cm, hairy; lobes 5, rounded or ovate, 4–6 mm across, obtuse. Stamens 2; filaments 6–9 mm; anthers subglobose, confluent, appendaged; staminodes 2; disk annular. Ovary linear, c. 10 mm; style subulate, 1.8–2.5 cm; stigma discoid, 1–1.5 mm across. Capsules cylindrical, 6.5–10 × 0.2–0.3 cm, dehisce loculicidally into 2-valves; calyx persistent; seeds oblong, 0.7–0.8 × c. 0.1 mm, a delicate filiform hairy at both ends.

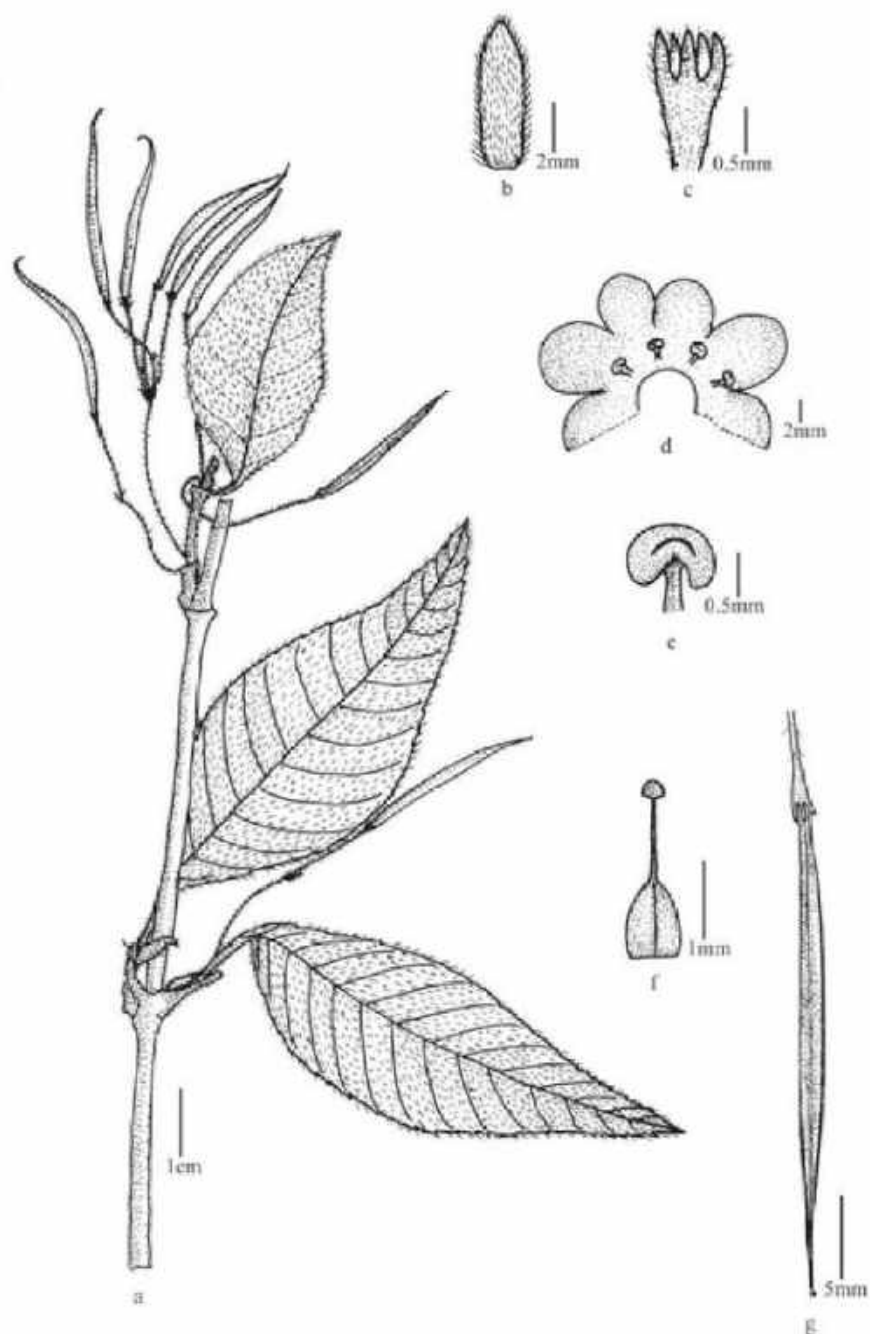


Fig. 71. *Leptoboea multiflora*: a. Fruiting branchlet; b. Inflorescence bract; c. Calyx; d. Corolla split open showing stamens; e. Stamen; f. Gynoecium; g. Capsule (AK 59652).

Flowering & Fruiting: July–January.

Distribution. India: Arunachal Pradesh, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Tobgaon, *KPB* 2063; Lepchakhawa, 1150m, *JKS* 979; Tashigaon Pond, *SKS* & *GK* 46164; Pana, 08.10.2012, *AK* 58739; Tashigaon to Rovers point, 02.10.2013, *AK* 59742.

5. *Middletonia* C. Puglisi

Middletonia multiflora (R. Br.) C. Puglisi, *Taxon* 65: 287. 2016. *Boea multiflora* R. Br., *Cyrtandreae*: 120. 1839; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 365. 1884. *Boea flosculosa* C. B. Clarke, *Commelyn. Cyrtandr. Bengal.*: 116, t. 83. 1874. *Paraboea multiflora* (R. Br.) B. L. Burtt, *Notes Roy. Bot. Gard. Edinburgh* 41: 433. 1984. [Plate 159a-b; Fig. 72e-]]

Erect herb, 4–6 cm high. Leaves crowded at reduced stems, apparently rosulate, elliptic, 3.5–18.5 × 2–10 cm, obliquely cuneate, crenate, subacute to obtuse, coriaceous, pilose above and woolly felted and reddish brown below when young, sparsely pubescent above and woolly prominently on veins below on maturity. Inflorescence axillary, many flowered, branched cymes, woolly; floral bracts linear to linear-lanceolate. Calyx divided to base, woolly; lobes 5, triangular-lanceolate, c. 1.5 × 0.5 mm, acute. Corolla white, campamilate; tube 1.5–1.8 mm; lobes 5, elliptic, 1.5–2 × 1 mm, glandular. Stamens 2, subsessile; anthers elliptic, glandular. Ovary conical, 4–5 × 0.5–1.2 mm, glandular; style c. 0.5 mm; stigma capitate; diskannular. Capsules linear-oblong, 6–11 × 1–1.2 mm, twisted clockwise, stalked, beaked, dehisce by margins, glandular pubescent; seeds brown, angular, reticulate, acute at both ends.

Flowering & Fruiting: July–September.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram and West Bengal.

Specimen examined: Santrabari to Buxa Fort, 28.09.2013, *AK* 59616.

6. *Rhynchoglossum* Blume

Rhynchoglossum obliquum Blume, *Bijdr. Fl. Ned. Ind.* 14: 741. 1826; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 367. 1884. *Rhynchoglossum obliquum* var. *parviflorum* C. B. Clarke in DC., *Monogr. Phan.* 5: 162. 1883; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 367. 1884 (as "*parviflora*"). [Plate 159c-d]]

Erect herb, 14–56 cm high, produces watery sap. Leaves elliptic-ovate, 4–10 × 1.8–6 cm, strongly oblique at base, often cordate-rounded on broader side, rounded or more or less cuneate on narrower side, entire and scabrid, acuminate, membranous, sessile glandular. Inflorescence axillary, many flowered, terminal, elongate racemes, pubescent; floral bracts linear. Calyx cupular; tube c. 2.5 mm, angular, scabrous hairy or glabrous; lobes 5, triangular, c. 2 × 0.8–1 mm, ciliolate, acute to short acuminate. Corolla bluish; tube 4–5 mm; upper lip 2-lobed and

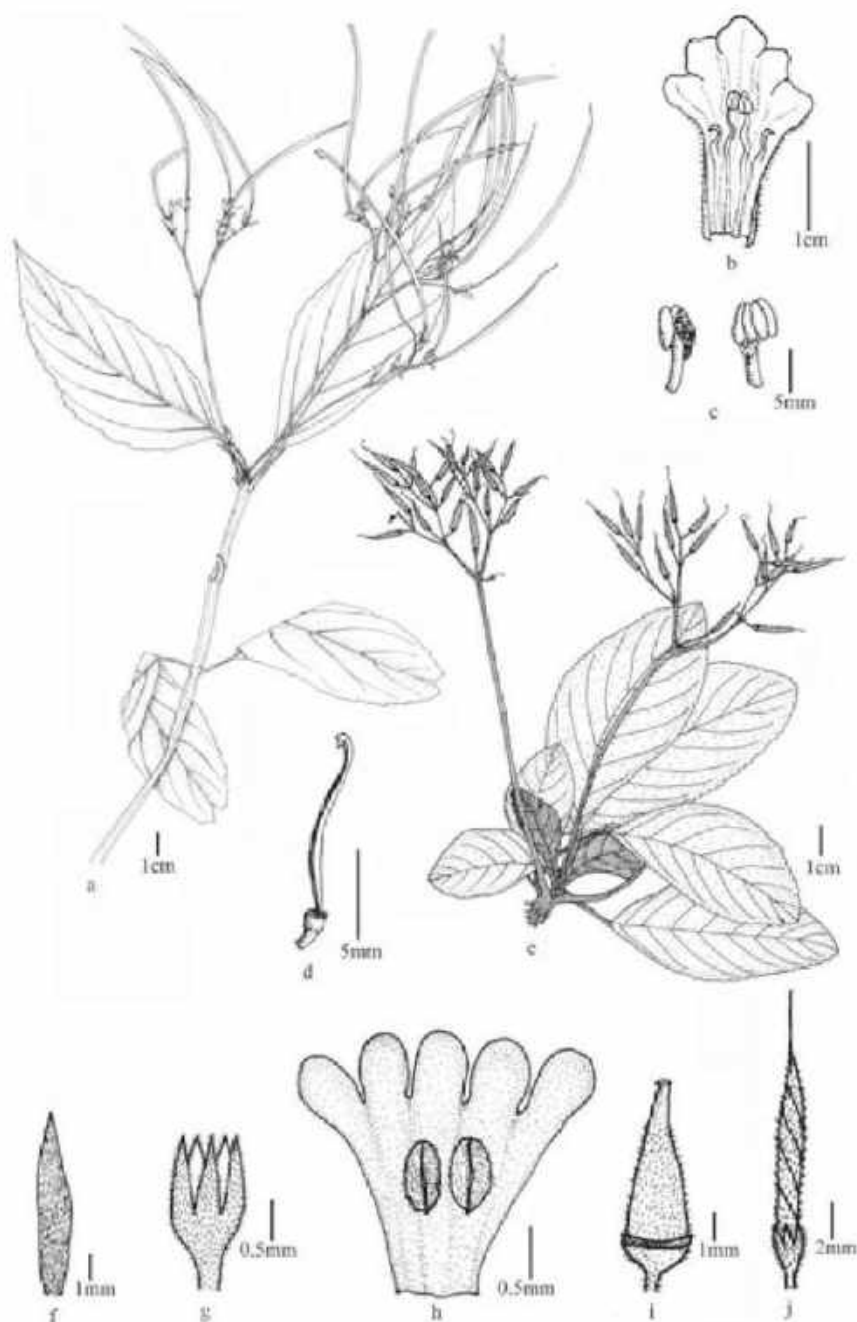


Fig. 72. *Lysionotus serratus*: a. Fruiting branchlet; b. Corolla split open showing stamens; c. Stamen; d. Gynoeceium (SKS & GK 46164); *Middletonia multiflora*: e. Habit; f. Floral bract; g. Calyx; h. Corolla split open showing stamens; i. Gynoeceium; j. Capsule (AK 59616).

lower lip 3-lobed, lobes triangular, 1–2.5 × 1–1.5 mm, acute. Stamens 2; filaments 2–2.5 mm; anthers globose, confluent. Ovary ovoid or ellipsoid; style c. 4 mm; stigma capitate, peltate, hairy; disk membranous, shallowly lobed, one sided. Capsules ellipsoid, 3–3.5 × c. 2 mm, enclosed in persistent calyx; seeds brown, lanceolate, minute, acute at both ends.

Flowering & Fruiting: August–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimens examined: Jainti range, 08.10.2009, SKS & GK 46203; Santrabari, 27.09.2013, AK 59607.

Bignoniaceae

Key to the genera

- 1a. Floral bracts tomentose; calyx spathe-like, pale yellow tomentose; filaments glabrous throughout; anthers knobbed at apex; stigma not 2-lobed; capsules gland-dotted, tomentose 1. *Markhamia*
- 1b. Floral bracts absent, or if present then puberulent; calyx campanulate, glabrous or puberulent; filaments tomentose or villous at base; anthers not knobbed at apex; stigma 2-lobed; capsules not gland-dotted, glabrous 2
- 2a. Corolla tube 4.5–8 cm; fertile stamens 5; capsules flat, septum not thickened; seeds rounded 2. *Oroxylum*
- 2b. Corolla tube 1.2–1.5 cm; fertile stamens 4; capsules angular, septum thickened; seeds ovoid 3. *Stereospermum*

1. *Markhamia* Seem. ex Bail.

Markhamia tomentosa (Benth.) K. Schum. ex Engl., Abh. Königl. Akad. Wiss. Berlin 1894: 34, 49. 1894. *Spathodea tomentosa* Benth., Niger Fl.: 462. 1849. *Muenteria tomentosa* Seem., J. Bot. 3: 330. 1865. [Plate 160a]

Large tree, 15–20 m high. Leaves imparipinnate; leaflets 11–13, elliptic or elliptic-oblong, sometimes suborbicular, 6–15 × 4–6 cm, obliquely cuneate, repand, sometimes dentate above, acuminate, subcoriaceous, minute scattered gland-dotted near margins above, puberulous with yellow glands below. Inflorescence terminal racemes, pale yellow tomentose; floral bracts triangular-ovate to ovate. Calyx spathe-like, 2–2.3 × c. 2 cm, split above, pale yellow tomentose. Corolla yellow with dark red streak, campanulate; tube 4–5 cm, gland-dotted, floccose inside; lobes 5, suborbicular, c. 1.3 mm across, undulate, gland-dotted. Stamens 4, didynamous; filaments 1.5–2 cm; anthers ovate, knobbed at apex. Ovary subglobose, truncate; style c. 2 cm; stigma oblong. Capsules flat, 85–100 × 1.6–1.8

cm, margins thick, median line prominent, gland-dotted, tomentose; seeds linear-oblong, 3–3.5 × c. 0.6 cm, winged.

Flowering & Fruiting: September–March.

Distribution. India: West Bengal.

Specimens examined: Rajabhatkhawa range, 04.12.2011, GK 52346; Checko-1, 25.09.2012, AK 56148.

Notes. It is a new addition to flora of India. Only a single individual found, might be introduced in the study area.

2. *Oroxylum* Vent.

Oroxylum indicum (L.) Kurz, Forest Fl. Burma 2: 237. 1877; C. B. Clarke in Hook. f., Fl. Brit. India 4: 378. 1884; Prain, Bengal Pl. 2: 787. 1903. *Bignonia indica* L., Sp. Pl. 2: 625. 1753. [Plate 160b]

Sona, Nasona, Sonpatti (B); *Totilla, Totola* (N).

Large tree, 15–20 m high. Leaves imparipinnate; leaflets 7–9, ovate to oblong-ovate, 7.5–10 × 3.8–6 cm, attenuate, entire, short acuminate, subcoriaceous. Calyx campanulate, 2.2–4.5 × 2–3 cm, truncate. Corolla yellowish purple, reddish purple, yellow inside, campanulate; tube 4.5–8 cm; lobes 5, suborbicular, 2–4.5 cm across, crenate, thick, reflexed. Stamens 4, slightly exserted; filaments 3–4.5 cm, tomentose at base; anthers ellipsoid, 8–10 mm. Ovary in disk; style 5–7 cm; stigma 2-lobed; disk 5-lobed, 4–5 mm high, fleshy. Capsules sword-like, flat, 50–62 × 4–9 cm, woody, lenticellate, dehisce septically; seeds rounded, c. 6.5 × 3.2 cm, winged.

Flowering & Fruiting: May–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Dadra and Nagar Haveli, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Tripura, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Panbari 6, 29.11.2011, GK 47175; North Rydak, 26.09.2011, AK 52929.

Notes: Dried flowers powder used in the cure of piles and fever; fruits used as an embellishment.

3. *Stereospermum* Cham.

Stereospermum colais (Buch.-Ham. ex Dillwyn) Mabb., Taxon 27: 553. 1978. *Bignonia colais* Buch.-Ham. ex Dillwyn, Rev. Hortus Malab 6 (26): 28. 1839.

Stereospermum chelonoides auct. non (L. f.) DC. 1838: C. B. Clarke in Hook. f., Fl. Brit. India 4: 382. 1884; Prain, Bengal Pl. 2: 790. 1903. [Plate 160c]

Dharmar, Atcapali (B); *Parari* (N).

Large tree, 15–25 m high. Leaves imparipinnate; leaflets 7–9, oblong-elliptic or obovate, 6–14 × 2.5–6.5 cm, cuneate, repand, abruptly acuminate, subcoriaceous to chartaceous, glandular above. Inflorescence terminal panicles, puberulent; floral bracts lanceolate. Calyx reddish brown, campanulate; tube c. 3 mm, puberulent with few scattered glands; lobes 5, triangular-ovate, 1.5–2 × 0.8–1 mm, sparsely ciliate, acuminate. Corolla maroon brown, creamy white with red-yellowish streaks inside; tube 1.2–1.5 cm, slightly curved, pubescent, villous inside; upper lip 2-lobed, suborbicular, 6–8 mm across, ciliate, obtuse; lower lip 3-lobed, broadly oblong, 5–6 × 3–5 mm, ciliate, obtuse. Stamens 4; filaments 1.8–2 cm, villous at base; anthers c. 1 mm. Ovary oblong, 3–3.5 mm, compressed; style 5–7 mm; stigma 2-lobed. Capsules angular, 20–30 × 0.8–1.2 cm, ridged, slightly twisted; seeds ovoid, 5–6 × 1.3 mm, winged.

Flowering & Fruiting: July–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: NRVK 5a, 30.03.2012, GK 50654; Marakata, 24.09.2011, AK 52858.

Acanthaceae

Key to the genera

- 1a. Climbing shrubs (except *Thunbergia erecta*); veins palmate; bracteoles spathaceous, free later; calyx annular; anthers bearded at base; capsules subglobose below with a sterile beak above; retinacula absent 16. *Thunbergia*
- 1b. Herbs or shrubs, not climbing; veins pinnate; bracteoles not spathaceous, free; calyx not annular; anthers not bearded at base; capsules not as above; retinacula present (absent in *Nelsonia*) 2
- 2a. Floral bracts silky glandular hairy 3
- 2b. Floral bracts not silky glandular hairy 4
- 3a. Calyx lobes 4, one of the lobes larger and bifid; seeds on minute, papillae like structure 10. *Nelsonia*
- 3b. Calyx lobes equally 5-lobed; seeds on well developed retinacula 14. *Pseuderanthemum*
- 4a. Arborescent; branchlets with prominent scars of fallen leaves; leaves viciously pinnatifid, spine tipped; bracteoles black; calyx lobes 4; upper lip of corolla obsolete; lower lip 5-lobed 1. *Acanthus*

Botanical Survey of India

- 4b. Not arborescent; branchlets without prominent scars of fallen leaves; leaves entire; bracteoles green; calyx lobes 5 (except *Barleria*); upper lip of corolla well developed; lower lip usually 3-lobed (corolla not significantly bilabiate in *Strobilanthes*) 5
- 5a. Corolla lobes twisted to left in buds; anthers usually 2-celled, cells parallel or one a little below the other, not spurred at base; style bifid, one lobe often suppressed; retinacula scarcely to strongly curved 6
- 5b. Corolla lobes twisted to right in buds or not; anthers 2-celled, one cell frequently placed much above the other, often spurred at base; style shortly, equally bifid or subentire; retinacula strongly curved 8
- 6a. Leaves anisophyllous; ovules 2 in each cell; capsules 4 or 16-seeded 15. *Strobilanthes*
- 6b. Leaves isophyllous (anisophyllous in *Phaulopsis imbricata*); ovules 3-12 in each cell; capsules 4 or more seeded 7
- 7a. Floral bracts obovate or oblong-lanceolate; corolla distinctly bilabiate; seeds 14-20
6. *Hygrophila*
- 7b. Floral bracts reniform to orbicular; corolla subequally 5-lobed; seeds 4 12. *Phaulopsis*
- 8a. Herbs 9
- 8b. Undershubs or shrubs 10
- 9a. Leaves scurfy above; inflorescences head-like spikes; flowers white with brown upper lip; floral bracts and bracteoles spine tipped; calyx lobes 5, arranged in 2 whorls; upper lip 2-lobed; lower lip 3-lobed; stamens 4; anthers bearded; seeds with hygroscopic hairs 8. *Lepidagathis*
- 9b. Leaves not scurfy above; inflorescences cymes; flowers pink purple or white with few pinkish spots on lip; floral bracts and bracteoles not spine tipped; calyx lobes 5, not arranged in 2 whorls; upper lip 3-lobed; lower lip entire; stamens 2; anthers not bearded; seeds verrucose or with barbed papillae 4. *Dicliptera*
- 10a. Inflorescences terminal thyrse, cone-like; flowers dark purplish red to orange yellow; bracteoles absent 13. *Phlogacanthus*
- 10b. Inflorescences various, not terminal thyrse; flowers variously coloured, not dark purplish red to orange yellow; bracteoles present 11
- 11a. Flowers pink; floral bracts spatulate; corolla tube compressed in buds; upper lip of corolla with dark reddish spots, strongly reflexed, shallowly 3-toothed; filaments retrorsely hairy 11. *Peristrophe*
- 11b. Flowers variously coloured, not pink; floral bracts not spatulate; corolla tube not compressed in buds; upper lip of corolla without spots, not reflexed; filaments not retrorsely hairy 12
- 12a. Stamens 2 (except *Eranthemon griffithii*) 13
- 12b. Stamens 4 15
- 13a. Inflorescences racemes; flowers white, pink veins all over, pedicellate; floral bracts triangular-ovate, mid vein prominent; bracteoles connate at base, clasping the stem; corolla slightly dorso-ventrally compressed 9. *Mackaya*

- 13b. Inflorescences spikes; flowers not white, if white then pink veins at lower lip, sessile; floral bracts not triangular-ovate, mid vein not prominent (triangular in *Justicia gendarussa*); bracteoles free at base, not clasping the stems; corolla not dorso-ventrally compressed 14
- 14a. Inflorescences terminal spikes forming dichotomously or trichotomously branched panicles; floral bracts reticulately nerved; corolla indistinctly bilabiate; upper lip not hooded; anthers not spurred at base 5. *Eranthemum*
- 14b. Inflorescences terminal spikes but not branched; floral bracts not as above; corolla strongly bilabiate; upper lip hooded; anthers usually spurred at base 7. *Justicia*
- 15a. Scrambling shrubs; inflorescences short panicles; floral bracts present; bracteoles linear-subulate; calyx lobes 5, not in 2 whorls; corolla tubular below, ventricose above; upper lip of corolla 2-lobed; anthers spurred at base; stigma globose; seeds rugose 2. *Ayastasia*
- 15b. Erect shrubs; inflorescences cymes; floral bracts absent; bracteoles elliptic to linear-lanceolate or ovate-lanceolate; calyx lobes 4 in 2 whorls; corolla tubular-campanulate; upper lip of corolla 4-lobed; anthers not spurred at base; stigma bifid; seeds silky hairy 3. *Barleria*

1. *Acanthus* L.

Acanthus carduaceus Griff., Itin. Pl. Khasyah Mts.: 144, No. 688. 1848; C. B. Clarke in Hook. f., Fl. Brit. India 4: 480. 1885. [Plate 160d, 161a-b; Fig. 73]

Shrub, 2–3 m high. Leaves sessile, elliptic, pinnatifid, 12–60 × 15–40 cm, semiamplexicaul, spinescent dentate, subcoriaceous, punctate below. Inflorescence terminal, pedunculate and elongate, erect spikes; floral bracts ovate to obovate; bracteoles black, linear-lanceolate. Calyx deeply divided to base; lobes 4 in 2 whorls, acuminate-lanate; larger lobes ovate-elliptic, 18–23 × 6–9 mm, one of the lobes bifid, 4–6-nerved; smaller lobes linear-lanceolate, 12–15 × 3.5–4.5 mm, nerved, glabrous except villous mid nerve inside. Corolla white brown; tube subglobose, 4.5–5 × 5–6 mm, pubescent or glabrous, villous at throat; upper lip absent; lower lip 5-lobed; lobes suborbicular, 4–7 mm across, pubescent or villous. Stamens 4; filaments subulate, 1–1.2 mm; anthers lanceolate, 4–4.5 mm, glandular hairy on back, bearded. Ovary ellipsoid, c. 4 × 3 mm; style c. 1 cm; stigma bifid. Capsules ellipsoid-oblancoate, c. 10 × 6 mm, compressed, stalked, umbonate, glandular and gland-dotted; seeds white, brownish after drying, subcircular, 5–6.5 mm across.

Flowering & Fruiting: December–March.

Distribution. India: West Bengal.

Specimens examined: Way to Sinchula, KPB 2032; Ramiti, Buxaduar, JKS 4034; Rovers point to Bhutan Border, 15.02.2014, AK 59962.

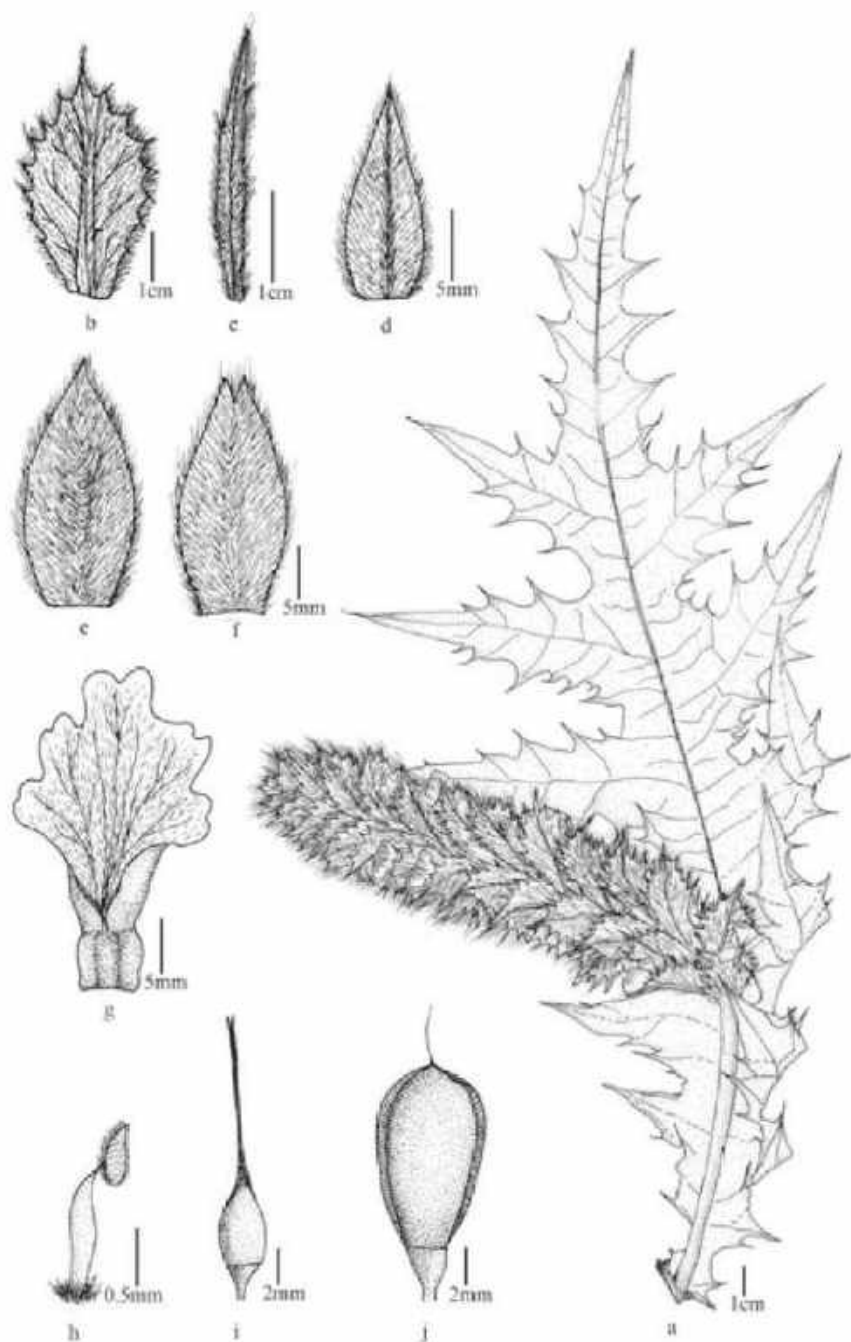


Fig. 73. *Acanthus carduaceus*: a. Leaf with inflorescence; b. Floral bract; c. Bracteole; d. Smaller calyx lobe; e. Larger calyx lobe with entire apex; f. Larger calyx lobe with bifid apex; g. Corolla; h. Stamen; i. Gynoecium; j. Capsule (AK 59962).

2. *Asystasia* Blume

Asystasia macrocarpa Nees in Wall., Pl. Asiat. Rar. 3: 89. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 495. 1885; Prain, Bengal Pl. 2: 813. 1903.

[Plate 161c; Fig. 74]

Scrambling undershrub, 1–1.5 m high. Leaves elliptic-oblong, 3.5–7.5 × 1.3–3.5 cm, cuneate, entire, acute to acuminate, subcoriaceous, lineolate, sparsely pubescent. Inflorescence 3–6-flowered, short terminal panicles, glandular pubescent; inflorescence bracts oblong or lanceolate; floral bracts and bracteoles linear-subulate. Calyx divided to base; lobes 5, subulate, 3–5 mm, up to 7 mm in fruiting, acute, glandular pilose. Corolla pale purple, tubular-ventricose; tube 2.5–3 cm, glandular pubescent, sericeous inside along the filaments; upper lip 2-lobed, lobes suborbicular, c. 4 × 3 mm, obtuse, puberulous; lower lip 3-lobed, central lobe slightly larger, or else same as upper lobes. Stamens 4; filaments 5–8 mm, pubescent; anthers oblong-ovate, spurred. Ovary oblong, c. 2.5 mm, white hairy; style c. 1.6 cm; stigma globose. Capsules clavate, 3.5–4 × c. 0.5 cm, glandular pubescent; seeds orbicular, 4–5 mm across, rugose.

Flowering & Fruiting: January–May.

Distribution. India: Assam, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Jainti 7, 09.03.2011, GK 50521; Jainti 7, 05.04.2012, GK 56031; Sankosh, 17.02.2012, AK 55650, 55656.

3. *Barleria* L.

Key to the species

- 1a. Inflorescence not unilateral clustered cymes; bracteoles elliptic to linear-lanceolate, erect, spiny; calyx spiny; corolla white or bluish; seeds suborbicular 1. *B. cristata*
- 1b. Inflorescences unilateral clustered cymes; bracteoles ovate-lanceolate, deflexed, not spiny; calyx not spiny; corolla purplish blue; seeds deltoid to ovate 2. *B. strigosa*

1. *Barleria cristata* L., Sp. Pl. 2: 636. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 488. 1885; Prain, Bengal Pl. 2: 812. 1903. [Plate 161d]

Jati (B).

Shrub, 45–60 cm high. Leaves ovate-elliptic to elliptic-oblong, 2–9 × 1–2.6 cm, attenuate, entire, acute with mucronate tip at apex, subcoriaceous, lineolate above, appressed hairy. Inflorescence dense axillary or terminal clustered cymes; floral bracts absent; bracteoles elliptic to linear-lanceolate. Calyx divided to base; lobes 4 in 2 whorls, spiny; outer whorl lanceolate or elliptic, 2–2.5 × 0.5–1 cm, mucronate; inner whorl linear-lanceolate, 6–7 × 1–2 mm, acute. Corolla tubular-campanulate; tube 5.5–7 cm, glandular pubescent, pilose inside; upper lip 4-lobed, lobes obovate-oblong, c. 2.2 × 1.5 cm; lower lip obovate, c. 3 × 1.8 cm. Stamens 2, exerted; filaments 2–3 cm, pubescent; anthers c. 2 mm; staminodes 2; disk

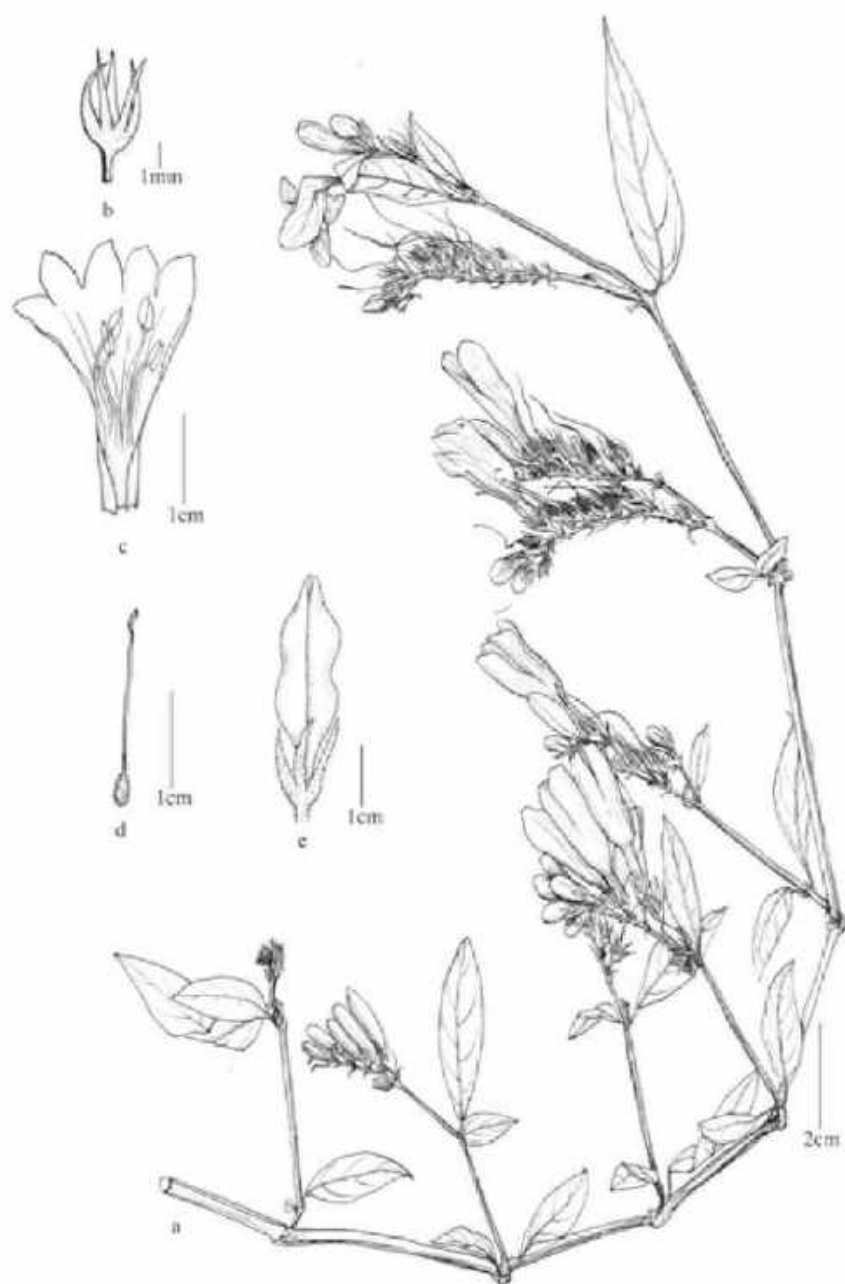


Fig. 74. *Asystasia macrocarpa*: a. Flowering branchlet; b. Calyx; c. Corolla tube split open showing stamens; d. Gynoecium; e. Capsule (GK 56031).

cupular. Ovary c. 3 mm; style 2–4 cm; stigma 2-lobed. Capsules oblong-ovate, c. 13 × 5 mm; seeds suborbicular, 4–5 × 3–3.5 mm, compressed, silky hairy.

Flowering & Fruiting: December–March.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 02.12.1975, JKS 4096; Jainti range, 13.10.2010, SKS & GK 46347; NRVK 6a, 04.11.2011, GK 52322; Hatipota, 17.02.2013, AK 59812.

2. *Barleria strigosa* Willd., Sp. Pl. 3: 379. 1803; C. B. Clarke in Hook. f., Fl. Brit. India 4: 489. 1885; Prain, Bengal Pl. 2: 812. 1903; Roxb., Fl. Ind. 3: 37. 1832.

[Plate 162a]

Dasi (B).

Shrub, 60–100 cm high. Leaves broadly ovate or elliptic, 4–15 × 1.4–5 cm, attenuate, entire, acute, subcoriaceous, lineolate above, strigose. Inflorescence dense short pedunculate, unilateral axillary or terminal clustered cymes; floral bracts absent; bracteoles foliaceous, ovate-elliptic. Calyx divided to base; lobes 4 in 2 whorls, strigose, lobes overlapping; outer lobes rhomboid-ovoid, 2.5–3 × 1.5–1.8 cm, ciliate, acute, 8–10-nerved; inner lobes linear-lanceolate, 0.8–1 × 0.2 cm, ciliate, acuminate, bidentate with a prominent notch, strigose. Corolla tubular-campanulate; tube 5–6.5 cm, short glandular pubescent; upper lip 4-lobed, lobes ovate-oblong, c. 2 cm, pilose; lower lip same as upper lobes. Stamens 2, exserted; filaments 2.5–3 cm; anthers linear; staminodes 2. Ovary ovate-oblong, c. 3 × 1.5 mm; style 3.5–4 cm, hairy at base; stigma linear. Capsules oblong, 1.5–2 × 0.5–0.6 cm; seeds deltoid to ovate, 5–6 × 4–5 mm, silky hairy.

Flowering & Fruiting: August–March.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 02.12.1975, JKS 4096; Jainti 5, 08.10.2009, SKS & GK 46224; Jainti 6, 11.10.2009, SKS & GK 46284; SRVK 6, 29.11.2011, GK 47165; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58589; Santrabari to Buxa Fort, 28.09.2013, AK 59620.

4. *Dicliptera* Juss.

Key to the species

- 1a. Scrambling herbs; stems puberulous; leaves short acuminate, glabrous; petioles 1–3.5 cm; floral bracts 0.6–1.5 × 0.3–0.7 cm; outer bracteoles oblong-lanceolate, 5–7 × c. 0.2 mm; inner bracteoles lanceolate, c. 1.5 mm wide, not glandular pubescent; pedicels 1–1.5 cm; calyx not glandular pubescent outside; lobes 4–5 mm, acuminate; corolla tube 8–10 mm; lower lip acute; seeds verrucose **1. *D. bupleuroides***
- 1b. Decumbent herbs; stems pubescent; leaves acute, pubescent; petioles 2–3.5 mm; floral bracts c. 5 × 1 mm; outer bracteoles obovate to oblanceolate, 0.7–1 × 0.2–0.5

cm; inner bracteoles linear to subulate, c. 0.5 mm wide, glandular pubescent; pedicels 1–1.5 mm; calyx glandular pubescent outside; lobes c. 2 mm, acute; corolla tube c. 5 mm; lower lip obtuse; seeds with apical barbed papillae **2. *D. chinensis***

1. *Dicliptera bupleuroides* Nees, Pl. Asiat. Rar. 3: 111. 1832. *Dicliptera roxburghii* T. Anderson, J. Linn. Soc. Bot. 9: 519 1867; Prain, Bengal Pl. 2: 822. 1903. *Dicliptera roxburghiana* Nees var. *bupleuroides* (Nees) C. B. Clarke in Hook. f., Fl. Brit. India 4: 554. 1885. [Plate 162b]

Scrambling herb, 30–60 cm high. Leaves elliptic, ovate to lanceolate, 2.8–9.8 × 1.4–4.3 cm, attenuate, entire or obscurely sinuate, short acuminate, chartaceous. Inflorescence pedunculate, axillary or terminal clustered cymes; floral bracts clustered, foliaceous, linear-oblong; bracteoles in 2 whorls; outer oblong-lanceolate and inner lanceolate. Calyx divided to base; lobes 5, subulate, 4–5 mm, acuminate, scarious, setaceous. Corolla pink purple with violet spot inside; tube white or pale lilac, 8–10 mm; upper lip ovate-oblong, 8–15 × 3–7 mm, shallowly 3-toothed; lower lip same as upper lip except acute apex. Stamens 2; filaments 4–5 mm, hairy; anthers superposed, c. 1 mm, 2-celled. Ovary oblong, c. 1.5 mm, pilose; style c. 15 mm; stigma 2-lobed. Capsules clavate, 5–8 mm, sparsely pubescent at apex; seeds rounded, c. 1 mm across, compressed, verrucose.

Flowering & Fruiting: September–April.

Distribution. India: Almost throughout India.

Specimens examined: Jainti, 09.02.2010, SKS & GK 46363; SRVK 4, 27.11.2011, GK 50599; Kumargram-Bhutan border, Kalikhola river, 27.09.2011, AK 52953; Sankoshi, 28.09.2011, AK 52982; Newlands, 15.02.2012, AK 53081; Sankosh, 17.02.2012, AK 55672.

2. *Dicliptera chinensis* (L.) Juss., Ann. Mus. Hist. Nat. 9: 268. 1807. *Justicia chinensis* L., Sp. Pl. 1: 16. 1753. *Dicliptera roxburghiana* Nees, Pl. Asiat. Rar. 3: 111. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 553. 1885. [Plate 162c]

Decumbent herb, 15–20 cm high. Leaves ovate, 5–12 × 3.5–9 mm, cuneate, entire and hairy, acute, membranous, cystoliths prominent, pubescent when young, glabrous later. Inflorescence axillary, 2–3-flowered short pedunculate cymes, pubescent; floral bracts subulate; bracteoles in 2 whorls, outer obovate to oblanceolate and inner linear to subulate. Calyx divided to base, glandular pubescent; lobes 5, subulate, c. 2 × 0.5 mm, ciliate, acute. Corolla pinkish white with purple spots on lower lip; tube c. 5 mm, pubescent near throat, 2 lines of hairs runs from filaments to base of corolla tube; upper lip elliptic-oblong, c. 4 × 2 mm, shallowly 3-toothed, pubescent; lower lip obovate to suborbicular, c. 4 × 3.5 mm, obtuse, pubescent. Stamens 2; filaments 3.5–4 mm, hairy; anthers subreniform. Ovary ovoid, shortly stalked, partially surrounded by a disk, sparsely pilose; style c. 6.5 mm; stigma 2-lobed; disk crown-shaped. Capsules ellipsoid, c. 6 × 3 mm, apiculate, grooved, corky, pubescent; seeds brown, circular, 1.5–2 mm across, apical barbed papillate.

Flowering & Fruiting: December–February.

Distribution. India: West Bengal and North Eastern region.

Specimens examined: Buxaduar, JKS 935; Ramiti, 1600m, JKS 4010; Tashigaon, JKS 4065; Bhutanghat, JKS 4080; North Bholka, JKS 4165; South Rajabhatkhawa, JKS 4250; Checko-1, 10.02.2013, AK 58826.

5. *Eranthemum* L.

Key to the species

- 1a. Branchlets hirsute mixed with glandular hairs; leaves glandular hairy, sparsely pilose; floral bracts green, elliptic-obovate, glandular pubescent; bracteoles 1–1.2 cm, glandular pubescent; corolla bright crimson; lobes strongly reflexed; stamens strongly exerted; style pubescent **1. *E. erythrochilum***
- 1b. Branchlets glabrous or hairy, not glandular hairy; leaves glabrous; floral bracts white with green nerves, broadly elliptic-obovate, short acuminate, not glandular pubescent; bracteoles 5–7.5 mm, glabrous; corolla pink or blue; lobes not reflexed; stamens slightly exerted; style puberulent or nearly glabrous **2**
- 2a. Branchlets hairy at edges; bracteoles 7–7.5 mm; corolla pink, tubular-ventricose; lobes suborbicular, c. 2 mm; stamens 4, fertile 2, rudimentary 2; disk present; style puberulent **2. *E. griffithii***
- 2b. Branchlets glabrous; bracteoles c. 5 mm; corolla blue, tubular; lobes obovate, 6–8 mm; stamens 2, fertile; disk absent; style nearly glabrous **3. *E. pulchellum***

1. *Eranthemum erythrochilum* J. R. I. Wood, Edinburgh J. Bot. 51 (2): 180. 1994. [Plate 162d; Fig. 75]

Undershrub/shrub, 1.5–2 m high, hirsute mixed with glandular hairs. Leaves elliptic, 12–23 × 4.8–9 cm, attenuate, crenate and ciliate, acuminate, coriaceous, sticky due to glandular hairs, lineolate with prominent cystoliths, sparsely pilose. Inflorescence terminal spikes forming dichotomously or trichotomously branched panicles, hirsute mixed with glandular hairs. Flowers sessile; floral bracts white with variegated green reticulate nerves, obovate; bracteoles linear-lanceolate. Calyx divided to base; lobes 5, linear-lanceolate, 9–10 × 1–1.5 mm, acute, hyaline with prominent mid vein, pubescent mixed with glandular hairs. Corolla bright crimson, tubular; tube 3.5–3.8 cm, slightly curved, glandular pubescent; lobes 5, obovate, 10–12 × 6–7 mm, rounded, strongly reflexed, glandular pubescent. Stamens 2, strongly exerted; filaments 2–2.5 cm; anthers oblong. Ovary oblong, c. 3 mm, glandular pubescent; style c. 5.5 cm, pubescent; stigma conical, pubescent. Capsules not seen.

Flowering: January–February.

Distribution. India: West Bengal.

Specimens examined: Way to Buxaduar, KPB 1914; Buxaduar, JKS 990; Jaini 5a, 06.12.2011, GK 52353; Pana, 11.02.2013, AK 58855; Buxaduar to Achalung, 14.02.2014, AK 59935.

Notes: This species is endemic to Buxa Tiger Reserve.

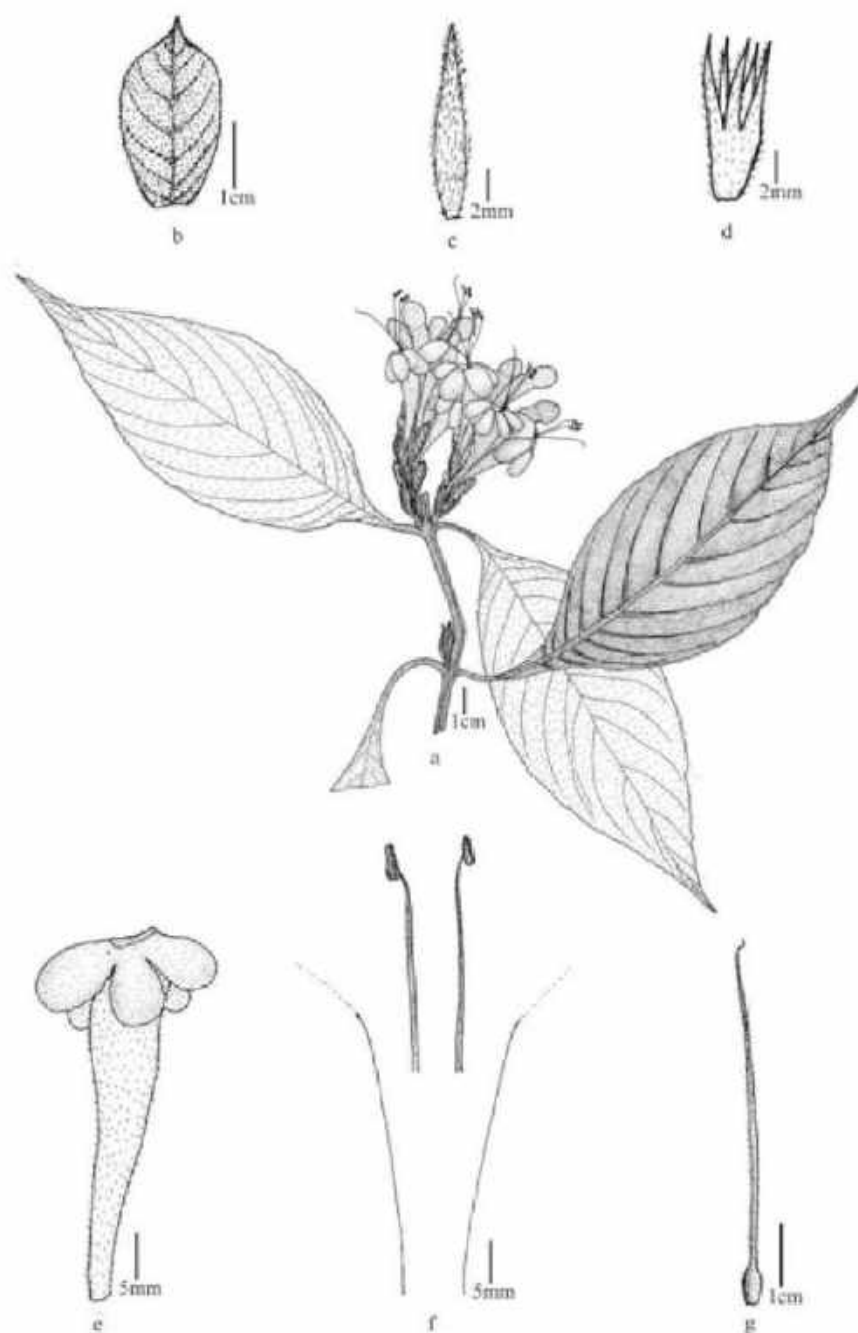


Fig. 75. *Eranthemum erythrochilum*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Calyx; e. Outer view of corolla; f. Corolla tube split open showing stamens; g. Gynoecium (AK 59935).

2. *Branthemum griffithii* (T. Anderson) Bremek. & Nan.-Bremek., Ver. Kon. Ned. Akad. Wetensch. Afd. Natuurk. Tweede Sect. 2, 45 (1): 35. 1948. *Daedalacanthus griffithii* T. Anderson, J. Linn. Soc. Bot. 9: 486. 1867; C. B. Clarke in Hook. f., Fl. Brit. India 4: 418. 1885. [Plate 163a]

Undershrub, 0.3–1.5 m high. Leaves lanceolate or elliptic, 4–17.5 × 1.4–5.5 cm, attenuate, entire to repand, acute to short falcate-acuminate, subcoriaceous, cystoliths present. Inflorescence terminal spikes forming dichotomously or trichotomously branched panicles. Flowers sessile; floral bracts white with green reticulate nerved, elliptic-obovate; bracteoles linear-lanceolate. Calyx cupular; tube c. 4 mm, puberulous inside; lobes 5, triangular-lanceolate, c. 4 × 0.5–0.8 mm, acuminate, puberulous with few glandular hairs. Corolla pink, tubular-ventricose, puberulous with few glandular hairs; tube 20–22 mm, curved; lobes 5, suborbicular, c. 2 mm across, nerved. Stamens 4, fertile 2, rudimentary 2, exserted; filaments 10–12 mm, hairy at base; anthers oblong, c. 2.5 mm; disk columnar. Ovary ellipsoid, 1.5–1.8 × 0.8–1 mm, laterally compressed, grooved, 2-celled, on raised disk, glandular hairy; style 3–3.5 cm, puberulent; stigma bifid, puberulent. Capsules clavate, 15–18 × 3–5 mm, pointed, compressed, grooved, with persistent bracts, bracteoles and calyx, corky, few glandular hairy; seeds black, subcircular to obovate, 3–4 mm across, mucronate tipped, villous.

Flowering & Fruiting: December–March.

Distribution. India: Assam and West Bengal.

Specimens examined: Newlands, 15.02.2012, AK 53093; Sankosh, 17.02.2012, AK 55697; Kumargram, 18.02.2012, AK 55725; Hatipota, 17.02.2013, AK 59819; Hatipota, 18.02.2013, AK 59824.

3. *Branthemum pulchellum* Andrews, Bot. Repos. 2: t. 88. 1800. *Daedalacanthus nervosus* (Vahl) T. Anderson, J. Linn. Soc. Bot. 9: 487. 1867; C. B. Clarke in Hook. f., Fl. Brit. India 4: 418. 1885; Prain, Bengal Pl. 2: 807. 1903. [Plate 163b]

Arklejhar, Keboo (N).

Shrub, 40–100 cm high. Leaves ovate or ovate-elliptic, 6.6–18.4 × 2.4–5.6 cm, attenuate, entire or crenate, acuminate, subcoriaceous, linear cystoliths present. Inflorescence terminal spikes forming dichotomously or trichotomously branched panicles, puberulous. Flowers sessile; floral bracts white with green variegated prominent reticulate nerves, oblong-obovate; bracteoles linear. Calyx cupular; tube c. 5 mm, sericeous; lobes 5, linear-lanceolate, 4.5–5 × 1 mm, acute, glandular pubescent. Corolla blue, tubular-campanulate; tube 1.5–2 cm, simple hairy; lobes 5, obovate, 6–8 × 5–6 mm, rounded. Stamens 2; filaments 1.2–1.5 cm, slightly exserted; anthers oblong, 2-celled, mucous. Ovary linear-oblong, c. 3.2 × 1.5 mm, glandular pubescent above; style c. 3 cm, nearly glabrous. Capsules oblong, 1–1.5 cm; seeds elliptic, 3–6 mm across, hairy.

Flowering & Fruiting: January–April.

Distribution. India: Andhra Pradesh, Bihar, Chandigarh, Haryana, Jammu & Kashmir, Madhya Pradesh, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Buxa road, 26.02.1934, *KPB* 1630; Bhutanghat, 02.12.1975, *JKS* 4116; Bhutanghat, 02.12.1975, *JKS* 4117; Jainti, 11.02.2010, *SKS* & *GK* 47038; Checko-1, 09.02.2013, *AK* 58822.

6. *Hygrophila* R. Br.

Key to the species

- 1a. Decumbent herbs; stems herbaceous, pubescent; leaves broadly elliptic to oblanceolate, cuneate at base, entire, subcoriaceous, glabrous; inflorescences terminal, many flowered spikes; corolla bluish white; lower lip prominently 3-lobed, glabrous at throat; stamens 2; filaments with bristly appendages at base
1. *H. polysperma*
- 1b. Erect herbs; stems woody, hairy at nodes; leaves lanceolate to elliptic-lanceolate, attenuate at base, crenate-serrate, chartaceous, pubescent; inflorescences axillary, 2-3-flowered cymes; corolla blue; lower lip shallowly 3-lobed, hairy at throat; stamens 4; filaments without bristly appendages at base
2. *H. ringens*

1. *Hygrophila polysperma* (Roxb.) T. Anderson, J. Linn. Soc. Bot. 9: 456. 1876; C. B. Clarke in Hook. f., Fl. Brit. India 4: 406. 1885; Prain, Bengal Pl. 2: 801. 1903. *Justicia polysperma* Roxb., Fl. Ind. 1: 120. 1820. [Plate 163c-d]

Decumbent herb, 15-25 cm high, pubescent. Leaves broadly elliptic to oblanceolate, 9-20 × 3-7 mm, cuneate, entire, acute, subcoriaceous, lineolate. Inflorescence terminal spikes. Flowers sessile; floral bracts obovate; bracteoles linear-oblong. Calyx cupular, divided to base; lobes 5, linear-subulate, c. 8 mm, villous, acute, glandular hairy. Corolla bluish white; tube 1.2-1.5 cm, pubescent, sparsely hairy inside; upper lip 2-lobed, lobes ovate-oblong, c. 0.6 mm; lower lip 3-lobed, lobes oblong-obovate, c. 1 mm, obtuse. Stamens 2, slightly exerted; filaments 1-2 mm, with staminodal bristly appendages at base; anthers minute, 2-celled. Ovary oblong, c. 3 mm, hairy; style c. 2.5 mm, hairy; stigma bifid, one lobe suppressed. Capsules linear-oblong, c. 1 cm, compressed; seeds brown, ovoid to orbicular-oblong, c. 1 × 0.5 mm, with few trichomes.

Flowering & Fruiting: March-July.

Distribution. India: Almost throughout India.

Specimens examined: South Bholka, 07.02.1975, *JKS* 4207; Poro, 22.11.1975, *JKS* 769; Bhutanghat, 02.12.1975, *JKS* 4083; Balapara, *JKS* 4173; Newlands, 15.02.2012, *AK* 55643; Sankosh, 17.02.2012, *AK* 55674.

2. *Hygrophila ringens* (L.) R. Br. ex Spreng., Syst. Veg., ed. 16. 2: 828. 1825. *Ruellia ringens* L., Sp. Pl. 2: 635. 1753. *Hygrophila salicifolia* (Vahl) Nees in Wall., Pl. Asiat. Rar. 3: 81. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 407. 1885; Prain, Bengal Pl. 2: 801. 1903. [Plate 164a]

Erect herb, 30–80 cm high. Leaves sessile, lanceolate to elliptic-lanceolate, 2–7 × 0.4–1.1 cm, attenuate, crenate-serrate and hairy at margins, subacute, chartaceous, pubescent when young, sparsely hairy. Inflorescence axillary, 2–3-flowered cymes. Flowers sessile; floral bracts and bracteoles oblong-lanceolate. Calyx cupular; tube c. 2 mm; lobes 5, linear-subulate, 4.5–5.5 × 0.3–0.6 mm, ciliate, acute, hairy. Corolla bluish; tube c. 8 mm, pilose at throat of lower lip, glabrous to puberulent, only 2 lines of hairs up to base from filaments inside; upper lip elliptic, c. 7 × 5 mm, 2-lobed, nerved, puberulent, pilose or pubescent inside; lower lip elliptic, c. 8 × 5 mm, shallowly 3-lobed, puberulent. Stamens 4, all fertile; filaments 2–4.5 mm; anthers sagittate. Ovary elliptic-oblong, pilose; style 6–6.5 mm; stigma bifid; one lobe suppressed. Capsules elliptic-oblong, 9–11 × 2–3 mm; seeds brownish, rounded, 2–3 mm across, hairy.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Poro, JKS 758; Narathali, 20.02.2012, AK 55788.

7. *Justicia* L.

Key to the species

- | | |
|---|-------------------------|
| 1a. Herbs | 2 |
| 1b. Shrubs or undershrubs | 3 |
| 2a. Flowers compactly placed in glabrous spike; floral bracts dimorphic, linear-oblong or broadlyovate; corolla pale purple to bluish | 3. <i>J. pectinata</i> |
| 2b. Flowers distantly placed in glandular pubescent spike; floral bracts variable, usually obovate to oblanceolate, sometimes elliptic-lanceolate; corolla creamy white | 4. <i>J. virgata</i> |
| 3a. Stems softly pubescent; leaves elliptic or elliptic-lanceolate, 5.6–8.2 cm wide, punctate above; petioles pubescent; inflorescences strobilate, strigose; floral bracts ovate or elliptic, leafy and closely set, without a prominent violet mid vein; calyx lobes acute, puberulous; style hairy; stigma not lobed | 1. <i>J. adhatoda</i> |
| 3b. Stems glabrous; leaves oblong-lanceolate, 0.6–2.4 cm wide, not punctate above; petioles glabrous; inflorescences in loose spikes, glabrous; floral bracts triangular-ovate, not leafy and closely set, with a prominent violet mid vein; calyx lobes acuminate, glabrous; style glabrous; stigma 2-lobed | 2. <i>J. gendarussa</i> |

1. *Justicia adhatoda* L., Sp. Pl. 1: 15. 1753. *Adhatoda vasica* Nees in Wall., Pl. Asiat. Rar. 3: 103. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 540. 1885; Prain, Bengal Pl. 2: 819. 1903. [Plate 164b]

Bakas, Vasaka (B); *Asuro, Kalo Vashak* (N).

Shrub, 1.5–2 m high, softly pubescent, glabrous later. Leaves elliptic or elliptic-lanceolate, 18–24 × 5.6–8.2 cm, attenuate, entire or crenate, acute, subcoriaceous,

punctate above, glabrous except nerves below. Inflorescence terminal and axillary spikes, strigose. Flowers sessile; floral bracts ovate or elliptic; bracteoles linear-lanceolate. Calyx divided to base; lobes 5, oblong-lanceolate, *c.* 7 × 2.5 mm, acute, 3–5-nerved, sericeous, puberulous. Corolla white; tube 1.3–1.6 cm, pubescent; upper lip 2-lobed, ovate-oblong, *c.* 1.6 cm, hooded, pubescent; lower lip 3-lobed, oblong-orbicular, *c.* 2.5 cm across, palate at central lobe, with purple pink nerves, pubescent. Stamens 2, exserted; filaments 1.4–2 cm, declinate, villous at base; anthers spurred at base. Ovary oblong, *c.* 2.5 mm, villous; style 2–2.5 cm, hairy; stigma simple. Capsules obovoid, *c.* 2.5 cm, stipitate, pubescent; seeds orbicular, tuberculate.

Flowering & Fruiting: October–April.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, JKS 949; Jainti 3, 08.10.2009, SKS & GK 46207; Kumargram, 13.02.2012, AK 53014.

Notes: Leaf decoction is given in cold and cough.

2. *Justicia gendarussa* Burm. f., Fl. Ind.: 10. 1768; Roxb., Fl. Ind. 1: 129. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 4: 532. 1885; Prain, Bengal Pl. 2: 818. 1903.

[Plate 164c]

Jagat-madan (B).

Undershrub, 1–1.5 m high. Leaves oblong-lanceolate, 2.2–11.5 × 0.6–2.4 cm, cuneate to attenuate, undulate, acuminate, coriaceous. Inflorescence axillary or terminal spikes; floral bracts triangular; bracteoles elliptic to linear-lanceolate. Calyx cupular; tube *c.* 1.5 mm; lobes 5, linear-lanceolate, 7–8 × 1–1.2 mm, acuminate. Corolla creamy white with pinkish nerves and deep maroon spot inside at palate of lower lip; tube 9–10 mm; upper lip 2-lobed, *c.* 7 × 4 mm; lower lip 3-lobed, lobes oblanceolate, 3–4.5 × *c.* 3.5 mm. Stamens 2, exserted; filaments *c.* 3 mm; anthers 2-celled, cells unequal, lowest mostspurred at base, apiculate. Ovary oblong-cylindrical, *c.* 1.5 × 1 mm; style 9–10 mm; stigma capitate, 2-lobed. Capsules clavate; seeds discoid.

Flowering & Fruiting: February–July.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, 13.02.2012, AK 53015.

3. *Justicia pectinata* L., Cent. Pl. II: 3. 1756. *Rungia pectinata* (L.) Nees in DC., Prodr. 11: 469. 1847. *Rungia parviflora* (Retz.) Nees var. *pectinata* (L.) C. B. Clarke in Hook. f., Fl. Brit. India 4: 550. 1885; Prain, Bengal Pl. 2: 821. 1903.

[Plate 165a-b]

Decumbent herb, 20–30 cm high, pubescent. Leaves oblong-elliptic, 1.7–5.6 × 0.5–1.3 cm, cuneate, entire, bluntly acute, subcoriaceous, lineolate. Inflorescence

short sessile, 1-sided axillary and terminal spikes. Flowers sessile; floral bracts dimorphic; outer barren bracts linear-oblong; inner fertile bracts ovate. Calyx divided to base; lobes 5, linear-lanceolate, 2–2.2 × 0.2–0.3 mm, ciliate, acute, hyaline. Corolla pale purple to bluish, tubular-campanulate; tube c. 1 mm; upper lip suborbicular, c. 0.5 mm across, emarginate, hairy; lower lip 3-lobed, lobes same as upper lip, pubescent. Stamens 2, subsessile; anthers falcate, spurred. Ovary oblong-obovate, hairy; style c. 1 mm; stigma 2-lobed. Capsule ellipsoid, c. 3 × 1.5 mm, pointed; seeds ovoid, c. 0.8 × 0.6 mm, compressed, verrucose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Poro, JKS 818; Buxaduar, JKS 929; Tashigaon, JKS 4043; Bhutanghat, JKS 4077; Balapara, JKS 4157; Jainti range, 11.10.2009, SKS & GK 46288; Kumargram, Kalikhola river belt, 21.09.2011, AK 52729; Newlands, Sukno river, 22.09.2011, AK 52741; Bhutanghat, 26.09.2011, AK 52906; Sankosh, 28.09.2011, AK 52973; Sankosh, 17.02.2012, AK 55673; Mainabari, 24.02.2012, AK 55921.

4. *Justicia virgata* T. Anderson, J. Linn. Soc., Bot. 9: 516. 1867. *Dianthera virgata* Benth. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 542. 1885.

[Plate 165c-d; Fig. 76]

Decumbent herb, 20–40 cm high, puberulous. Leaves subequal to unequal, ovate-elliptic to lanceolate-elliptic, 1.9–6.5 × 0.7–3.4 cm, cuneate to subobtusate, undulate and hairy, acuminate, chartaceous, lineolate and punctate. Inflorescence terminal spikes, glandular pubescent. Flowers sessile; floral bracts variable, usually obovate to oblanceolate, sometimes elliptic-lanceolate; bracteoles subulate. Calyx cupular; tube c. 0.5 mm; lobes 5, linear-subulate, 0.5–2.5 mm, ciliate, acute, glandular pubescent. Corolla white; tube 3–4 mm, hairy at throat; upper lip obovate, 2.5–3 × 2–2.5 mm, notched, hooded, hairy; lower lip 3-lobed, lobes obovate, 2.5–3 × 1.2–1.5 mm, rounded, hairy; Stamens 2; filaments c. 2 mm; anthers subcircular, 1–1.2 × c. 0.8 mm, truncate at base, obtuse. Ovary ellipsoid, pubescent above; style c. 5 mm, few hairs at base; stigma globose. Capsules clavate, 8–11 × c. 1.5 mm, sparsely pubescent, glandular hairy at apex; seeds suborbicular, acutely curved tipped, c. 2 × 1.8 mm, rugose.

Flowering & Fruiting: August–October.

Distribution. India: Eastern, North Eastern regions and Eastern Himalayas.

Specimens examined: Lepchakhawa, 1200m, JKS 972; Jainti range, 09.10.2009, SKS & GK 46256; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59666.

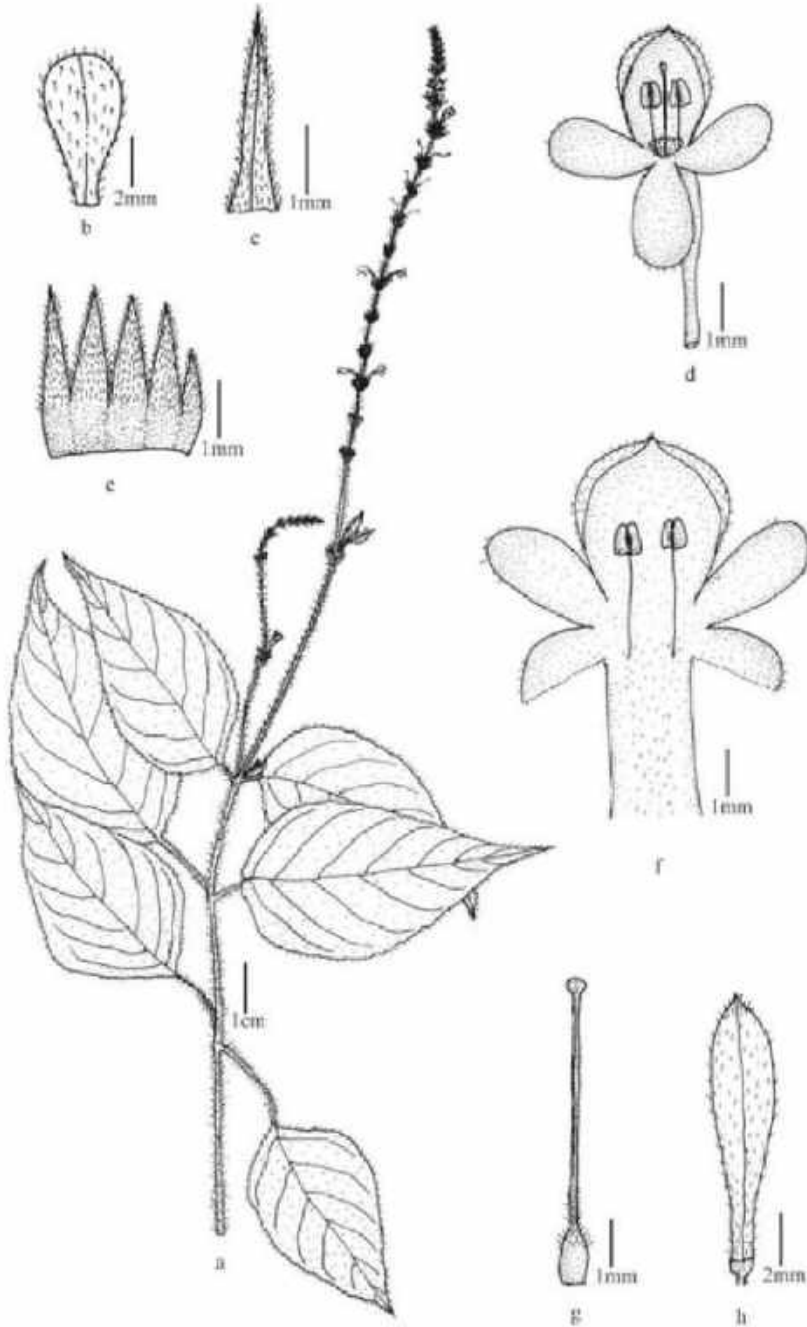


Fig. 76. *Justicia virgata*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Flower without calyx; e. Calyx; f. Corolla split open showing stamens; g. Gynoecium; h. Capsule (AK 59666).

8. *Lepidagathis* Willd.

Lepidagathis incurva Buch.-Ham. ex D. Don, Prodr. Fl. Nep.: 119. 1825. *Lepidagathis hyalina* Nees in Wall., Pl. Asiat. Rar. 3: 95. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 521. 1885; Prain, Bengal Pl. 2: 815. 1903. [Plate 166a]

Decumbent herb, 17–30 cm high. Leaves pale-green, often blotched along center, ovate or linear-oblong or lanceolate, 5–12 × 1.4–4.3 cm, cuncate or decurrent, crenate, acute, subcoriaceous, lineolate, scurfy above. Inflorescence subsessile heads. Flowers sessile; floral bracts and bracteoles oblong-lanceolate. Calyx cupular; tube c. 1 mm; lobes 5, arranged in 2 whorls, unequal; lobes linear-lanceolate, 6–9 × 0.5–1.5 mm, ciliate, acute, pubescent mixed with glandular hairs. Corolla brown white, tubular-ventricose; tube c. 8 mm, finely pubescent; upper lip suborbicular, c. 2.5 mm across, slightly notched, concave; lower lip 3-lobed, oblong, c. 3 mm, obtuse. Stamens 4; filament c. 1 mm; anthers oblong, bearded. Ovary oblong, hairy above; style c. 6 mm, hairy; stigma 2-lobed. Capsule oblong-lanceolate, c. 5 mm, beaked, puberulous dorsally; seeds orbicular, c. 0.5 mm across, clothed with hygroscopic hairs.

Flowering & Fruiting: January–May.

Distribution. India: Assam, Bihar, Goa, Karnataka, Kerala, Maharashtra, Manipur, Punjab, Rajasthan, Sikkim and West Bengal.

Specimens examined: Poro, JKS 767; Garam, JKS 871; Tashigaon, JKS 4048; Bhutanghat, JKS 4082; Bholka, JKS 4199; Jainti 6, 09.02.2010, SKS & GK 46361; Kumargram, 13.02.2012, AK 53003; Newlands, 15.02.2012, AK 53080; Kumargram, 18.02.2012, AK 55716; Hauda nala, 19.02.2013, AK 59852.

9. *Mackaya* Harvey

Mackaya indica (Nees) Ensermu, Kew Bull. 47 (4): 672. 1992. *Thrysacanthus indicus* Nees in DC., Prodr. 11: 335. 1847. *Eranthemum indicum* (Nees) C. B. Clarke in Hook. f., Fl. Brit. India 4: 497. 1885. [Plate 166b]

Shrub, 1–1.5 m high. Leaves elliptic to ovate-lanceolate, 6.5–18.5 × 3–6.8 cm, attenuate, repand, acuminate, subcoriaceous to chartaceous, lineolate below. Inflorescence many flowered, terminal racemes; floral bracts triangular-ovate; bracteoles lanceolate. Calyx cupular; tube 1–1.5 mm, glabrous to puberulous; lobes 5, triangular-lanceolate, 3.5–4 × 1–1.2 mm, ciliate, short acuminate, puberulous. Corolla white, pink veined, tubular-ventricose, glandular puberulous; tube 2–2.2 cm; upper lip obovate, c. 10 × 8.5 mm, ciliolate, notched; lower lip 3-lobed, lobes obovate-elliptic, 8–9 × 5–6 mm, ciliolate, subcircular, many nerved. Stamens 2; filaments 10–12 mm, few hairs at base; anthers oblong-lanceolate, c. 5 mm. Ovary ovoid, c. 3.5 × 1–1.2 mm; style 2–2.2 cm, hairy below; stigma bifid. Capsules clavate, 2.8–3.6 cm, glandular pubescent; seeds flattened, lens-shaped.

Flowering & Fruiting: January–April.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 11.02.2014, AK 59906.

10. *Nelsonia* R. Br.

Nelsonia canescens (Lam.) Spreng., Syst. Veg. 1: 42. 1825. *Justicia canescens* Lam., Tab. Encycl. 1: 41. 1791. *Nelsonia campestris* R. Br., Prodr. 1: 41. 1810; C. B. Clarke in Hook. f., Fl. Brit. India 4: 394. 1885; Prain, Bengal Pl. 2: 797. 1903.

[Plate 166c-d]

Prostrate herb, 10–20 cm high, villous. Leaves dimorphic; petiolate ones elliptic-oblong or suborbicular, 3–10 × 1.5–5 cm, acute to attenuate, entire, obtuse, subcoriaceous, sparsely to densely pilose; sessile ones 1–4 × 0.8–2.5 cm, obtuse or rounded, or else same as petiolate ones. Inflorescence terminal, cylindrical spikes, pilose. Flowers sessile; floral bracts ovate or ovate-elliptic. Calyx cupular; tube 1–1.2 mm; lobes 4, lanceolate, 3–5 × c. 1 mm, acute, 4–5-nerved, one of the lobes larger and bifid, hairy. Corolla pale purple with crimson streaks on upper lip and spots on lower lip; tube c. 1.5 cm; upper lip 2-lobed, lobes oblong-obovate, c. 2 mm; lower lip 3-lobed, glandular hairy at throat, or else same as lobes of upper lip. Stamens 2; filaments c. 5 mm; anthers subglobose. Ovary oblong-ovoid, c. 1.5 mm; style c. 1 mm; stigma unequally 2-lobed. Capsules ovoid-oblong, 4–6 cm, glandular pubescent above; seeds yellow, ellipsoid, tuberculate.

Flowering & Fruiting: January–May.

Distribution. India: Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa Road, 1600ft, 26.02.1934, KPB 1600; Jainti range, 09.02.2010, SKS & GK 46364; SRVK 6, 12.03.2011, GK 50557; Kumargram, 13.02.2012, AK 53005; Newlands, 15.02.2012, AK 53073.

11. *Peristrophe* Nees

Peristrophe speciosa (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3: 113. 1836; C. B. Clarke in Hook. f., Fl. Brit. India 4: 556. 1885. *Justicia speciosa* Roxb., Fl. Ind. 1: 122. 1885.

[Plate 167a; Fig. 77]

Decumbent undershrub, 15–40 cm high. Leaves ovate-elliptic, 5–12 × 3.5–9 mm, cuneate at base, repand and hairy, short acuminate, chartaceous, lineolate, pubescent. Inflorescence axillary, 2–3-flowered cymes. Flowers sessile; floral bracts spatulate; bracteoles linear-lanceolate. Calyx cupular, pubescent; tube 1.2–1.5 mm; lobes 5, linear-lanceolate, c. 2 × 0.5 mm, scarious and ciliate, acute. Corolla pink, pubescent; tube 2–2.3 cm, compressed, curved, rows of hairs inside;

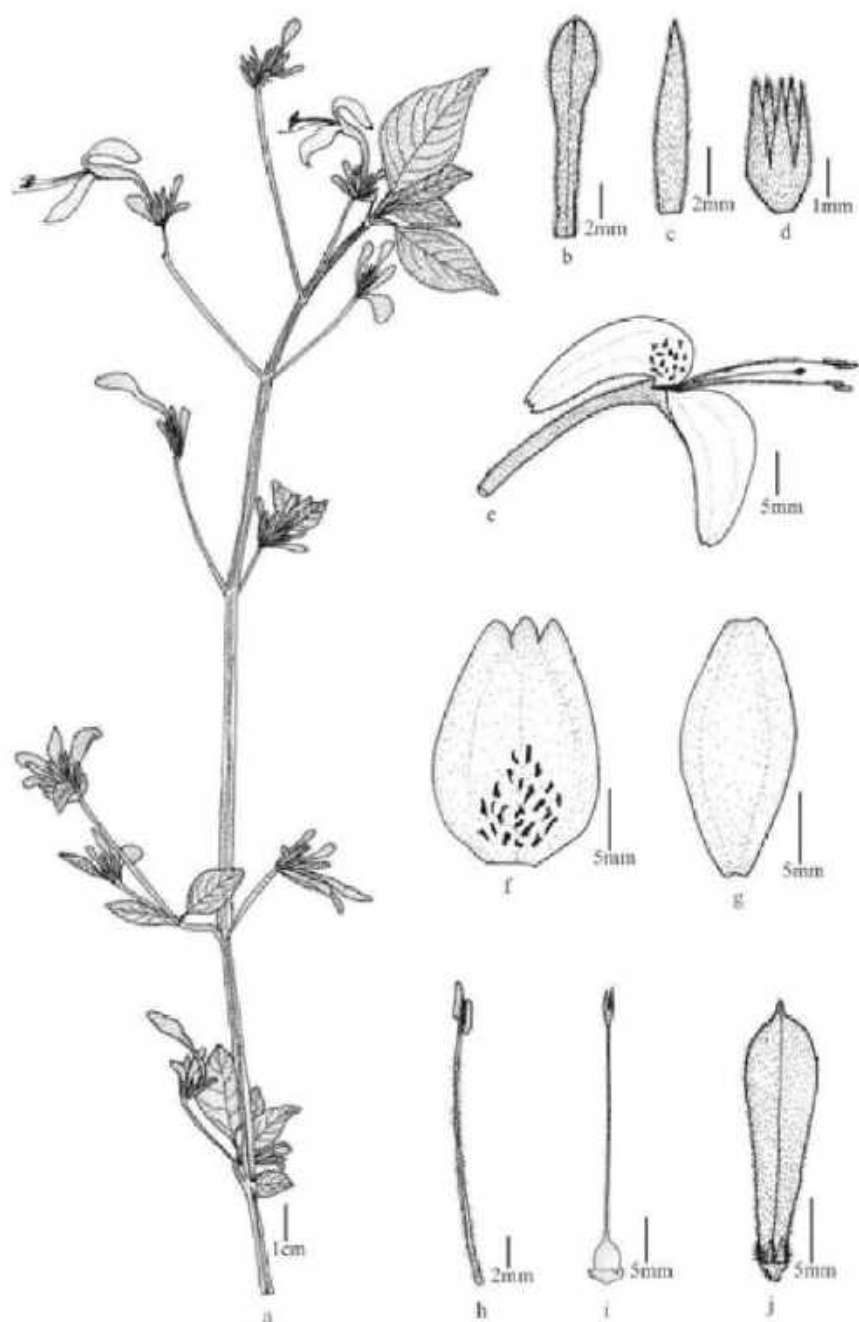


Fig. 77. *Peristrophe speciosa*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Calyx; e. Flower without calyx; f. Upper corolla lobe; g. Lower corolla lobe; h. Stamen; i. Gynoecium with disk; j. Capsule (A.K. 59964).

upper lip with pink spots at centre, ovate-elliptic, 1.8–2 × c. 0.8 cm, shallowly 3-lobed, strongly reflexed; lower lip elliptic, c. 18 × 6–6.5 mm, shallowly 2-lobed. Stamens 2, exserted; filaments 1.5–1.6 cm, retrorsely hairy except apex; anthers linear-oblong, 2.5–3 mm, 2-celled, anther cells unequal. Ovary oblong-lanceolate or cylindric, stipitate, encircled by a disk, sparsely hairy above; style 2.8–3 cm, hairy at base; stigma bifid; disk membranous, c. 1 mm, wavy at rim, notched at one side. Capsules clavate, 1.5–2 cm, apiculate, pubescent; seeds brown, circular, c. 2 mm across.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya and West Bengal.

Specimen examined: Santrabari to Buxaduar, 16.02.2014, AK 59964.

12. *Phaulopsis* Willd.

Phaulopsis imbricata (Forssk.) Sweet, Hort. Brit.: 327. 1827. *Ruellia imbricata* Forssk., Fl. Aegypt.-Arab.: 113. 1775. *Phaulopsis parviflora* Willd., Sp. Pl. 3: 342. 1800; C. B. Clarke in Hook. f., Fl. Brit. India 4: 417. 1885; Prain, Bengal Pl. 2: 806. 1903. [Plate 167b]

Decumbent herb, 60–70 cm high, villous. Leaves unequal in pair, ovate or elliptic, 2.5–7.5 × 1.1–3 cm, attenuate, crenate-dentate, short acuminate, membranous, sparsely appressed hairy. Inflorescence dense terminal spikes. Flowers sessile; floral bracts reniform to orbicular. Calyx divided to base; lobes 5 in 2 whorls, dissimilar, ciliate and glandular hairy; outer ones elliptic-ovate, 4–6 × c. 2 mm; inner series linear-lanceolate, 4–6 × c. 0.5 mm. Corolla white; tube 6–12 mm; upper lip 2-lobed, lobes ovate-oblong, 1–2 × 0.8 mm, obtuse; lower lip 3-lobed, same as upper lobes. Stamens 4; filaments c. 0.5 mm, pubescent; anthers oblong. Ovary ovoid, c. 1 mm, hairy; style c. 2.5 mm, hairy; stigma 2-lobed, unequal. Capsules clavate, shortly stalked, glandular pubescent above; seeds orbicular, subcompressed, hairy.

Flowering & Fruiting: September–December.

Distribution. India: Andaman and Nicobar Islands, Andhra Pradesh, Assam, Chhattisgarh, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Buxa Road, 26.02.1934, KPB 1659; South Rajabhatkhawa, 09.12.1975, JKS 4268; Jainti 5, 09.02.2010, SKS & GK 46360; Newlands, 15.02.2012, AK 53038, 55614.

13. *Phlogacanthus* Nees

Phlogacanthus thyriformis (Roxb. ex Hardw.) Mabb., Taxon 29: 606. 1980. *Justicia thyriformis* Roxb. ex Hardw., Asiat. Res. 6: 349. 1801. *Phlogacanthus*

thrysiflorus (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3: 99. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 512. 1885. [Plate 167c-d]

Chua (N).

Shrub, 2–3 m high. Leaves decussate, crowded near apex, elliptic-obovate to oblanceolate, 17–22 × 4–6 cm, cuneate and decurrent, entire, acute or short acuminate, subcoriaceous. Inflorescence terminal thyrses, tomentose. Flowers sessile; floral bracts linear-subulate. Calyx divided to base; lobes 5, linear-subulate, 6–8 mm, tomentose. Corolla orange yellow to crimson, tubular-campanulate, pubescent; tube 1.5–1.8 cm, hairy at the junction of anthers; upper lip 2-lobed, lobes oblong-ovate, c. 5 × 3–4.5 mm, acute; lower lip 3-lobed, lobes same as upper lip except slightly smaller. Stamens 2, slightly exserted; filaments 1.5–1.7 cm, villous at base, sparsely pubescent; anthers oblong, 3.5–4 mm, spurred at base; staminodes 2. Ovary oblong, c. 4 mm, angled; style 2–2.5 cm; stigma clavate. Capsules nearly clavate or oblanceolate, 2–3 cm; seeds orbicular, strongly compressed, pubescent.

Flowering & Fruiting: February–June.

Distribution. India: Arunachal Pradesh, Bihar, Maharashtra, Sikkim and West Bengal.

Specimens examined: Poro, JKS 776; South Rajabhatkhawa, JKS 4276; Jainti, 09.02.2010, SKS & GK 47003; Newlands, 15.02.2012, AK 55615; Sankosh, 17.02.2012, AK 55666; Bhutanghat, 25.02.2012, AK 55927.

Notes: Leaves and seeds are used in fever. Cooked inflorescences are edible and used as vegetable.

14. *Pseuderanthemum* Radlk. ex Lindau

Pseuderanthemum latifolium (Vahl) B. Hansen, Nordic J. Bot. 9 (2): 213. 1989. *Justicia latifolia* Vahl, Symb. Bot. 2: 4. 1791. *Eranthemum palatiferum* Nees var. *levicapsum* C. B. Clarke in Hook. f., Fl. Brit. India 4: 498. 1884. *Eranthemum palatiferum* var. *elatum* (Kunz) C. B. Clarke in Hook. f., Fl. Brit. India 4: 498. 1884. [Plate 168a]

Undershrub, 30–50 cm high. Leaves elliptic or oblong-elliptic, 7–11.8 × 3–3.5 cm, attenuate, entire, acute, chartaceous, lineolate. Inflorescence of lax terminal and axillary, 5–17 cm long racemes, those in leaf axils shorter and solitary; floral bracts linear. Calyx cupular, divided to base; lobes 5, linear-lanceolate, c. 6 × 0.5 mm, acute, puberulent. Corolla light purple with purple dots on lower lip, finely glandular pubescent; tube 1.5–2.5 cm; upper lip 2-lobed, lobes elliptic-lanceolate, c. 1 cm; lower 3-lobed, middle lobes ovate, obtuse, lateral lobes equal to lobes of lower lip. Stamens 2, included; anthers mucous; staminodes 2. Ovary oblong,

c. 1 mm; style c. 2.3 mm; stigma 2-lobed. Capsules linear-oblong, 2.5–3 cm, pubescent; seeds ovate, c. 4 × 3.5 mm, clothed with silky hairs.

Flowering & Fruiting: December–April.

Distribution. India: Andaman and Nicobar Islands, Arunachal Pradesh, Assam and West Bengal.

Specimens examined: NRVK 4, 05.03.2011, GK 47257; NRVK 6, 29.03.2012, GK 50605.

15. *Strobilanthes* Blume

Key to the species

- | | |
|---|---------------------------|
| 1a. Capsules 16-seeded | 5. <i>S. tomentosa</i> |
| 1b. Capsules 4-seeded | 2 |
| 2a. Flowers in capitate heads; floral bracts suborbicular, deciduous soon | 2. <i>S. pubiflora</i> |
| 2b. Flowers in panicles or spikes; floral bracts not as above | 3 |
| 3a. Inflorescences lax panicles; flowers subsessile, pendant; floral bracts foliaceous, ovate-oblong, acuminate; bracteoles same as floral bracts; corolla usually white; disk absent; style sparsely pubescent | 1. <i>S. hamiltoniana</i> |
| 3b. Inflorescences various, not panicles; flowers sessile, erect; floral bracts not as above; bracteoles dissimilar to floral bracts; corolla pale purple; disk present; style glabrous | 4 |
| 4a. Leaves similar, elliptic; inflorescences small, shortly pedunculate, axillary clusters on main stem and on axillary branchlets, clusters sometimes developing into short 1-sided cymes; floral bracts elliptic-obovate, deciduous, not glandular pubescent; bracteoles linear-spathulate, c. 1.7 cm | 3. <i>S. persicifolia</i> |
| 4b. Leaves dissimilar, smaller ones broadly ovate and larger ones lanceolate to elliptic-ovate; inflorescences axillary spikes; floral bracts obovate to suborbicular, persistent, glandular pubescent; bracteoles oblanceolate, 3–3.5 mm | 4. <i>S. sabiniana</i> |

1. *Strobilanthes hamiltoniana* (Steud.) Bosser & Heine, Bull. Mus. Natl. Hist. Nat., B, Adansonia Sér. 4, 10 (2): 148. 1988. *Ruellia hamiltoniana* Steud., Nomencl. Bot., ed. 2. 2: 481. 1841. *Strobilanthes colorata* T. Anderson, J. Linn. Soc. Bot. 9: 481. 1867; C. B. Clarke in Hook. f., Fl. Brit. India 4: 473. 1885. [Plate 168b]

Erect undershrub, 1–1.5 m high, glabrescent. Leaves usually unequal, ovate or elliptic-lanceolate, 4.5–19 × 2–7 cm, attenuate, crenate-serrate, acuminate, subcoriaceous, lineolate. Inflorescence usually axillary or terminal, lax panicles, glandular pilose. Flowers subsessile, pendant; floral bracts and bracteoles foliaceous, ovate-oblong. Calyx cupular; tube 2–3 mm; lobes 5, linear-oblong, 8–10 × 1.5–2 mm, acute, lineolate, glabrous when young, glandular at maturity. Corolla white, rarely pale purple, tubular-ventricose; tube 2.5–3 cm, hairy inside; lobes 5, orbicular, 8–10 mm across, notched. Stamens 4, didynamous; filaments shorter

pair c. 1 mm, longer ones 7–9 mm; anthers linear-oblong, slightly recurved. Ovary oblong, 2–2.5 mm; style 3.5–3.8 cm, sparsely pubescent, exserted; stigma linear. Capsules oblong, 0.6–1.2 cm; seeds ovate, c. 6 × 5 mm, pilose with mucilaginous hairs.

Flowering & Fruiting: October–April.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Maharashtra, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 46257; Bhutia Pond, 13.02.2010, SKS & GK 47055; Jainti range, 27.11.2011, GK 50600; Pana, 11.02.2013, AK 58853; Buxa Fort to Tashigaon, 01.10.2013, AK 59714; Hatipota, 18.02.2013, AK 59829.

2. *Strobilanthes persicifolia* (Lindl.) J. R. I. Wood, Kew Bull. 64: 28. 2009. *Ruellia persicifolia* Lindl., Bot. Reg.: 11, t. 955. 1826. *Strobilanthes anisophylla* (G. Lodd.) T. Anderson, Cat. Pl. Calcutta: 43. 1865; C. B. Clarke in Hook. f., Fl. Brit. India 4: 462. 1884. [Plate 168c]

Erect undershrub, 30–60 cm high. Leaves strongly unequal (rarely oblong-lanceolate and equal), elliptic, 4.5–22 × 1.8–6.8 cm, attenuate, serrate at margins, acuminate, lineolate above, rounded cystoliths below. Inflorescence shortly pedunculate, axillary clusters on main stem and on axillary branchlets, clusters sometimes developing into short 1-sided cymes, glandular pubescent. Flowers sessile; floral bracts elliptic-obovate; bracteoles linear-spathulate. Calyx divided to base, glandular pubescent; tube c. 1 mm; lobes 5, linear, 7–10 mm, acute. Corolla pale purple, tubular-campanulate, glandular pubescent; tube 3.5–3.8 cm, nerved, hairy inside in narrow part; lobes 5, ovate, c. 4 mm across, notched. Stamens 4, didynamous; filaments c. 2 mm in smaller pair, 5–6 mm in larger pair, white villous at base; anthers subglobose. Ovary oblong-lanceolate, 1.5–2 × 0.5–0.8 mm, surrounded by disk, sparsely hairy; style 3.5–4 cm; stigma linear; disk saucer-shaped. Capsules clavate, 10–13 × 2.2–2.5 mm, glandular hairy; seeds oblong-ovate, 2–2.5 × 1.2–1.5 mm, obtuse, flattened, elastic hairs, punctate at hilum.

Flowering & Fruiting: January–May.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: Way to Buxaduar, JKS 932; Buxa dam, JKS 966; Jainti range, Tashigaon 1, Bhutia Pond, 11.02.2010, SKS & GK 47037; Hauda nala, 19.02.2013, AK 59849; Rovers point to Bhutan Border, 15.02.2014, AK 59959.

3. *Strobilanthes pubiflora* J. R. I. Wood, Edinburgh J. Bot. 51 (2): 254. 1994; J. R. I. Wood in Grierson & D. G. Long, Fl. Bhutan 2 (3): 1265. 2001. [Plate 168d]

Undershrub, up to 1.5 m high. Leaves unequal, elliptic, 5–18 × 2–5.5 cm, attenuate, serrate, shortly acuminate, glabrous. Inflorescence pedunculate, simple or 2–3

forked axillary capitate heads; floral bracts suborbicular, concave; bracteoles absent. Calyx divided to base; lobes 5, linear, 5–7 mm, acute, one longer than others, sticky, glandular pilose. Corolla blue above, white below, tubular-campanulate; tube 3–5 cm, slightly curved, pubescent; lobes 5, ovate, c. 5 × 7 mm, rounded. Stamens 4, didynamous, included; filaments 5–6 mm in longer pair, c. 2 mm in shorter pair, pilose; anthers ellipsoid, c. 1 mm, mucicous. Ovary glandular-puberulent; style c. 3 cm; stigma simple, curved. Capsules clavate, 14–15 mm, glandular pilose near to base; seeds c. 2 mm, with mucilaginous hairs.

Flowering & Fruiting: September–February.

Distribution. India: Manipur, Nagaland, Sikkim and West Bengal.

Specimen examined: Tashigaon to Rovers point, 02.10.2013, AK 59748.

4. *Strobilanthes sabiniana* Nees in Wall., Pl. Asiat. Rar. 3: 86. 1836; C. B. Clarke in Hook. f., Fl. Brit. India 4: 454. 1885. [Plate 169a; Fig. 78]

Suberect undershrub, 40–100 cm high. Leaves unequal and dissimilar, lineolate; smaller ones sessile, broadly ovate, 5–15 × 5–22 mm, cordate, entire, acute; larger ones petiolate, lanceolate to elliptic-ovate, 2.5–13.5 × 0.7–6.1 cm, attenuate at base, entire below and obscurely dentate above, acute to acuminate. Inflorescence axillary spikes, glandular pubescent. Flowers sessile; floral bracts obovate-suborbicular; bracteoles oblanceolate. Calyx divided to base, glandular pubescent; tube c. 1 mm; lobes 5, linear-oblanceolate, c. 5 mm, rounded, glandular pubescent above inside. Corolla pale purple, tubular-campanulate, sparsely glandular pubescent, glabrous later; tube 2–2.4 cm, curved, 2 rows of hairs inside; lobes 5, suborbicular, c. 5 mm across, notched. Stamens 4, didynamous; filaments c. 3 mm in smaller pair, c. 10 mm in larger pair, white villous at base; anthers elliptic, c. 2 mm, mucicous. Ovary oblanceolate, c. 2 mm, stipitate, surrounded by a disk, glandular pubescent; style c. 2 cm; stigma linear; disk saucer-shaped. Capsules clavate, 6–8 × 1.8–2 mm, glandular pubescent; seeds ovate, c. 8 × 6 mm, flattened.

Flowering & Fruiting: January–April.

Distribution. India: Meghalaya and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 11.02.2014, AK 59908.

5. *Strobilanthes tomentosa* (Nees) J. R. I. Wood, Kew Bull. 64 (1): 16. 2009. *Aechmanthera tomentosa* Nees in Wall., Pl. Asiat. Rar. 3: 87. 1832. *Aechmanthera tomentosa* var. *wallichii* C. B. Clarke in Hook. f., Fl. Brit. India 4: 428. 1884.

[Plate 169b-c; Fig. 79]

Undershrub, 20–60 cm high. Leaves isophyllous or anisophyllous, ovate to elliptic-ovate, 4.5–10 × 2–4.3 cm, cuneate, serrate to dentate and puberulent or glandular hairy, acute to acuminate, subcoriaceous, cystoliths present. Inflorescence axillary or clustered on branched panicles form axillary thyrses with a reduced

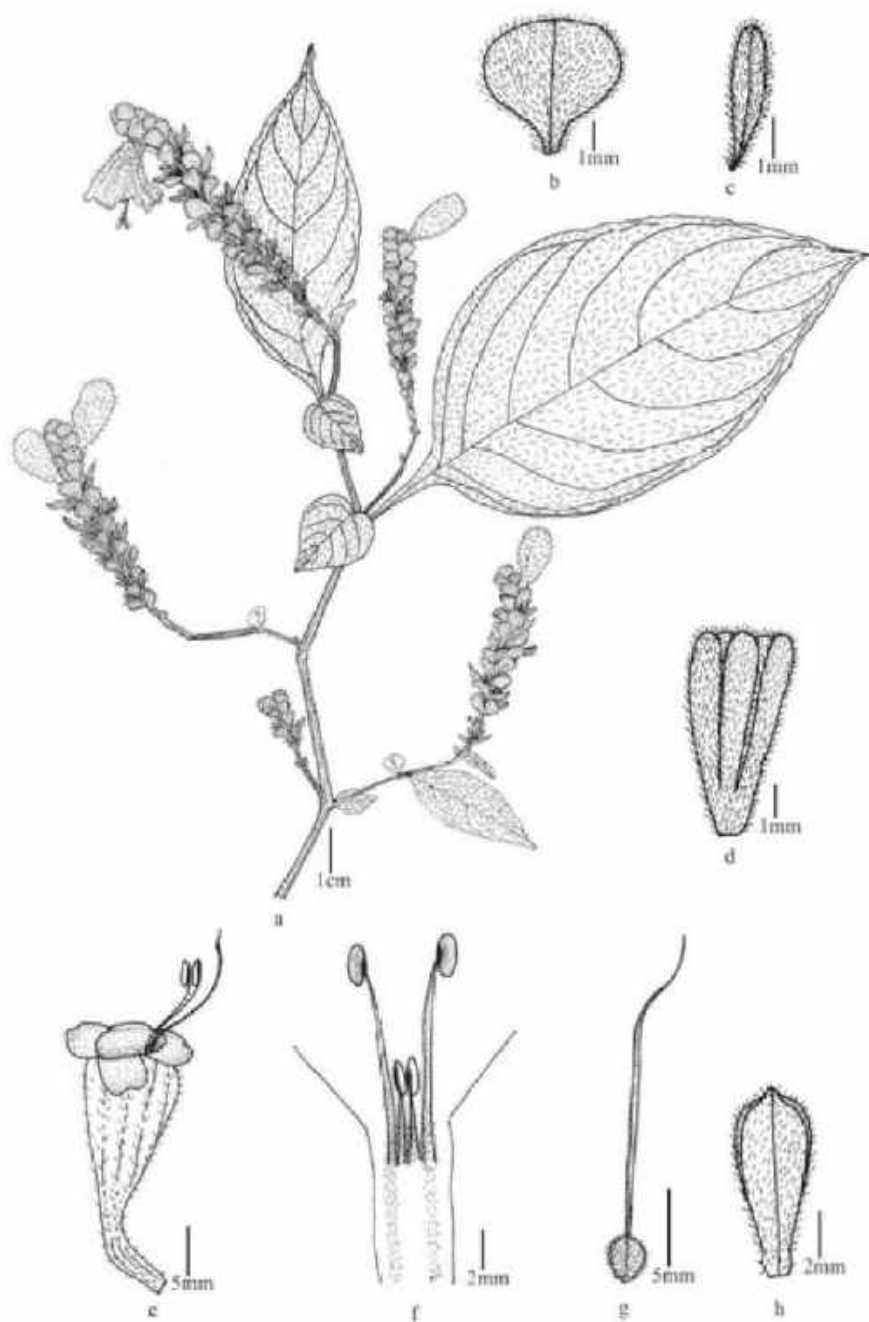


Fig. 78. *Strobilanthes sabiniana*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Calyx; e. Flower without calyx; f. Corolla tube split open showing stamens; g. Gynoecium; h. Capsule (AK 59908).

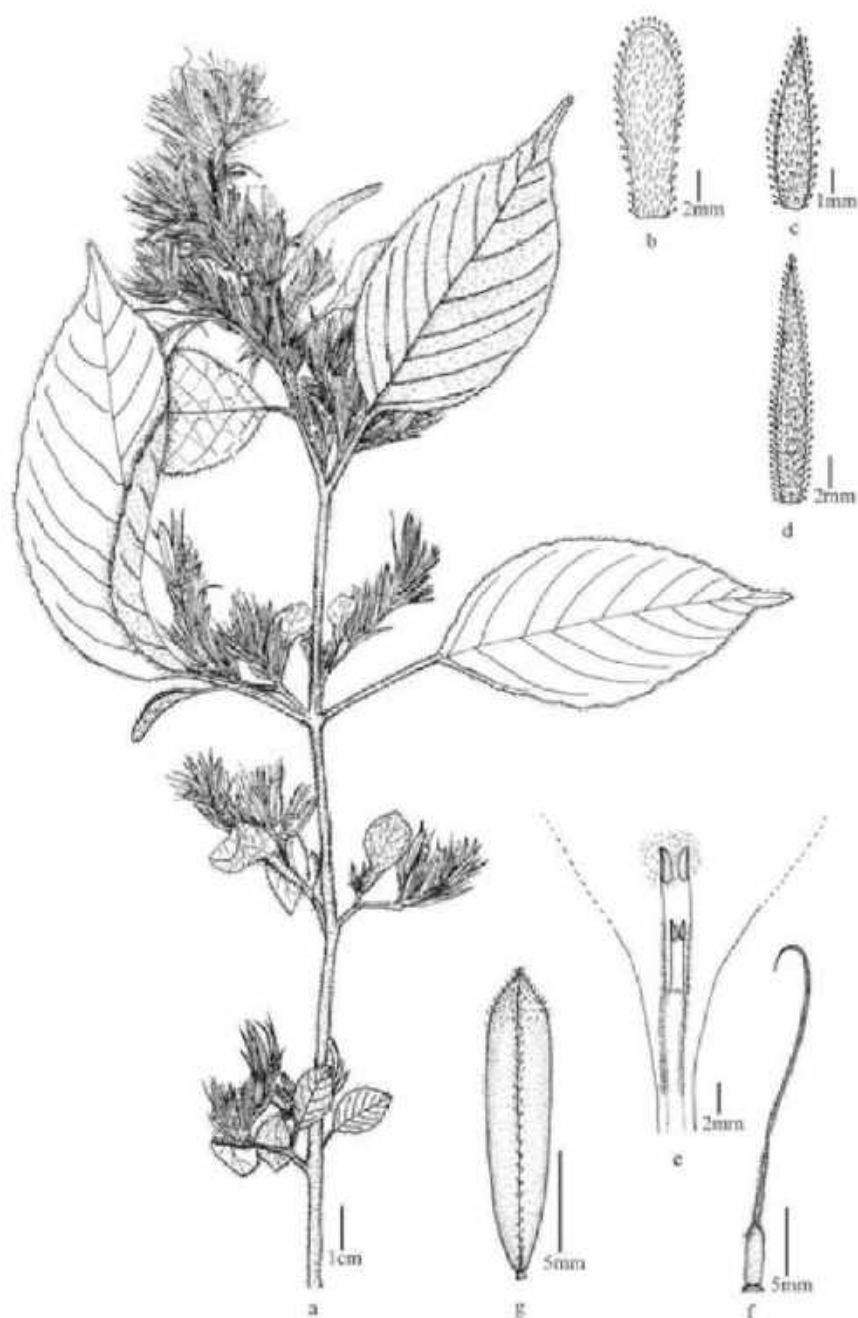


Fig. 79. *Strobilanthes tomentosa*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Calyx lobe; e. Corolla tube split open showing stamens; f. Gynoecium; g. Capsule (AK 59830).

leaf, puberulent to glandular pubescent; floral bracts linear-ligulate; bracteoles linear. Calyx divided to base, glandular hairy to glabrescent; lobes 5, linear, 12–15 × c. 1 mm, acuminate. Corolla blue, infundibular; tube c. 20 mm, vertical line of hairs inside; lobes suborbicular, 4–5 mm across, notched irregularly above, pubescent. Stamens 4; filaments 2–6 mm, pilose at base; anthers sagittate, c. 2.5 mm, connective excurrent. Ovary oblong, 5–6 mm, hairy; style 1.6–2 cm, hairy; stigma linear, hairy. Capsules oblong, c. 15 × 3 mm, stalked, umbonate, grooved, corky, glandular hairy above; seeds brownish, rounded, 1–1.5 mm across, hairy.

Flowering & Fruiting: December–March.

Distribution. India: Assam, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Punjab, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Hatipota, 18.02.2013, AK 59830; Mahakal cave, 20.02.2013, AK 59868; Santrabari to Buxaduar, 16.02.2014, AK 59968.

16. *Thunbergia* Retz.

Key to the species

- 1a. Erect shrubs; leaves pinnately nerved; inflorescence solitary, rarely in pairs; flowers violet; calyx bearing 10–16 subulate teeth 2. *T. erecta*
- 1b. Climbing shrubs; leaves palmately nerved; inflorescences not solitary; flowers white or crimson; calyx reduced to an entire ring 2
- 2a. Branchlets ribbed at edges; leaves not tuberculate above; veins 3–5 from base; flowers crimson, bilabiate; corolla tube crimson inside, not annular hairy above the constriction inside; lobes strongly reflexed; anthers not spurred at base; stigma subclavate; disk present; capsules glabrous 1. *T. coccinea*
- 2b. Branchlets not ribbed at edges; leaves tuberculate above; veins 5–7 from base; flowers white, not distinctly bilabiate; corolla tube yellow inside, annular hairy above the constriction inside; lobes not reflexed; anthers spurred at base; stigma infundibular; disk absent; capsules sparsely nectariferous and pubescent 3. *T. grandiflora*

1. *Thunbergia coccinea* Wall., Tent. Fl. Nep. 1: 48, t. 37. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 394. 1885. [Plate 169d; Fig. 80]

Kanesi (N).

Climbing shrub. Leaves ovate to lanceolate, 8–13.5 × 4–8 cm, rounded to slightly subcordate, undulate or distantly dentate, acuminate, chartaceous, punctate. Inflorescence terminal pendant racemes; floral bracts foliaceous; bracteoles dark red, oblong-ovate, often falcate. Calyx reduced to a minute ring, shallowly lobed. Corolla crimson; tube 1.5–2 cm, compressed, hairs at insertion of filaments; upper lip obovate to suborbicular, c. 1 × 1.5 cm, bifid, strongly reflexed; lower lip 3-lobed, lobes obovate, 5–6 × 6–6.5 mm, narrow at base, strongly reflexed.

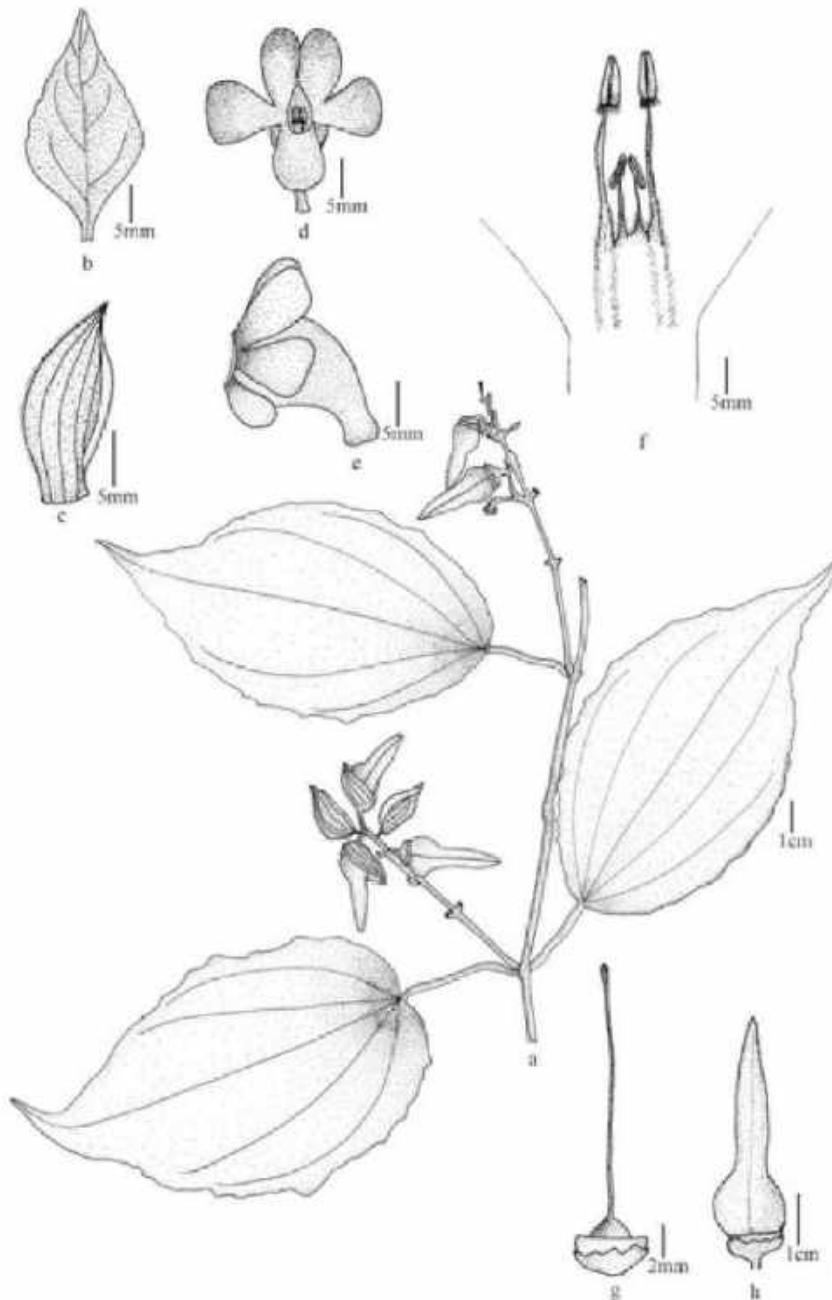


Fig. 80. *Thunbergia coccinea*: a. Fruiting branchlet; b. Floral bract; c. Bracteole; d. Front view of flower; e. Lateral view of corolla; f. Corolla tube split open showing stamens; g. Gynoecium with disc and reduced calyx; h. Capsule with disc and reduced calyx (AK 59963).

Stamens 4, didynamous; filaments 1.5–2 cm, tuft of hairs at base; anthers oblong, 5–7 mm, bearded. Ovary broadly ovoid, c. 2 mm across; style c. 1.5 cm; stigma subclavate; disk cupular, 2–3 mm high. Capsules dagger shaped, 3.7–4.2 cm, basal part subglobose and beaked above; seeds subcircular, c. 7.5 × 6 mm, soft brown scaly.

Flowering & Fruiting: December–April.

Distribution. India: Almost throughout India.

Specimens examined: Jainti hill forest office bungalow, 14.11.1999, AG 20422; Santrabari to Buxaduar, 16.02.2014, AK 59963.

2. *Thunbergia erecta* (Benth.) T. Anderson, J. Proc. Linn. Soc., Bot. 7: 18. 1863. *Meyenia erecta* Benth. in Hook., Niger Fl.: 476. 1849; Prain, Bengal Pl. 2: 593. 1903. [Plate 170a]

Shrub, up to 1 m high. Leaves ovate to rhombic-ovate 2–9 × 1.5–3 cm, cuneate, entire or undulate, acute, subcoriaceous, glabrous. Inflorescence axillary, solitary, rarely paired; bracteoles ovate. Calyx connate below with small annular 10–16 teeth; teeth linear-lanceolate, 1–5 mm, unequal, glandular pubescent. Corolla purple, infundibular; tube yellow within, 2.4–2.6 cm, glandular pubescent; lobes 5, suborbicular, c. 1 cm across, obtuse. Stamens 4; filaments 1–2.3 cm, glandular hairy at base; anthers oblong, 4–6 mm, shortly mucronate, bearded. Ovary c. 3 mm; style c. 3.5 cm; stigma 2-cleft, unequal. Capsules dagger shaped, broad base gradually narrowed or contracted in 1–2 cm woody beak.

Flowering & Fruiting: November–April.

Distribution. India: Widely cultivated throughout the country in gardens, parks as an ornamental and hedge plant.

Specimen examined: Rajabhatkhawa, 02.11.2011, GK 52309.

3. *Thunbergia grandiflora* (Roxb. ex Rottl.) Roxb., Bot. Reg. 6: 6, pl. 495. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 4: 392. 1885; Prain, Bengal Pl. 2: 793. 1903. *Flemingia grandiflora* Roxb. ex Rottl., Neue Schriften Ges. Naturf. Freunde Berlin 4: 202. 1803. [Plate 170b]

Kanesi (N).

Climbing shrub, 6–8 m, pubescent. Leaves ovate-triangular or suborbicular, shallowly or palmately lobed, 9.5–17 × 6–17 cm, cordate, wavy, acuminate, subcoriaceous, tubercled above, punctate. Inflorescence axillary, solitary or paired, sometimes terminal racemes, pubescent; floral bracts linear; bracteoles oblong-elliptic. Calyx reduced to an entire ring. Corolla white, tubular-campanulate; tube yellowish inside, 3–3.5 cm, a ring of hairs above the constriction inside; lobes 5, ovate or suborbicular, 3–4 cm across, rounded. Stamens 4, didynamous; filaments

1.2–1.8 cm; anthers oblong, 8–10 mm, bearded and spurred at base. Ovary 2–3 cm, glabrescent; style 1.5–2.6 cm; stigma infundibular with 2 round lobes. Capsules dagger shaped, subglobose base terminated in long beak, 4–5 cm, sparsely nectariferous and pubescent; seeds subtrigonal, 3–8 mm, flat, soft brown scaly.

Flowering & Fruiting: Throughout the year.

Distribution. India: North Eastern region, and cultivated in the plains throughout the country.

Specimens examined: South Rajabhatkhawa, JKS 4214; Buxaduar, JKS 4653; NRVK 4, 27.11.2011, GK 47142; Jainti 5, 08.10.2009, SKS & GK 46206; Kumargram, Kalikhola river belt, 21.09.2011, AK 52712; Newlands, Sukno river, 22.09.2011, AK 52743, 52797.

Verbenaceae

Key to the genera

- 1a. Branchlets white pubescent; leaves palmately compound, grey tomentose below; petioles and petiolules white pubescent; inflorescences grey pubescent; corolla bluish, white tomentose at throat **9. Vitex**
- 1b. Branchlets not white pubescent; leaves simple, not grey tomentose below; petioles not white pubescent; inflorescences not grey pubescent; corolla variously coloured, white tomentose or not at throat **2**
- 2a. Creeping herbs; stems rooting from prostrate nodes; leaves sessile; inflorescences condensed spikes in globose heads, cylindric later; calyx bilabiate, 4-lobed **6. Phyla**
- 2b. Straggling or erect shrubs or trees; stems not rooting from prostrate nodes; leaves petiolate; inflorescences not condensed spikes in globose heads, nor cylindric; calyx not bilabiate, 5-lobed or entire **3**
- 3a. Branchlets armed; inflorescences pseudombellate or subumbellate spikes; flowers sessile; calyx and corolla lobes with hyaline glands; stamens included **5. Lantana**
- 3b. Branchlets unarmed; inflorescences not pseudombellate or subumbellate spikes; flowers pedicellate; calyx and corolla lobes without hyaline glands; stamens exserted **4**
- 4a. Straggling shrubs; inflorescences cyme-like racemes; calyx red, saucer-shaped; corolla red, infundibular; lower lip 4-lobed **4. Holmskioldia**
- 4b. Erect shrubs (except *Clerodendrum laevifolium*) or trees; inflorescences not cyme-like racemes; calyx not red, cupular or campanulate; corolla not red and infundibular; lower lip not 4-lobed **5**
- 5a. Shrubs **6**
- 5b. Trees **7**
- 6a. Anterior corolla lobe only slightly larger than the others; stamens at throat of corolla tube **2. Clerodendrum**
- 6b. Anterior corolla lobe frequently much larger than the other four; stamens at above middle of corolla tube **8. Rothea**

- 7a. Deciduous trees; leaves broadly ovate, cordate or truncate at base; veins 3 from base; corolla brownish yellow to golden yellow; seeds hollow 3. *Gmelina*
- 7b. Evergreen trees; leaves not broadly ovate, cuneate at base; veins pinnate; corolla pink purple or white; seeds solid 8
- 8a. Branchlets stellate tomentose; leaves repand or crenate at margins, stellate tomentose below; corolla pink purple, campanulate, glabrous at throat inside; stamens at base of corolla tube 1. *Callicarpa*
- 8b. Branchlets puberulous or pubescent; leaves entire throughout or entire at basal part and irregularly serrate upwards at margins, glabrous below; corolla white, bilabiate, tomentose at throat inside; stamens at throat of corolla tube 7. *Premna*

1. *Callicarpa* L.

Key to the species

- 1a. Large trees; leaves repand at margins; pedicels quadrangular; filaments 3–3.2 mm 1. *C. arborea*
- 1b. Small trees or shrubs; leaves crenate at margins; pedicels terete; filaments 4.5–5 mm 2. *C. macrophylla*

1. *Callicarpa arborea* Roxb., Fl. Ind. 1: 405. 1820; C. B. Clarke in Hook. f., Fl. Brit. India 4: 567. 1885; Prain, Bengal Pl. 2: 827. 1903. [Plate 171a]

Bormalla (B); *Guenla*, *Gwelo*, *Guenylo*, *Guenyhlo* (N).

Large tree, 15–20 m high, yellow stellate tomentose. Leaves ovate-elliptic to elliptic-lanceolate, 10–19.5 × 4–9 cm, cuneate, repand, short acuminate, coriaceous, stellate tomentose, with scattered glands below. Inflorescences axillary, pedunculate, lax, rounded cymes, stellate tomentose; inflorescence bracts oblong; floral bracts oblong-lanceolate. Calyx cupular, pubescent; tube c. 1 mm; lobes 4, minute, obtuse. Corolla pink purple, campanulate; tube 1.8–2.2 mm, papillose, glandular inside; lobes 4, ovate to oblong-obovate, c. 1.2 × 1 mm, subacute to rounded, golden yellow glandular, papillose inside. Stamens 4, didynamous, exserted; filaments 3–3.2 mm; anthers elliptic, c. 1.5 mm. Ovary globose, white hairy, with glands; style c. 5 mm, exserted; stigma disciform, bilobed. Drupes black or purple when ripe, subglobose, 2–2.5 mm across; seeds ellipsoid, minute.

Flowering & Fruiting: April–September.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar (?), Chhattisgarh, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimens examined: NRVK 6, 01.12.2011, GK 52301; Panbari 7, 04.12.2011, GK 52339; Newlands, Sukno River, 22.09.2011, AK 52761; Phashkhawa, 27.09.2012, AK 56194; Buxaduar to Achalung, 19.05.2014, AK 62637.

2. *Callicarpa macrophylla* Vahl, Symb. Bot. 3: 13, t. 53. 1794; C. B. Clarke in Hook. f., Fl. Brit. India 4: 568. 1885; Prain, Bengal Pl. 2: 828. 1903. *Callicarpa macrophylla* var. *sinensis* C. B. Clarke in Hook. f., Fl. Brit. India 4: 568. 1885.

[Plate 171b-c]

Small tree or shrub, 5–6 m high, stellate tomentose. Leaves elliptic or elliptic-oblong, 7.5–22 × 2–8.5 cm, cuneate, crenate, acuminate, coriaceous, scabrous above, stellate tomentose below. Inflorescence dense axillary cymes, stellate tomentose; inflorescence bracts oblong; floral bracts oblong-lanceolate. Calyx cupular, stellate tomentose; lobes 4, ovate, c. 1 × 2 mm, acute. Corolla pink purple, tubular-campanulate; tube 2.4–2.6 mm, glandular; lobes 4, oblong-ovate, c. 1 × 0.7 mm. Stamens 4, didynamous, exserted; filaments 4.5–5 mm; anthers elliptic. Ovary globose; style c. 6 mm; stigma disciform, bilobed. Drupes dark brown, globose, c. 1.5 mm across, smooth; seed solitary, minute.

Flowering & Fruiting: June–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Balapara, JKS 4214; SRVK 6, Near 26½ mile watch tower, 13.03.2011, GK 50561; North Rydak, 26.09.2011, AK 52933.

2. *Clerodendrum* L.

Key to the species

- 1a. Scandent shrubs; inflorescences pendulous racemes; corolla lobes one sided; anthers sagittate; stigma subclavate; seeds rugose **7. *C. laevifolium***
- 1b. Erect shrubs or undershrubs; inflorescences not pendulous racemes; corolla lobes spreading; anthers not sagittate; stigma not subclavate; seeds not rugose **2**
- 2a. Corolla lobes 10–15; filaments strap-shaped; ovary rudimentary **2. *C. chinense***
- 2b. Corolla lobes 5; filaments slender; ovary well developed **3**
- 3a. Leaves 3–6 in whorls or opposite, oblong-lanceolate, undulate at margins; petioles 3–4 mm or absent; inflorescences cymes; bracteoles present; corolla tube more than 8 cm **5. *C. indicum***
- 3b. Leaves not in whorls, opposite, ovate to broadly ovate, not undulate at margins; petioles more than 1 cm; inflorescences panicles or corymbs or capitate cymes; bracteoles absent; corolla tube less than 8 cm **4**
- 4a. Inflorescences capitate cymes **1. *C. bracteatum***
- 4b. Inflorescences panicles or corymbs **5**
- 5a. Branchlets rusty tomentose; veins pinnate; inflorescences red villous; pedicels red tomentose; filaments hairy at base **3. *C. cordatum***

- 5b. Branchlets hirsute or glabrescent; veins palmate; inflorescences not red villous; pedicels not red tomentose; filaments glabrous 6
- 6a. Branchlets not sulcate, hirsute; leaves entire at margins, glabrous above; veins 3 from base; inflorescences green, corymbs; calyx lobes usually with large glands, hirsute; corolla white; seeds granular 4. *C. glandulosum*
- 6b. Branchlets sulcate, glabrescent; leaves denticulate at margins, appressed pubescent above; veins 5-7 from base; inflorescences scarlet, panicles; calyx lobes without large glands, glandular pubescent; corolla scarlet; seeds not granular 6. *C. japonicum*

1. *Clerodendrum bracteatum* Wall. ex Walp., Repert. Bot. Syst. 4: 106. 1845; C. B. Clarke in Hook. f., Fl. Brit. India 4: 593. 1885.

Chitu (N).

Shrub, 1-1.5 m high, pubescent. Leaves ovate to broadly ovate, 6-18.5 × 4.5-11.5 cm, rounded or truncate, entire or subentire, acute, coriaceous, hispid above, hispid and yellow gland-dotted beneath. Inflorescence axillary, bearing 1-3 capitate cymes; inflorescence bracts elliptic-ovate. Calyx red, campanulate; tube c. 5 mm; lobes 5, ovate-lanceolate, c. 11 × 5 mm, acuminate, membranous. Corolla white, salver-shaped; tube 1-2.5 cm, puberulent mixed with glandular hairs; lobes 5, elliptic or obovate, 6-8 × c. 3 mm, obtuse. Stamens 4, didynamous; filaments slender, exerted; anthers purple, turning brown. Drupes subglobose, c. 6 mm across, enclosed in calyx cup.

Flowering & Fruiting: July-November.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and West Bengal.

Specimen examined: Jainti, 09.10.2009, SKS & GK 46279.

2. *Clerodendrum chinense* (Osbeck) Mabb., Pl-Book: 707. 1989. *Cryptanthus chinensis* Osbeck, Dagb. Ostind. Resa: 215. 1757. *Clerodendrum fragrans* (Vent.) R. Br. in W. T. Aiton, Hort. Kew. 4: 63. 1812, *nom. illeg.*; C. B. Clarke in Hook. f., Fl. Brit. India 4: 589. 1885; Prain, Bengal Pl. 2: 835. 1903. [Plate 171d]

Undershrub, 50-70 cm high, pubescent. Leaves ovate, 9-14.8 × 9-11 cm, subcordate or truncate, irregularly dentate, acute, subcoriaceous, pubescent. Inflorescence dense, terminal corymbs, hirsute; inflorescence bracts leafy, ovate. Flowers fragrant. Calyx campanulate; tube 3-4 mm; lobes 5, lanceolate, c. 5 × 2.2 mm, acute, puberulous. Corolla white or pinkish, subcampanulate; tube 1.2-1.3 cm; lobes 10-15, obovate or orbicular, 12-14 × 8-10 mm, rounded. Stamens 4, didynamous, sometimes all sterile; filaments strap-shaped, 1.5-2.5 cm, exerted; anthers linear-oblong, 2-3 mm. Ovary rudimentary; style greenish, 1-1.2 cm, twisted; stigma bifid. Fruits not seen.

Flowering: September-October.

Distribution. India: Arunachal Pradesh, Assam (?), Manipur (?), Meghalaya, Nagaland and West Bengal.

Specimens examined: Chunabhati, JKS 995; Buxaduar, JKS 4026; Chunabhati, 1100m, s. d., JKS 4591; Jainti range, 08.10.2009, SKS & GK 46237; North rydak, 26.09.2011, AK 52931.

3. *Clerodendrum cordatum* D Don, Prodr. Fl. Nepal.: 103. 1825. *Clerodendrum viscosum* Vent., Jard. Malmaison: t. 25. 1803, *nom. illeg.* *Clerodendrum infortunatum* auct. non L. 1753: C. B. Clarke in Hook. f., Fl. Brit. India 4: 594. 1885; Prain, Bengal Pl. 2: 835. 1903. [Plate 172a]

Bhant, Ghentu (B).

Shrub, 1.5–2 m high, rusty tomentose. Leaves ovate, 6–18 × 5.5–13.5 cm, truncate to subcordate, serrate-dentate, acute, subcoriaceous, hispid, gland-dotted below. Inflorescence terminal panicles of trichotomously branched cymes, red villous; inflorescence bracts leafy, ovate-lanceolate; floral bracts ovate. Calyx campanulate; tube short; lobes 5, oblong-ovate, c. 1.1 × 0.7 cm, acute, gland-dotted, villous. Corolla white with flushed red at centre, salver-shaped; tube c. 6 mm, tomentose; lobes 5, slightly obliquely oblong-elliptic, 7–8 × 4–5 mm, obtuse, hairy. Stamens 4, didynamous; filaments 2.8–3 cm, hairy at base, exserted; anthers oblong, c. 2.5 mm. Ovary c. 2 mm across; style c. 2 cm; stigma bifid. Drupes black, subglobose, 1–4-lobed, 8–10 mm across, subtended by red calyx.

Flowering & Fruiting: January–May.

Distribution. India: Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram (?), Nagaland (?), Odisha, Punjab, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Way to Buxaduar, JKS 4614; NRVK 6, 29.03.2012, GK 50621; Kumargram, 13.02.2012, AK 53020; Sankosh, 17.02.2012, AK 55649.

4. *Clerodendrum glandulosum* Lindl., Edwards's Bot. Reg. 30: t. 19. 1844. *Clerodendrum colebrookianum* Walp., Repert. Bot. Syst. 4: 114. 1845; C. B. Clarke in Hook. f., Fl. Brit. India 4: 594. 1885. [Plate 172b; Fig. 81]

Boka kane, Bankar (N).

Shrub, 2–3 m high, hirsute. Leaves broadly ovate, 5.5–22 × 5.6–16 cm, cordate or subtruncate, entire and hirsute, acuminate, subcoriaceous, sparsely gland-dotted. Inflorescence axillary or terminal corymbs, hirsute; inflorescence bracts oblanceolate. Flowers fragrant; floral bracts linear. Calyx cupular, glands present or absent; tube 2–2.2 mm, hirsute; lobes 5, triangular-lanceolate, 1.2–1.5 × 1–1.2 mm, acute, hirsute. Corolla white, salver-shaped; tube 1.8–2.2 cm; lobes 5, obovate, 3.5–4 × c. 2 mm, rounded with apiculate tip, reflexed and hirsute, one of the lobes larger with acute to subacute apex, hirsute. Stamens 4, exserted; filaments 1.5–1.8 cm; anthers elliptic, c. 2 mm. Ovary subglobose, 4-lobed above;

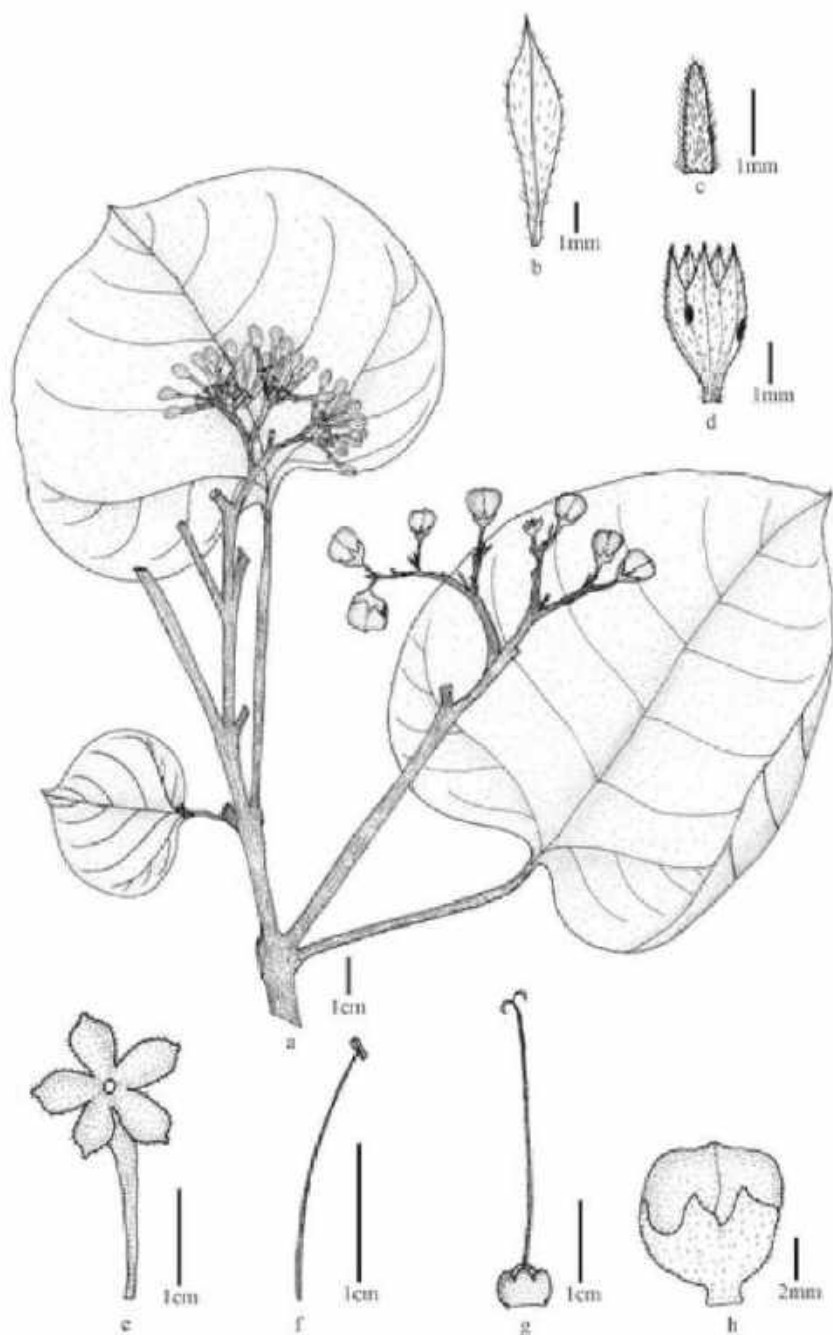


Fig. 81. *Clerodendrum glandulosum*: a. Flowering branchlet; b. Inflorescence bract; c. Floral bract; d. Calyx; e. Corolla; f. Stamen; g. Gynoecium with disk; h. Drupe (AK 59637).

style 3.4–3.6 cm, exserted; stigma bifid. Drupes subglobose, 6–6.5 × 7.5–8.5 mm, faintly 4-lobed, sometimes lobes aborted; seeds asymmetrically lanceolate, c. 5 × 2.8 mm, compressed, granular.

Flowering & Fruiting: August–November.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Buxa Fort to Achalung, 29.09.2013, AK 59637; Tashigaon to Rovers point, 03.10.2013, AK 59759.

5. *Clerodendrum indicum* (L.) Kuntze, Revis. Gen. Pl. 2: 586. 1891. *Siphonanthus indicus* L., Sp. Pl. 1: 109. 1753. *Clerodendrum siphonanthus* R. Br. in W. T. Aiton, Hort. Kew. 4: 65. 1812, *nom. illeg.*; C. B. Clarke in Hook. f., Fl. Brit. India 4: 595. 1885; Prain, Bengal Pl. 2: 836. 1903. [Plate 172c, 173a]

Bamunhatti (B).

Shrub, 1.5–2 m high, puberulent. Leaves 3–6 in whorls or opposite, oblong-lanceolate, 9.5–25.5 × 0.7–1.6 cm, cuneate, undulate, acute with mucro at apex, coriaceous, gland-dotted. Inflorescence axillary, 3–7-flowered, pedunculate cymes; inflorescence bracts leafy, linear, elliptic to oblong-lanceolate; floral bracts and bracteoles linear-lanceolate. Calyx cupular; tube 3–5 mm; lobes 5, ovate, c. 8 × 4 mm, acute, gland-dotted inside. Corolla white, salver-shaped; tube 8–8.5 cm, glandular pubescent; lobes 5, obovate, c. 9 × 4 mm, obtuse. Stamens 4, didynamous; filaments red, c. 3.5 cm, exserted; anthers oblong, c. 2.5 mm. Ovary globose, 4-lobed; style 1.2–1.5 cm; stigma bifid. Drupes dark blue, globose, 8–15 mm across, unlobed or 2–4-lobed; seeds solitary in each lobes, elliptic-lanceolate, c. 5 × 3 mm, compressed.

Flowering & Fruiting: August–February.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jammu & Kashmir (?), Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh (?) and West Bengal.

Specimens examined: South Rajabhatkhawa, JKS 4260; Panbari 3, 01.12.2011, GK 47179; Kumargram, 18.02.2012, AK 55729.

6. *Clerodendrum japonicum* (Thunb.) Sweet, Hort. Brit.: 822. 1826. *Volkameria japonica* Thunb. in Murray, Syst. Veg., ed. 14. 578. 1984. [Plate 173b]

Asare (N).

Shrub, 1.5–2 m high. Leaves ovate to broadly ovate, 12.5–17.5 × 6.9–14 cm, cordate, denticulate, short acuminate, coriaceous, appressed hairy above, sparsely appressed hairy and dense minute glands below. Inflorescence scarlet, terminal panicles of branched cymes, pubescent; inflorescence bracts foliaceous, ovate; floral bracts linear or subulate. Calyx campanulate; tube 3–4 mm; lobes 5, ovate,

c. 5 × 3 mm, acute, glandular pubescent. Corolla scarlet, salver-shaped; tube 1–1.8 cm, pubescent; lobes 5, obovate or spatulate-oblong, c. 8 × 5 mm, obtuse, pubescent. Stamens 4, didynamous; filaments 2–3 cm, exserted; anthers oblong, c. 3 mm. Ovary globose, c. 5 mm across; style 2–3 cm; stigma bifid. Drupes bluish black, globose, 8–10 mm across, enclosed in persistent calyx; seeds solitary, globose.

Flowering & Fruiting: March–September.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Manipur, Sikkim and West Bengal.

Specimens examined: Tashigaon 1, 12.10.2009, SKS & GK 46335; Chumiajhora, 28.09.2012, AK 58502.

7. *Clerodendrum laevifolium* Blume, Bijdr. Fl. Ned. Ind. 14: 808. 1826. *Clerodendrum nutans* Wall. ex D. Don, Prodr. Fl. Nepal.: 103. 1825, non Jack 1812; C. B. Clarke in Hook. f., Fl. Brit. India 4: 591. 1885; Prain, Bengal Pl. 2: 835. 1903. [Plate 173c; Fig. 82]

Scandent shrub, 2–3 m. Leaves elliptic-lanceolate or oblong-lanceolate, 6.2–14 × 2.3–3.8 cm, cuneate, slightly repand or entire, acuminate, subcoriaceous, gland-dotted below. Inflorescence terminal, pendulous racemes; inflorescence bracts foliaceous, linear-lanceolate; floral bracts linear. Calyx cupular, 5-angled, gland-dotted; tube 1.5–3 mm; lobes 5, ovate-lanceolate, 5–7 × 3–3.5 mm, ciliate, acute. Corolla white, tubular; tube 1–1.2 cm, hirsute; lobes 5, obovate, 10–12 × c. 6 mm, one sided, ciliate, obtuse, hirsute with glands, sparsely near margins inside. Stamens 4, didynamous, strongly exserted; filaments 3–3.3 cm; anthers sagittate, c. 3 mm. Ovary subglobose, c. 2 mm across, slightly 4-lobed above; style c. 3.5 cm, exserted; stigma subclavate, bilobed. Drupes dark purple or black when ripe, globose, 8–10 mm across, usually faintly 4-lobed, sometimes few lobes aborted, juicy; seeds ovate-lanceolate, 4–5 × c. 2.5 mm, acute, compressed, rugose.

Flowering & Fruiting: August–February.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Buxaduar, JKS 981; Buxa-Chunabhati, JKS 989; Buxa Fort to Chunabhati, 30.09.2013, AK 59691; Buxaduar to Tashigaon, 11.02.2014, AK 59911.

3. *Gmelina* L.

Gmelina arborea Roxb., Hort. Bengal.: 46. 1814; C. B. Clarke in Hook. f., Fl. Brit. India 4: 581. 1885. *Gmelina arborea* (Roxb.) Roth var. *glauscescens* C. B. Clarke in Hook. f., Fl. Brit. India 4: 582. 1885. [Plate 173d]

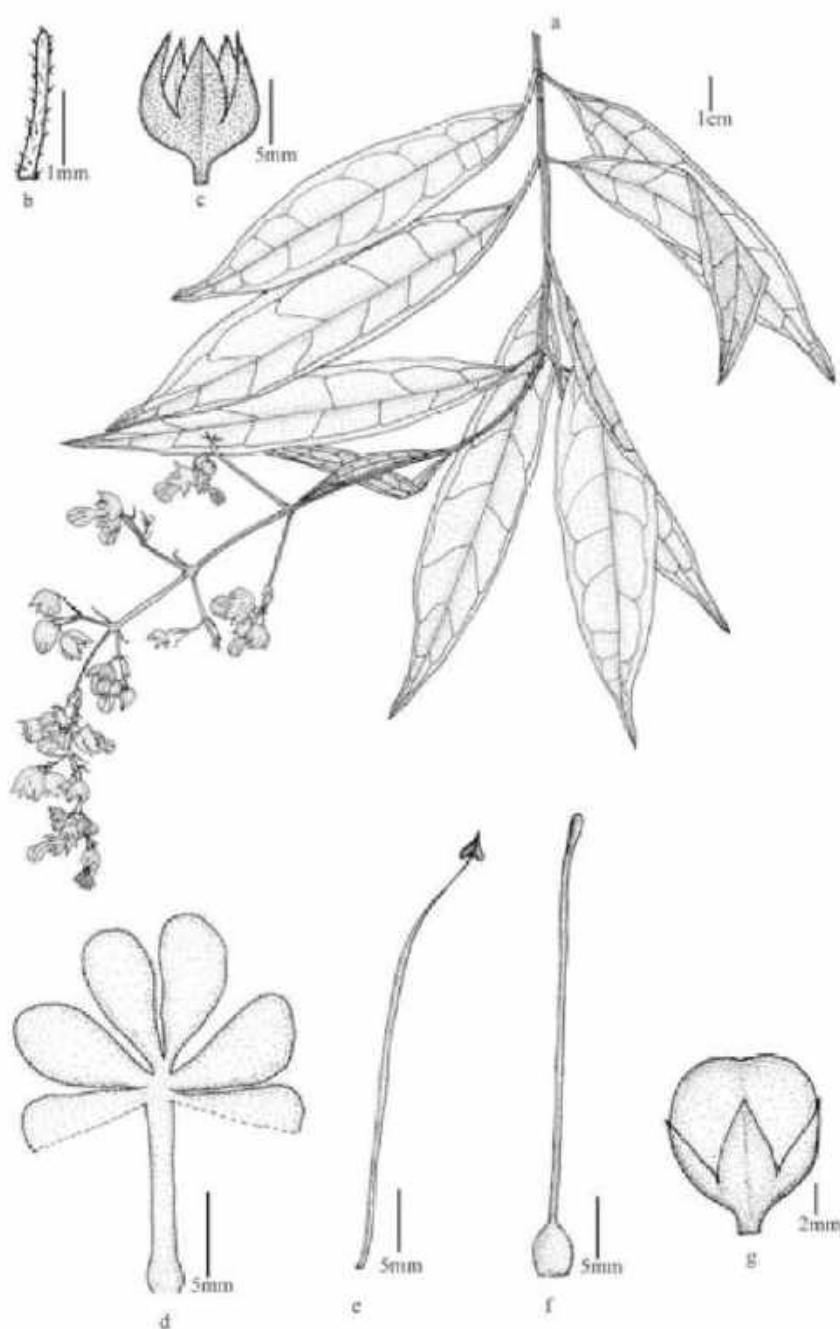


Fig. 82. *Clerodendrum laevifolium*: a. Flowering branchlet; b. Floral bract; c. Calyx; d. Corolla split open; e. Stamen; f. Gynoecium; g. Drupe with persistent calyx (AK 59691).

Gambar (B); *Khamari*, *Gamar*, *Gammari* (N).

Deciduous tree, 10–15 m high. Leaves ovate, 10–14 × 10–11.2 cm, cordate or truncate, entire, short acuminate, coriaceous, tomentose above when young, fulvous-tomentose below. Inflorescence terminal and axillary, composed of cymes; inflorescence bracts linear or lanceolate. Calyx campanulate; tube c. 5 mm, hairy; lobes minute. Corolla brownish yellow to golden yellow, obliquely bilipped; tube c. 1 cm, densely pubescent; upper lip 2-lobed, lobes ovate or oblong, c. 1.5 × 1 mm; lower lip 3-lobed; mid lobe ovate, c. 2 × 1.5 cm, projecting forward, crenulate; lateral lobes ovate, c. 1.5 × 1 cm, acuminate. Stamens 4, didynamous; filaments 0.5–1.5 cm, exerted; anthers oblong, c. 3 mm. Ovary subglobose, c. 4 × 3 mm; style c. 2 cm; stigma unequally bifid. Drupes orange yellow, obovoid or pyriform, 2–2.5 cm; seeds hollow, open at one side.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Poro, BK 450; Panbari 6, 31.03.2012, GK 50700; Newlands, 15.02.2012, AK 53047.

Notes: Twigs and stem bark used as fodder.

4. *Holmskioldia* Retz.

Holmskioldia sanguinea Retz., *Observ. Bot.* 6: 31. 1791; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 596. 1885; Prain, *Bengal Pl.* 2: 836. 1903. [Fig. 83a-d]

Aputo, *Hare lahara*, *Katli lahara* (N).

Straggling shrub, 10–15 m, puberulous. Leaves ovate, 4.5–7 × 2.8–3.5 cm, cuneate or rounded, crenate, short acuminate, thinly coriaceous, puberulous. Inflorescence axillary and terminal, cymose racemes; inflorescence bracts leafy, ovate. Calyx scarlet, saucer-shaped, c. 2.5 cm, 5-lobed or entire above, glandular pubescent. Corolla red to scarlet, infundibular; tube cylindric, c. 2.5 cm, curved, glandular pubescent; upper lip ovate, 3–4 mm, subacute; lower lip 4-lobed, lobes subcircular, 1–2 × 1 mm, obtuse. Stamens 4, didynamous; filaments c. 2 cm, exerted, pubescent; anthers ovate, 1–2 mm. Ovary conical, c. 4 × 3 mm; style c. 2.3 cm; stigma shortly bifid. Drupes obovoid or subglobose, c. 10 × 8 mm, 4-lobed; seeds oblong, rugose.

Flowering & Fruiting: October–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Gujarat, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Meghalaya, Nagaland, Odisha (cultivated), Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

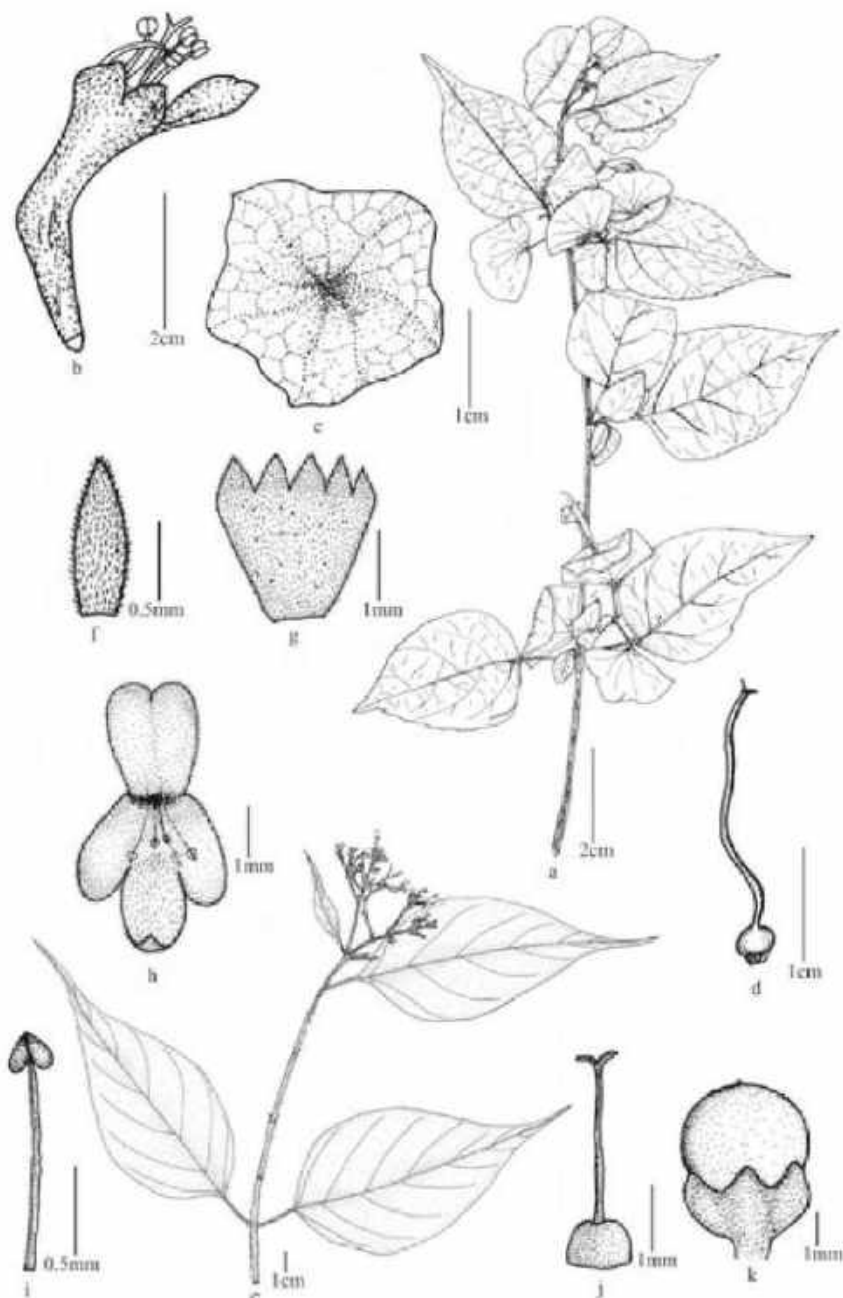


Fig. 83. *Holmskioldia sanguinea*: a. Flowering branchlet; b. Flower without calyx; c. Calyx; d. Gynoecium (GK 47205); *Premna mollissima*: e. Flowering branchlet; f. Floral bract; g. Calyx split open; h. Corolla showing stamens; i. Stamen; j. Gynoecium; k. Drupe with calyx (AK 52871).

Specimens examined: Santrabari, 26.11.1975, JKS 933; Tashigaon, 30.11.1975, JKS 4067; Bhutanghat, 02.12.1975, JKS 4114; Jainti river, 03.03.2011, GK 47205; Panbari 8, 27.11.2011, GK 50595; Bhutanghat, 25.02.2012, AK 55932; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58583.

5. *Lantana* L.

Lantana camara L., Sp. Pl. 2: 627. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 562. 1885; Prain, Bengal Pl. 2: 825. 1903.

Barra mase (N).

Shrub, 1.5–2 m high, armed, hispid. Leaves ovate, 1–4.7 × 0.6–3.4 cm, attenuate, serrate, acute, coriaceous, puberulous. Inflorescence axillary and terminal, pedunculate, pseudoumbellate or subumbellate spikes. Flowers sessile; floral bracts linear-lanceolate. Calyx cupular; tube c. 1.5 mm, hispid, with hyaline glands; lobes 5, triangular. Corolla orange to red, whitish with pink hue, tubular-campanulate; tube 7–8 mm, curved, pubescent; upper lip 2-lobed, lobes subcircular; lower lip 3-lobed; mid lobe subcircular, c. 4 × 3 mm, recurved; lateral lobes obtuse, c. 2 × 1 mm, hispid, with hyaline glands. Stamens 4, didynamous, included; filaments c. 1 mm; anthers ovoid. Ovary ovate-oblong; style minute; stigma obliquely subcapitate. Drupes black, globose, c. 5 mm across, fleshy; seeds small.

Flowering & Fruiting: Throughout the year.

Distribution. India: Throughout India.

Specimens examined: Way to Buxaduar, JKS 925; Buxaduar, JKS 4611; Rajabhatkhawa range, 09.10.2009, SKS & GK 46278; Rydak river belt, 20.09.2011, AK 52679; Newlands, Sukno river, 22.09.2011, AK 52782.

6. *Phyla* Lour.

Phyla nodiflora (L.) Greene, Pittonia 4: 46. 1899. *Verbena nodiflora* L., Sp. Pl. 1: 20. 1753. *Lippia nodiflora* (L.) Michx., Fl. Bor.-Amer. 2: 15. 1815; C. B. Clarke in Hook. f., Fl. Brit. India 4: 563. 1885; Prain, Bengal Pl. 2: 825. 1903. [Plate 174a]

Bhui-okra (H, B).

Creeping herb, 10–15 cm. Leaves sessile, obovate-oblong, 1–2.3 × 0.4–0.6 cm, cuneate or attenuate, serrate, acute, subcoriaceous, scabrid. Inflorescence axillary, solitary or in pairs, pedunculate, condensed spikes in globose heads, cylindrical later, hairy. Flowers sessile. Calyx bilipped, 4-lobed; lobes rhomboid, c. 3 × 2.8–3 mm, acute. Corolla creamy white; tube c. 2.5 cm, slightly curved; upper lip 2-lobed; lobes slightly wider, oblique; lower lip 3-lobed; lobes ovate, acute, mid lobe bigger than lateral ones. Stamens 4, didynamous, at base of corolla tube, subsessile; anthers ovate. Ovary ovoid, c. 1.5 × 1.3 mm, 2-lobed; style minute, slightly curved; stigma obliquely subcapitate, hairy. Drupes subglobose, 1–2 mm across, compressed, calyx persistent; seeds minute.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India except North Eastern regions.

Specimens examined: South Diana, 27.05.1975, JKS 376; Jainti 3, 07.04.2012, GK 56051; Rydak river belt, 20.09.2011, AK 52660; Rydak river belt, 20.09.2011, AK 52698; Hauda nala, 03.10.2012, AK 58671.

7. *Premna* L.

Key to the species

- 1a. Leaf margins entire at base and irregularly serrate upwards; veins palmately 3–5 from base; calyx and corolla 4-lobed; drupes obovoid 1. *P. barbata*
- 1b. Leaf margins entire throughout; veins pinnate; calyx and corolla 5-lobed; drupes globose 2. *P. mollissima*

1. *Premna barbata* Wall. ex Voigt, Hort. Suburb. Calcutt.: 468. 1845; C. B. Clarke in Hook. f., Fl. Brit. India 4: 579. 1885; Prain, Bengal Pl. 2: 831. 1903.

[Plate 174b-c]

Gineri (N).

Deciduous, small tree, 5–7 m high, pubescent, glabrous later. Leaves ovate to elliptic-lanceolate, 4–15 × 2–6 cm, cuneate, rounded or shallowly cordate, irregularly serrate above upper half, acuminate to caudate, membranous, pubescent. Inflorescence terminal corymbs, pubescent. Calyx cupular; tube c. 2 mm; lobes 4, oblong, c. 1 mm, rounded, pubescent. Corolla greenish-white, infundibular; tube 1.5–2 mm, pubescent at throat; lobes 4, oblong or obovate, 2.5–3 mm, obtuse. Stamens 4, rarely 5, didynamous, exserted; filaments cylindric, 1.5–2 mm; anthers globose. Ovary obovoid, c. 1 mm across; style slender, 3–4 mm; stigma distinctly bifid. Drupes reddish, black when ripe, obovoid, 5–6 mm across, smooth.

Flowering & Fruiting: April–June.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Chhatisgarh, Himachal Pradesh, Jammu & Kashmir (?), Jharkhand, Madhya Pradesh, Meghalaya, Mizoram, Odisha, Sikkim, Tamil Nadu (?), Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Chunabhati, 21.05.2013, AK 55928.

2. *Premna mollissima* Roth, Nov. Pl. Sp.: 286. 1821. *Premna latifolia* Roxb., Fl. Ind. 3: 76. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 4: 577. 1885; Prain, Bengal Pl. 2: 831. 1903. *Premna latifolia* var. *mollissima* (Roxb.) C. B. Clarke in Hook. f., Fl. Brit. India 4: 578. 1885. *Premna latifolia* var. *mucronata* (Roxb.) C. B. Clarke in Hook. f., Fl. Brit. India 4: 578. 1885; Prain, Bengal Pl. 2: 831. 1903. *Premna latifolia* var. *viburnoides* (Wall. ex Schauer) C. B. Clarke in Hook. f., Fl. Brit. India 4: 578. 1885. [Plate 174d, 175a; Fig. 83e-k]

Gineri (N).

Small tree, 7–10 m high, puberulous, glabrous later. Leaves ovate to elliptic-ovate, 6.5–14.5 × 4–6.7 cm, cuneate, entire, acuminate to cuspidate, membranous. Inflorescence terminal panicles, pubescent; inflorescence and floral bracts lanceolate. Calyx cupular, pubescent; tube 1.5–1.8 mm; lobes 5, triangular, c. 0.5 mm across, ciliate, acute, gland-dotted. Corolla white, infundibuliform, puberulous; tube 1–2.2 mm, tomentose at throat; upper lip 2-lobed, 1–1.5 × c. 1.5 mm; lower lip 3-lobed, unequal; lateral lobes rounded or obovate, c. 1 mm across; mid lobe ovate, c. 1 × 1.5 mm, hooded, pubescent inside. Stamens 4, didynamous; filaments 1–1.2 mm; anthers ovoid. Ovary subglobose; style 2–2.5 mm; stigma bifid. Drupes black when ripe, globose, 3–3.5 mm across, umbonate, smooth, tuberculate and stony when dry; seeds brownish, ellipsoid, 1.2–1.5 × 0.5–0.6 mm.

Flowering & Fruiting: September–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Sikkim (?), Tamil Nadu, Telangana, Tripura, Uttar Pradesh (?), Uttarakhand and West Bengal.

Specimens examined: Kumargram, 19.09.2011, AK 52628; Marakata, 24.09.2011, AK 52871.

8. *Rothea* Raf.

Rothea serrata (L.) Steane & Mabb., Novon 8: 206. 1998. *Volkameria serrata* L., Mant. Pl.: 90. 1767. *Clerodendrum serratum* (L.) Moon, Cat. Pl. Ceylon: 46. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 4: 592. 1885; Prain, Bengal Pl. 2: 835. 1903. *Clerodendrum serratum* var. *wallichii* C. B. Clarke in Hook. f., Fl. Brit. India 4: 592. 1885. [Plate 175b]

Andekhi (N).

Shrub, 2–3 m high, puberulous to pubescent, glabrous later. Leave oblanceolate to lanceolate or elliptic-obovate, 1.3–5.3 × 0.6–2 cm, attenuate, serrate, acuminate, subcoriaceous, puberulous, brown glandular below. Inflorescence axillary, terminal panicles, pubescent; inflorescence and floral bracts lanceolate. Calyx cupular, pubescent; tube c. 2 mm; lobes truncate to shallowly or distinctly lobed, if lobed then 5 or 6, equal or sometimes unequal, triangular-lanceolate, 2–3 × c. 1 mm, acute. Corolla pale purple to creamy white, pubescent; tube 3.5–4 mm, hairy at insertion of filaments inside; upper lip 3-lobed, unequal; lateral lobes obovate, c. 5 × 3.5 mm; mid lobe oblong-obovate, 10–12 × 4–7 mm, notched; lower lip 2-lobed, obovate, 6–8 × 3–3.5 mm. Stamens 4, didynamous, exserted; filaments 18–20 mm, curved, white scaly at base; anthers c. 1.5 mm. Ovary subglobose, c. 1 mm across, tomentose; style c. 2.8 cm; stigma unequally bilobed. Drupes subglobose, c. 4 × 3 mm, 4–6 obscurely lobed, pubescent; seeds oblong, c. 2 mm, slightly curved.

Flowering & Fruiting: January–October.

Distribution. India: Almost throughout India.

Specimens examined: Poro, BK 451; Jainti 3, 03.03.2011, GK 47208; North Rydak, 26.09.2011, AK 52928; Narathali, 20.02.2012, AK 55775; Kumargram, Hathinala, 21.02.2012, AK 55836; Phashkhawa river belt, 30.09.2012, AK 58550; Hatipota, 17.02.2013, AK 59816.

9. *Vitex* L.

Vitex negundo L., Sp. Pl. 2: 638. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4: 583. 1885; Prain, Bengal Pl. 2: 833. 1903. [Plate 175c-d]

Sewali, Simali (N).

Shrub, 2–3 m high, white pubescent. Leaves palmately compound; leaflets 3–5, unequal, lateral ones sessile, terminal one petiolulate, lanceolate, rarely oblanceolate when young, 2–10.5 × 0.6–2.7 cm, attenuate, repand and puberulent, acuminate, subcoriaceous, puberulous turning glabrous above, grey tomentose below. Inflorescence axillary, terminal panicles, grey pubescent; inflorescence bracts lanceolate. Flowers subsessile; floral bracts lanceolate. Calyx cupular, grey tomentose; tube c. 2 mm; lobes 5, triangular, c. 5 mm across, acute. Corolla pale purple, grey tomentose mixed with glands; tube 4–5 mm, white tomentose at throat; upper lip 2-lobed, triangular-ovate, c. 2 × 1–2 mm, obtuse, puberulent inside; lower lip 3-lobed, unequal, puberulent inside; lateral lobes same as upper lobes; mid lobe larger than lateral lobes, elliptic-ovate, 4–4.5 × 2–2.5 mm, obtuse, hairs on throat extended up to base of lateral lobes. Stamens 4, exserted; filaments 3.5–4.5 mm; anthers c. 1 mm. Ovary subglobose, c. 1 mm across, few glands present; style 6–7 mm, exserted; stigma bifid. Drupes black when ripe, subglobose, c. 5 mm across, enclosed by persistent calyx; seeds obovoid.

Flowering & Fruiting: August–November.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, 19.09.2011, AK 52644.

Lamiaceae

Key to the genera

- | | |
|---|--------------------|
| 1a. Anther cells separated by staminal connectives | 14. <i>Salvia</i> |
| 1b. Anther cells without staminal connectives | 2 |
| 2a. Flowers in opposite pair on rachis | 11. <i>Moala</i> |
| 2b. Flowers not as above, if in opposite pair then corolla with deep sinus, upper lip obsolete, and looks like 1-lipped | 3 |
| 3a. Leaves pinnatifid towards apex, palmatifid towards base; calyx lobes spine-tipped (except <i>Leucas lavandulifolia</i>); nutlets slightly winged | 9. <i>Leonurus</i> |
| 3b. Leaves not as above; calyx lobes not spine-tipped; nutlets not winged (except <i>Hyptis suaveolens</i>) | 4 |

The Flora of Buxa Tiger Reserve, West Bengal, India

- 4a. Infructescences globose or cylindric; upper lip of fruiting calyx especially middle tooth enlarged, deflexed and enclosed the mouth of calyx tube **3. Anisochilus**
- 4b. Infructescences and upper lip of fruiting calyx not as above 5
- 5a. Plants gynodioecious; calyx lobes elongated in fruiting calyx; nutlet solitary **5. Colebrookea**
- 5b. Plants not gynodioecious; calyx lobes not elongated in fruiting calyx; nutlets 4 (except *Gomphostemma parviflorum*) 6
- 6a. Plants stellate hairy; corolla yellow, prominently large; nutlets drupe-like **7. Gomphostemma**
- 6b. Plants variously hairy or glabrous, not stellate hairy; corolla not yellow, not prominently large; nutlets not drupe-like 7
- 7a. Corolla blue; tube gibbous at base, geniculate above swelling, a ring of septate hairs around rim of inflated part inside; disk one sided; nutlets pitted **2. Ajuga**
- 7b. Corolla not blue; tube not gibbous at base, not geniculate above swelling, a ring of septate hairs around rim of inflated part absent inside; disk not one sided; nutlets not deeply pitted 8
- 8a. Corolla 1-lipped; ovary stipitate, glandular above; style quadrangular, glandular at base; nutlets slightly compressed at one side, glandular above **15. Teucrium**
- 8b. Corolla bilabiate or subequally divided; ovary not stipitate, not glandular at apex; style not quadrangular, nor glandular at base; nutlets not as above 9
- 9a. Inflorescences pedunculate dense heads or lax secund cymes; upper lip of corolla 2-lobed **8. Hyptis**
- 9b. Inflorescences not as above; upper lip of corolla entire 10
- 10a. Aromatic plants; calyx bilabiate, upper lip ovate or suborbicular, lower lip 4-6-toothed **12. Ocimum**
- 10b. Non-aromatic plants; calyx not as above 11
- 11a. Calyx 10-nerved; lobes 10, toothed, spine-tipped; corolla villous **10. Leucas**
- 11b. Calyx not 10-nerved; lobes 5, not toothed, nor spine-tipped; corolla not villous 12
- 12a. Corolla pale pink, subequally divided or bilabiate; filaments pale pink, bearded at middle **13. Pogostemon**
- 12b. Corolla creamy or pinkish white, bilabiate; filaments white, glabrous or villous at apex 13
- 13a. Shrubs; flowers sessile; corolla tube and upper lip white; lobes of lower lip pink, strongly reflexed, hairy at throat; filaments villous above **4. Anisomeles**
- 13b. Herbs; flowers pedicellate; corolla tube and upper lip white or pinkish white; lobes of lower lip white or pinkish white, not reflexed, glabrous at throat; filaments glabrous 14

14a. Floral bracts obovate; calyx purplish; corolla tube in calyx tube completely, pinkish white; corolla lobes white or pinkish white; ovary hairy; nutlets fleshy

1. *Achyropermum*

14b. Floral bracts lanceolate; calyx green; corolla tube not in calyx tube completely, creamy white; corolla lobes creamy white; ovary glabrous; nutlets dry 6. *Elsholtzia*

1. *Achyropermum* Blume

Achyropermum densiflorum Blume, Bijdr. Fl. Ned. Ind. 14: 841. 1826.
Achyropermum wallichianum (Benth.) Benth. ex Hook. f., Fl. Brit. India 4: 673. 1885. [Plate 176a]

Erect herb, 30–60 cm high, pubescent. Leaves elliptic-ovate, 2–8.5 × 0.8–4 cm, attenuate, serrate-dentate, short acuminate, chartaceous, pubescent above. Inflorescence terminal, spike-like racemes; floral bracts obovate. Calyx obliquely tubular, hairy, nerves prominent; tube 4–6 mm; lobes 5, ovate, c. 2 × 1 mm, acute. Corolla light pink; tube c. 8 mm, pubescent; upper lip entire; lower lip 3-lobed. Stamens 4, didynamous; filaments 3–5 mm; anthers 2-celled; disk shallowly 4-lobed. Ovary oblong, c. 1 mm, hairy; style 5–8 mm; stigma bifid. Nutlets obovate-oblong, c. 1.5 × 0.7 mm, fleshy.

Flowering & Fruiting: September–March.

Distribution. India: Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Buxaduar, JKS 940; Buxa road, KPB 1635; South Rajabhatkhawa, JKS 4246; Jainti range, 08.10.2009, SKS & GK 46220; Jainti 4, 05.03.2011, GK 47270; Checko-1, 09.02.2013, AK 58818; Santrabari to Buxa Fort, 28.09.2013, AK 59627.

2. *Ajuga* L.

Ajuga macrosperma Wall. ex Benth. in Wall., Pl. Asiat. Rar. 1: 58. 1830; Hook. f., Fl. Brit. India 4: 704. 1885; Prain, Bengal Pl. 2: 860. 1903. *Ajuga macrosperma* var. *breviflora* Hook. f., Fl. Brit. India 4: 704. 1885; Prain, Bengal Pl. 2: 860. 1903. [Plate 176b; Fig. 84]

Decumbent herb, 10–16 cm high, hirsute. Leaves ovate to ovate-elliptic, 2.5–8 × 1–4.5 cm, attenuate, unequally sinuate-crenate, subacute to obtuse, chartaceous, sparsely hirsute above. Inflorescence terminal, spike-like racemes, pilose; verticillasters distant or interrupted; lower inflorescence bracts brownish, foliaceous, upper ones elliptic-lanceolate to linear-lanceolate. Calyx greenish brown, campanulate, weakly bilabiate, sparsely pilose; tube 2–2.5 mm; upper lip 3-lobed; lobes ovate to subcircular, 0.6–1 × 0.8–1.2 mm, subacute to obtuse, mid lobe smaller than lateral ones, ciliate; lower lip 2-lobed; lobes ovate, 1.5–1.8 × 0.8–1 mm, subacute. Corolla blue, glandular; tube 6–6.5 mm, gibbous at base, a ring of septate hairs around rim inside; upper lip 2-lobed; lobes oblong, c. 2 × 1.2 mm,

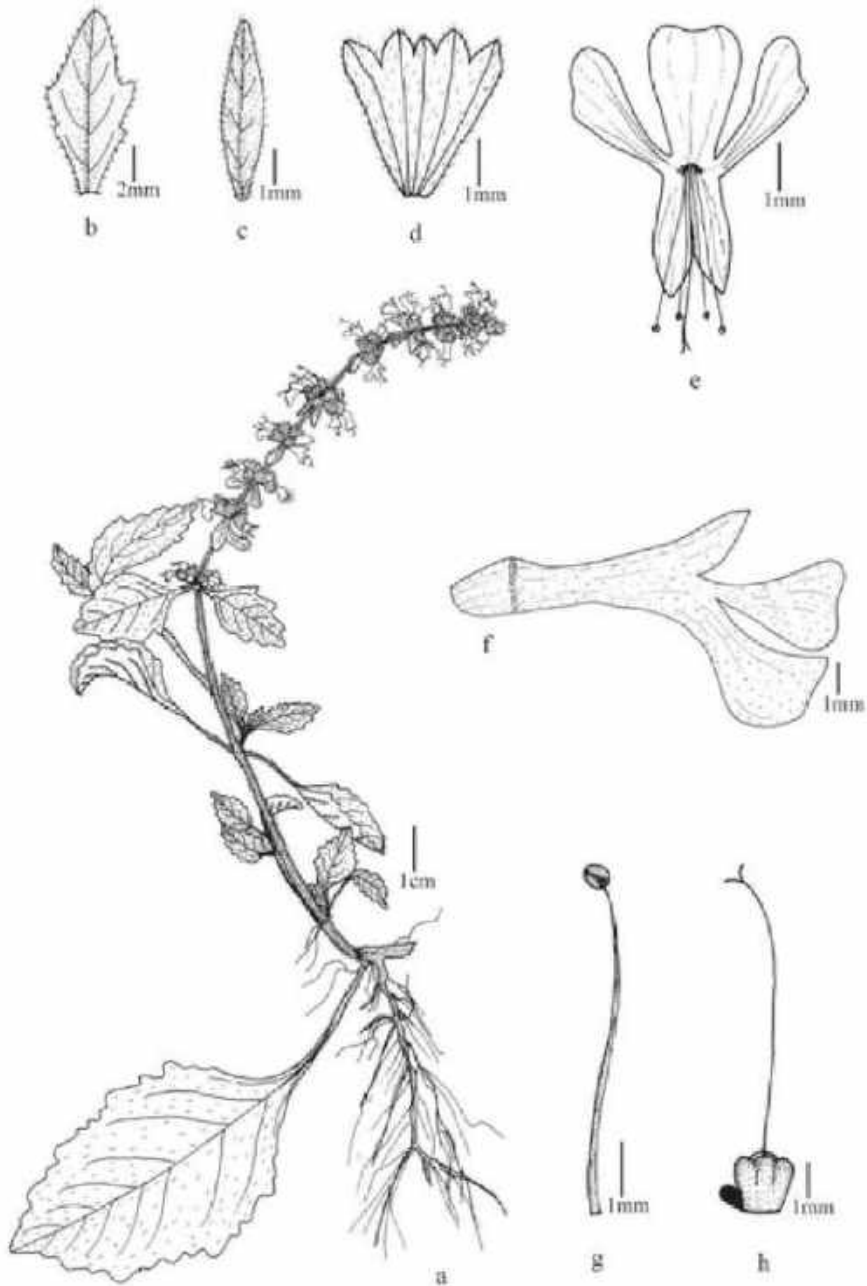


Fig. 84. *Ajuga macrosperma*: a. Flowering branchlet; b. Lower inflorescence bract; c. Upper inflorescence bract; d. Calyx split open; e. Front view of flower; f. Lateral view of corolla; g. Stamen; h. Gynoecium with disk (AK 59926).

circular; lower lip 3-lobed; lobes oblong-spathulate, 3–3.5 × 2–3 mm. Stamens 4, didynamous, exserted; filaments 3.5–6 mm; anthers rounded. Ovary pyriform, 4-lobed, 0.8–1 mm across; style c. 8 mm, exserted; stigma subequally bifid; disk one sided, oblong or rounded. Nutlets obovoid, 2–2.5 × c. 1.7 mm, deeply pitted.

Flowering & Fruiting: February–May.

Distribution. India: Almost throughout India.

Specimens examined: Way to Sinchula, KPB 2002; Buxaduar, JKS 984; Buxaduar, JKS 984; Tashigaon, JKS 4006; Buxaduar, Ramiti, 29.11.1975, JKS 4030; Tashigaon to Rovers point, 12.02.2014, AK 59926.

3. *Anisochilus* Wall. ex Benth.

Anisochilus pallidus Wall. ex Benth. in Wall., *Pl. Asiat. Rar.* 2: 18. 1830 (as "*pallidum*"); Hook. f., *Fl. Brit. India* 4: 629. 1885. [Plate 176c]

Erect herb, 40–100 cm high, pilose mixed with glands. Leaves ovate-elliptic, lanceolate to lanceolate-oblong above, 4–11.5 × 0.8–4 cm, cuneate, gland tipped serrate and hairy, acuminate, chartaceous, pilose above, glabrous except veins below with sessile glands. Inflorescence terminal panicles of many spikes; verticillasters dense, compact, hairy; inflorescence bracts linear-lanceolate. Flowers sessile. Calyx bilipped, hairy; tube c. 2 mm; upper lip 3-toothed, triangular, minute, middle tooth larger; lower lip 2-toothed, triangular, minute. Corolla purple, tubular; tube 5–6 mm, pubescent; upper lip 2-lobed, lobes inflated, c. 1.5 mm; lower one entire, boat-shaped, 2–3 mm, obtuse. Stamens 4, didynamous; filaments c. 2 mm, weakly exserted; anthers rounded. Ovary pyriform, 4-lobed, 1–1.2 mm across; style 5–6 mm, exserted; stigma subequally bifid. Infructescences globose or cylindric, up to 4.5 cm; fruiting calyx 4–6 mm; upper lip especially middle tooth enlarging and deflexing, mouth closed. Nutlets brownish, ellipsoid to ovoid, c. 1 × 0.5 mm, smooth.

Flowering & Fruiting: October–January.

Distribution. India: Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxaduar, JKS 974; Tashigaon, 29.11.1975, JKS 4015; Buxa Fort to Chunabhati, 30.09.2013, AK 59683; Buxaduar to Tashigaon, 11.02.2014, AK 59915.

4. *Anisomeles* R. Br.

Anisomeles indica (L.) Kuntze, *Revis. Gen. Pl.* 2: 512. 1891. *Nepeta indica* L., *Sp. Pl.* 2: 571. 1753. *Anisomeles ovata* R. Br. in W. T. Aiton, *Hort. Kew.*, ed. 2. 3: 364. 1811; Hook. f., *Fl. Brit. India* 4: 672. 1885; Prain, *Bengal Pl.* 2: 853. 1903.

[Plate 176d]

Shrub, 1–2 m high, pubescent. Leaves ovate, 2–11 × 1–4.7 cm, attenuate, serrate, acuminate, chartaceous, pubescent below. Inflorescence terminal spikes; verticillasters condensed above; inflorescence bracts foliaceous. Flowers sessile; floral bracts linear-lanceolate. Calyx tubular-campanulate; tube 4–6 mm, glandular pubescent, villous inside; lobes 5, triangular-ovate, c. 2 × 1 mm, acute. Corolla pale purple or mauve, tubular-campanulate; tube 6–7 mm; upper lip nearly ovate, entire; lower lip 3-lobed; middle lobe obcordate, c. 3 × 4.5 mm, slightly undulate, reflexed, puberulous at throat; lateral lobes ovate. Stamens 4, didynamous, exerted; filament c. 4 mm, villous above; anthers subglobose, posterior pair 1-celled, anterior pair 2-celled; disk rounded, enclosed ovary. Ovary c. 1 mm; style c. 7 mm, hairy; stigma obliquely bifid. Nutlets fleshy, basal scar small.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: Poro, JKS 819; Garam, JKS 845; Buxaduar, JKS 992; Bhutanghat, JKS 4081; Balapara, JKS 4169; Jainti range, 08.10.2009, SKS & GK 46243; Jainti range, 06.10.2009, SKS & GK 46184; Rangamati to Bharnabari, 06.10.2012, AK 58695; Santrabari to Chunabhati, 04.10.2013, AK 59781.

5. *Colebrookea* Sm.

Colebrookea oppositifolia Sm., Exot. Bot. 2: 111, t. 115. 1806; Hook. f., Fl. Brit. India 4: 642. 1885; Prain, Bengal PL 2: 851. 1903. [Plate 177a-c]

Gobura (B); *Dosro*, *Chusre* (N).

Shrub, 1–2 m high, gynodioecious, softly woolly or tomentose. Leaf lanceolate to elliptic, 4.5–21 × 1–8.2 cm, cuneate, rarely subcircular, crenulate and hairy, acuminate, subcoriaceous, puberulous above, softly tomentose below. Inflorescence axillary, terminal spikes, softly tomentose; verticillasters distant. Flowers sessile to subsessile, unisexual or bisexual; floral bracts linear-lanceolate. Calyx campanulate; tube short, pubescent; lobes 4–6, linear, 1–1.2 mm, pubescent. Corolla creamy white; tube c. 0.8 mm, pubescent except near base; upper lip 2-lobed, triangular-ovate, 0.2–0.3 × 0.1–0.2 mm, obtuse, pubescent; lower lip 3-lobed, unequal, lateral lobes same as upper lobes; mid lobe elliptic, 0.5–0.7 × 0.5 mm, obtuse, pubescent. Stamens 4, didynamous; filaments filiform, 1.5–2 mm; anthers globose. Ovary ellipsoid, 4-lobed, pilose; style 1–1.5 mm; stigma bifid, exerted in female flowers. Nutlets brownish, obovoid, c. 0.8 × 0.5 mm, hairy above.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, 28.11.1975, JKS 988; Kumargram, 18.02.2012, AK 55708; Hatipota, 29.09.2012, AK 58511; Pana, 11.02.2013, AK 58864; Pana, 11.02.2013, AK 58865; Buxaduar, 16.02.2014, AK 59970, 59973.

6. *Elsholtzia* Willd.

Elsholtzia blanda (Benth.) Benth., *Labiata. Gen. Spec.*: 162. 1833; Hook. f., *Fl. Brit. India* 4: 643. 1885. *Aphanochilus blandus* Benth. in Wall., *Pl. Asiat. Rar.* 1: 29. 1830. [Plate 177d]

Mirey pati (N).

Erect herb, 20–40 cm high, puberulous. Leaves lanceolate to elliptic-lanceolate, 1.5–5 × 0.6–2.1 cm, attenuate, serrate and hairy, short acuminate to obtuse, chartaceous, puberulous mixed with glands above, sunken yellow gland leaving dots below. Inflorescence axillary, terminal spikes, forming panicles, puberulous; verticillasters distant, few flowered; inflorescence bracts lanceolate; floral bracts lanceolate. Calyx cupular, urceolate in fruiting, puberulous, glandular; tube 0.5–0.7 mm; lobes 5, lanceolate, 0.8–1.1 × 0.2–0.3 mm, acute. Corolla white, puberulous glandular; tube 1.4–1.6 mm; upper lip obovate, c. 0.5 mm, 2-lobed or retuse; lower lip 3-lobed, unequal, lateral lobes same as upper lobes; mid lobe suborbicular, c. 0.5 × 0.6–0.7 mm. Stamens 4, didynamous; filaments 0.8–1.5 mm; anthers obcordate. Ovary 4-lobed; style 1.5–2 mm; stigma bifid; disk small. Nutlets pale yellow, ellipsoid, c. 1 × 0.5 mm, smooth or tuberculate, enclosed in urceolate calyx.

Flowering & Fruiting: October–May.

Distribution. India: Arunachal Pradesh, Assam, Jharkhand, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Lepchakhawa, JKS 971; Chunabhati, JKS 999; Tashigaon, JKS 4069; Kumargram, Hathinala, 21.02.2012, AK 55835; Buxaduar to Tashigaon, 20.05.2014, AK 62678.

7. *Gomphostemma* Wall. ex Benth.

Key to the species

- 1a. Stems branched, not white stellate tomentose; leaves simple hairy above; floral bracts elliptic; corolla tubular-ventricose; nutlets usually 1–4 **1. *G. ovatum***
1b. Stems unbranched, white stellate tomentose; leaves branched hairy above; floral bracts linear-lanceolate; corolla tubular; nutlet solitary **2. *G. parviflorum***

1. *Gomphostemma ovatum* Wall. ex Benth. in Wall., *Pl. Asiat. Rar.* 2: 12. 1830; Hook. f., *Fl. Brit. India* 4: 699. 1885. [Plate 178a; Fig. 85a-f]

Undershrub, 30–50 cm, stellate tomentose. Leaves ovate, 6–8.5 × 3–4.5 cm, cuneate or rounded, crenate, acute, subcoriaceous, simple hairy above, stellate tomentose below. Inflorescence axillary verticels, more than 10-flowered. Flowers

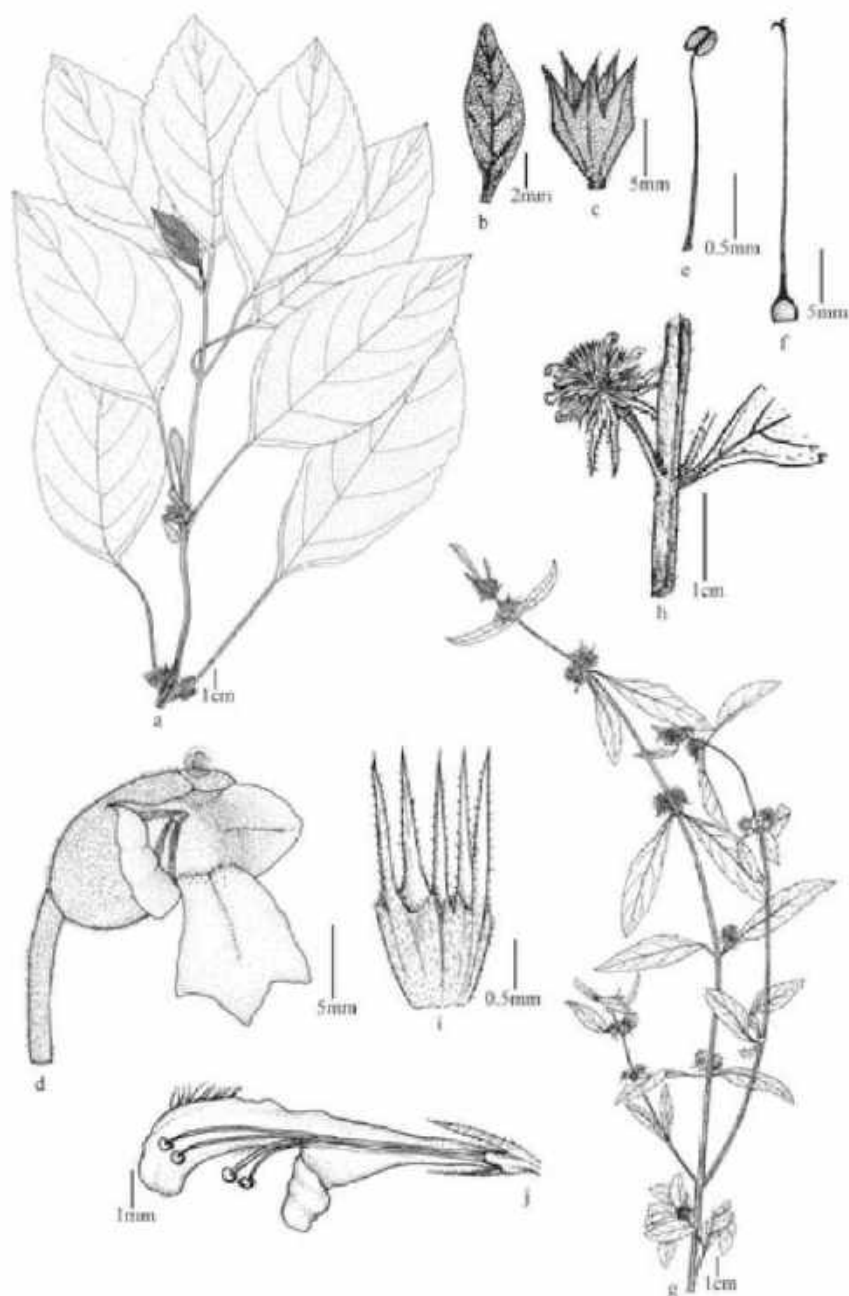


Fig. 85. *Gomphostemma ovatum*: a. Flowering branchlet; b. Floral bract; c. Calyx; d. Corolla showing stamens; e. Stamen; f. Gynoceium (AK 56117); *Hyptis brevipes*: g. Flowering branchlet; h. Inflorescence with portion of leaf; i. Calyx; j. Corolla split open showing stamens with calyx (AK 52723).

subsessile; floral bracts elliptic. Calyx cupular, stellate hairy; tube 5–6 mm; lobes 5, triangular, 5–6 × 1.5–2 mm, acute. Corolla pale yellow, tubular-ventricose, glandular pubescent; tube c. 2.5 cm, curved; upper lip suborbicular, c. 1 cm across, emarginate; lower lip 3-lobed; lateral lobes suborbicular, c. 1 cm across, circular; mid lobe larger than lateral lobes, obovate, c. 1.5 × 1 cm, shallowly 3-toothed. Stamens 4, didynamous; filaments fused with corolla tube; anthers 2-locular; disk slightly swollen. Ovary subglobose; style 2–2.2 cm; stigma obliquely 2-lobed. Nutlets drupe-like, c. 5 × 4 mm, fleshy.

Flowering & Fruiting: August–December.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimens examined: Jainti range, 12.10.2009, SKS & GK 46331; Checko-1, 25.09.2012, AK 56117.

2. *Gomphostemma parviflorum* Wall. ex Benth. in Wall., Pl. Asiat. Rar. 2: 12. 1830; Hook. f., Fl. Brit. India 4: 697. 1885; Prain, Bengal Pl. 2: 859. 1903.

[Plate 178b]

Undershrub, 70–100 cm high, white stellate tomentose. Leaves elliptic, 14–17 × 5.2–6.2 cm, attenuate, serrate-dentate, short acuminate, subcoriaceous, branched hairy above, white stellate tomentose below. Inflorescence lax or dense axillary, many flowered, fascicled cymes, stellate tomentose. Flowers subsessile; floral bracts linear-lanceolate. Calyx campanulate, stellate hairy; tube c. 4 mm; lobes 5, triangular, c. 3 mm, acute. Corolla pale yellow, tubular, stellate hairy; tube c. 1.5 cm; upper lip suborbicular, 6–8 mm across, hooded; lower lip 3-lobed, toothed; lateral lobes oblong-ovate, 1–1.2 × c. 0.6 mm; mid lobe suborbicular, 6–8 mm across. Stamens 4, didynamous; filaments fused with corolla tube; anthers 2-locular; disk slightly swollen. Ovary subglobose; style filiform, c. 1.5 cm; stigma obliquely 2-lobed. Nutlets drupe-like, usually solitary, fleshy, basal scar broad.

Flowering & Fruiting: September–December.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Odisha, Nagaland, Sikkim, Tripura and West Bengal.

Specimens examined: Buxa road, KPB 1612; Rajabhatkhawa range, 12.10.2009, SKS & GK 46333; Jainti range, 27.11.2011, GK 47143; Gadadhar range, 29.03.2012, GK 50623; Jainty-Phashkhawa, 02.10.2012, AK 58599.

8. *Hyptis* Jacq.

Key to the species

- 1a. Herbs; leaves lanceolate to oblanceolate; inflorescences axillary or terminal globose heads; corolla white; nutlets not winged, nor rugose L. *H. brevipes*
1b. Shrubs; leaves ovate or ovate-elliptic; inflorescences axillary, 4–6-flowered, lax secund cymes; corolla pale blue; nutlets slightly winged, rugose 2. *H. suaveolens*

1. *Hyptis brevipes* Poit., Ann. Mus. Par. 7: 465. 1806; T. K. Paul & Anant Kumar, Indian J. Forest. 35 (1): 101. 2012. [Plate 178c; Fig. 85g-]

Erect weak herb, 1–1.5 m high, sparsely hairy. Leaves lanceolate to oblanceolate, 4–7 × 1–2 cm, cuneate, serrate, acute to short acuminate, gland-dotted and sparsely hairy above, glabrescent below. Inflorescence axillary or terminal, pedunculate, globose heads, 7–10 mm across; inflorescence bracts 8–12 at bottom of each head, linear. Flowers sessile. Calyx cupular; tube c. 1 mm, glandular, pubescent; lobes 5, linear-subulate, c. 1 mm, ciliate, sharply acute. Corolla white, tubular; tube 1–1.2 mm; upper lip 2-lobed; lower lip 3-lobed. Stamens 4, didynamous; filaments 1.5–2 mm; anthers globose. Ovary 4-partite; style 1.6–2 mm; stigma slightly bifid. Nutlets dark brown or black, dry, minute.

Flowering & Fruiting: September–December.

Distribution. India: Andaman & Nicobar Islands, Tripura and West Bengal (naturalized).

Specimen examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52723.

2. *Hyptis suaveolens* (L.) Poit., Ann. Mus. Hist. Nat. 7: 472, t. 29, f. 2. 1806; Hook. f., Fl. Brit. India. 4: 630. 1885; Prain, Bengal Pl. 2: 848. 1903. *Ballota suaveolens* L., Syst. Nat., ed. 10, 2: 1100. 1759. [Plate 179a]

Gandehar (N).

Shrub, 1–1.5 m high, pubescent. Leaves broadly ovate to ovate or ovate-elliptic, 1–5.8 × 0.6–4.4 cm, subcordate or cuneate, serrate-dentate, acute, chartaceous, yellow orange glands below; pubescent. Inflorescence axillary, 4–6-flowered, lax secund cymes; inflorescence bracts linear. Flowers sessile. Calyx campanulate-tubular, pubescent; tube c. 5 mm, ribbed; lobes 5, linear-subulate, c. 2 mm, nerved. Corolla pale blue, tubular; tube 7–8 mm; upper lip 2-lobed, rounded, c. 3 × 2.5 mm, ciliate, circular; lower lip 3-lobed; mid lobe shorter than lateral lobes, cleft above; lateral lobes oblong, 2–3 mm, obtuse. Stamen 4, didynamous; filaments c. 2 mm, hairy; anther cells confluent; disk 4-lobed. Ovary 4-partite; style c. 5 mm, included; stigma shortly bifid. Nutlets oblong, c. 4 mm, slightly winged, rugose.

Flowering & Fruiting: September–March.

Distribution. India: Naturalized almost throughout.

Specimens examined: Nimati Range, Poro, 22.11.1975, JKS 791; Lepchakhawa, JKS 4045; South Bholka, 06.12.1975, JKS 4168; Jainti range, 11.10.2009, SKS & GK 46299; NRVK 7, 11.10.2009, GK 47217; Kumargram, Kalikhola river belt, 21.09.2011, AK 52719; Newlands, Sukno river, 22.09.2011, AK 52795; Marakata, 24.09.2011, AK 52848.

Notes: Leaf decoction is useful in skin related problem.

9. *Leonurus* L.

Leonurus sibiricus L., Sp. Pl. 2: 584. 1753; Hook. f., Fl. Brit. India 4: 678. 1885; Prain, Bengal Pl. 2: 854. 1903. 1940. [Plate 179b]

Guma (B).

Shrub, 80–100 cm high, tomentose. Leaves pinnatipartite towards apex, palmatipartite towards base, 5–10 cm; lobes linear, incised, puberulous above, tomentose and gland-dotted below. Inflorescences axillary whorls below, forming long interrupted spikes above. Flowers sessile; floral bracts linear. Calyx tubular-campanulate; tube 4–5 mm, pubescent; lobes 5, triangular, c. 1 mm, awned, pubescent. Corolla crimson, tubular, tomentose to villous; tube c. 6 mm; upper lip obovate, c. 7 × 3 mm, ciliate, obtuse; lower lip 3-lobed; lateral lobes oblong, 1.8–2.2 mm, obtuse; mid lobe spatulate, 3–4 mm, emarginate, slightly reflexed. Stamens 4, didynamous; filaments 4–5 mm; anthers subglobose. Ovary 4-celled, c. 1 mm across; style c. 6 mm; stigma bifid. Nutlets oblong, c. 2 mm, rugose, slightly winged, fleshy, basal scar small.

Flowering & Fruiting: February–April.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 14.02.2010, SKS & GK 47096; Sankosh, 17.02.2012, AK 55690.

10. *Leucas* R. Br.

Leucas lavandulifolia Sm., Cycl. 20: 2. 1812. *Leucas linifolia* (Roth) Spreng., Syst. Veg. 2: 743. 1825; Hook. f., Fl. Brit. India 4: 690. 1885; Prain, Bengal Pl. 2: 856. 1903. [Plate 179c-d]

Hal-kusa, Guma (B).

Erect herb, 30–40 cm high, appressed puberulous. Leaves linear-lanceolate, 1.7–5 × 0.3–0.7 cm, attenuate, distantly serrate, acute, chartaceous, pubescent above, hispid below. Inflorescence axillary and terminal verticillasters subtended by leaves. Flowers subsessile; floral bracts linear. Calyx campanulate; tube c. 5 mm,

oblique at mouth, striated, 10-nerved, pubescent, pubescent at throat inside; lobes 10, toothed, spinescent. Corolla white, tubular, villous; tube c. 5 mm; upper lip oblong, concave; lower lip 3-lobed; lateral lobes triangular, small; mid lobe large, obovate or rounded, c. 5 × 3 mm. Stamens 4, didynamous; filaments 5–7 mm; anthers small; disk 4-lobed. Ovary 4-lobed; style c. 7 mm; stigma bifid. Nutlets triquetrous, c. 0.5 mm, obtuse, fleshy, basal scar small.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Garam, JKS 857; Moynabari, JKS 4144; NRVK 6, 11.10.2009, SKS & GK 46302; Kumargram, 18.09.2011, AK 52617, 52621; Kumargram, 19.09.2011, AK 52649; Marakata, 22.02.2012, AK 55869.

11. *Mosla* Buch.-Ham. ex Benth.

Mosla dianthera (Buch.-Ham. ex Roxb.) Maxim., Bull. Acad. Imp. Sci. Saint-Petersburg 20: 457. 1875; Hook. f., Fl. Brit. India 4: 647. 1885. *Lycopus dianthera* Buch.-Ham. ex Roxb., Fl. Ind. 1: 144. 1820.

Erect aromatic herb, up to 1 m high, pilose. Leaves ovate to elliptic, 1.5–4.2 × 0.8–2.3 cm, cuneate, serrate-dentate, acute, subchartaceous, sparse or densely pilose, yellow punctuate gland-dotted beneath. Inflorescence terminal or axillary racemes, 3–10 cm; floral bracts triangular ovate. Calyx campanulate or obconic, 2 lipped, 10 prominent nerves, punctate, yellow gland-dotted above; upper lip 2-toothed, teeth triangular-ovate, c. 1 mm; lower lip 3-toothed, c. 4 × 3 mm, accrescent in fruiting, enlarged up to 5 × 3 mm. Corolla white-purple, c. 3.5 mm; upper lip emarginate, puberulous; midlobe of lower lip much broader than lateral ones; lobes puberulous. Stamens 4, didynamous; anther cells 2, divaricate. Ovary 4-celled; style 3–4 mm, bifid. Nutlets subglobose, 1–1.2 mm across, reticulate, basal scar present.

Flowering & Fruiting: July–August.

Distribution. India: Arunachal Pradesh, Assam, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Odisha (?), Sikkim, Tripura, Uttarakhand and West Bengal.

Specimen examined: Bala River, 04.12.2011, GK 52344.

12. *Ocimum* L.

Key to the species

- 1a. Herbs; leaves unequal in pair, obliquely cuneate at base, glabrous; length of pedicels equal to the length of calyx; nutlets brownish, subglobose, punctiform

3. *O. tenuiflorum*

- 1b. Undershrubs; leaves equal in pair, cuneate or rounded or attenuate at base, glabrous or hairy; length of pedicels smaller than length of calyx; nutlets blackish, oblong, not punctiform 2
- 2a. Leaves cuneate or rounded at base, acute at apex, glabrous to pubescent; calyx tube with ring of hairs at throat inside; median pair of lower calyx lobe equal or smaller than upper calyx lobe; filaments glabrous; nutlets rugose L. O. *americanum*
- 2b. Leaves attenuate at base, acuminate at apex, hispid and scabrous above, softly pubescent below; calyx glabrous inside; median pair of lower calyx lobe larger than upper calyx lobe; filaments hairy at base; nutlets finely tuberculate 2. O. *gratissimum*

1. *Ocimum americanum* L., Cent. Pl. 1: 15. 1755. *Ocimum canum* Sims in Curtis, Bot. Mag. 51: t. 2452. 1823; Hook. f., Fl. Brit. India 4: 607. 1885; Prain, Bengal Pl. 2: 843. 1903. [Plate 180a]

Aromatic undershrub, 40–50 cm high, pubescent. Leaves lanceolate, 0.7–3 × 0.3–1.1 cm, cuneate or rounded, serrate and ciliate, acute, chartaceous, gland-dotted, glabrous to pubescent. Inflorescence spiciform terminal racemes; verticillasters 5–6-flowered, lax; floral bracts lanceolate to elliptic-lanceolate. Calyx campanulate, bilipped, pubescent; tube 1–1.5 mm, ring of hairs at throat; upper lip suborbicular, c. 2.5 × 2 mm, acute; lower lip 4-toothed; two lateral teeth triangular, 1.5–2 mm, ciliate; two median ones linear-triangular, 2–2.5 mm, ciliate. Corolla white, tubular; tube 2–2.5 mm; upper lip 4-lobed; lobes ovate-rounded, 1–1.5 mm, ciliate; lower lip oblong, ovate-oblong, 2–2.5 mm, concave, sparsely hairy. Stamens 4, didynamous, exserted; filaments declinate, c. 4 mm; anthers subglobose; disk 4-lobed. Ovary 4-lobed, c. 1 mm; style 5–6 mm; stigma 2-lobed, oblique. Nutlets oblong-ellipsoid, c. 1 × 0.5 mm, triquetrous, rugose, basal scar small.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 6, 12.10.2010, SKS & GK 46336; Hatipota, 18.02.2013, AK 59833.

2. *Ocimum gratissimum* L., Sp. Pl. 2: 1197. 1753; Hook. f., Fl. Brit. India 4: 608. 1885; Prain, Bengal Pl. 2: 843. 1903.

Aromatic undershrub, 50–70 cm high, hispid. Leaves ovate-lanceolate or elliptic-lanceolate, 2.5–7 × 1.3–2.5 cm, attenuate, serrate-dentate, acuminate, coriaceous, yellow or pale gland-dotted, hispid and scabrous above, softly pubescent below. Inflorescence terminal or axillary, simple or branched racemes; verticillasters 4–6-flowered, dense; floral bracts deltoid to ovate. Calyx campanulate, bilipped, hairy, intermixed with glands; tube c. 2 mm, nerved; upper lip ovate to suborbicular, c. 1.5 mm, pubescent; lower lip 4-toothed; lateral teeth c. 1 mm; median teeth shortly triangular, c. 2 mm, hairy. Corolla white, tubular; tube 2–3 mm; upper lip 4-lobed; lobes triangular-ovate, subequal or median lobes slightly larger, 0.5–

0.7 × c. 0.5 mm, acute, pubescent towards tip; lower lip spatulate-oblong, c. 2 mm, acute. Stamens 4, didynamous; filaments 3–3.5 mm, declinate, hairy at base; anthers subglobose. Ovary 4-celled, c. 0.7 × 0.5–0.6 mm; style 4–5 mm; stigma bilobed. Nutlets blackish, oblong, c. 1.5 mm, finely tuberculate, mucilaginous when wet.

Flowering & Fruiting: May–October.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 6, 11.02.2011, GK 47033; Hauda nala, 03.10.2012, AK 58666; Buxaduar to Chunabhati, 21.05.2014, AK 65904.

3. *Ocimum tenuiflorum* L., Sp. Pl. 2: 597. 1753. *Ocimum sanctum* L., Mant. Pl. 1: 85. 1767 (as "*Ocimum*"); Hook. f., Fl. Brit. India 4: 609. 1885; Prain, Bengal Pl. 2: 843. 1903.

Tulsi (H, B).

Aromatic erect herb, 40–80 cm high, glandular, sparsely hairy. Leaves unequal in pairs, elliptic, 4–10.5 × 1.4–3.5 cm, obliquely cuneate, serrate and hairy, acuminate, subcoriaceous, glandular, glabrous. Inflorescence terminal and axillary, spike-like racemes, pubescent; verticillasters few-flowered, lax below, compact above; inflorescence bracts foliaceous; upper bracts ovate. Calyx campanulate, bilipped, glandular, pubescent; tube c. 1 mm; upper lip ovate to suborbicular, 1–1.5 mm across; lower lip 4–6-toothed; lateral teeth 2, triangular, c. 1 mm; median ones linear; lowest ones linear-triangular. Corolla white, bilabiate, glabrous except upper lip; tube cylindric, 1.5–2 mm; upper lip 4-lobed; lobes ovate-oblong, median ones longer and c. 1 mm; lower lip oblong, 1.5–2 mm. Stamens 4, didynamous, exserted; filaments 3–4 mm; anthers subglobose. Ovary subglobose; style 3.5–4 mm; stigma bifid. Nutlets brownish, subglobose, c. 1.5 × 1 mm, punctiform.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59680.

13. *Pogostemon* Desf.

Key to the species

- | | |
|--|----------------------|
| 1a. Leaves sessile, 4–10 in whorls; flowers subsessile | 2 |
| 1b. Leaves petiolate, opposite; flowers sessile | 3 |
| 2a. Stems not succulent; leaves 4 in whorls, rounded at base; inflorescences pilose; corolla tube with a ring of hairs at middle inside; filaments 2.5–3.5 mm, densely bearded at middle; anthers reniform; style c. 3 mm; disk obpyriform; nutlets grey black, ellipsoid, faintly triquetrous | 5. <i>P. pumilus</i> |

Botanical Survey of India

- 2b. Stems succulent; leaves 4–10 in whorls, narrowed at base; inflorescences tomentose; corolla tube without a ring of hairs at middle inside; filaments 1.2–1.6 mm, sparsely bearded at middle; anthers not reniform; style 1.2–1.5 mm; disk not obpyriform; nutlets pale brown to pale yellow, obovate, dorso-ventrally compressed

6. *P. stellatus*

- 3a. Herbs; inflorescence solitary, terminal spikes **1. *P. auricularius***

- 3b. Shrubs or undershrubs; inflorescences panicles of axillary, terminal spikes 4

- 4a. Verticillasters few flowered; floral bracts deciduous; upper lip of corolla 4-lobed; anthers confluent; nutlets faintly rugose **4. *P. parviflorus***

- 4b. Verticillasters many flowered; floral bracts persistent; upper lip of corolla 3-lobed; anthers not confluent; nutlets smooth 5

- 5a. Leaves not glandular, not vesicular above; verticillasters congested; inflorescence bracts absent; calyx tube gland-dotted, villous or hirsute inside **2. *P. benghalensis***

- 5b. Leaves glandular, vesicular above; verticillasters distant; inflorescence bracts present; calyx tube not gland-dotted, glabrous inside **3. *P. elsholtzioides***

1. *Pogostemon auricularius* (L.) Hassk., Tijdschr. Natuurl. Gesch. Physiol. 10: 127. 1843. *Mentha auricularia* L., Mant. Pl. 1: 81. 1767. *Dysophylla auricularia* (L.) Blume, Bijdr. Fl. Ned. Ind. 14: 826. 1826; Hook. f., Fl. Brit. India 4: 638. 1885; Prain, Bengal Pl. 2: 850. 1903. **[Plate 180b]**

Erect herb, 20–30 cm high, hirsute or villous. Leaves oblong-elliptic, elliptic or ovate-lanceolate, 3–7.6 × 0.9–2.3 cm, cuneate, crenate-serrate, acute, chartaceous, strigose with scattered impressed glands. Inflorescence lateral and terminal spikes, villous; verticillasters many flowered, dense. Flowers sessile; floral bracts ovate-elliptic. Calyx turbinate; tube c. 1 mm, pearl gland-dotted, glabrous or puberulous; lobes 5, ovate, c. 0.3 × 0.5 mm, ciliate, acute. Corolla white, tubular-campanulate; tube 1.8–2 mm; lobes 4, subequal or bilipped; upper lip elliptic-oblong, obtuse, hairy; lower lip 3-lobed, same as upper lip but smaller. Stamens 4, exserted; filaments 2.5–3 mm, bearded at middle and hairy at base; anthers globose; disk 4-lobed. Ovary 4-lobed; style 2.5–3.5 mm; stigma bifid. Nutlets light brown, ellipsoid to obovoid, c. 0.8 × 0.5 mm, faintly rugose.

Flowering & Fruiting: August–November.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Chhattisgarh, Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Poro, JKS 757; West Rajabhatkhawa, 05.08.1981, BS & party 10339; Jainti range, 04.10.2009, SKS & GK 46120; Marakata, 24.09.2011, AK 52863; Checko-1, 26.09.2012, AK 56167.

2. *Pogostemon benghalensis* (Burm. f.) Kuntze, Revis. Gen. Pl. 2: 529. 1891. *Origanum benghalense* Burm. f., Fl. Ind.: 128, t. 38, f. 3. 1768. *Pogostemon plectranthoides* Desf., Mem. Mus. Hist. Nat. Paris 2: 155, t. 6. 1815; Hook. f., Fl. Brit. India 4: 632. 1885; Prain, Bengal Pl 2: 849. 1903. [Plate 180c-d]

Jui-lata (B).

Shrub, 1.5–2 m high, tomentose or villous. Leaves ovate-elliptic to ovate, 2.5–7 × 1–2.5 cm, cuneate or rounded, single or double serrate, often irregularly dentate, acute, chartaceous, pubescent. Inflorescence axillary and terminal panicles, acute, chartaceous, pubescent. Inflorescence axillary and terminal panicles, pubescent; verticillasters many flowered, congested. Flowers sessile; floral bracts lanceolate or oblanceolate. Calyx tubular-campanulate, 5-nerved, gland-dotted, hairy, villous or hirsute inside; tube c. 3 mm; lobes 5, triangular, 1–1.5 × 0.6–1 mm. Corolla white with purple dots or pinkish purple, tubular-campanulate; tube c. 5 mm, puberulous at base of filaments inside; upper lip 3-lobed, elliptic, subacute, mid lobe larger than lateral lobes; lower lip puberulous. Stamens 4, exserted; filaments 4–8 mm, bearded at middle and puberulous at base; anthers subglobose; disk 4-lobed. Ovary 4-lobed; style 6–8 mm; stigma bifid. Nutlets dark brown, ellipsoid to suborbicular.

Flowering & Fruiting: January–June.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, JKS 939; Rajabhatkhawa range, 11.02.2010, SKS & GK 47034; Newlands, 15.02.2012, AK 55613.

3. *Pogostemon elsholtzioides* Benth. in DC., Prodr. 12: 153. 1848; Hook. f., Fl. Brit. India 4: 634. 1885. [Plate 181a]

Shrub, 1.5–2 m high, tomentose, glabrous later. Leaves lanceolate to lanceolate-elliptic, 2–8.5 × 0.6–2.8 cm, attenuate, serrate, acute to caudate-acuminate, chartaceous, vesicular above, glandular and pubescent. Inflorescence panicle of axillary and terminal spikes, pubescent; verticillasters many flowered, distant, secund; inflorescence and floral bracts lanceolate. Flowers sessile. Calyx campanulate, pubescent; tube c. 2.5 mm; lobes 5, triangular-ovate, c. 1 × 0.6–0.8 mm, acute. Corolla pinkish white, tubular-campanulate, few golden glands present, tube 4.5–5 mm, puberulous inside; upper lip 3-lobed, mid lobe ovate, lateral ones subcircular, 0.6–1 across, subobtusate to rounded, hairy; lower lip triangular-ovate, c. 1.2 mm across, acute. Stamens 4, didynamous; filaments 5.5–6 mm, puberulous; anthers subcircular. Ovary subglobose, 4-lobed; style 5–7 mm; stigma bifid; disk dark brown, ribbed, truncate. Nutlets brownish, elliptic-oblong.

Flowering & Fruiting: January–April.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal.

Specimens examined: Buxaduar, JKS 926; Buxaduar, JKS 970; Buxaduar to Tashigaon, 11.02.2014, AK 59909.

4. *Pogostemon parviflorus* Benth. in Wall., *Pl. Asiat. Rar.* 1: 31. 1830; Hook. f., *Fl. Brit. India* 4: 632. 1885; Prain, *Bengal Pl.* 2: 849. 1903. *Pogostemon glaber* Benth. in Wall., *Pl. Asiat. Rar.* 1: 31. 1830 (as "*glabrum*"); Hook. f., *Fl. Brit. India* 4: 632. 1885.

Undershrub, 50–100 cm high, pubescent. Leaves ovate or ovate-lanceolate, 4.3–9.5 × 1.5–5.5 cm, attenuate, double serrate, acute or acuminate, chartaceous, tomentose below. Inflorescence terminal or axillary panicles, pubescent; verticillasters few flowered, distant. Flowers sessile; floral bracts ovate, ovate-lanceolate or elliptic. Calyx campanulate; tube 2–3 mm, gland-dotted, hairy; lobes 4–5, triangular, 1–1.5 × 0.5–0.6 mm, acute, hairy. Corolla white with purple dots or pinkish purple, tubular; tube 1.5–2 mm; upper lip 4-lobed, 5–6 mm; lower lip triangular-ovate. Stamens 4; filaments c. 3 mm, bearded at middle and puberulous at base; anther cells confluent; disk equal, subentire. Ovary 4-lobed; style c. 3 mm; stigma bifid. Nutlets ovoid or oblong, faintly rugose.

Flowering & Fruiting: January–April.

Distribution. India: Arunachal Pradesh, Assam (?), Gujarat, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Jainti range, 16.10.2009, SKS & GK 46318; Rajabhatkhawa range, 29.11.2011, GK 47156; Newlands, 15.02.2012, AK 53075; Newlands, 15.02.2012, AK 53094; Way to Mahakal cave, 20.02.2013, AK 59859; Way to Mahakal cave, 20.02.2013, AK 59860.

5. *Pogostemon pumilus* (Graham) Press., *Bull. Brit. Mus. (Nat. Hist.) Bot.* 10: 74. 1982. *Mentha pumila* Graham, *Edinburgh New Philos. J.* 4: 393. 1828, non Host 1831. *Dysophylla crassicaulis* Benth. in Wall., *Pl. Asiat. Rar.* 1: 30. 1830; Hook. f., *Fl. Brit. India* 4: 640. 1885; Prain, *Bengal Pl.* 2: 851. 1903. *Dysophylla crassicaulis* var. *pumila* (Graham) Hook. f., *Fl. Brit. India* 4: 640. 1885; Prain, *Bengal Pl.* 2: 851. 1903. [Plate 181b; Fig. 86]

Ascending or erect herb, 10–25 cm high. Leaves 4 in whorls, sessile, linear-oblong, 7–20 × 1–3 mm, rounded, distantly serrate, subobtuse, chartaceous, scattered hairy when young, glabrous later, gland-dotted below. Inflorescence lateral and terminal spikes, pilose; verticillasters compact, few flowered; inflorescence bracts oblanceolate. Flowers subsessile; floral bracts linear. Calyx campanulate, pilose; tube 1–1.2 mm; lobes 5, triangular-ovate, 0.3–0.5 × 0.5–0.6 mm, ciliate, subacute. Corolla pale purple, tubular-campanulate; tube 0.5–1.2 mm, ring of hairs at middle of tube inside; upper lip 3-lobed, obovate, c. 1 mm across, obtuse; lower lip ovate, c. 1 mm across, subacute. Stamens 4, didynamous, exserted; filaments 2.5–3.5 mm, bearded at middle; anthers reniform. Ovary 4-lobed, c. 5 mm across; style

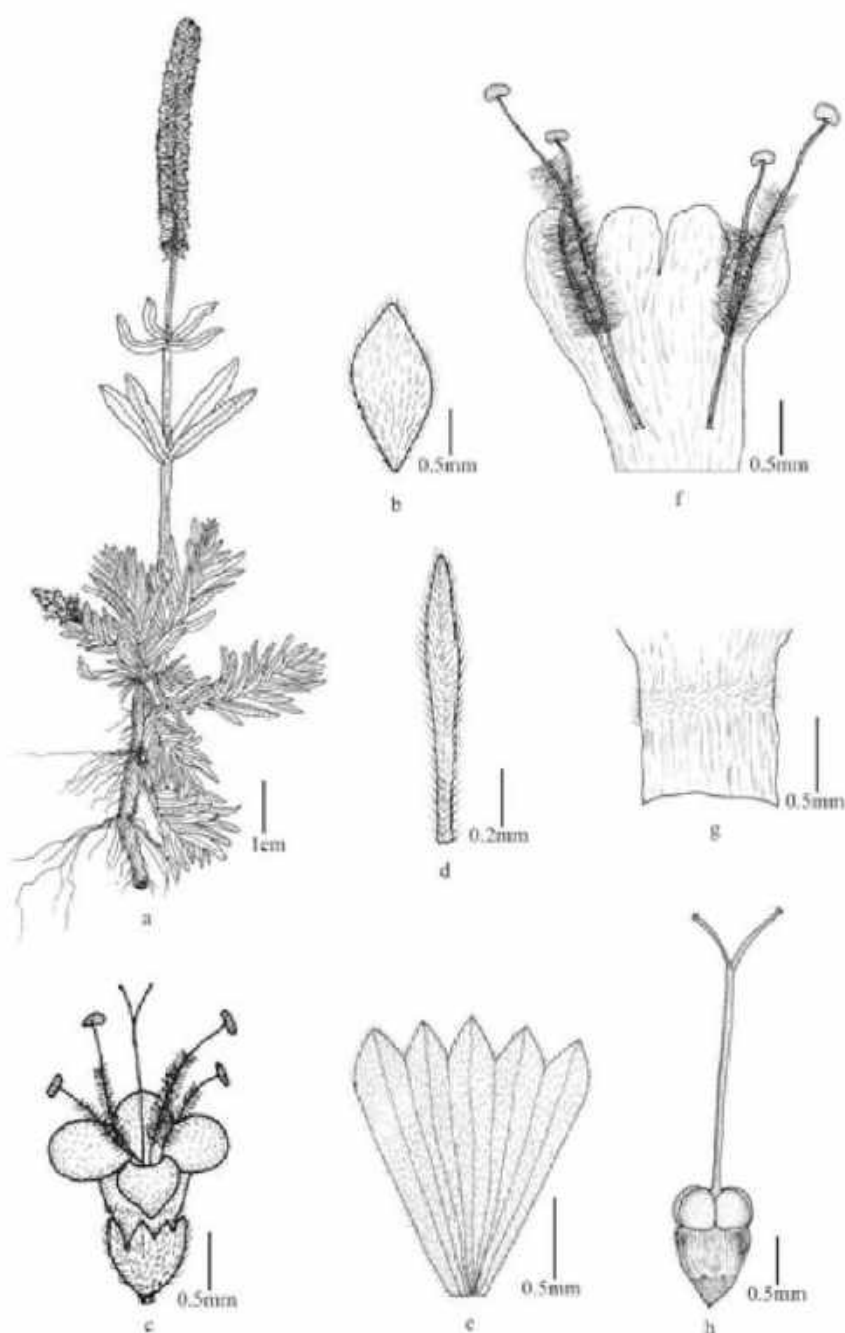


Fig. 86. *Pogostomon pumilus*: a. Flowering branchlet; b. Inflorescence bract; c. Flower; d. Floral bract; e. Calyx; f. Corolla split open showing stamens; g. Corolla tube showing a transverse row of hairs outside; h. Gynoecium (AK 55798).

c. 3 mm, exserted; stigma bifid with globose tips; disk obpyriform. Nutlets grey black, ellipsoid, faintly triquetrous, 0.6–0.8 × c. 0.5 mm, truncate at base, smooth, enclosed in persistent calyx.

Flowering & Fruiting: December–March.

Distribution. India: Assam, Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Odisha, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55798.

6. *Pogostemon stellatus* (Lour.) Kuntze, Revis. Gen. Pl. 2: 529. 1891 (as "*stellatum*"). *Mentha stellata* Lour., Fl. Cochinch. 2: 361. 1790, non Buch.-Ham. ex Roxb. 1832. *Dysophylla verticillata* Benth. in Wall., Pl. Asiat. Rar. 1: 30. 1830; Hook. f., Fl. Brit. India 4: 639. 1885; Prain, Bengal Pl. 2: 851. 1903. [Plate 181c-d]

Erect herb, 50–80 cm high. Leaves sessile, 4–10 in whorls, linear to linear-oblong, 3–85 × 2–4 mm, narrow, serrate, acute, subchartaceous, tuberculate above, punctate glandular below. Inflorescence lateral and terminal spikes, tomentose; verticillasters compact, few to many flowered; inflorescence bracts elliptic-lanceolate or oblanceolate. Flowers subsessile; floral bracts linear. Calyx campanulate, pubescent; tube c. 0.5 mm; lobes 5, minute, toothed, acute. Corolla pale purple, tubular-campanulate; tube c. 0.5 mm; upper lip 3-lobed, rounded, c. 2 mm across, ciliate, pilose; lower lip triangular-ovate, c. 0.5 mm across, ciliate, subacute, pilose. Stamens 4, didynamous; filaments 1.2–1.6 mm, sparsely bearded at middle; anthers minute. Ovary 4-lobed; style 1.2–1.5 mm; stigma bifid with globose tips; disk raised, 4-lobed. Nutlets pale brown to pale yellow, obovate, c. 0.5 mm across, dorso-ventrally compressed, smooth, enclosed in persistent calyx.

Flowering & Fruiting: July–October.

Distribution. India: Andhra Pradesh, Bihar, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Tamil Nadu and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56102.

14. *Salvia* L.

Salvia coccinea Buch'hoz ex Etl., Comm. Bot.-Med. *Salvia*: 23. 1777; Prain, Bengal Pl. 2: 859. 1903. [Plate 182a]

Erect herb, 30–40 cm high, villous. Leaves deltoid or ovate, 1.5–4.5 × 1–3 cm, truncate to subcordate, serrate, acute, subcoriaceous, appressed hairy. Inflorescence verticillasters, 6–8-flowered widely spaced, in terminal racemes; floral bracts ovate. Calyx campanulate-tubular, bilipped, finely pilose mixed with glands, glabrous inside, nerves prominent; tube 5–6 mm; upper lip ovate, c. 2.5 × 3 mm, ciliolate, mucronate; lower lip nearly as long as upper one, 2-toothed.

Corolla scarlet, tubular; tube c. 1.8 cm; lower lip c. 7 × 8.5 mm; upper lip shorter than lower. Stamens 2, exserted; filaments short; disk prominent. Ovary c. 2 mm; style shortly 2-fid. Nutlets ovoid-triangular, smooth, glabrous, basal scar small.

Flowering & Fruiting: April–November.

Distribution. India: Cultivated and naturalized almost throughout India.

Specimen examined: Jainti range, 09.10.2009, SKS & GK 46269.

15. *Teucrium* L.

Teucrium viscidum Blume, Bijdr. Fl. Ned. Ind. 14: 827. 1826. *Teucrium stoloniferum* Roxb., Fl. Ind. 3: 3. 1832; Hook. f., Fl. Brit. India 4: 700. 1885; Prain, Bengal Pl. 2: 860. 1903. [Plate 152b; Fig. 87]

Stoloniferous, erect herb, 30–60 cm high, retrorsely pubescent, with glandular hairs. Leaves ovate, 2.2–7 × 1–4.8 cm, truncate or shortly cuneate, serrate-crenate, acute, chartaceous, hirsute. Inflorescence axillary, lax, simple or panicles of slender racemes, glandular pubescent; floral bracts foliaceous, oblanceolate to elliptic, 3-toothed in lowest ones. Calyx campanulate, weakly bilipped, glandular pubescent; tube c. 2.5 mm; upper lip 3-lobed, triangular-ovate, 0.5–0.7 × 0.5 mm, obtuse to rounded, mid lobe slightly longer and subcircular; lower lip 2-lobed, triangular-ovate, 0.5–0.7 × c. 0.5 mm, obtuse. Corolla pinkish, tubular, 1-lipped; tube swollen, inflated above, c. 4 mm, glandular pubescent, pubescent at throat or else glabrous; upper lip absent; lower lip 3-lobed, mid lobe oblong-obovate, c. 1.6 mm; lateral lobes sub-rounded, c. 0.5 mm, rounded. Stamens 4, didynamous; filaments 2.5–3.5 mm; anthers elliptic. Ovary globose, 4-lobed, stipitate, glandular above; style quadrangular, c. 7 mm, glandular at base; stigma bifid. Nutlets subglobose, enclosed in fruiting calyx, glandular above.

Flowering & Fruiting: May–August.

Distribution. India: Arunachal Pradesh, Assam, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkawa, JKS 7008; Buxaduar to Achalung, 19.05.2014, AK 62663.

Plantaginaceae

Plantago L.

Plantago asiatica L. subsp. *erosa* (Wall.) Z. Yu Li, Fl. Reipubl. Popul. Sin.: 70: 328. 2002. *Plantago erosa* Wall., Fl. Ind. 1: 423. 1820. *Plantago major* sensu Hook. f., Fl. Brit. India 4: 705. 1885, non L. 1753. [Plate 182c; Fig. 88]

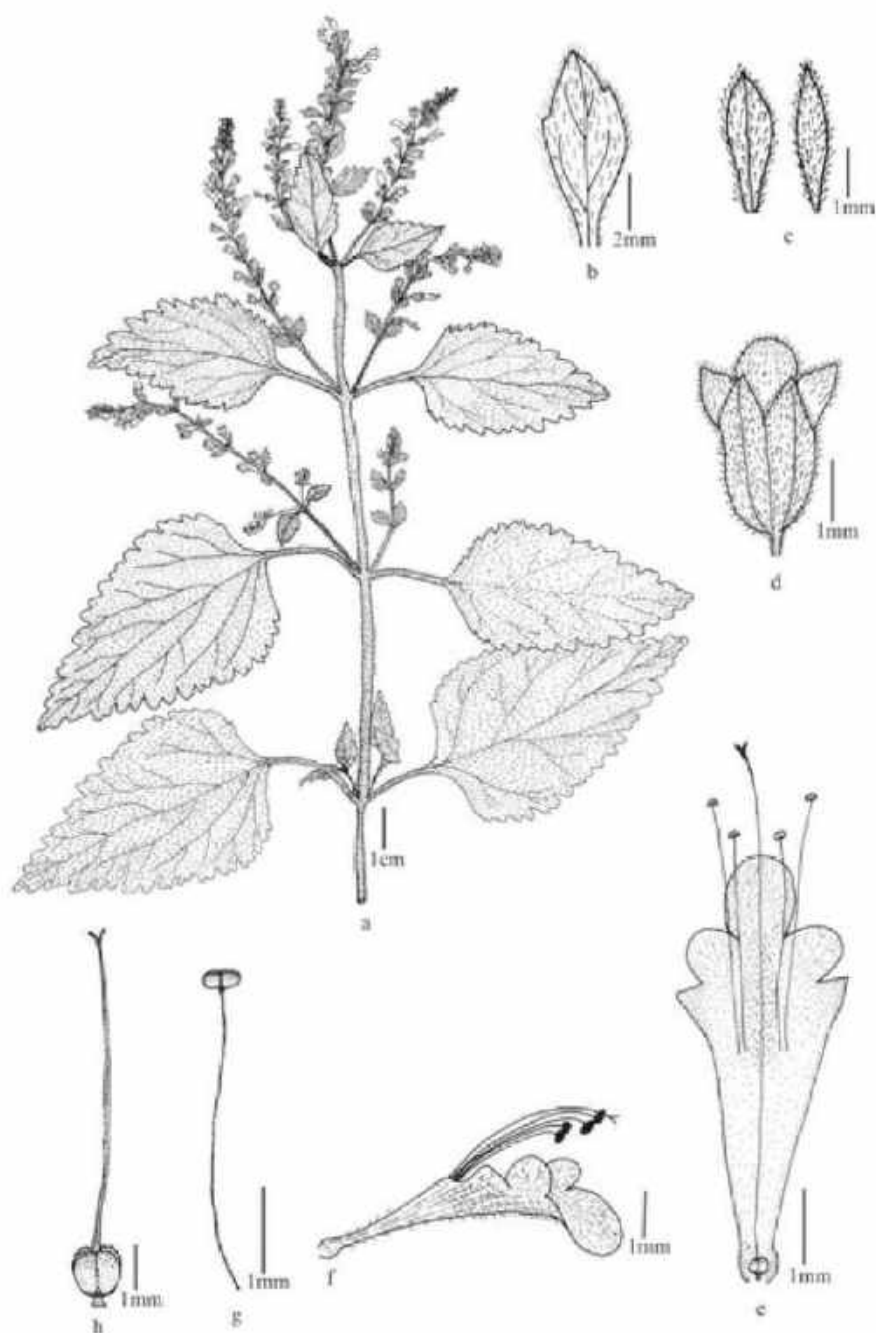


Fig. 87. *Teucrium viscidum*: a. Flowering branchlet; b. Lower floral bract; c. Upper floral bracts; d. Calyx; e. Corolla split open showing stamens and gynoecium; f. Lateral view of flower without calyx; g. Stamen; h. Gynoecium (AK 62663).

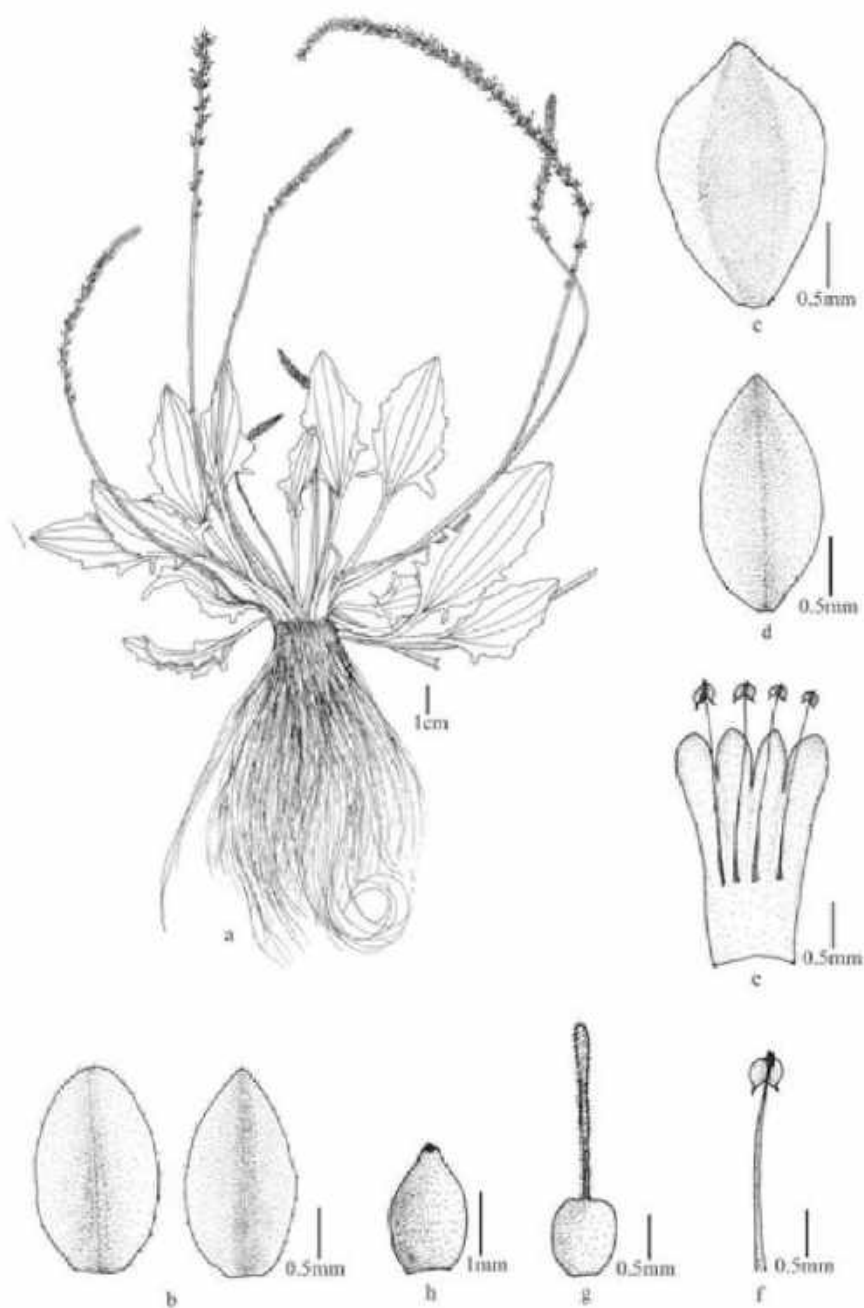


Fig. 88. *Plantago asiatica* subsp. *erosa*: a. Habit; b. Floral bracts; c. Outer sepal; d. Inner sepal; e. Corolla split open showing stamens; f. Stamen; g. Gynoecium; h. Capsule (AK 55972).

Botanical Survey of India

Acaulescent herb. Leaves rosulate, elliptic, 4–7 × 1.8–2.5 cm, attenuate, shallowly dentate and lobulate, subacute, chartaceous. Inflorescence erect to spreading scape, dense during flowering, lax in fruiting. Flowers sessile; floral bracts elliptic to ovate. Sepals 4 in 2 whorls, dissimilar, outer ones obovate, inner 2 elliptic, hyaline, hairy or glabrous, subacute to subobtuse with apical cusp, 1-nerved. Corolla tubular; tube c. 2 mm; lobes 4, suborbicular or ovate, obtuse or subacute. Stamens 4, exserted; filaments c. 2 mm; anthers suborbicular, spurred at base, connective acutely protrude. Ovary black, subglobose; style 1.6–1.8 mm, pubescent; stigma minute, pubescent. Capsules ovoid, blunt at apex, faintly grooved; seeds black, ellipsoid to ovoid, compressed, tuberculate.

Flowering & Fruiting: December–March.

Distribution. India: Almost throughout India.

Specimens examined: Way to Sinchu, JKS 6914; Rydak river belt, 26.02.2012, AK 55972.



Plate 183: a-b. *Boerhaavia diffusa*; c-d. *Achyranthes aspera*

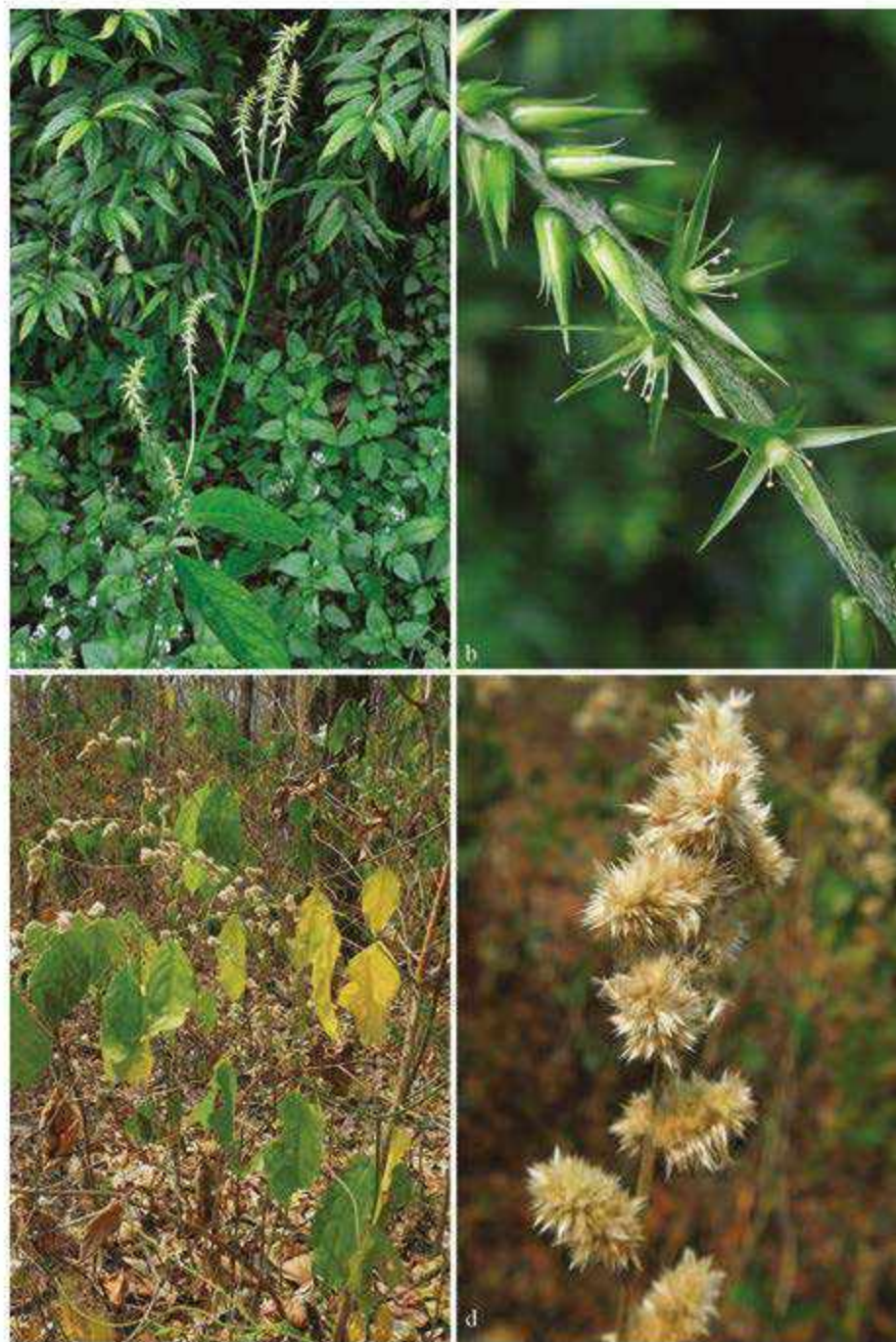


Plate 184: a-b. *Achyranthes bidentata*; c-d. *Asruva sanguinolenta*



Plate 185: a-b. *Alternanthera ficoidea*; c-d. *Alternanthera paronychioides*



Plate 186: a-b. *Alternanthera versilis*; c-d. *Amaranthus spinosus*



Plate 187: a-b *Cyathula prostrata*; c-d. *Doeringia amaranthoides*



Plate 188: a. *Perisicaria barbata*; b-c. *Perisicaria capitata*; d. *Perisicaria chinensis*



Plate 189: a. *Pericaria hydrociper*; b. *Pericaria nepalensis*; c. *Pericaria strigosa*; d. *Pericaria rensinata*

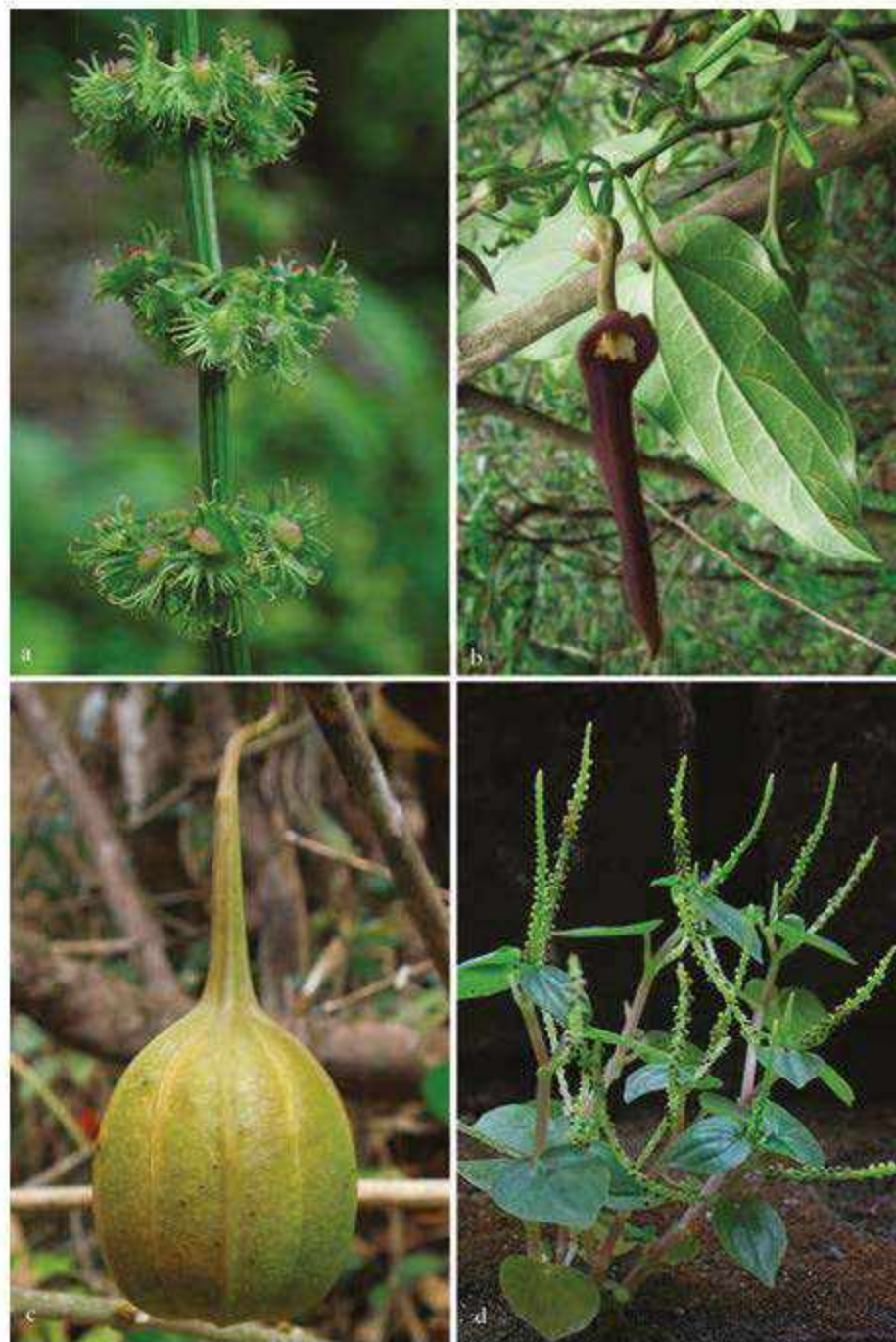


Plate 190: a. *Eumex maritimus*; b-c. *Aristolochia acuminata*; d. *Peperomia pellucida*



Plate 191: a. *Piper beteloides*; b-c. *Piper longum*; d. *Piper umilana*



Plate 192: a-b. *Piper paeupaloides*; c. *Piper sulpignua*; d. *Piper thomsonii*



Plate 193: a-b *Chloranthus alatiflorus*; c. *Howafieldia kingii*; d. *Actinodaphne obovata*



Plate 194: a-c. *Actinodaphne sikkimensis*; d. *Bellischnidia assamica*



Plate 195: a. *Ballochmidia dalzellii*; b-d. *Cryptocarya amygdalina*



Plate 196: a-b. *Litsea cubeba*; c-d. *Litsea monopetala*



Plate 197: a-b. *Litsea salicifolia*; c-d. *Machilus glaucescens*

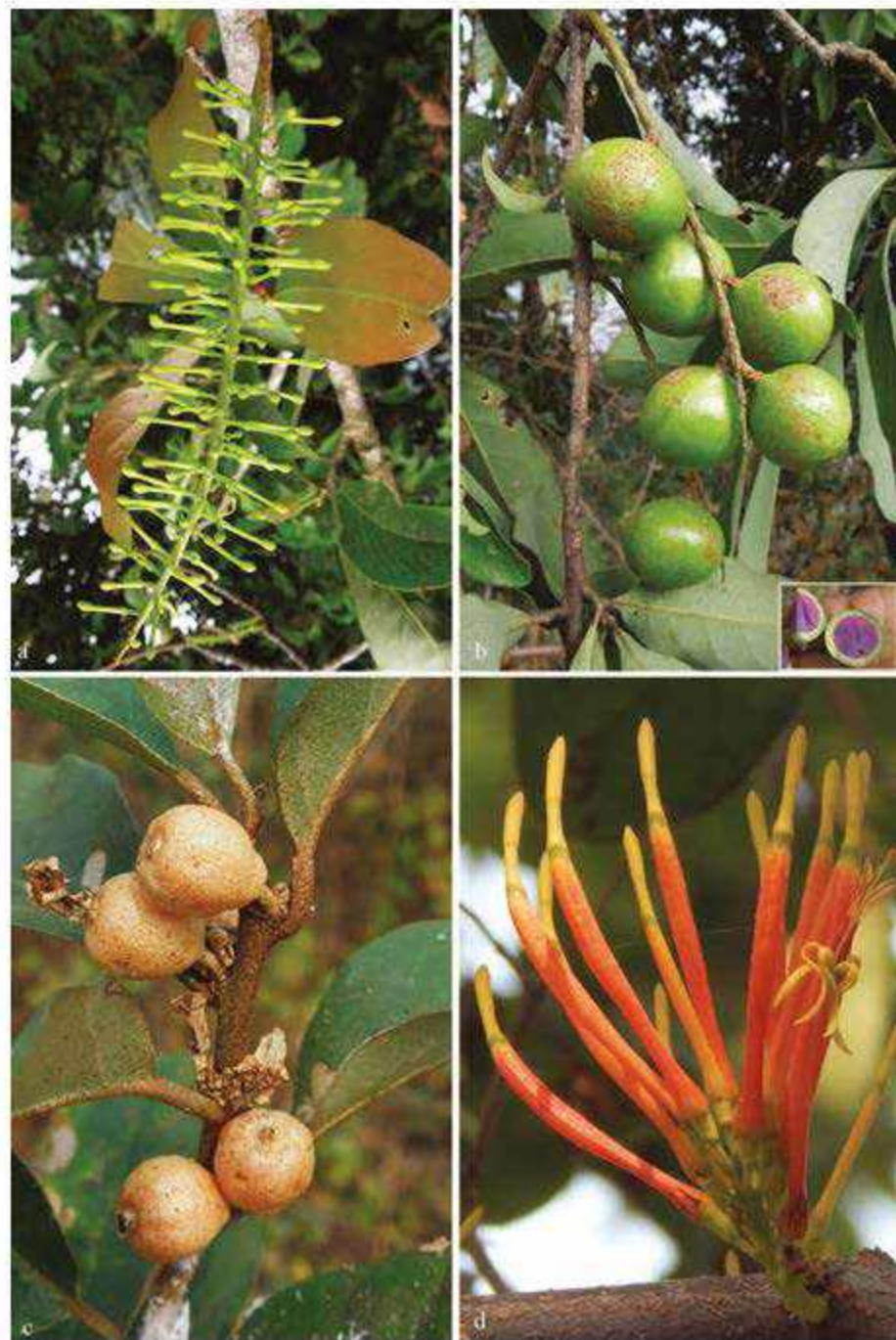


Plate 198: a-b. *Helicla nflagirica*; c. *Elaeagnus pyriformis*; d. *Dendrophthoe falcata*





Plate 200: a. *Macrosolan globosus*; b-d. *Scorria gracilifolia*



Plate 201: a-c. *Scarrula parasitica*; d. *Tolypanthus involucreatus*

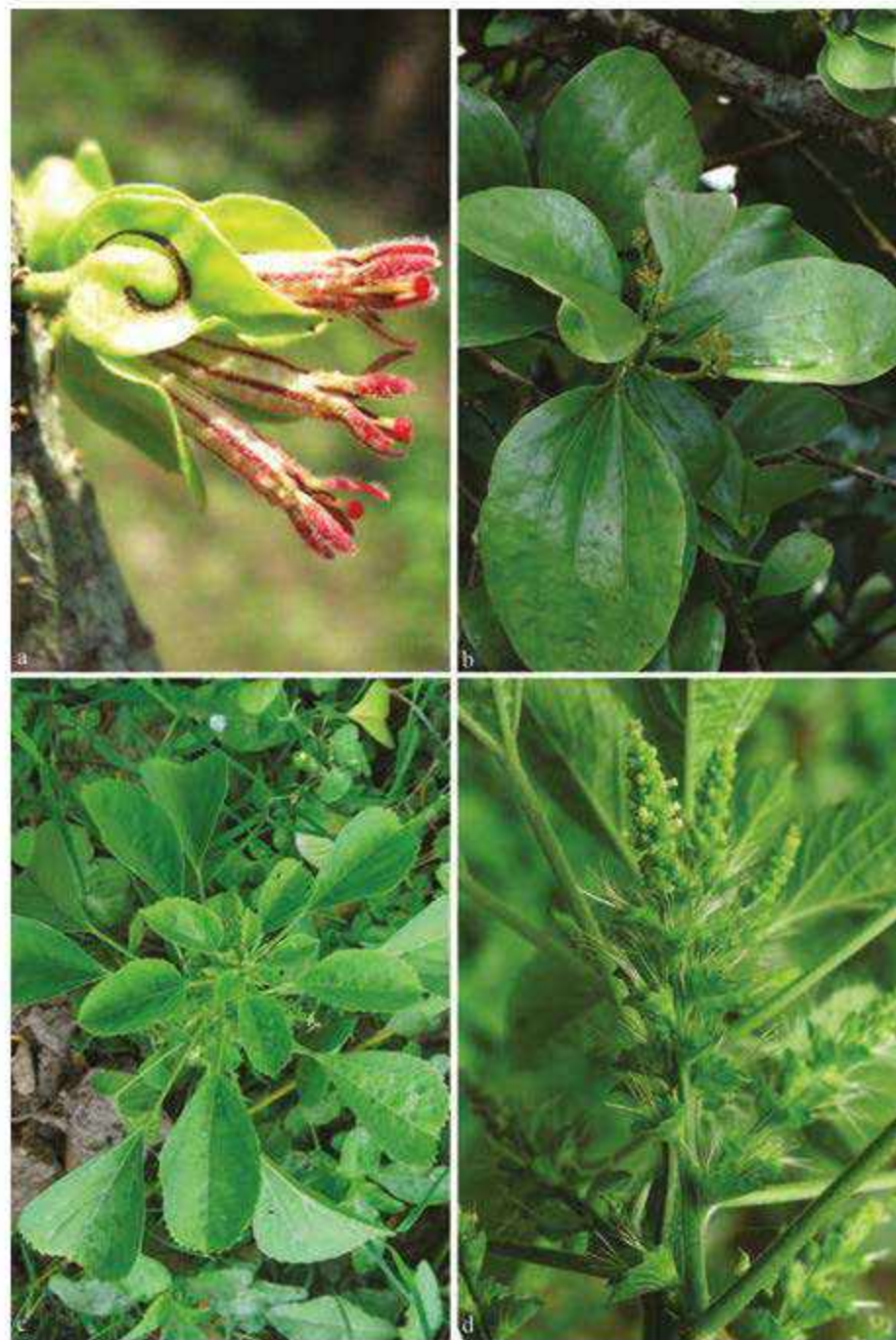


Plate 202: a. *Tolypanthus involucreatus*; b. *Dufrenoya platyphylla*; c-d. *Acalypha indica*

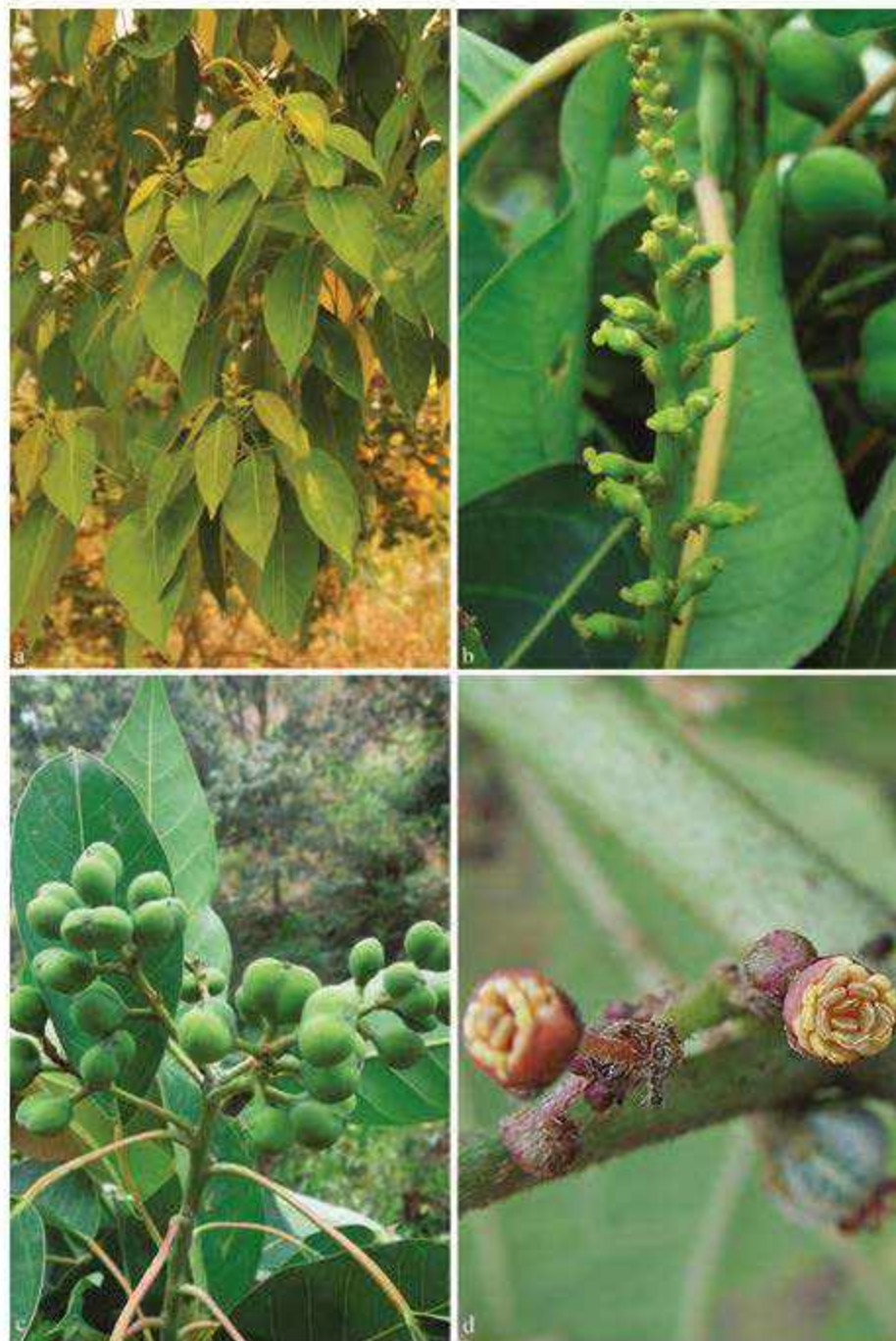


Plate 203: a-c. *Balakata baccata*; d. *Baliosperum solarifolium*



Plate 204: a-b. *Baliospermum solanifolium*; c. *Cleoerylon khasianum*



Plate 205: a-b *Croton candidus*; c-d. *Croton persimilis*



Plate 206: a. *Drypetes amara*; b. *Euphorbia thymifolia*; c-d. *Falconeria insignis*



Plate 207: a-b. *Jatropha curcas*; c. *Macaranga denticulata*; d. *Mallotus undiflorus*

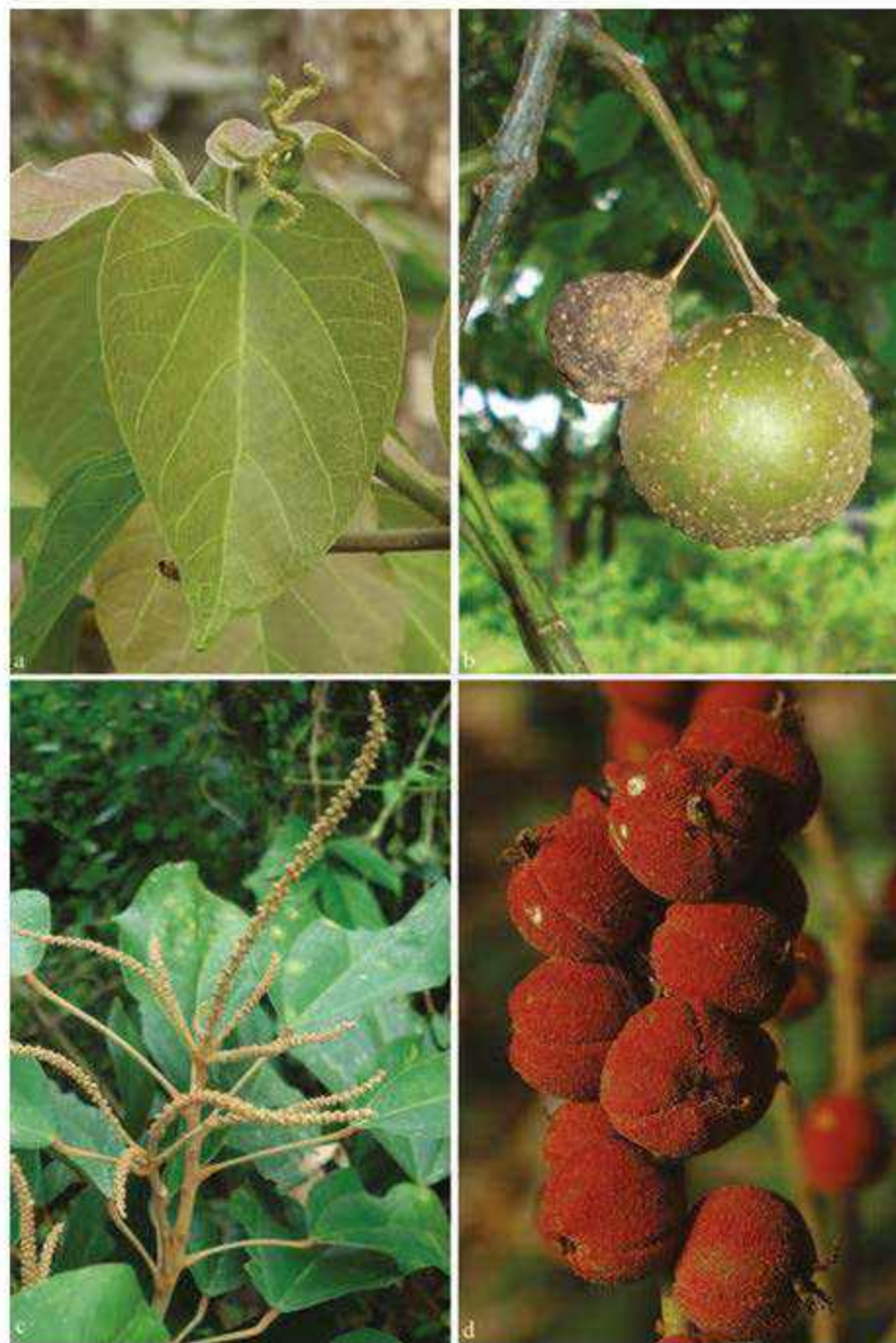


Plate 208: a-b. *Mallotus undiflorus*; c-d. *Mallotus philippensis*

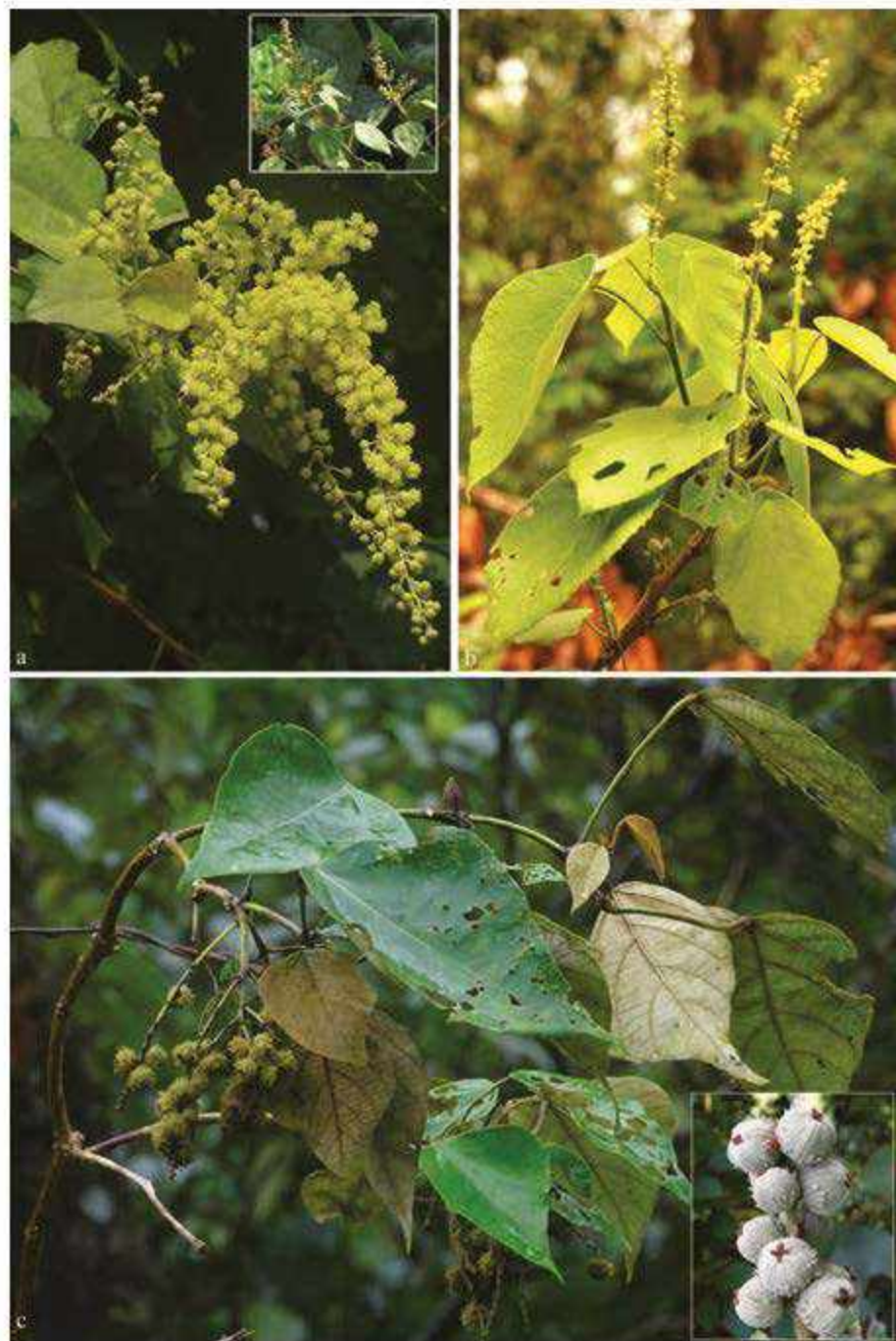


Plate 209: a. *Mallotus repandus*; b. *Mallotus roxburghianus*; c. *Mallotus tetracoccus*



Plate 210: a-b. *Ostodes paniculata*; c. *Ricinus communis*



Plate 211: a. *Elcims commensis*; b. *Antidesma bunius*; c-d. *Apocosa octandra*



Plate 212: a. *Apocosa octandra*; b-c. *Baccarea ramiflora*

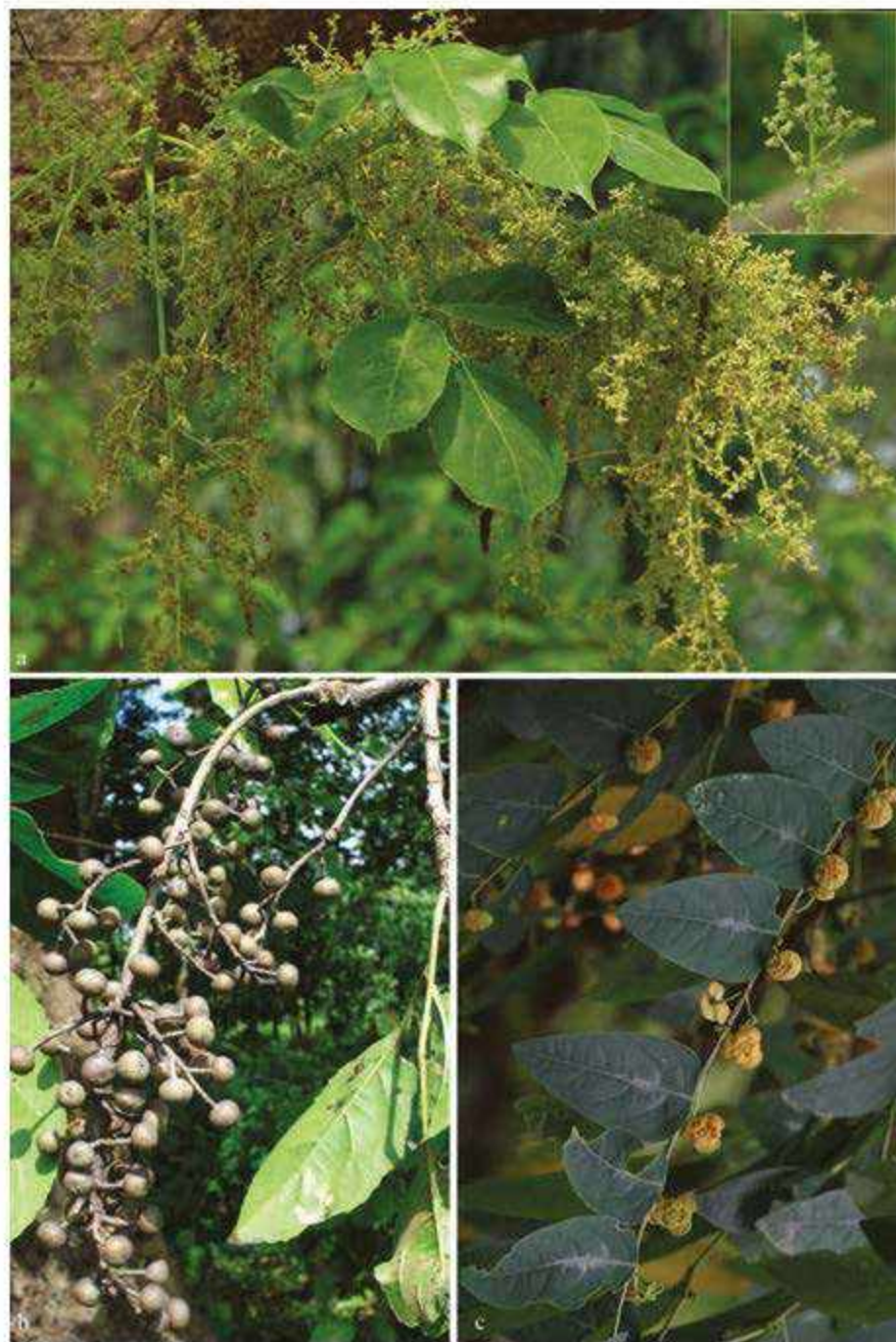


Plate 213: a-b. *Bischofia javanica*; c. *Breynia androgyna*



Plate 214: a-b. *Breynia androgynua*; c-d. *Breynia rigida*



Plate 215: a. *Breyenia rigida*; b-d. *Breyenia trinervis*



Plate 216: a-c. *Breyeria vitthidanae*; d. *Bridelia retusa*

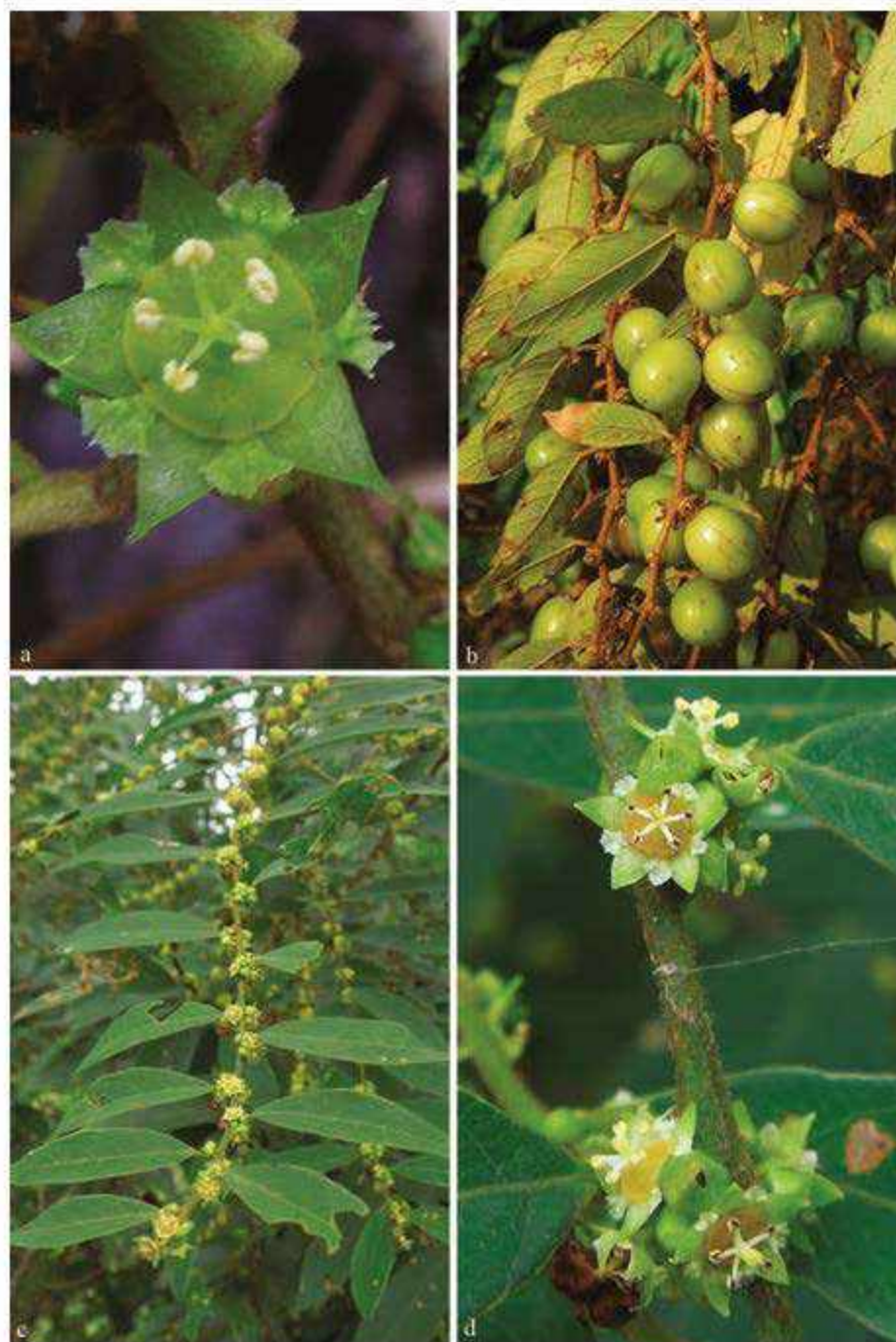


Plate 217: a-b. *Bridella stipularis*; c-d. *Bridella tomentosa*



Plate 218: a. *Bridelia tomentosa*; b. *Flueggea virosa*; c-d. *Glochidion ellipticum*

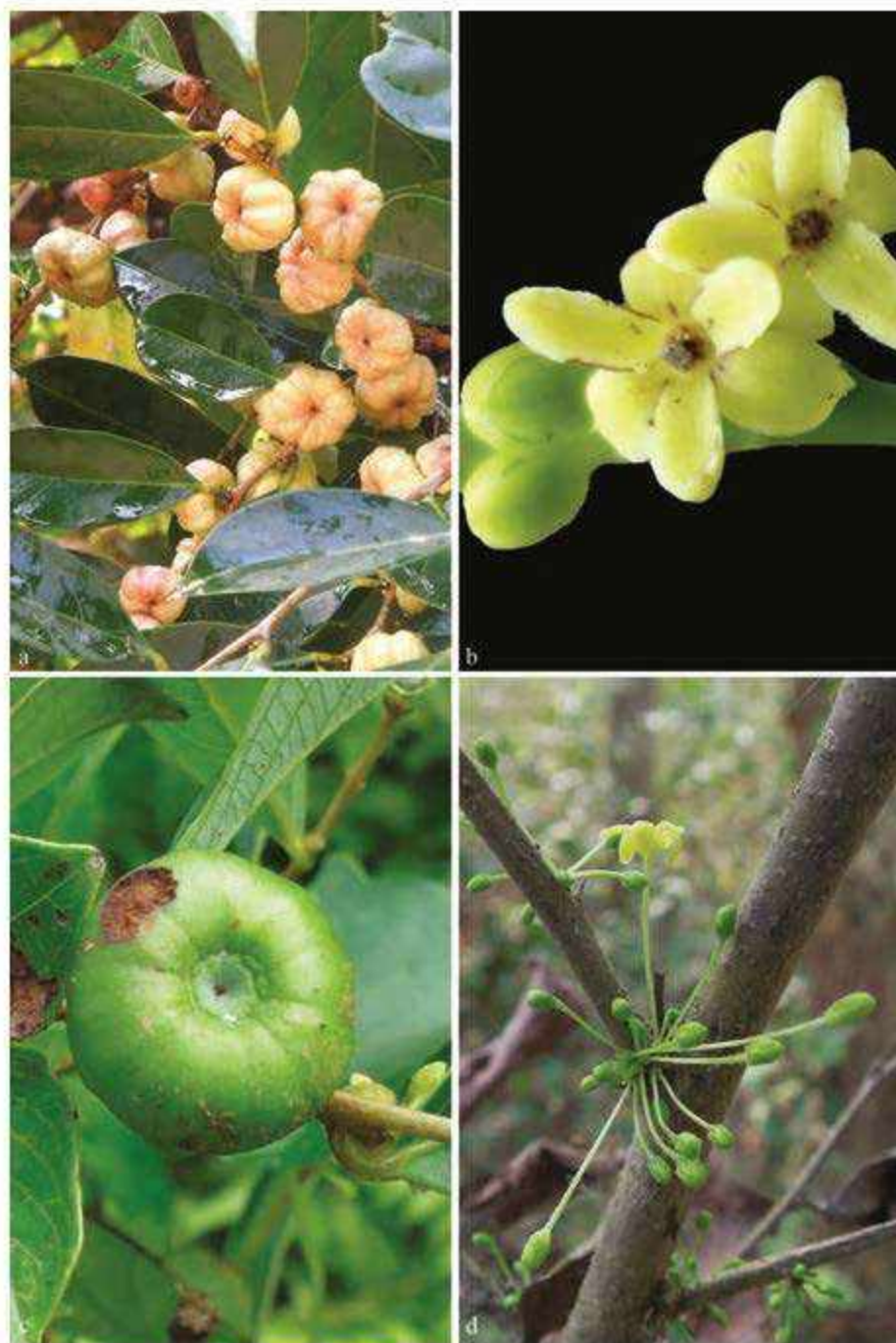


Plate 219: a. *Glochidion lanceolarium*; b-c. *Glochidion multiloculare*; d. *Glochidion* subgenum



Plate 220: a-b *Glochidion zeylanicum* var. *tomentosum*; c-d. *Phyllanthus siry-shawii*



Plate 221: a-b. *Phyllanthus amarus*; c. *Phyllanthus emblica*; d. *Phyllanthus reticulatus*



Plate 222: a-b. *Phyllanthus sikkimensis*; c-d. *Phyllanthus simplex*



Plate 223: a-c. *Phyllanthus urinaria*; d. *Boehmeria glomerulifera*

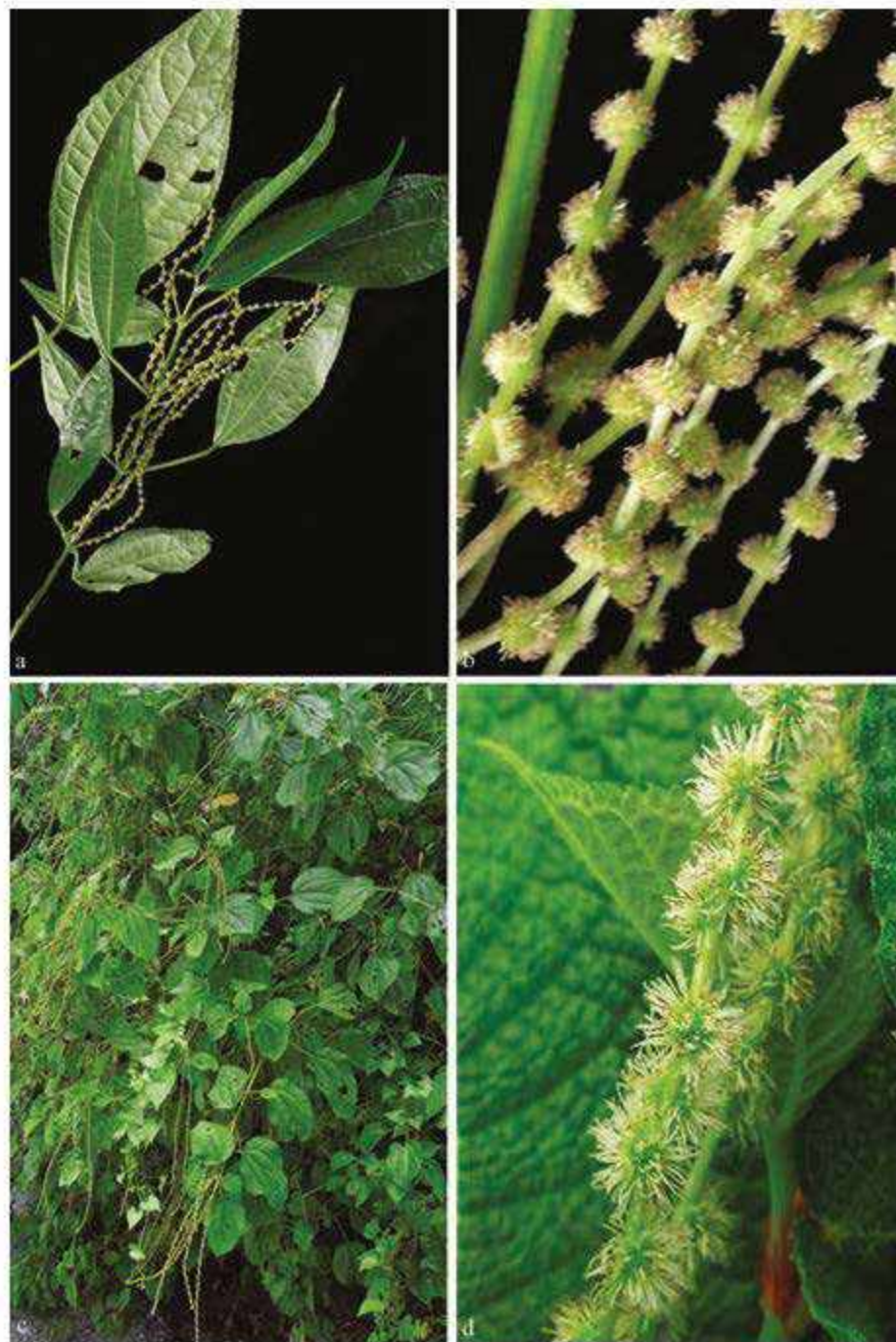


Plate 224: a-b. *Boehmeria hamiltoniana*; c-d. *Boehmeria macrophylla*



Plate 225: a-b. *Boehmeria penduliflora*; c. *Heterostema lineolatum*



Plate 226: a. *Elatostema parvum*; b-c. *Elatostema platyphyllum*; d. *Girardinia diversifolia*

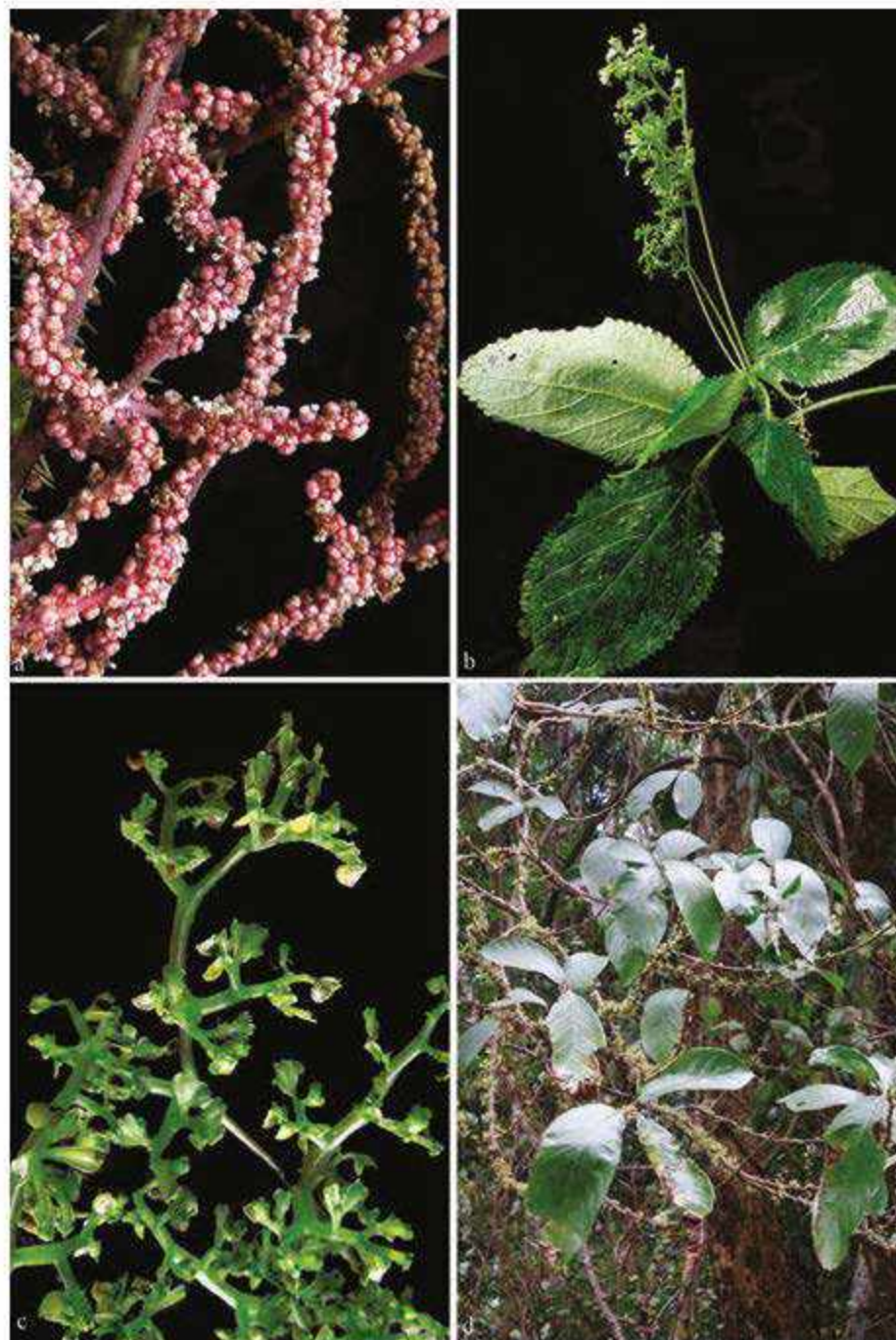


Plate 227: a. *Girardinia diversifolia*; b-c. *Laportea bulbifera*; d. *Oreocnide rubescens*



Plate 228: a-b. *Oreocnide rubescens*; c-d. *Pilea anisophylla*



Plate 229: a. *Pilea antisophylla*; b. *Pilea microphylla*; c-d. *Pilea papillosa*



Plate 230: a-b. *Fokkiospermum lanceolatum*; c. *Fouzolzia hirta*; d. *Fouzolzia sanguinea*

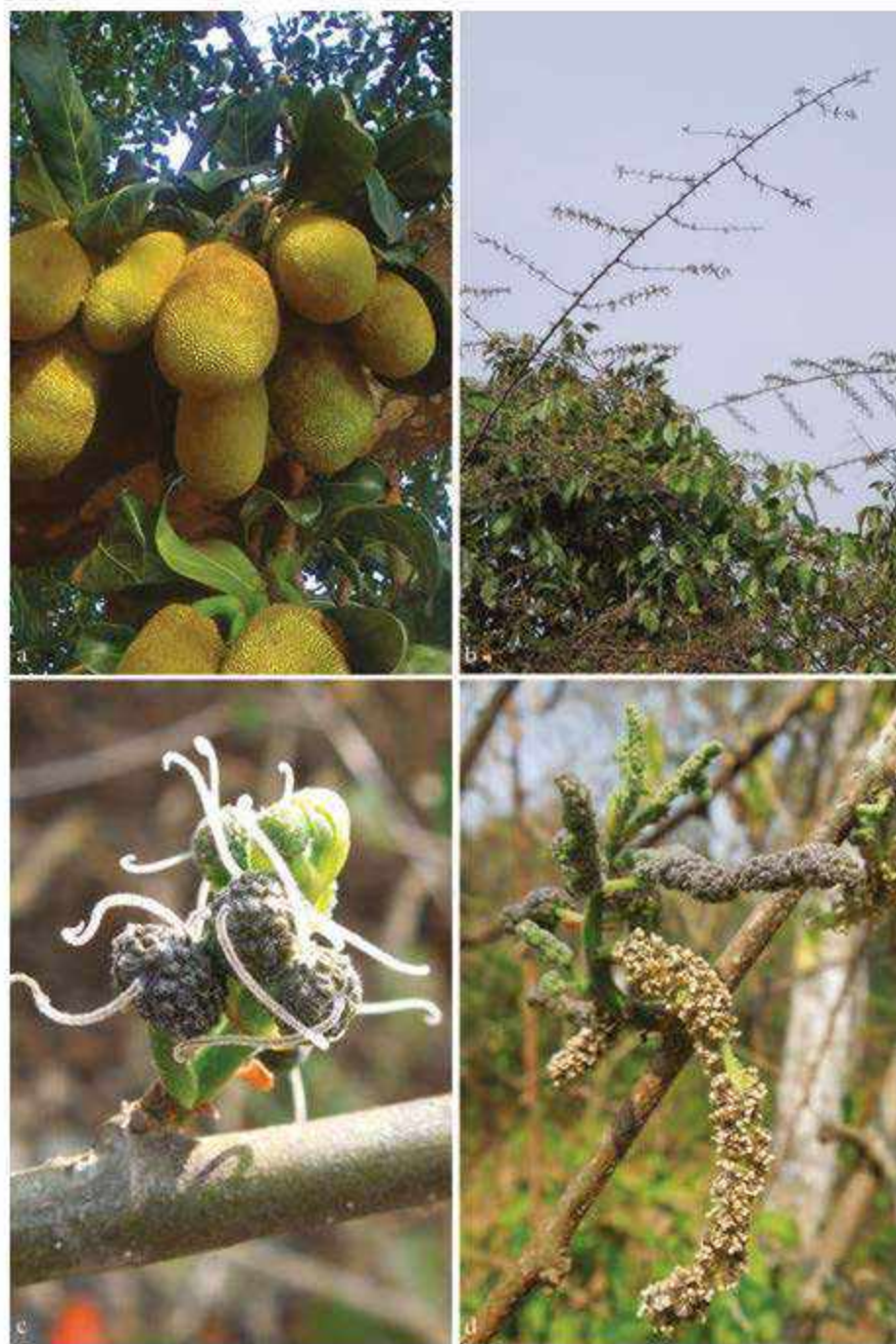


Plate 231: a. *Artocarpus heterophyllus*; b-d. *Bromsonetia kurzii*



Plate 232: a. *Ficus altissima*; b. *Ficus auriculata*; c. *Ficus benjamina*; d. *Ficus cartipoo*



Plate 233: a. *Ficus curtipes*; b-c. *Ficus cyrtophylla*; d. *Ficus stuloea*

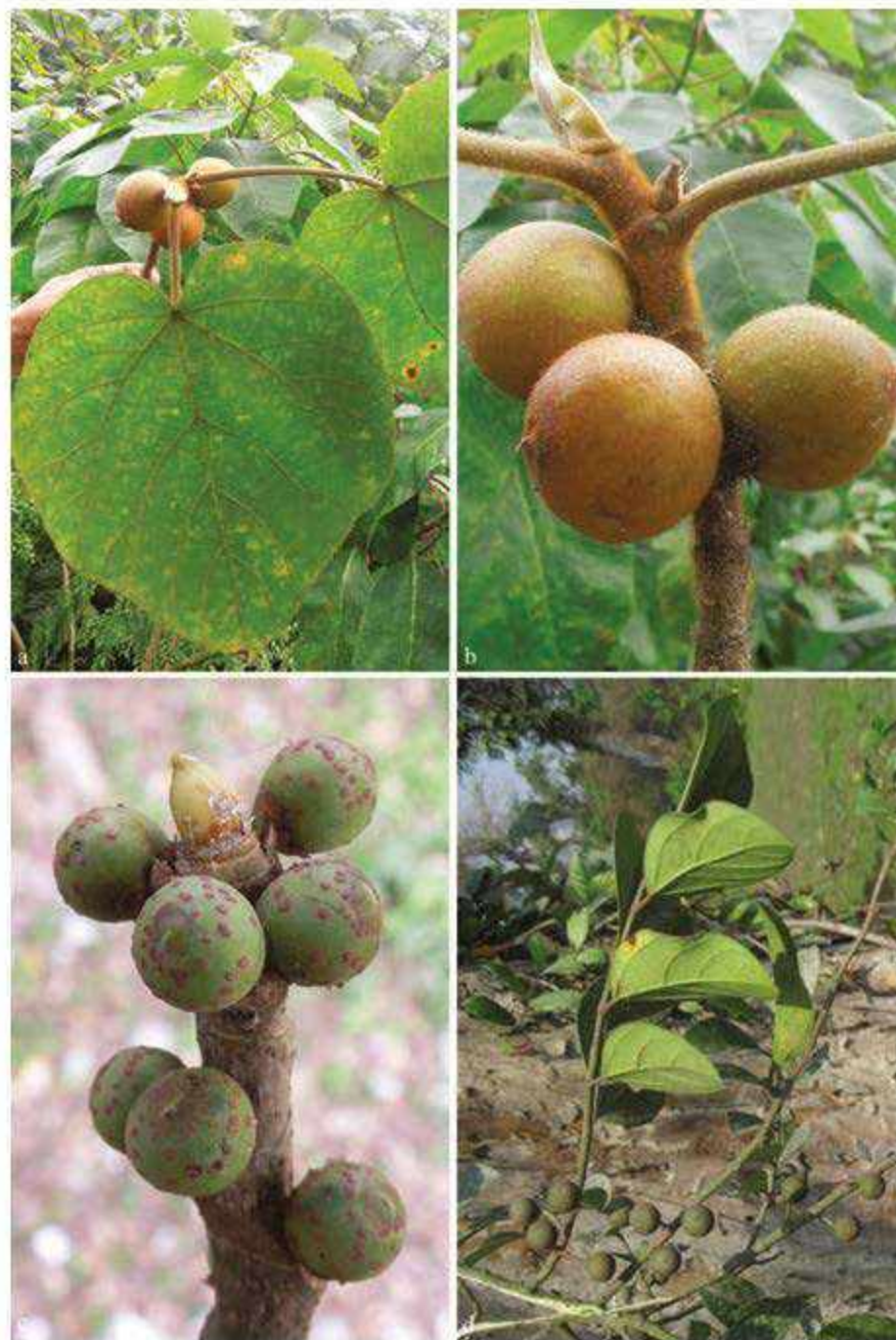


Plate 234: a-b. *Ficus fulva*; c. *Ficus geniculata*; d. *Ficus hederacea*



Plate 235: a. *Ficus hederacea*; b. *Ficus heterophylla*; c-d. *Ficus heteroploura*

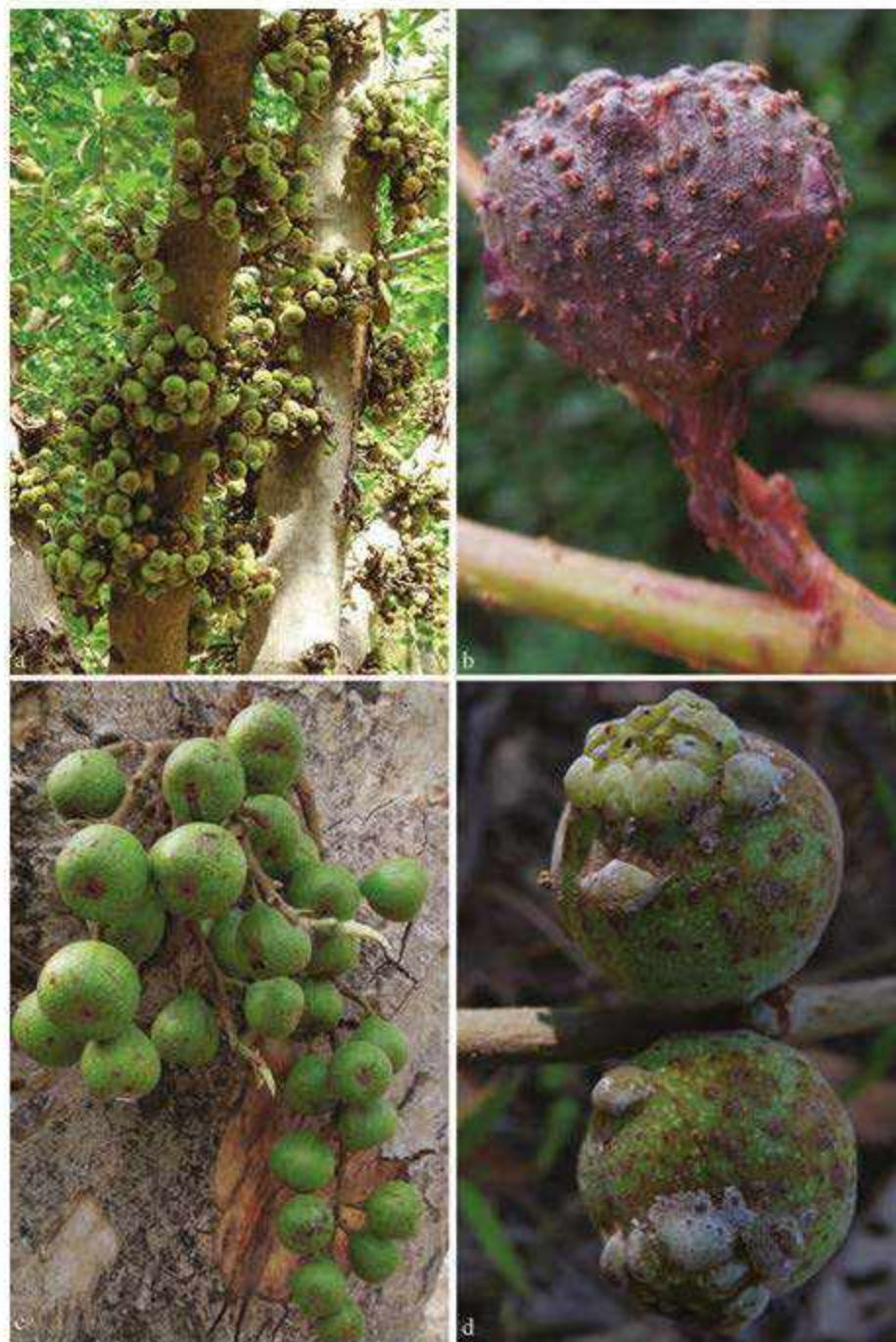


Plate 236: a. *Ficus hispida*; b. *Ficus prostrata*; c. *Ficus racemosa*; d. *Ficus semicordata*



Plate 237: a. *Maclura cochinchinensis*; b. *Morus indica*; c. *Streblus asper*; d. *Engelhardtia spicata*

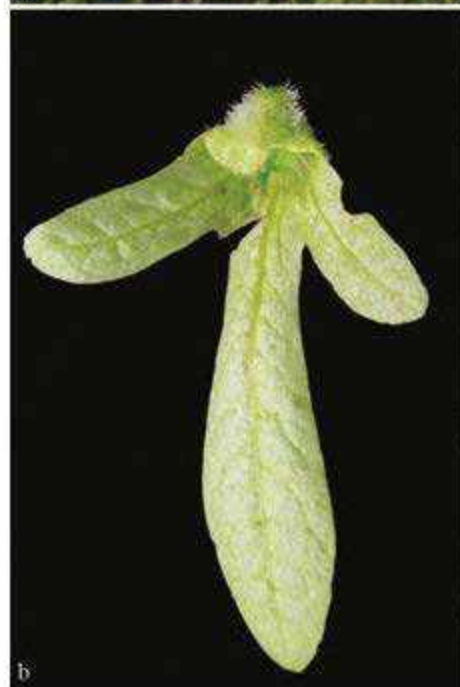


Plate 238: a-c. *Engalkhardtia spicata*; d. *Curtanopsis indica*



Plate 239: a-b. *Castanopsis indica*; c-d. *Castanopsis lanceifolia*

3. Monochlamydeae

Key to the families

- | | | |
|------|--|-------------------------|
| 1a. | Flowers bisexual, rarely unisexual (excl.: some genera in Chenopodiaceae, Loranthaceae, Elaeagnaceae and Lauraceae) | 2 |
| 1b. | Flowers unisexual, rarely bisexual (excl.: some genera in Piperaceae) | 11 |
| 2a. | Ovary inferior | 3 |
| 2b. | Ovary superior | 5 |
| 3a. | Scandent herbs or shrubs; leaves alternate; stamens twice as many as perianth lobes; disk absent; gynostegium present; ovary partially 6 (5-4)-loculed; ovules many in each locule; fruits capsules | Aristolochiaceae |
| 3b. | Epiphytic shrubs, parasitic or not; leaves opposite; stamens as many as perianth lobes; disk present; gynostegium absent; ovary 1-loculed; ovule solitary; fruits drupes/berries | 4 |
| 4a. | Epiphytic rarely terrestrial semi-parasitic shrubs; perianth corolline, simple or sometimes double, the inner coloured large, the outer minute ovule solitary, erect from the base of the ovary but at first not clearly distinguishable from the tissues of the inner carpellary wall | Loranthaceae |
| 4b. | Semi-parasitic on roots; terrestrial herbs, shrubs or trees frequently; perianth always simple, calycine or corolline; ovules 3, 2 or solitary; pendulous from the tip or below the tip of a free funicular central axis | Santalaceae |
| 5a. | Seeds without albumen | 6 |
| 5b. | Seeds usually with copious albumen | 8 |
| 6a. | Perianth-tube constricted above the ovary; fruits usually nuts, covered by thickened fleshy perianth base; seeds basal | Elaeagnaceae |
| 6b. | Perianth-tube not constricted above the ovary, lobes rather long | 7 |
| 7a. | Perianth-lobes valvate; stamens always 4 in one series; ovules solitary or 2 (collateral) or several (2-seriate) | Proteaceae |
| 7b. | Perianth-lobes imbricate; stamens often in 2, rarely in 3 series; ovules pendulous | Lauraceae |
| 8a. | Leaves stipulate, stipules connate in a tube around the nodes | Polygonaceae |
| 8b. | Leaves exstipulate; or if stipules present, then minute or reduced to tubercles | 9 |
| 9a. | Flowers usually bisexual; perianth tubular below, valvate to plicate lobed above; fruits 1-seeded achene surrounded by persistent base of perianth tube | Nyctaginaceae |
| 9b. | Flowers bisexual/unisexual; perianth-lobes united only at the base, always imbricate; fruits capsules, or berries or achenes | 10 |
| 10a. | Inflorescences in spikes; perianth scarious, dry; flowers usually bracteate and bracteolate; ovules suspended on basal funicles; fruits/utricles/circumscissile capsules/rarely berries | Anacardiaceae |

The Flora of Buxa Tiger Reserve, West Bengal, India

- 10b. Inflorescences in clusters, often ball-like and branched; perianth membranous; flowers usually exsertate and bracteolate; ovule basal or lateral; fruits schenous
Chenopodiaceae
- 11a. Leaves exstipulate; perianth sepaloid
Myrsinaceae
- 11b. Leaves stipulate or if stipules absent (Piperaceae) the flowers bisexual; perianth absent
12
- 12a. Leaves pinnately compound; flowers in catkins; ovary syncarpous, 1-locular; placentas 2 or 4, not intruded; ovules on each placenta 4 or more 2-seriately superposed; seeds with coma of long hairs
Juglandaceae
- 12b. Leaves simple or palmately compound; flowers not in catkins; ovary monocarpellary 1-locular, or if syncarpous 2 or more locular; ovules solitary or 2 (collateral) in each locule; seeds not as above
13
- 13a. Ovary 1-locular; 1-ovuled
14
- 13b. Ovary 2 to many locular; 2-ovuled in each locale
19
- 14a. Seeds with copious albumen, embryo minute
15
- 14b. Seeds with little or no albumen and large embryo present
16
- 15a. Herbs; leaves alternate, rarely opposite (excl.: some *Peperomia* sp.); flowers usually unisexual, rarely bisexual; stamens 1-10; filaments usually free; anthers 2-locular
Piperaceae
- 15b. Shrubs; leaves opposite; flowers spuriously bisexual, male and female connate on a bract; stamens 1 or 3, confluent; anthers 1-or 2-loculed
Chloranthaceae
- 16a. Fruits samaras or drupes
Ulmaceae
- 16b. Fruits schenous
17
- 17a. Trees/shrubs/lianas with milky or watery latex, sometimes spiny, devoid of stinging hairs; leaves pinnately veined or palmately 3-5-veined at base, glabrous or hairy, cystoliths absent; flowers minute, in heads, racemes or catkins/syconiums; filaments not reflexed; ovule 1, basal
Moraceae
- 17b. Herbs/shrubs/rarely trees, very rarely climbing, stems often fibrous, sometimes succulent, and (or) stinging hairy; leaves palmately 3-veined at base or pinnately veined, punctate or linear cystoliths present; flowers minute, usually in clusters or heads, sometimes aggregated into cymes or panicles, usually unisexual, filaments usually reflexed; ovule 1, pendulous
18
- 18a. Leaves palmately compound; pistillode absent; styles 2, central, subulate or filiform, stigmatose inside; embryo curved or spiral
Cannabaceae
- 18b. Leaves simple; pistillode often present; style simple, or absent; embryo straight
Urticaceae

Botanical Survey of India

- 19a. Monoecious; leaves simple; male flowers in spikes or catkins; female flowers in spikes or in fascicles; fruits 1-seeded nut, pericarp hard, exarillate **Eugeniaceae**
- 19b. Monoecious or dioecious; leaves simple/pinnately or rarely palmately compound; inflorescences variable, but male inflorescences never catkins; fruits capsule/ baccate/drupe, 1-many seeded, pericarp leathery, arillate or not 20
- 20a. Ovules 1 per locule; indumentum simple, stellate, scale-like, glandular, or stinging hairs; latex present or absent; leaves mostly spiral, less often distichous, sometimes lobed, margins entire or variously toothed, often with glands/extra-floral nectaries on petiole apex/leaf base and/or margins; inflorescence axillary or terminal, often thyrsoid or cymose, sometimes pseudanthial, rarely sessile clusters; seeds sometimes carunculate **Euphorbiaceae**
- 20b. Ovules 2 per locule; indumentum simple, very rarely branched hairy; latex absent; leaves often strongly distichous, never lobed, margins entire or finely serrulate (3-foliate and toothed in *Bischofia*), usually without glands (present in *Aporosa*); inflorescence mostly axillary; often without visible axis; seeds not carunculate, sometimes arillate **Phyllanthaceae**

Nyctaginaceae

Boerhavia L.

Boerhavia diffusa L., Sp. Pl. 1: 3. 1753. *Boerhavia repens* L. var. *diffusa* (L.) Hook. f., Fl. Brit. India 4: 709. 1885; Prain, Bengal Pl. 2: 863. 1903. [Plate 183a-b]

Prostrate herb, pubescent. Leaves orbicular to cordate, 1.6–3.6 × 1.6–3.4 cm, subcordate or rounded-cuneate, wavy, obtuse or micro-acute at apex, pubescent. Inflorescence axillary, corymbose cymes, pubescent; bracts ovate, pubescent. Perianth pink purple, campanulate; tube short, pubescent; lobes obovate. Stamens 3, at base of perianth tube; filaments slightly connate at base; anthers reniform. Ovary obovate, ribbed, glandular pubescent; style short; stigma discoid, peltate. Fruits elliptic-oblong, 5-ribbed, glandular pubescent; seeds many.

Flowering & Fruiting: August–November.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, JKS 4089; Santrabari, 09.10.2009, SKS & GK 46261; Kumargram, Kalikhola river belt, 21.09.2011, AK 52709; Newlands, Sukno river, 22.09.2011, AK 52768; Rangamati to Bharnabari, 06.10.2012, AK 58704.

Uses: The leaves are used as vegetable; and root extract is used to cure diarrhea.

Amaranthaceae

Key to the genera

- 1a. Scandent shrubs; flowers distant in spike-like racemes; fruits berries, red; seeds 1–6 **6. Deeringia**

- 1b. Erect, decumbent, straggling, prostrate or diffuse herbs or shrubs; flowers clustered in spike-like racemes/spikes/heads; fruits utricles, not red; seed solitary 2
- 2a. Flowers in clusters, composed of 1-2 central fertile flowers and outer 1-2 sterile flowers with perianth lobes reduced to hooked awns; filaments connate below in a hypogynous membranous cup 3. *Cyathula*
- 2b. Flowers not as above; filaments free or connate below but not in a hypogynous membranous cup 3
- 3a. Inflorescences cylindric spikes, not narrowed at apex; flowers basipetally deciduous; perianth lobes slightly connate at base, 5-nerved; utricles circumscissile 7. *Psilotrichum*
- 3b. Inflorescences not cylindric spikes, if cylindric, then gradually narrowed at apex; flowers persistent; perianth lobes free, 1-3-nerved; utricles not circumscissile (except *Amaranthus spinosus* and *A. tricolor*) 4
- 4a. Leaves opposite 5
- 4b. Leaves alternate (opposite in lower part in *Aerva sanguinolenta*) 6
- 5a. Erect herbs; flowers in elongate spikes, pendent; bracteoles spinose; stamens connate at base to staminodes and form staminal column 1. *Achyranthes*
- 5b. Prostrate or diffuse herbs or undershrubs; flowers in compact heads, not pendent; bracteoles not spinose; stamens connate at base to staminodes but not form staminal column 3. *Alternanthera*
- 6b. Suffrutescent, straggling undershrubs; flowers bisexual; filaments connate at base; staminodes present; styles 2; stigma simple; utricles not rugose; seeds reniform 2. *Aerva*
- 6a. Erect herbs; flowers unisexual; filaments free; staminodes absent; style solitary; stigma 3-lobed; utricles rugose; seeds rounded 4. *Amaranthus*

1. *Achyranthes* L.

Key to the species

- 1a. Stems woody at base; floral bracts rhomboid, hairy at margins throughout; bracteoles ovate-lanceolate, not winged; stamens pink; staminodes fimbriate; ovary rhomboid 1. *A. aspera*
- 1b. Stems not woody at base; floral bracts ovate, hairy at margins only; bracteoles subulate, winged; stamens greenish; staminodes toothed; ovary obpyriform 2. *A. bidentata*

1. *Achyranthes aspera* L., Sp. Pl 1: 204. 1753; Hook. f., Fl. Brit. India 4: 730. 1885; Prain, Bengal Fl. 2: 875. 1903. [Plate 183c-d]

Apang (B).

Erect herb, 20-50 cm high, pubescent. Leaves elliptic to elliptic-ovate, obovate to suborbicular, 2.5-14 × 1.5-8 cm, alternate, entire and hairy, acute to acuminate or

obtuse with apiculate tip, chartaceous, sparsely appressed pubescent to pubescent with glands or without glands. Inflorescence spikes, tomentose. Flowers subsessile, pendent; floral bracts rhomboid, hairy, subulate; bracteoles 2, ovate-lanceolate, hairy, spinescent. Perianth lobes greenish, 5, lanceolate, 3.5–3.8 × 0.5–1 mm, concave, scarious, sharply acute. Stamens pink, 5, alternate to staminodes, connate at base along with staminodes to form staminal column; filaments c. 1 mm; anthers ellipsoid; staminodes oblong, fimbriate. Ovary rhomboid; stigma truncate. Utricles oblong; seeds brown, solitary, oblong.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, JKS 4090; South Rajabhatkhawa, 09.12.1975, JKS 4272; Kumargram, Kalikhola river belt, 21.09.2011, AK 52704; Bhutanghat, 25.09.2011, AK 52925; North Rydak, 26.09.2011, AK 52940; Jainty-Phashkhawa, 02.10.2012, AK 58611.

Uses: Root and leaf paste is medicinal in the relief of asthma, cough, carache, stomachache.

2. *Achyranthes bidentata* Blume, Bijdr. Fl. Ned. Ind. 11: 545. 1826; Hook. f., Fl. Brit. India 4: 730. 1885. [Plate 184a–b; Fig. 89]

Erect herb, 20–40 cm high. Leaves elliptic, 3.5–8.8 × 1–4 cm, cuncate, shallowly crenate and hairy, shortly acuminate to caudate-acuminate, chartaceous, appressed hirsute. Inflorescence spikes, tomentose. Flowers pendent; floral bracts ovate, slightly concave, hairy above only, subulate; bracteoles 2, subequal, subulate with 2 lateral wings, stout and concave at base, spinescent. Perianth lobes greenish, 5, subequal, lanceolate, 4.5–5.5 × 0.6–0.8 mm, concave, sharply acute, mid nerve prominent. Stamens greenish, 5, alternate to staminodes, connate with staminodes to form staminal column; filaments c. 0.8 mm; anthers elliptic to subcircular; staminodes toothed. Ovary obpyriform, subtruncate, subangular; style subangular, slightly broad at base; stigma brown, truncate. Utricles yellowish brown, oblong, smooth; seed light brown, solitary.

Flowering & Fruiting: August–November.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Jammu & Kashmir, Jharkhand, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Buxa Fort to Tashigaoa, 01.10.2013, AK 59721.

2. *Aerva* Forssk.

Aerva sanguinolenta (L.) Blume, Bijdr. Fl. Ned. Ind. 11: 547. 1826. *Achyranthes sanguinolenta* L., Sp. Pl., ed. 2. 294. 1762. *Aerva scandens* (Roxb.) Wall., Numer. List: n. 6911. 1832; Hook. f., Fl. Brit. India 4: 727. 1885; Prain, Bengal Pl. 2: 874. 1903. [Plate 184c–d]

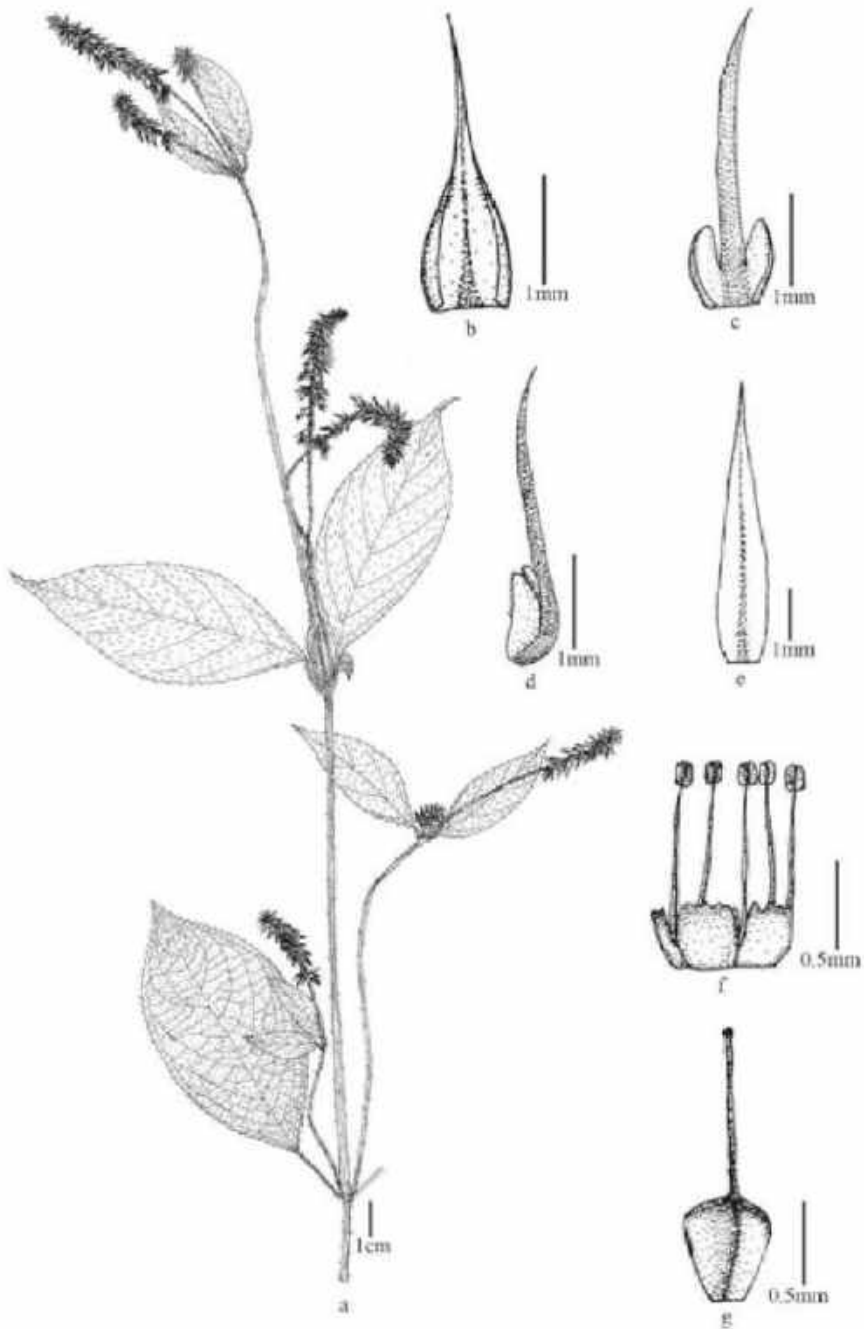


Fig. 89. *Achyranthes bidentata*: a. Flowering branchlet; b. Floral bract; c. Front view of bracteole; d. Lateral view of bracteole; e. Perianth segment; f. Stamens with staminodes; g. Gynoecium (AK 59721).

Suffrutescent, straggling undershrub, 1–1.5 cm high. Leaves reddish, elliptic-ovate, 1.2–8 × 0.5–5 cm, cuncate, entire, acute with nectary scales on above surface at base, chartaceous. Inflorescence sessile spikes forming lax raceme or panicles; floral bracts white, deltoid, prominent mid rib continuing into excurrent acute apex; bracteoles white, ovate. Perianth lobes white, 5, subequal, oblong-elliptic, woolly; outer 2 perianth lobes tapering above into excurrent-mucro apex; inner 3 slightly shorter, narrower than outer perianth lobes, acute. Stamens 5; filaments connate at base; anthers dorsifixed; staminodes 5, triangular. Ovary faintly ribbed; styles 2; stigma divergent. Utricles compressed; seed black, reniform.

Flowering & Fruiting: December–June.

Distribution. India: Almost throughout India.

Specimens examined: Tobgaon, KB 2045; Bhutanghat, JKS 4141; Jainti 3, 01.12.2011, GK 52320; Jainti 5, 09.02.2010, SKS & GK 46365; Mainabari, Bhutanghat, 24.02.2012, AK 55915.

3. *Alternanthera* Forssk.

Key to the species

- 1a. Leaves cuneate at base, dentate at margins; floral bracts deltoid-ovate, mid vein keeled; perianth lobes 1-nerved 3. *A. sessilis*
- 1b. Leaves attenuate at base, entire at margins; floral bracts not deltoid-ovate, mid vein not keeled; perianth lobes 3-nerved 2
- 2a. Undershrubs; stems hollow, ascending, not forming mats with numerous branches; leaves petiolate, not clustered, oblong-lanceolate or elliptic-oblong; staminodes as long as stamens or slightly exceeding stamens, laciniate; stigma pubescent 1. *A. ficoidea*
- 2b. Herbs; stems solid, creeping, forming mats with numerous branches; leaves sessile, clustered, spatulate; staminodes much shorter than stamens, dentate; stigma glabrous 2. *A. paronychioides*

1. *Alternanthera ficoidea* (L.) P. Beauv., Fl. Oware. 2: 66. 1818. *Gomphrena ficoidea* L., Sp. Pl. 1: 225. 1753. *Alternanthera tenella* Colla, Mem. Reale Accad. Sci. Torino 23: 131, t. 9. 1829; T. K. Paul & G. Chaudhury, J. Econ. Taxon. Bot. 31: 567. 2007. [Plate 185a-b; Fig. 90]

Prostrate or diffuse undershrub, 40–100 cm high. Leaves oblong-lanceolate or elliptic-oblong, 0.8–30 × 2.5–3 mm, attenuate, entire, subacute to rounded with mucronate tip at apex, subcoriaceous, pilose and tuberculate. Inflorescence axillary, ovoid-subglobose heads; floral bracts white, elliptic-oblong to elliptic-lanceolate, acuminate; bracteoles white, elliptic-lanceolate, acuminate, midvein prominent. Perianth lobes white, 5, subequal, outer 3 larger than inner 2; outer ones lanceolate or oblong-lanceolate, dentate above middle, acuminate, 3-nerved and pilose on back; inner series lanceolate, dentate above middle, acuminate, 1-nerved and

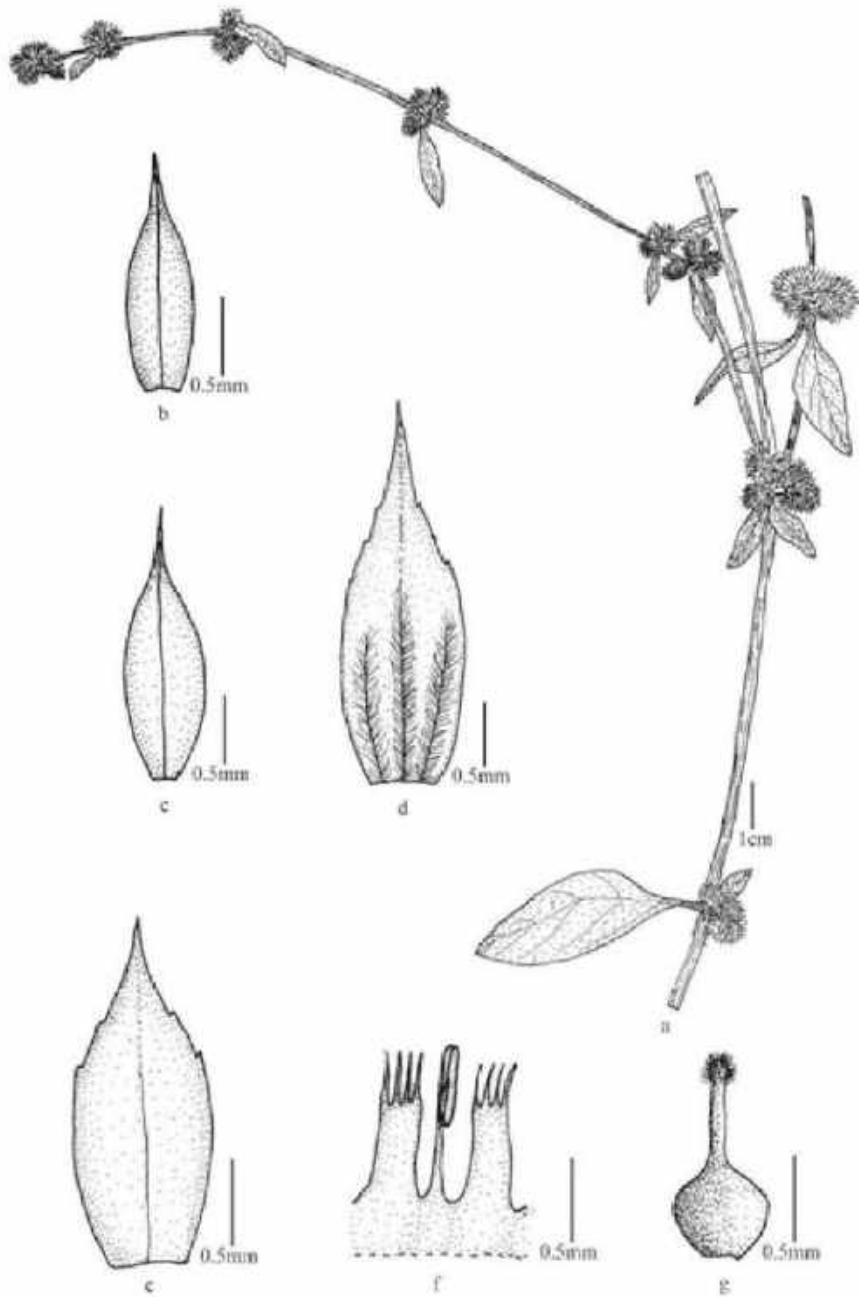


Fig. 90. *Alternanthera ficoidea*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Outer perianth segment; e. Inner perianth segment; f. Stamen with staminodes; g. Gynoecium (AK 55911).

glabrous on back. Stamens 5; filaments connate at base; anthers linear; staminodes strap-shaped, laciniate. Ovary obovoid; stigma capitate, pubescent. Utricles not seen.

Flowering: January–May.

Distribution. India: Jammu & Kashmir, Kerala, Maharashtra, Odisha, Tamil Nadu and West Bengal.

Specimen examined: Rydak, on the way to Tiamari, 23.02.2012, AK 55911.

2. *Alternanthera paronychioides* A. St. Hil., *Voy. Distr. Diam.* 2 (2): 439. 1833; T. K. Paul & G. Chaudhury, *J. Econ. Taxon. Bot.* 31: 565. 2007. [Plate 185c-d]

Prostrate or creeping herb, 10–20 cm, villous when young, glabrous later. Leaves sessile, 3–4 at each node, spatulate, 1.2–3.4 × 0.3–0.7 cm, attenuate, entire, acute, chartaceous. Inflorescence axillary, solitary or 2–3-together, compact globose heads; floral bracts white, ovate, mucronate, mid vein prominent; bracteoles narrower, or else same as floral bracts. Perianth lobes white, 5, subequal, outer 2 slightly longer than inner 3, oblong-lanceolate, 3–4 × 1.5–2.5 mm, dentate towards apex, acuminate, prominently 3-nerved. Stamens 5; filaments c. 1 mm, connate at base, alternate with staminodes; anthers oblong; staminodes strap-shaped, dentate. Ovary globose, compressed; stigma capitate. Utricles orbicular, compressed; seed brown, obscurely reticulate.

Flowering & Fruiting: January–April.

Distribution. India: Andhra Pradesh, Assam, Bihar, Delhi, Haryana, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55795.

3. *Alternanthera sessilis* (L.) R. Br. ex DC., *Cat. Horti. Monsp.* 4: 77. 1813; Hook. f., *Fl. Brit. India* 4: 731. 1885; Prain, *Bengal Pl.* 2: 875. 1903. *Gomphrena sessilis* L., *Sp. Pl.* 1: 225. 1753. [Plate 186a-b]

Prostrate herb, 20–35 cm long, villous at nodes, glabrous later. Leaves subsessile, 2–3 at each node, elliptic-lanceolate, 1–4 × 0.2–0.7 cm, cuneate, dentate, obtuse or acute, chartaceous. Inflorescence axillary, sessile, solitary, compact heads; floral bracts white, deltoid-ovate, 0.8–1 × 1–1.5 mm, dentate, mucronate, prominently keeled at mid vein; bracteoles same as floral bracts. Perianth lobes white, 5, ovate-elliptic, acuminate, mid vein prominent. Stamens 5; filaments connate at base, alternate with staminodes; anthers oblong; staminodes subulate. Ovary obovoid, compressed; stigma capitate. Utricles orbicular, compressed, thick margined; seed pale brown, rounded.

Flowering & Fruiting: July–March.

Distribution. India: Throughout India.

Specimens examined: Checko, 24.11.1975, JKS 916; Bhutanghat, JKS 4095; Jainti range, 11.10.2009, SKS & GK 46287; Kumargram, 19.09.2011, AK 52647; Rydak river belt, 20.09.2011, AK 52694; Kumargram, Kalikhola river belt, 21.09.2011, AK 52727; Newlands, Sukno river, 22.09.2011, AK 52739; Marakata, 24.09.2011, AK 52840; Sankosh, 28.09.2011, AK 52988; Newlands, 15.02.2012, AK 55623; Sankosh, 17.02.2012, AK 55680; Bhutanghat, 25.02.2012, AK 55938; Rydak river belt, 26.02.2012, AK 55959; Pana, 08.10.2012, AK 58736.

4. *Amaranthus* L.

Key to the species

- 1a. Stems armed; bracteoles dissimilar to floral bracts; perianth lobes 5; stamens 5; stigma pubescent 1. *A. spinosus*
- 1b. Stems unarmed; bracteoles similar to floral bracts; perianth lobes 3; stamens 3–4; stigma sparsely hairy or scabrid 2
- 2a. Leaves reddish, verrucose; floral bracts finely awned; perianth lobes lanceolate or oblong-lanceolate; stamens 3; filaments 1.8–2 mm; ovary glabrous; stigma sparsely hairy; utricles dehiscent; seed smooth 2. *A. tricolor*
- 2b. Leaves green, not verrucose; floral bracts recurved mucro at apex; perianth lobes oblanceolate; stamens 3–4; filaments c. 0.5 mm; ovary and stigma scabrid; utricles indehiscent; seed verrucose 3. *A. viridis*

1. *Amaranthus spinosus* L., Sp. Pl. 2: 991. 1753; Hook. f., Fl. Brit. India 4: 718. 1885; Prain, Bengal Pl. 2: 869. 1903. [Plate 186c-d]

Kanta maris, Kanta notey (B).

Erect herb, 20–60 cm high, armed; spines axillary, 3–6 mm. Leaves rhomboid to elliptic-lanceolate, 0.8–3.3 × 0.3–1.3 cm, cuneate, repand, obtuse or notched with mucronate tip. Inflorescence axillary dense clusters and terminal spikes. Flowers unisexual; bracts lanceolate to ovate-lanceolate or rhomboid-ovate, awned; bracteoles lanceolate to elliptic-lanceolate. Perianth lobes 5, subequal, lanceolate or oblong-lanceolate, 1–1.5 × 0.5–1 mm, obtuse with mucronate tip, 1-nerved. Male: Stamens 5; filaments c. 0.8 mm; anthers lanceolate. Female: Ovary elliptic-oblong or obovoid; stigma 3-fid, pubescent. Utricles subglobose, compressed, stigma-persistent, enclosed in perianth lobes, circumscissile, rugose; seed brown, compressed, notched.

Flowering & Fruiting: August–March.

Distribution. India: Throughout India.

Specimens examined: Kumargram, 18.09.2011, AK 52609; Newlands, 15.02.2012, AK 53045.

2. *Amaranthus tricolor* L., Sp. Pl. 2: 989. 1753. *Amaranthus gangeticus* L., Syst. Nat., ed. 10. 2: 1268. 1759; Hook. f., Fl. Brit. India 4: 719. 1885; Prain, Bengal Pl. 2: 870. 1903.

Erect herb, 25–50 cm high. Leaves reddish, rhomboid-ovate, 1.5–2.8 × 0.8–1.3 cm, attenuate, repand, retuse with mucronate tip at apex, verrucose. Inflorescence axillary dense spikes. Flowers unisexual; floral bracts lanceolate to ovate-lanceolate, awned; bracteoles same as floral bracts. Perianth lobes 3, equal, lanceolate or oblong-lanceolate, 3–3.2 × 1–1.2 mm, awned, 1-nerved. Male: Stamens 3; filaments 1.8–2 mm; anthers lanceolate. Female: Ovary c. 0.5 × 0.3 mm; stigma 3-fid, sparsely hairy. Utricles subglobose, c. 1.6 mm across, compressed, enclosed in perianth lobes; seed brownish black, compressed, notched.

Flowering & Fruiting: May–October.

Distribution. India: Throughout India.

Specimen examined: Rydak river belt, 20.09.2011, AK 52680.

3. *Amaranthus viridis* L., Sp. Pl., ed. 2. 2: 1405. 1763; Hook. f., Fl. Brit. India 4: 720. 1885; Prain, Bengal Pl. 2: 871. 1903.

Erect herb, 30–50 cm high. Leaves rhomboid-oblong, 5–6 × 3.5–4 cm, cuneate to attenuate, slightly sinuate, obtuse and emarginate. Inflorescence axillary or terminal paniculate spikes or in compact clusters in lower branches. Female flowers numerous, usually in lower part of spike, male flowers comparatively less in number, usually confined to upper part of spike; floral bracts deltoid-ovate to lanceolate, mid vein extended in recurved mucro, hyaline except midvein; bracteoles same as floral bracts. Perianth lobes 3, oblanceolate, 1–1.3 × 9–6 mm, narrower in female flower, obtuse, mid vein extended in short mucro, greenish at midvein. Male: Stamens 3–4; anthers oblong. Female: Ovary oblong-ovate, scabrid; stigma 3, scabrid. Utricles pale brown, globose, indehiscent, strongly rugose; seed dark brown, orbicular, compressed, verrucose.

Flowering & Fruiting: August–December.

Distribution. India: Throughout India.

Specimen examined: Newlands, Sukno river belt, 22.09.2011, AK 52772.

5. *Cyathula* Blume

Cyathula prostrata (L.) Blume, Bijdr. Fl. Ned. Ind. 11: 549. 1826; Hook. f., Fl. Brit. India 4: 723. 1885; Prain, Bengal Pl. 2: 872. 1903. *Achyranthes prostrata* L., Sp. Pl. 2: 296. 1762. [Plate 187a-b]

Decumbent herb, 10–20 cm high, pubescent. Leaves rhombic-ovate, 1.5–5.5 × 1–3.5 cm, cuneate, repand, acute, glabrescent. Flowers in clusters, composed of 1–2 central fertile flowers and 1–2 sterile flowers out side in pubescent terminal spikes/racemes; perianth lobes reduced to hooked awns. Fertile flowers: floral bracts ovate, concave, pubescent; bracteoles ovate, pubescent. Perianth lobes 5, subequal, ovate, 1.5–2 × c. 0.5 mm, acute, 3-nerved, pubescent. Stamens reddish,

5; filaments connate below in a membranous cup; anthers oblong. Ovary obovoid; style c. 1 mm; stigma capitate. Sterile flowers: bracts and perianth lobes yellow, c. 1.5 mm, villous, hooked; staminodes 2-fid or retuse. Utricles globose, enclosed in perianth; seed brown, ovoid-oblong.

Flowering & Fruiting: August–March.

Distribution. India: Arunachal Pradesh, Assam, Daman & Diu, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Tobgaon, KB 3240; on the way to Buxaduar, 28.02.1934, KB 1755; Jainti range, 04.10.2009, SKS & GK 46131; Newlands, Sukno river, 22.09.2011, AK 52759, 52783; Marakata, 24.09.2011, AK 52839; Kumargram, 13.02.2012, AK 53021; Rangamati to Bharnabari, 06.10.2012, AK 58714.

6. *Deeringia* R. Br.

Deeringia amaranthoides (Lam.) Merr., *Interpr. Herb. Amboin.*: 211. 1917. *Achyranthes amaranthoides* Lam., *Encycl.* 1: 548. 1785. *Deeringia celosioides* R. Br., *Prodr. Fl. Nov. Holland.*: 413. 1810; Hook. f., *Fl. Brit. India* 4: 714, 1885; Prain, *Bengal Pl.* 2: 866. 1903. [Plate 187c-d]

Scandent shrub, 4–6 m long. Leaves ovate-lanceolate, 1.5–3 × 1–1.8 cm, attenuate, crenate, acuminate, chartaceous. Inflorescence axillary or terminal, spike-like racemes; floral bracts triangular-ovate, 1.5–2.2 × c. 1 mm, acute. Perianth lobes light green turned crimson in fruiting, 5, elliptic-ovate or oblong-ovate, 1.5–2 × 0.6–1 cm, membranous. Stamens 5; filaments c. 1.5 mm, connate at base; anthers 2-celled. Ovary globose, 3–4 mm across; style minute; stigma capitate. Berries red, subglobose, pulpy; seeds black, 1–6, reniform, compressed.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Tashigaon, JKS 4024; Bhutanghat, 02.12.1975, JKS 4107; Santrabari, 05.10.2009, SKS & GK 46123; Rajabhatkhawa range, 05.03.2011, GK 47282; Bhutanghat, 26.09.2011, AK 52945; Newlands, 15.02.2012, AK 53077; Sankosh, 17.02.2012, AK 55654; Phashkhawa river belt, 30.09.2012, AK 58544; Hauda nala, 03.10.2012, AK 58687; Buxa Fort to Chunabhati, 30.09.2013, AK 59678; Buxa Fort to Tashigaon, 01.10.2013, AK 59725.

7. *Psilotrichum* Blume

Psilotrichum ferrugineum (Roxb.) Voigt, *Hort. Suburb. Calcutt.*: 318. 1845; Hook. f., *Fl. Brit. India* 4: 725. 1885. *Achyranthes ferruginea* Roxb., *Fl. Ind.* 1: 675. 1820. *Psilotrichum trichotomum* Blume, *Bijdr. Fl. Ned. Ind.* 11: 545. 1826; Hook. f., *Fl. Brit. India* 4: 725. 1885. [Fig. 91]

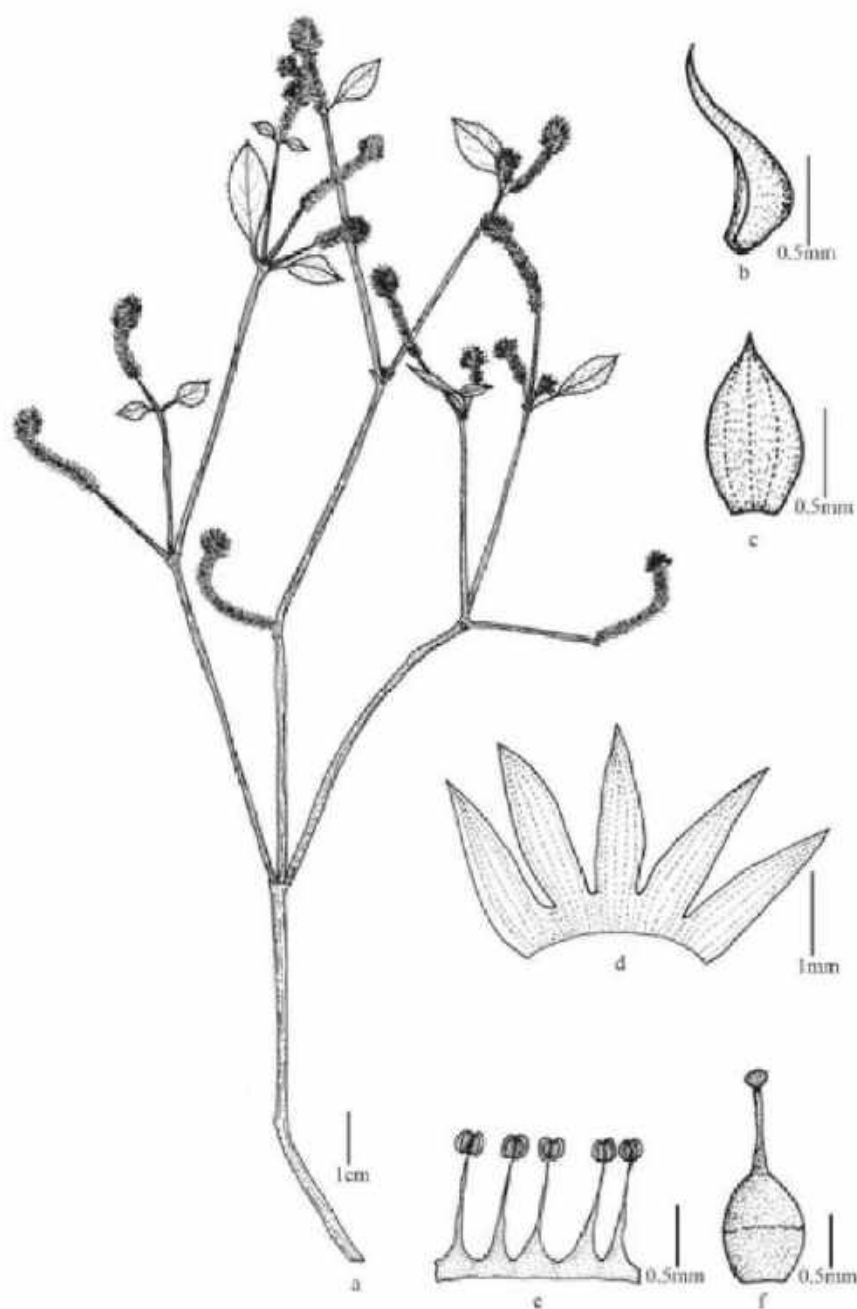


Fig. 91. *Psilotrichum ferrugineum*: a. Flowering branchlet; b. Floral bract; c. Bracteole; d. Perianth split open; e. Stamens; f. Gynoecium (AK 52961).

Perennial herb or subshrub, prostrate to scandent, 10–20 cm high, glabrous to sparsely hairy. Leaves elliptic to obovate, 12–35 × 5–20 mm, attenuate, entire and hairy, subacute to obtuse with mucronate tip, chartaceous. Inflorescence axillary or terminal, cylindrical spikes, sparsely pilose. Flowers sessile, basipetally deciduous; floral bracts lanceolate, 1–1.2 × 0.3–0.5 mm, concave, acuminate; bracteoles ovate, acute with mucronate tip. Perianth lobes white, 5, lanceolate, 2–2.5 × 0.5–0.6 mm, slightly connate at base, acute, 5-nerved. Stamens 5; filaments c. 1 mm, connate at base; anthers rounded. Ovary ellipsoid; style c. 0.8 mm; stigma capitate. Utricles ellipsoid, circumscissile, enclosed in perianth, style persistent; seeds black, ellipsoid, compressed, subapically notched, smooth.

Flowering & Fruiting: May–September.

Distribution. India: Arunachal Pradesh, Bihar, Gujarat, Madhya Pradesh, Meghalaya, Odisha, Uttar Pradesh and West Bengal.

Specimens examined: Kumargram, Hathinala, 27.09.2011, AK 52961; Sankosh, 28.09.2011, AK 52971; Jainty-Phashkhawa, 02.10.2012, AK 58619; Bhutri, 05.10.2012, AK 58631.

Chenopodiaceae

Key to the genera

- 1a. Stems glabrous; leaves cuneate at base, sub-coriaceous, glabrous; perianth lobes ovate-orbicular or oblong-ovate; stamens 5; ovary dorso-ventrally compressed, globose or orbicular; style distinct; stigma indistinct **1. Chenopodium**
- 1b. Stems pubescent; leaves attenuate at base, chartaceous, glandular hairy below; perianth lobes not as above; stamens 4–6; ovary oblong-ovoid; style indistinct; stigma distinct **2. Dysphania**

1. *Chenopodium* L.

Chenopodium album L., Sp. Pl. 1: 219. 1753; Hook. f., Fl. Brit. India 5: 3. 1886; Prain, Bengal Pl. 2: 879. 1903.

Erect herb, 10–30 cm high. Leaves variable, rhombic, deltoid or lanceolate, 0.8–5.5 × 0.3–1.9 cm, cuneate, entire or toothed or irregularly lobulate, acute or obtuse, subcoriaceous. Inflorescence paniced spikes. Flowers bisexual or female. Perianth lobes 5, ovate-orbicular or oblong-ovate, 1–1.2 × 0.8–1 mm, acute, connate at base, keeled, membranous. Stamens 5, exserted; filaments flattened, hyaline; anthers yellow. Ovary depressed-globose or orbicular; style 2; stigma indistinct. Utricles globose, enclosed in perianth lobes; seed black with thin pericarp, smooth, radially striated.

Flowering & Fruiting: January–August.

Distribution. India: Throughout India.

Specimens examined: Jainty river, 07.04.2012, GK 56052; Kumargram, 18.02.2012, AK 55719; Kumargram, Hathinala, 21.02.2012, AK 55831.

2. *Dysphania* R. Br.

Dysphania ambrosioides (L.) Mosyakin & Clemants, Ukrayins'k. Bot. Zhurn. 59 (4): 382. 2002. *Chenopodium ambrosioides* L., Sp. Pl. 1: 219. 1753; Hook. f., Fl. Brit. India 5: 4. 1886; Prain, Bengal Pl. 2: 879. 1903. [Fig. 92]

Erect herb, 30–60 cm high. Leaves variable, elliptic-lanceolate to lanceolate, oblanceolate, linear-lanceolate, 0.3–6 × 0.1–2.2 cm, attenuate, irregularly serrate to entire, acute to obtuse, chartaceous, glabrous to pilose above, orange scattered glandular hairy below. Inflorescence spike-like condensed cymes. Flowers 3–5 in clusters, supported by reduced leaf. Perianth lobes 5, partially opened, usually fused, 5-lobed. Stamens 4–6; anthers yellow. Ovary oblong-ovoid; style indistinct; stigmas 3, filiform, exserted from perianth. Utricles globose, membranous, enclosed in perianth lobes; seed brown black, orbicular, compressed.

Flowering & Fruiting: February–September.

Distribution. India: Throughout India.

Specimens examined: Rydak river belt, 20.09.2011, AK 52665; Narathali, 20.02.2012, AK 55780; Rydak river belt, 26.02.2012, AK 55970.

Polygonaceae

Key to the genera

- 1a. Ocrea deciduous; perianth lobes 6 in 2 whorls, inner series toothed at margins; stigma fimbriate 3. *Rumex*
- 1b. Ocrea persistent; perianth lobes 4 or 5, not in whorls, entire at margins; stigma not fimbriate 2
- 2a. Petioles articulate at base; ocrea 2-cleft or lacerate; inflorescences axillary or terminal fascicles except *Polygonum posumbu* and *P. runcinatum*; filaments dilated at base 2. *Polygonum*
- 2b. Petioles not articulate at base; ocrea neither 2-cleft nor lacerate; inflorescences axillary or terminal, spikes or heads or panicles; filaments not dilated at base 1. *Persicaria*

1. *Persicaria* (L.) P. Miller

Key to the species

- 1a. Leaves decurrent on petioles forming wings; ocrea with recurved seta at base; petioles with auricles at base; perianth lobes 4 6. *P. nepalensis*
- 1b. Leaves not as above; ocrea without seta at base; petioles with or without auricles at base; perianth lobes 5 2
- 2a. Stems, leaves, mid vein, ocrea and petioles retrorsely prickly 7. *P. strigosa*
- 2b. Stems, leaves, mid vein, ocrea and petioles not retrorsely prickly 3
- 3a. Petioles with auricles at base; inflorescences axillary, terminal, solitary or in pairs, pedunculate heads or panicles of heads, glandular pubescent; achenes trigonous 4

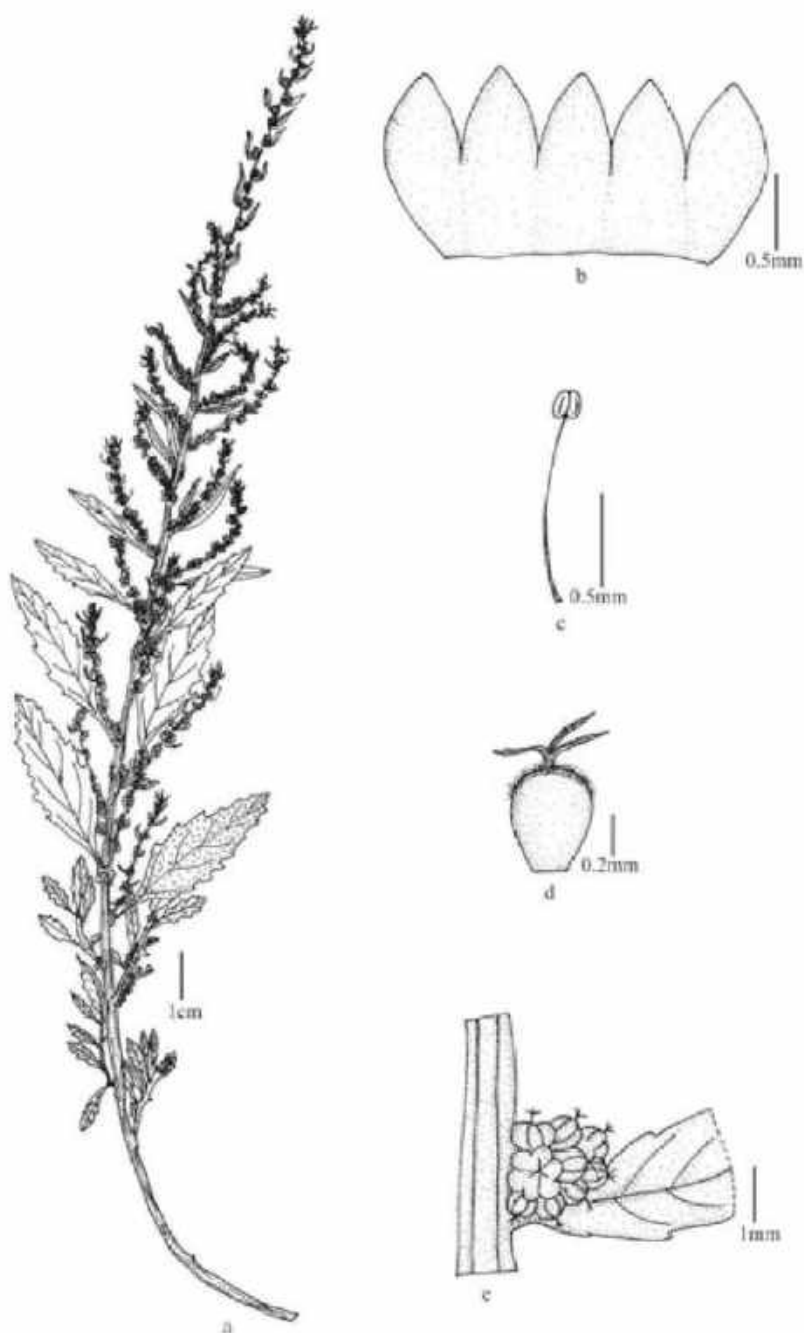


Fig. 92. *Dysphania ambrosioides*: a. Flowering branchlet; b. Perianth split open; c. Stamen; d. Gynoecium; e. Fruiting branchlet (AK 55970).

Botanical Survey of India

- 3b. Petioles without auricles at base; inflorescences axillary, terminal spikes, not glandular pubescent; achenes trigonous or biconvex 5
- 4a. Decumbent herbs; leaves acute; inflorescences solitary or in pairs, pedunculate heads; achenes punctate 2. *P. capitata*
- 4b. Large scrambling shrubs; leaves acuminate; inflorescences panicles of heads; achenes not punctate 3. *P. chinensis*
- 5a. Stamens at base of perianth; style 3-fid above; achenes trigonous 1. *P. barbata*
- 5b. Stamens at middle of perianth lobes; style 2-fid above; achenes biconvex 6
- 6a. Stems ribbed, brown punctate; mid vein setulose; lateral veins 20–25 pairs; ocrea 1–1.5 cm, setulose or brown punctate; petioles setulose or brown punctate; inflorescences brown punctate; achenes pitted 4. *P. hydropiper*
- 6b. Stems not ribbed, not brown punctate; mid vein sparsely hairy; lateral veins 6–8 pairs; ocrea upto 1 cm, appressed hairy; petioles appressed hairy; inflorescences not brown punctate; achenes smooth 5. *P. minor*

1. *Persicaria barbata* (L.) Hara, Fl. E. Himalaya: 70. 1966. *Polygonum barbatum* L., Sp. Pl. 1: 362. 1753; Hook. f., Fl. Brit. India 5: 37. 1886; Prain, Bengal Pl. 2: 887. 1903. [Plate 188a]

Bekh-unjubaz (B).

Erect herb, 40–90 cm high, pubescent. Leaves lanceolate or elliptic-lanceolate, 5–14 × 0.8–2.3 cm, cuneate, ciliate, acuminate, subcoriaceous, pubescent; ocrea tubular, 1.5–2 cm, membranous, truncate and ciliate at apex, hispidulous. Inflorescences terminal, spikes or panicles, rarely solitary; floral bracts funnel-shaped, 2–3 mm, ciliate, each contain 3–5 flowers. Perianth lobes 5, white or greenish, elliptic, acute. Stamens 5–8, at base of perianth; filaments c. 1 mm; anthers globose. Ovary 0.7–0.9 × 0.6–0.7 mm; style c. 1 mm, 3-fid above; stigma capitate. Achenes black, ovoid, trigonous, enclosed in perianth.

Key to the varieties

- 1a. Stems pubescent; leaves lanceolate or elliptic-lanceolate, cuneate at base, pubescent and devoid of glandular hairs beneath; ocrea 1.5–2 cm L. 1. var. *barbata*
- 1b. Stems glabrous; leaves elliptic-lanceolate, attenuate at base, glabrous and scattered orange glandular hairy beneath; ocrea 5–12 mm 1. 2. var. *gracilis*

L1. var. *barbata*

Flowering & Fruiting: August–February.

Distribution. India: Throughout the hotter parts of India.

Specimens examined: Bhutanghat, 28.06.1949, VN 3077, 3083; Bhutanghat,

02.12.1975, JKS 4088; North Bholka, 06.12.1975, JKS 4152; SRVK 4, 14.02.2010, SKS & GK 47081; Marakata, 24.09.2011, AK 52866; Newlands, 15.02.2012, AK 53098.

1.2. var. *gracilis* (Danser) H. Hara, Enum. Fl. Pl. Nepal: 175. 1982. *Polygonum barbatum* subsp. *gracile* Danser, Bull. Jard. Bot. Buitenzorg, Ser. 3, 8: 146, f. 2. 1927.

Flowering & Fruiting: February–May.

Distribution. India: Assam, East Himalaya and West Bengal.

Specimens examined: Bhutanghat, JKS 4088; Narathali, 20.02.2012, AK 55754.

2. *Persicaria capitata* (Buch.-Ham. ex D. Don) H. Gross, Bot. Jahrb. Syst. 49 (2): 277. 1913. *Polygonum capitatum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal: 73. 1825; Hook. f., Fl. Brit. India 5: 44. 1886. [Plate 188b-c]

Prostrate herb, 20–25 cm long, glandular pubescent or glabrous. Leaves reddish, ovate-elliptic, 1.2–2.5 × 0.9–1.7 cm, cuneate or rounded, entire and ciliate, acute, thinly coriaceous, glandular pubescent; ocrea tubular, 5–8 mm, truncate at apex, auricled, ciliate, membranous, glandular pubescent. Inflorescence terminal, pedunculate, globose heads, solitary or in pairs, glandular pubescent; floral bracts ovate, membranous. Perianth lobes pinkish red, 5, elliptic, acute. Stamens 8, at base of perianth; filaments short; anthers dorsifixed. Ovary trigonous; style 3-fid; stigma capitate. Achenes black/brown, trigonous, enclosed in perianth, punctate.

Flowering & Fruiting: February–October.

Distribution. India: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal.

Specimens examined: Buxa-Bhutan road, 35th mile, 16.05.1949, VN2541; Buxaduar, JKS 956; Buxaduar, 28.11.1975, JKS 985; way to Ramiti, 16.05.1976, JKS 4098; way to Sinchu, JKS 4698; Tashigaon, 300m, 09.10.2009, GK & SKS 46266; Rydak, 26.02.2012, AK 55960; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58570.

3. *Persicaria chinensis* (L.) H. Gross in Engl., Bot. Jahrb. Syst. 49 (2): 269. 1913. *Polygonum chinense* L., Sp. Pl. 1: 363. 1753; Hook. f., Fl. Brit. India 5: 44. 1886; Prain, Bengal Pl. 2: 887. 1903.

Large scrambling shrub, 2–3 m long. Leaves ovate-elliptic, 3–13 × 1.5–4.5 cm, truncate or rounded, entire, acuminate, thinly coriaceous; ocrea tubular, 1–2 cm, auricled, membranous. Inflorescence panicles of heads, glandular pubescent; inflorescence bracts triangular-ovate to hastate, 4–5 × 2.5–3 mm, truncate at base, acute, subcoriaceous. Perianth lobes white or pink, 5, elliptic, 2.3–3 × 0.5–0.7 mm, acute, membranous. Stamens 7–8; filaments 1.2–2 mm; anthers subglobose. Ovary c. 1 mm; style 3-fid above; stigma capitate. Achenes ovoid, trigonous, enclosed in reddish fleshy perianth.

Key to the varieties

- 1a. Leaves ovate-elliptic, truncate or rounded at base, entire at margins, orange scattered glands absent below; inflorescence bracts triangular-ovate to hastate; floral bracts absent 3.1. var. chinensis
- 1b. Leaves ovate, rounded-subcordate at base, serrulate at margins, orange scattered glands below; inflorescence bracts funnel-shaped; floral bracts present 3.2. var. ovalifolia

3.1. var. chinensis

[Plate 188d; Fig. 93a-c]

Flowering & Fruiting: February–April.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Buxa to Bhutan road, 38th mile, 16.05.1949, VN 2495; Lepchakhawa, JKS 965; Jainti range, 09.02.2010, SKS & GK 46379; Jainti range, 13.02.2010, SKS & GK 47059; Jainti range, 05.10.2009, GK 46169; Newlands, 15.02.2012, AK 53099; Bhutanghat, 25.02.2012, AK 55930.

3.2. var. ovalifolia (Meisn.) H. Hara, Fl. E. Himalaya 1: 71. 1966. *Polygonum chinense* var. *ovalifolium* Meisn. in Wall., Pl. Asiat. Rar. 3: 60. 1832; Hook. f., Fl. Brit. India 5: 45. 1886.

Flowering & Fruiting: January–April.

Distribution. India: Maharashtra, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Tashigaon to Rovers point, 12.02.2014, AK 59924.

4. *Persicaria hydropiper* (L.) Delarbre, Fl. Auvergne (Delarbre) ed. 2: 518. 1800. *Polygonum hydropiper* L., Sp. Pl. 1: 361. 1753; Hook. f., Fl. Brit. India 5: 39. 1886; Prain, Bengal Pl. 2: 887. 1903. [Plate 189a]

Erect herb, 20–50 cm high. Leaves elliptic-lanceolate to lanceolate, 3.5–8.5 × 0.5–1.8 cm, cuneate, entire and ciliate, acuminate, chartaceous, brown punctate to smooth; ocrea tubular, 1–1.5 cm, truncate at apex, ciliate at rim, membranous, setulose or punctate. Inflorescence spikes, pendulous, brown punctate. Flowers 2–4 in clusters; floral bracts infundibular, 2–3 mm, ciliate, brown punctate. Perianth lobes 5, rarely 4, elliptic, 2–2.5 × 1–1.2 mm, connate at base, subacute to obtuse or rounded, brown punctate. Stamens 6, at middle of perianth lobes; filaments c. 1 mm; anthers globose. Ovary ovoid to subglobose; style bifid above; stigma capitate. Achenes brown, ovoid, biconvex, enclosed in perianth lobes, small pitted.

Flowering & Fruiting: August–February.

Distribution. India: Arunachal Pradesh, Jammu & Kashmir, Odisha, Sikkim and West Bengal.

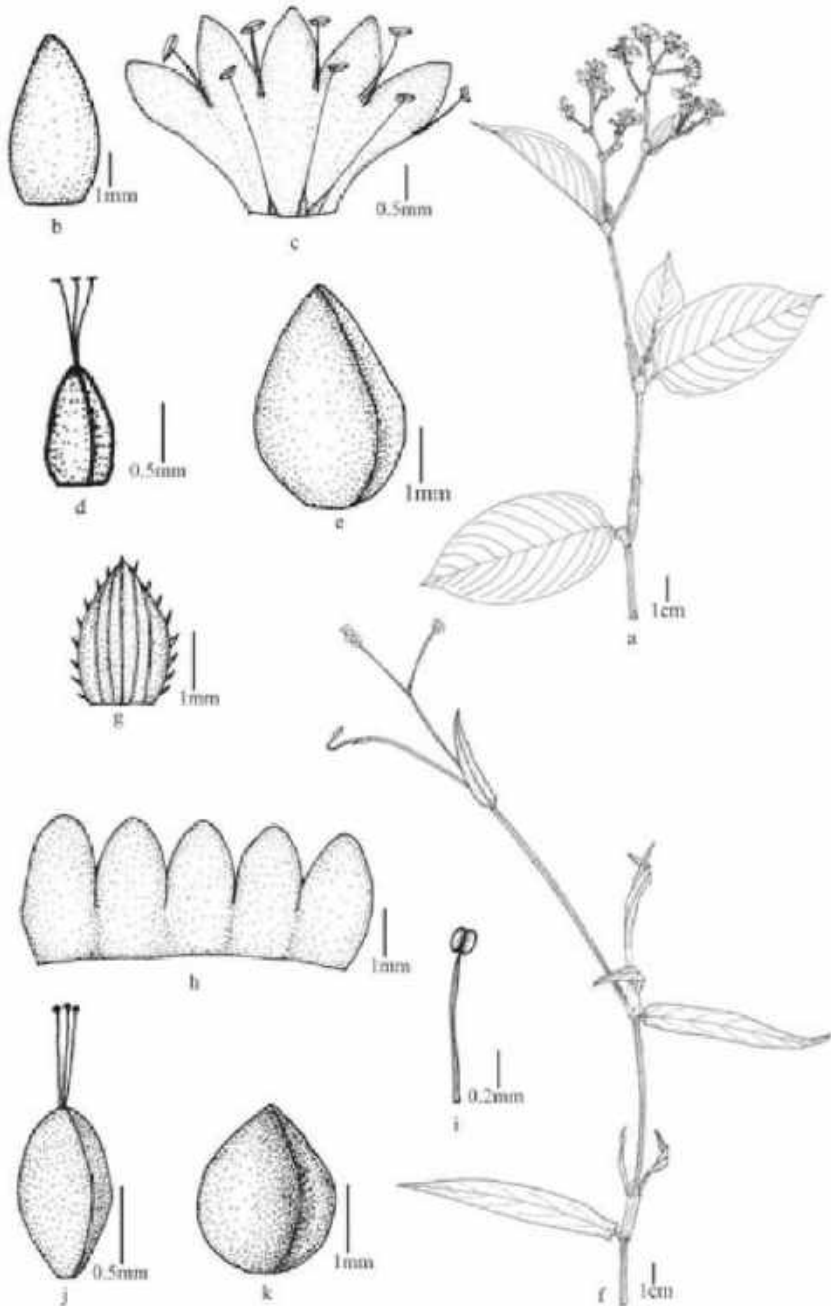


Fig. 93. *Persicaria chinensis*: a. Flowering branchlet; b. Inflorescence bract; c. Perianth split open showing stamens; d. Gynoecium; e. Achene (AK 55930); *Persicaria strigosa*: f. Flowering branchlet; g. Floral bract; h. Perianth split open; i. Stamen; j. Gynoecium; k. Achene (AK 55753).

Specimens examined: Rydak river belt, 20.09.2011, AK 52675; Narathali, 23.09.2011, AK 52825; Kumargram, 13.02.2012, AK 53016; Narathali, 20.02.2012, AK 55756.

5. *Persicaria minor* (Huds.) Opiz, *Seznam*: 72. 1852. *Polygonum minus* Huds., *Fl. Angl.*: 148. 1762; Hook. f., *Fl. Brit. India* 5: 36. 1886; Prain, *Bengal Pl.* 2: 886. 1903.

Erect herb, 60–70 cm high. Leaves lanceolate or oblong-lanceolate, 1.1–5.1 × 0.3–1 cm, cuneate, entire and ciliate, acute, subcoriaceous, gland-dotted below; ocrea tubular, 6–10 mm, membranous, ciliate at rim, appressed hairy. Inflorescence terminal or lateral, usually with several dense spikes, aggregated and looks panicle-like; inflorescence bracts infundibular, 2–2.5 mm, ciliate at rim, usually each enclosed 3–4-flowers. Perianth lobes white or pinkish, 5, elliptic, 2–2.5 × c. 1.5 mm, obtuse, chartaceous. Stamens 6–8, at middle of perianth lobes; filaments flat, c. 1 mm; anthers ovoid. Ovary ovoid; style bifid above; stigma globose. Achenes black brown, ovoid, biconvex, enclosed in perianth lobes.

Flowering & Fruiting: June–September.

Distribution. India: North East India and West Bengal.

Specimens examined: Jainti range, 11.02.2010, SKS & GK 47042; Newlands, 15.02.2012, AK 55602; Sankosh, 17.02.2012, AK 55668; Sankosh, 17.02.2012, AK 55699.

6. *Persicaria nepalensis* (Meisn.) H. Gross, *Bot. Jahrb. Syst.* 49 (2): 277. 1913. *Polygonum nepalense* Meisn., *Monogr. Polyg.*: 84, pl. 7, f. 2. 1826. *Polygonum alatum* (D. Don) Buch.-Ham. ex Spreng., *Syst. Veg.*, ed. 16. 4 (2, Cur. Post.): 154. 1827; Hook. f., *Fl. Brit. India* 5: 41. 1886; Prain, *Bengal Pl.* 2: 887. 1903.

[Plate 189b]

Decumbent or ascending herb, 20–30 cm high. Leaves ovate or ovate-elliptic, 1.5–5 × 1.1–2.2 cm, cuneate, entire, acuminate, decurrent along petioles forming wings like structure, chartaceous, punctate; ocrea tubular, 5–10 mm, obliquely truncate at apex, with recurved seta, auricled, membranous. Inflorescence compact heads, pubescent; floral bracts ovate-elliptic, 1.2–1.6 × c. 1 mm, membranous, acute. Perianth lobes pinkish, 4, oblong-elliptic, 2–3 × 1–1.5 mm, obtuse. Stamens 6; filaments c. 0.6 mm; anthers ovoid. Ovary obovoid, c. 0.8 × 0.4 mm, trigonous; style 3-fid above; stigma capitate. Achenes black, ovoid, trigonous, enclosed in perianth lobes, pitted.

Flowering & Fruiting: September–February.

Distribution. India: Arunachal Pradesh, Jammu & Kashmir, Meghalaya, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Bhutanghat, JKS 4078; Buxaduar, 27.11.1975, JKS 953;

Buxaduar, 969m, 27.11.1975, JKS 953; Santrabari range, 05.10.2009, SKS & GK 46150; 23rd Mile watch tower, 05.03.2011, GK 47259; Gadadhar range, 09.03.2011, GK 50528; Bhutanghat, Mainabari, 26.09.2011, AK 52893; Sankosh, 17.02.2012, AK 55671; Rydak river belt, 26.02.2012, AK 55957; Rydak river belt, 26.02.2012, AK 55967; Bhutri, 05.10.2012, AK 58640.

7. *Persicaria strigosa* (R. Br.) H. Gross, Bot. Jahrb. Syst. 49 (2): 308. 1913. *Polygonum strigosum* R. Br., Prodr. Fl. Nov. Holland.: 420. 1810; Hook. f., Fl. Brit. India 5: 47. 1886; Prain, Bengal Pl. 2: 888. 1903. [Plate 189c; Fig. 93f-k]

Erect or decumbent herb, 40–60 cm high. Leaves elliptic-lanceolate to oblong-lanceolate, lanceolate, 5–10.7 × 0.6–1.5 cm, weakly cordate or sub-sagittate at base, acuminate; ocrea 1–2.5 cm, truncate, bristly, membranous. Inflorescence terminal, slender spikes, pubescent with simple and stellate hairs or glandular hairs; floral bracts elliptic-ovate, contain 2–3 flowers, setulose, keeled, verrucose to pubescent or glabrous. Perianth lobes white or pinkish, elliptic, connate at base. Stamens 6–7, at middle of perianth lobes; filaments short; anthers globose. Ovary obovoid, trigonous; styles 3 from base; stigmas capitate. Achenes light brown, ovoid to sub-orbicular, trigonous, enclosed in perianth lobes.

Flowering & Fruiting: January–September.

Distribution. India: Himachal Pradesh, Meghalaya, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Narathali, 23.09.2011, AK 52816; Narathali, 20.02.2012, AK 55753.

2. *Polygonum* L.

Key to the species

- 1a. Prostrate herbs; leaves sessile, oblanceolate to linear-lanceolate, verrucose; ocrea and floral bracts similar; styles 3 from base **1. *P. plebeium***
- 1b. Erect or decumbent herbs; leaves petiolate, not as above in shape, not verrucose; ocrea and floral bracts dissimilar; style 3-fid or 2-fid above **2**
- 2a. Decumbent herbs; stems glandular pubescent above; leaves runcinate-pinnatifid; ocrea infundibular, sub-obliquely truncate at apex, with a vertical slit up to base; petioles with auricles; inflorescence axillary, terminal heads, glandular pubescent **3. *P. runcinatum***
- 2b. Erect herbs; stems glabrous or hirsute; leaves not runcinate-pinnatifid; ocrea tubular, not sub-obliquely truncate at apex, without a vertical slit up to base; petioles without auricles; inflorescences not as above **3**
- 3a. Stems branched, glabrous; leaves caudate-acuminate at apex, chartaceous, not gland-dotted below, appressed hispid; ocrea appressed hispid; inflorescences spikes; flowers sessile; style 3-fid above; achenes trigonous **2. *P. posumbu***
- 3b. Stems unbranched, hirsute; leaves acute at apex, sub-coriaceous, gland-dotted below, hirsute; ocrea hirsute; inflorescences fascicles; flowers pedicellate; style 2-fid above; achenes biconvex **4. *P. viscosum***

1. ***Polygonum plebeium*** R. Br., Prodr. Fl. Nov. Holland.: 420. 1810; Hook. f., Fl. Brit. India 5: 27. 1886; Prain, Bengal Pl. 2: 885. 1903 (as "*plebejum*").

Prostrate herb, 10–15 cm high. Leaves sessile, oblanceolate to linear-lanceolate, 0.4–4 × 0.1–0.2 cm, cuneate, entire, acute, chartaceous, verrucose; ocrea infundibular, c. 2 mm, splitting one side, slightly fused at base only, oblique at apex, ciliate along rim, membranous. Inflorescence axillary, fascicles. Flowers 3–5 in clusters, in bracts; floral bracts infundibular, c. 1 × 0.5–0.6 mm, ciliate, membranous; pedicels 0.2–1.8 mm, articulate at middle. Perianth lobes white or pink, 5, elliptic, 1.2–1.5 × 0.4–0.5 mm, fused at base, subobtuse, faintly keeled with scales on back. Stamens 5, at above base of perianth lobes; filaments c. 0.5 mm; anthers globose. Ovary ovoid, 0.8–1 × 0.5–0.6 mm, trigonous; style 3 from base, minute; stigma capitate. Achenes brown black, ovoid to suborbicular, trigonous, enclosed in perianth lobes.

Flowering & Fruiting: January–September.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, 15.02.2012, AK 55629; Narathali, 20.02.2012, AK 55801, 55806; Kumargram, Hathinala, 21.02.2012, AK 55832; Marakata, 22.02.2012, AK 55900.

2. ***Polygonum posumbu*** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 71. 1825; Hook. f., Fl. Brit. India 5: 38. 1886.

Decumbent herb, 30–70 high. Leaves ovate-lanceolate or ovate, 1–3.8 × 0.5–1.5 cm, cuneate, entire and ciliate, caudate-acuminate, chartaceous, sparsely appressed hispid above, hispid below; ocrea tubular, 4–6 mm, truncate and ciliate at apex, thinly membranous, appressed hispid. Inflorescence terminal or axillary, slender spikes; floral bracts infundibular, c. 2 × 1 mm, ciliate, each enclosed 3–4-flowers. Perianth lobes pinkish, 5, oblong-elliptic, 2–2.5 × 1–1.2 mm, connate below, obtuse, membranous. Stamens 8, exserted; filaments c. 1 mm; anthers ovoid. Ovary ovoid, c. 1 × 0.7 mm; style 3-fid above; stigma capitate. Achenes blackish brown, ovoid, trigonous, enclosed in perianth lobes.

Flowering & Fruiting: August–February.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Manipur, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa to Chumabhati, VN 2633; Jainti range, 10.02.2010, SKS & GK 46389; Sankosh, 28.09.2011, AK 52970; Newlands, 15.02.2012, AK 55617; Pana, 08.10.2012, AK 58721.

3. ***Polygonum runcinatum*** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 73. 1825; Hook. f., Fl. Brit. India 5: 43. 1886. [Plate 189d; Fig. 94]

Decumbent herb, 12–18 cm long. Leaves runcinate-pinnatifid, 2.7–10.5 × 1.3–

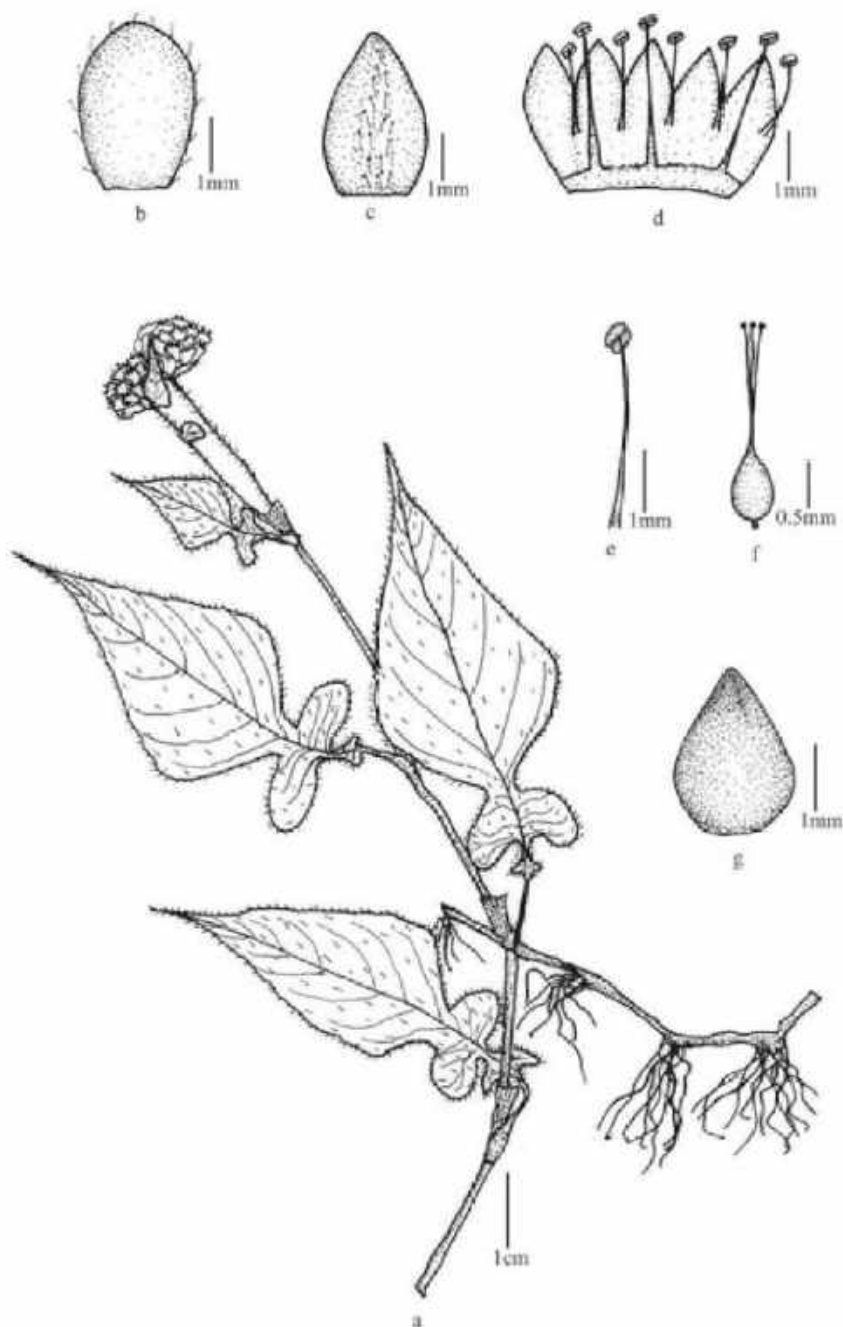


Fig. 94. *Polygonum runcinatum*: a. Flowering branchlet; b. Inflorescence bract; c. Floral bract; d. Perianth split open showing stamens; e. Stamen; f. Gynoecium; g. Achene (AK 59740).

5.5 cm, terminal lobes rhombic-ovate, lateral ones subcircular, 1–2 pairs, repand and hairy, acuminate, chartaceous, sparsely pubescent and vesicular; ocrea infundibular, 6–11 mm, subobliquely truncate at apex, enclosing the stem with a vertical slit up to base, with reniform auricles, membranous, sparsely pubescent. Inflorescence axillary, terminal, cymes, terminating in heads, glandular pubescent; inflorescence bracts subcircular, median, sometimes absent, 2.5–3 mm across, entire and glandular hairy. Flowers sessile; floral bracts ovate to ovate-oblong, 3–3.5 × c. 1.5 mm, scarious, subacute, glandular hairy at nerves. Perianth lobes white, 5, ovate to elliptic-ovate, 2.5–3 × 1.5–1.8 mm, connate at base, obtuse. Stamens 8, in 2 whorls, 3 at base and 5 at apex of perianth; filaments 2.2–3 mm; anthers rounded. Ovary ellipsoid; style c. 1.6 mm, 3-fid above; stigma capitate. Achenes black brown, ovoid, rounded, slightly trigonous, enclosed in perianth lobes.

Flowering & Fruiting: September–December.

Distribution. India: Assam, Jammu & Kashmir, Nagaland, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Ramiti, JKS 4007; Tashigaon to Rovers point, 02.10.2013, AK 59740.

4. *Polygonum viscosum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 71. 1825; Hook. f., Fl. Brit. India 5: 36. 1886; Prain, Bengal Pl. 2: 887. 1963.

Erect herb, 10–30 cm high, hirsute. Leaves ovate to ovate-lanceolate, 1.2–2.5 × 0.4–1.2 cm, cuneate, entire and hairy, acute, subcoriaceous, gland-dotted below, hirsute; ocrea tubular, 3–8 mm, truncate at apex, ciliate at rim, membranous, hirsute. Inflorescence axillary or terminal, dense fascicles. Flowers 1–3 in clusters, in floral bracts, actinomorphic; floral bracts infundibular, 2–4 × c. 2 mm, ciliate, membranous, pubescent. Perianth lobes pinkish, 5, elliptic to obovate, 3–3.5 × 1.8–2 mm, connate, obtuse. Stamens 6, at base of perianth; filaments 2.5–3 mm; anthers globose. Ovary globose, c. 1 mm across; style c. 1 mm, 2-fid above; stigma capitate. Achenes brown, suborbicular, c. 2.5 × 3 mm, biconvex, enclosed in perianth lobes.

Flowering & Fruiting: January–September.

Distribution. India: Assam, Meghalaya, Nagaland and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55755.

3. *Rumex* L.

Key to the species

- 1a. Stems branched at base; leaves rounded or subcordate at base, obtuse at apex; flowers unisexual; outer perianth lobes triangular; inner lobes oblanceolate **1. R. dentatus**
- 1b. Stems branched throughout; leaves cuneate at base, acute at apex; flowers bisexual; outer perianth lobes elliptic; inner lobes ovate-lanceolate **2. R. maritimus**

1. *Rumex dentatus* L., Mant. Pl. 2: 226. 1771; Hook. f., Fl. Brit. India 5: 59. 1886; Prain, Bengal Pl. 2: 889. 1903.

Erect herb, 25–30 cm high. Leaves oblong-lanceolate, 1.1–4.2 × 0.2–1.2 cm, rounded or subcordate, undulate, obtuse, chartaceous, vesicular; ocrea tubular, 1.2–3.3 cm, membranous, deciduous. Inflorescence axillary, racemes in clusters, reflexed during fruiting. Flowers unisexual. Perianth lobes 6 in 2 whorls; outer lobes triangular, 1–1.2 × c. 0.5 mm, slightly connate at base, acute; inner lobes oblanceolate, c. 1.6 × 0.6 mm, free, irregularly toothed, reticulately nerved, mid vein stout at centre. Male: stamens 6, at base of perianth; filaments short; anthers linear-oblong. Pistillode present. Female: staminodes 6, at base of outer perianth. Ovary suborbicular, c. 0.5 × 0.2 mm, trigonous; style 3 from base, c. 0.5 mm; stigma fimbriate. Achenes light brown, elliptic-ovate, acute, enclosed in inner perianth lobes.

Flowering & Fruiting: March–August.

Distribution. India: Jammu & Kashmir, Sikkim and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 62682.

2. *Rumex maritimus* L., Sp. Pl. 1: 335. 1753; Hook. f., Fl. Brit. India 5: 59. 1886; Prain, Bengal Pl. 2: 888. 1903. [Plate 190a]

Erect herb, 15–60 cm high, glabrous or papillose. Leaves lanceolate or oblong-lanceolate, 4–15 × 1–3 cm, cuneate, repand, acute, subcoriaceous, papillose below, cauline leaves nearly sessile; ocrea early caducous, membranous. Inflorescence terminal or axillary, paniced racemes. Flowers clustered; floral bracts same as ocrea. Perianth lobes 6 in 2 whorls; outer ones elliptic, c. 2 mm; inner whorl ovate-lanceolate, c. 3 × 1.2 mm, truncate at base, toothed, acute, oblong tubercle at centre. Stamens 6, at base of perianth; filaments short; anthers oblong. Ovary ovoid, 1–2 × c. 1 mm, trigonous; style 3 from base; stigma fimbriate. Achenes yellow brown, ellipsoid, trigonous, enclosed in perianth lobes.

Flowering & Fruiting: December–April.

Distribution. India: Manipur, Odisha and West Bengal.

Specimen examined: Jainti range, 03.03.2011, GK 47218; Narathali, 20.02.2012, AK 55774.

Aristolochiaceae

Aristolochia L.

Aristolochia acuminata Lam. in Lam. & al., Encycl. 1 (1): 254. 1783. *Aristolochia tagala* Cham., Linnaea 7: 207. 1832; Prain, Bengal Pl. 2: 891. 1903. *Aristolochia roxburghiana* Klotzsch, Monatsb. Akad. Berl.: 596. 1859; Hook. f., Fl. Brit. India 5: 75. 1886. [Plate 190b-c; Fig. 95]

Climbing shrub, puberulous when young. Leaves ovate, 6–17 × 3.8–8 cm, cordate, repand and hairy, acute or short acuminate, coriaceous. Inflorescence axillary,

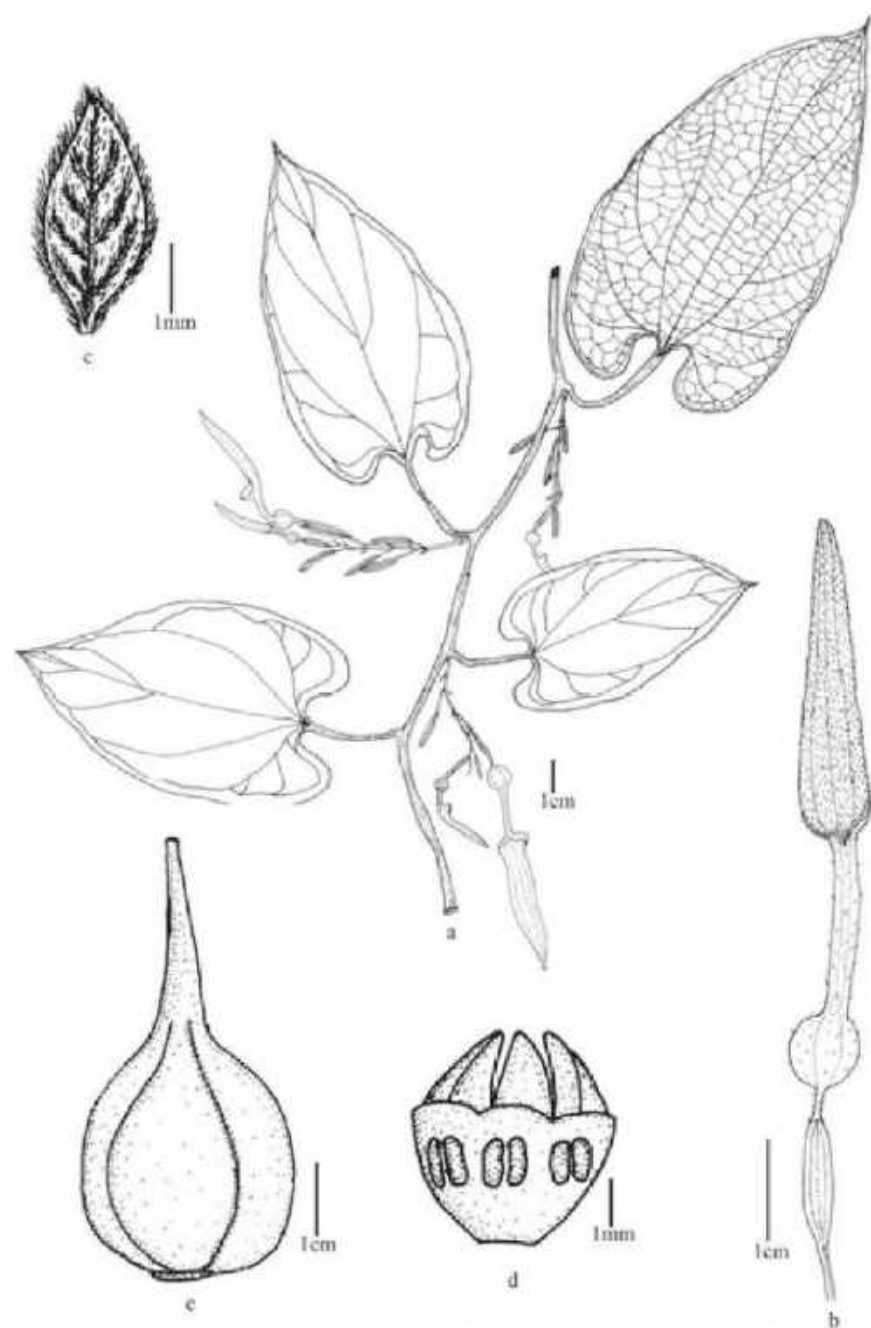


Fig. 95. *Aristolochia acuminata*: a. Flowering branchlet; b. Flower; c. Floral bract; d. Gynostegium; e. Capsule (AK 62649).

4–8-flowered racemes; inflorescence and floral bracts ovate, ciliate, reticulately nerved, lanate. Perianth greenish brown, tubular, curved, pubescent; basal part globose, 5–8 mm across, stalked, verrucose inside; tube 1–1.5 cm; limb purplish red, ligulate, oblong-lanceolate, 3–4 cm, margins revolute. Gynostegium conical; stamens shallowly 6-lobed; anthers 6, adnate to staminal column; stigmatic lobes 6, conical. Ovary linear-oblong, 0.7–1.3 cm, angled. Capsules lantern-like, 6-valved, opening through valves; seeds many, triangular-ovate.

Flowering & Fruiting: May–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Maharashtra, Manipur, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Buxa to Jainty, 26.05.1949, VN & party 2993; Panbari 8, 14.02.2010, SKS & GK 47086; Hauda nala, 19.02.2013, AK 59846; Buxaduar to Achahung, 19.05.2014, AK 62649.

Piperaceae

Key to the genera

- 1a. Decumbent herbs; stems succulent; lateral veins obscure; flowers bisexual; stigma solitary, penicillate 1. *Peperomia*
- 1b. Climbing shrubs (except *Piper mulesuu*); stems not succulent; lateral veins prominent; flowers usually unisexual; stigma not solitary, filiform 2. *Piper*

1. *Peperomia* Ruiz & Pav.

Peperomia pellucida (L.) Kunth, Nov. Gen. Sp. 1: 64. 1816; Prain, Bengal Pl. 2: 894. 1903. *Piper pellucidum* L., Sp. Pl. 1: 30. 1753. [Plate 190d]

Herb, 10–15 cm high, glabrous or sparsely pubescent. Leaves ovate, 1.1–2.3 × 0.9–2 cm, cordate, entire, acute, chartaceous, pellucid gland-dotted. Inflorescence terminal or leaf opposed spikes. Flowers bisexual; floral bracts suborbicular, c. 0.5 mm across, peltate. Perianth lobes absent. Stamens 2; filaments sessile; anthers ovoid-subglobose, minute, confluent. Ovary ellipsoid, c. 0.5 × 0.3–0.4 mm, ribbed, articulate; style short; stigma penicillate. Nutlets globose, pericarp thin; seed solitary, minute.

Flowering & Fruiting: August–October.

Distribution. India: Throughout India.

Specimens examined: Tashigaon hills, 05.10.2009, SKS & GK 46148; Kumargram, 19.09.2011, AK 52630; Newlands, Sukno river, 22.09.2011, AK 52765; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58571.

2. Piper L.

Key to the species

- | | |
|---|----------------------------|
| 1a. Erect shrubs; female spikes globose heads | 5. <i>P. mullesua</i> |
| 1b. Climbing shrubs; female spikes cylindrical | 2 |
| 2a. Bracts of male and female spikes basifixed | 2. <i>P. attenuatum</i> |
| 2b. Bracts of male and female spikes peltate | 3 |
| 3a. Leaves with minute silver scales below; male spikes 10–12 cm; drupes yellow | 1. <i>P. argyrophyllum</i> |
| 3b. Leaves without minute silver scales below (except <i>P. longum</i>); male spikes less than 10 cm (except <i>P. suipigua</i>); drupes black | 4 |
| 4a. Stipules absent | 5 |
| 4b. Stipules present | 6 |
| 5a. Leaves slightly obliquely cuneate at base, glabrous; veins 3–5 from base; male spikes 2.8–3 cm; floral bracts without brownish red glands above, glabrous below; anthers ovoid-globose; stigmas 3 or 4 | 6. <i>P. peepuloides</i> |
| 5b. Leaves usually obliquely rounded or shallowly cordate at base, brownish red glandular especially along veins below; veins 5–7 from base; male spikes 3–5.5 cm; floral bracts brownish red glandular above, pubescent below; anthers reniform; stigmas 2 | 9. <i>P. thomsonii</i> |
| 6a. Branchlets glabrous; leaves obliquely cuneate or rounded at base, glandular; anthers ovoid | 7 |
| 6b. Branchlets puberulous or pubescent; leaves obliquely cordate at base, not glandular; anthers globose or ellipsoid | 8 |
| 7a. Veins 5–7 from base; stipules conspicuous; male spikes 7–14 cm; stamens 3; stigmas 4; drupes loosely aggregated | 7. <i>P. suipigua</i> |
| 7b. Veins 5 from base; stipules inconspicuous; male spikes 0.8–5.5 cm; stamens 4; stigmas 2 or 3; drupes aggregated | 8. <i>P. sylvaticum</i> |
| 8a. Branchlets puberulous; leaves without silver scales below; stipules c. 1 cm; male spikes c. 3.3 cm; female spikes 2.5–3.5 cm; stamens 3; anthers globose; stigmas 4 or 5 | 3. <i>P. beteloides</i> |
| 8b. Branchlets pubescent; leaves with silver scales below; stipules 1.5–2.5 cm; male spikes c. 1.1 cm; female spikes 1.5–2.5 cm; stamens 2; anthers ellipsoid; stigmas 3 | 4. <i>P. longum</i> |

1. *Piper argyrophyllum* Miq., Syst. Piperac. 2: 330. 1844; Hook. f., Fl. Brit. India 5: 93. 1886.

Diocious, climbing shrub, 1–1.5 m long, sparsely pubescent to glabrous at swollen nodes. Leaves lanceolate to elliptic-lanceolate, 2.5–10 × 0.8–3.5 cm,

symmetric or slightly obliquely cuneate at base, entire, acuminate with mucronate tip, chartaceous, silvery scales to glabrous above, minute silver scales below; stipules c. 4 mm, membranous, pubescent. Inflorescence terminal or lateral, leaf-opposed spikes, pubescent; male spikes 10–12 cm, flexuous; female spikes 2.5–3 cm, erect; floral bracts orbicular, c. 1 mm across, peltate. Perianth lobes absent. Male: stamens 2; anthers 2-lobed; filaments short. Female: ovary ovate, c. 1 × 0.2 mm; style absent; stigma 3. Drupes yellow, globose to obovate, aggregated; seed solitary.

Flowering & Fruiting: October–February.

Distribution. India: Kerala, Tamil Nadu and West Bengal.

Specimen examined: Adma, Panbari, 12.02.2013, AK 58882.

2. *Piper attenuatum* Buch.-Ham. ex Miq., Syst. Piperac.: 306. 1843; Hook. f., Fl. Brit. India 5: 92. 1886.

Dioecious climbing shrub, 2–3 m long. Leaves broadly-ovate or ovate-orbicular, 3.6–8 × 4–6.9 cm, truncate to subcordate at base, entire, acuminate, subcoriaceous; stipules very short. Inflorescence leaf-opposed spikes; male spikes 6–8 cm; female spikes 7–9 cm. Perianth lobes absent. Male: floral bracts oblong-obovate, c. 2 × 0.6–1 mm, rounded, basifixed. Stamens 3; filaments short; anthers ovoid. Female: floral bracts shallowly cupular, c. 3 × 1 mm, basifixed. Ovary globose; style absent; stigmas 4. Drupes black, ovoid-globose, loosely aggregated; seed solitary.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: Tashigaon 1, Bhutia hill, 10.02.2010, SKS & GK 46394; Checko-1, 25.09.2012, AK 56133.

3. *Piper betleoides* C. DC., Candollea 1: 186. 1923.

[Plate 191a]

Dioecious climbing shrub, 1–2 m long, puberulous. Leaves oblong-ovate to ovate, 2–15 × 1.6–7.2 cm, obliquely cordate at base, entire, acuminate, chartaceous; stipules c. 1 cm. Inflorescence leaf-opposed spikes; male spikes c. 3.3 cm, hanging; female spikes 2.5–3.5 cm; floral bracts suborbicular, small, peltate. Perianth absent. Male: stamens 3; filaments very short; anthers globose, c. 2 mm across. Female: ovary globose; style absent; stigma 4 or 5. Drupes black, globose, aggregated; seed solitary.

Flowering & Fruiting: February–April.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: Jainti 7, 05.04.2012, GK 56039; Checko-1, 10.02.2013, AK 58840.

4. *Piper longum* L., Sp. Pl. 1: 29. 1753; Hook. f., Fl. Brit. India 5: 85. 1886; Prain, Bengal Pl. 2: 893. 1903. [Plate 191b-c]

Dioecious climbing shrub, 1–2 m long, pubescent. Leaves ovate to lanceolate, 4–8 × 2–4.5 cm, symmetric or slightly obliquely cordate, entire, acute to acuminate, chartaceous, minute silver scales below; stipules 1.5–2.5 cm, pubescent. Inflorescence leaf-opposed spike, pubescent; male spikes c. 11 mm, erect; female spikes 1.5–2.5 cm, erect; floral bracts orbicular, c. 1 mm across, peltate. Perianth lobes absent. Male: stamens 2; filaments very short; anthers ellipsoid. Female: ovary ovoid, c. 1 × 0.3 mm, partly connate to rachis; style absent; stigma 3. Drupes black, globose, aggregated; seed solitary.

Flowering & Fruiting: August–March.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Narathali, 23.09.2011, AK 52829.

5. *Piper mullesua* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 20. 1825. *Piper brachystachyum* Wall. ex Hook. f., Fl. Brit. India 5: 87. 1886, *nom. illeg.* [Plate 191d; Fig. 96a-b]

Dioecious, small, erect shrub, 20–40 cm high. Leaves elliptic or elliptic-ovate, 10.5–13 × 4.5–7.6 cm, symmetric or slightly obliquely cuneate at base, entire, caudate-acuminate, thinly coriaceous; stipules absent. Inflorescence leaf-opposed spikes at apices of branchlets; male spikes 3–7 cm, erect; female spikes 2–8 mm across, subglobose heads; floral bracts orbicular, c. 1 mm across, peltate. Perianth lobes absent. Male: stamens 2; filaments short; anthers reniform. Female: ovary obovoid; style absent; stigma 3 or 4. Drupes black, obovoid, aggregated; seed solitary.

Flowering & Fruiting: February–September.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimens examined: On the way to Sinchula, 02.03.1934, KB 1975; way to Sinchu, JKS 4697; Bhutia pond, 09.10.2009, SKS & GK 46271; Buxa Fort to Chunabhati, 30.09.2013, AK 59690.

6. *Piper peepuloides* Roxb., Fl. Ind. 1: 159. 1820; Hook. f., Fl. Brit. India 5: 83. 1886; Prain, Bengal Pl. 2: 893. 1903. [Plate 192a-b]

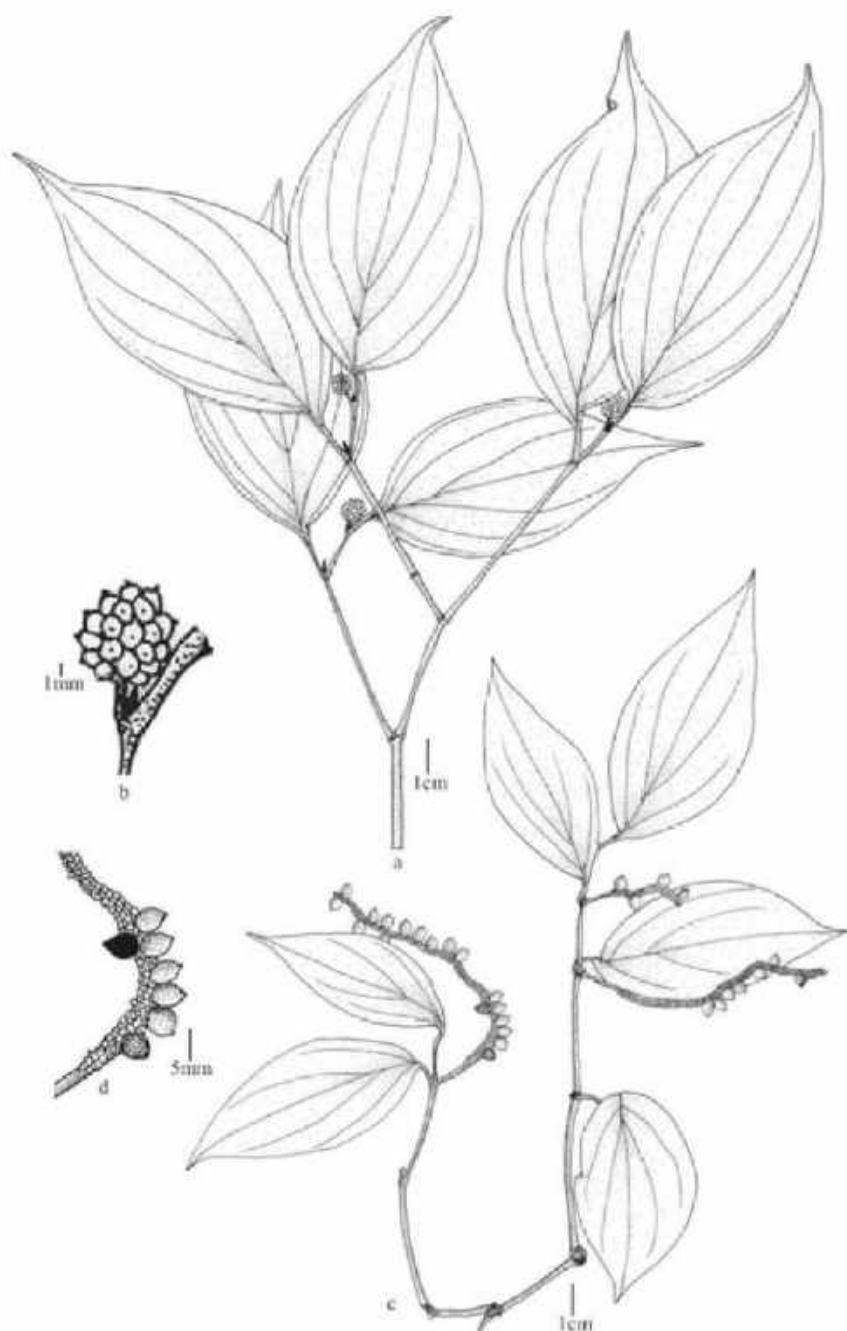


Fig. 96. *Piper mullisua*: a. Fruiting branchlet; b. Fruiting spike (AK 59690); *Piper suiwigua*: c. Fruiting branchlet; d. Portion of fruiting spike (AK 59954).

Dioecious climbing shrub, 0.5–1 m long. Leaves ovate-elliptic, ovate-lanceolate or lanceolate, 6–9 × 1.7–2.8 cm, slightly obliquely cuneate, entire, caudate-acuminate, subcoriaceous; stipules absent. Inflorescence leaf-opposed spikes; male spikes 2.8–3 cm, erect; female spikes 6–15 mm, erect; floral bracts suborbicular, c. 1 mm across, peltate. Perianth lobes absent. Male: stamens 2; filaments flat, c. 0.4 mm; anthers ovoid-globose. Female: ovary obovoid; style absent; stigma 3 or 4. Drupes black, globose, aggregated; seed solitary.

Flowering & Fruiting: November–February.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: Tobgaon, VN 2707; Buxaduar, 26.11.1975, JKS 937; Buxa to Tobgaon, JKS 938; Buxaduar, JKS 4058; Rajabhatkhawa range, 11.02.2010, SKS & GK 47039; Pana, 11.02.2013, AK 58843; Hatipota, 18.02.2013, AK 59827.

7. *Piper sulpigua* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 20. 1825. *Piper nepalense* Miq., Syst. Piperac. 2: 318. 1844; Hook. f., Fl. Brit. India 5: 89. 1886.

[Plate 192c; Fig. 96c-d]

Dioecious climbing shrub, 5–8 m long. Leaves elliptic-lanceolate to ovate, 6.2–9.7 × 2.6–4.2 cm, asymmetrically cuneate, entire, acute to acuminate, chartaceous, glandular; stipules 1.5–1.8 cm, deciduous. Inflorescence leaf-opposed spikes, pubescent; male spikes 7–14 cm, erect; female spikes 3–6 cm; floral bracts orbicular or suborbicular, 1.2–1.5 mm wide, peltate. Perianth lobes absent. Male: stamens 3; filaments short; anthers ovoid. Female: ovary globose, c. 1 mm across; style absent; stigma 4. Drupes black, ovoid, acute, loosely aggregated, slightly pungent; seed solitary.

Flowering & Fruiting: May–February.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59954.

8. *Piper sylvaticum* Roxb., Fl. Ind. 1: 158. 1820; Hook. f., Fl. Brit. India 5: 84. 1886; Prain, Bengal Pl. 2: 893. 1903.

Dioecious, climbing shrub, 2–3 m long. Leaves ovate, oblong-elliptic or oblong-ovate, 4–14 × 2–6 cm, symmetric or slightly obliquely cuneate or rounded, repand, caudate-acuminate, chartaceous, reddish brown glandular; stipules narrow, inconspicuous. Inflorescence leaf-opposed spikes; male spikes 0.8–5.5 cm, erect; female spikes c. 3 cm; floral bracts orbicular, c. 1 mm across, peltate, sessile in female floral bracts. Perianth lobes absent. Male: stamens 4; filaments very short; anthers ovoid. Female: ovary globose; style absent; stigma 2 or 3. Drupes black, globose, aggregated; seed solitary.

Flowering & Fruiting: September–February.

Distribution. India: Sikkim and West Bengal.

Specimens examined: Rajabhatkhawa range, 14.02.2010, SKS & GK 47087; Jainti range, 05.03.2011, GK 47268, 47269; Jainti range, 08.03.2011, GK 50509, 50510; Jainti-Phashkhawa, 02.10.2012, AK 58612; Checko-1, 09.02.2013, AK 58809.

9. *Piper thomsonii* (C. DC.) Hook. f., Fl. Brit. India 5: 87. 1886. *Chavica thomsonii* C. DC. in DC., Prodr. 16 (1): 389. 1868. [Plate 192d]

Dioecious climbing shrub, 1–2 m long. Leaves ovate, ovate-lanceolate or elliptic, 6–16 × 3–8 cm, obliquely rounded or shallowly cordate, occasionally cuneate, entire, acuminate, membranous to thinly papery, brownish red glandular especially along veins below; stipules absent. Inflorescence leaf-opposed spikes; male spikes 3–5.5 cm; female spikes c. 1.5 cm; floral bracts orbicular, 0.8–1 mm wide, peltate, brownish red glandular above, pubescent below. Perianth lobes absent. Male: stamens 2 or 4; filaments short; anthers reniform. Female: Ovary globose; style absent; stigma 2. Drupes black, globose, aggregated; seed solitary.

Flowering & Fruiting: Throughout the year.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Bhutanghat, 25.02.2012, AK 55937; Checko-1, 25.09.2012, AK 56134; Buxaduar to Achalung, 19.05.2014, AK 62661; Buxaduar to Tashigaon, 20.05.2014, AK 62691.

Chloranthaceae

Chloranthus Sw.

Chloranthus elatior Link, Enum. Hort. Berol. Alt. 1: 140 1821. *Chloranthus officinalis* Blume, Enum. Pl. Javae 1: 79. 1827. *Chloranthus elatior* R. Br., Bot. Mag. 48: sub t. 2190. 1820, *nom. inval.*; Hook. f., Fl. Brit. India 5: 100: 1886.

[Plate 193a-b]

Undershrub, to 1 m high. Leaves elliptic to elliptic-ovate, 6.5–17 × 3.2–6.5 cm, acuminate, sharply serrate, cuneate, sub-coriaceous, dark brown above when dry, pale green beneath when dry, pellucid gland-dotted. Inflorescence terminal spike, c. 7 cm, dichotomously or racemosely branched. Flowers unisexual or bisexual, white, sessile; bracts ovate, 1–1.5 mm. Perianth absent. Stamens 1 or 3; filaments short; anthers 2-lobed. Ovary 1-loculed, enclosed by bracts; style short. Drupes green when young, white at maturity, ovoid or globose; seed pendulous.

Flowering & Fruiting: April–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 8, 10.02.2010, SKS & GK 46319; Checko-1, 25.09.2012, AK 56116.

Myristicaceae

Horsfieldia Willd.

Horsfieldia kingii (Hook. f.) Warb., Nova Acta Acad. Cacs. Leop.-Carol. German. Nat. Cur. 68: 308. 1897. *Myristica kingii* Hook. f., Fl. Brit. India 5: 106. 1886.

[Plate 193c]

Ramguwa (B, N).

Dioecious tree, 15–20 m high. Leaves whorled towards end of branchlets, obovate, elliptic-oblong or oblong-lanceolate, 18–33 × 6–11 cm, acuminate, entire, attenuate, coriaceous. Male flowers 3–10 in clusters in axillary, tomentose to puberulous lax panicles, hairs dendroid; bracts accrescent in fruiting. Perianth lobes 4, triangular, thick, coriaceous. Stamens 12–20; anthers sessile. Androphore sessile or subsessile. Female inflorescence in panicles, 3–7 cm, tomentose to puberulous, hairs dendroid, 7–8-flowered. Perianth lobes as in male flowers. Ovary ellipsoid or obovoid, 2–2.5 × c. 2 mm, pubescent. Fruits ellipsoid-oblong, rounded to sub-acute, 2 persistent perianth valves at base; pericarp thick; stalk 3–6 mm; aril entire, rarely lacerate; seeds hard.

Flowering & Fruiting: April–July.

Distribution. India: Assam, Sikkim, Tripura and West Bengal.

Specimen examined: Panbari 8, 10.04.2012, GK 56093.

Notes: Fruits are edible, but promote intoxication; kernel is used as a substitute for areca nut; its gum is good against mouth sores.

Lauraceae

Key to the genera

- | | |
|---|------------------------|
| 1a. Leaves 3-veined at or above base (sometimes pinnately veined above but basal lateral veins much stronger than others) | 2 |
| 1b. Leaves pinnately veined throughout (lowermost lateral veins weaker than those above) | 3 |
| 2a. Leaves obovate, clustered at branch ends; panicles short and dense, bearing flowers to base | 1. <i>Actinodaphne</i> |
| 2b. Leaves elliptic, ovate or lanceolate, not clustered at branch ends; panicles elongate, slender, on naked peduncle | 3. <i>Cinnamomum</i> |
| 3a. Inflorescences axillary, umbels or fascicles; flowers unisexual | 5. <i>Litsea</i> |
| 3b. Inflorescences axillary, terminal panicles; flowers bisexual | 4 |
| 4a. Anthers 2-celled | 5 |
| 4b. Anthers 4-celled | 6 |

- 5a. Petioles and pedicels sericeous; perianth lobes 5-6, not in 2 whorls; stamens 9 in 2 whorls; filaments hairy at base; drupes not enclosed by perianth lobes 2. *Beilschmiedia*
- 5b. Petioles glabrous and pedicels tomentose; perianth lobes 6 in 2 whorls; stamens 9, not in whorls; filaments glabrous; drupes enclosed by perianth lobes 4. *Cryptocarya*
- 6a. Perianth lobes 6, not in whorls; drupes not enclosed by thin and soft perianth lobes 6. *Machilus*
- 6b. Perianth lobes 6 in 2 whorls; drupes enclosed by thick and hard perianth lobes 7. *Phoebe*

1. *Actinodaphne* Nees

Key to the species

- 1a. Leaves obovate, strongly 3-veined near base; flowers in panicles 1. *A. obovata*
- 1b. Leaves elliptic, lanceolate or oblanceolate, pinnately veined; flowers in umbels or clusters 2. *A. sikkimensis*

1. *Actinodaphne obovata* (Nees) Blume, Mus. Bot. 1: 342. 1851; Hook. f., Fl. Brit. India 5: 153. 1886. *Tetradenia obovata* Nees, Pl. Asiat. Rar. 2: 64. 1831.

[Plate 193d]

Runchey, Runchey Kath, Runche (N).

Tree, 10-15 high, ferruginous pubescent; terminal buds dark brown. Leaves crowded at the end of branchlets, variable, ovate-oblong, ovate-elliptic or obovate, 17.5-25 × 6.5-10 cm, acuminate, wavy, cuneate, coriaceous, turned brown when dry, immature leaves tomentose, glabrous when matured; stipules caducous. Flowers infasciculate cymes; floral bracts obovate *c.* 9 × 6 mm, tomentose, glabrous inside. Male: perianth yellow, 6, sub-equal, ovate, *c.* 3.5 × 2-2.5 mm, silky tomentose, glabrous inside except at base. Stamens 9, perfect, in 3 whorls, 1st and 2nd whorls eglandular, of the 3rd whorls bi-glandular; filaments *c.* 5 mm, pillose at base; anthers oblong, *c.* 2 mm, 4-celled, rudimentary, pillose. Female: perianth as in male flowers; staminodes 9. Ovary sub-globose, villous; style slender; stigma dilated. Fruits ellipsoid, seated on perianth cup.

Flowering & Fruiting: March-April.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Specimen examined: Near 23rd mile tower, 12.03.2011, GK 50545.

2. *Actinodaphne sikkimensis* Meisn. in DC., Prodr. 15 (1): 213. 1864; Hook. f., Fl. Brit. India 5: 147. 1886. [Plate 194a-c; Fig. 97a-e]

Phurke Sissi (N).

Tree, 5-7 m high, sericeous. Leaves lanceolate to elliptic-lanceolate, 9-16.2 ×



Fig. 97. *Actinodaphne sikkimensis*: a. Flowering branchlet; b. Perianth split open showing stamens; c. Stamen; d. Gynoecium; e. Drupe (AK 59912); *Beilschmiedia assamica*: f. Fruiting branchlet (GK 52304).

2.2–4.3 cm, cuneate, caudate-acuminate, coriaceous, glandular below; bracts obovate, scarious and ciliate, glandular, deciduous, white silky pubescent. Male: perianth lobes greenish yellow, 6, oblanceolate, connate at base, scarious and ciliate, glandular, silky pubescent. Stamens 9; filaments short, hairy; anthers oblong, 4-celled. Female: perianth lobes same as in male flowers. Ovary ovoid, pubescent; style 6–8 mm; stigma capitate. Drupes ellipsoid, c. 1.3 × 0.7 cm, beaked; seed solitary, ellipsoid, tubercled.

Flowering & Fruiting: February–May.

Distribution. India: Sikkim and West Bengal.

Specimens examined: On the way to Sinchula, 02.03.1934, KB 2019; Buxaduar to Tashigaon, 11.02.2014, AK 59912; Buxaduar to Tashigaon, 20.05.2014, AK 62687.

2. *Beilschmiedia* Nees

Key to the species

- 1a. Leaves opposite or subopposite, ovate to ovate-elliptic; terminal buds large, subglabrous 1. *B. assamica*
1b. Leaves alternate, elliptic-lanceolate; terminal buds small, tomentose 2. *B. dalzellii*

1. *Beilschmiedia assamica* Meisn. in A. DC. Prodr. Syst. Nat. Reg. Veg. 15 (1): 64. 1864; Hook. f., Fl. Brit. India 5: 124. 1886. [Plate 194d; Fig. 97f]

Tree, 20–25 m high; terminal buds lanceolate, 8–12 × 2–3.5 mm. Leaves ovate to ovate-elliptic, 10.5–16 × 3.5–7 cm, attenuate or cuneate, entire, acute, coriaceous, glabrous. Inflorescences axillary panicles, 12–14 cm. Perianth tube short; lobes 5, subequal. Stamens 9, perfect, in 3-series; two outer series with eglandular filaments and anthers introrse; third series with bi-glandular filaments and anthers extrorse; fourth series with cordate staminodes. Ovary free from perianth. Berries green initially, turned dark blue once ripened, oblong-ovoid, seated on thickened fruiting pedicels.

Flowering & Fruiting: August–December.

Distribution. India: Arunachal Pradesh, Assam, Nagaland, Meghalaya, Manipur, Mizoram, Sikkim, Tripura and West Bengal.

Specimen examined: Panbari 8, 01.12.2011, GK 52304.

2. *Beilschmiedia dalzellii* (Meisn.) Kosterm., Reinwardtia 6: 282. 1962. *Beilschmiedia fagifolia* Nees var. *dalzellii* Meisn., Prodr. Syst. Nat. Reg. Veg. 15 (1): 64. 1864; Hook. f., Fl. Brit. India 5: 122. 1886. [Plate 195a]

Tree, 5–8 m high, sericeous. Leaves elliptic-lanceolate, 6.5–12 × 2.5–4 cm, cuneate at base, repand, sub-acute to short acuminate, coriaceous, minute scattered hairs

below; floral bracts lanceolate, puberulent. Perianth lobes oblong, connate at base. Stamens perfect; outer 6 introrse, inner 3 extrorse; filaments short. Ovary ovoid; style short; stigma obtuse. Drupes dark blue, oblong-obovoid, pulpy; seed solitary, ovoid.

Flowering & Fruiting: March–May.

Distribution. India: Andhra Pradesh, Maharashtra, Karnataka and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 62674.

3. *Cinnamomum* Schaeff., *nom. cons.*

Cinnamomum bejolghota (Buch.-Ham.) Sweet, Hort. Brit.: 344. 1827. *Laurus bejolghota* Buch.-Ham., Trans. Linn. Soc. London 13 (2): 559. 1822.

Ram-Tejpata (B).

Tree, to 7–10 m high. Leaves oblong-obovate, 18–36 × 5–13 cm, attenuate, entire, obtuse, coriaceous, glabrous on upper surface, puberulous beneath; terminal buds ovate, c. 5 × 4 mm, tomentose. Inflorescences terminal panicles, 12–20 cm, sparsely pubescent. Perianth 6, in 2-whorls, appressed hairy; outer whorl ovate-oblong, c. 2.5 × 1.5 mm; inner whorl ovate, c. 2 × 2 mm. Stamens 9, perfect; filaments c. 1 mm, hairy at base; anthers oblong-ovate, c. 1 mm, 4-celled; staminodes 9, hairy at base; disk white hairy. Ovary c. 1 × 0.5 mm, glabrous; style subulate, c. 1 mm; stigma discoid. Berries seated on a perianth cup, ellipsoid, c. 12 × 8 mm.

Flowering & Fruiting: March–July.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Nagaland, Meghalaya, Mizoram, Manipur, Sikkim and West Bengal.

Specimens examined: SRVK 11, 30.03.2012, GK 50651; SRVK 12, 29.03.2012, GK 50612.

Use: Leaves used as spices.

4. *Cryptocarya* R. Br.

Cryptocarya amygdalina Nees in Wall., Pl. Asiat. Rar. 2: 69. 1831; Hook. f., Fl. Brit. India 5: 118. 1886; Prain, Bengal Pl. 2: 897. 1903. [Plate 195b–d; Fig. 98a–e]

Tree, 8–10 m high, puberulent. Leaves sometimes subopposite, ovate, elliptic-ovate, ovate-lanceolate, 5–18 × 2–6.5 cm, cuneate, entire, short acuminate, coriaceous, puberulous below. Inflorescence terminal and axillary panicles, pubescent or glabrous. Perianth lobes 6 in 2 whorls, ovate, c. 1 × 1.2 mm, connate at base, hooded, tomentose, puberulous inside. Stamens 9, perfect; filaments short, hairy at base only; anthers falcate, c. 0.5 mm, 2-celled. Ovary ovoid; style c. 1 mm; stigma discoid. Drupes brown black, ellipsoid-ovate, enclosed by perianth lobes; seed solitary, ovoid.

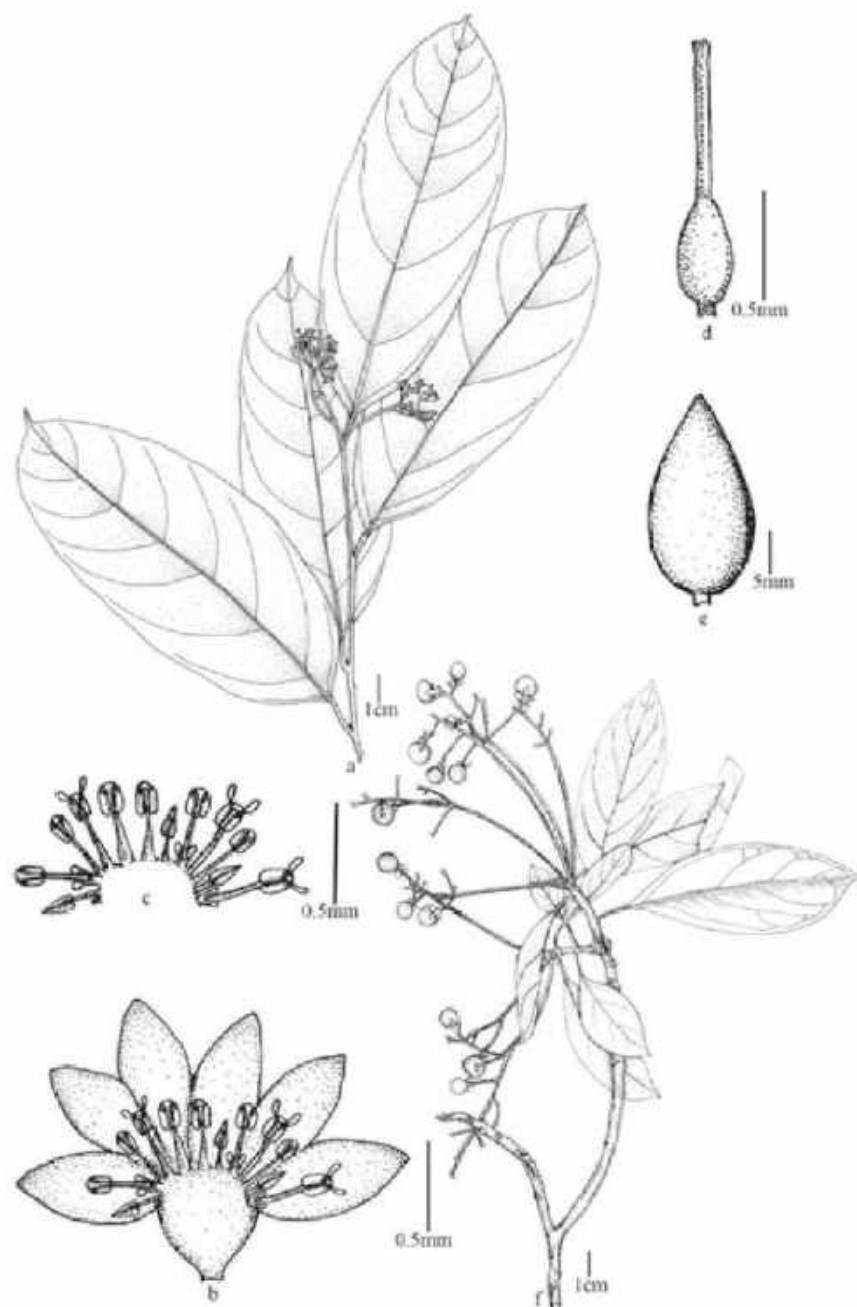


Fig. 98. *Cryptocarya amygdalina*: a. Flowering branchlet; b. Perianth split open showing stamens and staminodes; c. Whorl of stamens and staminodes; d. Gynoecium; e. Drupe (AK 59840); *Machilus glaucescens*: f. Fruiting branchlet (GK 50642).

Flowering & Fruiting: October–August.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal.

Specimens examined: Buxa to Santrabari, 23.05.1949, VN 2931; Jainti 8, 12.10.2009, SKS & GK 46329, 46334; Jainti 8, 10.02.2010, SKS & GK 47008, 47009; Jainti, 04.03.2011, GK 47246; Hatipota, 18.02.2013, AK 59838; Hatipota, 18.02.2013, AK 59840.

5. *Litsea* Lam.

Key to the species

- 1a. Leaves elliptic with broad obtuse ends and prominent tertiary nerves beneath, 5–11 cm broad; fruits with persistent perianth tube 2. *L. monopetala*
- 1b. Leaves lanceolate, oblanceolate or elliptic-oblong, 2–5 cm broad; fruits without perianth tube 2
- 2a. Leaves lanceolate, glabrous beneath except on veins; lateral veins 8–12 pairs, not prominent beneath; umbels in clusters of 2–6; fruit subglobose, lemon scented 1. *L. cubeba*
- 2b. Leaves elliptic-oblong, silky-pubescent beneath; lateral veins 10–15 pairs, prominent beneath; umbels in clusters of 6–18; fruits ellipsoid, not lemon scented 3. *L. salicifolia*

1. *Litsea cubeba* (Lour.) Pers., Syn. Pl. 2: 4. 1806. *Laurus cubeba* Lour., Fl. Cochinch.: 252. 1790. *Litsea citrata* Blume, Bijdr. Fl. Ned. Ind. 11: 565. 1826; Hook. f., Fl. Brit. India 5: 155. 1886. [Plate 196a]

Deciduous tree, to 7–10 m high. Leaves lanceolate to ovate-lanceolate, 6.4–14.5 × 2.2–4.2 cm, acuminate, entire, obliquely attenuate, chartaceous, glabrous above, glabrescent beneath; midvein slightly raised. Inflorescence umbel, 2–6-flowered, puberulous. Male: perianth 6, ovate; stamens 9, fertile; filaments hairy below middle, of 3rd whorls each with 2 shortly stipitate glands at base; pistilode glabrous. Female: perianth 6, free, orbicular, c. 5 × 1 mm, hyaline gland-dotted; staminodes 9, c. 5 mm, hairy; ovary c. 5 × 5 mm; style not distinct; stigma peltate. Drupes subglobose, 6–7 mm across, perianth rim c. 1.5 mm across, on thickened, 3–5 mm long pedicel.

Flowering & Fruiting: December–September.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Specimen examined: Rajabhatkhawa range, 04.12.2011, GK 52310.

Notes: On crushing leaves and fruits a lemon scent appears.

2. *Litsea monopetala* (Roxb.) Pers., Syn. Pl. 2: 4. 1807. *Tetranthera monopetala* Roxb., Pl. Coromandel 2: 26. 1798. *Litsea polyantha* Juss., Ann. Mus. Natl. Hist.

Nat. 6: 211. 1805; Hook. f., Fl. Brit. India 5: 162. 1886; Prain, Bengal Pl. 2: 903. 1903. [Plate 196b-c]

Tree, 7–10 m high, rusty tomentose. Leaves oblong-obovate to oblong-elliptic, 6–15.5 × 3.5–6.5 cm, cuneate or rounded, undulate, acute to obtuse, coriaceous, rusty villous below. Inflorescence axillary fascicles, rusty tomentose. Flowers unisexual; floral bracts triangular-ovate, c. 2 × 1 mm, hairy. Male: perianth lobes yellow or creamy, 6, subequal, ovate, c. 1 × 0.5 mm, sericeous, gland-dotted; stamens 9 in 3 whorls, perfect, stamens of inner whorl having 2 oblate glands; filaments 1–1.5 mm; anthers oblong, 4-celled. Female: perianth lobes same as in male flowers; ovary ovoid, c. 5 mm, hairy; style c. 1 mm; stigma discoid. Drupes ellipsoid, on perianth; seed solitary.

Flowering & Fruiting: February–July.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Rajabhatkhawa range, 13.03.2011, GK 50563; Jainti range, 31.03.2012, GK 50697; Sankosh, 17.02.2012, AK 55684; Narathali, 20.02.2012, AK55778.

3. *Litsea salicifolia* (Roxb. ex Nees) Hook. f., Fl. Brit. India 5: 167. 1886. *Tetranthera salicifolia* Roxb. ex Nees, in Wall., Pl. Asiat. Rar. 2: 66. 1831.

[Plate 197a-b]

Shrub to small tree, 1–4 m high, appressed hairy. Leaves oblong-obovate or ovate-elliptic, 10–23 × 2.9–6.8 cm, cuneate, undulate, acute with mucronate tip, coriaceous, appressed hairy below. Inflorescence axillary fascicles, hairy. Flowers unisexual; floral bracts many, linear, 2–2.5 × c. 1 mm, silky tomentose; bracteoles orbicular, c. 2.5 across, hairy. Male: perianth lobes yellow, 6, obovate, c. 1.5 × 1 mm, connate at base, obtuse, gland-dotted; stamens 9, perfect; filaments c. 1 mm, villous; anthers oblong, 1–1.5 mm, 4-celled. Female: perianth lobes same as in male flowers; ovary ovoid, c. 5 mm, hairy; style c. 1 mm; stigma discoid. Drupes ellipsoid, on perianth tube; seed solitary.

Flowering & Fruiting: January–May.

Distribution. India: Assam, Meghalaya and West Bengal.

Specimens examined: NRVK 14, 09.02.2010, SKS & GK 46372; NRVK 14, 04.03.2011, GK 47242; Newlands, 15.02.2012, AK 55612; Kumargram, 18.02.2012, AK 55712; Bhutanghat, 25.02.2012, AK 55925; Panbari 9, 05.04.2012, GK 56038; Panbari8, 10.04.2012, GK 56082; Checko-1, 09.02.2013, AK 58806; Buxaduar to Tashigaon, 20.05.2014, AK 62693.

6. *Machilus* Nees

Key to the species

- 1a. Branchlets striated, yellow pubescent, turning glabrous; leaves attenuate at base, entire at margins, acute at apex, puberulous below; inflorescence rusty tomentose; floral bracts linear-lanceolate; stamens 9, not in whorls; filaments without glands at base; staminodes 9 **1. *M. glaucescens***
- 1b. Branchlets not striated, glabrous throughout; leaves cuneate at base, repand at margins, caudate-acuminate at apex, glabrous below; inflorescences glabrous; floral bracts elliptic-lanceolate; stamens 9 in 3 whorls; filaments of 3rd whorl each with 2 glands at base; staminodes 3 **2. *M. odoratissima***

1. *Machilus glaucescens* (Nees) Wight, Icon. Pl. Ind. Orient. 5 (2): 12. 1852. *Ocotea glaucescens* Nees, Pl. Asiat. Rar. 2: 71. 1831. *Laurus villosa* Roxb., Fl. Ind. 2: 310. 1832. *Machilus villosa* (Roxb.) Hook. f., Fl. Brit. India 5: 140. 1886; Prain, Bengal Pl. 2: 900. 1903. [Plate 197c-d; Fig. 98f]

Bhale Kaulo, Kawla (N).

Tree, to 10 m high, yellowish pubescent, glabrate later. Leaves crowded towards end of branchlets, elliptic to elliptic-lanceolate, 4.2–9.5 × 2–2.9 cm, attenuate, entire, acute, coriaceous, greenish brown above on drying, reddish brown beneath on drying, puberulous beneath. Inflorescence terminal panicles, 6–10 cm, rusty tomentose; floral bracts linear-lanceolate, 1.5–2 mm, tomentose. Perianth 6, ovate, c. 3 × 2 mm, acute, rusty tomentose, puberulous inside; stamens 9 fertile; filaments subequal, 1–1.5 mm, hairy at base; anthers oblong, c. 1 mm, 4-celled; staminodes 9 in 2 whorls, c. 1 mm, hairy at base; disk hairy; ovary c. 1 mm across, glabrous; style c. 1 mm, glabrous. Berries globose-ovoid, 5–8 mm across, seated on perianth.

Flowering & Fruiting: January–April.

Distribution. India: Arunachal Pradesh, Assam (?), Bihar, Nagaland, Meghalaya, Manipur, Mizoram, Odisha, Sikkim, Tripura and West Bengal.

Specimen examined: SRVK 11, 30.03.2012, GK 50642.

Uses: Bark is used for incense purposes.

2. *Machilus odoratissima* Nees in Wall., Pl. Asiat. Rar. 2 (8): 70. 1831; Hook. f., Fl. Brit. India 5: 139. 1886.

Lali Kawla (N).

Small tree, 6–10 m high. Leaves elliptic-lanceolate to elliptic-oblancoate, 9.2–14.2 × 2.4–5.5 cm, cuneate, repand, caudate-acuminate, coriaceous. Inflorescence terminal panicles; floral bracts elliptic-lanceolate, c. 5 × 1 mm, acuminate, mid nerve prominent, glandular, deciduous, villous. Perianth lobes 6, subequal,

obovate, 2.5–3.5 × 1.8–2 mm, ciliate, obtuse, glandular, 5 prominent parallel veins and sparsely pubescent inside. Stamens 9 in 3 whorls, those of 3rd whorl each with 2 glands at base; filaments flat, 1–1.3 mm, villous at base; anthers 4-celled; staminodes 3, innermost whorl sagittate-cordate, with villous stalk. Ovary ovoid, c. 1.2 × 1 mm; style c. 1 mm; stigma discoid, 2-lobed. Drupes ellipsoid, fleshy; seed solitary.

Flowering & Fruiting: March–June.

Distribution. India: Assam, Himachal Pradesh, Meghalaya, Nagaland and West Bengal.

Specimen examined: Rovers point to Bhutan Border, 15.02.2014, AK 59951.

7. Phoebe Nees

Phoebe lanceolata (Nees) Nees, Syst. Laurin.: 109. 1836; Hook. f., Fl. Brit. India 5: 141. 1886; Prain, Bengal Pl. 2: 900. 1903. *Ocotea lanceolata* Nees in Wall., Pl. Asiat. Rar. 2: 71. 1831. [Fig. 99]

Tree, 10–15 m high, sparsely puberulous in older shoots; bud scales triangular-ovate, c. 1.5 × 1 mm, deciduous, densely pubescent. Leaves crowded at end of branchlets, elliptic-ob lanceolate, 9–17 × 2.6–4.6 cm, attenuate, repand, acuminate, coriaceous, gland-dotted above, puberulous below. Inflorescence axillary panicles, often clustered near end of branches. Flowers bisexual or unisexual; floral bracts lanceolate, c. 1 × 0.5 mm, ciliate, hairy. Perianth lobes 6 in 2 whorls, subequal, obovate, 3.5–4 × 1.6–2 mm, connate at base, puberulent-ciliate, subacute with pubescent, glandular, white silky tomentose inside; stamens 9 in 3 whorls; filaments c. 1 mm, pubescent; anthers triangular-ovate, 4-celled; staminodes 6 in 2 whorls, hairy at base; ovary globose, c. 1 mm across; style c. 5 mm; stigma capitate. Drupes ellipsoid, in straw yellow, thick and hard perianth; seed solitary.

Flowering & Fruiting: April–September.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Tobgaon, KB 2074; Tashigaon 2, Bhutia Pond, 07.04.2012, GK 56050; Buxaduar to Achalung, 19.05.2014, AK 62659.

Proteaceae

Helicia Lour.

Helicia nilagirica Bedd., Madras J. Lit. Sci., Ser. 3, 1: 56, pl. 11. 1864; Hook. f., Fl. Brit. India 5: 190. 1886. *Helicia erratica* Hook. f., Fl. Brit. India 5 (13): 189. 1886. [Plate 198a-b; Fig. 100]

Tree, 6–12 m high, brown pubescent when young. Leaves oblanceolate to obovate, 5–14 × 1.5–5 cm, attenuate, repand and sometimes serrulate, short acuminate to

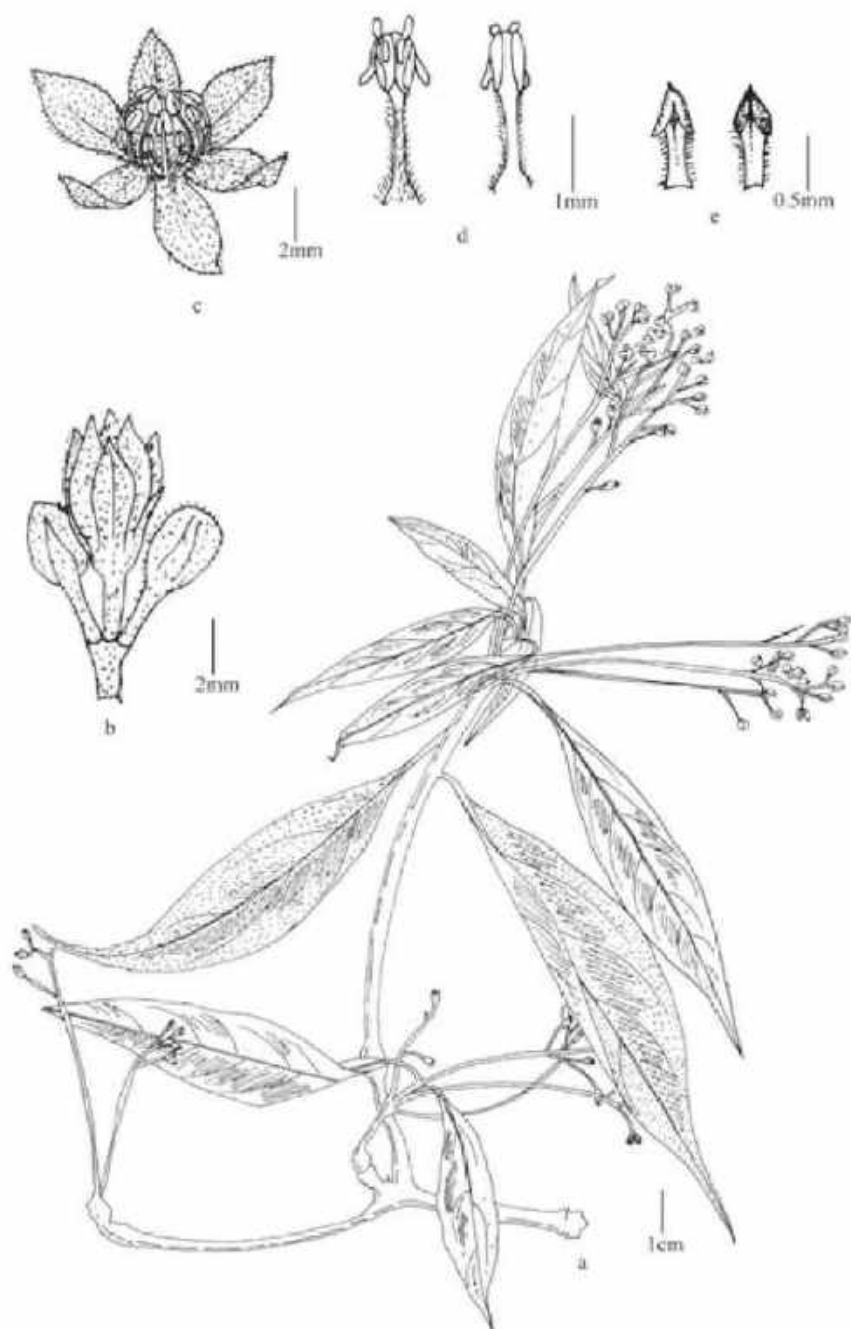


Fig. 99. *Phoebe lanceolata*: a. Flowering branchlet; b. Flowers; c. Flower showing stamens and staminodes; d. Stamens; e. Staminodes (GK 56050).

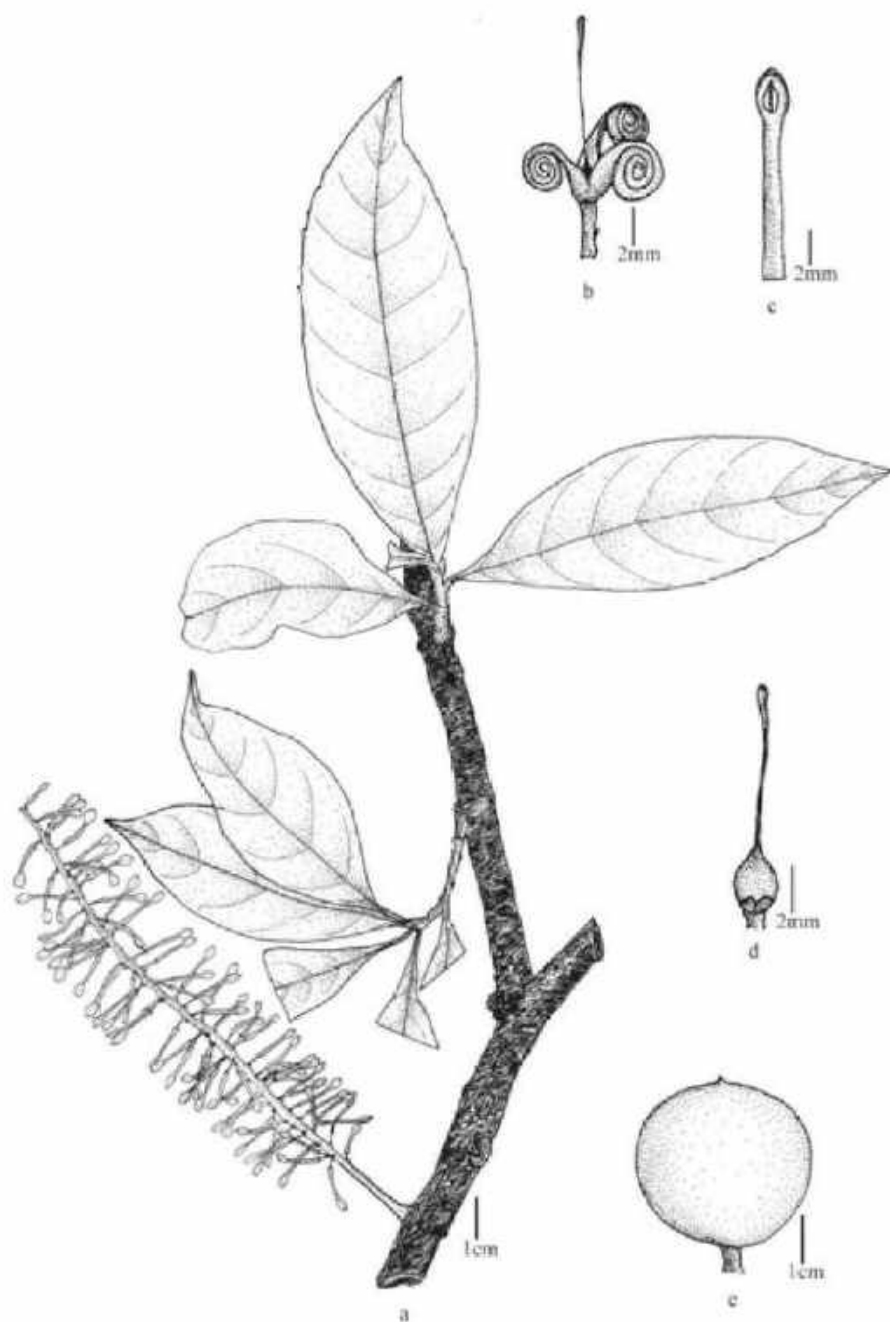


Fig. 100. *Helicia nilagirica*: a. Flowering branchlet; b. Opened flower; c. Perianth segment with stamen; d. Gynoecium; e. Drupe (AK 62675, AK 59932).

sub-acute, glandular below. Inflorescence racemes on older shoots, sparsely brown hairy; floral bracts lanceolate, brown pubescent; pedicels short. Perianth lobes yellowish green, 4, clavate, 1–1.2 cm, connate, reflexed at anthesis. Stamens 4, at perianth lobes; anthers elliptic, connective extended above; hypogynous glands 4, ovate, truncate, glandular. Ovary oblong-lanceolate; style 7–7.5 mm; stigma clavate. Drupes dark green, globose, style persistent; seed solitary, globose.

Flowering & Fruiting: Throughout the year.

Distribution. India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Kerala, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Tashigaon to Rovers point, 03.10.2013, AK 59772; Buxaduar to Lepchakhawa, 13.02.2014, AK 59932; Buxaduar to Tashigaon, 20.05.2014, AK 62675.

Elacagnaceae

Elaeagnus L.

Elaeagnus pyriformis Hook. f., Fl. Brit. India 5: 202. 1886. [Plate 198c]

Straggling shrub, brown or silver scaly. Leaves elliptic, 2.5–9 × 1.5–5 cm, cuneate to sub-rounded, obtuse, acute to shortly acuminate, coriaceous, silver scales leaving dots above; stipular spines up to 2.5 cm. Inflorescence umbellate or clustered on short axillary shoots or stipular spines. Perianth tubular; tube 4-angled, 7–9 mm; lobes 4, triangular-ovate, stellate hairy inside. Stamens 4, at mouth of perianth tube; filaments short; anthers lanceolate. Ovary oblong; style 6–7 mm, stellate hairy; stigma swollen. Fruits drupaceous, yellowish, pyriform, 7–10 × 5–7 mm, perianth tube persistent; seed solitary, globose or ellipsoid.

Flowering & Fruiting: December–May.

Distribution. India: Assam, Meghalaya, Mizoram and West Bengal.

Specimens examined: Jainti range, Mahakalguri, 16.11.1891, EAB 131; Rajabhatkhawa, 66m, 25.02.1934, KB s. n.; Buxaduar, JKS 4658; Narathali, 20.02.2011, AK 55744; Pana, 11.02.2013, AK 58862.

Loranthaceae

Key to the genera

- | | |
|---|-----------------------|
| 1a. Bracts conspicuous, c. 15 mm, arranged in involucre of 3–4 enclosing flowers | |
| | 5. Tolypanthus |
| 1b. Bracts inconspicuous, 1–3 mm, scale-like, 1–3 at base of ovary or forming a cup-like rim on rachis of inflorescence | 2 |
| 2a. Flowers symmetric; corolla without a vertical split | 3 |
| 2b. Flowers asymmetric; corolla with a vertical split | 4 |

- 3b. Inflorescences pseudo-racemes, brown pubescent; floral bract solitary; petals red, free, 4; stamens 4; drupes red, ovoid **2. Helixanthera**
- 3a. Inflorescences racemes, glabrous; floral bracts 3, connate at base; petals green maroon, fused, 6-lobed; stamens 6; drupes pale yellow, urceolate or globose **3. Macrosolen**
- 4a. Inflorescences 8–12-flowered racemes, glabrous; flowers 5-merous; corolla tube 2.7–3 cm, glabrous; drupes bright pink, ellipsoid-ovoid to oblong, smooth, glabrous **1. Dendrophthoe**
- 4b. Inflorescences 2–5-flowered pseudo-racemes, tomentose with white brown candelabra hairs; flowers 4-merous; corolla tube 7–9 mm, tomentose with white brown candelabra hairs; drupes yellow green with rosy hue, pyriform, rugose with short candelabra hairs **4. Scurrula**

1. *Dendrophthoe* Mart.

Dendrophthoe falcata (L. f.) Ettingsh., Denkschr. Kaiserl. Akad. Wiss., Wien. Math.-Naturwiss. Kl.: 32. 1871. *Loranthus falcatus* L. f., Suppl. Pl.: 211. 1782. *Dendrophthoe falcata* var. *pubescens* (Hook. f.) V. Chandras. in A. N. Henry & al., Fl. Tamil Nadu, India, Ser. 1, 2: 215. 1987; K. Rajasekaran in N. P. Balakr. et al., Fl. India 23: 5. 2012; Anant Kumar & Venu, Indian J. Forest. 42 (3): 202. 2019. *Loranthus longiflorus* var. *pubescens* Hook. f., Fl. Brit. India 5: 215. 1886.

[Plate 198d]

Shrub, 1–1.5 m high. Leaves elliptic-oblong or ovate-lanceolate, 4–16 × 3.5–6.5 cm, cordate to cuneate at base, obtuse, coriaceous; floral bracts obliquely cupular. Calyx cupular; tube short, shallowly lobed or entire. Corolla reddish to yellow green or green red, colliculate and vesicular inside; tube curved, ribbed; lobes subulate or linear-lanceolate, reflexed. Stamens at mouth of corolla tube, exerted; filaments short; anthers linear-oblong, few glandular hairs at base. Ovary inferior; style quadrangular, c. 4.5 cm, exerted, glandular hairy; stigma capitate. Drupes ellipsoid, calyx tube persistent.

Flowering & Fruiting: August–March.

Distribution. India: Throughout India.

Specimen examined: Kumargram, 19.09.2011, AK 52645.

2. *Helixanthera* Lour.

Helixanthera ligustrina (Wall.) Danser, Bull. Jard. Bot. Buitenzorg, Ser. 3, 10: 317. 1929. *Loranthus ligustrinus* Wall. in Roxb., Fl. Ind. 2: 219. 1824; Hook. f., Fl. Brit. India 5: 207. 1886; Prain, Bengal Pl. 2: 911. 1903. [Plate 199a-b]

Parasitic shrub, c. 1 m high, sparsely brown pubescent when young, glabrous later. Leaves opposite when young, alternate when old, elliptic-ovate to ovate-lanceolate, 2–6 × 1–2.2 cm, attenuate, entire, subacute to acuminate,

subcoriaceous, pubescent when young, glabrous later. Flowers 2–4 in axillary, brown pubescent pseudoracemes; inflorescence bracts triangular-ovate, *c.* 1 mm, acute, caducous, brown pubescent; floral bracts cucullate, ovate-elliptic, 1.2–1.5 × 0.8–1 mm, obtuse, brown pubescent. Calyx urceolate, 1.5–2 mm, truncate, hairy at rim, brown pubescent. Petals red, 4, linear-spathulate, 6.5–8 mm, acute and thick, strongly reflexed, papillose inside at reflexed part, brown pubescent outside, faintly keeled inside. Stamens 4, at middle of petals; filaments flat, *c.* 2 mm; anthers linear-oblong, *c.* 2 mm. Ovary inferior, 4-lobed at apical exerted part; style quadrangular, 6.5–8 mm; stigma capitate. Drupes red, ovoid, truncate, with persistent stylar scar, brown pubescent; seed solitary.

Flowering & Fruiting: April–November.

Distribution. India: Arunachal Pradesh, Meghalaya, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa N. W., VN 2730; Chunabhati, JKS 4654, 4664; Buxaduar to Achalung, 19.05.2014, AK 62643.

Notes: This species is parasitic on branches of *Croton caudatus*.

3. *Macrosolen* (Blume) Rchb.

Key to the species

- 1a. Lateral nerves distinct; petioles flattened adaxially; corolla-tube splitting up to two-third the length; anthers planilobate; fruits with collar and stylar stub, rugulose
1. *M. cochinchinensis*
- 1b. Lateral nerves obscure on either surface; petioles sulcate adaxially; corolla-tube splitting up to middle; anthers elevatilobate; fruits without collar and hemispherical stylar stub, muricate
2. *M. globosus*

1. *Macrosolen cochinchinensis* (Lour.) Tiegh., Bull. Soc. Bot. France 41: 122. 1894. *Loranthus cochinchinensis* Lour., Fl. Cochinch. 1: 195. 1790; Prain, Bengal Pl. 2: 912. 1903. *Loranthus ampullaceus* Roxb., Fl. Ind. 1: 189. 1820; Hook. f., Fl. Brit. India 5: 220. 1886. [Plate 199c-d]

Shrub, *c.* 1 m high. Leaves elliptic or elliptic-ovate, 4.5–11 × 1.7–4.3 cm, cuneate at base, acute to short acuminate, coriaceous, gland-dotted below. Inflorescence bracts ovate; floral bracts unequal, ovate to sub-orbicular. Calyx urceolate; tube short; lobes saucer-shaped, reflexed. Corolla tube angular, 6–9 mm, keeled inside; lobes spatulate, *c.* 6 mm, reflexed. Stamens at mouth of corolla tube; filaments short; anthers oblong. Ovary inferior; style *c.* 1.3 cm, smooth or gland-dotted; stigma capitate. Drupes surrounded by annular or subcordate collar, stylar stub persistent, rugulose.

Flowering & Fruiting: December–May.

Distribution. India: Andaman & Nicobar Islands, Assam, Bihar, Meghalaya,

Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: On way to Buxaduar, KB 1710, 1910; Panbari 8, 31.03.2012, GK 56004; Narathali, 20.02.2012, AK 55776; Buxaduar to Achalung, 19.05.2014, AK 62646.

2. *Macrosolen globosus* (Roxb.) Tiegh., Bull. Soc. Bot. France 42: 442. 1895. *Loranthus globosus* Roxb., Fl. Ind. 2: 206. 1824; Hook. f., Fl. Brit. India 5: 220. 1886; Prain, Bengal Pl. 2: 912. 1903. [Plate 200a]

Shrub, c. 1 m high. Leaves elliptic, 5–8 × 1.5–2 cm, cuneate at base, obtuse or subacute, coriaceous. Inflorescence axillary, 4–7-flowered pseudoracemes, 1–2 cm; floral bracts ovate, 1–1.5 × 0.5–0.6 mm. Calyculus-tube 0.2–0.4 mm. Petals 6, united; tube terete, splitting equally up to the middle, 4.5–5.2 mm; lobes reflexed, elliptic or spatulate, 4–4.5 mm. Stamens 6, 2.3–2.5 mm; anthers elliptic-ovate. Ovary oblong, 1.5–2 mm; style continuous, tetragonous, as long as corolla; stigma capitate. Fruits globose, muriculate, mamillate without stylar stub, bluish black when dry.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimen examined: Buxaduar to Achalung, 19.05.2014, AK 62646.

4. *Scurrula* L.

Key to the species

- 1a. Leaves lanceolate to elliptic-lanceolate, 4–11 × 1.1–3.2 cm, glabrous on both surfaces when mature 1. *S. gracilifolia*
- 1b. Leaves broadly ovate, 6–12 × 4.2–7.2 cm, glabrous above and pale tomentose below when mature 2. *S. parasitica*

1. *Scurrula gracilifolia* (Roxb. ex Schult.) Danser, Blumea 2: 47. 1936. *Loranthus gracilifolius* Roxb. ex Schult. f., Syst. Veg., ed. 15 bis, 7 (1): 99. 1829.

[Plate 200b-d]

Shrub, 1–1.5 m high, tomentose with white brown candelabra hairs; branchlets lenticellate. Leaves lanceolate to elliptic-lanceolate, 4–11 × 1.1–3.2 cm, cuneate, entire, sub-acute, sub-coriaceous, densely brown stellate when young, turning glabrous on both surfaces when mature; floral bracts ovate. Calyx cupular; tube short; lobes truncate. Corolla greenish; tube slightly curved, compressed, ribbed, sparsely keeled inside, vertical line of candelabra hairs inside; lobes spatulate, c. 6 mm, reflexed. Stamens at mouth of corolla tube; filaments short; anthers oblong. Ovary inferior; style quadrangular, c. 1.6 cm, punctate; stigma capitate to clavate. Drupes surrounded by annularcollar; stylar stub persistent.

Flowering & Fruiting: December–May.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Rangamati, 14.02.2013, AK 58897.

2. *Scurrula parasitica* L., Sp. Pl. 1: 110. 1753; Rajasek. in N. P. Balakr. & al., Fl. India, 23: 27. 2012. *Loranthus scurrula* L., Sp. Pl., ed. 2, 1: 472. 1762; Hook. f., Fl. Brit. India 5: 208. 1886; Prain, Bengal Pl. 2: 911. 1903. [Plate 201a-c]

Shrub; branchlets terete, c. 5 mm across, stellate tomentose or subglabrous; bark dark brown, lenticellate. Leaves broadly ovate, 6–12 × 4.2–7.2 cm, rounded, entire, acute, subcoriaceous, densely brown stellate when young, turning glabrous above and pale tomentose below when mature. Inflorescence stellate tomentose, in 2–3-flowered fasciculate racemes, rarely solitary; floral bract at the apex of flower pedicels. Calyx annular. Corolla 4-lobed above, c. 3 cm, curved in middle, greenish. Stamens 4, adnate to petals; filaments filiform, c. 2.5 cm; anthers linear, c. 4 mm. Ovary claviform; style columnar, filiform; stigma subcapitate. Berries reddish, pyriform, pilose.

Flowering & Fruiting: October–April.

Distribution. India: Throughout India.

Specimens examined: Jainti 3B, 04.03.2011, GK 47244; NRVK 12, 01.12.2011, GK 47198.

5. *Tolypanthus* (Blume) Rchb.

***Tolypanthus involucratus* (Roxb.) Tiegh.**, Bull. Soc. Bot. France 42: 248 1895; Rajasek. in N. P. Balakr. & al., Fl. India, 23: 39. 2012. *Loranthus involucratus* Roxb., Fl. Ind. 2: 188. 1832; Hook. f., Fl. Brit. India 5: 218. 1886; Prain, Bengal Pl. 2: 911. 1903. [Plate 201d, 202a; Fig. 101]

Santepuru (L); *Ajeru* (N).

Shrub, with tomentose shoots when young. Leaves oblong-ovate or elliptic oblong, 3.5–9.5 × 1.6–4.5 cm, rounded or cordate, entire, acute, coriaceous, scabrous. Inflorescence in the axils of existing/fallen leaves; flowers in clusters of 3–4-flowers, enclosed by involucre bracts; bracts foliaceous, green, ovate, c. 1.5 × 1 cm, acute, undulate, subcoriaceous, pubescent, nerves faintly visible. Calyx shallowly 4-lobed; tube c. 4 mm, pubescent; lobes triangular c. 0.5 × 0.5 mm, acute. Corolla creamish with pink streak, lobes reddish, pubescent, inflated below; tube c. 15 × 8 mm; lobes lanceolate 3–4 × c. 1 mm, acute, recurved. Stamens 6; filaments c. 2 mm, glabrous; anthers linear c. 1.5 mm. Ovary subglobose, c. 2 mm; style c. 1.4 cm; stigma reddish-pink, capitate, obscurely lobed. Drupes ellipsoid, orange red, crowned by persistent enlarged calyx.



Fig. 101. *Tolypanthus involucratus*: a. Flowering branchlet; b. Involucre of bracts and flowers (GK 50675).

Flowering & Fruiting: February–May.

Distribution. India: Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal.

Specimen examined: Panbari 10, 31.03.2012, GK 50674.

Notes: Parasite on *Dillenia indica* L.

Santalaceae

Dufrenoya Chatin

Dufrenoya platyphylla (Spreng.) Stauffer in Vierteljahrsschr. Naturf. Ges. Zurich 114: 70. 1969. *Viscum platyphyllum* Spreng., Syst. Vcg. 4 (2): 47. 1827. *Henslowia heterantha* Hook. f. & Thomson ex A. DC. in DC., Prodr. 14 (2): 632. 1857; Hook. f., Fl. Brit. India 5: 233. 1886. [Plate 202b]

Semi-parasitic shrub, 1–1.5 m high, with twisted branchlets. Leaves obovate to sub-orbicular, 6–8 × 4.5–8 cm, abruptly cuneate, rounded or retuse, coriaceous. Inflorescence axillary, spicate; inflorescence bracts ovate. Flowers unisexual; involucre bracts ovate. Male: flowers sessile, in clusters of 4 or 5; perianth lobes ovate; anthers attached at base of perianth lobes. Female: flowers solitary or in clusters of 3–10; pedicels short; perianth lobes same as in male flowers; disk circular; ovary obovoid; style conical; stigma sub-orbicular, shortly 5-lobed. Drupes red or orange yellow, oblong-ellipsoid, fleshy; seed star-shaped.

Flowering & Fruiting: April–August.

Distribution. India: Sikkim, Uttarakhand and West Bengal.

Specimens examined: Tobgaon, 18.05.1949, VN & party 2697; Buxa-Bhutan Road, 20.05.1949, VN & party 2762; Rovers point to Bhutan Border, 15.02.2014, AK 59953.

Euphorbiaceae

Key to the genera

- 1a. Leaves palmate divided into leaflets or palmatifid for at least the upper third of the lamina; basal nerves palmate, supporting lobes or leaflets 2
- 1b. Leaves not palmate or palmatifid; nerves usually pinnate (to palmate) 3
- 2a. Petals yellow; disk-glands 5; stamens 6–10; fruits capsular to tardily dehiscent and subdrupaceous, smooth; seeds ovoid or oblong, shiny 10. *Jatropha*
- 2b. Petals and disk absent; stamens more than 100; fruits rhcgmas, somewhat lobed, smooth to sparsely to densely echinate 14. *Ricinus*
- 3a. Flowers in cup-like, gland-fringed cyathia containing one ovary and several stamens 8. *Euphorbia*

The Flora of Buxa Tiger Reserve, West Bengal, India

3b. Flowers never in cyathia	4
4b. Leaves alternate, in pseudo-whorls or partly but never all opposite	6
4a. Leaves all opposite	5
5a. Leaves and inflorescences with stellate hairs and/or glandular scales	12. <i>Mallotus</i>
5b. Leaves and inflorescences glabrous or with simple hairs	5. <i>Cleidion</i>
6a. Ovary with 2 ovules in each locule	7. <i>Drypetes</i>
6b. Ovary with 1 ovule in each locule	7
7a. Petals present at least in male flowers	8
7b. Petals absent	9
8b. Inflorescences axillary or terminal; stamens less than 20	6. <i>Croton</i>
8a. Inflorescences on old wood; stamens 30-35	13. <i>Ostodes</i>
9a. Anthers 4-loculed, rarely 3-loculed	11. <i>Macaranga</i>
9b. Anthers 2-loculed	10
10a. Stamens intermixed with glands or scales with a tuft of hairs; anther-thecae diverging, attached basally to the connective; seeds enclosed in fleshy aril	4. <i>Claoxyton</i>
10b. Stamens not intermixed with glands, scales and hairs; anther-thecae not diverging; seeds arillate or not, if arillate then not completely covering the seeds	11
11a. Sepals imbricate (overlapping in bud)	3. <i>Baliospermum</i>
11b. Sepals valvate (touching in bud), connate at base up to various lengths	12
12a. Stamens 5-10; bracts without large glands	1. <i>Acalypha</i>
12b. Stamens 2 or 3; bracts with large glands	13
13a. Leaves entire, whitish or not beneath; seeds with a thin sarcotesta and a stony seed coat	2. <i>Balakata</i>
13b. Leaves shallowly to distinctly serrate, not whitish beneath; seeds with a thin, fleshy aril	9. <i>Falconeria</i>

1. *Acalypha* L.

Acalypha indica L., Sp. Pl. 2: 1003. 1753; Hook. f., Fl. Brit. India 5: 416. 1887; Prain, Bengal Pl. 2: 948. 1903; Susila & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 96. 2012. [Plate 202c-d]

Mukta-jhuri (B).

Erect herb, 20-50 cm high, puberulous. Leaves whorled, broadly ovate to rhombic-ovate, 1.8-4.4 × 1.5-2.8 cm, attenuate to acute at base, serrate, acute, chartaceous, glabrous except veins. Inflorescence racemose, c. 5.5 cm, pubescent; bracts suborbicular, c. 8 × 6 mm, ciliate, nerved. Male: flowers clustered at the upper portion of the spike, c. 1 mm across; sepals 4, obovate, c. 0.5 mm; stamens 10-15

on a convex receptacle; filaments free, c. 0.2 mm; anthers vermiculiform, c. 0.5 mm; pistillode absent. Female: flowers one in the axils of each bract, subsessile; bracts cupular, denticulate, 5–13 mm; sepals 3, ovate to ovate-lanceolate, c. 0.7 mm, hairy; ovary 1–1.5 mm across, whitish tomentose; style laciniate, filiform, c. 2 mm, pubescent. Capsules ovoid, 3–4 mm across, 3-lobed, pubescent, mixed with a few short stipitate pale brown glands; seeds reddishbrown, subglobose to ovoid.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: SRVK 6a, 04.03.2011, GK 47236.

Uses: Dried powder of whole plant is useful in rheumatism and crushed fresh leaves applied locally for wound.

2. *Balakata* Esser

Balakata baccata (Roxb.) Esser, *Blumea* 44: 155. 1999. *Sapium baccatum* Roxb., *Fl. Ind.* 3: 694. 1832; Hook. f., *Fl. Brit. Ind.* 5: 470. 1888. [Plate 203a-c]

Tree, 8–10 m high. Leaves ovate or ovate-elliptic, 7–11 × 3.2–4.8 cm, rounded-cuneate, entire, acuminate, chartaceous. Inflorescence axillary or terminal, erect spikes; male spikes usually branched; female spikes usually simple, sometimes branched; floral bracts obovate, c. 2 mm, acuminate. Male: calyx 2-lobed; lobes obovate-orbicular, c. 1 mm across, serrulate near apex, entire toward base, acute; petals absent; disk absent; stamens 2; filaments c. 1 mm; anthers c. 1 mm; pistillode absent. Female: calyx 3-lobed; lobes ovate, c. 1.5 × 1 mm; petals absent; staminode absent; ovary ovoid, c. 1.5 mm, 2-loculed; style short; stigma bifid. Fruits baccate, subglobose or shallowly 2-lobed, compressed, latex translucent, sticky; seeds 2, subglobose.

Flowering & Fruiting: August–April.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura and West Bengal.

Specimens examined: SRVK 6, 13.03.2011, GK 50564; Buxaduar to Achalung, 19.05.2014, AK 62648.

3. *Baliospermum* Blume

Key to the species

- 1a. Plants dioecious; leaves gland-tipped at margins, without 2 glands at the base of lamina; upper leaves not appreciably smaller than leaves of lower nodes; veins 3 from base; disk glandular; male disk glands distinct; ovary appressed puberulous; capsules depressed, not intruded, glabrous ***L. B. calycinum* var. *bracteatum***

- 1b. Plants usually monoecious; leaves not gland-tipped at margins, with 2 glands at the base of lamina; upper leaves often appreciably smaller than leaves at lower nodes; veins 5 from base; disk not glandular; male disk glands connate into a cup; ovary tomentellous; capsules often turbinate-obovoid, intruded, pubescent

2. *B. solanifolium*

1. *Baliospermum calycinum* Müll. Arg. var. *bracteatum* Chakrab. & N. P. Balakr., J. Econ. Taxon. Bot. 7: 359. 1985 (1986) & in Bull. Bot. Surv. India 32: 10, f. 3. 1990 (1992).

Shrub, 1.5–3 m high, sparsely hairy. Leaves elliptic-oblong or lanceolate, 15–17 × 4.5–6 cm, cuneate or obtuse, gland-tipped sinuate-dentate, caudate-acuminate, chartaceous, sparsely hispid above. Male inflorescence axillary, terminal, narrow, 2.5–6 cm, branched racemes, hispid; female inflorescence initially subcorymbose, finally thyrsiform or falsely racemiform, leafless, 2–18 cm, rarely flowers solitary; inflorescence bracts foliaceous, 2–2.5 cm. Flowers arranged in corymbiform clusters; floral bracts triangular-ovate, hispid. Male: sepals 5, orbicular, 1–2.5 mm across, sparsely hairy; petals absent; disk glands 5 or 6, transversely oblong or obcordate, 0.2–0.7 × 0.6–1 mm; stamens 12–20; filaments 1–2 mm; anthers subglobose. Female: sepals 5 or 6, oblong-lanceolate to linear-lanceolate, 3–8 × 1–3 mm; petals absent; disk cupular, 0.4–1 mm high, crenate; ovary subglobose, c. 2 mm across, appressed puberulous; styles 3, shortly connate or free; stigma simple or flabelliform, 2–3 mm. Capsules trilocular, slightly depressed, with accrescent sepals; seeds 3, oblong-ellipsoid, smooth.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Assam and West Bengal.

Specimen examined: Tashigaon to Rovers point, 03.10.2013, AK 59761.

2. *Baliospermum solanifolium* (Burm.) Suresh in Nicolson & al., Interpr. Rheede's Hort. Malab. (Regnum Veg. 119): 106. 1988. *Croton solanifolius* Burm., Fl. Malab.: 6. 1769. *Baliospermum axillare* Blume, Bijdr. Fl. Ned. Ind. 12: 604. 1826; Hook. f., Fl. Brit. India 5: 461. 1887; Prain, Bengal Pl. 2: 946. 1903.

[Plate 203d, 204a-b]

Shrub, 1–1.5 m high, pubescent. Leaves oblong-lanceolate to oblong-ovate, 2–14 × 0.9–6.2 cm, rounded or cuneate, sinuately lobed at margins, acute, subcoriaceous, 2 glands at the base of lamina, scabrous above, hirsute below. Inflorescence axillary racemes, tomentose; floral bracts ovate, c. 1 mm, pubescent. Male: calyx divided to base; lobes 5, imbricate, ovate or ovate-orbicular, c. 1 × 1.5 mm, hairy at base, hyaline; petals absent; disk cupular, minute. Stamens 14–25; filaments c. 5 mm, adnate to disk; anthers reniform or suborbicular, small. Female: calyx divided to base; lobes 5, ovate to triangular, 1–2 × 0.8–1 mm, pubescent; petals

absent; ovary subglobose, 1–3 mm across; style 3, stout, 1.5–3 mm, bifid; stigma flabellate. Capsules subglobose to turbinate-obovoid, strongly 3-lobed, pubescent; seed solitary in each lobed, ovoid, smooth.

Flowering & Fruiting: February–May.

Distribution. India: Throughout India.

Specimens examined: Bhutanghat, JKS 4093; SRVK 6, 13.02.2010, SKS & GK 47067; Mainabari, 24.02.2012, AK 55919; Checko-1, 09.02.2013, AK 58825.

Uses: The seeds externally applied in rheumatism.

4. *Claoxylon* A. Juss.

Claoxylon khasianum Hook. f., Fl. Brit. India 5: 411. 1887; K. Rajasekaran in N. P. Balakr. & al., Fl. India 23: 111. 2012. *Claoxylon khasianum* var. *serrulata* Hook. f., Fl. Brit. India 5: 411. 1887. [Plate 204c; Fig. 102a-d]

Dioecious shrub or tree, 5–8 m high, finely pubescent or puberulous in young parts. Leaves elliptic-lanceolate or oblong-lanceolate or oblong-ovate, 11–27.5 × 4.5–11 cm, rounded at base, crenate-dentate to obscurely serrate, each tooth ending with glands, acute to acuminate, chartaceous, scaberulous when young, nearly glabrous, finely pubescent on nerves beneath. Male: inflorescence yellow-pubescent or hirsute spikes, up to 30 cm, pendulous; bracts ovate, 0.5–1.5 × c. 1 mm, rounded at base, obtuse to acute; sepals 3 or rarely 4, ovate, c. 3 × 2 mm, rounded at base, acute, rough, yellow hirsute hairy; petals absent; stamens 35–40, clustered on a convex receptacle, mixed with hyaline scales or glands; filaments free, up to 3 mm; anthers c. 0.7 mm, extrorse. Female: flower solitary in 3–9 cm long panicles, yellow-glaucous pubescent; sepals as in male flowers; ovary white-pubescent; styles 3, entire, 3–5 mm, plumose. Capsules globose-rounded, 3-lobed, 1–1.8 cm across, hirsute or finely soft yellowish or whitish pubescent; seeds dark brown, rounded or globose, arillate.

Flowering & Fruiting: February–November.

Distribution. India: Assam, Meghalaya, Nagaland and West Bengal.

Specimens examined: Garo-Para, 24.04.1959, CRD 90; Rajabhatkhawa range, 14.02.2010, SKS & GK 47083; Jainti 3A & 3B, 29.03.2012, GK 50622; Checko-1, 25.09.2012, AK 56111; Checko-1, 09.02.2013, AK 58810; Checko-1, 10.02.2013, AK 58832.

5. *Cleidion* Blume

Cleidion javanicum Blume, Bijdr. Fl. Ned. Ind. 12: 613. 1826; Hook. f., Fl. Brit. India 5: 444. 1887; Susila & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 122. 2012.

Bepari, Hare Bepari (N).

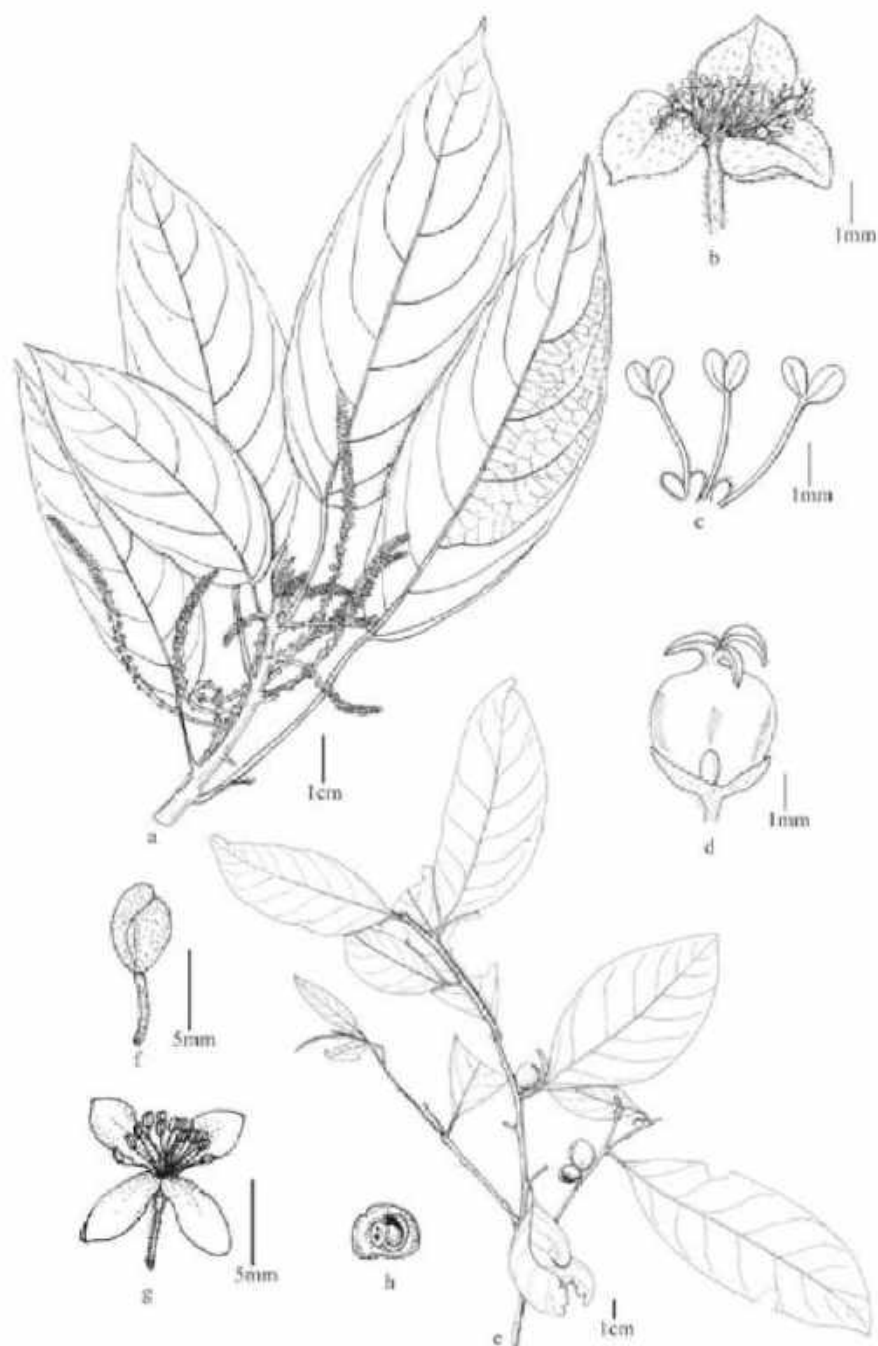


Fig. 102. *Claoxylon khasianum*: a. Flowering branchlet; b. Male flower; c. Stamens; d. Gynoecium (GK 50622); *Drypetes assamica*: e. Fruiting branchlet; f. Flower bud; g. Male flower; h. Seed (GK 50547).

Dioecious tree, 7–8 m high. Leaves whorled, elliptic or elliptic-obovate, 10–21 × 3.5–7.6 cm, cuneate, distantly serrate, abruptly acuminate, coriaceous, glabrous; stipules triangular-ovate, c. 2 × 1 mm, acute. Male: inflorescence racemose, c. 10 cm, 1 or 2–3-flowered at a place; bracts ovate-triangular, c. 1 mm; sepals 4, ovate, c. 3 × 3 mm, pubescent, glabrous inside; stamens 40–70; filaments c. 1.5 mm, hyaline gland-dotted; anthers globose, tetrahectous, c. 1 mm across; pistillode absent. Female: flowers 1 (–2) in axils of fallen leaves; sepals 4 or 5, ovate-triangular, 2–3 × 1.5–1.8 mm, mucro-acute at apex, glabrous; staminodes absent; ovary subglobose, 3–5 mm across, usually 2 (3)-locular; style filiform, c. 2.5 cm, bifid. Capsules 1–3, 2-valved cocci, with persistent style; seeds brownish sub-globose, 2–3-lobed.

Flowering & Fruiting: March–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Jainti 7, 05.03.2011, GK 47271.

6. *Croton* L.

Key to the species

- 1a. Leaves ovate, cordate at base; veins 3–5 from base, glandular at base and margins; flowers in fascicles on racemes; capsules globose; seeds floccose 1. *C. caudatus*
- 1b. Leaves not ovate, rounded or cuneate at base; veins pinnate; glandular or not at base and margins; flowers in simple racemes; capsules sub-globose or ellipsoid; seeds not floccose 2
- 2a. Branchlets white stellate scaly; leaves whorled above, lanceolate, acuminate at apex, white lepidote when young, glandular at base and margins; capsules ellipsoid 2. *C. bonplandianus*
- 2b. Branchlets white stellate tomentose, turning glabrous; leaves not whorled above, elliptic to ovate-lanceolate, bluntly acute or obtuse at apex, glabrous, not glandular at base and margins; capsules sub-globose 3. *C. persimilis*

1. *Croton bonplandianus* Baill., *Adansonia* 4: 339. 1864; Chakrab. & N. P. Balakr. in N. P. Balakr. & al., *Fl. India* 23: 231. 2012.

Monoecious undershrub, 30–50 cm high, white stellate scales on young shoots, glabrous later and leaving marks of white stellate scales on older shoots. Leaves lanceolate, 6–19 × 1.5–3.5 mm, cuneate, serrate, acuminate, subcoriaceous, white stellate scales when young, glabrous later; Inflorescence terminal, racemes, 1–2.7 cm, female flowers below, male flowers above, white stellate scaly. Male: floral bracts ovate, c. 0.5 × 0.2 mm, ciliate, acute; sepals 5, elliptic-lanceolate, c. 1 × 0.2–0.5 mm, slightly connate at base, obtuse; petals 5, elliptic-oblong, c. 1 × 0.2 mm, obtuse, 1-nerved, villous at base only inside; stamens many, into disk, in

fascicles, unequal; filaments 0.5–1 mm; anthers rounded; disk 4-lobed. Female: floral bracts ovate or crown shaped, c. 0.8 × 0.5 mm, ciliate, dentate, stellate scaly; sepals 5, elliptic-lanceolate, c. 1 × 0.5 mm, connate at base, obtuse and pubescent; petals absent; ovary globose, c. 1 mm across, stellate tomentose; style c. 1 mm, 3-fid above, each arm bifid again; stigma inconspicuous; disk 4-lobed. Capsules ellipsoid, 3-lobed, stellate pubescent; seeds brown, 3, ellipsoid.

Flowering & Fruiting: November–March.

Distribution. India: Throughout India.

Specimen examined: Kumargram, 13.02.2012, AK 53011.

2. *Croton caudatus* Geiseler, *Croton*. Monogr.: 73. 1807; Hook. f., *Fl. Brit. India* 5: 388. 1887; Prain, *Bengal Pl.* 2: 943. 1903. [Plate 205a-b]

Straggling or bushy shrub, 3–4 m high, stellate pubescent. Leaves ovate, 5–12.5 × 4–9.5 cm, cordate, dentate, acuminate, subcoriaceous, stellate pubescent, more densely below. Inflorescence terminal racemes, c. 20 cm in males and c. 10 cm in females, stellate pubescent; floral bracts triangular-ovate, c. 1 mm across, stellate pubescent. Male: calyx divided to base; lobes 5, ovate-lanceolate, c. 3 × 1 mm, acute, stellate pubescent; petals 5, ovate, c. 1.5 × 1.2 mm, villous; stamens many attached to disk; filaments c. 1 mm, attached with whole length of anther; anthers oblong. Female: calyx divided to base; lobes 5, ovate, c. 5 × 3 mm, acute, stellate pubescent; ovary globose or obovoid, 3–4 × 3–3.5 mm, stellate tomentose; style 5–13 mm, 2-fid from base; stigma inconspicuous. Capsules globose, 3-lobed, stellate pubescent; seeds 3, ellipsoid, ovoid or suborbicular, floccose.

Flowering & Fruiting: January–December.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Buxa-Bhutan Road, 950m, 16.05.1949, VN & party 2565; Rajabhatkhawa, 23.04.1959, CRD 36; NRVK, 23.05.1976, JKS 6987; NRVK 7, 03.03.2011, GK 47213, 47215; Newlands, Sukno river, 22.09.2011, AK 52789; Phashkhawa river belt, 30.09.2012, AK 58555; Santrabari to Buxaduar, 18.05.2014, AK 62611; Buxaduar to Achalung, 19.05.2014, AK 62647.

3. *Croton persimilis* Mull. Arg., *Linnaea* 34: 116. 1865; Chakrab. & N. P. Balakr. in N. P. Balakr. & al., *Fl. India*. 23: 240. 2012. *Croton oblongifolius* Roxb., *Fl. Ind.* 3: 685. 1832 non Delile 1814 nec. Spreng. 1826; Hook. f., *Fl. Brit. India* 5: 386. 1887; Prain, *Bengal Pl.* 2: 943. 1903. [Plate 205c-d]

Shrub, 2–3 m high. Leaves elliptic to ovate-oblong, 11–22.5 × 4.5–8.5 cm, rounded or cuneate, serrate, bluntly acute or obtuse, gland at the base of lamina on each side, coriaceous. Inflorescence elongate racemes; floral bracts linear-lanceolate, c. 2 mm, hairy. Male: calyx divided to base; lobes 5, ovate-elliptic or triangular-ovate, c. 3 × 1 mm, acute; petals 5, lanceolate, c. 2.5 × 1 mm, acute, hairy; stamens

10–15, attached on hairy receptacle; filaments *c.* 1.2 mm; anthers oblong, *c.* 1 mm, tetraheous; pistillode absent. Female: calyx divided to base; lobes 5, ovate, triangular to elliptic, 2–3.5 × 1–2.5 mm, acute; petals 5, spatulate to filiform, 0.3–3.5 mm; ovary subglobose, 2–4 mm across; style 4–6 mm, bifid; stigma inconspicuous. Capsules subglobose, 3-lobed; seeds brown, 3, oblong to ellipsoid.

Flowering & Fruiting: January–December.

Distribution. India: Andhra Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Bania, 26.02.1976, JKS 4342; Jainti range, 11.02.2010, SKS & GK 47044; Mainabari, 24.02.2012, AK 55917.

7. *Drypetes* Vahl

Drypetes assamica (Hook. f.) Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, XV (heft 81): 241. 1922. *Cyclostemon assamicus* Hook. f., Fl. Brit. India 5: 342. 1887; Prain, Bengal Pl. 2: 937. 1903. [Plate 206a; Fig. 102e-h]

Ban-bakul (B).

Tree, 8–10 m high. Leaves elliptic or elliptic-lanceolate, 5.8–13.5 × 2.3–5.3 cm, acute or cuneate, entire, acute, coriaceous, glabrous; stipules triangular-ovate, *c.* 2 × 1 mm, tomentose. Male: inflorescence axillary, fasciculate; sepals 4, sub-orbicular, 6–8 × 5–8 mm, ciliate, pubescent, glabrous inside; stamens 6–15; filaments 3–4 mm; anthers oblong, *c.* 1 mm; disk cupular. Female: flower solitary; sepals and petals as in male flowers; ovary globose or oblong-ellipsoid, 1.5–3 mm across, hairy; style 1–2 mm; stigma small. Drupes subcubical, pubescent.

Flowering & Fruiting: January–December.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: NRVK 12–13, 12.03.2011, GK 50547; Checko-1, 25.09.2012, AK 56144.

8. *Euphorbia* L.

Key to the species

- 1a. Erect or decumbent herbs; stems reddish green, hirsute, yellow spreading hairy; leaves oblong-ovate to elliptic-lanceolate, 0.9–2.5 × 0.4–0.6 cm, obliquely cuneate at base, serrate at margins, acute at apex, glabrous below; 3–5 veined from base; cyathia involucre turbinate, glabrous; lobes acute, glabrous; glands cupular, 0.5–0.8 mm across; male florets 4–6

1. *E. hirta*

- 1b. Prostrate herbs; stems crimson, villous to pilose; leaves elliptic to elliptic-oblong, 1.5–4 × 0.4–1 mm, obliquely rounded at one side, subcordate at other side, crenate-serrate and reddish at margins, obtuse at apex, pilose below; 3 veined from base; cyathia involucre cupular, pilose; lobes obtuse, pilose; glands globose, minute; male florets 3

2. *E. thymifolia*

1. *Euphorbia hirta* L., Sp. Pl 1: 454. 1753; Binojk. & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 287. 2012. *Euphorbia pilulifera* L., Sp. Pl. 454. 1753, *p. p.*; Hook. f., Fl. Brit. India 5: 250. 1887; Prain, Bengal Pl. 2: 925. 1903.

Monococious, erect or decumbent herb, 10–25 cm high, hirsute with yellow spreading hairs. Leaves oblong-ovate to elliptic-lanceolate, 0.9–2.5 × 0.4–0.6 cm, obliquely cuneate, serrate, acute, membranous; stipules linear-lanceolate, lacinate. Cyathia glomerulate in axillary globose heads, 5–10 mm across; involucre turbinate; lobes acute, *c.* 1 mm; glands 4, cupular, 0.5–0.8 mm across; limbs minute or as large as the gland, rounded, hyaline. Male florets 4–6; bracteoles setaceous, *c.* 0.5 mm; anthers subglobose. Female floret: gynophore *c.* 1 cm; ovary globose, *c.* 0.7 × 0.5 mm, trigonous, hispid; styles 3, *c.* 0.4 mm, each bifid halfway; stigma capitate. Capsules subglobose to trigonous, pubescent; seeds purplish or reddish grey, 3, oblong.

Flowering & Fruiting: February–December.

Distribution. India: Throughout India.

Specimens examined: NRVK 5, 13.02.2010, SKS & GK47076; NRVK 6, 04.03.2011, GK 47238; Kumargram, Kalikhola river belt, 21.09.2011, AK 52710; Hatipota, 29.09.2012, AK 58530; Hauda nala, 03.10.2012, AK 58689.

Uses: Latex used to treat eye troubles.

2. *Euphorbia thymifolia* L., Sp. Pl 1: 454. 1753; Hook. f., Fl. Brit. India 5: 252. 1887; Binojk. & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 299. 2012.

[Plate 206b]

Monococious, prostrate herb, 10–12 cm long, villous to pilose. Leaves elliptic to elliptic-oblong, 1.5–4 × 0.4–1 mm, obliquely rounded at one side, subcordate at another side at base, crenate-serrate and reddish, obtuse, membranous, pilose below; stipules linear-lanceolate, *c.* 0.8 mm, villous. Cyathia in axillary clusters, reddish, shortly stalked; involucre linear, *c.* 0.5 mm, pilose; involucre cupular, *c.* 1 × 0.5 mm, pilose; lobes 4, obtuse, *c.* 0.5 mm, pilose; glands 4, rounded, minute. Male florets 3, around female floret; perianth absent; filaments minute, anthers subglobose, minute. Female floret solitary, central in cyathial cup, subsessile; perianth absent; ovary subglobose, *c.* 0.5 × 0.3 mm, trigonous, tomentose; styles 3, each bifid above; stigma minute. Capsules subglobose, trigonous or 3-lobed, grooved, pilose to glabrescent; seeds orange red, 3, ovoid, punctate.

Flowering & Fruiting: August–March.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52634; Narathali, 20.02.2012, AK 55805; Rydak river belt, 26.02.2012, AK 55950.

9. *Falconeria* Royle

Falconeria insignis Royle, III. Bot. Himal. Mts.: 354, t. 84a. 1839; Chakrab. & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 347. 2012. *Sapium insigne* (Royle) Trimen, Syst. Cat. Fl. Pl. Ceylon: 83. 1885; Hook. f., Fl. Brit. India 5: 471. 1888. *Sapium insigne* var. *malabaricum* (Wight) Hook. f., Fl. Brit. India 5: 472. 1888.

[Plate 206c-d; Fig. 103]

Deciduous tree, 15–20 m high. Leaves spirally arranged, whorled at end of branchlets, ovate-elliptic or oblong-lanceolate, 10–30 × 4–11 cm, cuneate, crenate-serrulate, acuminate or caudate, chartaceous; stipules lanceolate, c. 1.5 mm, fimbriate, glandular at base. Inflorescence appearing before leaves, terminal, erect, cylindrical spikes, simple or dichotomously branched; male spikes 15–20 cm; female spikes 7–15 cm. Male: flowers in globose clusters of 10 in axils of 2 fleshy ovate green bracts, minute, sessile or on pedicels up to 0.5 mm; floral bracts divided up to base, ciliate; calyx lobes 2, orbicular, c. 1 mm, concave; petals absent; stamens 2, exerted; filaments c. 1.5 mm; anthers scarlet red. Female: solitary, subsessile; calyx 2-lobed; lobes 2 or 3, ovate, concave, long pointed; ovary ovoid to obovoid, c. 3 mm; styles 3, shortly recurved; stigma subsessile. Capsules dark crimson, ovoid, subglobose to globose, 3-lobed, fleshy when young, dehiscing to leave bristle-like vascular strands in between the seeds; seeds yellowish brown, 2 or 3, ovoid.

Flowering & Fruiting: January–June.

Distribution. India: Arunachal Pradesh, Andhra Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti river, 08.04.2012, GK 56060; Kumargram, 18.02.2012, AK 55709; Kumargram, 18.02.2012, AK 55710; Rangamati, 14.02.2013, AK 58896.

Uses: Crushed fruit pulp is used in fish piosion.

10. *Jatropha* L.

Jatropha curcas L., Sp. Pl. 2: 1006. 1753; Hook. f., Fl. Brit. India 5: 383. 1887; Prain, Bengal Pl. 2: 941. 1903. [Plate 207a-b]

Nera Khar Shing (L).

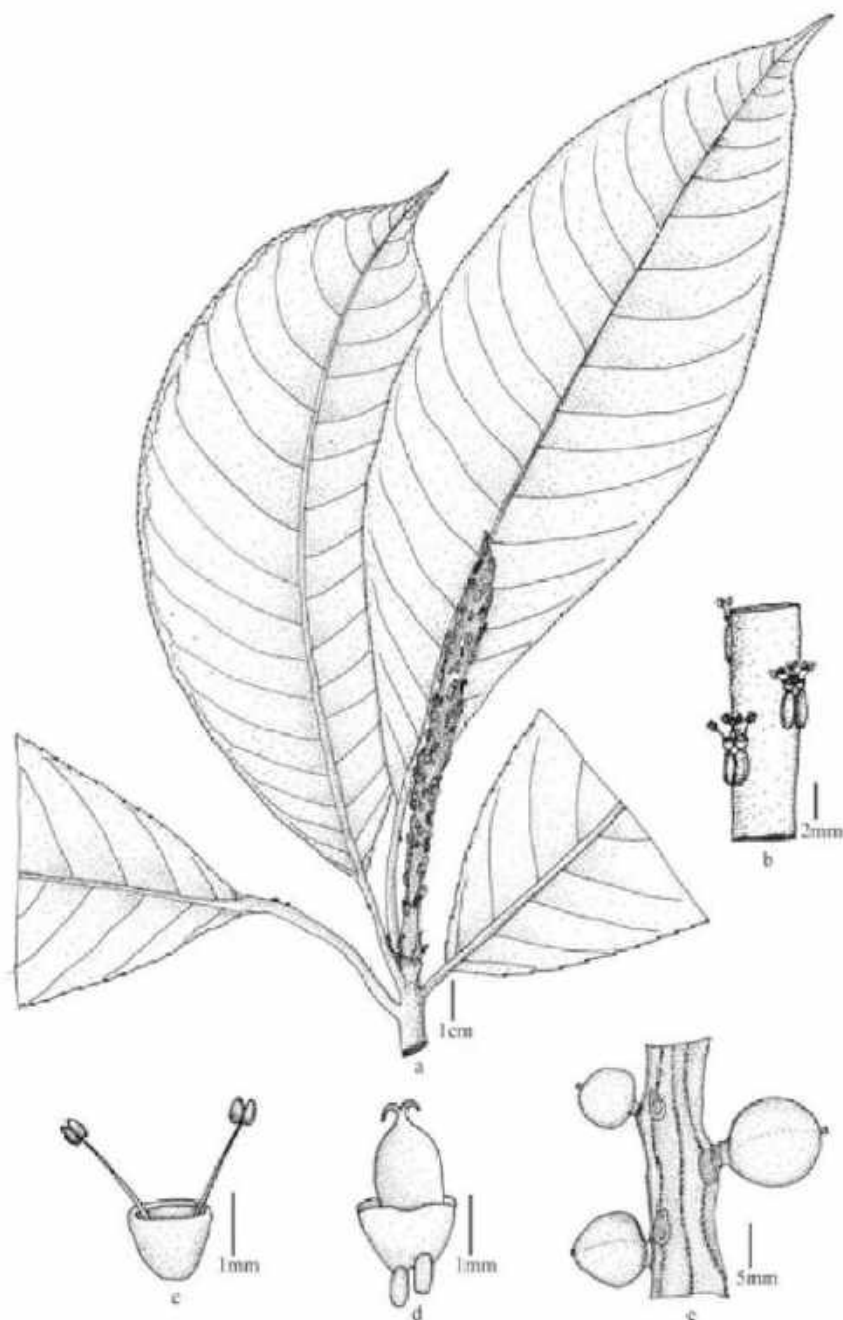


Fig. 103. *Falconeria insignis*: a. Flowering branchlet; b. Portion of male inflorescence; c. Male flower; d. Female flower; e. Portion of fruiting axis (AK 58896).

Shrub, 2–3 m high. Leaves orbicular-ovate, 6–12 × 5–10 cm, subcordate to cordate, coriaceous; mid lobe acuminate; lateral lobes obtuse or rounded; stipules caducous. Inflorescence sparsely pubescent; inflorescence bracts elliptic. Male: calyx divided near to base; lobes elliptic-oblong, hairy; petals oblong-elliptic; filaments short; anthers oblong; disk columnar, 5-lobed. Female: calyx as same as in male flowers; petals elliptic, c. 6 mm, pilose in middle; disk glands free; ovary 3-locular; styles 3; stigma indistinct. Capsules ellipsoid; seed solitary in each lobe, ovoid-ellipsoid, compressed.

Flowering & Fruiting: May–December.

Distribution. India: Almost throughout (cultivated and naturalized)

Specimens examined: Buxa to Chunabhati 750m, 17.05.1949, VN & party 2622; Buxaduar, 13.05.1976, JKS 4621; SRVK 1, 01.12.2011, GK 52303; Rydak river belt, 20.09.2011, AK 52666.

11. *Macaranga Thouars*

Macaranga denticulata (Blume) Mull. Arg. in DC., Prodr. 15 (2): 1000. 1866; Hook. f., Fl. Brit. India 5: 446. 1887; Susila & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 131. 2012. *Mappa denticulata* Blume, Bijdr. Fl. Ned. Ind. 12: 625. 1826. [Plate 207c]

Malata (N).

Tree, 10–15 m high, rusty tomentose. Leaves ovate, 18–24 × 15–18 cm, cordate, entire, acuminate, yellow gland-dotted below, tomentose, glabrous later. Male inflorescence axillary, 5–8-flowered panicles, rusty tomentose; female axillary or terminal panicles, rusty tomentose, shorter than male inflorescence. Flowers sessile in male, subsessile in female. Male: floral bracts ovate, 1–2 × c. 0.5 mm, acute; calyx divided to base; lobes 3, ovate, c. 1 mm across, rusty tomentose; petals absent; stamens 20; filaments c. 2.5 mm; anthers minute, tetrahectous; pistillode absent. Female: floral bracts linear-lanceolate to ovate-lanceolate, 2–5 × c. 0.5 mm, acute; calyx cupular, spathaceous; tube short; lobes 3, ovate, 2–3 mm across; petals absent; staminodes absent; ovary bilobed, c. 3 × 4 mm, rusty tomentose; styles 2, 1–2 mm, recurved; stigma inconspicuous. Capsules bilobed, grooved in between 2-lobed vertically, gland-dotted, brown tomentose.

Flowering & Fruiting: February–August.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Meghalaya, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: SRVK 5–6, 13.02.2010, SKS & GK 47078; Narathali, 20.02.2012, AK 55770; Bhutri, 13.02.2013, AK 58894.

12. *Mallotus* Lour.

Key to the species

- 1a. Leaves opposite, decussate; disk absent in male flowers; sepals fused in female flowers; fruits indehiscent 1. *M. nudiflorus*
1b. Leaves alternate, sometimes subopposite or crowded; disk present in male flowers; sepals free or connate at base only in female flowers; fruits dehiscent or indehiscent 2
2a. Scandent shrubs; capsules bilobed 3. *M. repandus*
2b. Erect shrubs or trees; capsules subglobose or trilobed 3
3a. Leaves strongly peltate, petiole inserted 10–25 mm from base of lamina 4. *M. roxburghianus*
3b. Leaves not or narrowly peltate, petiole inserted 2–8 mm from base of lamina 4
4a. Spikes simple; capsules densely red glandular, smooth 2. *M. philippensis*
4b. Spikes branched, forming panicles; capsule white tomentose, muricate 5. *M. tetraooccus*

1. *Mallotus nudiflorus* (L.) Kulju & Welzen, *Blumea* 52 (1): 124. 2007. *Trewia nudiflora* L., *Sp. Pl.* 2: 1193. 1753; Hook. f., *Fl. Brit. India* 5: 423. 1887.

[Plate 207d, 208a-b]

Ramrita, Aule Kapase (N).

Deciduous tree, 7–15 m high. Leaves ovate to deltoid, 6–20 × 3–15 cm, truncate or subcordate, caudate-acuminate; stipules linear-lanceolate, caducous. Inflorescence axillary or terminal, pendulous racemes; floral bracts ovate-lanceolate. Male: calyx divided near to base; lobes 3, ovate. Stamens many; filaments short; anthers oblong. Female: calyx divided near to base; lobes 3–5, ovate, caducous; ovary ovoid; styles 3–5, connate at base, 1.5–3 cm, papillose above; stigmas indistinct. Berries dark greyish green or pale brown, ovoid to sub-globose; seeds 3–5, globose to ovoid.

Flowering & Fruiting: January–July.

Distribution. India: Throughout India.

Specimens examined: Jainti river, 13.10.2010, GK 46344; Kumargram, Kalikhola river belt, 21.09.2011, AK 52734; Newlands, Sukno river, 22.09.2011, AK 52799; Kumargram, 13.02.2012, AK 53022.

2. *Mallotus philippensis* (Lam.) Mull. Arg., *Linnaea* 34: 196. 1865; Hook. f., *Fl. Brit. India* 5: 442. 1887; Prain, *Bengal Pl.* 2: 950. 1903; Susila & N. P. Balakr. in N. P. Balakr. & al., *Fl. India* 23: 159. 2012. *Croton philippensis* Lam., *Encycl.* 2: 206. 1786. [Plate 208c-d]

Sindure (N).

Tree, 5–7 m high. Leaves ovate or oblong-elliptic, 4.6–21 × 1.5–9 cm, cuneate at base with 2 cupular glands, toothed, acuminate, coriaceous, orange gland-dotted below. Male inflorescence terminal or axillary, racemes or panicles, 4–15 cm, rusty stellate pubescent, granular glandular; female axillary or terminal spikes, stellate pubescent. Flowers solitary or fascicled; floral bracts triangular, c. 1 mm, stellate tomentose. Male: calyx divided to base; lobes 3–4, ovate to elliptic-lanceolate, 1.5–2.5 × 0.5–0.7 mm, acute; petals absent; stamens 18–32; filaments small, free; anthers small. Female: calyx divided to base; lobes 3–5, unequal, lanceolate, c. 2 × 1 mm, acute, tomentose above only; petals absent; ovary subglobose, 3-lobed, 2–3 mm across, tomentose, crimson red glandular; styles 3 or 4, c. 4 mm, spreading and recurved above, papillose; stigma indistinct. Capsules subglobose, 3 or 4-lobed, red glandular-scaly; seed black, solitary in each lobe, subglobose.

Flowering & Fruiting: July–March.

Distribution. India: Almost throughout India.

Specimens examined: Chunabhati, JKS 4001; Bhutanghat, 26.09.2011, AK 52920; Sankosh, 28.09.2011, AK 52979; NRVK 6, 04.12.2011, GK 52317.

3. *Mallotus repandus* (Rottler) Mull. Arg., *Linnaea* 34: 197. 1865; Hook. f., *Fl. Brit. India* 5: 442. 1887; Prain, *Bengal Pl.* 2: 949. 1903; Susila & N. P. Balakr. in N. P. Balakr. & al., *Fl. India* 23: 161. 2012. *Croton repandus* Rottler, *Neue Schriften Ges. Naturf. Freunde Berlin* 4: 206. 1803. [Plate 209a]

Nanbhantur (B).

Scandent shrub, 5–10 m, dull yellowish-brown stellate tomentulose. Leaves ovate, 3–9 × 2–7.5 cm, truncate, undulate, micro-acute at apex, peltate, sessile glands at base near margins, sub-coriaceous, stellate tomentose, mixed with hyaline glands on lower surface. Male: inflorescence terminal, rarely axillary, branches few or absent, 5–10 cm; bracts subulate, c. 1.5 mm, tomentose; sepals 3-lobed, free; lobes triangular ovate, c. 2 × 0.2 mm, tomentose; stamens many; filaments c. 0.8 mm, filiform, slightly thickened at base; anthers irregular. Female: inflorescence 4–9 cm; bracts lanceolate, c. 2 mm; sepals 4 or 5, lanceolate, 2–3 mm, tomentulose; ovary 2-celled; style 3–5 mm, free, plumose. Capsules bilobed, stellate tomentose.

Flowering & fruiting: July–March.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Rajabhatkhawa range, 04.12.2011, GK 52307.

4. *Mallotus roxburghianus* Mull. Arg., *Linnaea* 34: 186. 1865; Hook. f., *Fl. Brit. India* 5: 428. 1887; Susila & N. P. Balakr. in N. P. Balakr. & al., *Fl. India* 23: 164. 2012. [Plate 209b]

Nim-puteli (B).

Shrub, 3–4 m high, pubescent. Leaves ovate, 13–17 × 6.5–13.5 cm, rounded and peltate at base, dentate, acuminate, coriaceous, simple hairy above, stellate pubescent beneath, yellowish gland-dotted. Male inflorescence terminal raceme, 10–25 cm. Female inflorescence 6–12 cm. Male: flowers 3–5-fascicled; floral bracts linear, c. 3 mm; sepals 4-lobed, free up to base; lobes oblong-ovate, c. 2 × 1 mm, hairy, glabrous inside, midvein prominent; petals absent; stamens many; filaments filiform, 1–1.5 mm, glabrous; psittillode absent. Female: sepals 5(6), spathaceous, lanceolate, 3–4 mm; petals absent; ovary 3-locular, 2–3 mm across, stellate-bristly and warty, with dense soft spines; styles 3, 3–5 mm, papillose, recurved. Capsules subglobose, 3-lobed, hirsute, with soft spinules; seeds subglobose.

Flowering & Fruiting: February–August.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal.

Specimens examined: Checko-2, 10.02.2010, GK 50582; Checko-2, 08.04.2012, GK 56075.

5. *Mallotus tetracoccus* (Roxb.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41 (2): 245. 1873. *Rottlera tetracocca* Roxb., Fl. Ind. 3: 826. 1832. *Mallotus ferrugineus* (Roxb.) Mull. Arg., Linnaea 34: 188. 1865; Susila & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 151. 2012. *Mallotus albus* auct. non Roxb. ex Jack 1820; Hook. f., Fl. Brit. India 5: 429. 1887; Prain, Bengal Pl. 2: 972. 1903. [Plate 209c; Fig. 104]

Jogi Malata, Kasre Malata (N).

Tree, 6–10 m high, brown or grey stellate tomentose. Leaves ovate to triangular-ovate, sometimes trilobed, 9.5–21 × 8–16 cm, truncate or shallowly cordate and sometimes narrowly peltate, repand-denticulate with glands, acuminate, 2–5 glands at base near nerves, coriaceous, sparsely gland-dotted above, stellate tomentose and gland-dotted below; stipules triangular-ovate, c. 2 × 1 mm, acute, caducuous, stellate tomentose. Inflorescence axillary or terminal, obpyramidal panicles of spikes or branched racemes, 14–22 cm. Flowers clustered along nodes in male, solitary or clustered along nodes in female. Male: floral bracts ovate, c. 1.5 × 1 mm, acute, tomentose; sepals 5, lanceolate, c. 2.5 × 1 mm, slightly connate at base, acute, tomentose; petals absent; stamens 60–80; filaments 1.5–2 mm; anthers globose. Female: floral bracts triangular-ovate, 2.5–3 × c. 1.5 mm, acute, tomentose; calyx cupular, stellate tomentose; tube c. 1.5 mm; lobes 5, triangular-ovate, c. 1.5 × 1 mm; petals absent; ovary subglobose, c. 1.5 mm across, 4-lobed, strongly enclosed by calyx, stellate tomentose; styles 4, connate at base, free above, papillose; stigma obscure; staminodes present. Capsules subglobose, 4-lobed, muricate with soft spinules, calyx, styles and staminodes persistent, white tomentose; seed solitary in each lobe, rounded, tuberculate.

Flowering & Fruiting: September–December.

Distribution. India: Arunachal Pradesh, Assam, Goa, Karnataka, Kerala,

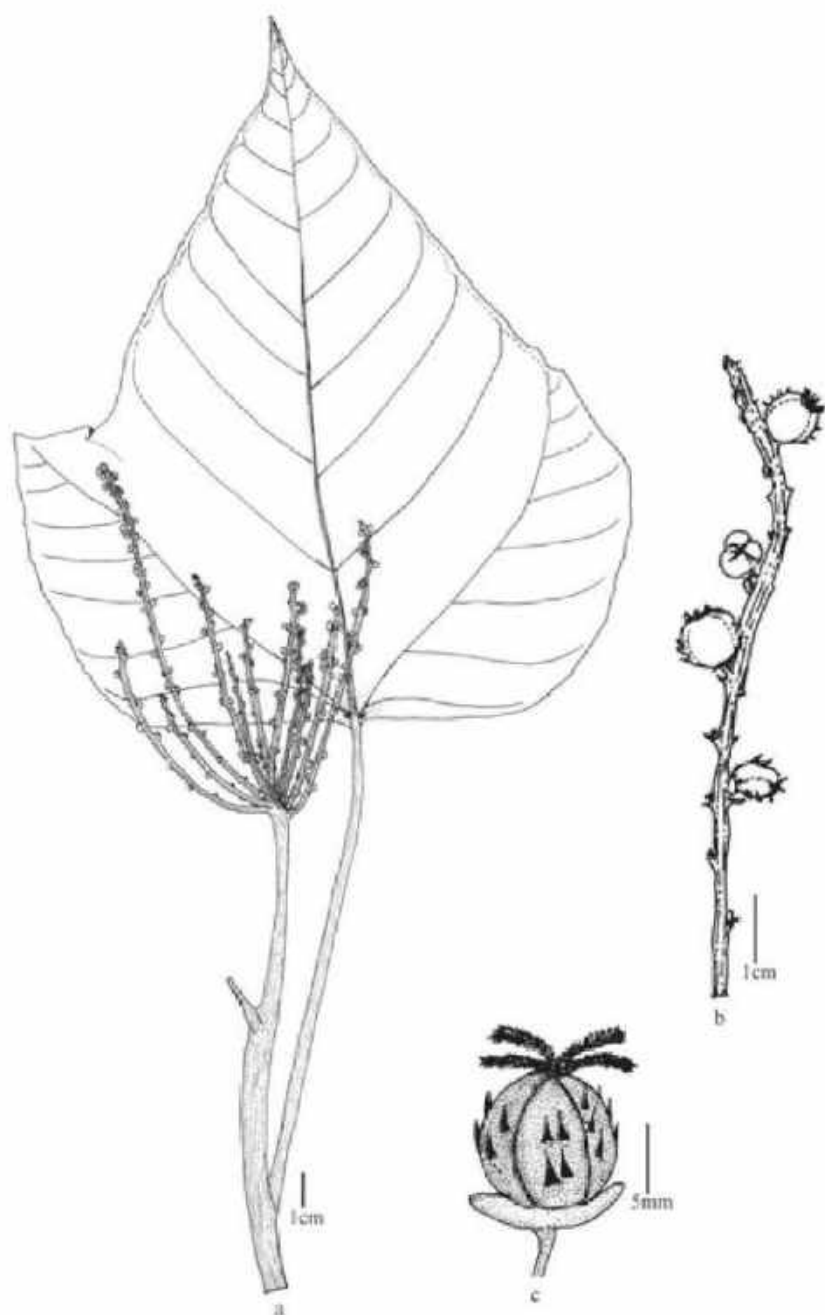


Fig. 104. *Mallotus tetraococcus*: a. Leaf with male inflorescence; b. Portion of fruiting axis; c. Capsule (AK 52835, AK 56172).

Maharashtra, Meghalaya, Tamil Nadu and West Bengal.

Specimens examined: Marakata, 24.09.2011, AK 52835; Checko-1, 26.09.2012, AK 56172.

13. *Ostodes* Blume

Ostodes paniculata Blume, Bijdr. Fl. Ned. Ind. 12: 620. 1826; Hook. f., Fl. Brit. India 5: 400. 1887; Chakrab. & N. P. Balakr. in N. P. Balakr. & al., Fl. India 23: 224. 2012. [Plate 210a-b; Fig. 105]

Bepari (N)

Dioecious tree, 8–12 m high, appressed brown pubescent. Leaves crowded at ends of branches, broadly to oblong-elliptic to ovate or triangular-ovate, 6.5–14 × 2.5–8 cm, denticulate or serrulate, acuminate, coriaceous; stipules caducous. Male inflorescence axillary or extra-axillary, many-flowered, pyramidal thyrsoïd; females less branched and fewer flowered, thyrsoïform, occasionally pseudo-racemose; inflorescence bracts triangular to linear-lanceolate, caducous. Male: calyx divided near to base; lobes orbicular or ovate-oblong, 2.5–6 mm; petals creamy white, sub-orbicular; disk glands 5–8; stamens 10–20; filaments short; anthers elliptic. Female: calyx divided near to base; lobes 5–7, orbicular-ovate to orbicular-obovate, 4–8 mm across; petals 5–7, 7–9 mm, or else same as in males; disk glands annular, crenate; ovary trigonous-globose, 3–7 mm across, tomentose; styles short; stigmas indistinct. Capsules subglobose, 6-grooved, appressed pilose; seed orbicular to oblong.

Flowering & Fruiting: March–December.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa to Bhutan road, VN 2572; Buxaduar, JKS 4676; Achalung to Lepchakhawa, 29.09.2013, AK 59660; Buxaduar to Tashigaon, 20.05.2014, AK 62700.

Notes: Fruits are used as narcotics by local people.

14. *Ricinus* L.

Ricinus communis L., Sp. Pl. 2: 1007. 1753; Hook. f., Fl. Brit. India 5: 457. 1887; Prain, Bengal Pl. 2: 952. 1903. [Plate 210c, 211a]

Reri (N).

Shrub, 1–3 m high. Leaves sub-orbicular, 10–60 × 10–70 cm, peltate, sparsely puberulous; lobes oblong-ovate to lanceolate, coarsely toothed, acute to acuminate; stipules ovate-lanceolate to triangular, caducous. Inflorescence leaf-opposed cymes, many flowered male cymes below and few flowered female cymes above. Male: calyx cupular; tube short; lobes 3–5, ovate-lanceolate, 5–9 mm; stamens many; anthers globose to ovoid. Female: calyx cupular; tube short; lobes 5–7, unequal, lanceolate, 5–6 mm, acuminate, caducous; ovary globose, echinate;



Fig. 105. *Ostodes paniculata*: a. Leaves with female inflorescences; b. Male flower; c. Stamen; d. Female flower; e. Gynoecium; f. Capsule (AK 62700).

styles 3; stigmas papillose. Capsules green, sub-globose, 3-lobed; seeds solitary in each lobe, ellipsoid to ovoid.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 09.10.2009, GK 46281; Santrabari to Buxaduar, 16.02.2014, AK 59971.

Phyllanthaceae

Key to the genera

- 1a. Leaves 3-foliolate, margins distinctly serrate; styles entire **4. Bischofia**
- 1b. Leaves simple, margins entire or serrulate; styles usually bifid, sometimes connate in *Glochidion* **2**
- 2a. Plants dioecious; inflorescences in spikes, racemes, or pseudoracemes, with visible inflorescence axis; petals absent **3**
- 2b. Plants monoecious or dioecious; inflorescences in glomerules or fascicles, inflorescence axis not visible or no longer than 1 cm; petals absent or present **5**
- 3a. Disk present; ovary and fruit 1- or 3-celled; petioles and leaf margins without glands; stamens longer than sepals **1. Antidesma**
- 3b. Disk absent; ovary and fruit 2-4-celled; petioles and leaf margins sometimes glandular; stamens shorter to longer than sepals **4**
- 4a. Leaves evenly distributed along branches, usually distichously arranged; leaf margins undulate to denticulate; petiole apex usually glandular **2. Aporosa**
- 4b. Leaves clustered toward branch tips, usually spirally arranged; leaf margins entire; petiole apex without glands. **3. Baccaurea**
- 5a. Flowers with petals (sometimes minute and hidden under disk) and disk; stamens usually 5, free; rudimentary ovary present **6. Bridelia**
- 5b. Flowers without petals; stamens 2-8, sometimes connate; rudimentary ovary absent or present **6**
- 6a. Flowers without disk **7**
- 6b. Flowers with a prominent, usually fleshy disk **8**
- 7a. Male calyx of free sepals, without adaxial scales; stamens 3-8; ovary 3-15-celled; styles connate into a terete, conical, clavate, or ovoid structure with a usually lobed or toothed apex; fruits longitudinally grooved **8. Glochidion**
- 7b. Male calyx disk-shaped, cupular, infundibular, or turbinate, entire or shallowly lobed, with whorl of scale-like lobes inserted at base of lobes where discernable; stamens 3; ovary 3-celled; styles 3, free or connate at base only; fruits not longitudinally grooved **3. Breynia**
- 8a. Male flowers with prominent pistillode; stamens 4-7, free; female disk annular;

branchlets sometimes spine-tipped; leaves often fascicled on short shoots, shoots never resembling pinnate leaves; fruit regularly dehiscent or a white berry 7. *Plueggea*

- 8b. Male flowers without pistillode; stamens 2-8, free or connate; female disk annular or in distinct parts; branchlets never spine-tipped; leafy branches often resembling pinnate leaves ("phyllanthoid branching"); fruit regularly or irregularly dehiscent, if fleshy and indehiscent, fruit a green to yellow drupe and shoots clearly resembling pinnate leaves or fruit a purplish berry 9. *Phyllanthus*

1. *Antidesma* L.

Antidesma bunius (L.) Spreng., Syst. Veg. 1: 826. 1824; Hook. f., Fl. Brit. India 5: 358. 1887, *p. p.* (excl. *A. thwaitesianum*); Prain, Bengal Pl. 2: 938. 1903; N. P. Balakr. & Chakrab. in N. P. Balakr. & al., Fl. India 23: 358. 2012. *Stilago bunius* L., Mant. Pl. : 122. 1767. [Plate 211b]

Himalchari (N).

Shrub, to 1-2 m high. Leaves elliptic or oblong-elliptic to obovate or sometimes oblong-lanceolate or oblanceolate, 7-19 × 3-8 cm, cuneate or rounded, entire, acute to cuspidate, subcoriaceous to coriaceous, glabrous or sometimes sparsely puberulous on midrib above, glabrous beneath except hairy at lower axils of the lateral nerves; stipules linear-lanceolate, 4-5 mm, hairy. Male inflorescence spicate, 1-10 cm, fulvous tomentose. Male: flowers sessile; bracts ovate, c. 1 × 1 mm, hairy, deciduous; calyx cupular, shallowly 4-lobed; lobes suborbicular c. 1 × 1-2 mm, ciliate, puberulous to glabrous; disk annular; stamens 3 or 4; filaments 1-2 mm, into the disk; anthers c. 1 mm; pistillode capitate. Female inflorescence racemose, 5-20 cm, stout, puberulous; calyx 4-lobed; lobes deltoid c. 1.5 × 1.5 mm, glabrous; ovary c. 7 mm, unilocular; styles 3(4), c. 1 mm. Drupes ovoid to ellipsoid, slightly compressed, glabrous.

Flowering & Fruiting: March-October.

Distribution. India: Almost throughout India.

Specimen examined: Checko 2, 08.04.2012, GK 56076.

Uses: Leaves and fruits are edible.

2. *Aporosa* Blume

Aporosa octandra (Buch.-Ham. ex D. Don) A. R. Vickery, Enum. Fl. Pl. Nepal 3: 193. 1982; Chakrab. & M. Gangop. in N. P. Balakr. & al., Fl. India, 23: 370. 2012. *Myrica octandra* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. : 56. 1825.

[Plate 211c-d, 212a]

Asare, Hare Kusum, Barikaunli (N).

Small tree, 6-8 m high. Leaves ovate or ovate-elliptic, 5.3-14.2 × 2.2-6.7 cm, cuneate, repand, acuminate, coriaceous, two glands at the base of petiole. Male inflorescence 2-3 cm, compact, cylindric spikes; female inflorescence axillary,

5–15 mm, sessile or subsessile spikes; floral bracts ovate, *c.* 1.5 × 2 mm, ciliate, obtuse. Male: calyx divided to base; lobes 4, elliptic or elliptic-ovate, 1.2–1.3 × *c.* 0.5 mm, ciliate, obtuse; petals absent; disk absent; stamens 2; filaments *c.* 0.5 mm; anthers *c.* 0.5 mm; pistillode absent. Female: calyx lobes 4, ovate, *c.* 1 × 0.5 mm, or else same as in male; petals absent; disk absent; staminode absent; ovary ellipsoid, 2.5–3 × *c.* 1.5 mm, pubescent; style columnar, 1–1.5 mm; stigma 2-fid. Capsules ellipsoid, 2-lobed; seeds 2, ellipsoid, smooth.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Bhutia Pond, 300m, 09.02.2010, SKS & GK 46374; Newlands, 15.02.2012, AK 53029; Checko-1, 10.02.2013, AK 58833; Panbari 10, 31.03.2012, GK 56007.

3. *Baccaurea* Lour.

Baccaurea ramiflora Lour., Fl. Cochinch. 2: 661. 1790; N. P. Balakr. & Chakrab. in N. P. Balakr. & al., Fl. India 23: 373. 2012 (*p. p.* excl. syn. *B. microstachya*); Hook. f., Fl. Brit. India 5: 371. 1887, *p. p.* *Baccaurea sapida* (Roxb.) Müll. Arg. in A. DC., Prodr. 15 (2. 2): 459. 1866. *Pierardia sapida* Roxb., Fl. Ind. 2: 254. 1832. [Plate 212b-c]

Latka (B); *Kusum* (N).

Tree, 7–10 m high, with scars of fallen leaves. Leaves crowded towards end of branchlets, elliptic or elliptic obovate, 8.5–16 × 3–6.6 cm, cuncate or acute, undulate, caudate-acuminate, coriaceous, glabrous except veins towards lower side. Male inflorescence axillary racemes, cauliflorous. Male flowers yellowish; bracts lanceolate, 3–3.5 × *c.* 1 mm, ciliate, hairy, glabrous inside; sepals 4(5), orbicular or ovate, *c.* 1 × 1 mm, hooded, hairy, glabrous inside; stamens 8; filaments short, free; anthers yellow, *c.* 0.25 mm, didynamous; pistillode terete, bipartite. Female inflorescence racemes, single to many together, cauliflorous, drooping; bracts ovate, *c.* 1 × 1 mm; sepals 4(6), spatulate, linear to oblong, 2–4 × 1–2 mm; ovary subglobose to ovoid, 1.5–2 mm across, 3-locular; style short; stigmas 2–5, discoid or flabellate. Capsules baccate, ovoid, woody, yellow when ripe, tardily dehiscent, 2–3-seeded; seeds flat-elliptic or rotund, arillate.

Flowering & Fruiting: December–August.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Odisha, Sikkim, Tripura and West Bengal.

Specimens examined: SRVK 11, 29.03.2012, GK 50618; SRVK 11, 30.03.2012, GK 50652.

Uses: Unripen fruits eaten as vegetable.

4. *Bischofia* Blume

Bischofia javanica Blume, Bijdr. Fl. Ned. Ind. 17: 1168. 1827; Hook. f., Fl. Brit. India 5: 345. 1887; Prain, Bengal Pl. 2: 926. 1903. [Plate 213a-b]

Kainjal (N).

Tree, 8–15 m high. Leaves digitately 3-foliolate; leaflets elliptic or elliptic-ovate or oblong-ovate, 9–17.3 × 3.9–9.4 cm, cuneate, crenate, acute to acuminate, coriaceous. Male inflorescence axillary thyriform, much branched pedunculate panicle racemes; female inflorescence same as in male but in the axil of fallen leaves, 15–20 cm. Male: floral bracts ovate, c. 1 mm across, acute, hyaline; calyx saucer-shaped; lobes 5, oblong-ovate to orbicular, c. 1 mm across, ciliate, hooded, thick, hyaline; petals absent; stamens 5; filaments c. 1 mm; anthers tetrahectous, c. 0.5 mm; pistillode broad, looks like disk; disk absent. Female: calyx saucer-shaped; lobes 5, ovate to orbicular, 1–2 × 0.6–2 mm, caducous; petals absent; ovary ellipsoid, 4–5 mm; style 3, 5–6 mm, reflexed; stigma indistinct. Fruits baccate, globose, hard; seeds 4, reniform, smooth.

Flowering & Fruiting: February–October.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Mizoram, Odisha, Karnataka, Kerala, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 7, 21.12.2011, GK 47199; Jainti 7, 09.03.2011, GK 50519; Marakata, 24.09.2011, AK 52856; Narathali, 20.02.2012, AK 55779.

5. *Breynia* J. R. Forst. & G. Forst.

Key to the species

- 1a. Leaves usually drying blackish adaxially; female calyx lobes fused, turbinate or hemispheric, campanulate, cupular, or rotate, not thickened in fruit; styles erect; fruit indehiscent or tardily or incompletely dehiscent 4. *B. vitis-idaea*
- 1b. Leaves drying green to brown; female calyx with 2 overlapping whorls of sepals, sometimes thicker in fruit; styles spreading and recurved; fruit dehiscent 2
- 2a. Leaves 3-nerved at base; sepals in two series, unequal; disk present 3. *B. trinervia*
- 2b. Leaves pinnately nerved; sepals in one series, equal; disk absent 3
- 3a. Calyx lobes in male flowers with no further lobulation, yellowish-green; fruits prominently drooping with long pedicels and recurved calyx 1. *B. androgyna*
- 3b. Calyx lobes in male flowers further bilobulate, crimson red; fruits not drooping with short pedicels 2. *B. rigida*

1. *Breynia androgyna* (L.) Chakrab. & N. P. Balakr., Bangladesh J. Pl. Taxon. 19 (2): 120. 2012. *Clusia androgyna* L., Mant. Pl. 1: 128. 1767. *Sauropus albicans* Blume, Bijdr. Fl. Ned. Ind. 12: 596. 1826; Hook. f., Fl. Brit. India 5: 332. 1887. *Sauropus lanceolatus* Hook. f., Fl. Brit. India 5: 333. 1887. *Sauropus oblongifolius* Hook. f., Fl. Brit. India 5: 333. 1887. [Plate 213c, 214a-b]

Shrub, 2–3 m high. Leaves ovate-oblong, 3–6 × 1.3–3.2 cm, cuneate, entire, subacute with mucronate tip, chartaceous; stipules triangular-ovate. Male: calyx orange red, discoid; anthers sub-globose. Female: calyx same as in male flowers; ovary depressed sub-globose; stigmas indistinct. Capsules with persistent calyx; seeds 6, triangular.

Flowering & Fruiting: July–December.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Mizoram, Nagaland, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Buxaduar, JKS 977; Santrabari, 04.10.2009, SKS & GK 46119; NRVK 5a, 13.02.2010, SKS & GK 47073; NRVK 5a, 04.12.2011, GK 52315; Chumiajhora, 28.09.2012, AK 58501; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58587.

Notes: Female flowers are quite attractive, initially green and turn orange red on maturity; inner calyx lobes which are smaller in flowers grew in size and reach the size of outer calyx lobes in fruits.

2. *Breynia rigida* (Thwaites) Chakrab. & N. P. Balakr., Bangladesh J. Pl. Taxon. 19 (2): 121. 2012. *Sauropus rigidus* Thwaites, Enum. Pl. Zeyl.: 284. 1861. *Sauropus compressus* Mull. Arg. in DC., Prodr. 15 (2): 243. 1866; Hook. f., Fl. Brit. India 5: 336. 1887; Chakrab. & M. Gangop. in N. P. Balakr. & al., Fl. India 23: 495. 2012. [Plate 214c-d, 215a]

Shrub or undershrub, 80–100 cm high, with winged branchlets. Leaves ovate-elliptic, 0.6–2 × 0.4–1.4 cm, cuneate or rounded, entire, acute or obtuse, sub-coriaceous. Male: calyx crimson red, discoid; anthers sub-globose. Female: calyx white, divided near to base; lobes sub-orbicular; ovary turbinate. Capsules with persistent calyx; seeds 6, triangular.

Flowering & Fruiting: February–November.

Distribution. India: Kerala (cultivated), Meghalaya, Mizoram, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa range, 13.05.1949, VN & party 2350, 2313; Panbari 8–9, 12.03.2011, GK 50544; Newlands, Sukno river, 22.09.2011, AK 52758; Bhutanghat, 26.09.2011, AK 52917; Chumiajhora, 28.09.2012, AK 56200; Phashkhawa river belt, 30.09.2012, AK 58554; Pana, 11.02.2013, AK 58844.

3. *Breynia trinervia* (Hook. f. & Thomson ex Mull. Arg.) Chakrab. & N. P. Balakr., Bangladesh J. Pl. Taxon. 19 (2): 121. 2012. *Sauropus trinervius* Hook. f. & Thomson ex Mull. Arg., Linnaea 32: 72. 1863; Hook. f., Fl. Brit. India 5: 334. 1887. [Plate 215b-d]

Undershrub, 1–1.5 m high, puberulent. Leaves ovate to ovate-lanceolate 5.4–10 × 2.4–3 cm, cuneate-rounded, acuminate, sub-coriaceous; stipules linear to linear-lanceolate, acuminate. Floral bracts lanceolate. Male: calyx discoid; anthers sub-globose. Female: calyx divided near to base; lobes unequal, outer one longer than inner ones; ovary oblong-ovoid, truncate; stigmas indistinct. Capsules white, slightly depressed, calyx persistent; seeds 6, triangular.

Flowering & Fruiting: April–September.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Jainti 7, 05.04.2012, GK 56030; Buxa Fort to Achalung, 29.09.2013, AK 59632.

4. *Breynia vitis-idaea* (Burm. f.) C. E. C. Fisch., Bull. Misc. Inform. Kew 1932 (2): 65. 1932; Chakrab. & al. in N. P. Balakr. & al., Fl. India 23: 411. 2012. *Rhamnus vitis-idaea* Burm. f., Fl. Ind.: 61. 1768. *Breynia rhamnoides* Müll. Arg. in A. DC., Prodr. 15 (2. 2): 440. 1866, *nom. illeg.*; Hook. f., Fl. Brit. India 5: 330. 1887; Prain, Bengal Pl. 2: 933, 1903. [Plate 216a-c]

Shrub, 1–1.5 m high. Leaves ovate, elliptic, oblong or orbicular, 1–5 × 0.8–3 cm, obtuse to rounded, entire, acute, membranous to chartaceous; stipules triangular to lanceolate, 1–2 × c. 0.5 mm, acute. Inflorescence axillary, solitary or 2–4-flowered racemes. Male: calyx divided to base; lobes 6, ovate, 1–2 × 1–1.5 mm, subtruncate; stamens 3, connate into capitate column; anthers c. 0.5 mm. Female: calyx cupular or obconic, 1–1.5 × 1.2–2 mm, 6-fid at apex; ovary ovoid-depressed, 1–2 mm across; styles 3, subulate or triangular; stigma minute. Capsules depressed globose or ovoid; seeds 4–6, trigonous.

Flowering & Fruiting: April–October.

Distribution. India: Almost throughout India.

Specimens examined: Mainabari, Bhutanghat, 26.09.2011, AK 52889; SRVK 6, 05.04.2013, GK 56033; Buxaduar to Achalung, 19.05.2014, AK 62657.

6. *Bridelia* Willd.

Key to the species

- 1a. Scandent shrubs; branchlets elliptic lenticellate; leaves obovate or obovate-elliptic; rachises zig-zag; male and female flowers on separate inflorescences; calyx and petals dissimilar in male and female flowers; drupes ellipsoid, not grooved

2. *B. stipularis*

- 1b. Small trees; branchlets rounded lenticellate; leaves not as above; rachises straight; male and female flowers on same inflorescences; calyx and petals similar in male and female flowers; drupes globose, grooved between pyrenes 2
- 2a. Branchlets yellow pubescent when young; leaves elliptic to elliptic-oblong, shallowly crenate at margins, short acuminate to sub-acute at apex, pilose below; lateral veins straight and parallel; male flowers sub-sessile to pedicellate; calyx reddish
1. *B. retusa*
- 2b. Branchlets tomentose when young; leaves lanceolate or elliptic-lanceolate, undulate at margins, round or acute at apex, sparsely tomentose to sub-glabrous below; lateral veins not straight, nor parallel; male flowers sessile; calyx green 3. *B. tomentosa*

1. *Bridelia retusa* (L.) A. Juss., Euphorb. Gen.: 109, t. 7, f. 22. 1824; Chakrab. & al. in N. P. Balakr. & al., Fl. India 23: 380. 2012. *Clusia retusa* L., Sp. Pl. 1: 1042. 1753 (as "*Cluytia*"). *Bridelia retusa* var. *roxburghiana* Mull. Arg. in DC., Prodr. 15 (2): 493. 1866, *nom. superfl.*; Hook. f., Fl. Brit. India 5: 268. 1887; Prain, Bengal Pl. 2: 927. 1903. [Plate 216d]

Gayo, Kuh (N).

Tree, c. 10 m high, yellow pubescent when young, glabrous later. Leaves elliptic to elliptic-oblong, 6.5–13 × 1.9–4 cm, obtuse, shallowly crenate, short acuminate to subacute, sub-coriaceous; stipules triangular-ovate, caducous; floral bracts triangular-ovate, glabrous to pilose. Male: calyx divided near to base; lobes triangular to triangular-ovate, pilose; petals creamy-white, lacinate, pilose; filaments short; anthers ovoid; pistillode conical; disk circular. Female: outer disk disciform; inner disk conical-cupular; ovary ovoid; style 2-fid above; stigmas minute. Drupes subglobose, shortly beaked, shallowly 2-lobed; seeds 2, ellipsoid, corky, embedded in pulp.

Flowering & Fruiting: June–October.

Distribution. India: Throughout India except Andaman & Nicobar Islands.

Specimen examined: Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58569.

2. *Bridelia stipularis* (L.) Blume, Bijdr. Fl. Ned. Ind. 12: 597. 1826; Hook. f., Fl. Brit. India 5: 270. 1887; Prain, Bengal Pl. 2: 928. 1903. *Clusia stipularis* L., Mant. Pl.: 127. 1767. [Plate 217a-b]

Lahara Gayo, Kasreto (N).

Scrambling shrub, to 8 m high, brownish tomentose. Leaves ovate, obovate or elliptic, 4.5–12 × 2.4–7 cm, rounded or obtuse, subentire or crenate, acute, sub-coriaceous, glabrous above, puberulous beneath; stipules triangular-ovate, 3–10 × 2–4 mm, pilose. Flowers in axillary or spicate clusters, shortly pedicellate; bracts c. 2.5 × 1 mm, acuminate, tomentose. Male: flowers cream to greenish yellow, sessile; sepals 5, ovate to triangular, c. 1 × 0.6 mm, glabrous; petals 5, spatulate to

orbicular-obovate, c. 1.5 × 1.25 mm, margins laciniate; disk shallowly cupular, c. 1 mm across; staminal column c. 0.6 mm; filaments c. 0.5 mm; anthers ellipsoid-oblong; pistillode ovoid. Female: flowers reddish green, sessile; sepals 5, ovate, c. 0.5 × 0.3 cm, acuminate, hairy; petals 5, obovate, c. 2.5 × 1.5 mm; ovary ovoid to globose, 1.5–2 mm across; styles 2, basally united, free above. Drupes globose, sap sticky, transparent; seeds 2, elliptic.

Flowering & Fruiting: August–March.

Distribution. India: Throughout India.

Specimens examined: Central Rydak, JKS 4138; NRVK 5, 09.02.2010, SKS & GK 46373; NRVK 5, 08.03.2011, GK 50507; Checko 2, 27.11.2011, GK 50593; Newlands, 15.02.2012, AK 55609; Narathali, 20.02.2012, AK 55772; Checko 29.03.2012, GK 50617; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58585; Bhutri, 05.10.2012, AK 58649.

3. *Bridelia tomentosa* Blume, Bijdr. Fl. Ned. Ind. 12: 597. 1826; Hook. f., Fl. Brit. India 5: 271. 1887; Prain, Bengal Pl. 2: 928. 1903. [Plate 217c-d, 218a]

Muse Gayo (N).

Shrub or small tree, 3–4 m high, tomentose when young, glabrous later. Leaves lanceolate or elliptic-lanceolate, 4.5–7.6 × 1.7–2.8 cm, rounded or cuneate, undulate, round or acute, subcoriaceous, sparsely tomentose to subglabrous below. Inflorescence axillary clusters or glomerules. Flowers sessile in male, sessile or subsessile in female. Male: floral bracts triangular, 0.4–0.7 mm, scarious; calyx divided to base; lobes 5, triangular-ovate, 1–1.2 × 0.6–0.7 mm, acute; petals creamy-white, 5, spatulate to orbicular-obovate, c. 0.5 mm across; disk orbicular, c. 1 mm across; stamens 5, connate below in c. 0.6 mm long staminal column; filaments c. 0.5 mm; anthers ellipsoid-oblong; pistillode ovoid. Female: floral bracts, calyx and petals as same as male flowers; ovary globose, c. 1 mm across; styles 2, free; stigma minute. Drupes globose, emarginate, slightly 2-lobed; seeds 2, subglobose, furrowed laterally.

Flowering & Fruiting: August–April.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Jharkhand, Meghalaya, Odisha, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: NRVK 6a, 13.10.2010, SKS & GK 46353; Marakata, 24.09.2011, AK 52850; Bhutanghat, 26.09.2011, AK 52911; SRVK 4, Bala River, 27.11.2011, GK 50594; Checko-1, 25.09.2012, AK 56124; Chuniajhora, 28.09.2012, AK 58505; Santrabari to Chunabhati, 04.10.2013, AK 59784.

7. *Flueggea* Willd.

Flueggea virosa (Roxb. ex Willd.) Royle, III. Bot. Himal. Mts. 9: 328. 1836. *Phyllanthus virosus* Roxb. ex Willd., Sp. PL, ed. 4. 4: 578. 1805. *Flueggea microcarpa* Blume, Bijdr. Fl. Ned. Ind. 12: 580. 1826; Hook. f., Fl. Brit. India 5: 328. 1887. [Plate 218b]

Shrub or small tree, 2–4 m high. Leaves elliptic, 1.5–5 × 1–3 cm, cuneate, entire, obtuse to acute, chartaceous. Inflorescence axillary, fascicled; floral bracts minute. Male: sepals 5, ovate-elliptic, 0.8–1.5 × 0.5–1 mm, acute; petals absent; stamens 5; filaments 1–2 mm; anthers ellipsoid; disk entire or lobed; disk glands 5; pistillode 1–1.5 mm. Female: sepals 5, ovate-triangular, 0.5–1 × 0.4–0.6 mm; ovary depressed subglobose, c. 0.5 mm across; styles 3, 0.7–1.5 mm, bifid above; disk annular, c. 1 mm across. Fruits baccate or capsular, whitish, depressed subglobose, 3-locular; seeds 3, brown, planoconvex, faintly reticulate.

Flowering & Fruiting: March–June.

Distribution. India: Throughout India.

Specimens examined: Buxa-Chunabhati, 17.05.1949, VN & party 2624; Santrabari to Buxaduar, 18.05.2014, AK 62613.

8. *Glochidion* J. R. Forst. & G. Forst.

Key to the species

- 1a. Stamens 6; capsules 3–6-lobed 2
1b. Stamens 3 or 4–12; capsules more than 6-lobed (except *G. zeylanicum* var. *tomentosum*) 3
- 2a. Male pedicels 7–11 mm; ovary obpyriform, c. 2.5 × 1 mm, pubescent when young, glabrous later 2. *G. lanceolarium*
2b. Male pedicels 8–10 mm; ovary depressed, 1–2 mm across, tawny-tomentellous 4. *G. nubigeum*
- 3a. Stamens 3 1. *G. ellipticum*
3b. Stamens 4 or 4–12 4
- 4a. Stamens 4–12; capsules green, strongly lobed, 10–16-lobed, strongly depressed with sunken styler stub, glabrous 3. *G. multiloculare*
4b. Stamens 4; capsules green with reddish patch, obscurely or shallowly lobed, 4–6-lobed, faintly depressed with erect styler column, tomentose 5. *G. zeylanicum* var. *tomentosum*

1. *Glochidion ellipticum* Wight, Icon. Pl. Ind. Orient. 5 (2): t. 1906. 1852; Hook. f., Fl. Brit. India 5: 321. 1887; Chakrab. & al. in N. P. Balakr. & al., Fl. India 23: 420. 2012. *Glochidion assamicum* (Mull. Arg.) Hook. f., Fl. Brit. India 5: 319. 1887; Prain, Bengal Pl. 2: 931. 1903. [Plate 218c–d]

Haldi Kath (N).

Monoecious tree, 5–7 m high. Leaves elliptic or ovate-elliptic, 9.4–13.5 × 4.7–5.7 cm, cuneate or slightly oblique, entire or undulate, acute to acuminate, coriaceous; stipules triangular-ovate, acute, deciduous. Inflorescence axillary or supraaxillary fascicles. Male: sepals 6 in 2 whorls, ovate-elliptic, oblong or spatulate, 1.5–5 × 0.5–2 mm; petals absent; stamens 3; filaments 1–1.5 mm; anthers minute. Female: calyx divided to base; lobes 6, arranged in 2 whorls; outer lobes ovate, *c.* 1.2 × 0.5 mm, ciliate, acute; inner lobes linear-lanceolate, *c.* 1 × 0.5 mm, ciliate, acute; petals absent; ovary subglobose, 0.5–1 mm across, tomentellous to glabrous; style columnar to conical or sometimes obconic, 3–6-lobed above, erect or spreading; stigma inconspicuous; disk absent. Capsules subglobose, compressed, 7-8-lobed, tomentose; seed solitary in each lobe, triangular-ovate.

Flowering & Fruiting: February–October.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa Road, 04.09.1981, VN & party 10318; SRVK 5–6, 12.03.2011, GK 50549; Marakata, 24.09.2011, AK 52879; Kumargram, 18.02.2012, AK 55703; Bhutri, 05.10.2012, AK 58634.

2. *Glochidion lanceolarium* (Roxb.) Voigt, Hort. Suburb. Calcutt.: 153. 1845; Hook. f., Fl. Brit. India 5: 308. 1887, *p. p.* *Bradleia lanceolaria* Roxb., Fl. Ind. 3: 697. 1832. [Plate 219a]

Bangikath (N).

Small monoecious tree, 5–6 m high. Leaves elliptic to oblanceolate, 5.2–13 × 3.1–5.8 cm, cuneate to obliquely cuneate, entire, short acuminate, coriaceous; stipules triangular-ovate, *c.* 2 mm across, acuminate. Inflorescence axillary or supraaxillary fascicles. Flowers pedicellate in male, sessile in female. Male: sepals 6 in 2 whorls, subequal; outer elliptic, 4–5 × *c.* 2 mm, fused at base, obtuse; inner elliptic-oblong, 4–5 × *c.* 1.2 mm, fused at base, obtuse; petals absent; stamens 6, connate into an ellipsoid column, *c.* 1.5 mm, acumen at apex; disk absent. Female: sepals 6 in 2 whorls; outer elliptic-oblong, *c.* 3 × 0.8 mm, subacute; inner lanceolate, *c.* 1.5 × 0.5 mm, acute; petals absent; ovary obpyriform, *c.* 2.5 × 1 mm; style connate into column, 6-lobed, pubescent; stigma inconspicuous; disk absent. Capsules 1–2 per axils, depressed globose, 6-lobed, compressed, puberulous; seed brown, solitary in each lobe, ovate to rounded.

Flowering & Fruiting: October–March.

Distribution. India: Assam, Chhattisgarh, Jharkhand, Karnataka, Meghalaya, Odisha, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Pana, 11.02.2013, AK 58867; Santrabari, 18.02.2015, AK 59994.

3. *Glochidion multiloculare* (Rottler ex Willd.) Voigt, Hort. Suburb. Calcutt.: 152. 1845; Hook. f., Fl. Brit. India 5: 307. 1887; Prain, Bengal Pl. 2: 930. 1903. *Agyneia multilocularis* Rottler ex Willd., Ges. Naturf. Freunde Berlin Neue Schriften 4: 206. 1803. [Plate 219b-c]

Small monoecious tree, 4–6 m high. Leaves elliptic to elliptic-oblong, occasionally oblanceolate, 1.7–6.7 × 0.7–2.2 cm, cuneate, entire, short acuminate to subacute with apiculate tip at apex, subcoriaceous, gland-dotted above; stipules triangular-ovate, c. 1.5 × 0.8 mm, acuminate. Inflorescence axillary or supraaxillary fascicles; floral bracts triangular-ovate, c. 1 mm across, hairy at margins, subacute. Male: sepals 6, subequal, arranged in 2 whorls; outer elliptic-oblong, c. 3.5 × 1.2 mm, fused at base, obtuse; inner c. 2.5 × 1 mm, or else same as in outer whorls; petals absent; stamens 4–12, connate into an ellipsoid column, c. 1 mm, with an erect and blunt acumen; disk absent. Female: sepals 8 in 2 whorls, equal, elliptic to elliptic-ovate, 2–2.5 × 1–0.8 mm, subacute; petals absent; ovary rounded, c. 2 mm across; style a short hollow grooved cone at top of ovary; stigma inconspicuous; disk absent. Capsules 3–4 per axils, depressed globose, 10–16-lobed, with sunken styler stub at top, compressed; seeds red, solitary in each lobe, triquetrous.

Flowering & Fruiting: June–October.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Chattisgarh, Jharkhand, Manipur, Meghalaya, Nagaland, Tripura, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Marakata, 24.09.2011, AK 52870.

4. *Glochidion nubigenum* Hook. f., Fl. Brit. India 5: 315. 1887; N. P. Balakr. & Chakrab. in N. P. Balakr. & al., Fl. India 23: 427. 2012. [Plate 219d]

Tree, 5–8 m high. Leaves oblong-elliptic or ovate elliptic, 2.5–12 × 1.3–6.9 cm, acute to cuneate, entire, acute to shortly acuminate, chartaceous to coriaceous, glaucous beneath, sparsely hirsute on major nerves to glabrous above, greyish-tomentellous to sparsely pilose beneath. Inflorescence unisexual or mixed. Male: calyx 6-lobed; lobes obovate, 2–2.5 × 1.5–2 mm, puberulous to glabrous; petals absent; stamens 3; filaments c. 1.5 mm. Female: calyx 6-lobed; lobes elliptic, suborbicular, ovate or obovate, 1–2 × 0.5–1.5 mm; ovary depressed, 1–2 mm across, tawny-tomentellous; styles 3–5, variable, 0.7–1.5 mm. Capsules depressed globose, 3–5-locular, prominently bilobulate lobed, glabrous.

Flowering & Fruiting: April–November.

Distribution. India: Arunachal Pradesh, Assam, Sikkim and West Bengal.

Specimen examined: Checko 2, 30.03.2012, GK 50646.

5. *Glochidion zeylanicum* (Gaertn.) A. Juss. var. *tomentosum* (Dalzell) Trimén., Cat. Pl. Ceylon: 79. 1885; N. P. Balakr. & Chakrab. in N. P. Balakr. & al., Fl. India 23: 431. 2012. *Glochidion tomentosum* Dalzell, J. Bot. Kew Gard. Misc. 3:

38. 1851; Hook. f., Fl. Brit. India 5: 309. 1887. *Bradleia hirsuta* Roxb., Fl. Ind. 3: 699. 1832. *Glochidion hirsutum* (Roxb.) Voigt, Hort. Suburb. Calcutt.: 153. 1845. *Glochidion tomentosum* var. *talbotii* Hook. f., Fl. Brit. India 5: 310. 1887.

[Plate 220a-b]

Tree, to 4–5 m high, tomentose. Leaves ovate, or ovate-elliptic, 3.2–10.5 × 2.8–5.3 cm, acute, undulate, rounded, sub-coriaceous, glabrous. Inflorescence axillary fascicled, 10–15-flowered. Male: sepals 6, arranged in two whorls; outer whorl oblong, c. 1.25 × 0.75 mm, hispid, glabrous inside, thick; inner whorl lanceolate, c. 1 mm, glabrous; petals absent; disk absent; stamens 4. Female: sepals and petals as in male flowers; ovary c. 1.5 mm across, tomentose; style broad and flat, 5–6 minute raised lobes. Capsules green with reddish patch, faintly depressed, 4–6-loculed, tomentose; seeds suborbicular.

Flowering & Fruiting: April–September.

Distribution. India: Almost throughout India.

Specimen examined: Checko 2, 08.04.2012, GK 56077.

9. *Phyllanthus* L.

Key to the species

- 1a. Trees; leaves 100 and more in each branchlets; drupes 1.5–3 cm across, edible **3. *P. emblica***
- 1b. Herbs or shrubs; leaves not as above; capsules or berries 1–5 mm across, not edible **2**
- 2a. Scandent shrubs; stamens 5, 3 of them free and 2 united in a staminal column; fruits berries; seeds 6–12, superposed, crustaceous **4. *P. reticulatus***
- 2b. Erect or sub-erect herbs or shrubs; all stamens connate in a staminal column (free in *P. simplex*); fruits capsules; seeds 3–6, not superposed, not crustaceous **3**
- 3a. Leaves phyllanthoid type **4**
- 3b. Leaves not phyllanthoid type **5**
- 4a. Stems not winged, glabrous; leaves truncate or rounded to cuneate at base, glabrous at margins, smooth above, glaucous below; stipules lanceolate, acute; floral bracts lanceolate; calyx lobes 5 in male flowers, not in whorls; disk glands 5; calyx lobes in female flowers same as in male flowers; stigma obscure **2. *P. amarus***
- 4b. Stems narrowly winged, hispid along the edges; leaves unequal at base, hispid at margins, punctate above, never glaucous below; stipules ovate-lanceolate to triangular-ovate, cuspidate; floral bracts lanceolate to triangular-ovate; calyx lobes 6 in male flowers, in 2 whorls; disk glands 6; calyx lobes in female flowers not same as in male flowers; stigma globose **8. *P. urinaria***
- 5a. Proximal leaves of branchlets double in the size of the distal leaves; stipules acute; calyx lobes scariously margined; disk glands star-like in male flowers and saucer-shaped in female flowers **1. *P. airy-shawii***

- 5b. Leaves of the branchlets more or less of the same size; stipules acute or acuminate; calyx lobes scariously margined or not; disk glands lobed or annular in male and female flowers 6
- 6a. Leaves ovate to elliptic, unequally sub-rounded at base; lateral veins 6–11 pairs; stipules triangular, 1–3 × 0.4–1 mm; pedicels of male and female flowers long; calyx crimson red, 4-lobed, fimbriate in male flowers; stamens 4; filaments connate into a short column 6. *P. sikkimensis*
- 6b. Leaves not as above; lateral veins indistinct; stipules not as above; pedicels of male and female flowers short; calyx white or greenish white or greenish red, 6-lobed, not fimbriate in male flowers; stamens 3; filaments connate or not 7
- 7a. Leaves elliptic to elliptic-obovate, cuneate or obtuse at base; stipules lanceolate, decurrent, sharply acuminate; male flower solitary on thickened pedicels; filaments connate; anther cells dehiscent vertically; disk of female flowers shallowly lobed; capsules smooth; seeds with concentric rings of tubercles, not papillose 5. *P. rheedel*
- 7b. Leaves elliptic-oblong, rounded at base; stipules sub-sagittate, peltate, acute; male flowers few, sub-sessile; filaments free; anther cells dehiscent transversely; disk of female flowers annular; capsules verrucose; seeds tubercled, papillose 7. *P. simplex*

1. *Phyllanthus airy-shawii* Jean F Brunel & Jacq. Roux, Nordic J. Bot. 4 (4): 470. 1984; Chakrab. & al. in N. P. Balakr. & al., Fl. India 23: 481. 2012. *Phyllanthus debilis* Wall. ex Hook. f., Fl. Brit. India 5: 299. 1887, *p. maj.*, non Klein ex Willd. 1805; Prain, Bengal Pl. 2: 936. 1903. [Plate 220c-d]

Herb, 60–80 cm high. Leaves elliptic, obovate or sub-orbicular, 0.6–1.4 × 0.4–0.8 cm, cuneate or acute at base, obtuse; stipules linear; floral bracts filiform. Male: calyx divided near to base; lobes 6, ovate, ovate-elliptic or obovate; disk glands 6, lobed, shortly stipitate; stamens 3; staminal column short; anthers oblong. Female: calyx divided near to base; lobes 6, obovate to spatulate; disk glands 6; ovary globose; styles 3; stigmas indistinct. Capsules depressed globose, slightly 3-lobed; seeds 2 in each lobe, triangular, irregularly 6 or 7-ribbed.

Flowering & Fruiting: April–December.

Distribution. India: Andhra Pradesh, Assam, Bihar, Jharkhand, Madhya Pradesh, Meghalaya, Odisha, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Jainti 3, 29.11.2011, GK 47163; Chuniajhora, 28.09.2012, AK 56199; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58561; Jainty-Phashkhawa, 02.10.2012, AK 58602.

2. *Phyllanthus amarus* Schumacher & Thonn., Beskr. Guin. Pl.: 421. 1827. *Phyllanthus nanus* Hook. f., Fl. Brit. India 5: 298. 1887. *Phyllanthus niruri* sensu Hook. f., Fl. Brit. India 5: 298. 1887, auct. non L. 1753. [Plate 221a-b]

Herb, c. 7 cm high. Leaves elliptic to elliptic-oblong, oblanceolate or sub-orbicular, 1.2–3 × 1–2 mm, rounded to truncate at base, occasionally emarginate with apiculate tip; stipules scarious; floral bracts acuminate, scarious. Male: calyx divided near to base; lobes elliptic-oblong, 1-nerved; disk glands stipitate; stamens 3; staminal column short; anthers fused. Female: ovary sub-globose; styles 3; disk shallowly annular, lobed. Capsules globose, 3-lobed; seeds 1–2 in each lobe, trigonous, longitudinally ribbed.

Flowering & Fruiting: January–December.

Distribution. India: Almost throughout India.

Specimens examined: Sankosh, 17.02.2012, AK 55696; Tashigaon to Rovers point, 03.10.2013, AK 59764.

3. *Phyllanthus emblica* L., Sp. Pl. 2: 982. 1753; Hook. f., Fl. Brit. India 5: 289. 1887; Prain, Bengal Pl. 2: 935. 1903. [Plate 221c]

Deciduous tree, 3–10 m high, puberulous to glabrous. Leaves distichous, linear-oblong, 0.3–2 × 0.1–0.5 cm, rounded, truncate or subcordate, obtuse with mucronate tip; stipules triangular. Inflorescence bracts triangular. Male: calyx divided near to base; lobes 6, oblong, obovate to oblanceolate; disk glands 6, clavate; stamens 3; staminal column short; anthers oblong. Female: calyx divided near to base; lobes 6, obovate-oblong to oblanceolate; disk cupular, 6-lobed; ovary 3-locular; styles 3, shortly connate below into a column, 2-fid to 4-fid above; stigmas indistinct. Drupes globose, 1.5–3 cm across, hard; seeds 1 or 2 in each fertile lobe.

Flowering & Fruiting: June–December.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 6a, 13.10.2010, SKS & GK 46343; Narathali, 23.09.2011, AK 52809.

Uses: Fruits are eaten raw; used in ayurvedic medicines in the form of dried powder.

4. *Phyllanthus reticulatus* Poir. in Lam., Encycl. 5: 298. 1804; Hook. f., Fl. Brit. India 5: 288. 1887; Prain, Bengal Pl. 2: 935. 1903. [Plate 221d]

Shrub, 1–2 m high. Leaves elliptic-ovate or obovate, 1.3–3 × 0.6–1.8 cm, cuneate at base; stipules linear, puberulent; floral bracts triangular-ovate. Male: calyx divided near to base; lobes 5–6, unequal, elliptic to obovate, obtuse or truncate; disk glands 5 or 6; staminal column short; anthers dithecous. Female: calyx divided near to base; lobes 5–6, obovate; disk glands 6-lobed. Berries reddish, subglobose, 8–10-locular; seeds triangular. Berries subglobose, fleshy, 8–10-loculed, smooth; seeds 1 or 2 in each locule, triangular.

Flowering & Fruiting: August–April.

Distribution. India: Andaman & Nicobar Islands, Assam and West Bengal.

Specimens examined: Buxaduar, KB 920; SRVK 6, 03.03.2011, GK 47225; Checko-1, 25.09.2012, AK 56118; Adma, Panbari, 12.02.2013, AK 58876; Buxa Fort to Tashigaon, 01.10.2013, AK 59712.

5. *Phyllanthus rheedei* Wight, Icon. Pl. Ind. Orient. 5 (2): 25, t. 1895, f. 1. 1852; Hook. f., Fl. Brit. India 5: 293. 1887.

Herb, 50–80 cm high. Leaves 4–14 × 2.5–7 mm, obtuse with apiculate tip; stipules scarious, mid nerve prominent; floral bracts lanceolate, acuminate. Male: calyx divided near to base; lobes unequal, elliptic to elliptic-obovate, mid nerve prominent; disk glands 5 or 6; staminal column short; anthers sub-orbicular. Female: calyx divided near to base; lobes obovate, mid nerve prominent; ovary subglobose, shallowly lobed; styles 3; stigmas indistinct. Berries subglobose, shallowly lobed, sepals and stigma persistent, smooth; seeds pinkish orange, triangular, longitudinal ribs on back.

Flowering & Fruiting: August–December.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Rajasthan, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Rydak river belt, 20.09.2011, AK 52678.

6. *Phyllanthus sikkimensis* Mull. Arg., Linnaca 32: 48. 1863. *Phyllanthus hamiltonianus* Mull. Arg., Linnaca 34: 75. 1865; Hook. f., Fl. Brit. India 5: 304. 1887. *Reidia hamiltoniana* (Mull. Arg.) A. M. Cowan & Cowan, Trees N. Bengal: 117. 1929. [Plate 222a-b]

Shrub, 1–5 m high, puberulous to sub-glabrous. Leaves ovate-elliptic, 2–5 × 1–3 cm, rounded, acute with mucronate tip, pilose to glabrous below; stipules caducous. Inflorescence axillary or terminal, racemes; male cymules 3–5-flowered towards base; female cymules 1-flowered towards apex; inflorescence bracts ovate-acuminate to lanceolate. Male: calyx lobes ovate, denticulate, sparsely puberulous; disk glands 4; staminal column short; anthers sub-globose. Female: calyx crimson red, divided near to base; lobes 6, ovate or triangular-ovate, denticulate, fimbriate, sparsely puberulous; ovary sub-globose, pubescent; styles 3; stigmas indistinct; disk cupular. Capsules subglobose, 3-lobed, muriculate, puberulous to glabrous; seeds solitary in each lobe.

Flowering & Fruiting: April–November.

Distribution. India: Assam, Sikkim, Tripura and West Bengal.

Specimens examined: Jainti range, 04.10.2009, GK 46139; Rajabhatkhawa range, 08.03.2011, GK 50511; Newlands, Sukno river, 22.09.2011, AK 52736; Bhutanghat,

Mainabari, 26.09.2011, AK 52886; SRVK 6, 04.12.2011, GK 52325; Chuniajhora, 28.09.2012, AK 56198.

7. *Phyllanthus simplex* Retz., *Observ. Bot.* 5: 29. 1789; Hook. f., *Fl. Brit. India* 5: 295. 1887; Prain, *Bengal Pl.* 2: 936. 1903. *Phyllanthus simplex* var. *oblongifolius* (Wight) Mull. Arg., *Linnaea* 32: 32. 1863; Hook. f., *Fl. Brit. India* 5: 295. 1887. *Phyllanthus virgatus* sensu Chakrab. & N. P. Balakr., *J. Econ. Taxon. Bot.* 31: 745. 2007, non G. Forst. 1786. [Plate 222c-d]

Prostrate or sub-erect herb, 8–12 cm high. Leaves oblong-elliptic, 4–10 × 1.5–2 cm, obtuse with mucronate tip; stipules scarious; Male: calyx greenish red, divided near to base; lobes obovate, scarious; disk glands 6, orbicular; filaments short; anthers sub-globose. Female: calyx divided near to base; lobes oblong-obovate, scarious; ovary sub-globose; styles 3; stigmas sub-globose. Capsules depressed globose, 1.5–2.3 mm across, faintly 3-lobed; seeds 1–2 in each lobe, trigonous, c. 1.5 mm, papillose.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 26.09. 011, AK 52951; Rydak river belt, 26.02.2012, AK 55961; Panbari 8, 10.04.2012, GK 56085; Jainty-Phashkhawa, 02.10.2012, AK 58621.

8. *Phyllanthus urinaria* L., *Sp. Pl.* 2: 982. 1753; Hook. f., *Fl. Brit. India* 5: 293. 1887; Prain, *Bengal Pl.* 2: 935. 1903. [Plate 223a-c]

Herb, 6–30 cm high. Leaves elliptic-oblong to obovate-oblong, 3.5–11 × 1–4 mm, rounded or obtuse with apiculate tip; stipules entire or auriculate, scarious; floral bracts acuminate. Male: calyx divided near to base; lobes elliptic to elliptic-obovate; disk glands minute; stamens 3; staminal column short; anthers sub-globose. Female: calyx divided near to base; lobes elliptic-oblong to ovate-lanceolate, mid nerve prominent; ovary sub-globose; styles 3; stigmas globose; disk petaloid, with 6 small radiating rays. Capsules brown to dark brown, depressed sub-globose, slightly 6-lobed, tuberculate when young; seed solitary in each lobe, trigonous, with 12–15 sharp transverse ridges at back, centrally keeled.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Marakata, 24.09.2011, AK 52865; Bhutanghat, 26.09.2011, AK 52914; Bhutanghat, 26.09.2011, AK 52949; Newlands, 15.02.2012, AK 53042; Hatipota, 29.09.2012, AK 58522.

Urticaceae

Key to the genera

- 1a. Climbing shrubs; male heads on distinct peduncles in dichotomously branched inflorescences; perianth lobes 2-lobuled in female flowers; filaments erect; ovary with mucilaginous sap **8. Poikilospermum**
- 1b. Herbs or shrubs, not climbing; male heads not as above; perianth lobes without lobules; filaments inflexed; ovary not with mucilaginous sap **2**
- 2a. Plants armed with stinging hairs **3**
- 2b. Plants without stinging hairs **6**
- 3a. Leaves opposite **4**
- 3b. Leaves alternate **5**
- 4a. Branchlets succulent, sap transparent watery, puberulous; leaves ovate to ovate-elliptic, cuneate at base, entire at margins, acute at apex, without punctiform cystoliths, scabrous above, scattered hispid below; veins pinnate; perianth lobes of female flowers connate; ovary hairy; style distinct; stigma ligulate; achenes white, not punctate **2. Dendrocnide**
- 4b. Branchlets sub-woody, without sap, glabrous; leaves ovate, subcordate or rounded or truncate at base, serrate-dentate at margins, acuminate at apex, with punctiform cystoliths, glabrous; veins 5-6 from base; perianth lobes of female flowers free; ovary glabrous; style indistinct; stigma penicillate; achenes not white, punctate **10. Urtica**
- 5a. Branchlets without bulbils, appressed pubescent; leaves sub-orbicular, 3-5-lobed, sub-truncate at base; stipules acute; male perianth 4-lobed; ovary sub-orbicular, compressed, not stipitate; style 2-partite above; achenes dark brown to grey brown, biconvex, slightly compressed, verrucose, not striated **4. Girardinia**
- 5b. Branchlets with 1-3 woody bulbils, pubescent to glabrescent; leaves lanceolate to ovate, not lobed, cuneate to rounded at base; stipules bifid; male perianth 5-lobed; ovary asymmetrically ovoid, not compressed, stipitate; style not 2-partite above; achenes purplish spotted, not biconvex, strongly compressed, not verrucose, striated **5. Laportea**
- 6a. Cystoliths linear or fusiform; perianth lobes of female flowers free or connate at base; staminodes present; style indistinct; stigma penicillate **7**
- 6b. Cystoliths punctiform; perianth lobes of female flowers usually connate into a tube; staminodes absent; style distinct or indistinct; stigma penicillate or filiform **8**
- 7a. Stems not succulent; leaves alternate, asymmetric, distichous; stipules membranous, 2 at each node, one axillary and one lateral or leaf-opposed, sometimes axillary stipule rudimentary or absent; flowers on bracteate, often fleshy receptacles, more rarely in cymes; achenes ribbed **3. Elatostema**
- 7b. Stems succulent; leaves opposite, usually symmetric, not distichous; stipules usually membranous, 2 at each node, axillary, rarely interpetiolar; flowers in branched cymes or panicles, rarely in globose heads or sub-umbellate; achenes smooth **7. Pilea**

- 8a. Small trees; leaves alternate, at the end of branchlets; flowers in clusters in axils of fallen leaves; style indistinct; stigma penicillate; achenes attached on a fleshy, whitish cup **6. Oreocnide**
- 8b. Shrubs; leaves alternate or opposite, not at the end of branchlets; flowers in clusters on pendulous rachis or in axils of leaves; style distinct; stigma filiform, villous at one side or pubescent; achenes not attached on a fleshy, whitish cup **9**
- 9a. Leaves opposite (alternate in *B. glomerulifera*); flowers in clusters on pendulous rachis (except *B. glomerulifera*); style not articulate, persistent; stigma pubescent; achenes not lustrous, strongly attached to perianth **1. Boehmeria**
- 9b. Leaves alternate or opposite; flowers in axillary clusters; style articulate, deciduous; stigma villous at one side; achenes lustrous, easily detached from perianth **9. Pouzolzia**

1. Boehmeria Jacq.

Key to the species

- 1a. Leaves alternate; inflorescences compact heads on leafy stems **1. B. glomerulifera**
- 1b. Leaves opposite; inflorescences glomerules on pendulous, spike-like specialized shoots **2**
- 2a. Leaves ovate or sub-orbicular **3. B. macrophylla**
- 2b. Leaves not ovate or sub-orbicular **3**
- 3a. Branchlets glabrous; leaves obliquely elliptic-lanceolate to lanceolate, glabrous below; pistillode ellipsoid; female perianth 2-toothed above; style glabrous; achenes sessile **2. B. hamiltoniana**
- 3b. Branchlets hispid; leaves elongate lanceolate, hispid below; pistillode clavate; female perianth 3-4-toothed above; style pubescent; achenes stipitate **4. B. penduliflora**

1. Boehmeria glomerulifera Miq. in Zollinger, Syst. Verz. 2: 101, 104. 1854.
Boehmeria malabarica Wedd., Ann. Mus. Hist. Nat., Paris 3: 355. 1855; Hook. f., Fl. Brit. India 5: 577. 1888; Prain, Bengal Pl. 2: 964. 1903. **[Plate 223d]**

Shrub, 1-1.5 m high, pubescent or glabrous. Leaves ovate to lanceolate or elliptic to subelliptic, 6-22 × 2.5-11 cm, cuneate to rounded, dentate, acuminate, chartaceous, smooth to punctate above, pubescent below; stipules lanceolate, c. 4.5 × 1 mm, acuminate, 1-nerved or keeled, deciduous, pubescent at nerve or keel on back only. Inflorescences axillary, compact heads on leafy stems; floral bracts obovate, c. 1.5 × 0.5-0.8 mm, subacute to rounded, membranous, sparsely pubescent. Male: perianth cupular; tube c. 1.2 mm, sparsely pubescent; lobes 4, triangular-ovate, 0.5-0.8 × c. 1 mm, acute, pubescent; stamens 4; filaments 1.5-1.8 mm; anthers ellipsoid; pistillode ellipsoid or obovate. Female: perianth tubular, obovoid or obovoid, with short neck, 2-toothed above, tightly enclosed the ovary, pubescent; tube 0.5-1 mm; ovary suborbicular; style short; stigma 1.8-2 mm, ciliate. Achenes enclosed in brown perianth, obovoid, sessile.

Flowering & Fruiting: December–April.

Distribution. India: Almost throughout India.

Specimens examined: Tobgaon, KB 2066; Pana, 11.02.2013, AK 58861; on way to Mahakal cave, 20.02.2013, AK 59861.

2. *Boehmeria hamiltoniana* Wedd., Ann. Sci. Nat., Bot., Ser. 4, 1: 199. 1854; Hook. f., Fl. Brit. India 5: 579. 1888. *Boehmeria platyphylla* D. Don var. *hamiltoniana* (Wedd.) Wedd. in DC., Prodr. 16 (1): 213. 1869. [Plate 224a-b]

Shrub, 1.5–2 m high. Leaves unequal, obliquely elliptic-lanceolate to lanceolate, 5.5–13 × 2.5–4 cm, cuneate or obliquely subcircular, crenate-serrate, acuminate, chartaceous; stipules subulate-lanceolate, c. 7 mm, acute, caducuous. Inflorescence glomerules on axillary, 10–15 cm, pendulous, spike-like specialized shoots, white pubescent; inflorescence bracts same as stipules. Flowers sessile, compactly arranged in glomerules on inflorescence axis; glomerules 2–3 mm across, white pubescent. Male: perianth cupular; lobes 4, elliptic, c. 1.5 mm, acute, sparsely pubescent; stamens 4; filaments c. 1.8 mm; anthers ellipsoid; pistillode ellipsoid. Female: perianth obovoid, compressed, 2-toothed above, pubescent; ovary ellipsoid, c. 1 mm, white pubescent; style minute; stigma pubescent. Achenes enclosed in brown perianth, ellipsoid, compressed, style persistent, pubescent.

Flowering & Fruiting: June–November.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Lepchakhawa, JK5 975; Tashigaon to Rovers point, 02.10.2013, AK 59739.

3. *Boehmeria macrophylla* Hornem., Hort. Bot. Hafn. 2: 890. 1815; Hook. f., Fl. Brit. India 5: 577. 1888. [Plate 224c-d]

Shrub, 1–2 m high, scabrous. Leaves ovate or suborbicular, 9–15 × 10–14 cm, rounded or subcordate, sharply serrate-dentate, caudate, subcoriaceous, strigose above. Inflorescence glomerules on pendulous, cylindrical congested spike-like specialized shoots. Male: flowers globose, c. 1 mm across, sessile, hispid; floral bracts ovate, c. 1 mm across, ciliate, acuminate, midvein prominent, hispid; perianth cupular; lobes 4, ovate, c. 1 × 0.8 mm, acuminate, hispid; stamens 4; filaments 0.6–0.8 mm; anthers oblong-ovate; pistillode clavate. Female: flowers ellipsoid, c. 1 mm across, sessile; floral bracts ovate-elliptic, c. 2.5 mm across, or else same as in male flowers; perianth compressed-oblongate, tubular below, 3–4-toothed above, hispid; tube 0.6–1 mm; ovary included; style short; stigma 0.5–1 mm, exerted, curved at tip, pubescent. Achenes ovoid-ellipsoid, 0.8–1 × c. 1 mm, style persistent, sparsely hispid.

Key to the varieties

- | | |
|-----------------------------------|-------------------------------|
| 1a. Leaves suborbicular | 3.2. var. <i>rotundifolia</i> |
| 1b. Leaves ovate | 2 |
| 2a. Leaves cuspidate, membranous | 3.1. var. <i>macrophylla</i> |
| 2b. Leaves acuminate, chartaceous | 3.3. var. <i>scabrella</i> |

3.1. var. *macrophylla*

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Buxaduar, KB 1923; Jainty Range, 04.10.2009, SKS & GK 46113; Rydak river belt, 20.09.2011, AK 52671; Newlands, Sukno river, 22.09.2011, AK 52774; Checko-1, 25.09.2012, AK56109.

3.2. var. *rotundifolia* (D. Don) W. T. Wang in W. T. Wang & C. J. Chen, Fl. Reipubl. Popularis Sin. 23 (2): 337. 1995. *Boehmeria rotundifolia* D. Don, Prodr. Fl. Nepal.: 60. 1825. *Boehmeria platyphylla* D. Don var. *rotundifolia* Wedd. in DC., Prodr. 16 (1): 212. 1869; Hook. f., Fl. Brit. India 5: 579. 1878.

Flowering & Fruiting: May–October.

Distribution. India: Sikkim and West Bengal.

Specimens examined: Bhutanghat, 26.09.2011, AK 52913; Phashkhawa, 27.09.2012, AK 56189.

3.3. var. *scabrella* (Wedd.) D. G. Long, Notes Roy. Bot. Gard. Edinburgh 40: 129. 1982. *Boehmeria platyphylla* var. *scabrella* (Roxb.) Wedd. in DC., Prodr. 16 (1): 211. 1869; Hook. f., Fl. Brit. India 5: 578. 1878.

Flowering & Fruiting: September–November.

Distribution. India: Almost throughout India.

Specimen examined: Phashkhawa, 27.09.2012, AK 56181.

4. *Boehmeria penduliflora* Wedd. ex D. G. Long, Notes Roy. Bot. Gard. Edinburgh 40: 130. 1982. [Plate 225a-b; Fig. 106a]

Shrub, 1–1.5 m high, hispid. Leaves lanceolate, 9–25 × 2–4 cm, cuneate, crenate-dentate, acuminate, coriaceous, wrinkled, hispid below; stipules lanceolate, 1.5–2 × c. 1 cm, acute. Inflorescence glomerules on axillary or terminal, 30–40 cm, pendulous spike-like specialized shoots, male part basal, 5–12 cm, female part apical, 15–35 cm. Male: flowers numerous in dense globose heads, c. 1 mm across, sessile; floral bracts ovate, c. 1.5 × 1 mm, ciliate, acuminate, mid nerve prominent,



Fig. 106. *Boehmeria penduliflora*: a. Flowering branchlet (AK 58540); *Laportea bulbifera*: a. Fruiting branchlet (AK 59753).

hispid; perianth cupular; lobes 4, ovate, c. 1 × 0.8 mm, acuminate, hispid; stamens 4; filaments 0.6–0.8 mm; anthers oblong-ovate; pistillode clavate. Female: flowers numerous in ellipsoid heads, c. 1.3 mm, sessile; perianth compressed-oblongate below, 3-toothed above, hispid; tube 1–1.5 mm; ovary included; style 1.5–1.8 mm, pubescent, exerted, curved above; stigma simple, hairy, persistent. Achenes oblong-ovoid, c. 0.5 mm, stipitate, enclosed by persistent dry perianth.

Flowering & Fruiting: April–October.

Distribution. India: Almost throughout India.

Specimens examined: Gadadhar range, 05.03.2011, GK 56016; Sankosh, 17.02.2012, AK 55652; Phashkhawa river belt, 30.09.2012, AK 58540.

2. *Dendrocnide* Miq.

Dendrocnide sinuata (Blume) Chew, Gard. Bull. Singapore 21: 206. 1965. *Urtica sinuata* Blume, Bijdr. Fl. Ned. Ind. 12: 605. 1826. *Laportea crenulata* Gaudich., Voy. Uranie, Bot.: 498. 1830; Hook. f., Fl. Brit. India 5: 550. 1888.

Monoecious shrub, 2–3 m high, succulent, sap transparent watery, puberulous. Leaves ovate to ovate-elliptic, 15–25 × 7.3–14 cm, cuneate, entire, acute, chartaceous, scabrous above, scattered hispid below. Inflorescence axillary panicle, 5–10 cm in male, 10–15 cm in female, stinging hairy. Flowers sessile or subsessile in male, pedicellate in female, Male: perianth creamy white, cupular; lobes 4, ovate, c. 1.5 × 2 mm, acute; stamens 4; filaments included; anthers obovate; pistillode ovoid. Female: perianth same as in male flowers; ovary ovoid, c. 3 × 2 mm, stinging hairy; style c. 1 mm; stigma ligulate, 1.5–2 mm. Achenes white, obliquely ovate, with transparent sap.

Flowering & Fruiting: February–September.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Jainti 6–8, 14.02.2010, SKS & GK 47093; Bhutanghat, 25.02.2012, AK 55939; Rangamati to Bharnabari, 06.10.2012, AK 58707.

3. *Elatostema* J. R. Forst. & G. Forst.

Key to the species

- 1a. Prostrate herbs, rooting from nodes; leaves acute to obtuse; 5–6-veined from base; perianth 5-lobed in all flowers; stamens 5 2. *E. psavum*
- 1b. Undershrubs, not rooting from nodes; leaves acuminate to caudate-acuminate; 3-veined from base; perianth 4-lobed in male and 3-lobed in female flowers; stamens 4 2

- 2a. Branchlets hispid; leaves 1–6.7 cm, obliquely cuneate at base, scabrous below, coriaceous; flowers in sessile receptacle; receptacle not papilionaceous in female flowers **1. *E. lineolatum***
- 2b. Branchlets glabrous; leaves 8.5–16 cm, broader half auriculate and narrower half cuneate at base, glabrous, chartaceous; flowers in stalked receptacle; receptacle nearly papilionaceous in female flowers **3. *E. platyphyllum***

1. *Elatostema lineolatum* Wight, Icon. Pl. Ind. Orient. 6: t. 1984. 1853; Hook. f., Fl. Brit. India 5: 565. 1888. [Plate 225c]

Undershrub, 60–80 cm high, lineolate, hispid. Leaves asymmetrically elliptic or lanceolate, 1.1–6.7 × 0.6–1.4 cm, obliquely cuneate, distinctly serrate, acuminate, coriaceous, lineolate, scabrous below. Inflorescence axillary, sessile heads. Male: perianth creamy white, cupular; lobes 4, subequal, obovate or ovate, c. 1 mm across, obtuse; stamens 4; filaments flattened, connate to calyx, short; anthers obovate or clavate, c. 1 mm; pistillode minute. Female: perianth 3-lobed, very small; ovary ellipsoid, minute; style absent; stigma penicillate; staminodes 3–5, linear. Achenes ellipsoid, c. 0.5 mm, 7 or 8-ribbed.

Flowering & Fruiting: February–June.

Distribution. India: Andhra Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, Uttarakhand, Tamil Nadu and West Bengal.

Specimens examined: Tobgaon, KB 2056; way to Tobgaon, JKS 4638; Jainti 7, 05.03.2011, GK 47263; Bhutri, 13.02.2013, AK 58887; Buxa Fort to Tashigaon, 01.10.2013, AK 59730.

2. *Elatostema parvum* (Blume) Blume ex Miq. in Zoll., Syst. Verz. 2: 102. 1854. *Procris parva* Blume, Bijdr. Fl. Ned. Ind. 10: 512. 1826. *Elatostema reptans* Hook. f., Fl. Brit. India 5: 567. 1888; Prain, Bengal Pl. 2: 963. 1903. [Plate 226a]

Prostrate herb, 10–20 cm long, pubescent. Leaves sessile or subsessile, obliquely ovate, 1–3 × 0.4–1.5 cm, obliquely cordate at base, sharply serrate, acute to obtuse, chartaceous, lineolate; stipules linear to lanceolate, 2–3 × 0.5–0.6 mm, cystoliths present. Inflorescence solitary or in clusters, sessile heads. Male: floral bracts connate, c. 5 mm; bracteoles ovate, lanceolate or linear; perianth cupular; lobes 5, obovate, c. 1 mm across, obtuse, hyaline; stamens 5, at base of perianth; filaments flattened, c. 1.2 mm; anthers oblong, c. 1 mm; pistillode present. Female: floral bracts lanceolate or subulate; perianth same as in male flowers; ovary ellipsoid, minute; style absent; stigma penicillate. Achenes ovoid, compressed, ribbed.

Flowering & Fruiting: July–October.

Distribution. India: Meghalaya, Sikkim, Uttarakhand and West Bengal.

Specimens examined: SRVK 5, 04.10.2009, SKS & GK 46104; Checko-1, 25.09.2012, AK 56132; Hatipota, 29.09.2012, AK 58529; Bhutri, 05.10.2012, AK 58652.

3. *Elatostema platyphyllum* Wedd., Arch. Mus. Hist. Nat. 9: 301. 1856; Hook. f., Fl. Brit. India 5: 566. 1888. [Plate 226b-c]

Undershrubs, 80–100 cm high. Leaves sessile to petiolate, obliquely elliptic, 8.5–16 × 3.5–8.5 cm, broader half auriculate and narrower half cuneate at base, serrate, acuminate to caudate-acuminate, lineolate, chartaceous; stipules lanceolate, 1.5–2 × 0.2–0.8 cm, acute, caducous. Male inflorescence pedunculate, solitary or in pairs; inflorescence bracts ovate, c. 1.5 × 0.5 mm, connate, subacute, lineolate. Flowers inserted in receptacle, sessile; floral bracts spatulate-oblong, minute; receptacle nearly papilionaceous, 0.5–0.8 × 5–6 mm, lineolate; perianth cupular, minute, 4-lobed; stamens 4; filaments c. 0.5 mm; anthers minute. Female inflorescences pedunculate, solitary, nearly oblong, 6–7 mm; flowers inserted in receptacle, sessile; receptacle nearly papilionaceous, 6–7 × 2–5 mm, lineolate, puberulent; floral bracts spatulate, puberulent; perianth 3-merous, minute; ovary ellipsoid, minute; style absent; stigma penicillate. Achenes ellipsoid, ribbed.

Flowering & Fruiting: February–May.

Distribution. India: Assam, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Way to Tobgaon, JKS 4644; Bhutri, 13.02.2013, AK 58886.

4. *Girardinia* Gaudich.-Beaup.

***Girardinia diversifolia* (Link) Friis**, Kew Bull. 36: 145. 1981. *Urtica diversifolia* Link, Enum. Hort. Berol. Ait. 2: 385. 1822. *Girardinia heterophylla* Decne. in Jacquem., Voy. Inde 4 (Bot.): 151, t. 153. 1844, *nom. illeg.*; Hook. f., Fl. Brit. India 5: 550. 1888. [Plate 226d, 227a]

Herb or undershrub, dioecious or monoecious, 1–1.5 m high, armed with stinging hairs, appressed pubescent. Leaves suborbicular, 3–5-lobed, 3–16 × 3–20 cm, subtruncate, chartaceous; lobes ovate or pendurate, 2–13 cm, regularly serrate-dentate, acuminate, punctiform, pubescent, stinging hairy; stipules oblong-obovate, c. 12 × 6 mm, apiculate, sparsely hairy. Inflorescence axillary, subpaniculate, spicate, cymose-racemose in males, female not paniculate, strigose and spreading hirsute. Male: flowers subsessile or pedicellate; perianth cupular; lobes 4, ovate, c. 1 mm, concave, acute; stamens 4; filaments c. 1.5 mm; anthers elliptic; pistillode cupular. Female: flowers surrounded by stinging hairs; perianth lobes unequal, the larger lobe boat-shaped, the smaller lobe linear, 0.2–0.4 mm, 3-toothed, sparsely strigillose; ovary suborbicular, compressed; style minute, 2-partite above; stigma inconspicuous. Achenes dark brownish to grey brown, obovoid, biconvex, slightly compressed, verrucose.

Flowering & Fruiting: September–February.

Distribution. India: Throughout tropical and temperate hills.

Specimens examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59723; Tashigaon to Rovers point, 03.10.2013, AK 59754; Tashigaon to Rovers point, 12.02.2014, AK 59922.

5. *Laportea* Gaudich.

Laportea bulbifera (Siebold & Zucc.) Wedd., Arch. Mus. Hist. Nat. 9: 139. 1856. *Urtica bulbifera* Siebold & Zucc., Abh. Boyer, Acad. Wiss., Math.-Naturwiss. Abt. 4 (3): 214. 1846. *Laportea terminalis* Wight, Icon. Pl. Ind. Orient 6: 9 t. 1972. 1853; Hook. f., Fl. Brit. India 5: 549. 1888. [Plate 227b-c; Fig. 106b]

Erect herb, 50–150 cm high, with 1–3 woody bulbils, pubescent and stinging hairy, glabrescent later. Leaves lanceolate to ovate, 8–15 × 4.5–8.5 cm, cuneate to rounded, serrate-dentate, acuminate, punctiform above, chartaceous, sparsely hispid; stipules oblong-lanceolate, 5–10 mm, bifid, early caducous. Male inflorescence in proximal axils, paniculate, 3–10 cm, white pubescent; female inflorescence terminal or in subterminal axils, 10–20 cm. Male: flowers pedicellate or sessile; floral bracts subulate, ciliate; perianth cupular; lobes 5, ovate, acute; stamens 5; filaments c. 1 mm; anthers rounded; pistillode obpyramidal. Female: pedicels laterally winged; perianth cupular; lobes 4, unequal; dorsal lobe concave; lateral lobes 2, larger, oblong-ovate, enclosing the ovary; ventral lobe smallest, triangular-ovate; ovary stipitate, asymmetric; style 2–4 mm, reflexed; stigma inconspicuous. Achenes purplish spotted, obovoid or semiorbicular, beaked, compressed, striated.

Flowering & Fruiting: June–November.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Madhya Pradesh, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

Specimen examined: Tashigaon to Rovers point, 02.10.2013, AK 59753.

6. *Oreocnide* Miq.

Oreocnide rubescens (Blume) Miq., Syst. Verz.: 101. 1854. *Urtica rubescens* Blume, Bijdr. Fl. Ned. Ind. 10: 506. 1825. *Villebrunea integrifolia* Gaudich. var. *syriatica* (Blume) Hook. f., Fl. Brit. India 5: 590. 1888. [Plate 227d, 228a-b]

Shrub to tree, 2–5 m high, pubescent. Leaves elliptic-obovate, 9–23 × 3.7–9.2 cm, sub-rounded, crenate-serrate, caudate-acuminate, sub-coriaceous, punctate, hirsute; stipules lanceolate, scarious, caducous. Male: perianth cupular; tube short; lobes 4, oblong, pubescent; stamens 4; filaments flat, short; anthers sub-orbicular; pistillode obovate-clavate. Female: perianth narrowed at mouth, hairy; ovary pubescent. Achenes black, conical, bluntly 4-angled, pubescent.

Flowering & Fruiting: October–February.

Distribution. India: Tamil Nadu and West Bengal.

Specimens examined: Jainti, 09.10.2009, SKS & GK 46274; Gadadhar Range, 30.03.2012, GK 50663; Gadadhar Range, 05.03.2011, GK 47274; Hauda nala, 19.02.2013, AK 59842, 59843.

7. *Pilea* Lindl.

Key to the species

- 1a. Stems rooting from nodes; leaves of each pair strongly dissimilar in size 1. *P. anisophylla*
1b. Stems not rooting from nodes; leaves of each pair equal or subequal 2
2a. Herbs or subshrubs, rarely climbing, stems 30–50 cm, occasionally smaller 4. *P. symmeria*
2b. Weak herbs, stems usually less than 15 cm, rarely up to 20 cm 3
3a. Leaves not crowded above, obovate to sub-orbicular or spatulate, 0.5–1.5 mm, cuneate to attenuate at base, entire at margins, obtuse, succulent; veins obscure; petioles 0.3–1 mm; perianth lobes horned in male flowers; flowers sessile and perianth lobes 3, sub-equal in female flowers 2. *P. microphylla*
3b. Leaves crowded on upper 2 or 3 nodes, orbicular or orbicular-ovate, 0.2–1.2 cm, cuneate or rounded at base, weakly sinuate-crenate at margins in upper half, entire in lower half, obtuse or sub-acute, chartaceous; veins distinct; petioles 1–1.5 cm; perianth lobes not horned in male flowers; flowers sub-sessile and perianth lobes 2, unequal in female flowers 3. *P. peploides*

1. *Pilea anisophylla* (Hook. f.) Wedd., Arch. Mus. Hist. Nat.: 193. 1856; Hook. f., Fl. Brit. India 5: 552. 1888. *Pilea anisophylla* var. *robusta* Hook. f., Fl. Brit. India 5: 552. 1888. [Plate 228c-d, 229a]

Decumbent herb, 5–8 cm high, succulent. Leaves dissimilar; larger ones lanceolate, 1.5–3.8 × 1–1.6 cm; smaller ones triangular-ovate to elliptic-ovate or sub-orbicular, 5–9 × 3–6 mm; stipules triangular-ovate, intra-petiolar, clasping the stem. Male: perianth cupular; tube short; lobes 4, ovate; stamens 4; filaments short; pistillode conical. Female: perianth cupular; tube short; lobes triangular-ovate, membranous; staminodes linear; ovary ovoid. Achenes pale brown, ovoid to ellipsoid, slightly oblique, c. 1 × 0.5 mm, slightly compressed, smooth, enclosed by perianth.

Flowering & Fruiting: August–February

Distribution. India: Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Rydak river belt, 26.02.2012, AK 55955.

Notes: This species usually has luxurious growth but in present collection, it is reduced and differs in smaller leaf petioles.

2. *Pilea microphylla* (L.) Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd. ser. 5, 2: 296, 302. 1851; Prain, Bengal Pl. 2: 962. 1903. *Parietaria microphylla* L., Syst. Nat., ed. 10. 2: 1308. 1759. *Pilea muscosa* Lindl., Coll. Bot.: t. 4. 1821; Hook. f., Fl. Brit. India 5: 551. 1888. [Plate 229b]

Erect or decumbent herbs, 4–5 cm high, succulent. Leaves obovate to suborbicular or spatulate, slightly unequal, 0.5–1.5 × 0.5–1 mm, cuncate to attenuate, entire at margins, obtuse, succulent, transversely arranged linear cystoliths below; stipules triangular-lanceolate, c. 0.5 mm, acute, membranous, persistent. Inflorescence axillary, short pedunculate, compact cymose capitata. Male: perianth cupular; lobes 4, ovate, horned above, lineolate; stamens 4; filaments minute; anthers small; pistillode conical. Female: flowers sessile; perianth cupular; lobes 3, subequal, oblong, one lobe larger than others, lineolate; ovary small; style absent; stigma penicillate. Achenes ovoid, compressed, smooth, enclosed by perianth.

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimen examined: Adma, Panbari, 12.02.2013, AK 58870.

3. *Pilea peploides* (Gaudich.) Hook. & Arn., Bot. Beechey Voy.: 96. 1832; Hook. f., Fl. Brit. India 5: 554. 1888. *Dubruellia peploides* Gaudich., Voy. Uranie.: 495. 1830. [Plate 229c-d]

Erect herb, 5–10 cm high, pink reddish, succulent. Leaves crowded on upper 2 or 3 nodes, orbicular or orbicular-ovate, 2–12 mm across, cuneate or rounded, weakly sinuate-crenate in upper half, entire in lower half, obtuse or subacute, chartaceous, lineolate; stipules ovate, deciduous. Inflorescence axillary, cymose-capitata. Male: perianth cupular; lobes 4, ovate, acute; stamens 4; filaments short; anthers minute; pistillode minute. Female: perianth 2-lobed; one lobe triangular-ovate, other boat-shaped, unequal, acute; staminodes oblong; ovary small; style absent; stigma penicillate. Achenes ovoid, compressed.

Flowering & Fruiting: April–August.

Distribution. India: Assam, Jammu & Kashmir, Himachal Pradesh, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Panbari 8–9, 31.03.2012, GK 56016; Checko-1, 10.02.2013, AK 58838.

4. *Pilea symmeria* Wedd., Arch. Mus. Hist. Nat. 9 (3): 246. 1856; Hook. f., Fl. Brit. India 5: 554. 1888.

Herb, 30–50 cm high, succulent. Leaves slightly asymmetric in shape, elliptic-lanceolate to oblong-lanceolate, 5.5–12.6 × 2.5–5.8 cm, cuneate or rounded, serrate, acuminate, chartaceous, lineolate above, punctate beneath; stipules lanceolate or ovate, c. 2 × 1 mm, acute, chartaceous, punctate, persistent. Inflorescence in axillary, cymose-panicles. Male: perianth 4-lobed, lobes connate up to half of length, ribbed; stamens 4. Female: perianth 4-lobed, lobes free above, connate below; lobes triangular ovate, c. 1 × 1 mm, acute, hyaline, unequal; staminode present. Achenes ovate, compressed, smooth; seed solitary, ovate, smooth, glabrous.

Flowering & Fruiting: March–August.

Distribution. India: Himachal Pradesh, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Panbari 8, 01.12.2011, GK 47189.

8. *Poikilospermum* Zipp. ex Miq.

Poikilospermum lanceolatum (Trecul.) Merr., *Contr. Arnold Arbor.* 8: 50. 1934. *Conocephalus lanceolatum* Trecul., *Ann. Sci. Nat., Bot., Ser. 3*, 8: 88. 1847. *Conocephalus suaveolens* sensu Hook. f., *Fl. Brit. India* 5: 545. 1888, $\mu\mu$, non Blume 1825. [Plate 230a-b; Fig. 107a-f]

Large climbing shrub, 10–15 m long. Leaves ovate or ovate-elliptic, 14–22 × 9.5–10 cm, rounded, repand, acute, coriaceous, setose below. Inflorescence dichotomously branched cymes ending in globose heads; inflorescence bracts triangular-ovate, *c.* 1.5 × 1 mm, acute, scaly. Male: flowers sessile; floral bracts oblong-obovate, *c.* 2.5 × 1.2 mm, acute or obtuse; perianth pinkish green, shallowly 4-lobed, tubular below; lobes triangular, *c.* 0.5 mm across, acute; stamens 3 or 4; filaments short, erect; pistillode small. Female: floral bracts same as in male flowers; perianth 4-lobed above, tubular below; tube ovoid, *c.* 3 mm; lobes triangular, *c.* 0.5 across, acute, each lobe with 2 lobules; ovary oblong-ovoid, *c.* 1 × 0.6 mm, with mucilaginous sap; style *c.* 0.5 mm; stigma recurved, hairy. Achenes ovoid, exserted from perianth.

Flowering & Fruiting: January–April.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim and West Bengal.

Specimens examined: Rajabhatkhowa Depot. Road, 14.05.1949, VN & party 2429; SRVK 5, 14.02.2010, SKS & GK 47088; SRVK 4, 29.03.2012, GK 50619; Checko-1, 10.02.2013, AK 58827.

9. *Pouzolzia* Gaudich.

Key to the species

- | | |
|--|-------------------------|
| 1a. Leaves alternate | 2 |
| 1b. Leaves opposite | 3 |
| 2a. Branchlets woody throughout; leaves silvery white tomentose below; achenes grey brown | 1. <i>P. calophylla</i> |
| 2b. Branchlets woody at base, fistular above; leaves strigose below; achenes white | 3. <i>P. sanguinea</i> |
| 3a. Stems quadrangular, white pubescent; leaves lanceolate to oblong-lanceolate, hispid above; male flowers 5-merous | 2. <i>P. hirta</i> |
| 3b. Stems terete, not white pubescent; leaves ovate or ovate, glabrous above; male flowers 4-merous | 4. <i>P. zeylanica</i> |



Fig. 107. *Poikilospermum lanceolatum*: a. Flowering branchlet; b. Portion of female inflorescence; c. Male flower; d. Female flower; e. Achene enclosed by perianth; f. Seed (GK 50619); *Pouzolzia hirta*: g. Flowering branchlet (AK 59750).

1. *Pouzolzia calophylla* W. T. Wang & C. J. Chen, Acta Phytotax. Sin. 17 (1): 108. 1979.

Shrub, 1–2 m high, strigose to pubescent. Leaves lanceolate to ovate, 1.2–6 × 0.7–1.8 cm, cuneate to obtuse or subcircular, serrate, acute to short acuminate, subcoriaceous, brown punctate above, silvery white tomentose below; stipules brown, ovate to lanceolate, 1.5–2 × 1–1.5 mm, ciliate, bifid in leafy part, free later, become 2, persistent to caducous due to growth of inflorescence, keeled and strigose on back. Inflorescence axillary, compact heads; inflorescence bracts ovate or triangular-ovate, c. 1 × 0.6–1 mm, ciliate, acute, scarious, sparsely pubescent at keeled on back. Male: perianth cupular; tube 0.5–1 mm, strigose; lobes 4, acute to acuminate, strigose; stamens 4; filaments flat, c. 2 mm; anthers subglobose, basifixed. Female: perianth cupular; tube fusiform or obovoid, c. 1 × 0.8 mm, 3-fid, faintly ribbed, pubescent; lobes minute; ovary included; style short; stigma filiform, villous one sided, deciduous with style. Achenes grey brown, ovoid or subellipsoid, slightly compressed, lustrous.

Flowering & Fruiting: August–March.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Hatijhora, way to Mahakal cave, 01.10.2012, AK 58562, 58573; Bhutri, 13.02.2013, AK 58890.

2. *Pouzolzia hirta* (Blume) Hassk., Cat. Hort. Bot. Bogor.: 80. 1844. *Urtica hirta* Blume, Bijdr. Fl. Ned. Ind. 10: 495. 1826; Hook. f., Fl. Brit. India 5: 586. 1888.

[Plate 230c; Fig. 107g]

Prostrate or suberect herb, 60–120 cm high, white pubescent. Leaves lanceolate to oblong-lanceolate, 6–10 × 0.8–2.3 cm, subcordate or rounded, repand and hairy, acuminate, chartaceous, hispid with punctiform above, sparsely hispid mainly on veins below; stipules ovate, 5–6 mm, acuminate, caducous. Inflorescence axillary, 1–1.2 cm across, globose clusters. Flowers often bisexual or sometimes unisexual. Male: perianth 5-lobed; lobes lanceolate, 2–2.5 × c. 1 mm, connate at base, acute, 1-nerved; stamens 5; filaments c. 1.5 mm; anthers subglobose. Female: flowers sessile; perianth tube ovoid, 1.6–2.2 mm, longitudinally 10 keeled, 2-toothed and bristly, transparent; ovary included; style short; stigma filiform, villous one sided, deciduous with style. Achenes black, ovoid, enclosed in perianth tube.

Flowering & Fruiting: July–October.

Distribution. India: Andhra Pradesh, Bihar, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, North East Region, Odisha, Punjab, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Tashigaon to Rovers point, 02.10.2013, AK 59750.

3. *Pouzolzia sanguinea* (Blume) Merr., Contr. Arnold Arbor. 8: 52. 1934. *Urtica sanguinea* Blume, Bijdr. Fl. Ned. Ind. 10: 501. 1826. *Pouzolzia viminea* Wedd. in A. DC., Prodr. 16 (1): 228. 1869. [Plate 230d]

Shrub, 1–3.5 m high, strigose. Leaves lanceolate to ovate-lanceolate, ovate, 5–12 × 1–5 cm, cuneate, dentate-serrate, acuminate, chartaceous, appressed pubescent and punctiform above, strigose below; stipules lanceolate, c. 3 mm, ciliate, acute, caducous. Inflorescence axillary, 4–7 mm across, globose clusters. Flowers often unisexual, sometimes bisexual. Male: perianth cupular; lobes 4, ovate, c. 1.5 mm, acuminate, strigose; stamens 4; filaments c. 2 mm; anthers subglobose, connective with one gland. Female: flowers sessile; perianth tube ellipsoid, 0.8–1.2 × 0.3–0.5 mm, beaked and toothed, strigose; ovary ovoid; style 2–3 mm, exerted, hispid; stigma inconspicuous. Achenes white, ovoid, enclosed in perianth tube.

Flowering & Fruiting: July–October.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59711.

4. *Pouzolzia zeylanica* (L.) Bcn., Pl. Jav. Rar.: 67. 1838. *Parietaria zeylanica* L., Sp. Pl. 2: 1052. 1753. *Pouzolzia indica* (L.) Gaudich., Voy. Uranie, Bot.: 503. 1830, *nom. inval.*; Hook. f., Fl. Brit. India 5: 581. 1888; Prain, Bengal Pl. 2: 965. 1903. *Pouzolzia indica* var. *alienata* Wedd., Arch. Mus. Hist. Nat. 9 (3): 399. 1856; Hook. f., Fl. Brit. India 5: 581. 1888; Prain, Bengal Pl. 2: 965. 1903.

Erect herb, 30–50 cm high, appressed hairy when young, glabrescent later. Leaves ovate or ovate, 1–3.1 × 0.4–1.3 cm, subcordate or rounded, undulate and hairy, acute or acuminate, subcoriaceous, punctiform above; stipules ovate, c. 4 × 2.2 mm, acute, chartaceous. Inflorescence 4–6-flowered, axillary fascicles; inflorescence bracts ovate, c. 1 × 2 mm, ciliate, acuminate, hyaline. Male: perianth cupular; tube c. 1.2 mm; lobes 4, obovate, c. 1.2 × 0.5 mm, obtuse, slightly hooded, hairy; stamens 4; filaments c. 1.2 mm, hyaline, adnate to perianth lobes; anthers ovoid-orbicular, c. 1 mm across; pistillode clavate. Female: flowers sessile; perianth same as in male flowers; ovary ovoid, c. 1.2 × 1 mm; style absent; stigma filiform, c. 1.2 mm, deciduous, hairy. Achenes black or brown, ovoid, lustrous hairy.

Flowering & Fruiting: April–November.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52631, 52632; Jainti range, 01.12.2011, GK 47193; Newlands, 15.02.2012, AK 53100; Panbari 8, 10.04.2012, GK 56090.

10. *Urtica* L.

Urtica parviflora Roxb., Fl. Ind. 3: 581. 1832; Hook. f., Fl. Brit. India 5: 548. 1888.

Shrub, 1–1.5 m high, scattered stinging hairy. Leaves ovate, 5–11 × 2.2–5 cm,

subcordate or rounded or truncate, serrate-dentate, acuminate, punctiform, chartaceous; stipules ovate-lanceolate, *c.* 8 × 3 mm. Inflorescence in short, lax panicles, pubescent. Male: flowers sessile to subsessile; perianth cupular; lobes 4, suborbicular, *c.* 2 × 1 mm, connate at base; stamens 4; filaments short; anthers subglobose. Female: floral bracts lanceolate, *c.* 3 × 1 mm, hairy; perianth cupular; lobes 4, ovate or suborbicular, *c.* 2 × 1 mm, connate at base, pubescent; ovary ovoid or ellipsoid, *c.* 1.2 × 1 mm; style absent; stigma penicillate. Achenes ovoid or ellipsoid, punctate.

Flowering & Fruiting: May–September.

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand, Tamil Nadu and West Bengal.

Specimens examined: Buxaduar, KB 1921; Jainty Range, 08.10.2009, SKS & GK 46204; Santrabari to Buxa Fort, 28.09.2013, AK 59617.

Ulmaceae

Trema Lour.

Key to the species

- 1a. Leaves obliquely cordate at base; floral bracts acute and glabrous in males; perianth lobes similar in male and female flowers; ovary white hairy at base; style glabrous; seed ovoid 1. *T. orientalis*
- 1b. Leaves unequally rounded at base; floral bracts acuminate and pilose in males; perianth lobes dissimilar in male and female flowers; ovary glabrous; style hairy; seed orbicular 2. *T. politoria*

1. *Trema orientalis* (L.) Blume, Mus. Bot. 2: 62. 1856; Hook. f., Fl. Brit. India 5: 484. 1888; Prain, Bengal Pl. 2: 960. 1903. *Celtis orientalis* L., Sp. Pl. 2: 1044. 1753.

Small tree, 2–5 m high, puberulent. Leaves ovate or ovate-oblong, 2.5–14 × 1–6 cm, obliquely cordate, finely serrate, caudate-acuminate, subcoriaceous, hispid, rough with minute whitish papillae above, white tomentose below. Inflorescence axillary cymes. Flowers unisexual or polygamous. Male: floral bracts triangular-ovate, 1–1.2 × 0.5–0.7 mm, ciliate, acute; perianth lobes greenish white, 5, elliptic, *c.* 1.5 × 0.6 mm, boat-shaped, villous, pubescent; stamens 5; filaments *c.* 1.2 mm; anthers ovate; pistillodes obovate, *c.* 1.3 × 0.7 mm, compressed, white sericeous at base. Female: perianth lobes as in male flowers; staminodes absent; ovary linear-oblong, *c.* 1.3 mm, white hairy at base; style bifid; stigma minute, villous and reflexed in fruits. Drupes dark green, turned black when mature, globose to ovoid-globose, 3–5 × 2.5–3.5 mm, compressed; seed solitary, ovoid, compressed, bony.

Flowering & Fruiting: April–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra,

Mizoram, Odisha, Punjab, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Panbari 8, 08.04.2012, GK 56072; Rydak river belt, 20.09.2011, AK 52672.

2. *Trema politoria* (Planch.) Blume, Mus. Bot. 2 (1–8): 58. 1856; Hook. f., Fl. Brit. Ind. 5: 484. 1888. *Sponia politoria* Planch., Ann. Sci. Nat., Bot. sér. 3, 10: 326. 1848.

Small dioecious tree, 5–8 m high, pilose to puberulent. Leaves oblong-lanceolate to lanceolate, 6.5–10.5 × 1.7–2.7 cm, unequally rounded, serrate, acuminate, scabrid, white papillate. Inflorescence axillary cymes. Flowers unisexual. Male: floral bracts ovate, c. 1 mm across, ciliate, acuminate, sparsely pilose; perianth lobes greenish white, 5, linear-lanceolate, c. 1 × 0.4 mm, concave, ciliate, pubescent; stamens 5; filaments c. 1 mm; anthers elliptic-oblong; pistillode oblong or columnar. Female: floral bracts same as in male flowers; perianth lobes greenish white, 5, lanceolate to ovate, 0.8–1 × 0.3–0.5 mm, ciliate, pubescent and white papillae; staminodes absent; ovary ovoid, c. 1 × 0.4 mm, compressed; style bifid, hairy; stigma minute. Drupes dark green, turned black when mature, ovoid, c. 2.5 × 2 mm, compressed, style and perianth lobes persistent; seed pale yellow, solitary, orbicular, laterally compressed, weakly ribbed, bony.

Flowering & Fruiting: April–October.

Distribution. India: Bihar, Madhya Pradesh, Maharashtra, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Bhutanghat, Mainabari, 26.09.2011, AK 52895.

Cannabaceae

Cannabis L.

***Cannabis sativa* L.**, Sp. Pl. 2: 1027. 1753; Hook. f., Fl. Brit. India 5: 487. 1888; Prain, Bengal Pl. 2: 960. 1903.

Dioecious herb, 1–2 m high, pubescent. Leaves palmately 3–8-foliolate; stipules linear, pubescent; leaflets unequal, lanceolate, 1–5.5 × 0.2–1 cm, attenuate, serrate, acuminate, lineolate above, strigose with brownish yellow resinous dots below. Inflorescence axillary, terminal, lax panicles in males and axillary racemes in females. Male: floral bracts lanceolate to linear-lanceolate, pubescent; perianth lobes yellowish, elliptic to elliptic-oblong, connate at base, mid nerve prominent, pilose; filaments short; anthers oblong, connective extended in micro. Female: floral bracts ovate to linear-lanceolate, pubescent; bracteoles ovate, acuminate, 3–5-nerved, pubescent; perianth lobes green, inconspicuous, sparsely pubescent; ovary ovoid to ellipsoid; style bifid, papillose; stigmas indistinct. Achenes ellipsoid or ovoid, slightly compressed, enclosed in persistent bracteoles, reticulately nerved, crustaceous; seeds many, flat.

Flowering & Fruiting: February–May.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Punjab, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Kumargram, 18.02.2012, AK 55714.

Moraceae

Key to the genera

- | | | |
|-----|---|------------------------|
| 1a. | Monoecious plants; flowers in a globose or ellipsoid hypanthodium (figs) | 3. Ficus |
| 1b. | Dioecious plants; flowers not in a globose or ellipsoid hypanthodium | 2 |
| 2a. | Trees; flowers partially sunk into surface of globose or oblong receptacles; stamen solitary | L. Artocarpus |
| 2b. | Scandent shrubs or trees; flowers in catkins, racemes, globose heads or rarely solitary; stamens 4 | 3 |
| 3a. | Scandent shrubs; female inflorescences capitate heads | 4 |
| 3b. | Small trees; female inflorescences cylindrical catkin or solitary or few flowered short racemes | 5 |
| 4a. | Plants unarmed; leaves truncate at base, serrate at margins, caudate-acuminate at apex, deciduous when flowering; male inflorescences pendulous, cylindrical spikes; inflorescence bracts and inter-floral bracteoles absent; style c. 5 mm, pubescent; fruiting heads blackish purple | 2. Broussonetia |
| 4b. | Plants armed; leaves cuneate at base, entire and hairy at margins, short acuminate to rounded with mucronate tip, leafy in flower; male inflorescences erect, capitate heads; inflorescence bracts and inter-floral bracteoles present; style 1.5–2.5 mm, glabrous; fruiting heads orange yellow | 4. Maclura |
| 5a. | Branchlets glabrous; leaves ovate or ovate-lanceolate, subcordate to cordate at base, serrate at margins, caudate-acuminate, pubescent, scabrous or glabrous; veins 3–5 from base; female inflorescences cylindrical catkins; style bifid from middle, hairy; fruits with succulent perianth, blackish purple | 5. Morus |
| 5b. | Branchlets pubescent, turning glabrous; leaves elliptic-obovate, cuneate at base, sinuately or weakly serrate at margins, acute, scabrid; veins pinnate; female inflorescences solitary or few flowered short racemes; style bifid from base, glabrous; fruits drupes, yellow | 6. Streblus |

1. **Artocarpus** J. R. Forst. & G. Forst., *nom. cons.*

Artocarpus heterophyllus Lam., *Encycl.* 3: 210. 1789. *Artocarpus integrifolia* sensu King in Hook. f., *Fl. Brit. India* 5: 541. 1888, non. L. f. 1781. [Plate 231a]

Evergreen tree, 10–15 m high. Leaves spirally arranged, obovate-oblong or elliptic-oblong, 5.5–11 × 4–6.6 cm, attenuate, entire, obtuse, leathery, lenticellate;

stipules clasping, ovate, 1.5–8 cm, caducous, leaving a scar on branches. Male: inflorescences axillary on apical branchlets, cylindrical to conical-ellipsoid, 2–3 × 1.3 cm; perianth tubular, 2-lobed, 1–1.5 mm, pubescent; stamen 1; filament short; anthers c. 2 × 2 mm. Female: inflorescences with globose fleshy rachis; perianth tubular, apically 2-lobed; ovary 1-celled; style central or ± lateral; stigmas 1 or 2, equal or unequal. Fruiting syncarp pale yellow when young, yellowish brown when mature, ellipsoid, with stiff hexagonal tubercles and thick hairs. Drupes elliptic.

Flowering & Fruiting: December–May.

Distribution. India: Almost throughout India (cultivated).

Specimen examined: Panbari 10, 09.10.2009, SKS & GK 46265.

Notes: Ripe fruits and cooked seeds are edible.

2. *Broussonetia* L'Her. ex Vent.

Broussonetia kurzii (Hook. f.) Corner, Gard. Bull. Singapore 19: 234. 1962.
Allaeanthus kurzii Hook. f., Fl. Brit. Ind. 5: 490. 1888. [Plate 231b-d; Fig. 108]

Large scandent dioecious shrub, 3–5 m high, with drooping branches. Leaves oblong-ovate, 8–11 × 3–4.8 cm, truncate, serrate, caudate-acuminate, chartaceous, smooth or papillate; stipules obliquely triangular or lanceolate, 4–5 × 2.5–3 mm. Inflorescences pendulous, cylindrical spikes in male and capitate heads in female, pubescent. Male: floral bracts orbicular; perianth 4, triangular-ovate, c. 1.3 × 1 mm, acute, pubescent; stamens 4; filaments 2–2.5 mm; anthers ovoid; pistillode minute. Female: floral bracts ovate, 2–3 × 1–1.5 mm, ciliate, acute, pubescent; perianth tubular, 4-lobed; ovary sessile, minute; style c. 5 mm, exserted, pubescent; stigma indistinct. Fruiting heads blackish purple, globose, 8–10 mm across, floral bracts and perianth persistent. Achenes sessile, compressed, smooth.

Flowering & Fruiting: February–March.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimens examined: NRVK 11–12, 12.03.2011, GK 50548; Bhutri, 13.02.2013, AK 58893; Jainti 6–7, 31.03.2012, GK 50686; Rangamati, 14.02.2013, AK 58895; Rangamati, 14.02.2013, AK 58898.

2. *Ficus* L.

Key to the species

- | | |
|--|-------------------------|
| 1a. Scandent shrubs | 2 |
| 1b. Erect shrubs, procumbent undershrubs, or trees | 3 |
| 2a. Leaves ovate or ovate-elliptic, acute at apex, pale green, reddish pale when dry, papillate cystoliths present | 10. <i>F. hederacea</i> |



Fig. 108. *Broussonetia kurzii*: a. Branchlet with male inflorescences; b. Branchlet with female inflorescences (AK 58898, AK 58895).

The Flora of Buxa Tiger Reserve, West Bengal, India

- 2b. Leaves elliptic to obovate, caudate at apex, green, glabrous 12. *F. heteropleura*
- 3a. Leaves opposite 4
- 3b. Leaves alternate 5
- 4a. Branchlets glabrous; figs 3-5 in fascicles, globose, c. 1.5 cm across, green, reddish orange when mature, glabrous 7. *F. fistulosa*
- 4b. Branchlets hispid; figs solitary or paired, urn-shaped, 1.5-2 cm, greenish yellow when mature, hirsute 13. *F. hispida*
- 5a. Procumbent undershrubs; leaves dissimilar, lobed 11. *F. heterophylla*
- 5b. Erect shrubs or trees; leaves similar, not lobed 6
- 6a. Branchlets scaly; leaves distichous, semi-cordate at base (auriculate at upper margin, rounded at lower margin) 16. *F. semicordata*
- 6b. Branchlets and leaves not as above 7
- 7a. Leaves oblong-obovate; figs white, red spotted; perianth absent in female flowers 4. *F. curtipes*
- 7b. Leaves not oblong-obovate; figs not white, not red spotted; perianth present in female flowers 8
- 8a. Plants short stiff hairy; leaves asymmetric; female perianth 5-lobed 5. *F. cyrtophylla*
- 8b. Plants not stiff hairy; leaves symmetric; female perianth not 5-lobed 9
- 9a. Plants epiphytic when young; leaves greenish red; stipules dark red, oblong-lanceolate, 10-22 cm 6. *F. elastica*
- 9b. Plants not epiphytic when young; leaves green; stipules not dark red, not oblong-lanceolate, less than 10 cm 10
- 10a. Leaves ovate-elliptic, up to 10.5 cm, acuminate to caudate at apex, coriaceous, glabrous 3. *F. benjamina*
- 10b. Leaves variously shaped, more than 10.5 cm, acute/acuminate/caudate at apex, glabrous or hairy 11
- 11a. Leaves undulate at margins; figs red tubercled; involucre bracts sub-orbicular; male perianth tubular, split above 9. *F. geniculata*
- 11b. Leaves not undulate at margins; figs without red tubercles; involucre bracts not sub-orbicular; male perianth not tubular, not split above 12
- 12a. Leaves ovate or sub-orbicular, cordate or rounded at base, serrate-denticulate or dentate at margins; veins 3-5 from base 13
- 12b. Leaves not ovate or sub-orbicular, cuneate at base, entire at margins; veins pinnate or 3 from base 14
- 13a. Leaves dentate at margins, acute at apex, pubescent and white papillose below; veins 3-5 from base; figs reddish brown when ripe, pedunculate, with 8-12 conspicuous longitudinal ridges; male and female perianth 3-lobed 2. *F. auriculata*
- 13b. Leaves serrate-denticulate at margins, acuminate at apex, rusty hirsute below; veins 5 from base; figs yellowish brown, sessile; male and female perianth 4-lobed 8. *F. fulva*

- 14a. Leaves chartaceous, gland-dotted below; veins pinnate; figs tuberculate 14. *F. prostrata*
14b. Leaves coriaceous, not gland-dotted below; veins 3 from base; figs smooth 15
15a. Leaves acute at apex; figs sessile, paired, ellipsoid-ovoid on leafy branchlets; stamen 1
L. F. altissima
15b. Leaves acuminate at apex; figs pedunculate, aggregated, sub-globose on specialized
shoots on trunks; stamens 2 **15. F. racemosa**

L. Ficus altissima Blume, *Bijdr. Fl. Ned. Ind.* 9: 444. 1825; King in Hook. f., *Fl. Brit. India* 5: 504. 1888. **[Plate 232a]**

Large tree, 15–20 m high. Leaves whorled at end of branchlets, elliptic-ovate or oblong-ovate, 9–15 × 5.5–8 cm, asymmetrically cuneate, entire, acute, coriaceous; stipules ovate-lanceolate, 14–16 × 5–6 mm, acute. Figs green when immature, orange yellow when ripe, sessile, axillary on leafy branchlets, usually in pairs, ellipsoid-ovoid, 1–2 × c. 1 cm, apical pore navel-like, pubescent when very young, glabrous later; involucre bracts hood-like; apical bracts yellowish, in 4 or 5 rows, triangular-ovate. Male: perianth 4-lobed; lobes transparent; stamens 1. Gall flowers: perianth 4-lobed; style subapical. Female: perianth 4-lobed; lobes suborbicular, c. 1 × 0.5–0.6 mm; ovary ovoid, c. 1 × 0.5 mm; style c. 0.5 mm. Achenes brown, ellipsoid, tuberculate.

Flowering & Fruiting: March–September.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Deccan Peninsula, Mizoram, Meghalaya, Sikkim and West Bengal.

Specimens examined: Santrabari Range, 300m, 05.10.2009, SKS & GK 46177; Jainti, 09.10.2009, SKS & GK 46282; Kumargram, 13.02.2012, AK 53019; Bhutia Pond, 302m, 07.04.2012, GK 56048; Panbari 1–2, 08.04.2012, GK 56071; Buxaduar to Lepchakhawa, 13.02.2014, AK 59930.

2. Ficus auriculata Lour., *Fl. Cochinch.* 2: 666. 1790. *Ficus roxburghii* Miq., *London J. Bot.* 7: 456. 1848, *nom. illeg.*; King in Hook. f., *Fl. Brit. India* 5: 534. 1888; Prain, *Bengal Pl.* 2: 983. 1903. **[Plate 232b]**

Small tree, 4–8 m high, glabrous or pubescent. Leaves ovate or suborbicular, 7–26 × 7.5–19.5 cm, cordate to rounded, dentate, acute, coriaceous, pubescent and white papillose below; stipules triangular-ovate, c. 2.5 × 1 cm, enclose terminal buds, caducous, leaf scar at nodes, pubescent. Figs green with brownish hue, reddish brown when ripe, grows on specialized branchlets on trunks, peduncled, pyriform or depressed globose, 3–4 cm across, longitudinally ridged, densely pubescent when young, glabrescent later; involucre bracts triangular-ovate; apical bracts greenish or reddish brown, in 4 or 5 rows, triangular-ovate. Male: flowers sessile; perianth 3-lobed; lobes spatulate, membranous; stamens 2. Gall flowers: perianth 3-lobed; style lateral, hairy; stigma enlarged. Female: flowers pedicellate or sessile; perianth 3-lobed; ovary ovoid; style lateral, hairy. Achenes yellowish, obliquely suborbicular, c. 1 mm across, compressed, sparsely tuberculate.

Flowering & Fruiting: August–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Sikkim, South India and West Bengal.

Specimens examined: Chunabhati, JKS 4662; Kumargram, Hathinala, 27.09.2011, AK 52958; Buxa Fort to Chnabhati, 30.09.2013, AK 59675.

3. *Ficus benjamina* L., Mant. Pl. 1: 129. 1767; King in Hook. f., Fl. Brit. India 5: 508. 1888. *Ficus retusa* f. *nitida* (Thunb.) King in Hook. f., Fl. Brit. India 5: 511. 1888; Prain, Bengal Pl. 2: 980. 1903 (as “var. *nitida*”). [Plate 232c]

Kamrup-Zir (B).

Tree, 20–30 m high. Leaves ovate-elliptic, 7.5–10.5 × 1.5–5.4 cm, acuminate to caudate, entire-wavy, cuneate to rounded, coriaceous, glabrous; stipules lanceolate, c. 1 cm. Figs monoecious, axillary, solitary or in pairs, red–bluish orange, sessile; basal bracts 2–3, 2–3 mm; orifice with 3 apical bracts. Male: flowers few, scattered; perianth 2–4-lobed; lobes ovate-lanceolate, c. 2 mm, brown; stamen 1; filament c. 0.3 mm; anthers subsessile. Gall flowers: perianth 3–4-lobed; lobes spatulate; ovary smooth. Female: flowers sessile; perianth 3–4-lobed; lobes spatulate; ovary ovate, c. 0.7 mm across; style and stigma shorter than achenes. Achenes ovoid, reniform, smooth.

Flowering & Fruiting: October–April.

Distribution. India: Almost throughout India. Widely cultivated

Specimen examined: Panbari 8, 31.04.2012, GK 50679.

4. *Ficus curtipes* Corner, Gard. Bull. Singapore 17: 397. 1960. *Ficus obtusifolia* Roxb., Fl. Ind. 3: 546. 1832, *nom. illeg.*; King in Hook. f., Fl. Brit. India 5: 507. 1888; Prain, Bengal Pl. 2: 979. 1903. [Plate 232d, 233a]

Trees, 8–12 m high. Leaves whorled at end of branchlets, oblong-obovate, 9–18 × 3.9–7.5 cm, attenuate, entire, obtuse, coriaceous; stipules lanceolate to ovate-lanceolate, 13–18 × 4–9 mm, acute with mucronate tip. Figs whitish when immature, red to orange red when ripe, axillary in pairs, globose to depressed globose, 10–13 × 10–12 mm, apical pore flat, sessile; involucre bracts suborbicular; apical bracts in 3 or 4 rows, triangular-ovate. Male: perianth 3-lobed; lobes lanceolate, c. 1.2 × 0.5–0.6 mm; stamen 1. Gall flowers: perianth 4–5-lobed; lobes lanceolate. Female: perianth absent; ovary ovoid, c. 1 × 0.5 mm; style subapical, c. 1.5 mm; stigma funnelliform. Achenes ovoid, small, sticky, tuberculate.

Flowering & Fruiting: November–April.

Distribution. India: Andaman & Nicobar Islands, North East India and West Bengal.

Specimens examined: Bhutia Pond, 312m, 02.12.2011, GK 52306; Newlands, 15.02.2012, AK 55639.

5. *Ficus cyrtophylla* (Miq.) Miq., Ann. Mus. Bot. Lugd.-Bat. 3: 282. 1867.
Covellia cyrtophylla Miq., Hook. London J. Bot. 7: 460. 1848.

[Plate 233b-c; Fig. 109a]

Shrub or small tree, 3–5 m high, short stiff hairy. Leaves strongly asymmetric, oblong-elliptic to oblong-obovate, 15–30 × 7–14 cm, oblique, distantly dentate, acuminate, chartaceous, short stiff hairy above, papillate cystoliths and short stiff hairs below; stipules lanceolate, caducous, hairy. Figs green when immature, orange red or crimson when ripe, axillary on leafy shoots, paired or clustered, ovoid, 7–10 mm, apical pore flat, short stiff hairy; involucre bracts inconspicuous. Male: perianth white, 4-lobed; stamen 1. Gall flowers: style lateral, short. Female: perianth white, 5-lobed; lobes linear, hairy; style lateral; stigma enlarged. Achenes shortly ellipsoid, small.

Flowering & Fruiting: June–November.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59682.

6. *Ficus elastica* Roxb. ex Hornem., Hort. Bot. Hafn. Suppl.: 7. 1819; King in Hook. f., Fl. Brit. India 5: 508. 1888.

Tree, 20–25 m high, epiphytic when young. Leaves greenish red, elliptic-oblong, 12–27 × 7–13 cm, rounded to subcordate, entire, abruptly acuminate, coriaceous, inconspicuously gland-dotted below; mid vein flattened above, raised below; stipules dark red, oblong-lanceolate, 10–22 cm, acuminate, leaving scars, caducous. Figs orange yellow when ripe, axillary on leafless branchlets, paired, ovoid-ellipsoid, c. 10 × 5–8 mm, apical pore slightly raised, subsessile; involucre bracts hood-like; apical bracts in 3 or 4 whorls, triangular-ovate. Male: flowers scattered among other flowers; perianth 4-lobed; lobes ovate; stamen 1; filament absent; anther ovoid-ellipsoid. Gall flowers: perianth 4; ovary ovoid, smooth; style subapical, curved. Female: perianth 4-lobed; ovary ovoid; style c. 2 mm; stigma capitate. Achenes ovoid, small, tuberculate.

Flowering & Fruiting: April–October.

Distribution. India: Almost throughout India. Widely cultivated.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 62688.

7. *Ficus fistulosa* Reinw. ex Blume, Bijdr. Fl. Ned. Ind. 9: 470. 1825; King in Hook. f., Fl. Brit. India 5: 525. 1888; Prain, Bengal Pl. 2: 981. 1903.

[Plate 233d; Fig. 109b-c]

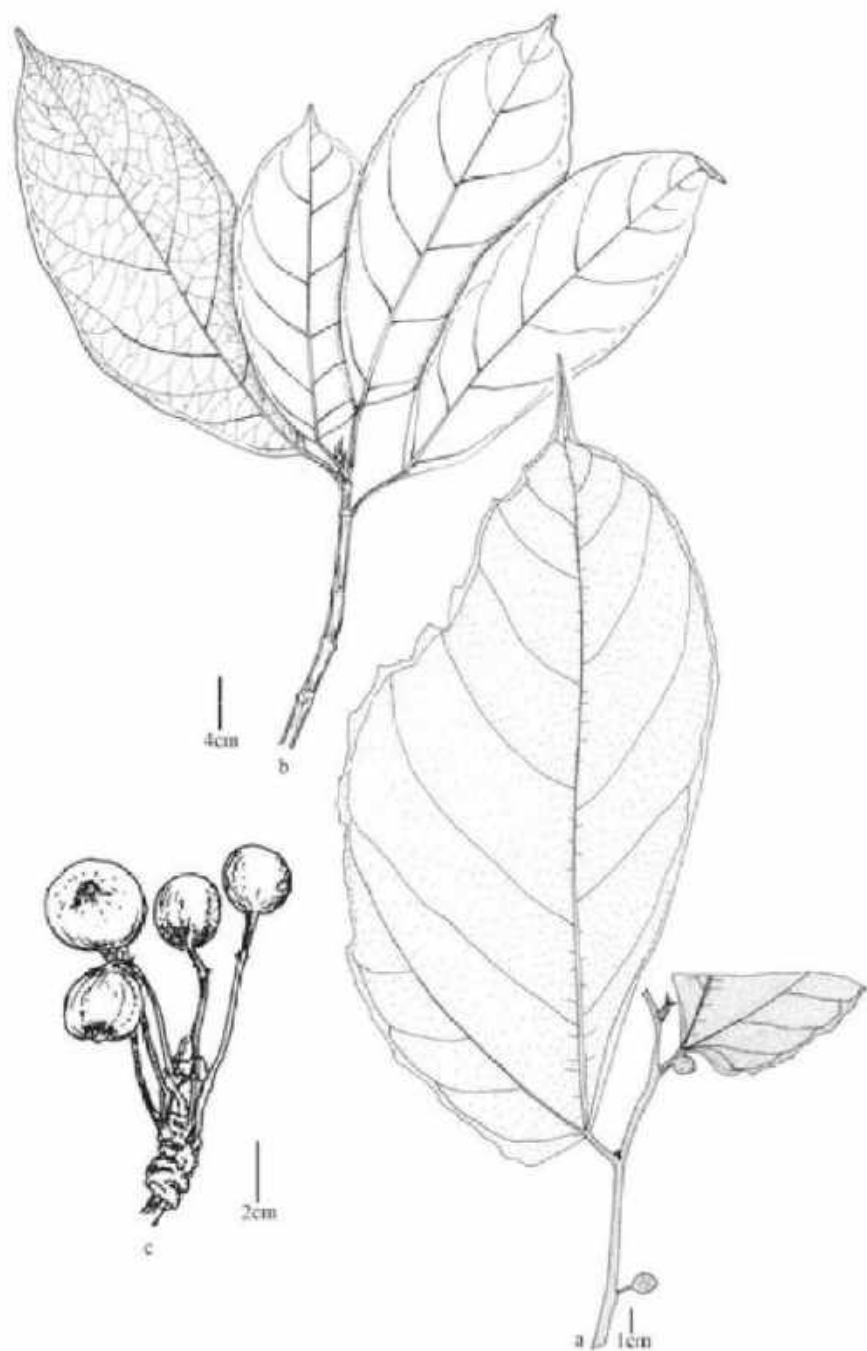


Fig. 109. *Ficus cyrtophylla*: a. Leaf with figs (AK 59682); *Ficus fistulosa*: b. Leaves; c. Figs (GK 50636).

Tree, 7–10 m high. Leaves whorled, obovate, ovate-elliptic or oblong-ovate, 13.5–19.5 × 6–8.3 cm, cuneate, sinuate, shortly acuminate, coriaceous, glabrous, plucid gland-dotted beneath; stipules ovate-lanceolate, c. 10 × 4 mm, acute, glabrous, caudous. Figs dioecious, canline, 3–5 in fascicles, globose, c. 1.5 cm across, green, reddish orange when mature, glabrous, apical pore not open; peduncular stipules triangular ovate. Male: perianth 3–4-lobed; stamens 1; filament short. Gall flowers: perianth 3-lobed; lobes short; ovary obovate; style lateral; stigma enlarged. Female: ovary obliquely obovate, c. 3 × 1 mm; style c. 1.25 mm, hairy; stigma cupular. Achene obovate, with small tubercles

Flowering & Fruiting: April–July.

Distribution. India: Andaman & Nicobar Islands, North East India, Jharkand and West Bengal.

Specimen examined: SRVK 12–13, 29.03.2012, GK 50636.

8. *Ficus fulva* Reinw. ex Blume, Bijdr. Fl. Ned. Ind. 9: 478. 1825; King in Hook. f., Fl. Brit. India 5: 531. 1888; Anant Kumar & Venu, Indian J. Forest. 42 (3): 202. 2019. *Ficus chrysocarpa* Reinw. ex Blume, Bijdr. Fl. Ned. Ind. 9: 475. 1825; King in Hook. f., Fl. Brit. India 5: 531. 1888. [Plate 234a-b; Fig. 110a]

Tree, 8–15 m high, rusty hirsute. Leaves ovate or suborbicular, 15–23 × 18–25 cm, cordate, serrate-denticulate, acuminate, chartaceous, scabrous above, rusty hirsute below; stipules lanceolate, 1–1.5 cm, obtuse, deciduous, rusty tomentose. Figs light yellowish brown, sessile, axillary on leafy shoots, paired or clustered at ends of branchlets, globose, 3–4 cm across, rusty hirsute, apical pore flat and navel-like; involucre bracts ovate; apical bracts 4 or 5 in whorls, triangular-ovate. Male: perianth 4-lobed; lobes transparent white, ovate; stamens 2. Gall flowers: perianth 4-lobed; lobes oblong-lanceolate, tufts of long hairs at apex; ovary ovoid; style lateral. Female: perianth same as in male flowers; style lateral; stigma cylindrical. Achenes creamy white, ellipsoid, c. 1 mm, crustaceous, faintly tuberculate.

Flowering & Fruiting: September–November.

Distribution. India: Andaman & Nicobar Islands, Meghalaya, Mizoram and West Bengal.

Specimen examined: Buxa Fort to Tashigaon, 01.10.2013, AK 59735.

9. *Ficus geniculata* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42 (2): 105. 1873; King in Hook. f., Fl. Brit. India 5: 516. 1888; Prain, Bengal Pl. 2: 981. 1903. [Plate 234c]

Tree, 8–12 m high. Leaves spirally arranged, clustered at end of branchlets, elliptic to elliptic-ovate, 13–18 × 7–10 cm, subcircular at base, undulate, caudate-acuminate, chartaceous; stipules ovate, 5–10 × c. 5 mm, acute to short acuminate, pubescent. Figs red when ripe, axillary in clusters of 2–4 on short woody

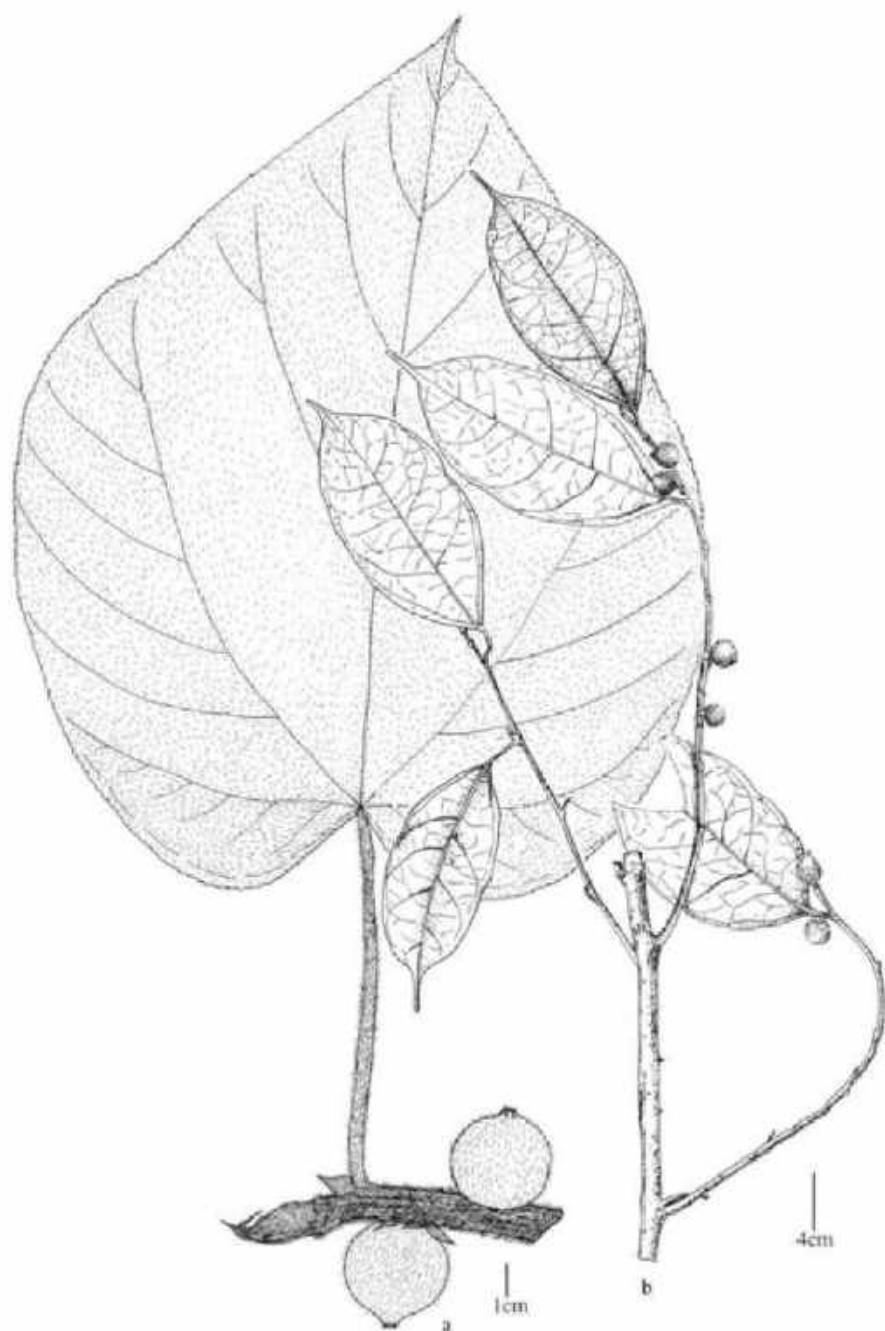


Fig. 110. *Ficus fulva*: a. Leaf with figs (AK 59735); *Ficus heteropleura*: b. Leaves with figs (GK 50659).

branchlets or on leafless older branchlets, depressed globose, 4–6 mm across, with conspicuous interfloral bristles, red tuberculate, sessile to subsessile, apical pore flat, sparsely glandular to glabrous; involucre bracts suborbicular; apical bracts in 4 or 5 rows, compactly closed. Male: perianth tubular, split above; stamen 1. Gall and female flowers: perianth 2 or 3-lobed; lobes lanceolate; style in female flowers 2–3 mm, c. 1 mm in gall flowers. Achenes yellowish, obliquely ovate to suborbicular, c. 1 mm across, compressed, in alveolate or pitted honeycomb like brown membrane.

Flowering & Fruiting: December–May.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Meghalaya, Odisha, Sikkim and West Bengal.

Specimen examined: Newlands, 15.02.2012, AK 53026.

10. *Ficus hederacea* Roxb., Fl. Ind. 3: 538. 1832. [Plate 234d, 235a]

Parkat-Dumar (B).

Scandent shrub. Leaves ovate or ovate-elliptic, 3.1–10.5 × 2.3–7.3 cm, rounded or cuneate, entire, bluntly acute, leathery, pale green, reddish pale when dry, cystoliths papillate; terminal stipules lanceolate, c. 13 × 4 mm, acute, glabrous. Figs axillary solitary or 2–3-fascicles, globose, 9–12 mm across, apical pore not opened; involucre bracts triangular ovate. Male: flowers scattered; perianth 3–4-lobed; stamen 1. Gall flowers: perianth 4-lobed; lobes lanceolate; ovary obovate; style subapical, short; stigma curved. Female: perianth 4-lobed, lobes linear. Achene ellipsoid, c. 2 × 1 mm.

Flowering & Fruiting: May–March.

Distribution. India: Andaman Islands, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jharkhand, Madhya Pradesh, Meghalaya, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Jainti range, 13.03.2011, GK 50567; Rajabhatkhawa range, 11.03.2011, GK 50535.

11. *Ficus heterophylla* L. f., Suppl. Pl.: 442. 1782; King in Hook. f., Fl. Brit. India 5: 511. 1888; Prain, Bengal Pl. 2: 981. 1903. [Plate 235b]

Gaori-Sheora (B).

Procumbent undershrub, 20–40 cm high, puberulent. Leaves simple or 1–5-lobed, ovate, 2–4 × 1.8–3 cm, obliquely cordate, crenate or denticulate, acute, scabrid above, hispid beneath; stipules ovate-lanceolate, c. 3 × 1.25 mm, hispid, glabrous inside. Figs on leafy or older leafless branches, green to greenish purple, solitary, axillary, globose, 10–16 mm across, appressed hairy, apical pore navel-like, convex; peduncular bracts sub-orbicular. Male: perianth 4-lobed, hyaline; lobes elliptic-lanceolate, 1–1.5 × 0.5–0.6 mm; stamens 1; filament c. 1 mm; anthers oblong, c.

1 mm, obliquely attached to filament. Gall flowers as in female flowers. Female: perianth white, 4-lobed; lobes linear lanceolate, 1–1.25 mm; ovary ellipsoid, c. 1.25 × 0.5 mm, slightly awned; style laterally attached, c. 0.5 mm; stigma capitate. Achenes shortly ellipsoid.

Flowering & Fruiting: June–December.

Distribution. India: Almost throughout India.

Specimens examined: Jainti 7b, 01.12.2011, GK 52302; Checko-1, 26.09.2012, AK 56166.

12. *Ficus heteropleura* Blume, Bijdr. Fl. Ned. Ind. 9: 466. 1825.

[Plate 235c-d; Fig. 110b]

Scandent shrub, often epiphytic, young branchlets with scurfy hairs, scabrid. Leaves elliptic to obovate, 9.3–12.5 × 3.8–5 cm, slightly asymmetric, cuneate, entire or undulate, caudate, coriaceous, glabrous; stipules subulate, small. Figs axillary on normal leafy shoots, pinkish to orange or yellow at maturity, globose, 8–10 mm across, with short thick hairs, apical pore navel-like, convex; peduncular bracts 2–3, mostly near the base. Male: perianth lobes 4, linear; stamen 1; rudimentary ovary present. Gall flowers: perianth lobes 3; ovary globose; style lateral, short, curved. Female: perianth 3-lobed; style persistent; stigma funnelliform. Achenes obliquely ovoid, coarse.

Flowering & Fruiting: January–August.

Distribution. India: Andaman & Nicobar islands, Arunachal Pradesh, Assam, Meghalaya, Tripura and West Bengal.

Specimen examined: Panbari 6, 30.03.2012, GK 50659.

13. *Ficus hispida* L. f., Suppl. Pl.: 442. 1782; King in Hook. f., Fl. Brit. India 5: 522. 1888; Prain, Bengal Pl. 2: 981. 1903. [Plate 236a]

Small tree or shrub, 3–5 m high, scaly, hispid. Leaves elliptic-ovate or obovate, 12–30 × 6.8–13.5 cm, rounded, serrate, acuminate, coriaceous, scabrid above, hirsute below; stipules triangular-ovate, 0.6–1.8 × 0.4–0.6 cm, acute, caducous, pubescent. Figs greenish yellow when mature, axillary, solitary or paired, pedunculate, urn-shaped, 1.5–2 cm across, hirsute; involucre bracts 2–3, ovate. Male: perianth 4-lobed; lobes obovate; stamen 1. Gall flowers: perianth absent; style subapical, short, thick. Female: perianth absent; ovary globose; style lateral, hairy; stigma clavate or tubular. Achenes black brown, ovoid.

Flowering & Fruiting: June–December.

Distribution. India: Throughout India.

Specimens examined: Rajabhatkhawa Range, 04.12.2011, GK 52313; Kumargram, 18.09.2011, AK 52602.

14. *Ficus prostrata* (Wall. ex Miq.) Miq., Ann. Mus. Bot. Lugd.-Bat. 3: 297. 1867; King in Hook. f., Fl. Brit. India 5: 523. 1888. *Covellia prostrata* Wall. ex. Miq., Hook. London J. Bot. 7: 465. 1848. [Plate 236b; Fig. 111]

Tree, 6–10 m high. Leaves elliptic-oblong to lanceolate, 13–27 × 4–10 cm, acuminate at apex; stipules lanceolate, acuminate, deciduous, puberulent. Figs red maroon when ripe, solitary, pendulous, eventually prostrate, leafless branchlets on trunk, pyriform, apical pore flat, pubescent; involucre bracts lanceolate to triangular-lanceolate. Male: perianth 3 or 4-lobed; lobes linear; stamen 1, rarely 2. Gall flowers: perianth same as in male flowers; ovary ovoid to rhombic; style lateral; stigma linear. Female: perianth same as in male flowers; ovary faintly trigonous; style lateral; stigma linear. Achenes creamy white, obliquely ovoid or trigonous, compressed, crustaceous.

Flowering & Fruiting: August–November.

Distribution. India: North East India and West Bengal.

Specimens examined: Buxaduar, KB 1767; Achalung to Lepchakhawa, 29.09.2013, AK 59659.

15. *Ficus racemosa* L., Sp. Pl. 2: 1060. 1753. *Ficus glomerata* Roxb., Pl. Coromandel 2: 213, t. 123. 1799; King in Hook. f., Fl. Brit. India 5: 535. 1888; Prain, Bengal Pl. 2: 983. 1903. [Plate 236c]

Large tree, 10–15 m high, pubescent. Leaves elliptic-obovate, elliptic or elliptic, 7.3–12 × 1.8–2.8 cm, cuneate, entire, acuminate, coriaceous; stipules ovate-lanceolate, 8–13 × 2–3 mm, ciliate, midnerve prominent and hairy, membranous. Figs rarely axillary on leafless branches or leafy shoot or on older leafless branchlets or on trunks, pedunculate, aggregated, subglobose, 2–2.5 cm across, apical pore flat; involucre bracts triangular-ovate; apical bracts in 3 or 4 whorls, triangular-ovate. Male: perianth 3–4-lobed; lobes linear, c. 1.5 mm, membranous. Stamens 2. Gall flowers: intermixed with female flowers in figs, or else similar. Female: perianth 3–4-lobed; lobes linear; ovary ovoid; style lateral; stigma clavate. Achenes ovoid, keeled, tuberculate, granular.

Flowering & Fruiting: February–October.

Distribution. India: Almost throughout India.

Specimens examined: SRVK 12–13, 29.03.2012, GK 50626; Narathali, 20.02.2012, AK 55784.

16. *Ficus semicordata* Buch.-Ham. ex Sm. in Rees, Cycl. 14: no. 71. 1810. *Ficus cunia* Buch.-Ham. ex Roxb., Fl. Ind. 3: 561. 1832; King in Hook. f., Fl. Brit. India 5: 523. 1888; Prain, Bengal Pl. 2: 982. 1903. [Plate 236d]

Large tree, 10–15 m high, scaly, scabrid. Leaves distichous, ovate-lanceolate, 16–20 × 4.5–6.6 cm, semicordate with auriculate upper margin at base, denticulate,

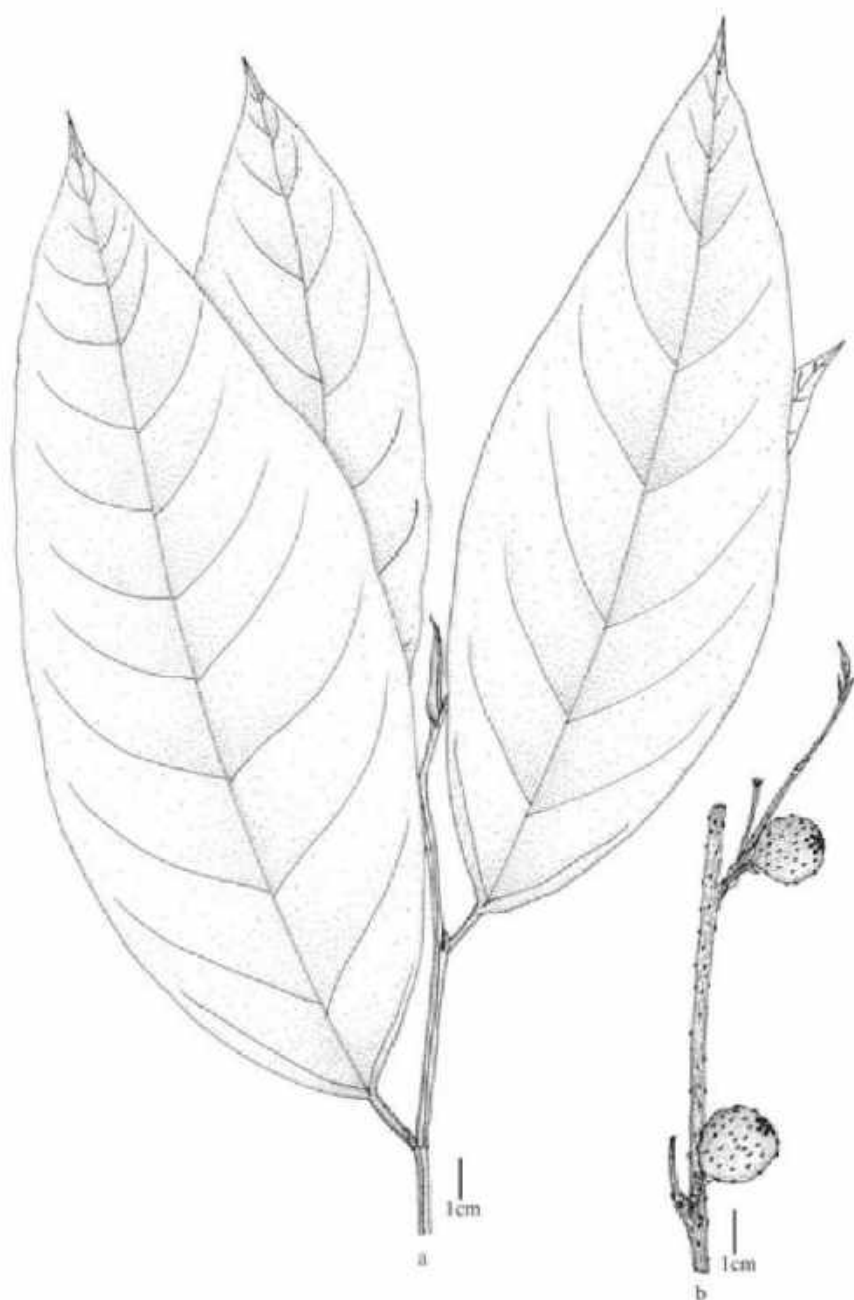


Fig. 111. *Ficus prostrata*: a. Leafy branchlet; b. Portion of branchlet with figs (AK 59659).

acuminate, coriaceous, scabrid; stipules triangular-ovate, c. 3 × 2 mm, acute. Figs in racemes, 1–2 at per axils, in leafless branches, globose, 5–11 mm across, lenticellate or tubercled; involucrel bracts triangular-ovate. Male: perianth 3-lobed; lobes oblanceolate; stamen 1. Gall flowers: perianth 4–5-lobed; lobes linear-lanceolate, 5–6 mm; style lateral, short. Female: perianth 4–5-lobed; ovary ovoid-ellipsoid, 2–3 × 2–5 mm; style lateral; stigma shallowly 2-lobed. Achenes ovoid, tuberculate.

Flowering & Fruiting: May–October.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa Range, 70m, 09.10.2009, SKS & GK 46263; Lepchakhawa to Buxa Fort, 29.09.2013, AK 59673.

3. *Maclura* Nutt.

Maclura cochinchinensis (Lour.) Corner, Gard. Bull. Singapore 19: 239. 1962. *Vaniera cochinchinensis* Lour., Fl. Cochinch. 2: 564. 1790. *Cudrania javanensis* Trécul, Ann. Sci. Nat., Bot. sér. 3, 8: 123. 1847; Hook. f., Fl. Brit. India 5: 538. 1888; Prain, Bengal Pl. 2: 970. 1903. [Plate 237a; Fig. 112]

Scandent shrub, 2–3 m high, armed, produce milky white latex, pubescent to glabrescent; spines axillary, straight, 1.2–2.2 cm. Leaves spirally arranged, elliptic to obovate, 6.6–4.3 × 1.9–4 cm, cuneate, entire and hairy, short acuminate to rounded with mucronate tip at apex, subcoriaceous. Inflorescence axillary, pedunculate, 5–20 mm across, capitate heads, pubescent; inflorescence bracts many, triangular-ovate, c. 2 × 1 mm, hairy, acute, pubescent; interfloral bracteoles ovate, c. 1 mm across, subacute, adnate to calyx, each with 2 embedded yellow glands. Male: perianth 4-lobed, unequal; stamens 4; filaments short; anthers minute; pistillode pyramidal. Female: perianth 4-lobed, apex thick; style 1.5–2.5 mm. Fruits orange yellow, globose syncarp, 1.5–2.2 mm across, fleshy, grey pubescent; fruitlets brown, ovoid; seeds brown, thin, minute.

Flowering & Fruiting: May–September.

Distribution. India: Assam, Bihar, North East Region, Odisha, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Rajabhatkhawa Depot Road, 14.05.1949, VN & party 2404; Rajabhatkhawa, 23.04.1959, CRD 54; Hatipota, 29.09.2012, AK 58526.

4. *Morus* L.

Morus indica L., Sp. Pl. 2: 986. 1753; Hook. f., Fl. Brit. India 5: 492. 1888; Prain, Bengal Pl. 2: 968. 1903. [Plate 237b]

Dioecious small tree, 2–3 m high. Leaves ovate or ovate-lanceolate, 3–9 × 2.5–6 cm, subcordate to cordate, serrate, caudate-acuminate, chartaceous to

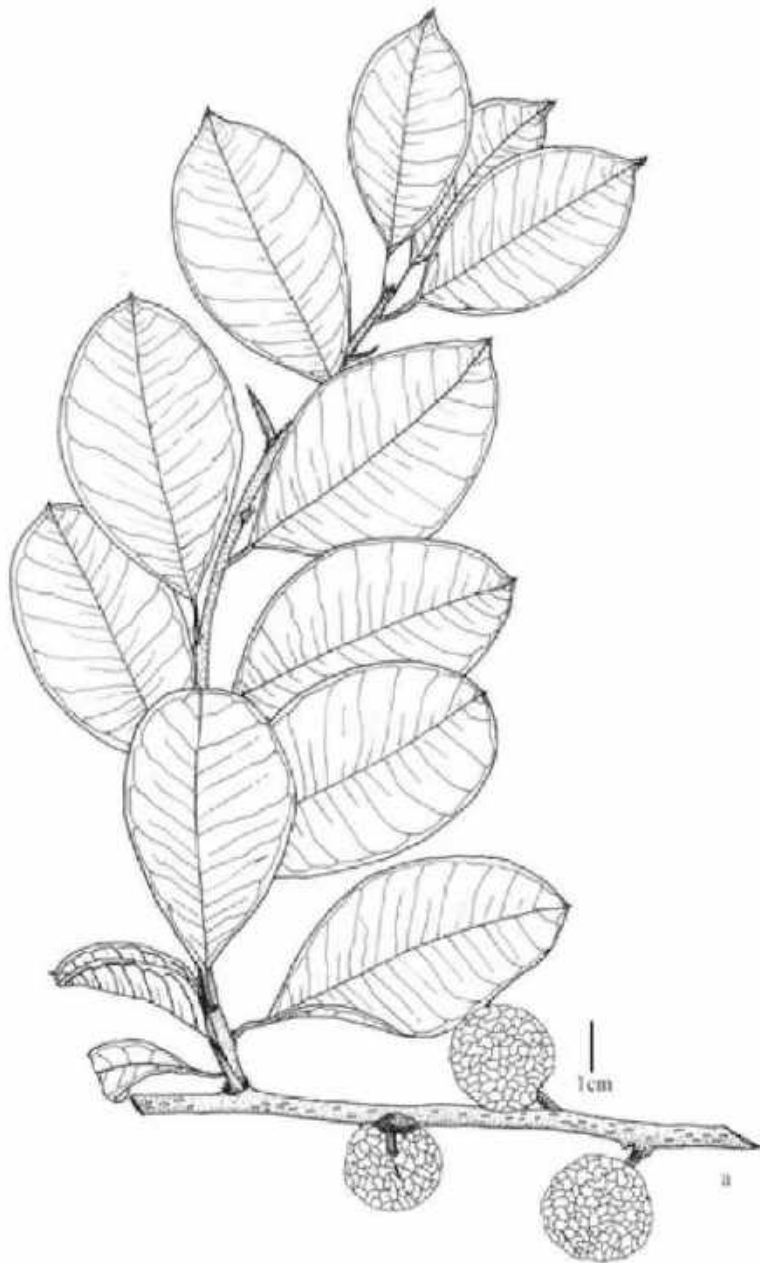


Fig. 112. *Maclura cochinchinensis*: a. Fructing branchlet (AK 58526).

subcoriaceous, pubescent, scabrous or glabrous; stipules linear-lanceolate, 5–8 mm, chartaceous. Inflorescence axillary catkin, male catkins longer than female. Male: perianth greenish-maroon, 4-lobed; lobes ovate, 2–3 × 1–1.5 mm, acute, pubescent; stamens 4; filaments c. 2 mm; anthers ovoid. Female: perianth 4-lobed, in 2-whorls, overlapping; outer lobes ovate, c. 1 mm across, ciliate, obtuse, more or less keeled; inner lobes flat, or else same as outer ones; ovary ovoid, c. 1 mm across; style 2–3.5 mm, 2-fid at middle, hairy; fruiting catkin cylindric or ovoid, 0.7–2 × c. 0.7 cm, succulent, perianth lobes turn blackish purple.

Flowering & Fruiting: February–May.

Distribution. India: Almost throughout India.

Specimens examined: 26th mile watch tower, 14.02.2010, SKS & GK 47080; Narathali, 20.02.2012, AK 55758.

Notes: Ripen inflorescences are edible.

5. *Streblus* Lour.

Streblus asper Lour., Fl. Cochinch. 1: 615. 1790; Hook. f., Fl. Brit. India 5: 489. 1888; Prain, Bengal Pl. 2: 969. 1903. [Plate 237c]

Evergreen dioecious tree, 4–5 m high, pubescent when young, glabrous later. Leaves elliptic-obovate, 3.5–8 × 2–4 cm, cuneate, sinuately or weakly serrate, acute, scabrid; stipules small, lateral, deciduous. Inflorescence globose heads in male and solitary or few flowered short racemes in female. Male: perianth yellowish, cupular; tube minute; lobes 4, ovate, c. 2 × 0.8 mm, obtuse, pubescent; stamens 4; filaments c. 1.2 mm; anthers subglobose. Female: floral bracts elliptic-ovate; perianth same as in male flowers; ovary enclosed by perianth lobes, subglobose, c. 1.5 mm across; style c. 4 mm, 2-fid from base, exerted; stigma indistinct. Drupes yellow, subglobose, 3–4 mm across, fleshy, surrounded by accrescent perianth lobes; seed solitary, globose.

Flowering & Fruiting: April–November.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 5a, 09.03.2011, GK 50515; Rydak river belt, 20.09.2011, AK 52664; Newlands, 15.02.2012, AK 55640.

Juglandaceae

Engelhardtia Lesch. ex Blume

Engelhardtia spicata Lesch. ex Blume, Bijdr. Fl. Ned. Ind. 10: 528. 1825; Hook. f., Fl. Brit. India 5: 595. 1888; Prain, Bengal Pl. 2: 984. 1903.

[Plate 237d, 238a–c]

Deciduous tree, 10–15 m high. Leaves 6–10-foliolate; leaflets elliptic-oblong, 4–17 × 1.8–6 cm, oblique, acuminate, coriaceous. Inflorescence catkins in axils of young leaves. Male: catkins 4–10 cm, hairy; perianth 4-lobed; lobes acute, hairy; stamens 6–10, attached in 2 or more series; anthers elliptic, sparsely hairy. Female: catkins 5–12 cm, pendulous; floral bracts 3-lobed, pilose, with pellucid glands, mid lobe larger than lateral lobes in fruiting; perianth same as in male flowers; ovary villous; style 2-fld from base, lacinate; stigmas indistinct. Fruiting catkins 25–45 cm, pendulous; drupes globose, surrounded by persistent bracts, pilose with pellucid glands; seed solitary, lobed.

Flowering & Fruiting: February–October.

Distribution. India: Almost throughout India.

Specimens examined: Tashigaon to Rovers point, 03.10.2013, AK 59769; Santrabari to Buxaduar, 16.02.2014, AK 59980.

Fagaceae

Castanopsis (D. Don) Spach

Key to the species

- | | |
|---|--------------------------|
| 1a. Cupules smooth, unarmed, with 4–6 wavy bands | 3. <i>C. lanceifolia</i> |
| 1b. Cupules spiny | 2 |
| 2a. Leaf margins entire; spines of cupules 4–6 mm | 1. <i>C. ferox</i> |
| 2b. Leaf margins serrate-dentate; spines of cupules 5–12 mm | 2. <i>C. indica</i> |

1. *Castanopsis ferox* (Roxb.) Spach, Hist. Nat. Veg. 11: 185. 1842. *Quercus ferox* Roxb., Fl. Ind. 3: 639. 1832. *Castanopsis tribuloides* var. *ferox* (Roxb.) King ex Hook. f., Fl. Brit. India 5: 623, 1888; Prain, Bengal Pl. 2: 988. 1903.

Tree, 10–20 m high. Leaves oblong or oblong-ovate, 8–12.5 × 3.2–5.5 cm, cuneate, entire, acute to acuminate, coriaceous. Inflorescence in spike, tomentulose. Male: perianth 6, connate below, free above; stamens 12; filaments short. Female spikes 15–20 cm. Cupules globose to ovoid, 2–2.5 cm across, greyish-brown pubescent, thin walled, with 4–6 mm long spines. Nuts subglobose, c. 1 cm across.

Flowering & Fruiting: May–November.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: NRVK 11–12, 29.11.2011, GK 47170.

2. *Castanopsis indica* (Roxb ex Lindl.) A. DC., J. Bot. 1: 182. 1863; Hook. f., Fl. Brit. India 5: 620. 1888; Prain, Bengal Pl. 2: 988. 1903. *Castanea indica* Roxb ex Lindl. in Wall., Pl. Asiat. Rar. 2: 5. 1830. [Plate 238d, 239a-b]

Tree, 12–15 m high. Leaves oblong-ovate, 10–15 × 3–5 cm, rounded or cuneate, acuminate, coriaceous, matted cottony masses on veins below. Inflorescence

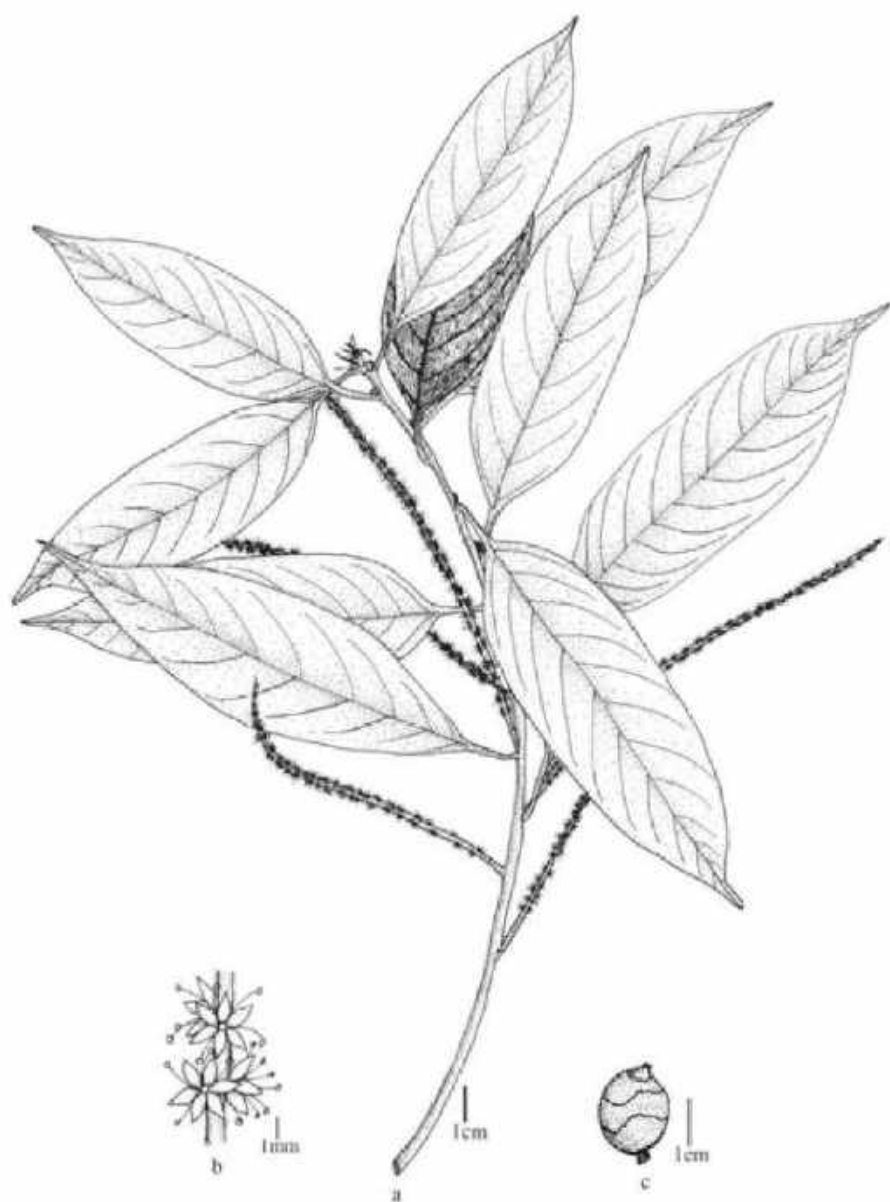


Fig. 113. *Castanopsis lanceifolia*: a. Flowering branchlet; b. Portion of inflorescence showing flowers; c. Cupule (AK 59694).

spikes, often paniculate, male spikes several, terminal female spikes few, brownish pubescent; inflorescence bracts lanceolate. Male: floral bracts lanceolate; perianth 6-lobed; lobes ovate, hairy; stamens 8-12; filaments short; anthers sub-rounded; pistillode white villous. Female: flowers usually solitary, pubescent; perianth same as in male flowers; ovary 3-loculed; styles 3; stigmas shallow terminal pores. Cupules globose, spinose. Nuts ovoid, pubescent at apex.

Flowering & Fruiting: September–May.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal.

Specimens examined: Jainti 8–9, 06.10.2009, SKS & GK 46197; Buxa Fort to Tashigaon, 01.10.2013, AK 59710.

3. *Castanopsis lanceifolia* (Oerst.) Hickel & A. Camus, Bull. Soc. Bot. France 68: 394. 1922 (as "*lancaefolia*"). *Pasania lanceifolia* Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjobenhavn 1866: 84. 1867 (as "*lancaefolia*"). *Quercus lanceifolia* Roxb., Fl. Ind. 3: 634. 1832, non Schltel. & Cham. 1830; Hook. f., Fl. Brit. India 5: 616. 1888; Prain, Bengal Pl. 2: 987. 1903. [Plate 239e-d; Fig. 113]

Tree, 5–8 m high. Leaves oblong-ovate or oblong-lanceolate, 7.5–15 × 3–5 cm, cuneate at base, acuminate, coriaceous, matted cottony masses below. Inflorescence spikes, often paniculate, male spikes several, terminal female spikes few, white pubescent. Male: perianth 6-lobed; lobes ovate, hairy; stamens 12; filaments short; anthers globose; pistillode white villous. Female: flowers solitary or in clusters of 3–5; perianth same as in male flowers; staminodes present; ovary 3-loculed; styles 3; stigmas shallow terminal pores. Cupules asymmetric, ovoid. Nuts ovoid, hairy.

Flowering & Fruiting: September–February.

Distribution. India: Assam, Meghalaya, Mizoram, Sikkim and West Bengal.

Specimens examined: NRVK 11–12, 27.11.2011, GK 50596; Checko 2, 29.11.2011, GK 47170; Buxa Fort to Chumabhati, 30.09.2013, AK 59694.



Plate 240: a. *Ottelia alismoides*; b-c. *Acampe papillosa*; d. *Ascides umittiflora*



Plate 241: a. *Arundina graminifolia*; b. *Bulbophyllum crassipes*



Plate 242: a. *Coslogyne ovalis*; b. *Coslogyne prolifera*



Plate 243: a. *Crepidium josephiarum*; b. *Cymbidium aloofolium*

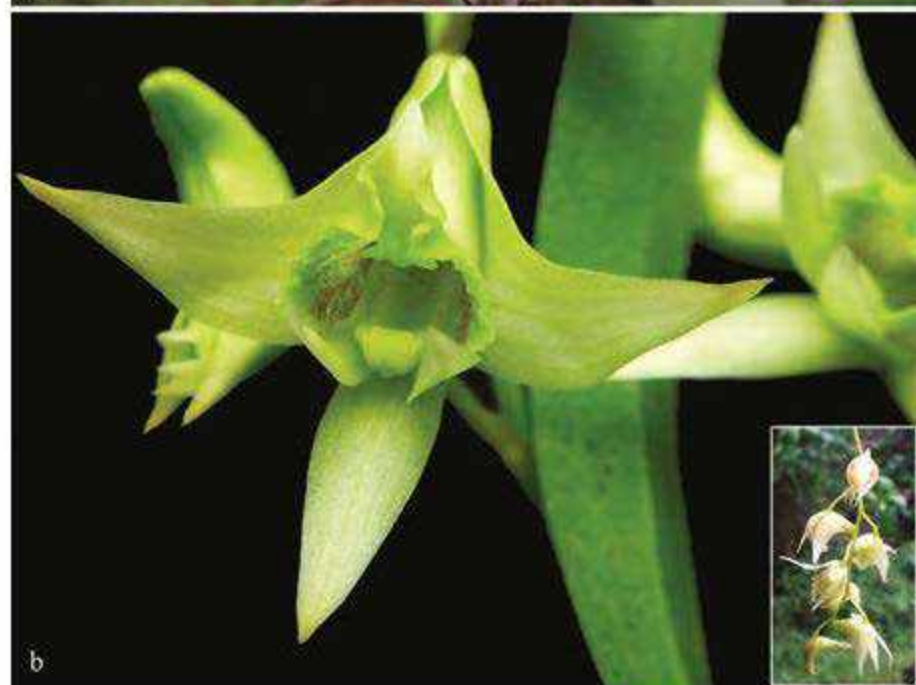


Plate 244: a. *Dendrobium aphyllum*; b. *Dendrobium ariflorum*



Plate 245: a. *Dendrobium fimbriatum*; b. *Dendrobium macchatum*



Plate 246: a-h. *Dendrobium terminale* [Photo credit: C.M. Sabapathy]; c. *Eria lasiopetala*



Plate 247: a. *Eria stricta*; b. *Gastrochilus obliquus* [Photo credit: A. Bhattacharjee]



Plate 248: a-b. *Goodyera procera*; c-d. *Habenaria stenopetala*



Plate 249: a. *Lulsia brachystachys* [Photo credit: Sachin Ranade]; b. *Lulsia filiformis*

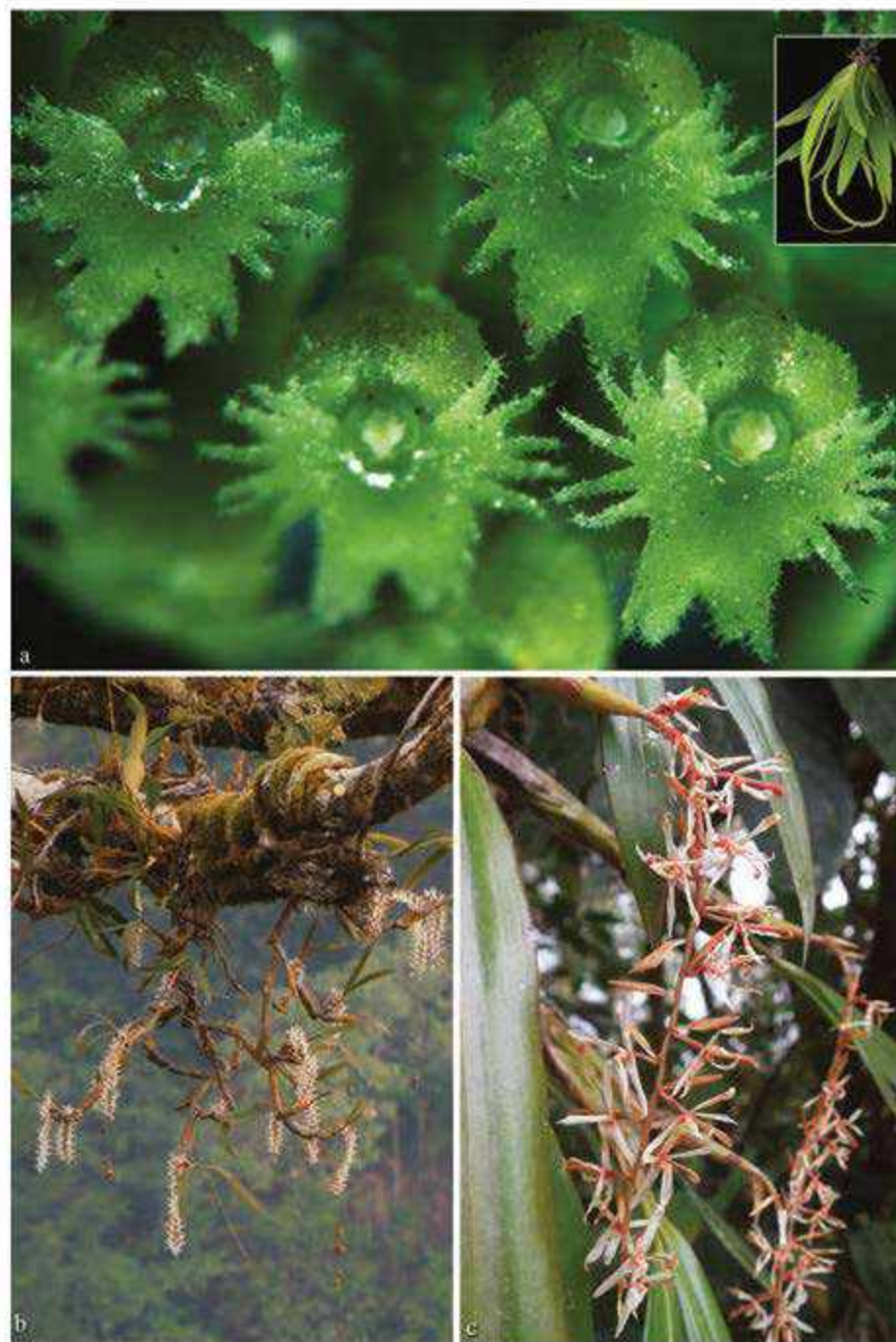


Plate 250: a. *Oberonia micromata*; b-c. *Otockilus lancilabium*



Plate 251: a. *Papilionanthe teres*; b. *Phaius tancarvilleae*



Plate 252: a. *Pholidota articulata*; b. *Pholidota imbricata*; c. *Rhyachostylis retusa* [Photo credit: A. Bhattacharjee]



Plate 253: a. *Smitinandia micrantha*; b. *Trichotozia dasyphylla*; c. *Vanda tessellata*; d. *Zeuxine lindleyana*



Plate 254: a. *Zeuxine longilabris*; b. *Zeuxine nervosa*; c. *Zeuxine reflata*; d. *Zeuxine strutschanskica*



Plate 255: a. *Hallantia speciosa*; b-c. *Alpinia nigra*; d. *Boesenbergia kingii*

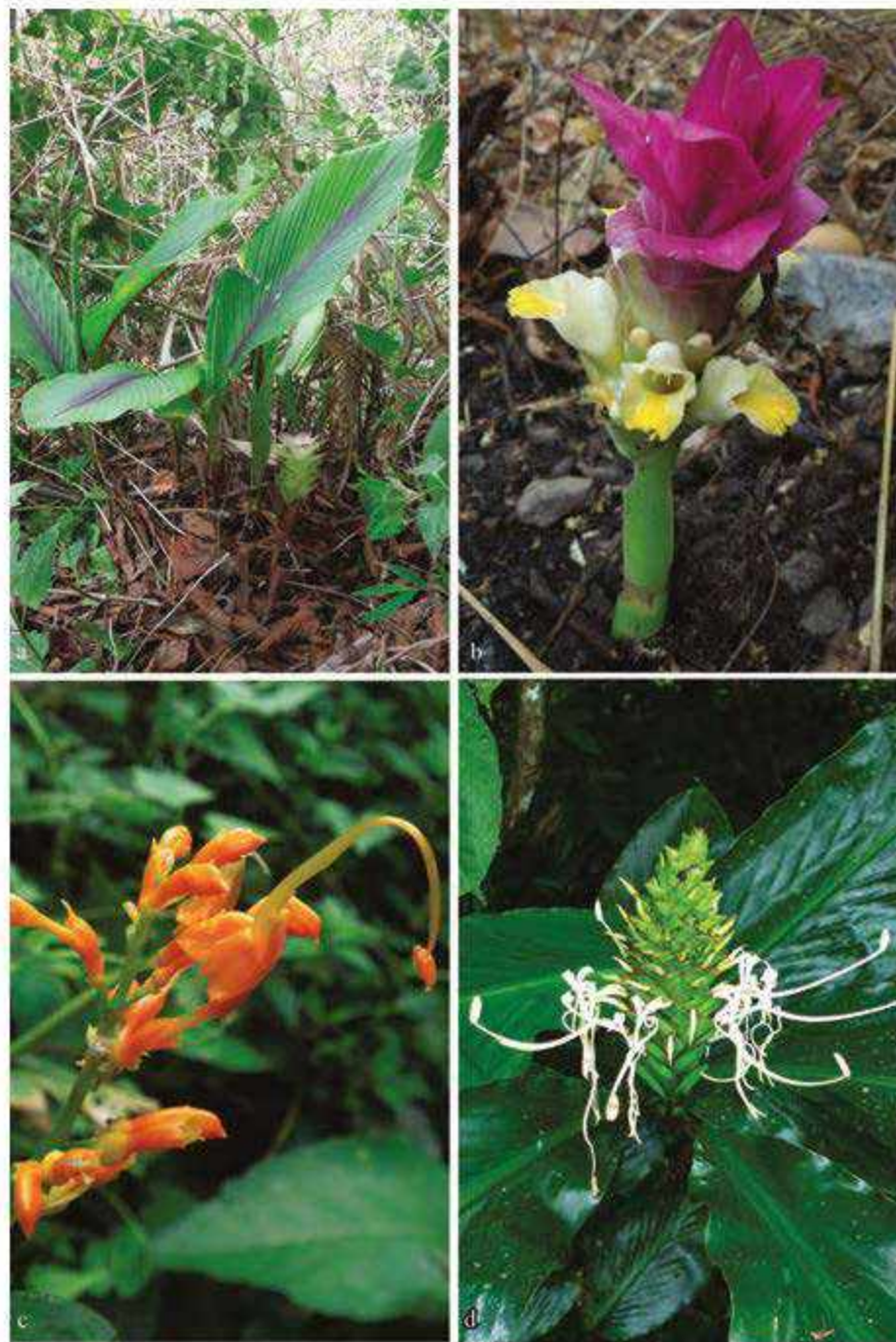


Plate 256: a-b *Curcuma aromatica*; c. *Globba racemosa*; d. *Hedyotis thyriformis*



Plate 257: a-b *Hamiorchis pantlingii*; c *Zingiber zerumbet*; d *Phrynium placantarium*



Plate 258: a. *Crinum amoenum*; b. *Molinaria capitulata*; c-d. *Ophiopogon intermedius*



Plate 239: a-b. *Dracaena angustifolia*; c-d. *Dioscorea bulbifera*



Plate 260: a. *Dioscorea glabra*; b. *Dioscorea hamiltonii*; c. *Dioscorea pentaphylla*; d. *Dioscorea praserii*

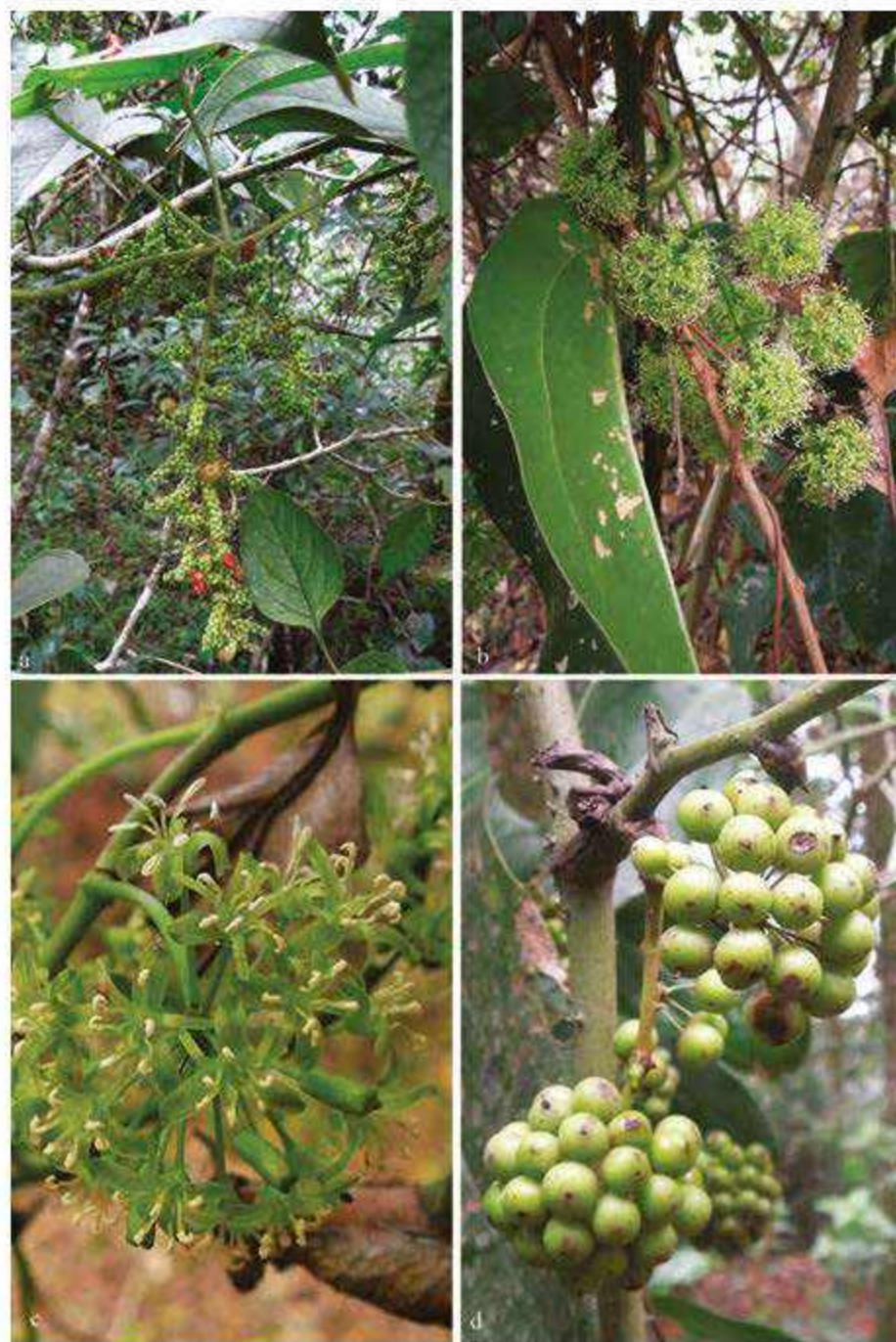


Plate 261: a. *Dioscorea pubera*; b-d. *Smilax perfoliata*



Plate 262: a. *Pontederia cruzipos*; b-c. *Pontederia hastata*; d. *Pontederia vaginalis*



Plate 263: a. *Amischotolype hookeri*; b. *Commelina benghalensis*; c. *Commelina diffusa*; d. *Commelina paludosa*



Plate 264: a. *Commelina sikkimensis*; b. *Cyanotis axillaris*; c. *Cyanotis cristata*; d. *Cyanotis vaga*



Plate 265: a. *Floscopa scandens*; b. *Mardannia undiflora*; c. *Mardannia spirata*; d. *Pollia subumbellata*.



Plate 266: a. *Pollia subumbellata*; b. *Rhopalophora scaberrima*; c. *Juncus bufonius* [Photo credit: S. Hakler]; d-a. *Calatium erectus*

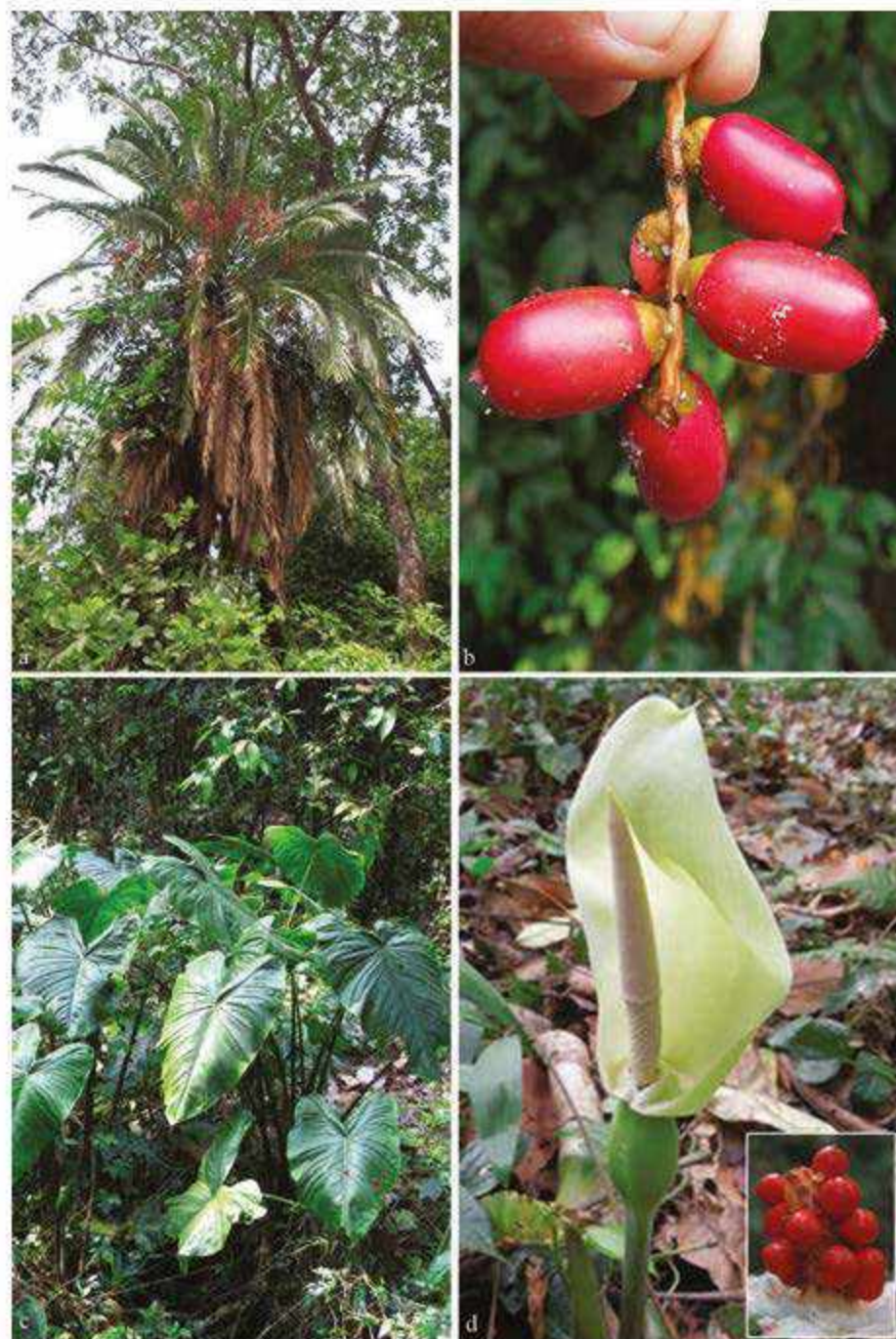


Plate 267: a-b *Phoenix sylvestris*; c-d. *Alocasia forficata*

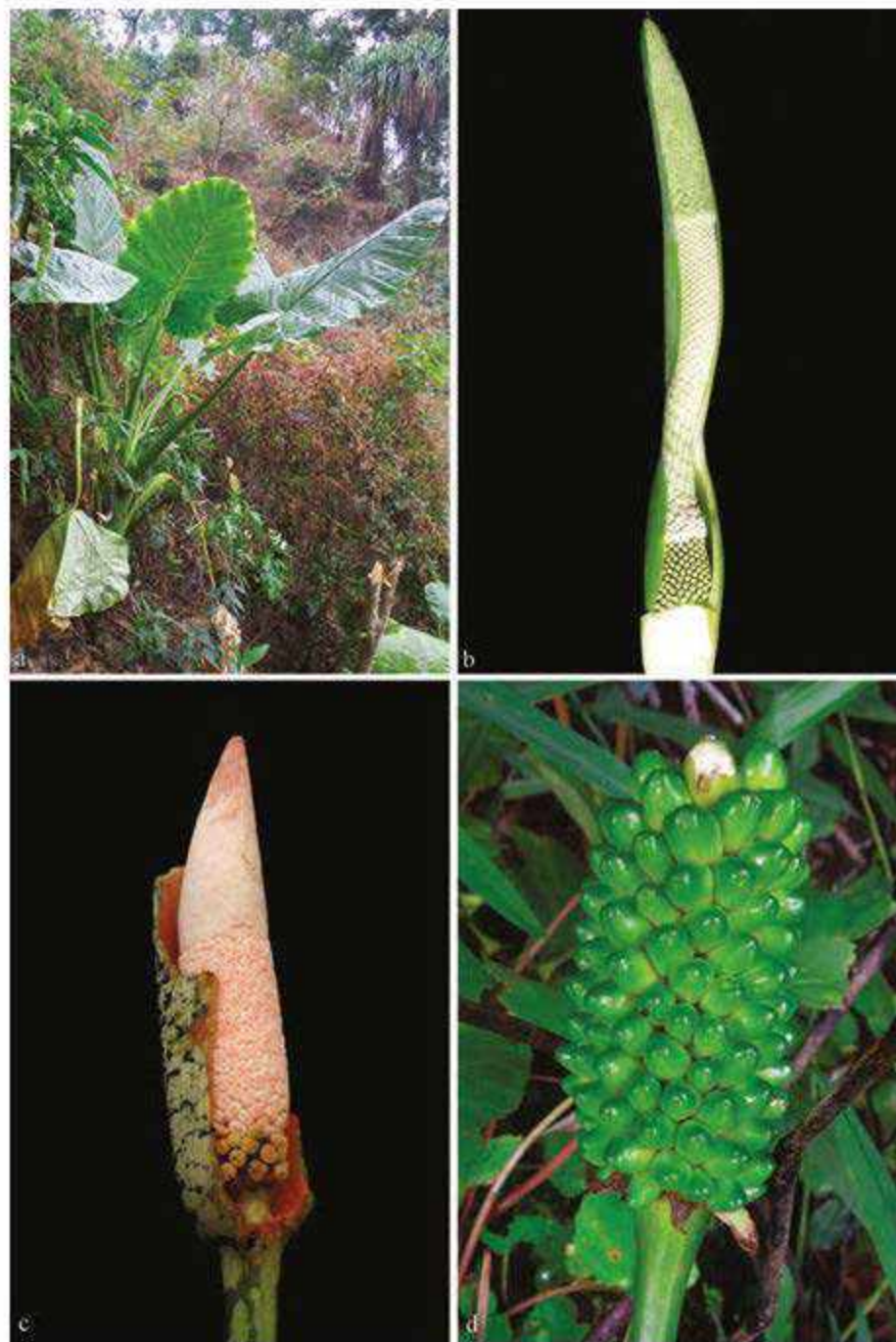


Plate 268: a-b. *Alocasia odora*; c-d. *Amorphophallus bulbifer*

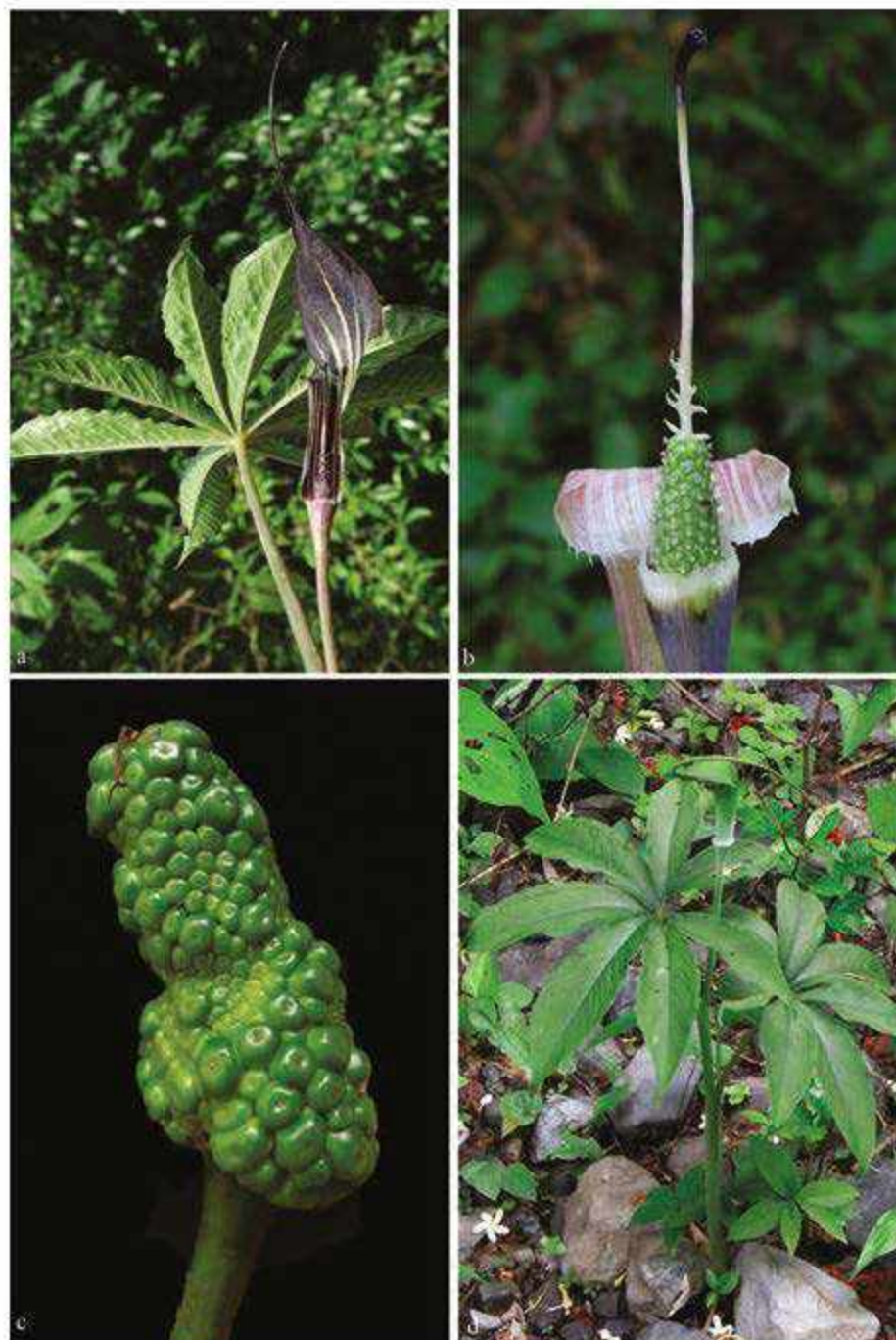


Plate 269: a-c. *Arisaema concoloratum*; d. *Arisaema tortuosum*



Plate 270: a-b. *Arisaema tortuosum*; c-d. *Lasia spinosa*



Plate 271: a. *Pistia stratiotes*; b-d. *Pothos scandens*



Plate 272: a-c. *Rasmuntia vivipara*; d. *Rhapsidophora calophylla*



Plate 273: a. *Rhaphidophora calophylla*; b-c. *Typhonium trilobatum*



Plate 274: a. *Lanna sequinoctialis* [Photo credit: S. Halder]; b-c. *Potamogeton nodosus*; d. *Bulbostylis barbata*



Plate 275: a. *Carex cruciata*; b. *Carex indica*; c. *Carex myosuroides*; d. *Cyperus compactus*



Plate 276: a. *Cyperus cuspidatus*; b. *Cyperus cyperinus*; c. *Cyperus cyperoides*; d. *Cyperus difformis*



Plate 277: a. *Cyperus digitatus*; b. *Cyperus distans*; c. *Cyperus iria*; d. *Cyperus rotundus*



Plate 278: a. *Cyperus siletensis*; b. *Eleocharis acutangala*; c. *Eriophorum comosum*



Plate 279: a. *Fimbristylis aestivalis* [Photo credit: S. Halder]; b. *Fimbristylis aphylla*; c. *Fimbristylis bisumbellata*; d. *Fimbristylis complanata*



Plate 280: a. *Fimbristylis dichotoma*; b. *Fimbristylis littoralis*; c. *Fimbristylis schoenodes*



Plate 281: a. *Fimbristylis squarrosa*; b. *Kyllinga brevifolia*; c. *Kyllinga nemoralis*; d. *Pycreus flavidus*



Plate 282: a. *Pycurus sanguinolentus*; b. *Schoenoplectiella articulata*; c. *Schoenoplectiella mustonata*; d. *Scleria terrestris*



Plate 283: a. *Bambusa cacharensis*; b. *Bambusa tulda*; c. *Coix lacryma-jobi*; d. *Dactyloctenium aegyptium*



Plate 284: a. *Dendrocalamus hamiltonii*; b. *Echinochloa colona*; c. *Echinochloa crus-galli*; d. *Eragrostis ciliaris*



Plate 285: a. *Kragrostis gangatica*; b. *Leersia hexandra*; c. *Oplismenus compositus*; d. *Panicum outvillorum*



Plate 286: a. *Pennisetum polystachion*; b. *Phragmites karka*; c. *Pogonatherum crinitum*; d. *Saccololepis indica*.

B. Monocotyledons

Key to the families

1a.	Perianth 2-seriate, usually both series calycine	2
1b.	Perianth 2-seriate, usually both series corolline (except Commelinaceae)	8
2a.	Inflorescences heads or cymes; flowers usually bisexual; perianth in 2 whorls	3
2b.	Inflorescences racemes or spikes or spadix; flowers unisexual or bisexual; perianth absent or reduced	4
3a.	Herbs with terete leaves; fruit dehiscent; embryo enclosed within the albumen	
	Juncaceae	
3b.	Shrubs or trees with flattened leaves; fruit indehiscent; embryo not enclosed within the albumen	
	Arecaceae	
4a.	Inflorescences of many or few-flowered spadices or spikes or racemes	5
4b.	Inflorescences of heads or spikelets composed of solitary flowers in the axil of glumaceous bracts	7
5a.	Terrestrial/epiphytic/aquatic herbs; flowers in spadices, subtended by a usually modified spathe	
	Araceae	
5b.	Aquatic or marshy plants; flowers not in spadices or if in spadices then not covered by spathe or spathaceous bracts	6
6a.	Freely floating, minute, stemless, lenticular or granular herblets, rootless or with 1 or more rootlets that do not enter the soil; inflorescence solitary flower	Lemnaceae
6b.	Fixed herbs with erect scapigerous or elongated floating or submerged leafy stems rising from a fixed substratum, usually creeping; inflorescences cylindrical or capitate spikes	Potamogetonaceae
7a.	Stems trigonous or triquetrous, nodes and internodes absent; florals subtended by glumes; stigma not plumose; fruits nutlets	Cyperaceae
7b.	Stems terete, nodes and internodes present; florals usually subtended by glumes, lemmas and paleas; stigma plumose; fruits caryopsis	Poaceae
8a.	Seeds many, minute, without albumen	9
8b.	Seeds few, conspicuous, with copious albumen	10
9a.	Aquatic herbs or shrubs; flowers actinomorphic, usually unisexual; outer perianth lobes calycine, inner corolline, often cleistogamous	Hydrocharitaceae
9b.	Epiphytic or terrestrial herbs or shrubs; flowers zygomorphic, bisexual; outer and inner perianth segments corolline, not cleistogamous	Orchidaceae
10a.	Ovary superior	11
10b.	Ovary inferior or half-superior	17
11a.	Outer perianth lobes calycine, inner series corolline	Commelinaceae
11b.	Perianth both series isomerous, corolline	12

Botanical Survey of India

- 12a. Aquatic or marshy plants; inflorescences racemose or spicate, terminating in 1-leaved
scape or a dense, cylindric spadix-like spike 13
- 12b. Terrestrial plants; inflorescences not as above 14
- 13a. Aromatic, marshy or emergent aquatic herbs; inflorescences a dense, cylindric
spadix-like spike, apparently lateral as subtended by erect, leaf-like bract; anthers
horseshoe-shaped **Acoraceae**
- 13b. Non aromatic, aquatic herbs; inflorescences racemose or spicate, terminating in
1-leaved scape; anthers not horseshoe-shaped **Pontederiaceae**
- 14a. Shrubs or vines; stems erect or climbing, usually prickly, sometimes unarmed; leaves
opposite or alternate, prominently 3-veined, reticulate between veins, usually bearing
tendrils; flowers usually unisexual; anthers 1-loculed; fruits baccate **Sauriaceae**
- 14b. Shrubs or herbs; stems partly or wholly subterranean and rhizomatous, or more
rarely pachycaul and enormous or occasionally absent; leaves basal and/or cauline,
alternate, opposite, or whorled, parallel or (rarely) reticulate veined; anthers
2-loculed; fruits capsules or berries 15
- 15a. Bulbous herbs; perianth lobes free; stamens not inserted at perianth **Liliaceae**
- 15b. Rhizomatous shrubs or herbs; perianth lobes fused at base; stamens inserted at
perianth 16
- 16a. Stamens usually inserted at apex of perianth tube **Convallariaceae**
- 16b. Stamens usually inserted at base of perianth tube **Dracaenaceae**
- 17a. Flowers irregular; stamens modified in staminodes 18
- 17b. Flowers regular; stamens not modified in staminodes, if modified then plants twining
and having unisexual flowers 20
- 18a. Flowers subtended by prophyll; outer perianth series of 3, free, equal or subequal
lobes; inner perianths 3, united into tube below; anther 1-celled, laterally adnate to
petaloid filaments **Marantaceae**
- 18b. Flowers not subtended by prophyll; both series of perianth united, tubular or
spathaceous; anthers 2-celled 19
- 19a. Plants lacking aromatic oil cells; leaves spirally arranged; leaf sheath closed;
staminodes 5, united into a labellum equaling or much longer than corolla, lateral
staminodes absent; epigynous glands absent (septate nectaries present); placentation
axile **Costaceae**
- 19b. Plants having aromatic oil cells; leaves distichous; leaf sheath open; staminodes 6,
in 2 whorls, lateral 2 staminodes of outer whorl petaloid, or forming small teeth at
base of labellum, or adnate to labellum, or absent, median staminode of outer whorl
always reduced; epigynous glands present; placentation parietal, basal, or axile
Zingiberaceae
- 20a. Leaves variously shaped but never linear; stems scandent or twining; leaves palmately
pinnate; inflorescences pendulous spikes or racemes; flowers unisexual, very small;
stamens 6, all perfect, sometimes 3 modified in staminodes **Dioscoreaceae**

- 20b. Leaves linear; stems not as above; leaves paralicly veined, prominent or obscure; inflorescences not as above; flowers bisexual, conspicuous or very large; stamens 6, all perfect 21
- 21a. Inflorescences umbel-like, 1-many-flowered, terminal on a usually leafless scape, enclosed in bud by 2 or more, usually persistent spathe valves; stamens at perianth throat or at base of lobes; filaments sometimes basally connate; anther dorsifixed or basifixed, mostly introrse; fruits capsules Amaryllidaceae
- 21b. Inflorescences of solitary flowered, few flowered umbels, or racemes which may be condensed and capitate; stamens at base of perianth; anther nearly basifixed or dorsifixed; filaments very short, sometimes subequalling to anther; fruits berries Hypoxidaceae

Hydrocharitaceae

Key to the genera

- 1a. Plants usually monoecious; leaves lanceolate to orbicular, usually petiolate; stamens 6-15; fruits winged; seeds hairy 1. *Ottelia*
- 1b. Plants dioecious; leaves linear to ribbon like, sessile; stamens 1-3; fruits not winged; seeds glabrous 2. *Vallisneria*

1. *Ottelia* Pers.

Ottelia alismoides (L.) Pers., Syn. Pl. 1: 400. 1805; Hook. f., Fl. Brit. India 5: 662. 1888; Prain, Bengal Pl. 2: 997. 1903. *Sratiotes alismoides* L., Sp. Pl. 1: 535. 1753. [Plate 240a]

Parmikalla (B).

Submerged herb. Leaves linear at juvenile stage, turn oblanceolate, ovate or cordate with maturity, 9-13 × 2.5-3 cm, attenuate, entire, acute, chartaceous. Inflorescences of terminal solitary flower, subtended by a spathe; spathe ovate or suborbicular, 2.5-4 × 1.5-2.5 cm, 2-3-lobed, with 3-6 longitudinal wings, wavy. Sepals oblong-lanceolate, scarious, faintly keeled on back. Petals white, obovate or suborbicular with fleshy basal yellow appendages, obtuse. Stamens 10; filaments flat, glandular hairy; anthers sagittate, 5-6.5 mm. Ovary oblong to narrowly ellipsoid; styles 10, flat, 2-fid above; stigma linear-oblong, pubescent. Fruits oblong, 4-5 × 0.8-2 cm, truncate at apex, faintly twisted and angular, enclosed in a spathe; seeds fusiform, hairy.

Flowering & Fruiting: February-October.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 16.02.2010, SKS & GK 47129; Narathali, 20.02.2012, AK 55822.

2. *Vallisneria* L.

Vallisneria spiralis L., Sp. Pl. 2: 1015. 1753; Hook. f., Fl. Brit. India 5: 660. 1888; Prain, Bengal Pl. 2: 996. 1903.

Syala (H).

Dioecious submerged, stoloniferous herb. Leaves tufted, linear, 20–30 × 0.3–0.7 cm, sheathed, wavy, acute, coriaceous, glabrous. Male flowers many, minute in shortly peduncled, 3-lobed ovoid spathe; sepals oblong-ovate, *c.* 2 × 1 mm; petals absent; stamens 1–3; filaments thick; anthers 2-celled; pistilodes absent. Female flower solitary in a tubular, 3-toothed spathe; scape spiral, filiform, 30–50 cm; sepals and petals as in male flowers; staminodes 3, bifid; ovary linear, *c.* 6 mm; style *c.* 2 mm; stigma 3-fid. Fruits linear, 6–7 mm, enclosed by spathe, many seeded.

Flowering & Fruiting: December–March.

Distribution. India: Almost throughout India.

Specimen examined: Rajabhatkhawa range, 16.02.2010, SKS & GK 47128.

Orchidaceae

Key to the genera

- | | |
|---|----------------------|
| 1a. Terrestrial herbs | 2 |
| 1b. Epiphytic herbs | 7 |
| 2a. Pollinia 2 or 4 | 3 |
| 2b. Pollinia 8 | 6 |
| 3a. Plants tuberous; flowers with spur | 13. <i>Habenaria</i> |
| 3b. Plants not tuberous; flowers without spur | 4 |
| 4a. Leaves plicate; flowers non-resupinate | 6. <i>Crepidium</i> |
| 4b. Leaves not plicate; flowers resupinate | 5 |
| 5a. Labellum-epichile entire; column with one stigma-lobe; stipe absent | 12. <i>Goodyera</i> |
| 5b. Labellum-epichile usually 2-lobed; column with two stigma-lobes; stipe present | 24. <i>Zeuxine</i> |
| 6a. Stem cane-like; leaves distichous | 3. <i>Arundina</i> |
| 6b. Stem with pseudobulb; leaves plicate | 18. <i>Phaius</i> |
| 7a. Pollinia 4 or 8 | 8 |
| 7b. Pollinia 2 | 18 |
| 8a. Pollinia 4 | 9 |
| 8b. Pollinia 8 | 17 |
| 9a. Leaves bilaterally compressed, fleshy, ensiform | 15. <i>Oberonia</i> |
| 9b. Leaves not bilaterally compressed, fleshy and ensiform (except <i>Dendrobium terminale</i>) | 10 |
| 10a. Leaves distichous | 11 |
| 10b. Leaves not distichous | 13 |
| 11a. Inflorescences subumbellate; sepals and petals yellow with reddish brown transverse stripes; labellum creamy white, spotted with purple-red, spur yellow | 1. <i>Acampe</i> |

The Flora of Buxa Tiger Reserve, West Bengal, India

- 11b. Inflorescences racemose or solitary; sepals and petals not as above 12
- 12a. Stems not caespitose; inflorescences lateral; lateral sepals not connate at base to form mentum; labellum pink purple, mid lobe linguiform, spurred 21. *Smitinandia*
- 12b. Stems caespitose; inflorescences terminal; lateral sepals connate at base to form mentum; labellum not pink purple, mid lobe not linguiform, not spurred 8. *Dendrobium*
- 13a. Leaf solitary 14
- 13b. Leaf 2 to many 15
- 14a. Labellum mobile, movably hinged to column foot; mentum saccate 4. *Bulbophyllum*
- 14b. Labellum not mobile, not hinged at base; mentum spur-like 10. *Flickingeria*
- 15a. Inflorescences emerging laterally from pseudobulbs; mid lobe of labellum boat-shaped, concave, parallel to rachis 16. *Otochilus*
- 15b. Inflorescences emerging apically from pseudobulbs; mid lobe of labellum not as above 16
- 16a. Inflorescences many flowered spikes; flowers distichously arranged; floral bracts persistent 19. *Pholidota*
- 16b. Inflorescences few flowered racemes; flowers not distichously arranged; floral bracts caducous 5. *Coelogyne*
- 17a. Plants creeping; leaves elliptic, succulent, long hispid and short whitish woolly hairy; inflorescences terminal, solitary 22. *Trichotosia*
- 17b. Plants erect; leaves not elliptic and succulent, glabrous; inflorescences few to many flowered, racemose or spikes 9. *Eria*
- 18a. Leaves slender, not distichous 19
- 18b. Leaves flat, distichous 20
- 19a. Leaves secund; inflorescences shorter than leaves; flowers not spurred 14. *Luisia*
- 19b. Leaves not secund; inflorescences longer than the leaves; flowers broadly spurred 17. *Papilionanthe*
- 20a. Labellum saccate, with deeply lacinate margins 11. *Gastrochilus*
- 20b. Labellum not as above 21
- 21a. Inflorescences densely flowered; flowers pink with light to dark pink spots, shortly spurred; anther cap beaked 22
- 21b. Inflorescences laxly flowered; flowers variously coloured, spurred or not; anther cap not beaked 23
- 22a. Labellum almost perpendicular to ovary, not conduplicate; column glandular pubescent 2. *Acerides*
- 22b. Labellum almost parallel to ovary, often conduplicate; column glabrous 20. *Rhynchostylis*
- 23a. Plants with small pseudobulbs; leaves not conduplicate, without tridentate lobule; flowers not spurred; labellum with 2 callus 7. *Cymbidium*
- 23b. Plants without pseudobulbs; leaves conduplicate, with tridentate lobule; flowers spurred; labellum with 2 raised keels 23. *Vanda*

1. *Acampe* Lindl.

Acampe papillosa (Lindl.) Lindl., Fol. Orchid. 4 (*Acampe*): 2. 1853. *Saccolabium papillosum* Lindl., Edwards's Bot. Reg. 18: t. 1552. 1832; Hook. f., Fl. Brit. India 6: 63. 1890; Prain, Bengal Pl. 2: 1022. 1903. [Plate 240b-c]

Epiphytic herb, 5–20 cm high. Leaves distichous, oblong, 9–13 cm, obliquely bilobed, leathery. Inflorescences often several, leaf-opposed or axillary, 1–4 cm, subumbellate, many flowered. Flowers yellow with brown stripes, sepals and petals yellow with reddish brown transverse stripes, labellum creamy white, spotted with purple-red, spur yellow. Labellum 3-lobed; hypochile weakly saccate; epichile ovate, papillose towards base, warty above; spur straight, cylindrical-conical. Pollinia 4, globose, unequal. Capsules fusiform, 2–3 cm long.

Flowering & Fruiting: November–December.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimen examined: NRVK 5a, 27.11.2011, GK 47147.

2. *Aerides* Lour.

Aerides multiflora Roxb., Pl. Coromandel 3 (3): 67, t. 27L. 1820; Hook. f., Fl. Brit. India 6: 44. 1890; Prain, Bengal Pl. 2: 1020. 1903. [Plate 240d]

Epiphytic herb. Leaves narrowly oblong, 12–30 cm, deeply channelled, obliquely bifid at the apex. Inflorescences racemose, densely many flowered, 8–10 cm, pendulous. Flowers pinkish-white, sepals and petals white to pinkish purple, often spotted with darker purple to light purple. Sepals subequal. Petals oblong to elliptic-oblong. Labellum broadly ovate, clawed. Spur small, almost straight. Pollinia 2, globose, unequally cleft. Capsules stalked, ovoid.

Flowering & Fruiting: May–September.

Distribution. India: Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Rajasthan, Tripura, Uttarakhand and West Bengal.

Specimens examined: Rydak river belt, 20.09.2011, AK 52700; Santrabari to Buxaduar, 18.05.2014, AK 62633; Buxaduar to Achalung, 19.05.2014, AK 62670; Buxaduar to Tashigaon, 20.05.2014, AK 62699.

3. *Arundina* Blume

Arundina graminifolia (D. Don) Hochr., Bull. New York Bot. Gard. 6: 270. 1910; S. Misra, Orchids India: 281. 2007. *Bletia graminifolia* D. Don, Prodr. Fl. Nepal.: 29. 1825. *Cymbidium bambusifolium* Roxb., Fl. Ind. 3: 460. 1832. *Arundina bambusifolia* Lindl., Gen. Sp. Orchid. Pl.: 125. 1831; Hook. f., Fl. Brit. India 5: 857. 1890. *Arundina revoluta* Hook. f., Fl. Brit. India 5: 858. 1890. [Plate 241a]

Terrestrial, cane-like herb, 1.5–2 m high. Leaves alternate, grass like, linear-lanceolate, 5.5–24 cm, acuminate. Inflorescences racemose, few to many flowered, flowers opening in succession. Flowers large, pink or white. Sepals lanceolate to elliptic-lanceolate. Petals spreading, broadly elliptic. Labellum 3-lobed, undulate; lateral lobes embracing column, reflexed; mid lobe nearly square shaped; disk with 3 yellow keels. Pollinia 8. Capsules long ellipsoid, cylindric, strongly ridged.

Flowering & Fruiting: September–March.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Tamil Nadu, Tripura, Sikkim and West Bengal.

Specimens examined: Haudanala, 03.10.2012, AK 58661; Haudanala, 19.02.2013, AK 59855.

4. *Bulbophyllum* Thouars

Bulbophyllum crassipes Hook. f., Fl. Brit. India 5 (16): 760. 1890; S. Misra, Orchids India: 282. 2007. *Bulbophyllum careyanum* Spreng. var. *crassipes* (Hook. f.) Pradhan, Indian Orchids 2: 713. 1979. [Plate 241b]

Epiphytic herb. Pseudobulbs ovoid or conical. Leaf solitary, oblong, 6.5–13.5 cm, leathery. Inflorescences from base of pseudobulbs, racemose, many flowered. Flowers yellowish-brown. Sepals spotted with purple, unequal. Petals golden orange with purple markings, obliquely triangular. Labellum orange yellow, simple to obscurely 3-lobed, oblong. Pollinia 4. Capsules ellipsoid, ribbed.

Flowering & Fruiting: September–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jharkhand, Meghalaya, Mizoram, Odisha, Sikkim and West Bengal.

Specimens examined: Santrabari range, 06.10.2009, SKS & GK 46199; Jainti range, 09.10.2009, SKS & GK 46277; Sankosh, 17.02.2012, AK 55683; Santrabari, 27.09.2013, AK 59612.

5. *Coelogyne* Lindl.

Key to the species

- 1a. Inflorescence with 1 or 2-flowered; flowers large; labellum disk 3-keeled 1. *C. ovalis*
1b. Inflorescence many flowered; flowers small; labellum disk 2-keeled 2. *C. prolifera*

1. *Coelogyne ovalis* Lindl., Edwards's Bot. Reg. 24 (Misc.): 91. 1838; Hook. f., Fl. Brit. India 5: 836. 1888. *Coelogyne arunachalensis* H. J. Chowdhery & G. D. Pal, Nordic J. Bot. 17 (4): 369. 1997. *Coelogyne fuliginosa* Lodd. ex Hook., Bot. Mag. 75: t. 4440. 1849; Hook. f., Fl. Brit. India 5: 836. 1888. [Plate 242a]

Epiphytic herb. Pseudobulbs ovoid to fusiform. Leaves 2, narrowly elliptic or ovate-lanceolate, acute to acuminate, coriaceous. Inflorescences racemose,

1–2-flowered. Flowers greenish yellow. Sepals unequal. Petals linear, reflexed. Labellum oblong, 3-lobed; lateral lobes oblong, minutely fimbriate, mid lobe ovate, ciliate at margins, rounded with mucronate tip; disk 3-keeled. Column winged. Pollinia 4. Capsules subobovoid, ribbed.

Flowering & Fruiting: August–November.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 47276; Buxa Fort to Chunabhati, 30.09.2013, AK 59674.

2. *Coelogyne prolifera* Lindl., Gen. Sp. Orchid. Pl.: 40. 1830; Hook. f., Fl. Brit. India 5: 838. 1888. [Plate 242b]

Epiphytic herb. Pseudobulbs ovoid-cylindric. Leaves 2, plicate, narrowly lanceolate, 6–12 cm, acuminate. Inflorescences racemose, erect, 3–10-flowered. Flowers greenish yellow. Sepals subsimilar, oblong-lanceolate, 8–9 × 2.5–3 mm, obtuse. Petals greenish yellow, linear, 6–7 × c. 0.5 mm, acute, reflexed. Labellum 3-lobed, c. 5 mm long; lateral lobes brown veined, erect, enclosing the column, obtuse; mid lobe yellow, wedge-shaped to obcordate at base expanded to an orbicular-quadrate, undulate-dentate at margins, rounded-retuse; disk 2-keeled. Column yellow, straight, 2-lobed, winged. Pollinia 4. Capsules ovoid, 1.3–1.5 cm long, ribbed.

Flowering & Fruiting: May–July.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal

Specimens examined: Buxaduar, 16.05.1976, JKS 6907; Buxaduar to Achalung, 19.05.2014, AK 62668.

6. *Crepidium* Blume

***Crepidium josephianum* (Rchb. f.) Marg., Ann. Bot. Fenn. 39: 65. 2002; S. Misra, Orchids India: 290. 2007. *Microstylis josephiana* Rchb. f., Bot. Mag. 103: t. 6325. 1877. *Malaxis josephiana* (Rchb. f.) Kuntze, Revis. Gen. Pl. 2: 673. 1891.**

[Plate 243a; Fig. 114a]

Terrestrial herb, 10–17 cm high. Pseudobulbs oblong-filiform, tapering towards apex. Leaves 3–6, plicate, green to pale purplish brown, undulate, acuminate at apex. Inflorescences racemose, laxly 3–6-flowered. Flowers non-resupinate, brownish yellow with purplish brown marking. Sepals subsimilar, broadly ovate, reflexed. Petals linear-oblong. Labellum bowl-shaped, with a strongly cordate-auriculate base, bifid at apex. Pollinia 4. Capsules obovoid, ribbed.

Flowering & Fruiting: May–September.



Fig. 114. *Crepidium josephianum*: a. Habit with flowers (AK 65902); *Dendrobium eriiflorum*: b. Habit with flowers (AK 59705); *Eria stricta*: c. Habit with flowers (AK 59945); *Luisia filiformis*: d. Flowering branchlet (AK 62658).

Distribution. India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Buxa-Adama, 24.05.1949, VN & party 2964; Buxaduar to Chunabhati, 21.05.2014, AK 65902.

7. *Cymbidium* Sw.

Cymbidium aloifolium (L.) Sw., *Nova Acta Regiae Soc. Sci. Upsal.* 6: 73. 1799; S. Misra, *Orchids India*: 290. 2007. *Epidendrum aloifolium* L., *Sp. Pl.* 2: 953. 1753. *Epidendrum pendulum* Roxb., *Pl. Coromandel* 1 (2): 35, t. 44. 1795. [Plate 243b]

Epiphytic herb. Pseudobulbs ovoid. Leaves sessile, lorate, 40–90 cm, thick. Inflorescences arising from base of pseudobulb, racemose, pendulous. Flowers c. 3 cm across, pale yellow to creamy yellow, sepals and petals with central maroon brown stripe, labellum maroon-red to creamy-white. Labellum subovate, 3-lobed, mid-lobe decurved, striped with pink or purple; disk minutely papillate or puberulent, with 2 sigmoid keels. Pollinia 2. Capsules oblong-ellipsoid, 3.5–5 cm long, ribbed.

Flowering & Fruiting: April–August.

Distribution. India: Almost throughout India.

Specimen examined: Buxaduar to Achalung, 19.05.2014, AK 62666.

8. *Dendrobium* Sw.

Key to the species

- | | |
|--|-------------------------|
| 1a. Inflorescences solitary or in pairs; labellum white, 2-lobed | 5. <i>D. terminale</i> |
| 1b. Inflorescences racemose, many flowered; labellum not as above | 2 |
| 2a. Labellum greenish yellow with reddish spots, 3-lobed, pectinate at margins; column densely finely papillate at margins | 2. <i>D. eriiflorum</i> |
| 2b. Labellum not as above; column smooth at margins | 3 |
| 3a. Leaves present during flowering; labellum with fimbriate margins | 3. <i>D. fimbriatum</i> |
| 3b. Leaves absent during flowering; labellum not fimbriate | 4 |
| 4a. Labellum pouch shaped | 4. <i>D. moschatum</i> |
| 4b. Labellum not pouch shaped | 1. <i>D. aphyllum</i> |

1. *Dendrobium aphyllum* (Roxb.) C. E. C. Fisch., *Fl. Madras* 3 (8): 1416. 1928. *Limodorum aphyllum* Roxb., *Pl. Coromandel* 1 (2): 34, t. 41. 1795. *Cymbidium aphyllum* (Roxb.) Sw., *Nova Acta Regiae Soc. Sci. Upsal.* 6: 73. 1799.

[Plate 244a]

Epiphytic herb. Leaves lanceolate to ovate-lanceolate, 4.5–10 cm, subacuminate at apex. Inflorescences lateral, arising from nodes of old stems, 1-flowered.

Flowers pinkish white, labellum with purple lines basally, fragrant. Sepals oblong-lanceolate, subacute. Petals ovate-lanceolate to elliptic, obtuse. Labellum pale yellow with purple lines basally, broadly suborbicular, shortly clawed, margins erose basally, becoming ciliate towards apex, pubescent. Pollinia 4 in 2 pairs. Capsules clavate.

Flowering & Fruiting: March–April.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Chhattisgarh, Manipur, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.

Specimen examined: Gadadhar range, 31.03.2012, GK 50693.

2. *Dendrobium eriiflorum* Griff., Not. Pl. Asiat. 3: 316. 1851. *Dendrobium eriiflorum* var. *sikkimense* Lucksom, Orchids Sikkim N. E. Himalaya: 631, fig. 398, pl. 29, 2007, *nom. inval.* [Plate 244b; Fig. 114b]

Epiphytic herb. Pseudobulbs up to 25 cm, tapering from base to apex with persistent sheaths. Leaves oblong, 5–6 cm, slightly bilobed at apex, thinly coriaceous. Inflorescences 1–4, subterminal, suberect or nodding, many flowered. Flowers yellowish green. Dorsal sepal narrowly oblong; lateral sepals falcate-lanceolate, adnate at base to form a mentum. Petals greenish yellow, narrowly oblong, acuminate. Labellum 3-lobed, pectinate at margins; disk white with purplish red stripes, with 2 or 3-lamellate ridged at centre. Pollinia 4. Capsules ellipsoid, ribbed.

Flowering & Fruiting: August–November.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Chunabhati, 30.09.2013, AK 59705.

3. *Dendrobium fimbriatum* Hook., Exot. Fl. 1 (5): t. 71. 1823; Hook. f., Fl. Brit. India 5: 745. 1890; Prain, Bengal Pl 2: 1010. 1903. [Plate 245a]

Epiphytic herb. Leaves oblong-lanceolate to narrowly elliptic-lanceolate, 8–12 cm, mucro-acute at apex, leathery. Inflorescences racemose, arising from nodes, pendent, laxly 6–12-flowered. Flowers golden yellow with a maroon blotch. Dorsal sepal oblong; lateral sepals obliquely ovate, adnate at base to form a mentum, obtuse; mentum rotund. Petals suborbicular to oblong-elliptic, obtuse. Labellum suborbicular, densely pubescent, clawed, margins plumose-fimbriate. Pollinia 4 in 2 pairs. Capsules not seen.

Flowering: March–May.

Distribution. India: Manipur, Meghalaya and West Bengal.

Specimen examined: Panbari 6, 31.03.2012, GK 50694.

4. **Dendrobium moschatum** (Buch.-Ham.) Sw., Neues J. Bot. 1: 94. 1805; S. Misra, Orchids India: 294. 2007. *Epidendrum moschatum* Buch.-Ham., Account Embassy Kingd. Ava: f. 478. 1800. *Cymbidium moschatum* (Buch.-Ham.) Willd., Sp. PL, ed. 4. 4 (1): 98. 1805. *Dendrobium calceolaria* Carey ex Hook., Exot. Fl. 3 (28): t. 184. 1825; Hook. f., Fl. Brit. India 5: 744. 1890. [Plate 245b]

Epiphytic robust herb. Leaves absent during flowering, oblong-lanceolate, 7–15 cm long, acute at apex, coriaceous. Inflorescences racemose, lateral, arising from nodes of leafy or leafless stem, laxly 8–16-flowered. Flowers yellow orange or yellow apricot, showy, sweetly scented. Dorsal sepal ovate-lanceolate; lateral sepals adnate at base to form a mentum. Petals broadly ovate, obtuse. Labellum mouth pouched with upturned margins, disk thick, glabrous. Pollinia 4 in 2 pairs. Capsules ovoid-pyriform, crenately ridged.

Flowering & Fruiting: July–August.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal

Specimens examined: Buxa-Chunabhati, 17.05.1949, VN 2618; Way to Santrabari, JKS 8112; Buxa Fort to Chunabhati, 30.09.2013, AK 59705.

5. **Dendrobium terminale** C. S. P. Parish & Rehb. f., Trans. Linn. Soc. London 30 (1): 149. 1874; Hook. f., Fl. Brit. India 5: 725. 1890. [Plate 246a-b]

Epiphytic herb. Leaves persistent during flowering, sessile, distichous, equitant, lanceolate, up to 10 cm. Inflorescence terminal, 1–2-flowered. Flowers white to very pale pink with yellow line on the labellum. Sepals connate at base to form mentum. Petals whitish, oblong-elliptic. Labellum white with yellowish edges, triangular-ovate, clawed, slightly reflexed. Pollinia 4 in 2 pairs. Capsules ellipsoid, ribbed.

Flowering & Fruiting: November–February.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: Pana, 11.02.2013, AK 58869.

9. *Eria* Lindl.

Key to the species

- 1a. Inflorescences lateral; flowers greenish yellow; labellum disk with 2 calli
1. *E. lasiopetala*
- 1b. Inflorescences terminal; white flushed with pink; labellum disk with 1 calli
2. *E. stricta*

1. *Eria lasiopetala* (Willd.) Ormerod, Opera Bot. 124: 22. 1995; S. Misra, Orchids India: 298. 2007. *Aerides lasiopetala* Willd., Sp. Pl., ed. 4. 4 (1): 130. 1805. *Eria flava* Lindl., Gen. Sp. Orchid. Pl.: 65. 1830; Hook. f., Fl. Brit. India 5: 801. 1890.

[Plate 246c]

Epiphytic herb. Pseudobulbs fusiform-ellipsoid, bilaterally compressed. Leaves 3–5, apical, lanceolate-oblong, 15–20 cm, 5–7-veined. Inflorescences racemose, lateral, 7–12-flowered. Flowers greenish-yellow, white-tomentose externally outside. Dorsal sepal lanceolate; lateral sepals triangular-lanceolate. Petals greenish yellow, oblong, parallel to column. Labellum greenish yellow, with or without crimson margins, 3-lobed, recurved; disk at base with 2 calli. Pollinia 8. Capsules narrowly fusiform, ribbed.

Flowering & Fruiting: April–July.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Manipur, Meghalaya, Mizoram, Odisha, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Buxa to Bhutan road, VN 2529; Buxaduar, 16.05.1976, JKS 6906; Santrabari to Buxaduar, 18.05.2014, AK 62605.

2. *Eria stricta* Lindl., Coll. Bot.: t. 41b. 1826; Hook. f., Fl. Brit. India 5: 791. 1890; S. Misra, Orchids India: 298. 2007. *Pinalia stricta* (Lindl.) Kuntze, Revis. Gen. Pl. 2: 679. 1891. [Plate 247a; Fig. 114c]

Epiphytic herb. Pseudobulbs crowded, cylindrical. Leaves oblong-elliptic, 7.5–11 cm, acute at apex, coriaceous. Inflorescences racemose, erect, arising from pseudobulb's apex in between leaves, densely many flowered. Flowers secund, white, flushed with pink, white-tomentose externally. Sepals subsimilar, ovate. Petals ovate, obtuse. Labellum white, suborbicular, concave, obscurely 3-lobed, truncate; disk with a small, depressed callus. Pollinia 8. Capsules fusiform, densely white woolly.

Flowering & Fruiting: February–May.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimen examined: Buxaduar to Achalung, 14.02.2014, AK 59945.

10. *Flickingeria* A. D. Hawkes

Flickingeria fugax (Rchb. f.) Seidenf., Dansk Bot. Ark. 34 (1): 46. 1980. *Dendrobium fugax* Rchb. f., Gard. Chron.: 1257. 1871. *Dendrobium sordidum* King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 583. 1897.

Epiphytic herb. Pseudobulbs narrowly fusiform. Leaf solitary, sessile, linear-oblong to narrowly oblong-elliptic, 6–14 cm, leathery. Inflorescences 1 or 2-flowered. Flowers ephemeral, white, labellum white, apex green-yellow; lateral lobes marked with purple spots. Sepal elliptic-oblong. Petals narrowly elliptic-

oblong. Labellum wedge-shaped, apex truncate to obscurely 2-lobed; disk with 2 plicate keels. Pollinia 4 in pairs. Capsules ovoid, ribbed.

Flowering: May–June.

Distribution. India: Arunachal Pradesh, Assam, Mizoram, Sikkim, Uttarakhand and West Bengal.

Specimen examined: NRVK 6a, 11.10.2009, SKS & GK 46292.

11. *Gastrochilus* D. Don

Gastrochilus obliquus (Lindl.) Kuntze, Revis. Gen. Pl. 2: 661. 1891. *Saccolabium obliquum* Lindl., Gen. Sp. Orchid. Pl.: 223. 1833; Hook. f., Fl. Brit. India 6: 61. 1890. [Plate 247b]

Epiphytic herb. Leaves basal, distichous, oblong-lanceolate, 8–20 cm, unequally 2-lobed at apex, leathery. Inflorescences 1–4, from base of stem, subumbellate, often 5–8-flowered. Flowers fragrant, sepals and petals yellow, labellum white, all with brownish purplish spots. Sepals subelliptic, obtuse. Petals spreading, oblong-ob lanceolate, obtuse. Labellum attached at base of column, cup-shaped, sporting a big yellow spot. Pollinia 2. Capsules cylindrical.

Flowering & Fruiting: October–December.

Distribution. India: Arunachal Pradesh, Mizoram, Sikkim and West Bengal.

Specimen examined: Jainti 9, 12.10.2009, SKS & GK 46327.

12. *Goodyera* R. Br.

Goodyera procera (Ker Gawl.) Hook., Exot. Fl. 1: t. 39. 1823; Hook. f., Fl. Brit. India 6: 111. 1890; Prain, Bengal Pl. 2: 1027. 1903; Pradhan, Indian Orchids 1: 109. 1976; S. Misra, Orchids India: 301. 2007. *Neottia procera* Ker Gawl., Bot. Reg. 8: t. 639. 1822. [Plate 248a-b]

Terrestrial, erect herb, 30–50 cm high. Leaves elliptic, 7–14 cm, green, petiolate. Inflorescence terminal, densely 40–60-flowered, racemose, pubescent. Flowers opening weakly, white with pale green tinge at base. Sepals subequal, broadly ovate. Petals cuneate or spatulate. Labellum white, suborbicular, involute at margins, obtuse to subacute, papillose with 2 small calli inside. Pollinia 2. Capsules ellipsoid, ribbed.

Flowering & Fruiting: February–May.

Distribution. India: Almost throughout India.

Specimens examined: Panbari 6, 31.03.2012, GK 50696; Pana, 11.02.2013, AK 58848; Haudanala, 19.02.2013, AK 59845.

13. *Habenaria* Willd.

Habenaria stenopetala Lindl., Gen. Sp. Orchid. Pl.: 319. 1835; Pradhan, Indian Orchids 1: 67. 1976; S. Misra, Orchids India: 303. 2007. [Plate 248c-d]

Terrestrial herb, 40–77 cm high. Tubers oblong-ellipsoid. Leaves clustered about middle of stem, elliptic-oblong, 4–15 cm, acute. Inflorescence densely flowered racemes. Flowers greenish white. Dorsal sepal elliptic-lanceolate, concave; lateral sepals spreading, elliptic-lanceolate, cuspidate, reflexed. Petals linear-subulate. Labellum deeply 3-lobed from base, lobes linear-subulate; spur narrowly cylindrical, longer than ovary. Pollinia 2. Capsules cylindrical-ovoid, ribbed.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Bihar, Chhattisgarh, Goa, Jharkhand, Maharashtra, Meghalaya, Punjab, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Way to Chuniajhora, 28.09.2012, AK 56195.

14. *Luisia* Gaudich.

Key to the species

1a. Leaves not secund; petals equalling to sepals; labellum lacking of dividing line between hypochile and epichile **1. *L. brachystachys***

1a. Leaves secund, long and thin; petals much longer than sepals; labellum with a distinct dividing line between hypochile and epichile **2. *L. filiformis***

1. *Luisia brachystachys* (Lindl.) Blume, Rumphia 4: 50. 1849; Hook. f., Fl. Brit. India 6: 23. 1890; Prain, Bengal Pl. 2: 1019. 1903. *Mesoclastes brachystachys* Lindl., Gen. Sp. Orchid. Pl.: 45. 1830. [Plate 249a]

Epiphytic herb. Leaves terete, obtuse at apex. Inflorescences leaf-opposed, short, 4–5-flowered. Flowers pale-green, c. 7 mm across; labellum pale yellow, column green, purple margined, anther cap yellow spotted with purple. Sepals subequal, dorsal ovate, concave, lateral ovate-oblong. Petals narrowly oblong. Labellum obovate-oblong, glabrous, without a distinct boundary between hypochile and epichile; hypochile concave, narrower than epichile, base without distinct lateral lobes; epichile nearly suborbicular or triangular-rhombic, obtuse. Pollinia 2. Capsules cylindrical.

Flowering: March–April.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Jainti range, 10.10.2009, SKS & GK 46310.

2. *Luisia filiformis* Hook. f., Fl. Brit. India 6 (17): 23. 1890; S. Misra, Orchids India: 306. 2007. *Luisia grovesii* Hook. f., Fl. Brit. India 6 (17): 25. 1890.

[Plate 249b; Fig. 114d]

Epiphytic herb. Leaves cylindrical, 14–26 cm, secund. Inflorescence leaf opposite, few flowered. Flowers spreading, greenish-white, with dark-purple hypochile of labellum. Sepals white, ovate; dorsal sepal concave, obtuse; lateral sepals dorsally

carinate and becoming winged at apex. Petals much longer than sepals, spreading, filiform, obtuse. Labellum white with dark purple centre, divided into hypochile and epichile by a prominent, semicircular dividing line; hypochile oblong, sidelobes auricular near base; epichile with 7–9 thick, longitudinal ridges. Pollinia 2. Capsules obovoid, ribbed.

Flowering & Fruiting: April–June.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Odisha (?) and West Bengal.

Specimen examined: Buxaduar to Achalung, 19.05.2014, AK 62658.

15. *Oberonia* Lindl.

Oberonia mucronata (D. Don) Ormerod & Seidenf. in Seidenf., Contr. Orchid Fl. Thailand 13: 20. 1997; S. Misra, Orchids India: 309. 2007. *Stelis mucronata* D. Don, Prodr. Fl. Nepal: 32. 1825. *Cymbidium iridifolium* Roxb., Fl. Ind. 3: 458. 1832. *Oberonia iridifolia* var. *denticulata* (Wight) Hook. f., Fl. Brit. India 5: 676. 1890. [Plate 250a]

Epiphytic herb. Leaves sessile, equitant, broadly ensiform, slightly falcate, 2–25 cm, acute at apex, fleshy. Inflorescences densely many flowered, pendulous, racemose; floral bracts elliptic. Flowers golden-yellow. Sepals reflexed, similar, ovate. Petals greenish yellow, ovate to lanceolate, acute at apex. Labellum greenish yellow, broadly ovate, 3-lobed, lateral lobes pectinate; mid lobe broad, emarginate, margins pectinate. Pollinia 4. Capsules broadly obovoid, ribbed.

Flowering & Fruiting: September–November.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Tamil Nadu and West Bengal.

Specimen examined: Sankosh, 28.09.2011, AK 52992.

16. *Otochilus* Lindl.

Otochilus lancilabius Seidenf., Opera Bot. 89: 94. 1986; S. Misra, Orchids India: 311. 2007. *Otochilus albus* Lindl. var. *lancilabius* (Seidenf.) Pradhan, Indian Orchids 2: 706. 1979. [Plate 250b-c; Fig. 115a]

Epiphytic herb. Pseudobulbs subcylindric, elongate-fusiform to clavate, sparsely wrinkled. Leaves 2, apical, oblong-lanceolate, 12–25 cm, acuminate at apex. Inflorescences terminal on developing shoot, proteranthous, pendulous, 12–15-flowered. Flowers white-cream. Sepals linear-oblong. Petals linear, acute. Labellum linear-lanceolate, 3-lobed, 0.8–1.5 × 0.3–0.5 cm, broadly funnel-shaped at base, acute; lateral lobes erect, short, obtuse; mid lobe lanceolate to elliptic, boat-



Fig. 115. *Otochilus lancilabius*: a. Flowering branchlet (AK 59928); *Trichotosia daeaphylla*: b. Habit; c. Front view of flower; d. Lateral view of flower (AK 65901).

shaped, concave, parallel to rachis, subacute; disk 3-keeled. Column brownish red, slender, dilated above, curved, winged; rostellum compressed; anther broadly triangular, obtuse; Pollinia 4. Capsules ellipsoid, ribbed.

Flowering & Fruiting: February–May.

Distribution. India: Nagaland, Sikkim, Uttarakhand and West Bengal.

Specimen examined: Buxaduar to Lepchakhawa, 13.02.2014, AK 59928.

17. *Papilionanthe* Schltr.

Papilionanthe teres (Roxb.) Schltr., *Orchis* 9: 78, t. 12. 1915; S. Misra, *Orchids India*: 311. 2007. *Dendrobium teres* Roxb., *Fl. Ind.* 3: 485. 1832. [Plate 251a]

Epiphytic herb. Leaves terete, cylindrical, 7.5–20 cm, curved. Inflorescences leaf opposed, racemose, laxly 3–6-flowered. Flowers opening together, widely spreading, white to pink. Sepals ovate to subrhombic, obtuse. Petals suborbicular, base, margins undulate. Labellum with yellow base and veined with pink spots, 3-lobed, pubescent; lateral lobes erect, semicircular; mid lobe flabellate-obcordate, deeply cleft; spur yellow brown, funnel-shaped. Pollinia 2. Capsules cylindrical, ribbed.

Flowering & Fruiting: May–July.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Tripura, Sikkim and West Bengal.

Specimen examined: Santrabari to Buxaduar, 18.05.2014, AK 62631.

18. *Phaius* Lour.

Phaius tankervilleae (Banks ex L'Hér.) Blume, *Mus. Bot.* 2 (9-12): 177. 1856. *Limodorum tankervilleae* Banks ex L'Hér., *Sert. Angl.* : 28. 1789. [Plate 251b]

Terrestrial herb, 1–2 m high. Pseudobulbs ovoid-conical. Leaves 3–6, apical, elliptic-lanceolate, 30–100 cm long, plicate. Inflorescences arising from base of pseudobulb, 50–200 cm long, loosely 10–25-flowered. Flowers large, 7–12 cm across, drooping, white externally, brown inside, labellum purple pink, suffused with maroon, spur yellow. Sepals oblong-lanceolate. Petals lanceolate-oblong. Labellum broadly rhombic-ovate, shallowly 3-lobed, mid lobe tube-shaped, side lobes have wavy or crinkled edges; disk usually with 2 or 3 ridges, densely puberulent; spur hooked, narrowly cylindrical. Pollinia 8 in 2 groups of four each. Capsules ellipsoid.

Flowering: March–June.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Panbari 6–7, 09.03.2011, GK 50531; Panbari 6, 31.03.2012, GK 50698.

19. *Pholidota* Lindl. ex Hook.

Key to the species

- 1a. Pseudobulbs not clustered, forming chain like pattern; leaves 2 1. *P. articulata*
1b. Pseudobulbs clustered, not forming chain like pattern; leaf solitary 2. *P. imbricata*

1. *Pholidota articulata* Lindl., Gen. Sp. Orchid. Pl.: 38. 1830; Hook. f., Fl. Brit. India 5: 844. 1890. *Pholidota griffithii* Hook. f., Hooker's Icon. Pl. 19: t. 1881. 1889. *Pholidota obovata* Hook. f., Fl. Brit. India 5 (16): 845. 1890. [Plate 252a]

Epiphytic herb. Pseudobulbs oblong, new ones arising near the apex of the old, jointed, branching, furrowed. Leaves 2, apical, ovate to linear-lanceolate, 6–13 cm, plicate, shortly petiolate. Inflorescence raceme, densely many-flowered, pendulous. Flowers brownish-pink. Dorsal sepal ovate to ovate-oblong, obtuse; lateral sepals ovate to ovate-lanceolate, acute to acuminate. Petals ovate to ovate-lanceolate, obtuse to acuminate. Labellum whitish pink, basal part boat-shaped, inflated, tapering, 5-keeled in basal half; apical part recurved, 2-lobed. Pollinia 4. Capsules ellipsoid, ribbed.

Flowering & Fruiting: May–July.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Buxa to Bhutan road, 36th mile, 16.05.1949, VN 2559; Tobgaon Road, 18.05.1949, VN 2709, 2731; Way to Buxaduar, 12.05.1976, JKS 4615; Buxaduar to Achalung, 19.05.2014, AK 62669.

2. *Pholidota imbricata* Hook., Exot. Fl. 2: t. 138. 1825; Hook. f., Fl. Brit. India 5: 845. 1890; S. Misra, Orchids India: 313. 2007. [Plate 252b]

Epiphytic herb, rarely lithophytic. Pseudobulbs clustered, ovoid. Leaf 1, oblong-oblancoate, 19–32 cm, thinly leathery. Inflorescences racemes, arising from young pseudobulbs with nearly mature leaf at anthesis, usually 30–60 cm. Flowers white or pink arranged in two rows. Sepals subequals. Petals sublinear-lanceolate. Lip broadly triangular, slightly 3-lobed, lateral lobes embracing column, mid lobe suboblong, slightly undulate at margins, emarginated; disk with 2 or 3 longitudinal lamellae. Pollinia 4. Capsules obovoid-ellipsoid, ribbed.

Flowering & Fruiting: July–February.

Distribution. India: Almost throughout India.

Specimens examined: Buxa to Bhutan road, VN 2539, 2753; Buxaduar, 13.05.1976, JKS 4668, 4669; Rajabhatkhawa range, 09.02.2010, SKS & GK 46386; Panbari, 31.03.2012, GK 50695; Newlands, 15.02.2012, AK 53028; Buxaduar to Chunabhati, 21.05.2014, AK 65918.

20. *Rhynchosstylis* Blume

Rhynchosstylis retusa (L.) Blume, Bijdr. Fl. Ned. Ind. 7: 286. 1825; Hook. f., Fl. Brit. India 6: 32. 1890; Prain, Bengal Pl. 2: 1020. 1903. *Epidendrum retusum* L., Sp. Pl. 2: 953. 1753. [Plate 252c]

Epiphytic herb. Leaves sessile, broadly lorate, 12–18 cm, retuse or unequally bilobed, leathery. Inflorescence raceme, longer than the leaves, axillary, drooping. Flowers white or pink, dense. Dorsal sepal, suborbicular, obtuse; lateral sepals broadly ovate, obtuse. Petals narrower than sepals, obtuse ovate-elliptic. Labellum often conduplicate, slightly retuse, spurred; spur laterally compressed. Pollinia 2. Capsules obovoid or subclavate, ribbed.

Flowering & Fruiting: May–July.

Distribution. India: Almost throughout India.

Specimen examined: Jainti 6, 12.10.2009, SKS & GK 46327.

21. *Smitinandia* Holttum

Smitinandia micrantha (Lindl.) Holttum, Gard. Bull. Singapore 25: 106. 1969; S. Misra, Orchids India: 316. 2007. *Saccolabium micranthum* Lindl., Gen. Sp. Orchid. Pl.: 220. 1833. *Cleisostoma micranthum* (Lindl.) King & Pantl., Ann. Roy. Bot. Gard. (Calcutta) 8: 234, t. 312. 1898; Hook. f., Fl. Brit. India 6: 59. 1890; Prain, Bengal Pl. 2: 1023. 1903. [Plate 253a]

Epiphytic herb. Leaves distichous, oblong, 1.3–8.5 cm, unequally 2-lobed at apex. Inflorescences racemose, leaf opposed, subdensely many flowered. Flowers pinkish, with dark pink lip. Sepals broadly ovate. Petals oblong. Labellum 3-lobed, spurred; lateral lobes triangular; mid lobe linguiform, convex, erose at margins, obtuse; spur inside a callus near the mouth. Pollinia 4. Capsules ellipsoid, ribbed.

Flowering & Fruiting: April–July.

Distribution. India: Sikkim, Uttarakhand and West Bengal.

Specimens examined: Buxa to Chunabhati, 17.05.1949, VN 2647; Buxaduar, 14.05.1976, JKS 4665; Santrabari to Buxaduar, 18.05.2014, AK 62627.

22. *Trichotosia* Blume

Trichotosia dasyphylla (C. S. P. Parish & Rehb. f.) Kraenzl. in Engler, Pflanzenr. (IV. 50): 138, f. 29. 1911. *Eria dasyphylla* C. S. P. Parish & Rehb. f., Trans. Linn. Soc. London 30: 147. 1874. [Plate 253b; Fig. 115b-d]

Epiphytic herb. Leaves sessile, elliptic-ovate to obovate, 1.2–2 cm, obtuse at apex, fleshy, long hispid hairy and short whitish woolly. Inflorescence axillary, with a

solitary flower. Flower pale yellow. Sepals pubescent outside; dorsal sepal erect, elliptic; lateral sepals broadly triangular, concave, fused at base to form broadly rounded mentum. Petals yellow, oblong, obtuse. Labellum obovate-oblong, margin ciliate, apex subtruncate, with 2 suboblong calli on both sides. Pollinia 8. Capsules ovoid, ribbed, pubescent.

Flowering & Fruiting: May–July.

Distribution. India: Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim, and West Bengal.

Specimen examined: Buxaduar to Tashigaon, 20.05.2014, AK 65901.

23. *Vanda Jones ex R. Br.*

Vanda tessellata (Roxb.) Hook. ex G. Don, Hort. Brit.: 372. 1830; S. Misra, Orchids India: 319. 2007. *Epidendrum tessellatum* Roxb., PL. Coromandel 1: 34. 1795. *Vanda roxburghii* R. Br., Bot. Reg. 6: t. 506. 1820; Hook. f., Fl. Brit. India 6: 52. 1890; Prain, Bengal Pl. 2: 1021. 1903. [Plate 253c]

Epiphytic herb. Leaves distichous, oblong, 12–19 cm, conduplicate, fleshy, obliquely 2-lobed at apex. Inflorescences arising through leaf sheath, laxly 3–6-flowered, racemes. Flowers yellowish-green, with blue tinge. Sepals and petals, tessellate, obovate-spathulate. Labellum creamy white at base, pink or bluish with white lines at apex, 3-lobed; lateral lobes falcate-ovate; mid lobe pendurate, 2-lobed at apex, with 2 raised keels; spur white, conical. Pollinia 2. Capsules clavate-oblong, ribbed.

Flowering & Fruiting: February–August.

Distribution. India: Almost throughout India.

Specimens examined: Jainti 6a, 10.03.2011, GK 46521; Newlands, 15.02.2012, AK 53053.

24. *Zeuxine* Lindl.

Key to the species

- | | |
|--|----------------------------|
| 1a. Leaves grass-like | 2 |
| 1b. Leaves not grass-like | 3 |
| 2a. Hypochile of the labellum without any callus or appendage, not fleshy, sparsely gland-dotted | 2. <i>Z. lindleyana</i> |
| 2b. Hypochile of the labellum with 2 calli or appendages, fleshy, minutely papillose | 6. <i>Z. strateumatica</i> |
| 3a. Petals abruptly apiculate (unilaterally) at apex; tegula bifurcate at base | 4. <i>Z. nervosa</i> |
| 3b. Petals not abruptly apiculate at apex; tegula entire at base | 4 |

Botanical Survey of India

- 4a. Epichile lobules form an obtuse angle (nearly right angle) with axis of labellum 1. *Z. clandestina*
4b. Epichile lobules form an acute angle with axis of labellum 5
- 5a. Epichile lobules 2–3.5 mm, entire at margins 5. *Z. reflexa*
5b. Epichile lobules 4–9.5 mm, serrate at margins 3. *Z. longilabris*

1. *Zeuxine clandestina* Blume, Coll. Orchid. 70: t. 39, f. 4. 1858; A. N. Rao, Indian Forester 122 (12): 1171. 1996.

Terrestrial herb, 10–25 cm high. Leaves 4–7, ovate to ovate-lanceolate, 1.2–3.5 cm, green with obscure reticulations when young. Inflorescence terminal raceme, laxly 6–many-flowered, pale brown pubescent. Flowers resupinate, greenish-yellow. Dorsal sepals ovate, forming hood; lateral sepals slightly oblique. Petals obliquely linear-oblong. Labellum pale green-yellow, 3-lobed; hypochile saccate; epichile 2-lobed, lobes subsquarish, divergent. Pollinia 2. Capsules ellipsoid, ribbed.

Flowering & Fruiting: March–April.

Distribution. India: Arunachal Pradesh, Assam and West Bengal.

Specimen examined: Jainti 7, 05.03.2011, GK 47288.

2. *Zeuxine lindleyana* A. N. Rao, Arunachal Forest News 6 (1): 34. 1988; Anant Kumar & al., Richardiana 12 (4): 198, f. 2. 2012. [Plate 253d]

Terrestrial erect herb, 3–25 cm high, rhizomatous. Leaves grass-like, lanceolate to linear-lanceolate, 1.5–6 cm, acuminate at apex. Inflorescences 3–14-flowered, terminal spikes. Flowers resupinate, white tinged with pink. Sepals sparsely gland-dotted; dorsal sepal ovate; lateral sepals ovate-lanceolate, sometimes oblique. Petals ovate-lanceolate, acute, sparsely gland-dotted. Labellum white with greenish tinge at base, pinkish tinge towards apex, ovate-lanceolate, cymbiform with saccate base without any callus or appendage, acute to subacute, sparsely gland-dotted. Pollinia 2. Capsules oblong-elliptic to fusiform, ribbed.

Flowering & Fruiting: January–May.

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Odisha and West Bengal.

Specimens examined: Kumargram, Hathinala, 21.02.2012, AK 55864; Checko-1, 09.02.2013, AK 58802.

3. *Zeuxine longilabris* (Lindl.) Trimen, Syst. Cat. Fl. Pl. Ceylon: 90. 1885; Hook. f., Fl. Brit. India 6: 107. 1890; Prain, Bengal Pl. 2: 1029. 1903; Pradhan, Indian Orchids 1: 119. 1976. *Monochilus longilabris* Lindl., Gen. Sp. Orchid. Pl.: 487. 1840. [Plate 254a]

Terrestrial erect herb, 11–48 cm high. Leaves ovate to elliptic-ovate, 1.5–5 cm, acute at apex, green. Inflorescences laxly 1–10-flowered. Flowers white base

reddish-brown. Dorsal sepal ovate to triangular, subacute; lateral sepals obliquely ovate-oblong. Petals oblong-falcate, broadly obtuse. Labellum white, 3-lobed, faintly saccate at base, with 2 entire to partly cleft appendages within; lobes falcate to obliquely elliptic, irregularly serrate at margins. Pollinia 2. Capsules pale to light green, ellipsoid, pubescent to villous.

Flowering & Fruiting: January–March.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Maharashtra, Odisha, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Kumargram, 18.02.2012, AK 55723; Rangamati, 14.02.2013, AK 59804; Hatipota, 17.02.2013, AK 59808.

4. *Zeuxine nervosa* (Wall. ex Lindl.) Trimen, J. Ceylon Br. Roy. Asiat. Soc. 9: 90. 1885; Hook. f., Fl. Brit. India 6: 108. 1890; Prain, Bengal Pl. 2: 1029. 1903. *Monochilus nervosus* Wall. ex Lindl., Gen. Sp. Orchid. Pl.: 487. 1840.

[Plate 254b]

Terrestrial erect herb, 20–35 cm high, rhizomatous. Leaves ovate to ovate-elliptic, 4–6 cm, acute at apex. Inflorescences with a few to more than 10 subdensely arranged flowers, sparsely villous. Flowers, white-green, resupinate. Dorsal sepal ovate, acute or subacuminate; lateral sepals oblong-ovate, acute to obtuse. Petals ovate, obtuse. Labellum white or pale yellow, 3-lobed; hypochile concave-saccate; mesochile margins incurved; epichile dilated, 2-lobed; lobes diverging at an acute angle, suborbicular. Pollinia 2. Capsules ellipsoid, ribbed.

Flowering & Fruiting: February–May.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Nagaland, Odisha, Sikkim and West Bengal.

Specimen examined: Jainti 6-7, 08.03.2011, GK 50502.

5. *Zeuxine reflexa* King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 291, t. 388. 1898; Anant Kumar & al., Richardiana 13: 286, f. 1. 2013. [Plate 254c]

Terrestrial erect herb, 17–23 cm high, rhizomatous. Leaves narrowly ovate to lanceolate, 1–2.8 cm, acute at apex. Inflorescences laxly 6–12-flowered, terminal racemes, pubescent. Flowers white, greenish brown. Sepals pubescent; dorsal sepal ovate-lanceolate, subacute; lateral sepals ovate-lanceolate to oblong-ovate, obtuse. Petals obliquely elliptic-lanceolate, obtuse. Labellum creamy white with yellowish tinge, 'Y' shaped, with 2 oblong-conical appendages at base, 2-lobed at apex; lobes oblong, minute apiculus. Pollinia 2. Capsules terete to elliptic-fusiform, ribbed, pubescent.

Flowering & Fruiting: October–March.

Distribution. India: Assam, Sikkim and West Bengal.

Specimens examined: Checko-1, 09.02.2013, AK 58801; Santrabari to Buxaduar, 16.02.2014, AK 59965.

6. *Zeuxine strateumatica* (L.) Schltr., Bot. Jahrb. Syst. 45: 394. 1911; Pradhan, Indian Orchids 1: 115. 1976; S. Misra, Orchids India: 320. 2007. *Orchis strateumatica* L., Sp. Pl. 2: 943. 1753. [Plate 254d]

Terrestrial erect herb, 3–28 cm high, rhizomatous. Leaves grass-like, dull green to brownish green, linear-lanceolate, 0.8–10 cm, acuminate at apex. Inflorescences densely 10–12-flowered, rarely lax, terminal spike. Flowers white with bright yellow labellum. Dorsal sepal ovate, concave; lateral sepals ovate-lanceolate. Petals falcately-oblong. Labellum, saccate, with 2 small oblong calli or warty appendages within; lobes obliquely subquadrate to 'D' shaped to hammer-headed. Pollinia 2. Capsules pale brown, ellipsoid to oblong-ovate, ribbed.

Flowering & Fruiting: February–May.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 09.02.2013, AK 58803.

Costaceae

Hellenia Retz.

Hellenia speciosa (J. Koenig) S. R. Dutta, Pleione 7 (1): 228. 2013. *Banksea speciosa* J. Koenig in Retz., Observ. Bot. 3: 75. 1783. *Costus speciosus* (J. Koenig) Sm., Trans. Linn. Soc. London 1: 249. 1791; Baker in Hook. f., Fl. Brit. India 6: 249. 1872; Prain, Bengal Pl. 2: 1045. 1903. [Plate 255a]

Kust, Keu (B, H); *Sakupaani* (N).

Tuberous erect herb, 1–2 m high. Leaves spirally arranged, elliptic, oblong-obovate to elliptic-oblong, 18–25 × 4–5 cm, cuneate to obtuse, entire, acuminate, coriaceous, tuberculate above, appressed hairy below; leaf sheaths tubular, pilose; ligule truncate, ciliate. Inflorescences terminal head, c. 7 × 5 cm; floral bracts green to crimson red, oblong-ovate; bracteoles red tinged, oblong-ovate. Calyx white, 3-lobed above; lobes elliptic-oblong, 3.5–4.5 × 2–2.5 cm, acute. Petals white, yellowish at throat, faintly pinkish, tubular below, shallowly 3-lobed above, c. 5 × 2–2.8 cm. Lateral staminodes absent. Labellum white with a creamy yellow median band, suborbicular, 5–8 cm wide, wavy at margins, hairy at the band. Stamen 1; filament hairy on back, declinate. Ovary flattened, 3-celled, hairy; stigma ciliate. Capsules reddish, subglobose; seeds black, tetragonous, with fleshy white aril.

Flowering & Fruiting: April–November.

Distribution. India: Almost throughout India.

Specimens examined: Gadadhar range, 05.10.2009, SKS & GK 46180; Newlands, Sukno river, 22.09.2011, AK 52779.

Zingiberaceae

Key to the genera

- 1a. Bracts of inflorescence adnate to each other by their lower margins, forming pouches; anthers versatile, spurred basally 3. *Curcuma*
1b. Bracts of inflorescence usually free to base, not forming pouches; anthers versatile or not, not spurred basally 2
2a. Inflorescences terminal on a leafy shoot 3
2b. Inflorescences basal, directly on rhizome 5
3a. Flowers under 3 cm, sometimes bulbils present; filament strongly curved in upper part; style often becoming separated from filament and forming a 'bow string' across curvature; ovary 1-locular 4. *Globba*
3b. Flowers usually much larger, bulbils rarely formed; filament and style not as above; ovary 3-locular 4
4a. Lateral staminodes reduced to small subulate points or swellings; plane of distichy of leaf blades transverse to rhizome 1. *Alpinia*
4b. Lateral staminodes well-formed, petal-like; plane of distichy leaf blades parallel to rhizome 5. *Hedychium*
5a. Inflorescences cone-like; lateral staminodes absent 7. *Zingiber*
5b. Inflorescences not cone-like; lateral staminodes present 6
6a. Lateral staminodes obovate; labellum pinkish white with red centre, obovate; fertile stamen 1; capsules oblong 2. *Bossenbergia*
6b. Lateral staminodes suborbicular; labellum yellow with purplish centre, suborbicular; fertile stamens 2; capsules fusiform 6. *Hemiorchis*

1. *Alpinia* Roxb.

Key to the species

- 1a. Corolla white; capsules yellow when ripe 1. *A. malaccensis*
1b. Corolla pinkish; capsules black when ripe 2. *A. nigra*

1. *Alpinia malaccensis* (Burm. f.) Roscoe, Trans. Linn. Soc. London 8: 345. 1807; Baker in Hook. f., Fl. Brit. India 6: 255. 1892; Prain, Bengal Pl. 2: 1046. 1903. *Maranta malaccensis* Burm. f., Fl. Ind.: 2. 1768.

Rhizomatous erect herb, c. 3 m high. Leaves oblong-lanceolate, 34–56 × 5–7 cm, acute, entire and undulate, acuminate, coriaceous, glabrous above, pubescent to glabrescent beneath; ligule 2-cleft, slightly tomentose. Inflorescences racemes, erect, c. 25 cm, yellow pubescent; bracteoles white, elliptic. Calyx campanulate, c. 1.5 cm, sericeous. Corolla white, sericeous; lobes oblong-lanceolate, 2.5–3 cm. Lateral staminodes absent. Labellum yellow orange with red stripes, ovate, c. 3.5 × 3 cm, emarginate. Stamen 1; filaments c. 1 cm; anthers c. 1.2 cm. Ovary villous. Capsules yellow, globose, c. 2 cm across, pubescent, dehiscent irregularly; seeds ovoid, 3–4-angled.

Flowering & Fruiting: April–November.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Tamil Nadu and West Bengal.

Specimen examined: Rajabhatkhawa range, 21st mile from Rajabhatkhawa, 13.05.1949, VN & party 2359.

2. *Alpinia nigra* (Gaertn.) B. L. Burt, Notes Roy. Bot. Gard. Edinburgh 35 (2): 213. 1977. *Zingiber nigrum* Gaertn., Fruct. Sem. Pl. 1: 35, t. 12. 1788. *Alpinia allughas* (Retz.) Roscoe, Trans. Linn. Soc. London 8: 346. 1807; Baker in Hook. f., Fl. Brit. India 6: 253. 1892; Prain, Bengal Pl. 2: 1047. 1903. [Plate 255b-c]

Taro, Turuko (B); *Chulumpa* (N).

Rhizomatous erect herb, 2–3 m high. Leaves elliptic-lanceolate to oblong-lanceolate, 30–55 × 4.5–7 cm, cuneate, entire, acuminate, coriaceous; ligule ovate, ciliate. Inflorescences terminal, erect, branched racemes, yellow pubescent; inflorescence bracts triangular-ovate; floral bracts infundibular. Calyx cupular; tube cylindrical, split up to middle, pubescent; lobes 2, triangular-ovate, acute or sometimes cuspidate, tomentose. Corolla pinkish; tube c. 1 cm; lobes oblong, c. 1.2 cm, cucullate, central one wider than lateral ones, pubescent; lateral staminodes subulate. Labellum obovate, c. 1.5 cm, clawed, 2-cleft at apex. Stamen 1; filament flat, c. 1 cm; anther curved. Ovary pubescent; style pubescent; stigma clavate. Berries black, globose, sparsely pubescent, calyx tube persistent; seeds rounded, tuberculate, arillate.

Flowering & Fruiting: May–February.

Distribution. India: Assam, Kerala, Odisha, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55743.

2. *Boesenbergia* Kuntze

Boesenbergia kingii Mood & L. M. Prince, Gard. Bull. Singapore 65 (1): 76. 2013. [Plate 255d; Fig. 116]

Rhizomatous erect herb, 40–70 cm high. Leaves elliptic-ovate, 10–15 × 6–11 cm, cordate, entire, acuminate, chartaceous; ligule ovate. Inflorescences on separate shoots arising from rhizomes, 3–4-flowered; inflorescence bracts elliptic-ovate. Calyx tubular-campanulate; tube 2–3 cm, 3-lobed above, split unilaterally. Corolla white, tubular; tube cylindrical, 1–2.5 cm; lobes 3, elliptic-oblong, 3.5–4 cm, acute or slightly hooded; lateral staminodes obovate. Labellum pinkish white with red centre, obovate, 4.5–5 × 2.5–3 cm. Stamen 1; filament very short; anther c. 1 cm, with linear appendage. Ovary included; style c. 2 cm; stigma subcapitate. Capsules oblong, 3-valved; seeds black, ovoid, with lacinate basal arils.

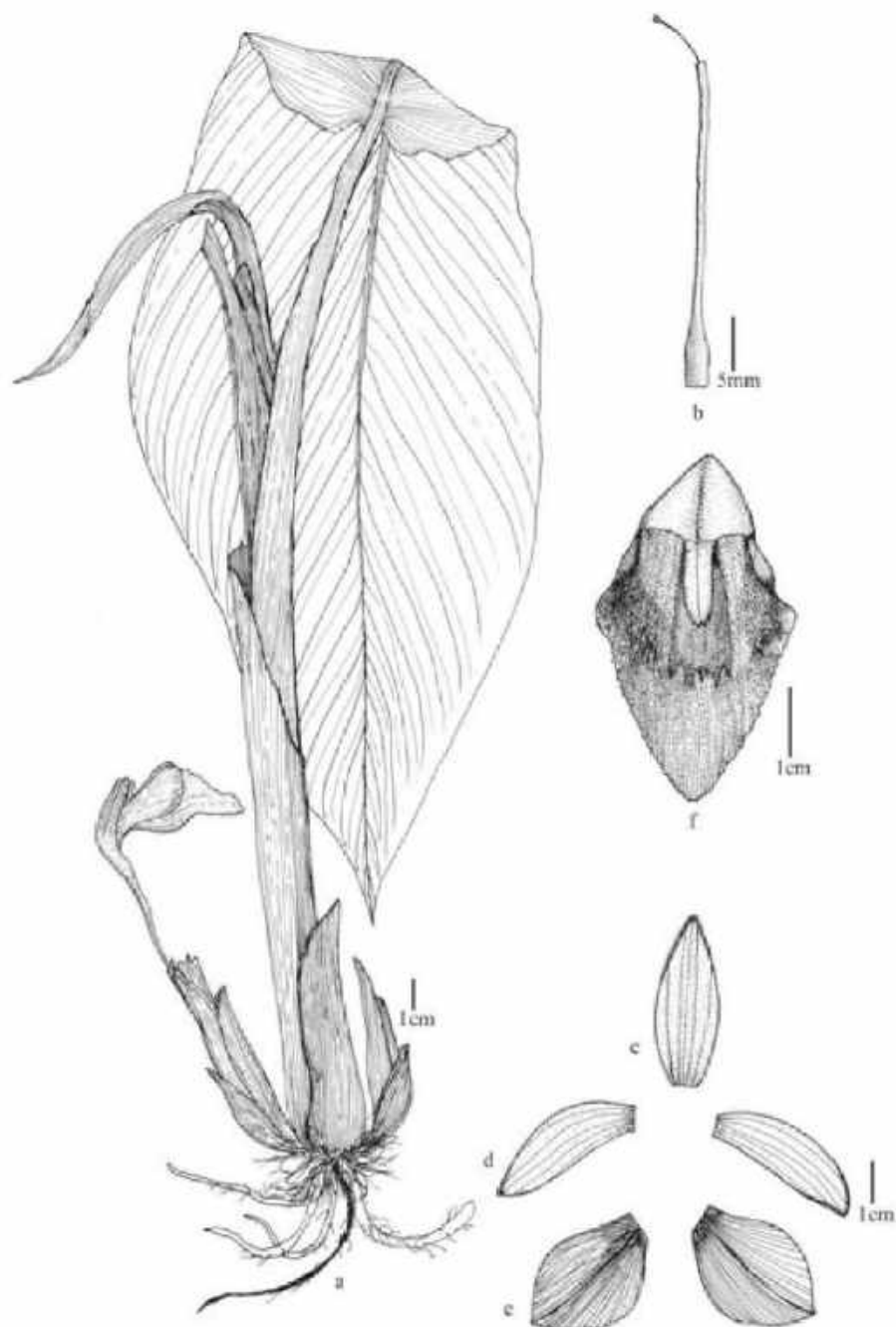


Fig. 116. *Boesenbergia kingii*: a. Habit; b. Corolla tube with style; c. Dorsal corolla lobe; d. Lateral corolla lobes; e. Lateral staminodes; f. Labellum (AK 62606).

Flowering & Fruiting: April–August.

Distribution. India: Assam, Sikkim and West Bengal.

Specimen examined: Santrabari to Buxaduar, 18.05.2014, AK 62606.

Notes: New distributional record for West Bengal.

3. *Curcuma* L.

Curcuma aromatica Salisb., *Parad. Lond.* 1: t. 96. 1807; Baker in Hook. f., *Fl. Brit. India* 6: 210. 1870; Prain, *Bengal Pl.* 2: 1042. 1903.

[Plate 256a-b; Fig. 117a-c]

Jangli haldi, Ban haldi (H).

Rhizomatous erect herb, 40–50 cm high. Leaves lanceolate, 25–70 × 0.6–1.4 cm, attenuate, wavy, acuminate, coriaceous, pubescent. Inflorescences pedunculate spikes on separate shoots, c. 14 cm. Lower floral bracts green, obovate; upper floral bracts deep pink, oblong-ovate. Calyx tubular below, lobed above; tube c. 8 mm; lobes ovate, hairy. Corolla funnelform; tube 2–2.5 cm; lobes pinkish white, oblong, outer one hooded, concave, hairy; lateral staminodes yellowish, obovate-oblong, 1–1.5 cm. Labellum yellow, obovate, c. 2.5 × 2 cm, emarginate. Stamen 1; anther oblong, c. 3.5 mm, spurred at base. Ovary villous; style 1–1.3 cm, sparsely hairy; stigma turbinate, ciliolate. Capsules ellipsoid, 3-valved; seeds ovoid, arillate.

Flowering & Fruiting: March–July.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Karnataka, Kerala, Meghalaya, Nagaland, Tamil Nadu and West Bengal.

Specimens examined: Bhutia Pond, 29.03.2012, GK 50606; Buxaduar to Achalung, 19.05.2014, AK 62665.

4. *Globba* L.

Globba racemosa Sm., *Exot. Bot.* 2: 115, t. 117. 1808; Baker in Hook. f., *Fl. Brit. India* 6: 201. 1890. [Plate 256c]

Alipat (N).

Erect herb with creeping rhizome, 20–40 cm high. Leaves elliptic-lanceolate, 7–10 × 1.2–1.5 cm, cuneate, entire and hairy, caudate-acuminate at apex, chartaceous, sparsely pilose above; ligule auriculate. Inflorescences terminal panicles, 5–7 cm; inflorescence bracts spatulate to obovate; floral bracts 2; larger one elliptic to elliptic-oblong; smaller ovate. Calyx turbinate or top-shaped; tube cupular, c. 4 mm, gland-dotted; lobes unequal, triangular-ovate, sometimes ciliate, acute to acuminate. Corolla yellow, spreading; tube cylindrical, curved; lobes 3, ovate,

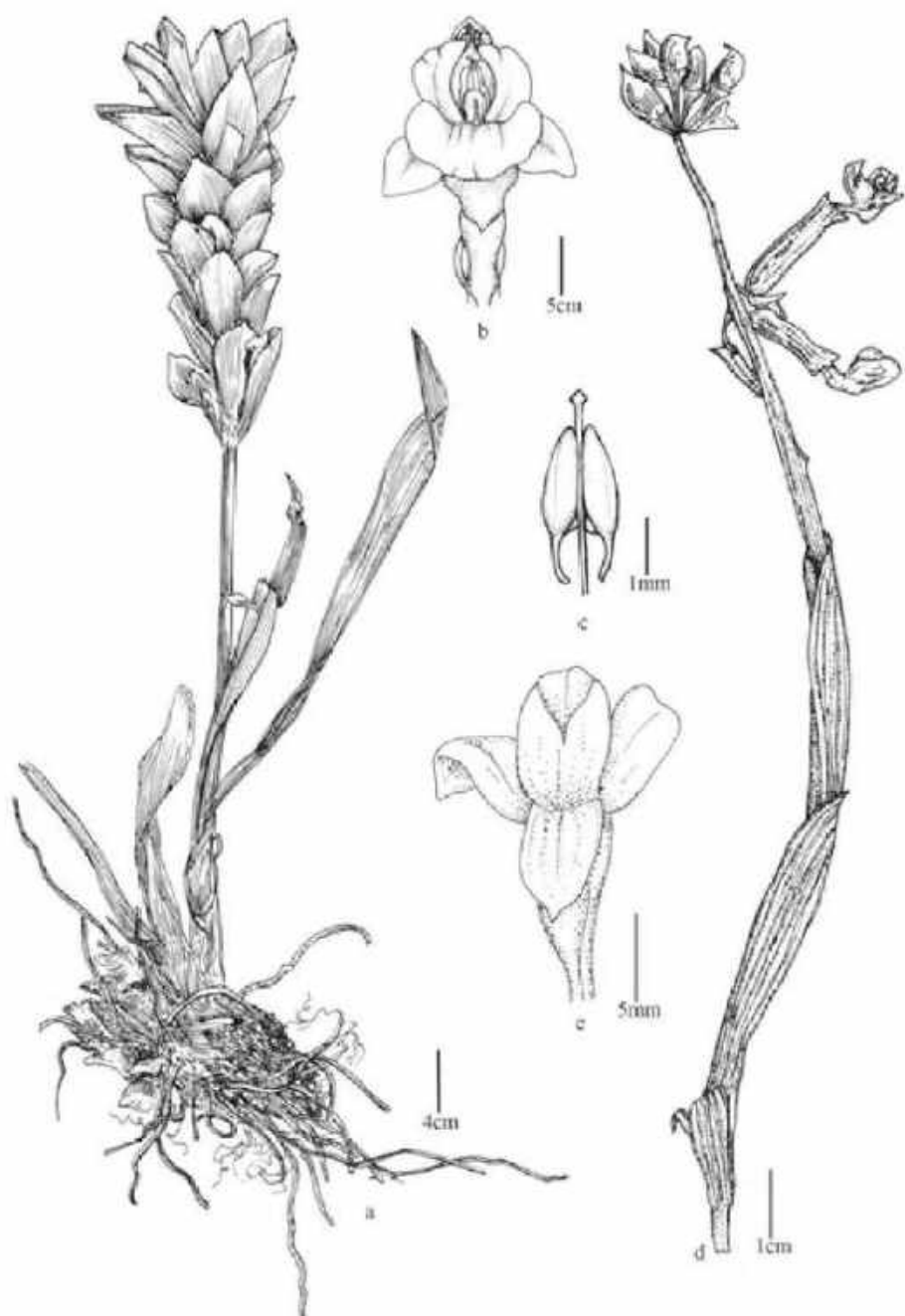


Fig. 117. *Curcuma aromatica*: a. Inflorescence; b. Flower; c. Anther (GK 50606); *Hemiorchis pantlingii*: d. Inflorescence; e. Flower (GK 50501).

concave, mucronate, reflexed, gland-dotted; lateral staminodes lanceolate, gland-dotted. Labellum reflexed, adnate to filament to form a slender tube above lateral staminodes and corolla lobes. Stamen 1; filament, curved; anther elliptic, spurred above. Ovary 1-locular; style c. 9 mm, gland-dotted; stigma minute. Capsules ellipsoid, irregularly dehiscent; seeds ovoid, with white lacerate arils.

Flowering & Fruiting: September–May.

Distribution. India: Assam, Meghalaya, Mizoram, Uttarakhand and West Bengal.

Specimens examined: Bhutia pond, 04.10.2009, SKS & GK 46121; Newlands, Sukno river, 22.09.2011, AK 52753; Bhutanghat, 26.09.2011, AK 52910; Checko-1, 25.09.2012, AK 56154.

5. *Hedychium* J. König

Hedychium thyrsiforme Sm., Cycl. 17: 4. 1811; Baker in Hook. f., Fl. Brit. India 6: 230. 1892; Prain, Bengal Fl. 2: 1040. 1903. [Plate 256d]

Tuberous erect herb, 1–2 m high. Leaves distichous, sessile, elliptic or ovate-oblong, 20–40 × 5–12 cm, attenuate, entire, acuminate at apex, coriaceous, appressed hairy or floccose below; ligules elliptic-ovate. Inflorescence terminal, compact, ellipsoid, head-like spike, 7–11 cm; floral bracts oblong-obovate. Calyx pale green, tubular, dentate and pilose at rim, chartaceous-leathery, sparsely pubescent. Corolla white, tubular, 3–3.5 cm, glandular, sparsely pubescent, pubescent at base inside; lobes 3–4 cm, 2-fid, clawed, glandular; lateral staminodes linear-lanceolate, c. 3 cm, acute, glandular. Labellum suborbicular, 2-cleft, clawed. Stamen 1; filament 6–7 cm, glandular, exserted; anther linear-oblong, curved, connective glandular. Ovary 3-locular; stigma subglobose. Capsules ellipsoid, tuberculate or ridged, umbonate, inserted in persistent bracts, pilose; seeds minute with lacerate aril.

Flowering & Fruiting: August–March.

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Meghalaya, Mizoram, Sikkim, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 05.10.2009, SKS & GK 46181; Panbari 7–8, on the way to 23rd mile road, 27.11.2011, GK 50569; Pana, 11.02.2013, AK 58868; Santrabari to Chunabhati, 04.10.2013, AK 59779.

6. *Hemiorchis* Kurz

Hemiorchis pantlingii King, Ann. Roy. Bot. Gard. (Calcutta) 5: 163. 1895; P. P. Ghosal & S. C. Srivastava, Bull. Bot. Surv. India 48: 197. 2006.

[Plate 257a-b; Fig. 117d-e]

Rhizomatous erect herb, up to 80 cm high. Leaves ovate-lanceolate, 15–40 × 3–6 cm, narrowed at base into short winged petioles, acuminate, subcoriaceous,

strigulose above, glabrous beneath. Inflorescence basal, appearing before leaves, 8–15 cm; inflorescence bracts linear-lanceolate. Calyx tubular; lobes subequal, subacute, lobes shorter than the corolla tube. Corolla 6-lobed, arranged in 2-whorls; outer whorl pinkish, ovate-lobed, c. 1.2 cm; inner whorl yellowish, shorter than the outer whorl lobes; middle lobes rhomboidal concave with a central thick ridge; two lateral lobes broad, obovate, emarginate; lateral staminodes yellow with pinkish-brown spots, suborbicular. Labellum yellow, central thickened part purplish, suborbicular. Fertile stamens 2, incurved. Ovary obliquely ellipsoid, striate, 1-celled; style filiform; stigma projecting slightly above the apex of the anther, cupular. Capsules fusiform, c. 3 cm, puberulous, 8–10-ribbed; seeds ovoid with short white fleshy arils.

Flowering & Fruiting: March–April.

Distribution. India: Assam, Meghalaya, Sikkim and West Bengal.

Specimen examined: Jainti 7, 08.03.2011, GK 50501.

7. Zingiber Mill.

Zingiber zerumbet (L.) Roscoe ex Sm., Exot. Bot. 2: 105. 1806; Baker in Hook. f., Fl. Brit. India 6: 247. 1870; Prain, Bengal Pl. 2: 1045. 1903. *Amomum zerumbet* L., Sp. Pl. 1: 1. 1753. [Plate 257c]

Maha bari bach, Nar kachur (B).

Rhizomatous erect herb, 20–30 cm high. Leaves distichous, sessile or shortly petiolate, lanceolate or oblong-lanceolate, 15–25 × 3–8 cm, cuneate, entire, acuminate, chartaceous, scattered tubercles above, appressed hairy or floccose below; ligules auriculate. Inflorescences from rhizomes, on separate shoot, conical, 6–15 × 3.5–5 cm, obtuse, 1 or 2-flowered at a time; floral bracts green when young, red when old, ovate to suborbicular. Calyx spathe-like, 1.2–2 cm, split unilaterally, 3-toothed above. Corolla white, tubular-campanulate; tube 2–3 cm; lobes pale yellow, 2, lanceolate, central one 1.5–2.5 cm; lateral staminodes absent. Labellum pale yellow, 3-lobed; central lobe suborbicular to obovate, emarginate; lateral lobes 2, obovate. Stamen 1; filament c. 1 cm; anther oblong, with beak-like connective appendage. Ovary 3-locular; style c. 4 mm; stigma subglobose. Capsules ellipsoid; seeds black, globose, arillate.

Flowering & Fruiting: September–December.

Distribution. India: Andhra Pradesh, Assam, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Odisha, Tamil Nadu and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56128.

Marantaceae

Key to the genera

- | | |
|--|---------------------------|
| 1a. Herbs; leaves more than 20 cm; inflorescences a condensed head | 1. <i>Phrynium</i> |
| 1b. Shrubs; leaves less than 20 cm; inflorescences racemes | 2. <i>Schumannianthus</i> |

1. *Phrynium* Willd.

Key to the species

- 1a. Inflorescences head-like cymules; prophylls dissimilar, apex not decaying in fibres; flowers pale orange 1. *P. placentarium*
1b. Inflorescences spike-like cymules; prophylls similar, apex decaying in fibres; flowers pinkish white 2. *P. pubinerve*

1. *Phrynium placentarium* (Lour.) Merr., Philipp. J. Sci. 15 (3): 230. 1919. *Phylloides placentaria* Lour., Fl. Cochinch. 1: 13. 1790. *Phrynium parviflorum* Roxb., Fl. Ind. 1: 7. 1820; Baker in Hook. f., Fl. Brit. India 6: 259. 1892; Prain, Bengal Pl. 2: 1049. 1903. [Plate 257d]

Kufyer, Kawaipat (N).

Rhizomatous erect herb, 70–100 cm high. Leaves distichous, elliptic to elliptic-ovate, 20–30 × 8–12 cm, rounded, entire, acuminate/obtuse, thinly coriaceous. Inflorescences sessile, of 4 or 5 or more spikelets, globose-like cymules, 3–6 cm in diam.; inflorescence bracts crowded, oblong. Prophylls pale yellowish brown, widely ovate; floral prophylls lanceolate. Sepals linear, c. 5 mm. Corolla tubular; tube c. 8 mm; lobes elliptic, c. 5 × 2 mm, acute. Stamens connate below, only 1 perfect. Staminal whorls 2; outer of 1–2, petaloid staminodes, fused below; inner of 2, petaloid staminodes (1 usually hooded) and 1 petaloid stamen bearing a single lateral anther; outer staminodes obovate, c. 5 mm. Ovary glabrous to puberulent apically; style fused with corolla tube, apical part hooked; stigma indistinct. Capsules ellipsoid, 1–1.2 × 0.5 cm, ribbed, gland-dotted or smooth, enveloped in thin exocarp among bracts; seed solitary, ellipsoid, c. 1 cm, red arillate.

Flowering & Fruiting: May–September.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 26.09.2012, AK 56174.

2. *Phrynium pubinerve* Blume, Enum. Pl. Javae 1: 38. 1827. *Phrynium capitatum* Willd., Sp. Pl., ed. 4. 1: 17. 1797, *nom. illeg.*; Baker in Hook. f., Fl. Brit. India 6: 258. 1892; Prain, Bengal Pl. 2: 1049. 1903.

Kudali (B); *Kopat, Kufyer, Kawaipat* (N).

Rhizomatous erect herb, 50–100 cm high. Leaves distichous, elliptic-oblong, 20–40 × 12–16 cm, rounded with attenuate end, entire, shortly acuminate, subcoriaceous. Inflorescences of narrow, condensed, 4–4.5 cm, sessile spike-like cymules; inflorescence bracts rigid, ovate. Prophylls reddish brown, all similar, oblong. Sepals linear, c. 1 cm. Corolla purple, 3-lobed above, tubular below; tube cylindrical; lobes oblong, blue veined, spreading, obtuse, chartaceous, hairy inside; Stamens connate at base, only 1 perfect; staminodes pinkish white, 3; outer pair obovate, one larger than other, other with retuse apex. Ovary inferior; style fused with corolla tube, apically hooked; stigma indistinct. Capsules turbinate, 3-lobed, oblong-obovoid, apex truncate, retuse; seed solitary, ellipsoid, c. 1 cm, red arillate.

Flowering & Fruiting: May–September.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Jainti range, 25.05.1949, VN & party 3001; Gadadhar range, 31.03.2012, GK 56013; Checko-1, 25.09.2012, AK 56147.

2. *Schumannianthus* Gagnep.

Schumannianthus dichotomus (Roxb.) Gagnep., Bull. Soc. Bot. France 51: 176. 1904. *Phrynium dichotomum* Roxb., Asiat. Res. 11: 324. 1810. *Clinogyne dichotoma* Salisb., Trans. Hort. Soc. London 1: 276. 1812, *nom. inval.*; Baker in Hook. f., Fl. Brit. India 6: 258. 1892; Prain, Bengal Pl. 2: 1048. 1903.

Mukta-pati, Pati-pati, Patipata, Madar-pati (B).

Shrub, 2–4.5 m high. Leaves elliptic or oblong-elliptic, 8–15 × 3.5–7 cm, rounded, entire, shortly acuminate, coriaceous. Inflorescences terminal panicles, c. 13 cm. Prophylls pale brown, stiffly erect, lanceolate. Sepals triangular, c. 6 × 1.5 mm. Corolla white, campanulate; tube short; lobes lanceolate, c. 3.5 × 0.6 cm. Stamens connate in a corolla tube, perfect 1, lobes petaloid; staminodes 2, oblanceolate, c. 3.5 cm. Ovary 3-loculed; style adnate below to the staminal tube, free, hooked above; stigma capitate, hairy. Fruit indehiscent, 1–3-seeded; seeds subglobose, arillate.

Flowering & Fruiting: June–October.

Distribution. India: Assam and West Bengal.

Specimen examined: Gadadhar range, 31.03.2012, GK 56005.

Amaryllidaceae

Crinum L.

Crinum amoenum Roxb. ex Ker Gawl., J. Sci. Arts (London) 3: 106. 1817; Hook. f., Fl. Brit. India 6: 282. 1892; Prain, Bengal Pl. 2: 1061. 1903. [Plate 258a]

Bulbous herb, 30–40 cm high; bulbs subglobose. Leaves sessile, dark green, linear-lanceolate, 4–10 × 0.5–1.5 cm, sheathing at base, entire, sharply acuminate, subcoriaceous. Inflorescences 5–7-flowered umbels on erect peduncle, nearly as long as leaves; inflorescence bracts linear-lanceolate. Flowers fragrant. Perianth salverform; tube greenish red, straight, 7–10 cm; lobes 6, white, linear, 4.5–9 × 0.6–0.9 cm, acuminate, spreading. Stamens 6; filament white below, reddish above, 4–5 cm; anthers linear, 1–1.2 cm. Ovary fusiform, 2.2–2.8 cm; style 10–13.5 cm; stigma subclavate. Capsules subglobose, 3–5 cm across, dehiscent; seed often solitary, orbicular.

Flowering & Fruiting: May–August.

Distribution. India: Maharashtra, Meghalaya, Sikkim and West Bengal.

Specimen examined: Buxaduar to Achalung, 19.05.2014, AK 62635.

Hypoxidaceae

Molineria Colla

Molineria capitulata (Lour.) Herb., Amaryllidaceae: 84. 1837. *Leucojum capitulatum* Lour., Fl. Cochinch. 1: 199. 1790. *Curculigo recurvata* W. T. Aiton, Hort. Kew., ed. 2: 2: 253. 1811; Hook. f., Fl. Brit. India 6: 278. 1892; Prain, Bengal Pl. 2: 1059. 1903. [Plate 258b]

Dhoti sara, Wurdo lago (N).

Perennial herb, 0.5–1 m high. Leaves from a rhizomatous rootstock, flat, fibrous, radical, oblong-lanceolate to elliptic, 40–85 × 9–12 cm, attenuate, entire, acuminate, ribbed longitudinally. Inflorescences many flowered, star shaped, peduncled, dense capitate to subovoid racemes at the base of the plant; floral bracts lanceolate. Perianth 6 in 2 whorls, yellow, connate at base; lobes ovate-lanceolate, 7–8 × 3–3.5 mm, obtuse to subacute with mucronate tip and bearded; outer lobes villous; inner whorl villous on midvein. Stamens 6 in 2 whorls, subsessile; anthers linear-oblong, 4–5 mm. Ovary grey brown tomentose; style yellow, 5–6 mm; stigma subcapitate. Fruits whitish to green, hairy, 7–8 × 6–6.5 mm; seeds numerous, small, embedded in white pulp, black, irregularly pyriform, tuberculate, grooved.

Flowering & Fruiting: April–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Newlands, 15.02.2012, AK 53086; Hauda nala, 03.10.2012, AK 58690; Buxaduar to Achalung, 19.05.2014, AK 62639.

Convallariaceae

Ophiopogon Ker Gawl.

Ophiopogon intermedius D. Don, Prodr. Fl. Nepal.: 48. 1825; Hook. f., Fl. Brit. India 6: 269. 1892. [Plate 258c-d]

Perennial herb, with thick root stocks, 30–40 cm high. Leaves radical, in tufts, linear, 21–39 × 0.3–1 cm, attenuate and swollen, serrulate, acute, subcoriaceous. Scape c. 25 cm, strongly curved below the inflorescence, sometimes slightly flattened and narrowly 2-winged. Inflorescences 4–13-flowered panicle; inflorescence bracts oblong-ovate. Flower solitary or in paired. Perianth 6, white, free, ovate to ovate-lanceolate, 7–8 × 2.5–3.5 cm, acute. Stamens 6; filaments 1–2 mm; anthers 2–4.5 mm. Ovary globose; style basally slightly wide; stigma slightly toothed. Berries ovoid, 7–10 mm across; seeds ovoid.

Flowering & Fruiting: May–October.

Distribution. India: Meghalaya and West Bengal.

Specimens examined: Jainti 8, 12.10.2010, SKS & GK 46317; Checko, 29.11.2011, GK 47164; Checko-1, 25.09.2012, AK 56126.

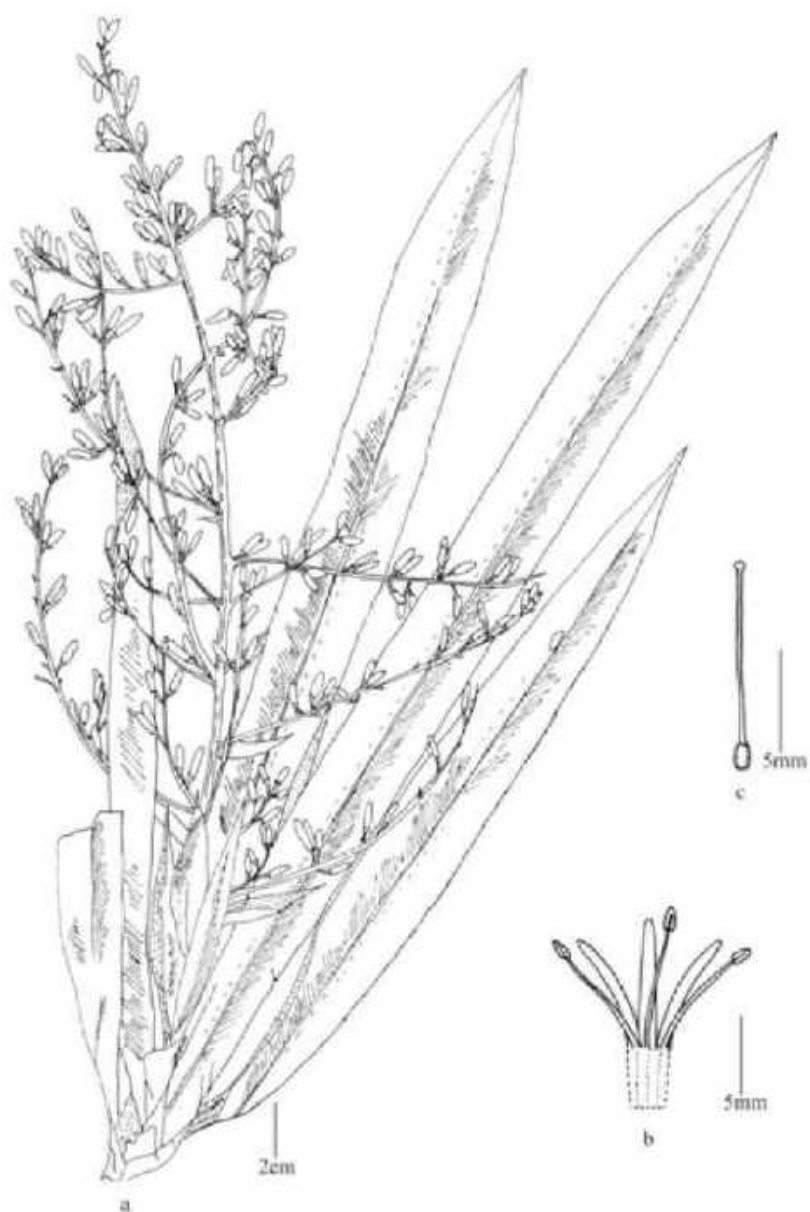


Fig. 118. *Dracaena angustifolia*: a. Flowering branchlet; b. Flower; c. Gynoecium (GK 47176).

Dracaenaceae

Dracaena Vand.

Dracaena angustifolia (Mcdik.) Roxb., Fl. Ind. 2: 155. 1832; Hook. f., Fl. Brit. India 6: 327. 1892. *Terminalis angustifolia* Medik., Theodora: 83. 1786.

[Plate 259a-b; Fig. 118]

Makaipate (N).

Pachycaul herb, 1–3 m high. Leaves spaced along distal part of stems, whorled, sword-shaped to linear-oblongate, 22–42 × 2–2.8 cm, clasping at base, wavy, acute, leathery. Inflorescences terminal panicles; inflorescence bracts leafy, linear-lanceolate or ovate. Flowers in clusters of 2 or 3, oblong-cylindric in buds, 0.8–1.1 cm; floral bracts ovate. Perianth greenish white, tubular, 6-lobed; tube linear-oblong, 7–8 × 0.5 mm; lobes linear, 1.1–1.6 cm. Stamens 6; filaments flattened, c. 5 mm; anthers linear-oblong, c. 2.5 mm, sagittate at base, divergent. Ovary oblong-ovate, c. 2 × 1.25 mm; style flattened, c. 6.5 mm; stigma capitate. Berries green, globose, 0.8–1.2 cm across, shallowly 2-lobed.

Flowering & Fruiting: November–March.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: SRVK 11-10, 29.11.2011, GK 47176; Panbari 3, 05.03.2011, GK 47256.

Dioscoreaceae

Dioscorea L.

Key to the species

- | | | |
|-----|--|-------------------------|
| 1a. | Stems twining to right | 2 |
| 1b. | Stems twining to left | 5 |
| 2a. | Secondary veins prominent on underside, forming ladder-like pattern | 1. <i>D. belophylla</i> |
| 2b. | Secondary veins not prominent on underside, not forming ladder-like pattern | 3 |
| 3a. | Leaves alternate to subopposite, ovate, undulate and cartilaginous at margins, pubescent below; perianth dissimilar in male and female flowers; outer whorls of perianth pubescent | 7. <i>D. pubera</i> |
| 3b. | Leaves opposite, elliptic-ovate, entire and not cartilaginous at margins, glabrous below; perianth similar in male and female flowers; outer whorls of perianth glabrous | 4 |
| 4a. | Leaves fulveolate above, rounded waxy deposits below; veins 5 from base; styles 3 from base; capsules obovate | 3. <i>D. glabra</i> |
| 4b. | Leaves smooth on both surfaces; veins 7–9 from base; styles fused below, 3-lobed above; capsules obovate to obovate | 4. <i>D. hamiltonii</i> |

- 5a. Stems prickly at base, pilose; leaves digitately 3–5-foliolate, cuncate at base; veins pinnate, brown pubescent below; petioles pilose; stamens 3 5. *D. pentaphylla*
- 5b. Stems not prickly at base, glabrous; leaves simple, cordate at base; veins palmate, glabrous below; petioles glabrous; stamens 6 6
- 6a. Stems subangular, narrowly winged; leaves ovate to suborbicular; veins 3–5 from base; male flowers sessile, solitary on axis; capsules elliptic-oblong, reflexed 2. *D. bulbifera*
- 6b. Stems terete, not winged; leaves triangular-ovate; veins 9–11 from base; male flowers subsessile, 2–4 in clusters on axis; capsules suborbicular, not reflexed 6. *D. prazeri*

1. *Dioscorea belophylla* (Prain) Voigt ex Haines, Forest Fl. Chota Nagpur: 530. 1910. *Dioscorea nummularia* Lam. var. *belophylla* Prain, Bengal Pl. 2: 1067. 1903.

Panus torul, *Ghita torul* (N).

Twining herb. Leaves cordate or triangular ovate, 6–12 × 3–6.3 cm, cordate at base (in basal leaves) or truncate or subcordate at base (terminal leaves), undulate, acute to acuminate, coriaceous. Inflorescences axillary panicles of spikes, 5–17 cm, hirsute; floral bracts ovate or suborbicular. Male: perianth lobes 6, obovate, c. 0.75 × 0.5 mm, thick. stamens 6; filament free around pistillode, 0.2–0.3 mm; anthers tetrahectous. Female: flowers solitary or 2 together, axillary. Capsules with narrower wings.

Flowering & Fruiting: October–January

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Bihar, Himachal Pradesh, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Jainti range, 06.10.2009, SKS & GK 46195.

2. *Dioscorea bulbifera* L., Sp. Pl. 2: 1033. 1753; Hook. f., Fl. Brit. India 6: 296. 1892. *Dioscorea sativa* sensu Hook. f., Fl. Brit. India 6: 295. 1892, non L. 1753. *Dioscorea bulbifera* var. *sativa* Prain, Bengal Pl. 2: 1066. 1903 (incl.: var. *crispata* and var. *pulchella*). [Plate 259c-d]

Githa, *Gita*, *Githa lahara*, *Kumchong simpot* (N).

Climbing herb, twining to left; bulbils dull grey brown with orbicular spots, globose to ovoid. Leaves ovate to suborbicular, 7–16 × 5.5–13.5 cm, cordate, entire to slightly undulate, caudate-acuminate to abruptly cuspidate at apex, chartaceous to subcoriaceous. Inflorescences clustered in leaf axils, drooping spikes. Male: flowers solitary, sessile; floral bracts and bracteoles ovate, 0.5–1.2 × 0.3–0.7 mm, acuminate; perianth 6 in 2 whorls, lanceolate, 0.8–1 × 0.2 mm, acute; stamens 6; filaments minute; anthers c. 0.4 mm. Female: flowers same as male flowers;

staminodes 6, minute. Ovary inferior; styles 3; stigma capitate. Capsules pale yellow, elliptic-oblong, 2–2.5 × 1–1.5 cm, 3-winged, reflexed, drooping; seeds dark brown, 1 or 2 in each locule, c. 0.5 × 0.4 cm, inserted near apex of capsule, with oblong winged.

Flowering & Fruiting: July–October.

Distribution. India: Andaman & Nicobar Islands, Karnataka, Maharashtra, Madhya Pradesh and West Bengal.

Specimens examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52732; Narathali, 23.09.2011, AK 52807, 52818; Phashkhawa river belt, 30.09.2012, AK 58549.

Notes: Bulbils are edible and eaten by Lepcha and Dumpha tribes.

3. *Dioscorea glabra* Roxb., Fl. Ind. 3: 804. 1832; Hook. f., Fl. Brit. Ind. 6: 294. 1892. *Dioscorea nummularia* sensu Prain, Bengal Pl. 2: 1067. 1903, non Lam. 1789. [Plate 260a]

Shora-atu (B).

Climbing herb, twining to right. Leaves elliptic-ovate, 6–7.5 × 2.7–4.7 cm, cordate to truncate or rounded, entire, caudate-acuminate, chartaceous, fulveolate and dark brown above, rounded waxy deposits below. Inflorescences spikes, 2–4 together, 3–4 cm, usually in narrow, axillary panicles in males and spikes paired, up to 37 cm long in females; inflorescence bracts triangular-ovate; floral bracts ovate. Male: perianth 6 in 2 whorls; outer whorl elliptic-oblong, c. 1 mm across, acute to obtuse; inner whorl obovate, 0.6–0.7 mm across, rounded, thick; stamens 6; filaments inflexed; anthers minute; pistillodes pyramid-shaped. Female: perianth 6 in 2 whorls; outer whorl ovate, obtuse; inner whorl obovate, rounded. staminodes 6, minute; ovary pilose; styles 3, falcate; stigma recurved. Capsules obovate, 1.2–1.8 × 3–4 cm (including wings), 3-winged, woody; seeds brownish, 2 in each locule, obovate, c. 1.6 × 2 cm (including wings).

Flowering & Fruiting: September–February.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 5a, 06.12.2011, GK 52348; Marakata, 24.09.2011, AK 52845; Sankosh, 28.09.2011, AK 52977; Kumargram, 18.02.2012, AK 55701.

4. *Dioscorea hamiltonii* Hook. f., Fl. Brit. India 6 (18): 295. 1892; Prain, Bengal Pl. 2: 1067. 1903. [Plate 260b]

Jat torul (N).

Climbing herb, twining to right. Leaves elliptic-ovate, 4.5–12 × 1.8–7.5 cm, usually cordate to hastate, truncate to rounded in young ones at base, entire, acuminate to

caudate, subcoriaceous. Inflorescences: male spikes 1–2 cm, in groups of 2–6 at leaf axils, on zig-zag angular axis; female spikes single or paired in axils, rather few flowered; inflorescence bracts linear-lanceolate; floral bracts and bracteoles ovate; perianth 6 in 2 whorls; outer ones elliptic-ovate, 0.8–1 × 0.5 mm, concave, subacute to obtuse; inner whorl obovate, rounded, thick. Male: stamens 6; filaments minute; anthers elliptic; pistillodes ovoid. Female: staminodes 6; ovary inferior; styles fused in erect column, 0.5–1.5 mm, 3-lobed above; stigma oblong, recurved. Capsules obovate to ovate, 19–25 × 38–43 mm, 3-winged; seeds 1 or 2 in each locule, ovate to circular with a straight edge along capsule axis, 6.5–7.5 × 7–7.5 mm, winged.

Flowering & Fruiting: August–December.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Jainti range, 06.10.2009, SKS & GK 46196; Sankosh, 28.09.2011, AK 52987; North Rydak, 26.09.2011, AK 52943; Checko-1, 26.09.2012, AK 56170; Phashkhawa, 27.09.2012, AK 56191.

5. *Dioscorea pentaphylla* L., Sp. Pl. 2: 1032. 1753; Roxb., Fl. Ind. 3: 806. 1832; Hook. f., Fl. Brit. Ind. 6: 289. 1892; Prain, Bengal Pl. 2: 1066. 1903. [Plate 260c]

Bhegur, Behagur (N).

Climbing herb, twining to the left, prickly, pilose; bulbils brown to dark brown or grey, obovoid to ovoid. Leaves digitately 3–5-foliolate; leaflets unequal, obovate to oblanceolate, 5–9 × 1.8–3.5 cm, cuneate to obliquely cuneate, entire and pilose to glabrous, acuminate, chartaceous. Inflorescences pendent, racemose, compound, 2–6 mm, 1–2 per axils in males and spicate, simple, 3.2–26 cm, 1–3 per axils in females; inflorescence bracts linear-lanceolate; floral bracts and bracteoles ovate to suborbicular. Male: perianth 6 in 2 whorls, cucullate; outer whorl ovate, 0.7–1 × 0.3–0.4 mm, acute to obtuse; inner whorl obovate, obtuse; stamens 3; filaments flattened; anthers ovate to rounded, flattened; staminodes 3, clavate, flattened; pistillodes ovoid. Female: perianth 6 in 2 whorls; outer whorl oblong to ovate-oblong, 1.3–2 mm, acute to obtuse; inner whorl elliptic-oblong, 0.8–1.5 mm, obtuse; staminodes 6, antheriform to filiform; ovary inferior; styles 3, recurved; stigma minute, recurved. Capsules oblong to elliptic-oblong, 11–21 × 8.5–12.5 mm, 3-winged, reflexed; seeds brownish, 1 or 2 in each locule, lenticular-ovoid with a small apical projection, 3–4.5 mm across, winged.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimens examined: Santrabari, 21.05.1949, VN & party 2897; Bhutanghat, 28.05.1949, VN & party 3070; Checko-1, 25.09.2012, AK 56125, 56142; Santrabari to Buxa Fort, 28.09.2013, AK 59619.

6. *Dioscorea prazeri* Prain & Burkill, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 73 (Suppl.): 2. 1905. *Dioscorea deltoidea* Wall. ex Griseb. var. *sikkimensis* Prain, Bengal Pl. 2: 1066. 1903. [Plate 260d; Fig. 119a-b]

Kukur toral (N).

Climbing herb, twining to left, sparsely prickly; bulbils few or absent. Leaves triangular-ovate, 5–22 × 1.6–12 cm, cordate, repand, acuminate, coriaceous. Inflorescences axillary, clustered, 3–19 cm long spikes in males and solitary in axils, 4–12 cm long spikes in females; inflorescence bracts minute. Male: perianth pale brown, 6 in 2 whorls, oblanceolate, 1–1.5 × 0.5–1 mm, rounded; stamens 6; filaments 0.5–0.7 mm; anthers minute. Female: floral bracts ovate; perianth same as in male flowers but slightly larger; ovary inferior; styles 3; stigma minute. Capsules suborbicular, 2–2.7 cm across, 3-winged, reflexed; seeds brownish, 2 in each locule, oblong, blunt, white winged.

Flowering & Fruiting: September–November.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimen examined: Buxa Fort to Achalung, 29.09.2013, AK 59648.

7. *Dioscorea pubera* Blume, Enum. Pl. Javae. 1: 21. 1827. *Dioscorea anguina* Roxb., Fl. Ind. 3: 803. 1832; Hook. f., Fl. Brit. Ind. 6: 293. 1892; Prain, Bengal Pl. 2: 1066. 1903. [Plate 261a; Fig. 119c]

Kukur-alu (B); *Panglang*, *Pangla torul* (N).

Climbing herb, twining to right, pubescent; bulbils small, rarely produced. Leaves ovate to ovate, 10–12 × 6.5–9 cm, shallowly cordate, undulate and cartilaginous, short caudate-acuminate, pubescent. Inflorescences axillary, densely flowered, clustered, 1–2.5 cm long spikes on 4.5–17 cm long pubescent axis in males and axillary spikes single or paired on short, pubescent axis in females; inflorescence bracts lanceolate; floral bracts minute. Male: perianth 6 in 2 whorls, elliptic-ovate, c. 1.2 × 0.8 mm, obtuse, pubescent in outer whorls only; stamens 6; filaments minute; anthers c. 0.3 mm; pistillodes globose. Female: flowers distantly on spikes; perianth same as in male flowers but shorter and wider; ovary inferior; styles 3; stigma minute. Capsules suborbicular, 2.5–3.8 cm across, 3-winged, pubescent at angles; seeds 1 or 2 in each locule, oblong, 2–3 mm, surrounded by brown wing.

Flowering & Fruiting: August–January.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Buxa Fort to Achalung, 29.09.2013, AK 59647.

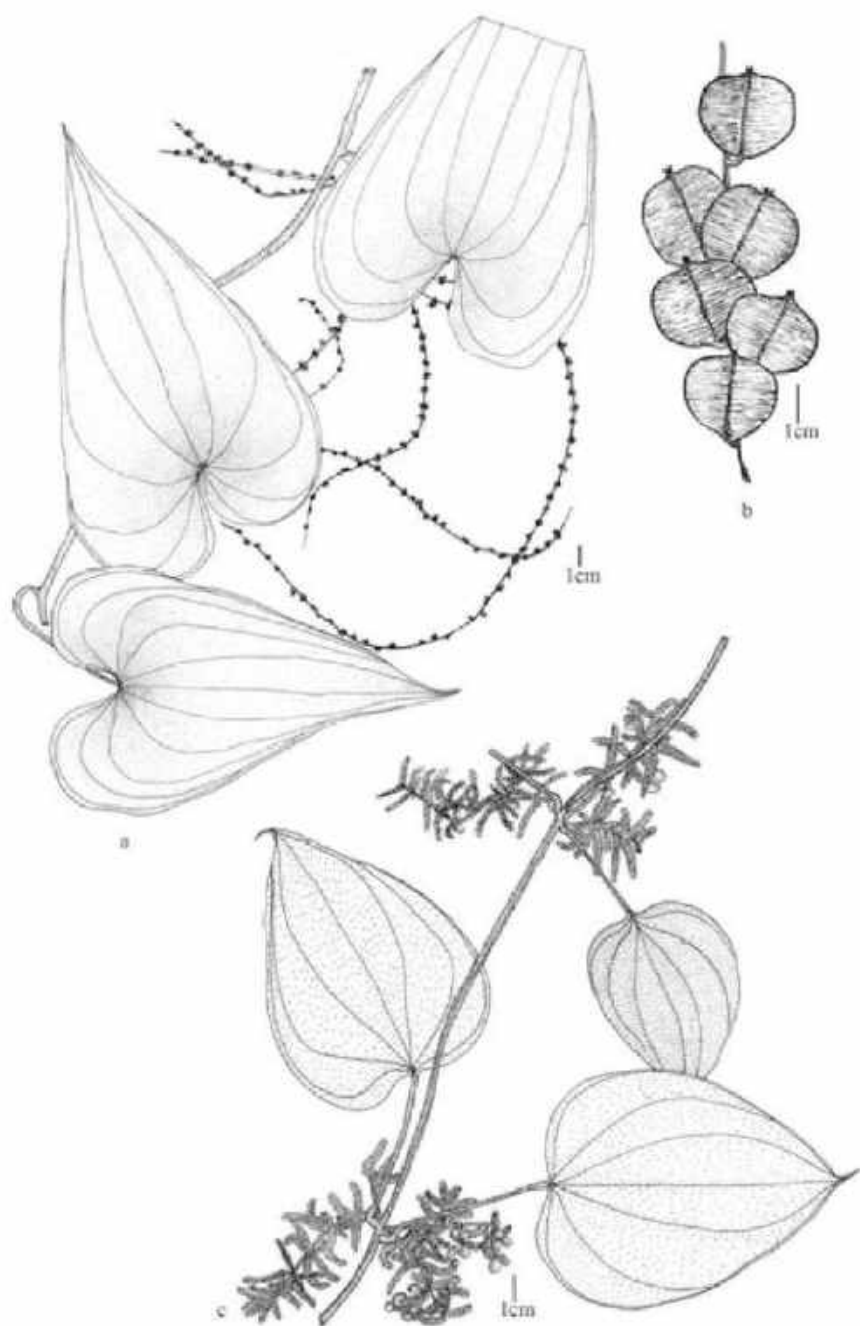


Fig. 119. *Dioscorea prazeri*: a. Flowering branchlet; b. Fruits (AK 59648); *Dioscorea pubera*: c. Flowering branchlet (AK 59647).

Liliaceae

Drimia Jacq. ex Willd.

Drimia indica (Roxb.) Jessop, J. S. African Bot. 43 (4): 272. 1977. *Scilla indica* Roxb., Fl. Ind. 2: 147. 1832. *Urginea indica* Kunth, Enum. Pl. 4: 333. 1843; Hook. f., Fl. Brit. Ind. 6: 347. 1892; Prain, Bengal Pl. 2: 1075. 1903.

Perennial herb; bulbs globose, 5–5.5 cm across, tunicate. Leaves appearing after flowers, linear-lanceolate, ensiform, 15–50 × 1.5–2 cm, overlapping at base, entire, acute. Inflorescences racemose on a leafless scape often appearing before leaves; scape 15–31 cm, flowers very distant and laxly arranged; floral bracts minute, deciduous; perianth pale brown, campanulate; lobes 6, linear-oblong, 8–10 mm, white at margins, acute. Stamens 6, included; filaments flattened below, 6–7 mm; anthers yellow, oblong-linear. Capsules ellipsoid, 1.5–1.8 cm, 6–9-seeded; seeds black, elliptic, flattened.

Flowering & Fruiting: April–May.

Distribution. India: Almost throughout India.

Specimen examined: Panbari 8, 31.03.2012, GK 56026.

Smilacaceae

Smilax L.

Key to the species

- 1a. Leaves not gland-dotted below; wings of petiole not clasping the stem at base, 0.5–1 mm wide; filaments 5–5.5 mm 1. *S. ovalifolia*
1b. Leaves gland-dotted; wings of petiole clasping the stem at base, 0.7–2 cm wide; filaments 2–2.5 mm 2. *S. perfoliata*

1. *Smilax ovalifolia* Roxb. ex D. Don, Prodr. Fl. Nepal.: 49. 1825. *Smilax macrophylla* Roxb., Fl. Ind. 3: 793. 1832; sensu Hook. f., Fl. Brit. India 6: 310. 1892, non Willd. 1805; Prain, Bengal Pl. 2: 1071. 1903.

Kumarika (B); *Kukur dyoti* (N).

Large dioecious climbing shrubs, sparsely prickly. Leaves ovate to suborbicular, 12–25 × 15–20 cm, cuneate to rounded, rarely slightly cordate, entire and scarious, abruptly contracted to cuspidate, chartaceous to subcoriaceous; petiolar wings narrowly oblong, 0.5–1 mm wide, not clasping stem at base; tendrils well developed, arising from apex of wings. Inflorescences of 2 or 3, pedunculate umbels, many flowered, 1–5 cm across; prophylls ovate; inflorescence bracts deciduous; floral bracts ovate. Male: perianth 6 in 2 whorls, reflexed, 1-nerved; outerwhorl elliptic-oblong, 5–6 × 1.5–1.8 mm, hooded; inner whorl linear-oblong, 5–6 × 0.6–0.8 mm; stamens 6; filaments 5–5.5 mm; anthers linear, 1.2–1.5 mm.

Female: perianth slightly smaller than male ones, otherwise same; staminodes 3; ovary 3-locular; style inconspicuous; stigma 3, curved. Berries dark red when ripe, ellipsoid-globose, 0.9–1.2 cm across, pulpy; seeds dark brown, 1 or 2, ellipsoid, 0.6–1 × 0.5–0.6 cm.

Flowering & Fruiting: March–December.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 23.09.2011, AK 52806; Buxaduar to Chunabhati, 21.05.2014, AK 65914.

2. *Smilax perfoliata* Lour., Fl. Cochinch. 2: 622. 1790. *Smilax prolifera* Roxb., Fl. Ind. 3: 795. 1832; Hook. f., Fl. Brit. India 6: 312. 1892. *Smilax roxburghiana* Wall. ex Hook. f., Fl. Brit. India 6: 311. 1892; Prain, Bengal Pl. 2: 1071. 1903.

[Plate 261b-d; Fig. 120]

Large climbing dioecious shrub, prickly. Leaves usually elliptic-lanceolate to elliptic-ovate, larger ones ovate to suborbicular, 12–18.5 × 6.5–17 cm, rounded to cuneate, occasionally shallowly cordate, entire and scarious, cuspidate (occasionally damaged and appearing retuse), chartaceous to subcoriaceous, gland-dotted; petiolar wings 7–20 mm wide, strongly clasping stem at base; tendrils arising from apex of wing. Inflorescences of 7 or 8, many flowered, pedunculate umbels, 1.8–2.5 cm across, on 11–25 cm long zig-zag rachis; prophylls ovate; inflorescence bracts ovate; floral bracts ovate. Male: perianth 6 in 2 whorls, reflexed, 1-nerved; outer whorl elliptic-oblong, 3–4 × 1–1.5 mm, slightly hooded and acute; inner ones linear, 3–4 × 0.3–0.4 mm; stamens 6; filaments 2–2.5 mm; anthers elliptic, 1.5–2 mm. Female: perianth slightly smaller than that of male flowers, or else same as in male flowers; staminodes 3; ovary 3-locular; style inconspicuous; stigmas 3, curved. Berries red when ripe, globose, 4–6 mm across, pulpy; seeds brown, 1 or 2, ellipsoid, 3–4 × 0.8–1.5 mm.

Flowering & Fruiting: February–August.

Distribution. India: Arunachal Pradesh, Assam, Sikkim and West Bengal.

Specimens examined: SRVK 11, 09.03.2011, GK 50516; Narathali, 20.02.2012, AK 55765.

Pontederiaceae

Pontederia L.

Key to the species

- 1a. Petioles with bulbous swelling; inflorescences racemes, overtopping the leaf; flowers sessile, asymmetric; perianth connate at base, all not in uniform colour; stamens 6, 3 bigger and 3 smaller 1. *P. crassipes*

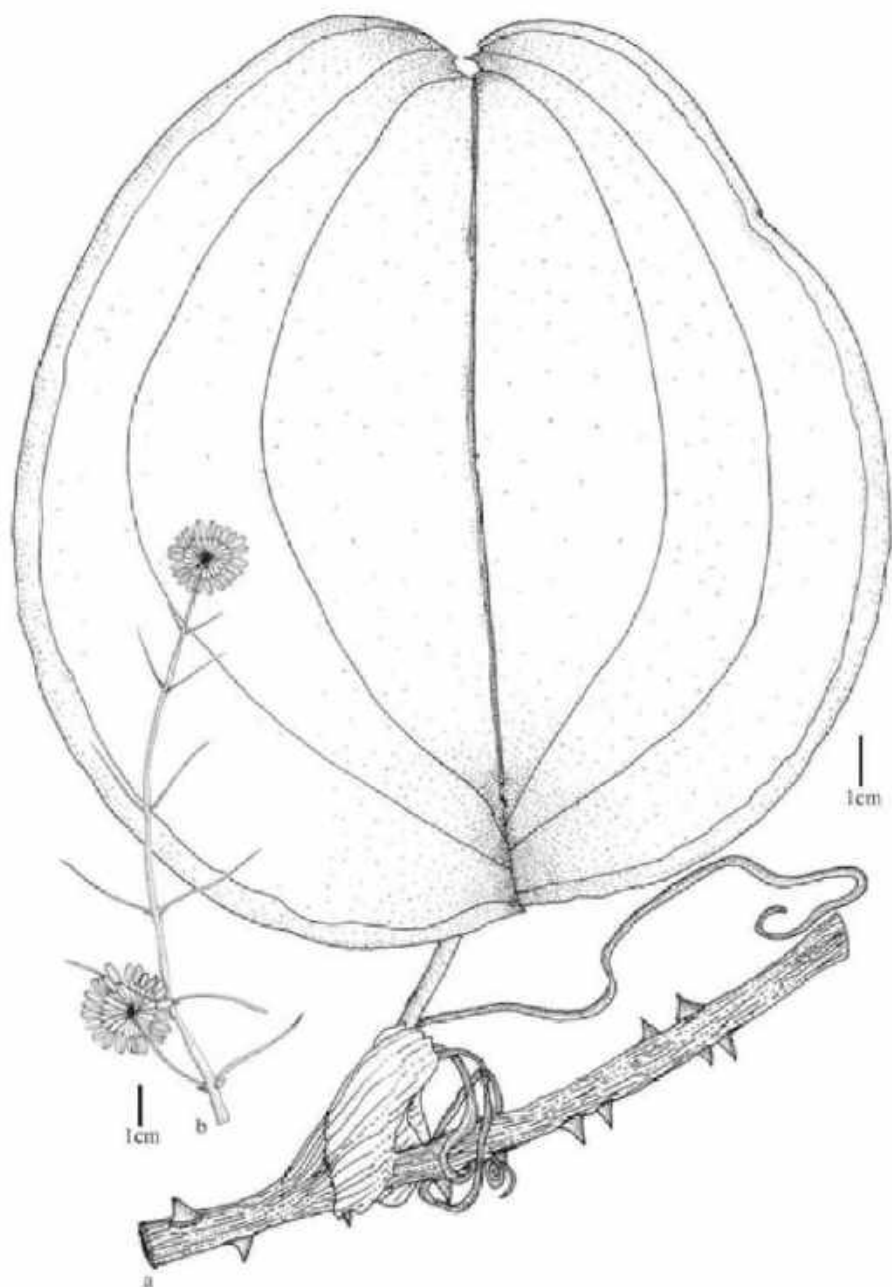


Fig. 120. *Smilax perfoliata*: a. Leafy branchlet; b. Inflorescence (AK 55765).

- 1b. Petioles without bulbous swelling; inflorescences umbels or subumbels, never overtopping the leaf; flowers pedicellate, symmetric; perianth free, all in uniform colour; stamens 6, 1 bigger and 5 smaller 2
- 2a. Leaves cordate, basal lobes sharply angled; inflorescences remaining erect after anthesis 2. *P. hastata*
- 2b. Leaves truncate to shallowly cordate, basal lobes circular; inflorescences reflexed after anthesis 3. *P. vaginalis*

1. *Pontederia crassipes* Mart., Nov. Gen. Sp. Pl. 1: 9, t. 4. 1823. *Eichhornia crassipes* (Mart.) Solms in A. DC., Monogr. Phan. 4: 527. 1883; C. D. K. Cook, Aquatic and Wetlands Pl. India: 329. 1996. [Plate 262a]

Kachuri pana (B).

Perennial, free floating, stoloniferous herb, up to 60 cm high. Leaves cauline, submerged and emergent, ovate-orbicular, 2.5–3.5 × 3–5 cm, subcordate, entire, rounded to short acuminate, coriaceous. Inflorescences 6–10-flowered, 10–15 cm, erect racemes, spathaceous; spathes 2, lower one leaf-like and upper one scale-like; perianth blue purple, larger perianth blue with yellow spot at middle, 6 in 2 whorls, connate at base; lobes unequal, oblanceolate, 3–4 × 2–3.6 cm, narrowed, obtuse to slightly retuse. Stamens 6 in 2 whorls; outer 3 bigger, exerted; inner 3 smaller, included; filaments blue purple, 2.5–3 cm, glandular hairy; anthers pale blue, oblong. Ovary pale green, oblong, c. 0.5 cm; style 6–8 mm; stigma pale green, 3-lobed, glandular hairy. Capsules ovoid, 3-valved; seeds oblong, c. 1.5 mm, with 8–10 longitudinal ribs.

Flowering & Fruiting: May–September.

Distribution. India: Almost throughout India.

Specimen examined: Narathali, 20.02.2012, AK 55768.

2. *Pontederia hastata* L., Sp. Pl. 1: 288. 1753. *Monochoria hastifolia* C. Presl, Reliq. Haenk. 1 (2): 128. 1827, *nom. illeg.*; Hook. f., Fl. Brit. India 6: 362. 1892; Prain, Bengal Pl. 2: 1079. 1903. *Pontederia sagittata* Roxb., Fl. Ind. 2: 124. 1832, *nom. illeg.* [Plate 262b–c]

Rhizomatous perennials herb. Leaves basal, hastate, 12–18 × 5.8–6.5 cm, cordate, wavy, acute, subcoriaceous, gland-dotted beneath. Inflorescence subumbellate, enclosed by spathe; spathe ovate, c. 3.4 × 2 mm, membranous, gland-dotted. Perianth blue, 6-lobed; lobes subequal. Stamens 6; filaments adnate to perianth; anthers 6 (5 smaller + 1 longer), oblong, 4–5 mm. Ovary ellipsoid; style shortly spreading hairy. Capsules oblong, c. 1 cm; seeds brown, oblong, winged.

Flowering & Fruiting: July–March.

Distribution. India: Almost throughout India.

Specimen examined: Rajabhatkhowa, 22.04.1959, CRD 8.

3. *Pontederia vaginalis* Burm. f., Fl. Ind.: 80. 1768. *Pontederia plantaginea* Roxb., Fl. Ind. 2: 123. 1824. *Monochoria vaginalis* (Burm. f.) C. Presl, Reliq. Hacnk. 1: 128. 1827, *nom. inval.*; Hook. f., Fl. Brit. India 6: 363. 1892; Prain, Bengal Pl. 2: 1079. 1903. [Plate 262d]

Nukha (B); *Pirulay* (N).

Annual or weakly rhizomatous perennial herb, 25–40 cm high. Leaves radical, cordate-ovate to lanceolate or sagittate, 3–5.5 × 0.6–2.5 cm, cordate, entire, acuminate, coriaceous. Inflorescences deflexed, 3–4-flowered umbels, opposite to leaf, never overtopping the leaf. Perianth blue purple, 6 in 2 whorls, free, membranous; outer whorl lanceolate, 10–12 × 4–5 mm, acute; inner whorl obovate, 10–14 × 5–7 mm, subacute. Stamens 6, exerted, unequal, 1 bigger, other 5 smaller; filaments blue purple, 2–3 mm; anthers yellow, larger one blue purple, linear-oblong. Ovary oblong-ovoid, 2–3.5 × c. 2 mm, 3-lobed, pubescent; style bluish, 1–2 mm, slightly curved; stigma obscurely 3-lobed. Capsules ellipsoid, c. 1 cm across, 3-valved, striated; seeds oblong, 0.5–1 mm, with 8–14 longitudinal ribs.

Flowering & Fruiting: January–June.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 16.02.2010, SKS & GK 47118; Rydak river belt, 20.09.2011, AK 52663; Kumargram, Hathinala, 21.02.2012, AK 55840; Chuniajhora, 28.09.2012, AK 58510.

Commelinaceae

Key to the genera

- 1a. Inflorescences emerging through the leaf sheaths, sessile, capitate; fertile stamens 6
1. *Amischotolype*
- 1b. Inflorescence not emerging through leaf sheaths, peduncled, not capitate; fertile stamens 6 or fewer 2
- 2a. Filaments glabrous 3
- 2b. Filaments hairy 6
- 3a. Inflorescences reduced thyrses, 4–10-flowered cincinni, closely subtended or enclosed in leafy bracts (spathes) 2. *Commelina*
- 3b. Inflorescences lax thyrses with many flowered cincinni, not enclosed in spathes 4
- 4a. Fruits baccate, indehiscent; seeds 6–8 in each locule 6. *Pollia*
- 4b. Fruits capsules, dehiscent; seed solitary in each locule 5
- 5a. Decumbent herbs; flowers pinkish, densely arranged; sepals glandular pubescent 4. *Floscopa*

- 5b. Erect herbs; flowers white, laxly arranged; sepals glabrous 7. *Rhopalephora*
6a. Stamens 2-3; staminodes 3-4, bearing small 3-lobed sterile antherodes; seeds with dorsal or semi-dorsal embryotega 5. *Murdannia*
6b. Stamens 6, all bearing fertile anthers; seeds with terminal embryotega 3. *Cyanotis*

Amischotolype Hassk.

Amischotolype hookeri (Hassk.) H. Hara, Fl. E. Himalaya: 399. 1966. *Forrestia hookeri* Hassk., Flora 47: 629. 1864; Hook. f., Fl. Brit. India 6: 384. 1892; Prain, Bengal Pl. 2: 1086. 1903. [Plate 263a]

Erect herb, 30-50 cm high. Leaves elliptic-obovate, 14-26 × 3.8-8.4 cm, wavy at margins, acuminate, subcoriaceous. Inflorescences in dense capitate heads at the base of sheath, sessile. Calyx pinkish, campanulate; tube short; lobes obovate-oblong, 8-9 × 6 mm, ciliate, obtuse, keeled, silky golden hairy. Corolla campanulate; tube short; lobes oblong, 8-9 × 5-6 mm. Stamens 6; filaments flattened, c. 8 mm, bearded; anthers c. 2.5 mm. Ovary ellipsoid; style sericeous at base; stigma capitate. Capsules ellipsoid-trigonous, golden hairy; seeds 3-4, 1 locule with 2 seeds, other two with 1 seed each, oblong, rugose.

Flowering & Fruiting: July-November.

Distribution. India: Assam, Manipur, Meghalaya, Sikkim and West Bengal.

Specimens examined: Tobgaon, 2000-3000ft, 18.05.1949, VN & party 2708; Jaintia 8-9, 12.10.2009, SKS & GK 46324; Checko 2, 27.11.2011, GK 47148.

2. Commelina L.

Key to the species

- 1a. Spathes infundibular 2
1b. Spathes ovate-lanceolate to ovate 3
2a. Plants with underground cleistogamous flowers; leaves ovate to ovate-elliptic, 1.5-3.5 cm, rounded at base, entire and hispid at margins, acute to obtuse at apex, hispid; leaf sheaths 1-1.3 cm; petioles distinct 1. *C. benghalensis*
2b. Plants without underground cleistogamous flowers; leaves elongate elliptic-lanceolate, 5-15 cm, cuncate at base, wavy and glabrous at margins, acuminate at apex, scabrous and gland-dotted above, glabrous below; leaf sheaths 2-2.5 cm; petioles indistinct 3. *C. paludosa*
3a. Leaves glandular at margins; stalk of spathes hairy; spathes ovate-lanceolate; capsules 8-9 mm; seeds not papillose, testa finely reticulate 2. *C. diffusa*
3b. Leaves not glandular at margins; stalk of spathes glabrous; spathes ovate; capsules 5-6 mm; seeds papillose, testa reticulate punctate 4. *C. sikkimensis*

1. Commelina benghalensis L., Sp. Pl. 1: 41. 1753; Hook. f., Fl. Brit. India 6: 370. 1892; Prain, Bengal Pl. 2: 1082. 1903. [Plate 263b]

Kanchira (B, H); *Kaney jhar* (N).

Decumbent herb, 20–30 cm high, hispid. Leaves ovate to ovate-elliptic, 1.5–3.5 × 0.9–2.2 cm, rounded, entire and hispid, acute to obtuse, chartaceous, hispid. Inflorescences axillary and terminal cymes, 3–4-flowered and in spathes; spathes infundibular, 7–9 × 5–12 mm, truncate, stalked, sometimes a vertical slit at lateral side, hispid. Flowers 3–4, two exerted from spathe, 2 on each peduncle. Outer sepal cucullate, free; inner 2 often connate below, obovate. Petals blue, ovate to suborbicular, 8–12 × 6–10 mm, inner 2 larger than the outer one, clawed. Fertile stamens 3, free; filaments 3–7 mm; staminodes 2–3, antherodes yellow, cruciform. Ovary ovoid; style short; stigma simple. Capsules 2–3-locular, dehisce loculicidally; seeds grey brown, 2 in each locule, usually subtriangular, testa reticulately pitted, hilum linear, embryotega lateral, circular with an erect tip at centre, punctate.

Flowering & Fruiting: July–November.

Distribution. India: Almost throughout India.

Specimens examined: Rydak river belt, 20.09.2011, AK 52656; Newlands, Sukno river, 22.09.2011, AK 52767.

2. *Commelina diffusa* Burm. f., Fl. Ind.: 18, t. 7, f. 2, 1768. *Commelina nudiflora* auct. non L. 1753: Hook. f., Fl. Brit. India 6: 369. 1892; Prain, Bengal Pl. 2: 1082. 1903. [Plate 263c]

Decumbent herb, 10–20 cm high. Leaves lanceolate, 1.6–7.2 × 0.5–1.7 cm, cuneate, entire and glandular, acute to acuminate, chartaceous. Inflorescences cymes with 2 exerted flowers; spathe ovate-lanceolate, 1.5–2.2 × 1.2–1.4 cm, folded, cordate at base, falcate to acuminate, on 10–12 mm long hairy stalk. Flowers 2, exerted from spathe, solitary on each peduncle. Sepals elliptic-lanceolate, often 2 connate at base. Petals blue, reniform above, clawed; adaxial pair ovoid, 2.3–2.5 × 3 cm, slightly emarginate; abaxial petal c. 1.7 × 0.6 cm, with a hyaline median vein. Fertile stamens 3; anthers divaricate, connective bluish; staminodes 3, with club-like pseudo anthers. Ovary minute; style short; stigma simple. Capsules 1–3 per spathe, oblong, 3-locular, dorsal locules 1-seeded, ventral locules 2-seeded; seeds grey brown, ellipsoid, testa finely reticulate, hilum linear, embryotega circular pit at centre.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Tashigaon 1, 09.10.2009, SKS & GK 46275; Sankosh, 28.09.2011, AK 52996; Newlands, 15.02.2012, AK 55619; Narathali, 20.02.2012, AK55816; Marakata, 24.09.2011, AK 52869.

3. *Commelina paludosa* Blume, Enum. Pl. Javae 1: 2. 1827. *Commelina obliqua* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 45. 1825; Hook. f., Fl. Brit. India 6: 372. 1892; Prain, Bengal Pl. 2: 1083. 1903. [Plate 263d]

Jata-kanchira (H).

Straggling herb, 30–50 cm high. Leaves elongate elliptic-lanceolate, 5–15 × 1.7–3.4 cm, cuneate, wavy, acuminate, chartaceous, scabrous and gland-dotted above. Inflorescences cymes, 7-flowered, surrounded by spathe; spathe subseesile, infundibular, 1–1.6 × 1–1.3 cm, clustered, ribbed. Sepals ovate, 3–6 × 2–2.8 mm, obtuse. Petals blue; outer pair suborbicular, 4–5 mm across, clawed; inner one ovate, 2–3 × 1.2–2 mm. Stamens 3; filaments coiled; anthers oblong. Ovary globose, c. 1.5 mm across. Capsules obovoid, 3-celled; seeds pale brown, solitary in each cell, ellipsoid, smooth, testa reticulate punctate, hilum linear, embryotega a lateral circular pit.

Flowering & Fruiting: August–October.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 05.10.2009, SKS & GK 46173; Panbari 8-9, 29.11.2011, GK 47158; Checko-1, 25.09.2012, AK 56112; Bhutri, 05.10.2012, AK 58630; Santrabari to Buxa Fort, 28.09.2013, AK 59622.

4. *Commelina sikkimensis* C. B. Clarke, *Commelyn. Cyrtandr. Bengal.*: t. 6. 1874; Hook. f., *Fl. Brit. India* 6: 369. 1892. [Plate 264a]

Straggling herb, 20–30 cm high. Leaves elliptic-lanceolate, 4–6.5 × 1–1.5 cm, cuneate, entire, acuminate, chartaceous. Inflorescences cymes, 1–3-flowered, surrounded by spathe; spathe ovate, 2.5–3.5 × 1.2–2 cm, cordate at base, acuminate, folded, stalked, ribbed. Sepals lanceolate, acute. Petals blue; outer pair suborbicular, clawed; inner one ovate. Stamens 6, 3 fertile and 3 sterile; filaments 6–7 mm; staminodes with 3-lobed antherodes. Ovary ellipsoid-trigonous; style 6–8 mm. Capsules oblong, 3-celled; seeds solitary in each cell, ellipsoid, papillose, testareticulate punctate, hilum linear, embryotega a lateral circular pit.

Flowering & Fruiting: August–October.

Distribution. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Specimens examined: Lapchakhawa to Buxa Fort, 29.09.2013, AK 59669; Tashigaon to Rovers point, 02.10.2013, AK 59745.

2. *Cyanotis* D. Don

Key to the species

- 1a. Aquatic or marshy herbs; inflorescences axillary clusters, in leaf sheath; capsules with 6 horned projections 1. *C. axillaris*
- 1b. Terrestrial herbs; inflorescences terminal and axillary scorpioid cymes, subtended by spathe-like bracts; capsules without horned projections 2
- 2a. Non bulbiferous herbs; leaves ciliate; flowers pedicellate; spathes sessile, connate; filaments without swelling gland near apex; capsules with ciliate stalk 2. *C. cristata*

- 2b. Bulbiferous herbs; leaves glabrous; flowers sessile; spathes peduncled, free; filaments with swelling gland near apex; capsules with glabrous stalk 3. C. vaga

1. *Cyanotis axillaris* (L.) D. Don ex Sweet, Hort. Brit.: 430. 1826; Hook. f., Fl. Brit. India 6: 388. 1892; Prain, Bengal Pl. 2: 1085. 1093. *Commelina axillaris* L., Sp. Pl. 1: 42. 1753. [Plate 264b]

Soltraj (H).

Aquatic or marshy decumbent herb, 5–30 cm high. Leaves sessile, linear-lanceolate, 1.2–6.2 × 0.2–0.5 cm, cuneate at base, purple to purple green and ciliate when young, acute, coriaceous. Inflorescences cymes, reduced to axillary clusters of 3–6-flowers in leaf sheaths. Calyx cylindrical; lobes elliptic-lanceolate, acuminate, ciliate keel on back. Corolla violet to white, salver-shaped; lobes ovate, obtuse to acute. Stamens 6, all fertile; filaments violet, c. 1.2 cm, bearded and swelling gland subapically, often coiled; anthers clavate. Ovary oblong-elliptic, 3-locular, hirsute; style often coiled; stigma ovoid. Capsules elliptic-ovoid, 3-locular, hispid, with 6 horned projections; seeds 6, two in each locule, cone-shaped, testa blackish brown, punctate or pitted, hilum a black pit laterally at base, embryotega terminally circular pit at apex.

Flowering & Fruiting: August–January.

Distribution. India: Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and West Bengal.

Specimens examined: Narathali, 23.09.2011, AK 52820; Checko-1, 26.09.2012, AK 56176.

2. *Cyanotis cristata* (L.) D. Don, Prodr. Fl. Nepal.: 46. 1825; Hook. f., Fl. Brit. India 6: 385. 1892; Prain, Bengal Pl. 2: 1085. 1093. *Commelina cristata* L., Sp. Pl. 1: 42. 1753. [Plate 264c]

Decumbent herb, 10–15 cm high, scattered hairy to glabrous. Leaves sessile, oblong-lanceolate to elliptic, 2–4.5 × 0.7–1.3 cm, decurrent with sheath at base, entire and ciliate, subacute, glabrous except veins. Inflorescences scorpioid cymes. Spathes 6–8, falcate, compact, overlapped, ciliate or glabrous. Calyx spreading; lobes elliptic-lanceolate, acute, hairy near apex, with ciliated keel. Corolla bluish, campanulate; lobes oblong-obovate, subacute. Stamens 6; filaments bearded above; anthers yellow. Ovary ellipsoid, pubescent; style often coiled. Capsules ellipsoid, 3-locular, truncate, glabrous except apex; seeds 2 in each locule, pyramidal, faintly trigonous, testa punctate, furrowed, embryotega terminal, rounded, slightly raised, looks like umbonate at apex; hilum a dark brown circular depression on inner edge at base.

Flowering & Fruiting: August–November.

Distribution. India: Almost throughout India.

Specimens examined: Jainty, 09.10.2009, SKS & GK 46273; Bhutri, 05.10.2012, AK 58632, 58643; Pana, 08.10.2012, AK 58735; Buxa Fort to Chunabhati, 30.09.2013, AK 59703.

3. *Cyanotis vaga* (Lour.) Schult. & Schult. f. in Roem. & Schult., Syst. Veg., ed. 15 bis 7(2): 1153. 1830. *Tradescantia vaga* Lour., Fl. Cochinch. 1: 193. 1790. *Cyanotis barbata* D. Don, Prodr. Fl. Nepal.: 46. 1825; Hook. f., Fl. Brit. India 6: 385. 1892. [Plate 264d; Fig. 121a-c]

Bulbiferous decumbent herb, 5–8 cm high; bulbs globose. Leaves sessile, linear to lanceolate, 1–4.5 × 0.2–0.7 cm, decurrent with sheath at base, entire, acute, glabrous or sparsely pubescent above. Inflorescences scorpioid cymes. Spathes 4–6, falcate, 5–12 × 1–1.8 mm, compact, peduncled, overlapped; floral bracts lanceolate. Calyx cylindric, keeled; lobes lanceolate, acute. Corolla bluish, campanulate; lobes obovate, subacute. Stamens 6; filaments bluish, 5–6 mm, swelling gland, bearded and coiled above; anthers yellow, obovate. Ovary ellipsoid, truncate, bearded above. Capsules ellipsoid, truncate, stalked, pubescent at apex; seeds 2 in each locule, pyramidal to ovate, faintly trigonous, testa punctate, furrowed, embryotege terminal, rounded, slightly raised, looks like umbonate at apex, hilum a dark brown circular depression on inner edge at base.

Flowering & Fruiting: August–November.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Sikkim, Uttarakhand and West Bengal.

Specimens examined: Bhutanghat, 26.09.2011, AK 52912; Buxa Fort to Chunabhati, 30.09.2013, AK 59702; Tashigaon to Rovers point, 02.10.2013, AK 59743.

3. *Floscopa* Lour.

***Floscopa scandens* Lour.**, Fl. Cochinch. 1: 193. 1790; Hook. f., Fl. Brit. India 6: 390. 1892; Prain, Bengal Pl. 2: 1086. 1903. [Plate 265a]

Erect herb, 20–30 cm high. Leaves lanceolate to elliptic-lanceolate, 2–7.5 × 0.7–1.2 cm, cuneate with sheath at base, wavy and scabrous, acute, subcoriaceous, scabrous when young. Inflorescences pinkish red, panicles, glandular pubescent; inflorescence bracts ovate to lanceolate; floral bracts lanceolate or suborbicular. Sepals pink purple, petaloid, elliptic-oblong, subacute to subobtusate, glandular pubescent. Petals pink purple, dissimilar; anterior ones obovate; posterior one linear. Stamens 6, 3 fertile, 3 sterile; filaments pink purple; anthers suborbicular; staminodes with 3-lobed yellow antherodes. Ovary orbicular, 2-locular; style pink purple; stigma obconical. Capsules husk yellowish, subglobose, 2-locular, compressed, loculicidally dehiscent, crustaceous; seed brown, solitary in each locule, elliptic, striated or faintly grooved, testa punctate and creamy white, embryotege central at dorsal side, hilum linear at ventral side.



Fig. 121. *Cyanotis vaga*: a. Flowering branchlet; b. Flower; c. Capsule (AK 52912); *Murdannia japonica*: d. Flowering branchlet (AK 62650); *Pollia subumbellata*: e. Fruiting branchlet (SKS & GK 46312).

Flowering & Fruiting: July–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Tamil Nadu and West Bengal.

Specimens examined: Jainti range, 16.02.2010, SKS & GK 47120; Checko 2, 29.11.2011, GK 47159; Narahali, 20.02.2012, AK 55752; Checko-1, 10.02.2013, AK 58839.

4. *Murdannia* Royle

Key to the species

- 1a. Diffuse or ascending herbs; leaves dissimilar, basal leaves larger, looks like rosette, cauline leaves shorter; testa grooved, pubescent or villous 2. *M. loriformis*
- 1b. Erect herbs; leaves similar, all cauline, not like rosette; testa not grooved, glabrous 2
- 2a. Stems angular; leaves elliptic-oblong, 8–17 × 2.5–4 cm, cuneate at base, undulate at margins; leaf sheaths 1–3 cm; seeds white punctate 1. *M. japonica*
- 2b. Stems terete; leaves linear-lanceolate to lanceolate, 1–6.5 × 0.2–0.7 cm, obtuse at base, entire at margins; leaf sheaths 3–8 mm; seeds not white punctate 3
- 3a. Stems caespitose; floral bracts caducous; stamens 5, 2 fertile and 3 sterile; seeds 2 in each locule, trigonous; testa pitted, reticulate, scattered verrucose 3. *M. nudiflora*
- 3b. Stems not caespitose; floral bracts persistent; stamens 6, 3 fertile and 3 sterile; seeds 5 in each locule, polygonous; testa not pitted, tuberculate 4. *M. spirata*

1. *Murdannia japonica* (Thunb.) Faden, *Taxon* 26: 142. 1977. *Commelina japonica* Thunb., *Trans. Linn. Soc. London* 2: 332. 1794. *Aneilema lineolatum* Kunth, *Enum. Pl.* 4: 69. 1843; Hook. f., *Fl. Brit. India* 6: 376. 1892; Prain, *Bengal Pl.* 2: 1084. 1903. [Fig. 121d]

Shinganijhar, Garey malajhar (N).

Erect herb, 20–60 cm high. Leaves elliptic-oblong, 8–17 × 2.5–4 cm, cuneate at base, undulate and scarious, acute or short acuminate, subcoriaceous. Inflorescences terminal, panicles; inflorescence bracts ovate-lanceolate; floral bracts ovate. Sepals elliptic, subobtuse. Petals white, obovate, obtuse. Stamens 6, 3 fertile and 3 sterile; filaments 4–5 mm, bearded; anthers ellipsoid; staminodes 3; antherodes 3-lobed. Ovary small; style 4–5 mm; stigma globose. Capsules ellipsoid, trigonous, 3-locular, beaked at apex, dehiscent, crustaceous; seeds brown grey, 2 in each locule, tetragonal, uniseriate, testa white punctate and brown muricate, embryotega a circular pit at dorsal side, hilum a black punctate spot at ventral side.

Flowering & Fruiting: June–October.

Distribution. India: Assam, Arunachal Pradesh, Bihar, Chhattisgarh, Goa,

Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: Phashkhawa, Hauda nala, 03.10.2012, AK 58656; Buxaduar to Achalung, 19.05.2014, AK 62650.

2. *Murdannia loriformis* (Hassk.) R. S. Rao & Kammathy, Bull. Bot. Surv. India 3: 393. 1961. *Aneilema loriforme* Hassk. in Miq., Pl. Jungh. 2: 143. 1852.

Diffuse or ascending herb, 10–15 cm high. Leaves dimorphic; basal leaves larger, looks rosette due to overlapping, cauline leaves shorter, linear to linear-lanceolate, cuneate, entire and scarious, acute. Inflorescences terminal, solitary or 2 or 3-flowered, forming panicles; inflorescence bracts foliaceous; floral bracts caducous. Sepals ovate-elliptic, concave, obtuse. Petals pale purple to pale blue purple, obovate, 4–6 × 2–3 mm. Stamens 5, 2 fertile and 3 sterile; filaments bearded; anthers ellipsoid; staminodes 3; antherodes 3-lobed. Ovary ovoid; style 3–4 mm; stigma globose. Capsules trigonous, crustaceous, dehiscent; seeds yellow brown, 2 in each locule, trigonous, uniseriate, truncate at base, testa grooved and pubescent or villous, embryotega circular at subdorsal side, hilum elliptic at ventral side.

Flowering & Fruiting: June–October.

Distribution. India: Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal.

Specimens examined: Sankosh, 28.09.2011, AK 52968; Rangamati, Bharnabari, 06.10.2012, AK 58711.

3. *Murdannia nudiflora* (L.) Brenan, Kew Bull. 7 (2): 189. 1952. *Commelina nudiflora* L., Sp. Pl. 1: 41. 1753. *Aneilema nudiflorum* (L.) R. Br., Prodr.: 271. 1810; Hook. f., Fl. Brit. India 6: 378. 1892; Prain, Bengal Pl. 2: 1084. 1903.

[Plate 265b]

Kanduli (B).

Erect herb, 10–20 cm high. Leaves linear-lanceolate to lanceolate, obtuse, entire, scabrous and scarious, acute, chartaceous. Inflorescences pedunculate panicles; inflorescence bracts foliaceous; floral bracts caducous. Sepals pale green, elliptic-oblong, subacute to obtuse. Petals pale purple, obovate. Stamens 5, 2 fertile and 3 sterile; filaments bearded; anthers oblong; staminodes 3, sparsely bearded, one antisepalous without antherode; antherodes white, trilobed. Ovary trigonous; stigma swollen, truncate at apex. Capsules obovoid to subglobose, dehiscent, crustaceous; seeds yellow brown, 2 in each locule, trigonous, uniseriate, truncate at base, testa pitted and reticulate, scattered verrucose, embryotega circular at subdorsal side, hilum elliptic at ventral side.

Flowering & Fruiting: July–October.

Distribution. India: Almost throughout India.

Specimens examined: Buxa camp, 24.05.1949, VN & party 2959; Rajabhatkhawa, 05.09.1981, BS & party s n.; Rajabhatkhawa range, 16.02.2010, SKS & GK 47123; Newlands, Sukno river, 22.09.2011, AK 52735.

4. *Murdannia spirata* (L.) G. Bruckn. in Engler & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930. *Commelina spirata* L., Mant. Pl. Altera: 176. 1771. *Aneilema spiratum* (L.) R. Br., Prodr.: 271. 1810; Hook. f., Fl. Brit. India 6: 377. 1892; Prain, Bengal Pl. 2: 1084. 1903. [Plate 266c]

Erect herb, 10–15 cm high. Leaves lanceolate, 1–1.7 × 0.3–0.7 cm, obtuse, entire, scabrous and scarios, acute, chartaceous. Inflorescences terminal, pedunculate panicles; inflorescence and floral bracts lanceolate. Sepals reddish brown, elliptic-oblong, subacute to obtuse. Petals pale blue purple, obovate. Stamens 6, 3 fertile and 3 sterile; filaments bearded; anthers oblong; staminodes 3, sparsely bearded; antherodes white, trilobed. Ovary trigonous; stigma swollen, truncate at apex. Capsules elliptic-oblong to obovoid, indehiscent, crustaceous; seeds 5 in each locule, polygonous, uniseriate, testa creamy white and tuberculate, embryotega circular at subdorsal side, hilum a black circular spot at ventral side.

Flowering & Fruiting: July–October.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 26.09.2012, AK 56176.

5. *Pollia* Thunb.

Pollia subumbellata C. B. Clarke, J. Linn. Soc., Bot. 11: 451. 1871; Hook. f., Fl. Brit. India 6: 368. 1892. [Plate 265d, 266a; Fig. 121e]

Erect herb, 30–50 cm high. Leaves spirally arranged, elliptic, 9.5–15 × 3–5.5 cm, attenuate, entire, acuminate, chartaceous, scabrous above, puberulous below. Inflorescences lax, spreading, branched, pendulous, umbel-like, puberulent; inflorescence and floral bracts ovate. Sepals green, orbicular, concave, hairy. Petals white, obovate, concave. Stamens 6, 3 fertile and 3 sterile; filaments c. 2.5 mm; anthers yellow, oblong; staminodes 3 with short filaments. Ovary white, globose; stigma subcapitate. Fruits silvery white with bluish hue, subglobose, berry-like, 2 or 3-locular, indehiscent, corky; seeds orange brown, trigonous to polygonal, 3–4 in each row, biseriate, testa punctate, embryotega orbicular pit at centre, hilum crest-like orbicular structure.

Flowering & Fruiting: July–November.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Specimens examined: Jainti 5-9, 12.10.2009, SKS & GK 46312; Checko-1, 25.09.2012, AK 56136.

6. *Rhopalephora* Hassk.

Rhopalephora scaberrima (Blume) Faden, *Phytologia* 37 (5): 480. 1977.
Commelina scaberrima Blume, *Enum. Pl. Javae* 1: 4. 1827. *Aneilema scaberrimum*
Kunth, *Enum. Pl.* 4: 69. 1843; Hook. f., *Fl. Brit. India* 6 (18): 382. 1892.

[Plate 266b]

Perennial erect herb, 50-80 cm high. Leaves ovate-lanceolate, 9-13 × 1.2-2.5 cm, acuminate, shortly scattered hispid above, glabrous beneath. Inflorescences terminal thyrses, branches lax arising from condensed axis, hairy; involucre bracts oblong or ovate-orbicular; floral bracts ovate. Sepals green, ovate, boat-shaped. Petals white, suborbicular, clawed, obtuse. Stamens 6, 3 fertile and 3 sterile; filaments c. 6 mm; anthers elliptic; staminodes 3, sometimes antisepalous one absent; antherodes bright yellow. Ovary globose, whitish, hooked hairy, shortly stipitate. Capsules subglobose, shortly stipitate, hump backed, hooked hairy, crowned by the long persistent style; seeds usually 3, sometimes 2, very rarely 1, oblong-elliptic, plano-convex, reticulately foveolate.

Flowering & Fruiting: August-November.

Distribution. India: Andaman & Nicobar Islands, Odisha and West Bengal.

Specimen examined: Panbari 8, 01.12.2011, GK 47191.

Juncaceae

Juncus L.

Key to the species

- 1a. Inflorescences lateral, laxly branched, subcontracted cymes; stamens 6 in 2 whorls **1. *J. bufonius***
1b. Inflorescences terminal, branched panicles or corymbs; stamens 3 **2. *J. prismatocarpus***

1. *Juncus bufonius* L., *Sp. Pl.* 1: 328. 1753; Hook. f., *Fl. Brit. India* 6: 392. 1892;
Prain, *Bengal Pl.* 2: 1088. 1903. [Plate 266c; Fig. 122]

Tufted erect herb, 10-12 cm high. Leaves yellow green, sessile, radical and cauline, 1-5 × 0.3-0.5 cm, entire and revolute, sharply acute, flat. Inflorescences lateral, lax, branched, subcontracted, 4-5 cm long cymes; inflorescence bracts linear. Flowers solitary or often in cluster of 2-3, sessile; floral bracts yellowish brown, lanceolate; bracteoles linear. Perianth green turns yellow, scarious, slightly acuminate; outer whorl lanceolate to elliptic-lanceolate, c. 5.5 × 1 mm; inner whorl slightly elliptic-lanceolate to linear-lanceolate, c. 4.5 × 1 mm. Stamens 6 in 2 whorls, adnate to perianth; filaments 1.5-2 mm; anthers yellow, elliptic. Ovary

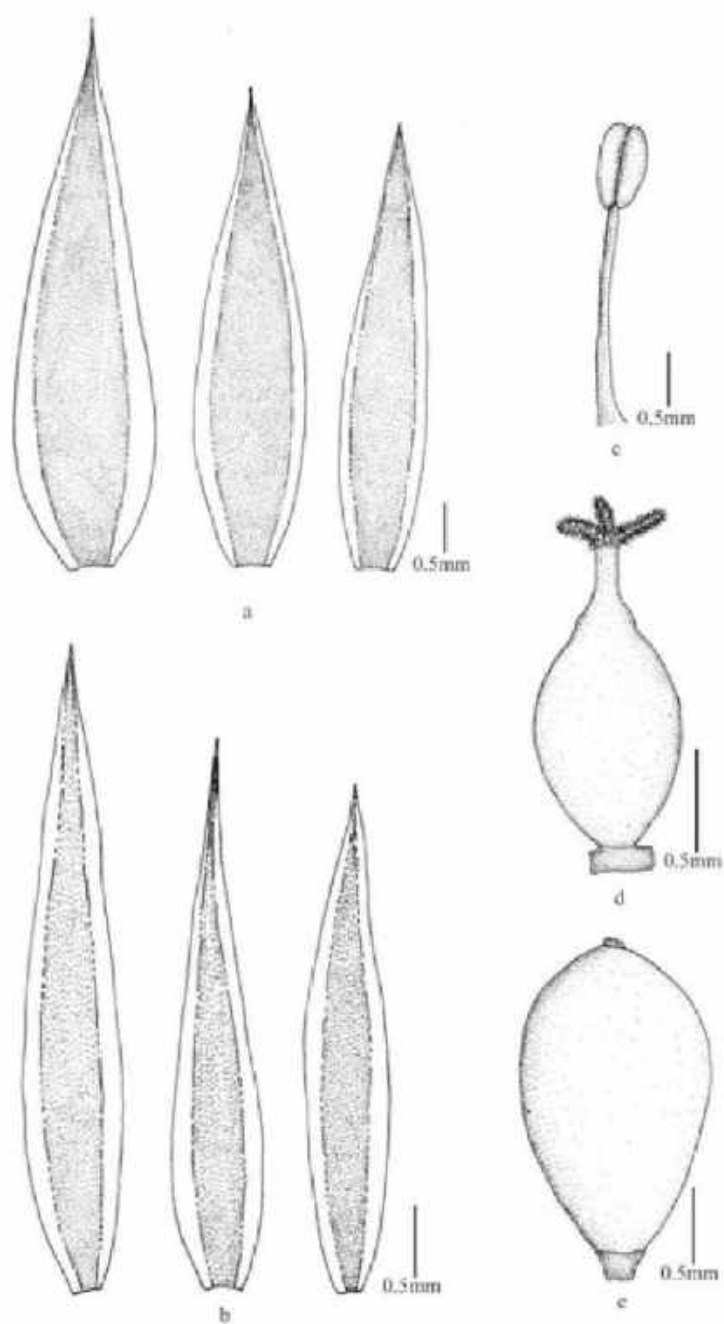


Fig. 122. *Juncus bufonius*: a. Outer perianths; b. Inner perianths; c. Stamen; d. Gynoecium; e. Seed (AK 55954).

obovate, c. 1.2 × 0.5 cm, stalked, obliquely striated; style blackish brown, short; stigmas 3, fimbriate. Capsules yellow brown, oblong, c. 2 × 1.2 mm, 3-locular; seeds orange brown, ellipsoid to obovoid, 4–5 × 2.5–3 mm, faintly reticulate.

Flowering & Fruiting: November–February.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Jammu and Kashmir, Kerala, Madhya Pradesh, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Rydak river belt, 26.02.2012, AK 55954.

2. *Juncus prismatocarpus* R. Br., Prodr. Fl. Nov. Holland.: 259. 1810; Hook. f., Fl. Brit. India 6: 395. 1892; Prain, Bengal Pl. 2: 1088. 1903.

Tufted perennial herb, 17–35 cm high. Basal leaves few, cauline leaves 2–4, linear, 10–25 × 2–4 mm, terete to compressed, distinctly and perfectly to incompletely septate, obtuse, acute or acuminate. Inflorescences terminal, branched panicles or corymbs, 10–18 cm high; involucre bracts leafy. Flowers in groups of 7–9; floral bracts ovate to ovate-lanceolate. Perianth 6 in 2 whorls, acute, coriaceous, prominently 3-nerved; outer whorl lanceolate, 3–4 × 0.5–0.7 mm, keeled; inner whorl lanceolate, c. 3 × 0.4–0.6 mm. Stamens inserted opposite to outer perianth lobes; filaments 1.3–1.4 mm; anthers oblong. Ovary linear-oblong to trigonous; style c. 0.5 mm; stigma 3-fid. Capsules elliptic-oblong, c. 4 × 1 mm, trigonous; seeds yellow, elliptic-oblong, c. 0.2 mm.

Flowering & Fruiting: March–November.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Panbari 8, 31.03.2012, GK 50690.

Arecaeae

Key to the genera

- 1a. Stems clustered, not with by old leaf bases, spiny; leaf sheaths with rows of spines; ocrea present; leaf base of pinnae not modified in acanthophylls; fruits scaly **1. Calamus**
- 1b. Stem solitary, covered by old leaf bases, not spiny; leaf sheaths without spines; ocrea absent; leaf base of pinnae modified in acanthophylls; fruits smooth **2. Phoenix**

1. *Calamus* L.

Calamus erectus Roxb., Fl. Ind. 3: 774. 1832; Becc. & Hook. f. in Hook. f., Fl. Brit. India 6: 438. 1892; Prain, Bengal Pl. 2: 1099. 1903. [Plate 266d–e]

Kadam bent (B).

Erect shrub, 3–4 m high, armed. Leaves pinnatisect, c. 3 m; pinnae lanceolate, up to 40 on each side. Inflorescences 1–2 m, distichous, scorpioid spikelets; inflorescence bracts tubular. Flowers sessile, polygamous. Male: flowers borne singly subtended by cup-like bracteole and infundibular bract. Corolla exceeding calyx. Stamens 6; filaments stout, free; anthers usually latrorsely dehiscent. Female: flowers accompanied by a cup-like bracteole and a sterile staminate flower, together subtended by infundibular bract. Corolla about equalling calyx. Ovary partly 3-loculed, surrounded by a corona of 6 fused filaments at base bearing sterile anthers, scaly; style usually short; stigmas 3, stout. Fruits greenish or reddish brown, ellipsoid, 3–5 × 2–2.5 cm, apiculate with persistent style, rhombic, downward pointing, shiny, grooved scaly; seed solitary, oblong, pitted.

Flowering & Fruiting: November–August.

Distribution. India: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura and West Bengal.

Specimen examined: Tashigaon to Rovers point, 03.10.2013, AK 59773.

Notes: Stems used in construction and furniture making.

2. Phoenix L.

Phoenix sylvestris (L.) Roxb., Fl. Ind. 3: 787. 1832; Becc. & Hook. f. in Hook. f., Fl. Brit. India 6: 425. 1892; Prain, Bengal Pl. 2: 1096. 1903. *Elate sylvestris* L., Sp. Pl. 2: 1189. 1753. [Plate 267a-b]

Khajur (H).

Erect plant, 8–12 m high, dioecious. Leaves 8–50, crowned, imparipinnate; leaflets sessile, 20–30 pairs, elongate, linear-lanceolate, 7–23 × 0.3–1 cm, entire, acute, chartaceous, base of leaflets modified into short, stout, sharp spines or acanthophylls. Inflorescences usually branched to 1-order, among leaves, on a flattened scape, subtended by prophylls; prophylls tubular. Flowers subtended by a small bracteole. Male: calyx cup-like, 3-pointed. Corolla lobes exceeding calyx, fused only at base. Stamens 6; anthers dehiscent latrorsely, attached basally. Female: flowers globose, persistent; corolla lobes very wide, strongly overlapping; staminodes small; carpels 3, connate, with recurved stigma. Fruits reddish, oblong or ellipsoid, 2–3 × 1–1.6 cm, umbonate, fleshy; seed solitary, subcylindric, 1.5–2.5 mm, elongate, grooved at one face.

Flowering & Fruiting: May–November.

Distribution. India: Almost throughout India.

Specimen examined: Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58591.

Notes: Fruits are edible and leaflets used in baskets/mats making.

Araceae

Key to the genera

- | | |
|--|--------------------------|
| 1a. Marshy herbs; petioles and peduncles prickly | 4. <i>Lasia</i> |
| 1b. Plants of dry or aquatic land; petioles and peduncles not prickly | 2 |
| 2a. Stoloniferous, floating aquatic herbs; leaves sessile, arranged spirally to form rosette; spadix small, with 4 male flowers and 1 female flower | 5. <i>Pistia</i> |
| 2b. Terrestrial erect herbs or scrambling or climbing herbs; leaves petiolate, not arranged spirally to form rosette; spadix not as above | 3 |
| 3a. Lianas or scrambling or climbing herbs; spadix lacking an appendix | 4 |
| 3b. Erect herbs; spadix having an appendix | 5 |
| 4a. Petioles winged; spadix globose; spathe green; flowers unisexual; perianth present; stamens 6; ovary depressed globose; berries red | 6. <i>Pothos</i> |
| 4b. Petioles not winged; spadix cylindrical; spathe orange yellow; flowers often bisexual, rarely unisexual; perianth absent; stamens 4; ovary hexagonal; berries greenish brown | 8. <i>Rhaphidophora</i> |
| 5a. Leaves peltate | 6 |
| 5b. Leaves not peltate | 7 |
| 6a. Large herbs, with pseudostem; bulbils absent; leaves shortly peltate, 1.5-1.7 cm deep, cordate at base | 1. <i>Alocasia</i> |
| 6b. Small herbs, without pseudostem; bulbils present on separate shoots, emerging from tuber; leaves peltate, 3.5-4 cm deep, shallowly cordate at base | 7. <i>Remusatia</i> |
| 7a. Leaves 3-lobed; spadix with neuters | 9. <i>Typhonium</i> |
| 7b. Leaves not 3-lobed; spadix without neuters | 8 |
| 8a. Monoecious; pseudostem absent; spathe not hooded | 2. <i>Amorphophallus</i> |
| 8b. Dioecious; pseudostem present; spathe hooded | 3. <i>Arisaema</i> |

1. *Alocasia* (Schott) G. Don

Key to the species

- | | |
|--|------------------------|
| 1a. Leaves obtuse at apex, lobes obtuse; spadix 7-9 cm, appendix smooth; spathe yellowish green; stamens in 8 rows | 1. <i>A. fornicata</i> |
| 1b. Leaves rounded at apex, lobes circular; spadix 15-20 cm, appendix rugose; spathe green; stamens in 3-4 rows | 2. <i>A. odora</i> |

1. *Alocasia fornicata* (Roxb.) Schott, Oesterr. Bot. Wochenbl. 4: 410. 1854; Hook. f., Fl. Brit. India 6: 526. 1893; Prain, Bengal Pl. 2: 1111. 1903. *Arum fornicatum* Roxb., Fl. Ind. 3: 501. 1832. [Plate 267c-d]

Perennial erect herb, c. 1 m high. Leaves basal, ovate, 33-37 × 21-22.5 cm, shortly peltate, deeply cordate, lobes obtuse, wavy, acute, subcoriaceous. Inflorescences spadix, 7-9 cm, appendix smooth, pedunculate, enclosed by

spathe; spathe yellowish green, ovate-lanceolate, 7–9 × c. 4 cm, ellipsoid with overlapping margins at base, subcoriaceous. Flowers unisexual, lacking perianth. Male: stamens in 8 rows, connate in an obpyramidal column, flattened with a pit at centre; anthers oblong, 1–1.5 mm. Female: ovary ovoid-oblong, 1.5–2 × 1.5–1.7 mm, white spotted; style 1–1.5 mm; stigma peltate, 3–6-lobed. Berries red when ripe, obovoid or subglobose, 8–10 mm across; seeds subglobose, 2–3 mm across, smooth.

Flowering & Fruiting: May–January.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Meghalaya, Mizoram, Odisha, Tripura and West Bengal.

Specimens examined: NRVK 6, 05.03.2011, GK 47261; NRVK 14, 08.04.2012, GK 56080; Buxaduar to Chunabhati, 21.05.2014, AK 65917.

2. *Alocasia odora* (Roxb.) K. Koch, *Index Sem.* (Berlin) 1854 (App.): 5. 1854. *Arum odorum* Roxb., *Fl. Ind.* 3: 499. 1832. [Plate 268a-b]

Perennial erect herb, 1–2 m high. Leaves basal, ovate, 33–37 × 21–22.5 cm, shortly peltate, cordate, lobes rounded, wavy, rounded, subcoriaceous. Inflorescences spadix, 15–20 cm, appendix rugose, pedunculate, enclosed by spathe; spathe green, ovate-lanceolate, 15–20 × 4–5 cm, ellipsoid with overlapping margins at base, subcoriaceous. Flowers unisexual, lacking perianth. Male: stamens in 3–4 rows, connate in an obpyramidal column, flattened at apex with a pit at centre; anthers hexagonal, 3.5–4 mm. Female: ovary ovoid-oblong, 1.5–2 × c. 1.5 mm; style c. 1 mm; stigma peltate. Berries red when ripe, subglobose, c. 1 cm across; seeds subglobose, 2–3 mm across, smooth.

Flowering & Fruiting: February–May.

Distribution. India: Andhra Pradesh, Assam, Meghalaya, Sikkim, Tripura and West Bengal.

Specimen examined: Buxaduar to Chunabhati, 17.02.2014, AK 59990.

Notes: Local inhabitants used tubers and petioles as a food after boiling for pigs.

2. *Amorphophallus* Blume ex Decne.

Amorphophallus bulbifer Blume, *Rumphia* 1: 148. 1837; Hook. f., *Fl. Brit. India* 6: 515. 1893; Prain, *Bengal Pl.* 2: 1110. 1903. [Plate 268c-d; Fig. 123a]

Amla-bel (B).

Perennial, tuberous, erect herb, 12–25 cm high; tuber dark brown, depressed globose. Leaf solitary, divided into 3 lobes; lobes once to several time divided pinnately into leaflets; leaflets elliptic, 17–20 × 5–7 cm, acuminate, main branching points with an epiphyllar bulbil; bulbils brown, depressed globose to subglobose.

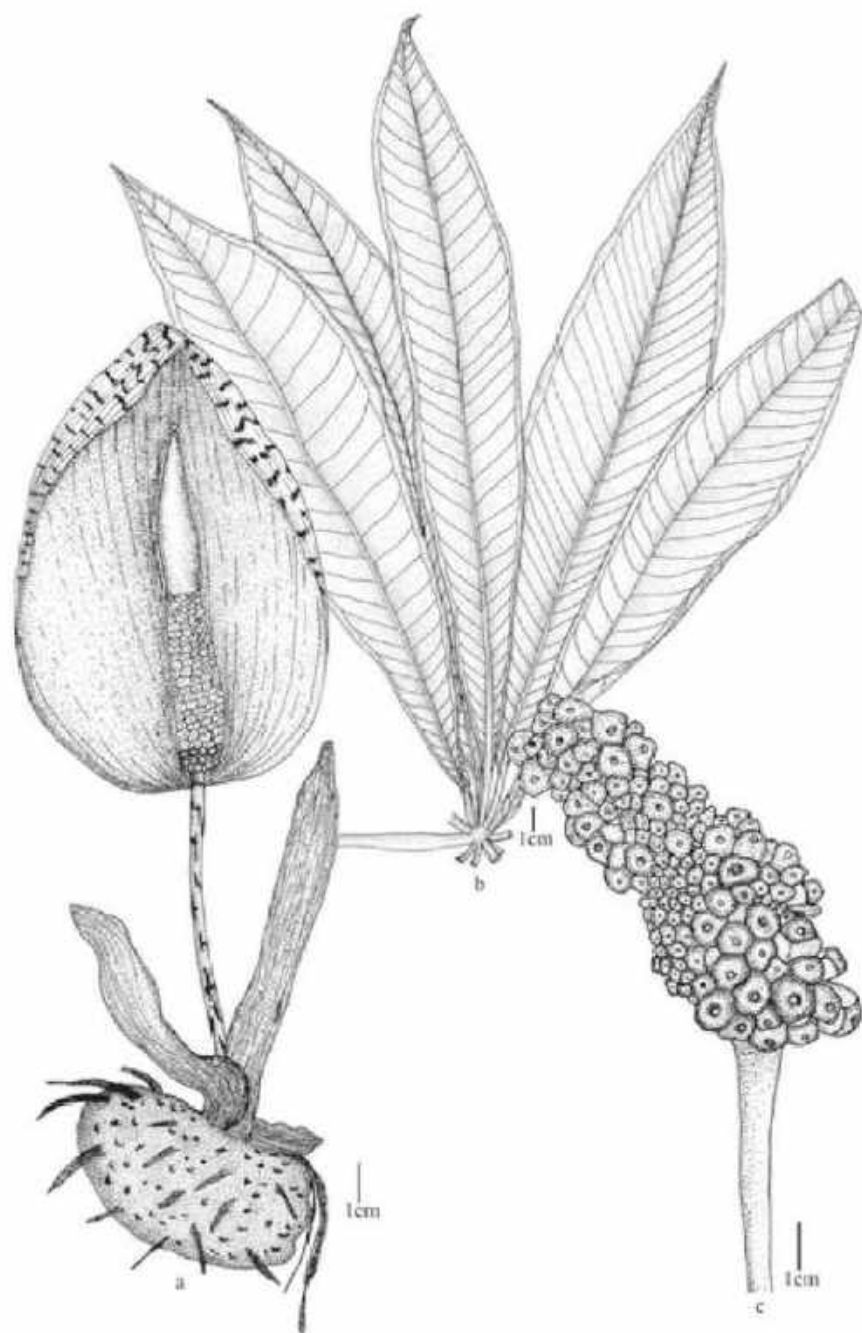


Fig. 123. *Amorphophallus bulbifer*: a. Inflorescence with bulb (AK 65916); *Arisaema concinnum*: b. Leaflets; c. Infructescence (AK 59776).

Inflorescence solitary spadix, 5–9 cm, appendix smooth, enclosed by spathe, flowering before leaf appears; spathe pink at base, green to deep green above, with dark green dots, ovate, 6.5–11 × 3–8 cm, overlapping margins, subcoriaceous. Flowers unisexual, perianth absent. Male: stamens in many rows, connate in a cylindrical column, flattened at apex with two pits at centre; anthers oblong, c. 1 mm. Female: ovary ovoid-oblong, 1–1.5 × c. 1 mm; style c. 1 mm; stigma peltate. Berries red when ripe, ovoid, c. 15 × 5 mm; seeds ovoid, 6–8 mm, smooth.

Flowering & Fruiting: April–November.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Meghalaya, Odisha, Rajasthan, Sikkim, Tripura and West Bengal.

Specimens examined: Santrabari to Buxaduar, 18.05.2014, AK 62607; Buxaduar to Chunabhati, 21.05.2014, AK 65916.

Uses: Local inhabitants used tubers and petioles as a vegetable.

3. *Arisaema* Mart.

Key to the species

- 1a. Leaf solitary, radiate, 11–20-foliolate; leaflets sessile; appendix smooth below and verrucose above, erect with clavate apex; spathe dark purple or green with longitudinal white stripes, long acuminate at apex; anthers dehiscing by apical pores; seeds smooth
1. *A. concinnum*
- 1b. Leaves 2–3, pedate, 5–7-foliolate; leaflets petiolulate; appendix smooth throughout, sigmoidally ascending with very acute apex; spathe green without stripes, acute to shortly acuminate at apex; anthers dehiscing by lateral slits; seeds rugose
2. *A. tortuosum*

1. *Arisaema concinnum* Schott, Bonplandia 7: 27. 1859; Hook. f., Fl. Brit. India 6: 505. 1893. [Plate 269a–c; Fig. 123b–c]

Perennial, tuberous erect herb, 12–25 cm high, dioecious; tuber depressed globose. Leaf solitary, radiate; leaflets 11–20, sessile, elliptic to oblanceolate, 10–20 × 3–4 cm, cuneate, undulate, acuminate, chartaceous. Inflorescence solitary spadix, 7.5–12 cm, appendix smooth below and verrucose above with clavate apex, enclosed by spathe; spathe dark purple or green with longitudinal white stripes, oblong-ovate, 12–15 × 3–4 cm, overlapping margins at base, long acuminate, hooded, subcoriaceous. Flowers unisexual. Male: perianth absent. Stamens in many rows, connate in a conical column; synandria widely spaced, on 1–2 mm stalk, composed of 2–3 anthers. Female: perianth absent. Ovary ovoid, 1–2 × c. 1 mm; style minute; stigma peltate, papillose. Berries red when ripe, obovoid, 6–8 × c. 2 mm, compact; seeds solitary or few, ovate, 4–5 mm, smooth.

Flowering & Fruiting: July–November.

Distribution. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Sikkim, Uttar Pradesh and West Bengal.

Specimens examined: Buxa to PW Road, 36th mile, 16.05.1949, VN & party 2602; Tashigaon to Rovers point, 03.10.2013, AK 59776.

2. *Arisaema tortuosum* (Wall.) Schott, Melet. Bot.: 17. 1832; Hook. f., Fl. Brit. India 6: 502. 1893; Prain, Bengal Pl. 2: 1106. 1903. *Arum tortuosum* Wall., Pl. Asiat. Rar. 2: 10, t. 114. 1830. [Plate 269d, 270a-b]

Perennial, tuberous erect herb, 1–1.5 m high, dioecious; tubers white, subglobose. Leaves 2–3, pedate; leaflets 5–7, elliptic to oblong-elliptic, cuneate, repand and crenulate, shortly acuminate, chartaceous, lineolate. Inflorescence solitary spadix, 10.5–18.5 cm, pedunculate, appendix smooth and sigmoidally ascending with very acute apex, covered by spathe; spathe ovate, 7–11.5 × 1.5–4 cm, tubular at base with overlapped margins, acute to shortly acuminate, hooded, ribbed, marked with scattered small white lines. Male: perianth absent; stamens in many rows, connate in a cylindrical column; synandria widely spaced, on 1–3 mm long stalk, composed of 2–3 anthers. Female: ovary ovoid, c. 1.5 mm; style short; stigma discoid, papillate. Berries red when ripe, 6–7 mm broad; seeds 4–5, angular-ovoid, rugose, coriaceous.

Flowering & Fruiting: May–September.

Distribution. India: Almost throughout India.

Specimens examined: Buxa-Tobgaon, 15.05.1949, VN & party 2664; Buxa to PW Road, 36th mile, 16.05.1949, VN & party 2611; Bhutanghat, 26.09.2011, AK 52927; Santrabari to Buxaduar, 18.05.2014, AK 62608.

4. *Lasia* Lour.

Lasia spinosa (L.) Thwaites, Enum. Pl. Zeyl.: 336. 1864. *Dracontium spinosum* L., Sp. Pl. 2: 967. 1753. *Lasia heterophylla* (Roxb.) Schott, Melet. Bot.: 21. 1832; Hook. f., Fl. Brit. India 6: 550. 1893; Prain, Bengal Pl. 2: 1116. 1903.

[Plate 270c-d; Fig. 124a]

Spinous herb. Leaves hastate, 12.8–22 × 9.8–27 cm, pedately lobed; lobes ovate-oblong, asymmetric, 5.5–13.5 × 2.3–6.3 cm, entire, acute or acuminate, coriaceous, glabrous except veins beneath. Inflorescences spadix, long peduncled; spathe crimson, narrow, 15–20 cm, attenuate, convolute. Spadix cylindrical, densely flowered, 2–3 cm, enclosed with spathe. Flowers sessile. Perianth 4–6, free; lobes suborbicular, c. 1.5 × 1.2 cm, white lenticellate, hooded, keeled. Stamens 4–6; filaments flattened, c. 1.5 mm; anthers ovoid. Ovary c. 1.5 mm across; stigma discoid, sessile. Berries obpyramidal, c. 1 × 0.5–1.3 cm, rugose, warty-aculeate, sides unarmed, when dry irregularly ribbed, truncate; seed ovoid-cordate, 5–7 mm.

Flowering & Fruiting: July–November.

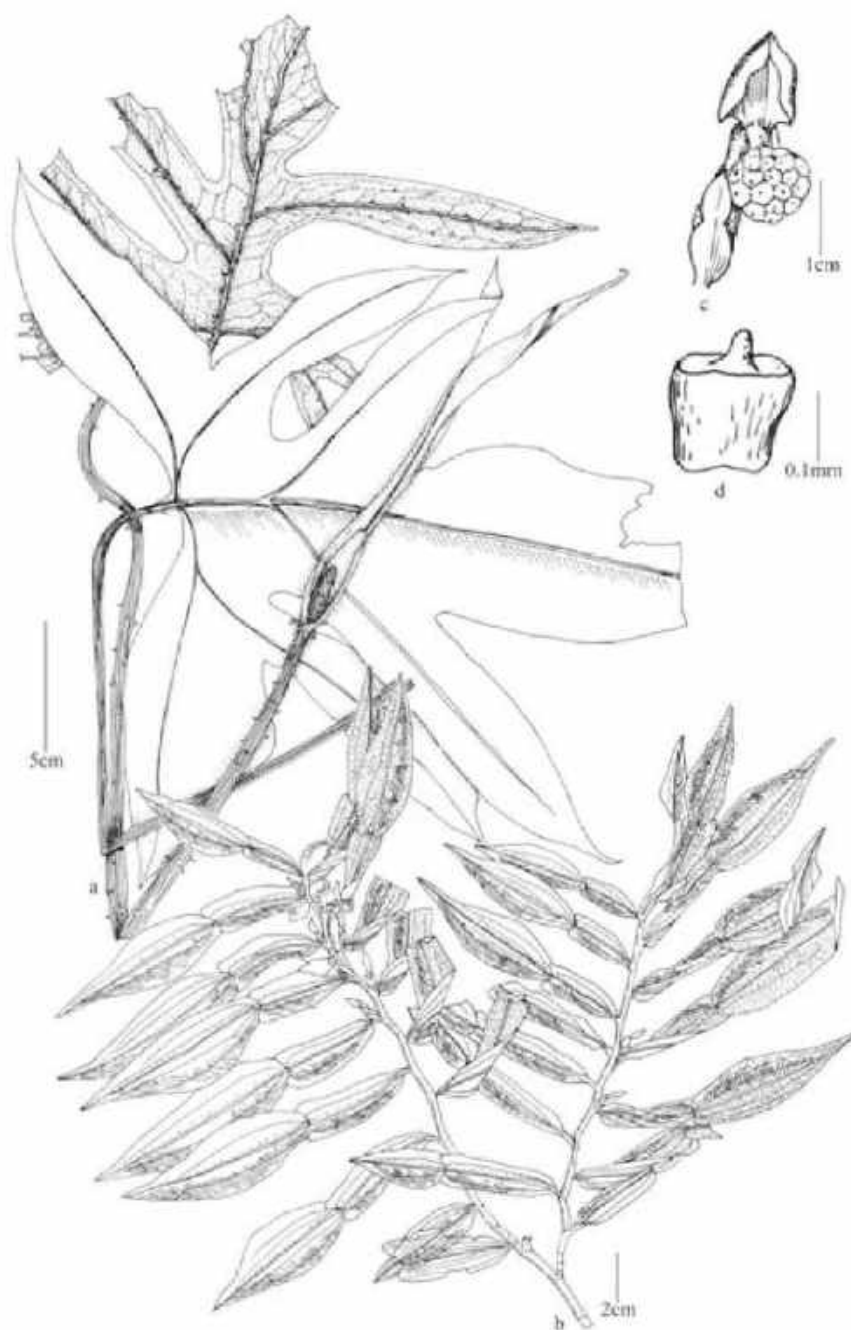


Fig. 124. *Lasia spinosa*: a. Leaves with inflorescence (GK 47262); *Pothos scandens*: b. Leaves with inflorescence; c. Inflorescence; d. Gynoecium (GK 47166).

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal.

Specimens examined: Rajabhatkhwa depot road, 14.05.1949, VN & party, 2462; Jainti 8, 05.03.2011, GK 47262.

Uses: Inflorescence is being used as a vegetable.

5. *Pistia* L.

Pistia stratiotes L., Sp. Pl. 2: 963. 1753; Hook. f., Fl. Brit. India 6: 497. 1893; Prain, Bengal Pl. 2: 1105. 1903. [Plate 271a]

Takapana (B); *Jalkumbhi* (H).

Stoloniferous, free floating aquatic herb. Leaves sessile, numerous in rosettes, obovate, 3.5–10 × 3–8 cm, cuneate, wavy, rounded, often retuse, pubescent, appearing velvety. Inflorescences axillary spadix; spathe pale green, 2–3.5 cm, convolute basally, shortly stalked, pubescent; spadix slightly smaller than spathe, with 4 male flowers above and 1 female flower below. Male: flowers represented by 4 pale yellow, globular anthers, 3–5 mm across, often united, without perianth. Female: flowers represented by solitary gynoecium; ovary flask shaped; style short; stigma cylindrical. Berries globose, c. 0.5 cm across, with persistent stigma; seeds barrel-shaped, reticulate.

Flowering & Fruiting: May–December.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, 13.02.2012, AK 53023.

6. *Pothos* L.

Pothos scandens L., Sp. Pl. 2: 968. 1753; Hook. f., Fl. Brit. India 6: 551. 1893; Prain, Bengal Pl. 2: 1115. 1903. [Plate 271b-d; Fig. 124b-d]

Epiphytic straggling shrub. Leaves ovate to elliptic or lanceolate, 2–8.5 × 5–3 cm, rounded to acute, entire, acuminate-mucronate, coriaceous. Inflorescence axillary, solitary, subglobose, stalked spadix, 4–10 × 3.5–10 mm, pedunculate, spathaceous, surrounded by cataphylls at base; spathes greenish to maroon, ovate, 4–8 × 4–7 mm, concave, clawed, inrolled, rounded to acute with mucronate tip at apex. Perianth 6, hooded. Stamens 6; filaments dilated; anthers ovoid. Ovary depressed ovoid, 3-locular; style absent; stigma umbonate. Berries deep scarlet when ripe, oblong-obovate, 0.8–1.7 cm; seeds smooth.

Flowering & Fruiting: Throughout the year.

Distribution. India: Andaman & Nicobar Islands, Assam, Meghalaya, Mizoram, Sikkim, Uttar Pradesh, Kerala and West Bengal.

Specimens examined: Rajabhatkhawa range, 05.10.2009, SKS & GK 46167; Jainti

range, 10.02.2010, SKS & GK 46392; Rajabhatkhawa range, 29.11.2011, GK 47166; Pana, 11.02.2013, AK 58860; Buxaduar to Tashigaon, 20.05.2014, AK 62690.

7. *Remusatia* Schott

Remusatia vivipara (Roxb.) Schott in Schott & Endl., Melet. Bot.: 18. 1832; Hook. f., Fl. Brit. India 6: 521. 1893; Prain, Bengal Pl 2: 1115. 1903. *Arum viviparum* Roxb., Hort. Bengal.: 65. 1814 (as "*viviparium*"). [Plate 272a-c]

Perennial, tuberous, erect herb, c. 50 cm high; tubers pinkish, depressed globose. Bulbils brownish, ellipsoid, hooked bristly. Leaves blackish green, ovate, 33–37 × 21–22.5 cm, peltate, shallowly cordate, lobes obtuse, wavy, acute, subcoriaceous. Inflorescence spadix, 5–8 cm, appendix smooth, pedunculate, enclosed by spathe; spathe yellowish green, ovate-lanceolate, 5–9 × 2.5–3 cm, ellipsoid with overlapping margins at base, subcoriaceous. Male: perianth absent; neuters forming a mass of packed, angular, flat-topped florets; stamens with a fleshy connective bearing 2–3 small anther-cells. Female: perianth absent; ovary white, ovoid-oblong; style absent; stigma peltate. Berries obovoid or subglobose, 6–8 mm across; seeds subglobose, smooth.

Flowering & Fruiting: July–October.

Distribution. India: Arunachal Pradesh, Bihar, Daman & Diu, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Buxa Fort to Achalung, 29.09.2013, AK 59645.

8. *Rhaphidophora* Hassk.

Rhaphidophora calophylla Schott, Prodr. Syst. Aroid.: 380. 1860. *Rhaphidophora peepla* sensu Hook. f., Fl. Brit. India 6: 545. 1893, non (Roxb.) Schott, 1857. [Plate 272d, 274a]

Large lianas, epiphytic or scrambling shrubs. Leaves symmetric or asymmetric, ovate to elliptic-ovate, 9–19 × 4.5–9.5 cm, rounded at base, entire and cartilaginous, short acuminate, coriaceous. Inflorescence axillary, spadix, 4.5–5 cm, pedunculate, appendix absent, spathaceous; spathes orange yellow, oblong-elliptic, 5–6 cm, boat-shaped, deciduous, coriaceous. Flowers lacking perianth. Stamens 4; filaments flat; anthers ditheous. Ovary hexagonal-cylindric, 1.5–2 mm across, apex truncate; style absent; stigma elliptic with blunt ends, slightly raised. Berries greenish brown, compactly arranged; seeds oblong, smooth.

Flowering & Fruiting: October–December.

Distribution. India: Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Puducherry, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Tashigaon to Rovers point, 03.10.2013, AK 59767.

9. Typhonium L.

Typhonium trilobatum (L.) Schott, Wiener Z. Kunst 3: 732. 1829; Hook. f., Fl. Brit. India 6: 509. 1893; Prain, Bengal Pl. 2: 1107. 1903. *Arum trilobatum* L., Sp. Pl. 2: 965. 1753. [Plate 273b-c]

Ghet-kachchu, Ghekul (B).

Perennial, tuberous, erect herb, 20–25 cm high; tubers white, depressed subglobose. Leaves 3-lobed, 6–14 × 4–7 cm, cordate-cuneate, irregularly repand, acuminate, punctate; mid lobe ovate and lateral lobes asymmetrically ovate. Inflorescence spadix, 10–12 cm, pedunculate, appendix pinkish and smooth; spathe pinkish green, pinkish inside, elliptic-ovate, 16–19.3 × 5–6 cm, convoluted at base, long acuminate at apex, ribbed, punctate. Flowers lacking perianth. Male: stamens pinkish green, many, filaments absent; anthers ellipsoid; neuter zone 2.5–2.8 cm, with staminodes at base and, naked and creamy white above; staminodes creamy white, filiform, 7–8 mm, twisted. Female: ovary greenish white, ellipsoid, 2.5–3 × 1.8–2 mm, angular; style absent; stigma truncate, disciform. Berries white when ripe, ellipsoid or ovoid, compact; seeds globose, smooth.

Flowering & Fruiting: July–September.

Distribution. India: Goa, Karnataka, Kerala, Lakshadweep, Maharashtra, Tamil Nadu and West Bengal.

Specimen examined: Chcko-1, 26.09.2012, AK 56173.

Acoraceae

Acorus L.

Acorus calamus L., Sp. Pl. 1: 324. 1753; Hook. f., Fl. Brit. India 6: 555. 1893.

Bojho (N).

Aromatic rhizomatous herb, 1–1.5 m high; rhizome pinkish. Leaves ensiform, distichous, 50–65 × 0.7–1.5 cm, wavy, acute, coriaceous. Inflorescence spadix, appendix absent; spathe green, leafy, 30–50 cm, acute. Spadix greenish, straight or slightly curved, erect, oblique, conic to subcylindric, 2.8–5.5 × 0.5–1 cm, densely flowered. Perianth 4-lobed; lobes oblong, c. 1.2 × 0.5–0.8 mm, hooded, keeled. Stamens 4; filaments 1.2–2.4 mm; anthers creamy white. Ovary 1.5–3.5 × 0.8–2.3 mm; stigma capitate. Berries densely arranged, oblong-obovoid, 4–4.5 × 2–3 mm, 1–many-seeded; seeds oblong-ellipsoid to ovoid, without bristles.

Flowering & Fruiting: April–September.

Distribution. India: Almost throughout (cultivated).

Specimens examined: Bhutanghat, 28.06.1949, VN & party 3069; Rajabhatkhwara range, 16.02.2010, SKS & GK 47127.

Lemnaceae

Lemna L.

Lemna aequinoctialis Welw., Apont.: 578. 1859. *Lemna paucicostata* Hegelm., Lemnac.: 138, t. 8. 1868; Hook. f., Fl. Brit. India 6: 556. 1893; Prain, Bengal Pl. 2: 1117. 1903. [Plate 274a]

Small aquatic, floating, herb, with or without roots; fronds light green, usually 1–3 together, oblong or ovate or orbicular, 2–5 × c. 0.3 mm, asymmetrical; two distinct papillae on the dorsal surface; nodal (where the veins converge) papillae smaller than apical one. Root one; root sheath winged, minute. Inflorescence on pouches; pouches two, lateral, sideways, distant from roots. Male flowers two, c. 0.1 mm; anthers divaricate, bilocular, dehisce by transverse slit. Female flower composed of gynoeceium, c. 0.2 mm; ovary globose, hyaline; style one, terminal. Fruit utricle.

Flowering: November–December.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, Hathinala, 21.02.2012, AK 55866.

Notes: Fronds are eaten by birds.

Potamogetonaceae

Potamogeton L.

Potamogeton nodosus Poir. in Lam., Encycl.: Suppl. 4, 535. 1816. *Potamogeton indicus* Roxb., Fl. Ind. 1: 452. 1820; Hook. f., Fl. Brit. India 6: 565. 1893; Prain, Bengal Pl. 2: 1123. 1903. [Plate 274b–c]

Stoloniferous, rhizomatous, floating herb. Leaves submerged to floating, elliptic to elliptic-obovate, lanceolate, 5–15 × 3–4.5 cm, cuneate to rounded, entire, acute to obtuse, coriaceous to membranous. Inflorescence axillary or terminal, erect, pedunculate, dense spikes, 2.5–4.3 cm. Flowers sessile. Perianth lobes 4, green when young, turn brown later, suborbicular, c. 1 × 1.5 mm, clawed, fleshy, thick. Stamens 4, adnate to perianth at base, sessile; anthers oblong, c. 2 × 1 mm. Carpels 4, subglobose, 2–2.5 mm across; style recurved; stigma capitate. Fruits drupelets, oblong, 1–2 mm, fleshy, dorsal keel distinct; seed subreniform, bony.

Flowering & Fruiting: August–May.

Distribution. India: Almost throughout India.

Specimen examined: Narathali, 20.02.2012, AK 55761.

Cyperaceae

Key to the the genera

- | | |
|-----------------------|----|
| 1a. Flowers bisexual | 2 |
| 1b. Flowers unisexual | 10 |

Botanical Survey of India

- 2a. Spikelets 1-2-flowered; glumes spinulose on back 7. *Kyllinga*
2b. Spikelets few to many-flowered; glumes not spinulose on back 3
3a. Spikelets flattened or compressed; glumes usually distichously arranged 4
3b. Spikelets ovoid/globose/cylindric, not flattened or compressed; glumes spirally arranged 5
4a. Stigmas 3 (rarely 2 or with a subentire style); nuts trigonous, triquetrous, sometimes lenticular, with one face opposite the rachilla 3. *Cyperus*
4b. Stigmas 2; nuts biconvex, with one angle facing the rachilla 8. *Pycreus*
5a. Flowers usually with a perianth of hypogynous scales or bristles or both 6
5b. Flowers without a perianth of hypogynous scales or bristles 8
6a. Leaves well developed; nuts with long beak of persistent style base 9. *Rhynchospora*
6b. Leaves reduced to bladeless sheaths; nuts not beaked 7
7a. Stems filiform; inflorescences reduced to a single terminal spikelet; style articulated with the ovary; nuts with swollen style base 4. *Eleocharis*
7b. Stems not filiform; inflorescences anthelate or a head, pseudolateral; style continuous with the ovary; nuts without swollen style base 10. *Schoenoplectiella*
8a. Style base not dilated, continuous with the nut 5. *Eriophorum*
8b. Style base dilated, constricted or articulated above the nut 9
9a. Ligule absent; stamen 1; style glabrous; nuts with a button-like thickening formed by the persistent style base 1. *Bulbostylis*
9b. Ligule absent or present; stamens 1-3; style usually fimbriate; nuts without a button-like thickening of the style base 6. *Fimbristylis*
10a. Contraligule absent; spikelets in axillary umbels; nuts enclosed in an utricle 2. *Carex*
10b. Contraligule present; spikelets never in axillary umbels; nuts white, on usually 3-lobed, persistent disk, not enclosed in an utricle 11. *Scleria*

1. *Bulbostylis* Kunth

Bulbostylis barbata (Rottb.) C. B. Clarke in Hook. f., Fl. Brit. India 6 (19): 651. 1893; Prain, Bengal Pl. 2: 1156. 1903. *Scirpus barbatus* Rottb., Descr. Pl. Rar.: 27. 1772. [Plate 274d; Fig. 128a-c]

Annual, densely tufted, erect herb, 6-16 cm high. Leaves capillary to very slender, 14-35 × 0.2-0.5 mm, acute, sometimes reduced to sheaths, glabrous or scabrous below; ligule absent. Inflorescences a terminal head of 2-20 sessile spikelets, subspherical, 2-7 × 2-13 mm. Spikelets ovoid to ovoid-lanceolate, 2-7 × 1-1.5 mm. Rachilla persistent, narrowly winged. Glumes brownish, ovate, 1.5-2 × 1.2-1.5 mm, concave, acute with excurved mucro at apex, ciliolate, strongly 1-keeled. Stamen 1; filaments up to 1.2 mm; anthers linear-oblong. Ovary obovate; style filiform, bulbous and articulate at base; stigmas 3. Nuts triquetrous, obovoid,

c. 0.8 × 0.5 mm, stipitate, umbonate, stramineous, finely reticulate with minute isodiametric cells in many rows.

Flowering & Fruiting: May–January.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, Sukno river, 22.09.2011, AK 52752; Newlands, 15.02.2012, AK 53072.

2. *Carex* L.

Key to the species

- | | |
|---|-----------------------|
| 1a. Utricles biconvex with 2 stigmas | 4. <i>C. longipes</i> |
| 1b. Utricles usually trigonous with 3 stigmas | 2 |
| 2a. Spikes cylindrical, larger, more than 2 cm, with many spikelets | 5. <i>C. myosurus</i> |
| 2b. Spikes oblong, smaller, less than 2 cm, with few spikelets | 3 |
| 3a. Female glume with prominent long awn; utricles 3–5 nerved on each faces, hispidulous | 1. <i>C. cruciata</i> |
| 3b. Female glume with short awn or not; utricles 8–10 nerved on each faces, glabrous (except <i>C. indica</i>) | 4 |
| 4a. Ligule present; staminate part shorter than female part; female glume with short awn | 2. <i>C. filicina</i> |
| 4b. Ligule absent; staminate part equal to female part; female glume without awn | 3. <i>C. indica</i> |

1. *Carex cruciata* Wahlenb., Kongl. Vetensk. Acad. Nya Handl. 24: 149. 1803; C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 715. 1894. [Plate 275a; Fig. 125a-d]

Rhizomatous, perennial, suberect herb, 20–40 cm high. Leaves linear, 2–5.5 mm wide, scabrid and revolute, subulate, scabrid at nerves above. Inflorescences much elongated, decompound, panicles. Spikes ovoid to oblong-ovoid, 3–6 mm, staminate part shorter than pistillate part. Flowers unisexual. Male: glumes brownish, elliptic-lanceolate, 1.6–2 × 0.5–0.6 mm, acute with short mucro; stamens 3; filaments up to 2 mm; anthers linear. Female: glumes reddish brown to dark brown, ovate, 2–2.5 × 0.8–1.2 mm, aristate, many nerved, glabrous or sparsely hispidulous. Utricles brown to reddish brown, obtusely trigonous, ellipsoid to ovoid, 2.5–3 × 0.8–1 mm, with bifid beak, 3–5-nerved on each face, hispidulous. Ovary trigonous, elliptic-oblong; style slender; stigmas 3, hispidulous. Nuts pale yellow to brown, trigonous, ovoid-ellipsoid, c. 2 × 1 mm, scarcely stipitate and beaked.

Flowering & Fruiting: July–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Chhattisgarh, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh,

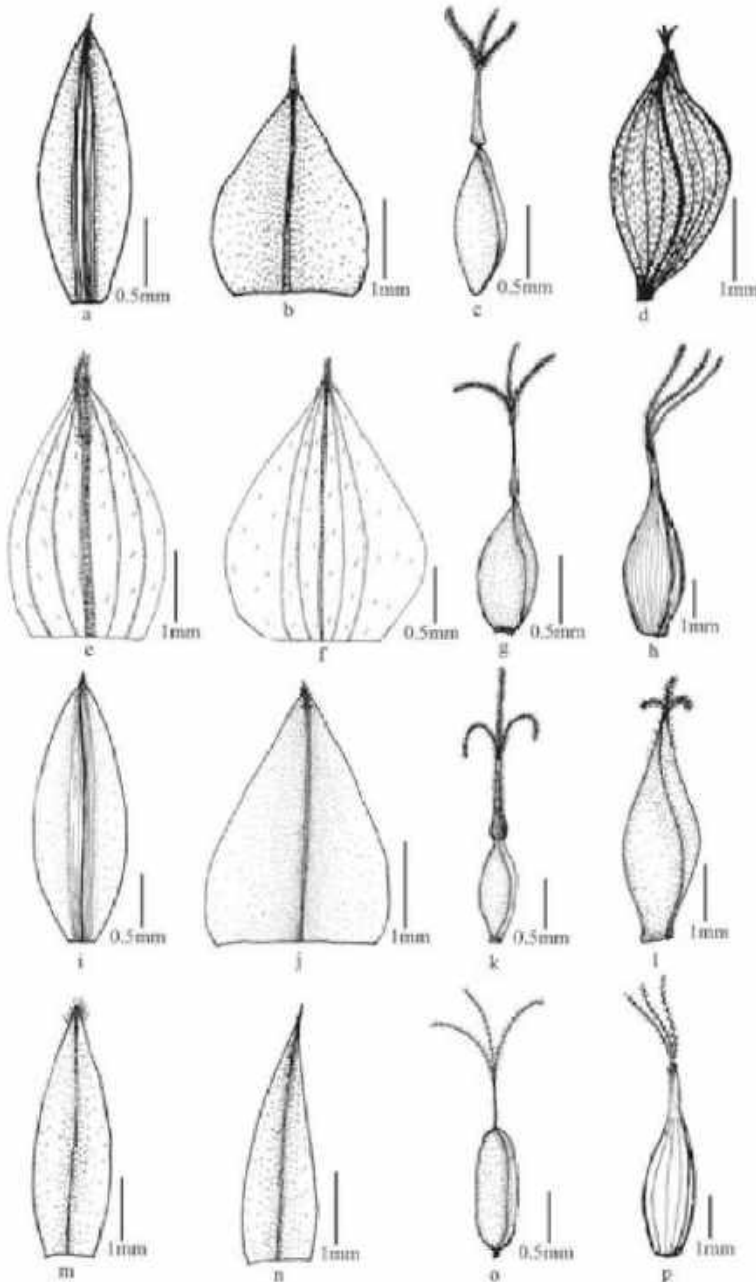


Fig. 125. *Carex oruciata* (a-d): a. Male glume; b. Female glume; c. Female flower; d. Utricle (AK 5578); *Carex filicina* (e-h): e. Male glume; f. Female glume; g. Female flower; h. Utricle (AK 59625); *Carex indica* (i-l): i. Male glume; j. Female glume; k. Female flower; l. Utricle (AK 58660); *Carex myosuroides* (m-p): m. Male glume; n. Female glume; o. Female flower; p. Utricle (AK 59629).

Maharashtra, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Phashkhawa river belt, 30.09.2012, AK 58538; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58578.

2. *Carex filicina* Nees in Wight, Contr. Bot. India: 123. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 6: 717. 1894. *Carex caricina* (D. Don) Ghildyal & U. C. Bhattach., J. Econ. Taxon. Bot. 7 (3): 602. 1986. *Carex caricina* var. *glaucina* (Boeckeler) Ghildyal & U. C. Bhattach., J. Econ. Taxon. Bot. 7(3): 602. 1986.

[Fig. 125e-h]

Rhizomatous, perennial, erect herb, 50–100 cm high. Leaves linear, 7–9 mm wide, sheathing at base, antrorsely scabrous towards apex, long acute, striated; ligule membranous. Inflorescences compound panicles, scabrous. Spikes sessile, oblong, 8–13 mm, staminate part usually shorter than pistillate part. Male: glumes lanceolate, 3.5–4 × c. 2 mm, mucronate, hispidulous. Stamens 3; filaments up to 3 mm; anthers linear-oblong. Female: glumes pale brown to reddish brown, ovate, 1.5–2.5 × 1–1.5 mm, obtuse or acute at apex ending in short hispid awn. Stigmas 3, scabrous. Utricles trigonous, ellipsoid, 4–5 × 1.8–2 mm, sometimes recurved and bifid at apex, stramineous, striated, with 8–10 nerves on each face. Nuts trigonous, ellipsoid, 2–2.5 × c. 1 mm, short stipitate, beaked, smooth.

Flowering & Fruiting: April–November.

Distribution. India: Almost throughout India.

Specimen examined: Santrabari to Buxa Fort, 28.09.2013, AK 59625.

3. *Carex indica* L., Mant. Pl. Altera: 574. 1771. *Carex indica* var. *laetebrunnea* C. B. Clarke in Hook. f., Fl. Brit. India 6: 715. 1894. [Plate 275b; Fig. 125i-l]

Rhizomatous, perennial, erect herb, 30–50 cm high. Leaves linear, 5–10 mm wide, scabrous, long acuminate, chartaceous. Inflorescence a compound panicle, branched into several sessile spikes. Spikes sessile, oblong, 5–10 mm, divaricate, staminate part and pistillate part almost equal. Male: glumes brown, elliptic-oblong, 2–2.5 × 0.8–1 mm, acute with mucro at apex; stamens 3; filaments up to 3.5 mm; anthers linear-oblong, apiculate and scabrous at apex. Female: glumes brownish, ovate, 2.5–3 × 1–2 mm, subacute with mucro and sparsely scabrous at apex; ovary elliptic-oblong, stipitate; style c. 0.7 mm, scabrid above; stigmas 3, scabrid. Utricles trigonous, ellipsoid or ovoid-ellipsoid, 2–4 × 1–2 mm, beaked, 8–10 nerved on each face, sparsely scabrid at angles above. Nuts dark brown, trigonous, ellipsoid, 2–2.5 × 1.2 mm, short stipitate, beaked.

Flowering & Fruiting: September–December.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Maharashtra, Meghalaya, Sikkim and West Bengal.

Specimens examined: Hauda nala, 03.10.2012, AK 58660; Buxaduar to Achalung, 14.02.2014, AK 59941; Buxaduar to Achalung, 19.05.2014, AK 62664.

4. *Carex longipes* D. Don, Philos. Mag. J. 62: 455. 1823; C. B. Clarke in Hook. f., Fl. Brit. India 6: 704. 1894.

Rhizomatous, perennial, erect herbs, 25–70 cm high. Leaves linear, 2–4 mm wide, flat, scabrous. Inflorescence panicle, branched into several sessile spikes. Spikes 3–5, cylindrical, 2–4 cm, staminate part shorter than pistillate part. Male: glumes brown, ovate-lanceolate, c. 2 × 0.8 mm, acute with mucro at apex; stamens 3; filaments up to 3 mm; anthers linear-oblong. Female: glumes yellowish green, ovate-lanceolate, 3.5–5 mm, acuminate at apex, aristate, scabrous on awn. Utricles greenish, obliquely patent, elliptic or elliptic, 5–6 mm, plano-convex, 5–9-veined abaxially, cuneate, apex gradually narrowed into a slightly long bifid beak at apex. Ovary elliptic; style broad at base; stigmas 2. Nuts stramineous, elliptic, biconvex, c. 2.5 mm, shortly stipitate.

Flowering & Fruiting: June–August.

Distribution. India: Meghalaya, Nagaland, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Tashigaon, 08.10.2009, SKS & GK 46231.

5. *Carex myosurus* Nees in Wight, Contr. Bot. India: 122. 1834; C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 723. 1894. [Plate 275c; Fig. 125m-p]

Rhizomatous, perennial, erect herb, 50–90 cm high. Leaves linear, revolute and scabrous above, acuminate, striated; ligule membranous. Inflorescence panicles, simple to decomposed, narrow, erect or somewhat nodding at the top. Spikes suberect to spreading, cylindrical, 3–6 cm, staminate part shorter to longer than pistillate part. Male: glumes brownish, oblong-lanceolate, 3–4 mm, hispidulous at apex; stamens 3; filaments 3–4 mm; anthers linear-oblong, mucronate. Female: glumes brown, oblong-lanceolate, 3–3.5 mm, aristate; ovary elliptic-oblong, trigonous, stipitate; style short; stigmas 3, scabrous. Utricles pale yellow, trigonous, ellipsoid, 4–4.5 mm, slightly curved, 4–6 nerved at each face, bifid and hispidulous at apex, beaked. Nuts pale yellow, triquetrous, elliptic to elliptic-oblong, abruptly beaked at apex, stipitate and punctate.

Flowering & Fruiting: July–December.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 08.10.2009, SKS & GK 46238; Santrabari to Buxa Fort, 28.09.2013, AK 59629; Buxaduar to Achalung, 19.05.2014, AK 62640.

3. *Cyperus* L.

Key to the species

- 1a. Inflorescence a head of sessile or rayed, densely cylindrical or globose spikes; spikelets falling entire at maturity (except *C. compactus*), linear, terete; rachilla deciduous 2
- 1b. Inflorescence not as above; spikelets persistent, elliptic to oblong, not terete; rachilla persistent 4
- 2a. Leaves septate-nodulose; spikes globose heads 1. *C. compactus*
- 2b. Leaves not septate-nodulose; spikes cylindrical 3
- 3a. Inflorescences usually contracted; rays usually absent, if present less than 1 cm; spikelets obliquely erect to horizontally divergent 3. *C. cyperinus*
- 3b. Inflorescence usually with well developed rays; rays 3-15, up to 8 cm; spikelets spreading at right angles to the rachis 4. *C. cyperoides*
- 4a. Spikelets spicately arranged 5
- 4b. Spikelets digitately or stellately arranged 8
- 5a. Glumes suborbicular, retuse with mucronate tip at apex; rachilla not winged 10. *C. iria*
- 5b. Glumes not as above; rachilla narrowly winged to winged 6
- 6a. Tuberous, stoloniferous herbs; stems less than 2 mm wide; nuts smooth 12. *C. rotundus*
- 6b. Rhizomatous herbs; stems more than 2 mm wide; nuts not smooth 7
- 7a. Leaves 5-12 mm wide; spikes cylindrical; rachilla straight with 0.4-0.5 mm long internodes; glumes acute at apex; nuts yellowish brown, ellipsoid or oblong-obovoid, with isodiametric cells on surfaces 7. *C. digitatus*
- 7b. Leaves 2.5-3 mm wide; spikes broadly ovoid-pyramidal; rachilla flexuous, with c. 1 mm long internodes; glumes obtuse with micro at apex; nuts pale yellow, ultimately dark brown, oblong, punctulate 8. *C. distans*
- 8a. Annuals with fibrous roots 9
- 8b. Perennials with short rhizome 10
- 9a. Spikelets 2-5 mm broad; rachilla not winged; glumes prominently excurved micro at apex 2. *C. cuspidatus*
- 9b. Spikelets 1-1.5 mm broad; rachilla narrowly winged; glumes micro at apex 5. *C. difformis*
- 10a. Inflorescences very lax compound umbels; rachilla winged; glumes broadly obovate to suborbicular 6. *C. diffusus*
- 10b. Inflorescences not as above; rachilla not winged; glumes variously shaped, not as above 11
- 11a. Inflorescences umbels, contracted or reduced to a single head; glumes acute at apex 13. *C. siletensis*
- 11b. Inflorescences not as above; glumes subobtusate with micro at apex 12

12a. Stems 1–2.5 mm wide; leaves not septate-nodulose; glumes oblong-ovate, 1–1.3 mm; stamen 1; style and stigmas not papillose; nuts without thickened corky angles

9. *C. haspan*

12b. Stems 3–8 mm wide; leaves septate-nodulose; glumes ovate to broadly ovate, 2–2.5 mm; stamens 3; style and stigmas papillose; nuts with thickened corky angles

11. *C. platystylis*

1. *Cyperus compactus* Retz., *Observ. Bot.* 5: 10. 1788. *Mariscus microcephalus* J. Presl & C. Presl, *Reliq. Haenk.* 1: 182. 1828; C. B. Clarke in Hook. f., *Fl. Brit. India* 6: 624. 1893. [Plate 275d; Fig. 126a-d]

Rhizomatous, perennial, erect herb, 50–100 cm high. Leaves linear, 42–112 × 0.4–0.8 cm, acute, canaliculate, rigid, septate-nodulose, some reduced to subphyllous sheaths, glabrous to scabrous at the margins and midrib below. Inflorescences greenish brown, terminal, compound, corymbs. Spikes globose to subglobose, 10–15 mm across; rachilla distinctly winged. Spikelets linear, 3–6 × 0.5–0.8 mm, 4–6-flowered, subterete or slightly compressed. Glumes spirally arranged; lower glumes 2–3, sterile, ovate-lanceolate to oblong-lanceolate, 1–1.5 × 0.2–0.5 mm, sharply acute to subobtusate at apex, faintly keeled; upper glumes, reddish brown to stramineous, fertile, oblong-lanceolate, 3–3.2 × 0.5–1 mm, obtuse or subobtusate at apex, 4–6-nerved. Stamens 3; filaments 0.4–3 mm; anthers linear-oblong. Ovary linear-oblong; style minute; stigmas 3. Nuts yellowish brown, trigonous, linear-oblong, 1.8–2.2 × 0.5 mm, apiculate at apex, slightly convex on one side.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 26.09.2012, AK 56177.

2. *Cyperus cuspidatus* Kunth, *Nov. Gen. Sp.* 1: 204. 1816; C. B. Clarke in Hook. f., *Fl. Brit. India* 6: 598. 1893; Prain, *Bengal Pl.* 2: 1141. 1903.

[Plate 276a; Fig. 126e-g]

Annual, erect herb, 2–5 cm high. Leaves linear, 0.5–1 mm wide, rigid, gradually narrowed to apex, scabrous in the upper part. Inflorescences simple to compound, often reduced to a single head, 7 × 14 mm. Spikelets 10–20-flowered, digitately arranged, up to 15 in each cluster, linear, 5–7 × 1.5–2.5 mm (including the mucro), strongly compressed; rachilla wingless. Glumes ferruginous to castaneous, oblong-spathulate, 0.8–1 × 1–1.5 mm (including the mucro), obliquely patent, emarginate, strongly excurved mucronate, subchartaceous, with 3-nerved keel; stamens 2 or 3; filaments up to 0.8 mm; anthers elliptic. Ovary trigonous, obovoid; style c. 0.2 mm; stigmas 3, longer than style. Nuts brown, trigonous, obovoid, 0.5–0.6 × 0.2–0.3 mm, apiculate at apex, punctate.

Flowering & Fruiting: July–November.

Distribution. India: Almost throughout India.

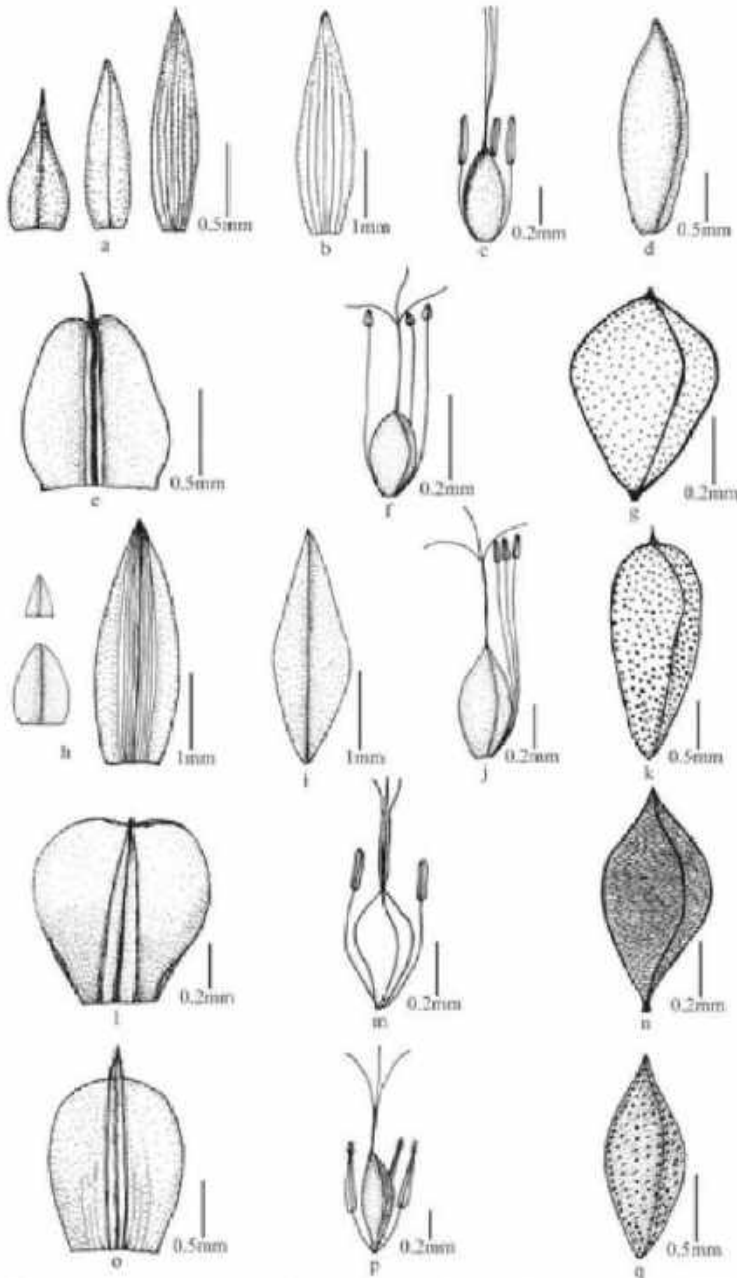


Fig. 126. *Cyperus compactus* (a-d): a. Lower glumes; b. Flower containing glume; c. Flower; d. Nut (AK 56177); *Cyperus cuspidatus* (e-g): e. Glume; f. Flower; g. Nut (AK 52750); *Cyperus cyperoides* (h-k): h. Lower glumes; i. Flower containing glume; j. Flower; k. Nut (AK 58730); *Cyperus difformis* (l-n): l. Glume; m. Flower; n. Nut (AK 55854); *Cyperus diffusus* (o-q): o. Glume; p. Flower; q. Nut (AK 58582).

Specimens examined: Rydak river belt, 20.09.2011, AK 52662; Newlands, Sukno river, 22.09.2011, AK 52750; Buxa Fort to Tashigaon, 01.10.2013, AK 59719.

3. *Cyperus cyperinus* (Retz.) Valck. Sur., *Cyperus*: 154, t. 6, f. 10. 1898. *Kyllinga cyperina* Retz., *Observ. Bot.* 6: 21. 1791. *Mariscus cyperinus* (Retz.) Vahl, *Enum. Pl.* 2: 377. 1805; C. B. Clarke in Hook. f., *Fl. Brit. India* 6 (19): 621. 1893. *Mariscus cyperinus* var. *bengalensis* C. B. Clarke in Hook. f., *Fl. Brit. India* 6 (19): 621. 1893; Prain, *Bengal Pl.* 2: 1147. 1903. [Plate 276b]

Rhizomatous, perennial, erect herb, 20–35 cm high. Leaves linear, 3.5–5 mm wide, narrowed, flat to canaliculate, scabrid at margins towards apex or throughout, scabrid on midrib below towards apex. Inflorescences usually contracted and head-like, with short rays. Spikes cylindric, 8–12 × 5–6 mm. Spikelets obliquely erect to horizontally divergent, subterete, linear-oblong to linear-lanceolate, 3–4.5 × 0.6–1 mm, usually 1–2-flowered. Glumes 4; lower glumes 2, sterile, ovate, 0.8–1 × 0.3–0.5 mm, acute to subacute at apex; third glume elliptic to ovate-lanceolate, 3–3.2 × 1–1.2 mm, acute at apex, with 3-nerved greenish keel; fourth glume elliptic, 2.5–3 × 0.8–1 mm, acute at apex, base jointed with third glume, keeled. Stamens 3; filaments up to 3 mm; anthers c. 1 mm. Ovary elliptic-oblong; style c. 0.5 mm; stigmas 3, longer than style. Nuts yellowish, trigonous, oblong-ellipsoid, 2–2.2 × 0.4–0.5 mm, apiculate at apex, slightly curved, punctate.

Flowering & Fruiting: May–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Gadadhar range, 31.03.2012, GK 56027; Hauda nala, 03.10.2012, AK 58658.

4. *Cyperus cyperoides* (L.) Kuntze, *Revis. Gen. Pl.* 3 (3): 333. 1898. *Scirpus cyperoides* L., *Mant. Pl. Altera*: 181. 1771. *Mariscus sieberianus* Nees ex C. B. Clarke in Hook. f., *Fl. Brit. India* 6 (19): 622. 1893; Prain, *Bengal Pl.* 2: 1147. 1903. [Plate 276c; Fig. 126h-k]

Bara guthubi (B).

Rhizomatous, perennial, erect herb, 15–50 cm high. Leaves linear, 2–5 mm wide, gradually narrowed, flat to canaliculate, glabrous to scabrid at margins towards apex or throughout, glabrous to scabrid on midrib below towards apex. Inflorescences subcompound, with short to long rays. Spikes cylindric, 1–2.7 × 0.5–0.9 cm. Spikelets usually 1–2-flowered, subterete, linear-oblong to linear-lanceolate, 3–5 × 0.5–0.8 mm, horizontally divergent. Glumes 5; lower glumes 2, sterile, triangular-ovate to ovate, 0.5–1 × 0.3–0.5 mm, acute to obtuse at apex; third and fourth glumes elliptic to ovate-lanceolate, 3–3.2 × 0.8–1 mm, acute at apex, with 6–8-nerved keel; fifth glume elliptic, 2.5–3 × 0.8–1 mm, acute at apex, jointed with fourth glume at base, keeled. Stamens 3; filaments up to 3.5 mm;

anthers linear-oblong. Ovary elliptic-oblong; style c. 0.5 mm; stigmas 3, longer than style. Nuts yellowish to reddish brown, trigonous, oblong-ellipsoid, 1.5–2.2 × 0.4–0.5 mm, apiculate at apex, slightly curved, punctate.

Flowering & Fruiting: June–November.

Distribution. India: Almost throughout India.

Specimens examined: Buxa-Bhutan Road, 35th mile, 16.05.1949, VN & party 2537; Rydak river belt, 26.02.2012, AK 55964; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58575; Pana, 08.10.2012, AK 58730; Achalung to Lapchakhawa, 29.09.2013, AK 59654.

5. *Cyperus difformis* L., Cent. Pl. 2: 6. 1756; C. B. Clarke in Hook. f., Fl. Brit. India 6: 599. 1893; Prain, Bengal Pl. 2: 1142. 1903. [Plate 276d; Fig. 126l-n]

Behua (B); *Mothey* (N).

Annual, erect to obliquely erect herb, 12–45 cm high. Leaves linear-lanceolate, 3–35 × 0.2–0.3 cm, acute, revolute and entire. Inflorescences simple or compound, lax to congested in a brown to black globose cluster of spikelets. Spikelets linear-oblong, 3–4.5 × 1–1.4 mm, compressed, stellately arranged; rachilla narrowly winged. Glumes reddish brown, distichously arranged, obovate to suborbicular, 0.6–0.8 mm across, faintly emarginate with minute mucro at apex, with prominent keel, obscurely 3-nerved. Stamens 2; filaments up to 0.6 mm; anthers minute. Ovary trigonous, elliptic-obovate; style minute; stigmas 3. Nuts pale white, triquetrous, elliptic-obovate, 0.6–0.8 × 0.5 mm, faintly apiculate at apex, stipitate, smooth with vertical rows of minute isodiametric cells.

Flowering & Fruiting: August–February.

Distribution. India: Almost throughout India.

Specimens examined: Rydak river belt, 20.09.2011, AK 52686; Narathali, 23.09.2011, AK 52827; Kumargram, Hathinala, 21.02.2012, AK 55851; Kumargram, Hathinala, 21.02.2012, AK 55854.

6. *Cyperus diffusus* Vahl, Enum. Pl. 2: 321. 1805; C. B. Clarke in Hook. f., Fl. Brit. India 6: 603. 1893; Prain, Bengal Pl. 2: 1142. 1903. *Cyperus pubescens* Steud., Syn. Pl. Glumac. 2 (7): 50. 1854; C. B. Clarke in Hook. f., Fl. Brit. India 6: 604. 1893. [Fig. 126o-q]

Rhizomatous, perennial, erect herb, 15–35 cm high. Leaves linear, 5–9 mm wide, scabrous, acuminate, 3-veined. Inflorescences decomposed, diffuse or distantly lax, 6–12 cm across. Spikelets 6–10-flowered, digitately arranged, 2–5 together or solitary, sessile when in cluster, oblong, 4–7 × 2–3 mm (including the mucro), subacute at apex, compressed; rachilla narrowly winged. Glumes greenish yellow, obovate to suborbicular, c. 1.5 mm across (including excurved mucro), obtuse with

micro at apex, sides faintly nerved, white hyaline, with strongly 3-nerved keel. Stamens 3; filaments up to 1 mm; anthers yellow, linear-oblong, with connective appendages at apex. Ovary trigonous, linear-oblong; style minute; stigmas 3. Nuts pale yellow, triquetrous, ellipsoid, 1.2–1.5 × 0.5–0.7 mm, acute and apiculate at apex, creamy punctate visible when dry, or else looks smooth.

Flowering & Fruiting: September–November.

Distribution. India: Throughout India except North Western Region.

Specimens examined: Jainti range, 12.10.2009, SKS & GK 46320; Kumargram, Kalikhola river belt, 21.09.2011, AK 52722; Newlands, 15.02.2012, AK 55610; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58582.

7. *Cyperus digitatus* Roxb., *Fl. Ind.* 1: 209. 1820; C. B. Clarke in Hook. f., *Fl. Brit. India* 6: 618. 1893; Prain, *Bengal Pl.* 2: 1145. 1903. [Plate 277a; Fig. 127a-c]

Rhizomatous, perennial, erect herb, 1–1.5 m high. Leaves strap-shaped, 5–12 mm wide, scabrous, narrowed, coriaceous. Inflorescences compound, 10–35 cm across. Spikes 3–9, digitately arranged (a few solitary on long peduncles), cylindric, 2.5–5 × 2–3 cm. Spikelets 8–20-flowered, spicately arranged, ultimately at right angle to the rachis, linear, 10–15 × 1–1.5 mm, slightly compressed; rachilla winged. Glumes elliptic to elliptic-oblancoolate, 2.6–3 × c. 1 mm, acute with scabrous at apex, with 3–5-nerved keel. Stamens 3; filaments up to 1.5 mm; anthers linear, with short connective, scabrous. Ovary linear-lanceolate, trigonous; style 1.2–1.5 mm; stigmas 3, as long as style. Nuts yellowish brown, trigonous, ellipsoid to oblong-obovoid, 1.2–1.5 × c. 0.5 mm, apiculate at apex, isodiametric cells on surface.

Flowering & Fruiting: August–October.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Haryana, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Narathali, 23.09.2011, AK 52814.

8. *Cyperus distans* L. f., *Suppl. Pl.*: 103. 1782; C. B. Clarke in Hook. f., *Fl. Brit. India* 6: 607. 1893. *Cyperus nutans* auct. non Vahl 1805; C. B. Clarke in Hook. f., *Fl. Brit. India* 6: 607. 1893; Prain, *Bengal Pl.* 2: 1144. 1903.

[Plate 277b; Fig. 127d-f]

Pani-malanga (B).

Rhizomatous, perennial, erect herb, 15–20 cm high. Leaves linear, 2.5–3 mm wide, entire, acute, chartaceous. Inflorescences compound to decomposed, spreading, 7–10 cm across. Spikelets brownish, linear, 8–12 mm, suberect, spreading,

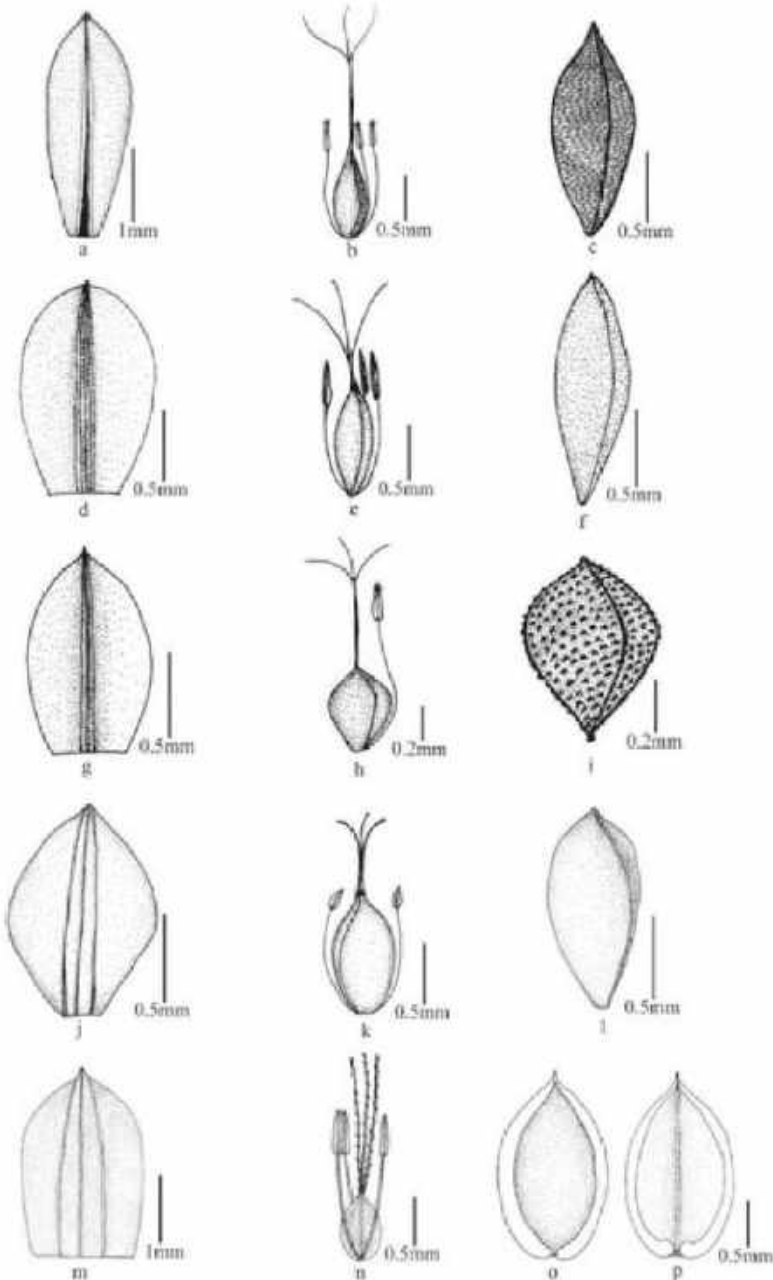


Fig. 127. *Cyperus digitatus* (a-c): a. Glume; b. Flower; c. Nut (AK 52814); *Cyperus distans* (d-f): d. Glume; e. Flower; f. Nut (AK 58734); *Cyperus haspan* (g-i): g. Glume; h. Flower; i. Nut (AK 55748); *Cyperus iria* (j-l): j. Glume; k. Flower; l. Nut (AK 55621); *Cyperus platystylis* (m-p): m. Glume; n. Flower; o. Dorsal view of nut; p. Ventral view of nut (AK 55759).

alternate and distantly arranged; rachilla winged. Glumes brown, oblong-elliptic, 1.2–1.6 × 0.8–1 mm, obtuse with mucro at apex, distantly arranged in zig-zag form, erecto-patent, hyaline, with 5–6-nerved keel. Stamens 3; filaments up to 1.2 mm; anthers linear-oblong. Ovary pale brown, trigonous, elliptic-oblong; style short; stigmas 3, brown dotted. Nuts pale yellow, ultimately dark brown, trigonous, elliptic-oblong, 1–1.4 × c. 0.2 mm, stipitate, apiculate at apex, punctulate.

Flowering & Fruiting: August–November.

Distribution. India: Almost throughout India.

Specimen examined: Pana, 08.10.2012, AK 58734.

9. *Cyperus haspan* L., Sp. Pl. 1: 45. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 6: 600. 1893; Prain, Bengal Pl. 2: 1142. 1903. [Fig. 127g-i]

Rhizomatous, perennial, erect herb, 8–25 cm high. Leaves linear, 1.5–3 mm wide, gradually narrowed to acute, smooth or scabridulous towards apex. Inflorescences compound to decomposed, loose to subdense, up to 9 cm across. Spikelets 6–20-flowered, digitately arranged in clusters of 3–6, linear-oblong to linear-lanceolate, 2–5.5 × 1–1.5 mm, acute at apex, strongly compressed; rachilla wingless. Glumes brownish yellow, oblong-ovate, 1–1.2 × 0.5–0.7 mm, subobtuse with short mucro at apex, distichous, with 3-nerved keel. Stamen 1; filament up to 1.2 mm; anther oblong, bristly connective appendages at apex. Ovary obovate, trigonous; style c. 0.5 mm; stigmas 3, as long as or slightly longer than style. Nuts creamish yellow, trigonous, obovoid, 0.5–0.7 × 0.5 mm, stipitate, apiculate at apex, granulate verruculose.

Flowering & Fruiting: October–February.

Distribution. India: Almost throughout India.

Specimens examined: Rajabhatkhawa range, 16.02.2010, SKS & GK 47126; Newlands, 15.02.2012, AK 55625; Sankosh, 17.02.2012, AK 55686; Narathali, 20.02.2012, AK 55748, 55763.

10. *Cyperus iria* L., Sp. Pl. 1: 45. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 6: 606. 1893; Prain, Bengal Pl. 2: 1143. 1903. [Plate 277c; Fig. 127j-l]

Mothey (N).

Annual, erect herb, 12–26 cm high. Leaves linear, 2.5–3 mm wide, entire, gradually narrowed. Inflorescences compound, pseudolateral, loose, usually in terminal cluster of spikes. Spikes irregular, loose, cluster of 5–30 spikelets. Spikelets linear-oblong to oblong-lanceolate, 7–10 × 1.5–2 mm, subacute at apex, compressed; rachilla wingless. Glumes yellowish brown, loosely alternate on rachilla, suborbicular, 1–1.2 mm across, retuse with mucronate tip at apex, concave, with 3-nerved keel. Stamens 2 or 3; filaments up to 1.5 mm; anthers

linear-oblong. Ovary oblanceolate, granular; style absent; stigmas 3, c. 0.5 mm, scabrous or rough. Nuts yellowish to blackish brown, obovate, 1–1.2 × 0.5–0.7 mm, triquetrous with blunt edges, stipitate, apiculate at apex, punctate.

Flowering & Fruiting: July–February.

Distribution. India: Almost throughout India.

Specimens examined: Buxa-Santrabari, VN 2908; Way to Buxaduar, JKS 7025; Newlands, 15.02.2012, AK 55621; Kumargram, Hathinala, 21.02.2012, AK 55857, 55858; Pana, 08.10.2012, AK 58731.

11. *Cyperus platystylis* R. Br., Prodr. Fl. Nov. Holland.: 214. 1810; C. B. Clarke in Hook. f., Fl. Brit. India 6: 598. 1893; Prain, Bengal Pl. 2: 1141. 1903.

[Fig. 127m-p]

Rhizomatous, perennial, erect herb, 60–100 cm high. Leaves flat to channelled, 5–8 mm wide, gradually narrowed, septate-nodulose, glabrous to scabrous and midrib above, coriaceous. Inflorescences compound to decomposed, very dense to somewhat loose, depressed corymbose or suborbicular, up to 22 cm across, with many spikelets. Spikelets stramineous to brownish, up to 30-flowered, clusters of 3–8, oblong-lanceolate to elliptic-lanceolate or elliptic-ovate, 4–10 × 2.5–3 mm, acute at apex, spreading, compressed; rachilla wingless. Glumes ovate, 2–2.8 × 1.2–2 mm, subobtusely with mucro at apex, distichous, sides brownish, with 3-nerved keel. Stamens 3; filaments up to 2.5 mm; anthers linear, connective produced into a bristly appendage. Ovary ovate; style flattened, papillose; stigmas 3, papillose. Nuts stramineous, faintly trigonous, ellipsoid to elliptic-ovoid, 1.5–2 × 0.8–1 mm, apiculate at apex, compressed, ventral side concave, with corky thickened angles and isodiametric cells.

Flowering & Fruiting: October–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Narathali, 20.02.2012, AK 55759.

12. *Cyperus rotundus* L., Sp. Pl. 1: 45. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 6: 614. 1893; Prain, Bengal Pl. 2: 1145. 1903. [Plate 277d]

Moitha (B); *Mothey* (N).

Tuberous, stoloniferous, perennial, erect herb, 15–25 cm high. Leaves linear, 2–4.2 mm wide, usually scabrid at margins towards apex, gradually narrowed to an acuminate apex. Inflorescences compound, loose, 3–4.5 × 4.5–3 cm. Spikes densely to subloosely bearing 3–9 spikelets. Spikelets reddish brown, 10–20-flowered, spicately arranged, linear-oblong to linear-lanceolate, 5–15 × 1–2 mm, acute to subacute, suberect to spreading, strongly compressed; rachilla winged. Glumes usually stramineous, elliptic-ovate, 3–4 × 1.5–2 mm, narrow hyaline, subobtusely

at apex, obliquely erect, with 5–7-nerved keel. Stamens 3; filaments up to 4 mm; anthers linear. Ovary trigonous, oblanceolate to obovate, *c.* 1 × 0.2 mm; style up to *c.* 0.5 mm; stigmas 3, much longer than style. Nuts brownish, trigonous, oblong-obovoid, 1.2–1.5 × 0.5–0.7 mm, apiculate, smooth.

Flowering & Fruiting: December–April.

Distribution. India: Almost throughout India.

Specimen examined: Rydak river belt, 26.02.2012, AK 55963.

13. *Cyperus silletensis* Nees, Contrib. Bot. India: 79. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 6: 600. 1893; Prain, Bengal Pl. 2: 1142. 1903. [Plate 278a]

Annual or short living perennial, erect herb, 14–20 cm high. Leaves linear, 1.5–2 mm wide, membranous, acuminate, chartaceous. Inflorescences simple, usually contracted and head-like, with short rays. Spikelets digitate, 4–5 mm, compactly arranged, cylindrical. Glumes ovate-oblong, *c.* 1.1 × 0.7 mm, acute at apex, scarious, with 3-nerved keel. Stamen 1; filament *c.* 0.4 mm; anthers oblong. Ovary elliptic, trigonous; style *c.* 0.5 mm; stigmas 3. Nuts trigonous or triquetrous.

Flowering & Fruiting: April–May.

Distribution. India: Assam, Meghalaya, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Panbari 9, 10.04.2012, GK 56091.

4. *Eleocharis* R. Br.

Key to the species

- 1a. Rhizomatous, stoloniferous, perennial herbs; stems stout, 2–3 mm wide, nodulose below; spikelet 1.2–3.7 cm; perianth bristles retrorsely scabrid; stigmas ciliate; nuts without pitted epidermal cells **1. *E. acutangula***
- b. Non-rhizomatous, non-stoloniferous, annual herbs; stems filiform, *c.* 0.2 mm wide, not nodulose below; spikelet 2–3.5 mm; perianth bristles smooth; stigmas scabrid; nuts with pitted epidermal cells **2. *E. chaetaria***

1. *Eleocharis acutangula* (Roxb.) Schult. in Roem. & Schult., Mant. 2: 91. 1824. *Scirpus acutangulus* Roxb., Fl. Ind. 1: 216. 1820. *Eleocharis fistulosa* Schult. in Roem. & Schult., Mant. 2: 89. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 6: 626. 1893; Prain, Bengal Pl. 2: 1148. 1903. [Plate 278b; Fig. 128d-f]

Rhizomatous, stoloniferous, perennial, marshy erect herb, 16–42 cm high. Leaves reduced into bladeless leaf sheaths. Spikelets pale brown, solitary, terminal, cylindric, 12–37 × 3–4 mm, acute, many flowered. Glumes loosely imbricate, elliptic-oblong, 3–5 × 1.8–2.5 mm, scarious, obtuse, veined. Perianth bristles 6, subequal, linear, up to 2.5 mm, retrorsely scabrid. Stamens 3; filaments up to 4.5 mm; anthers yellow, linear-oblong, with connective appendages at apex. Ovary pale yellow, obovoid; style *c.* 2 mm, conical at base; stigmas 3, ciliate. Nuts pale

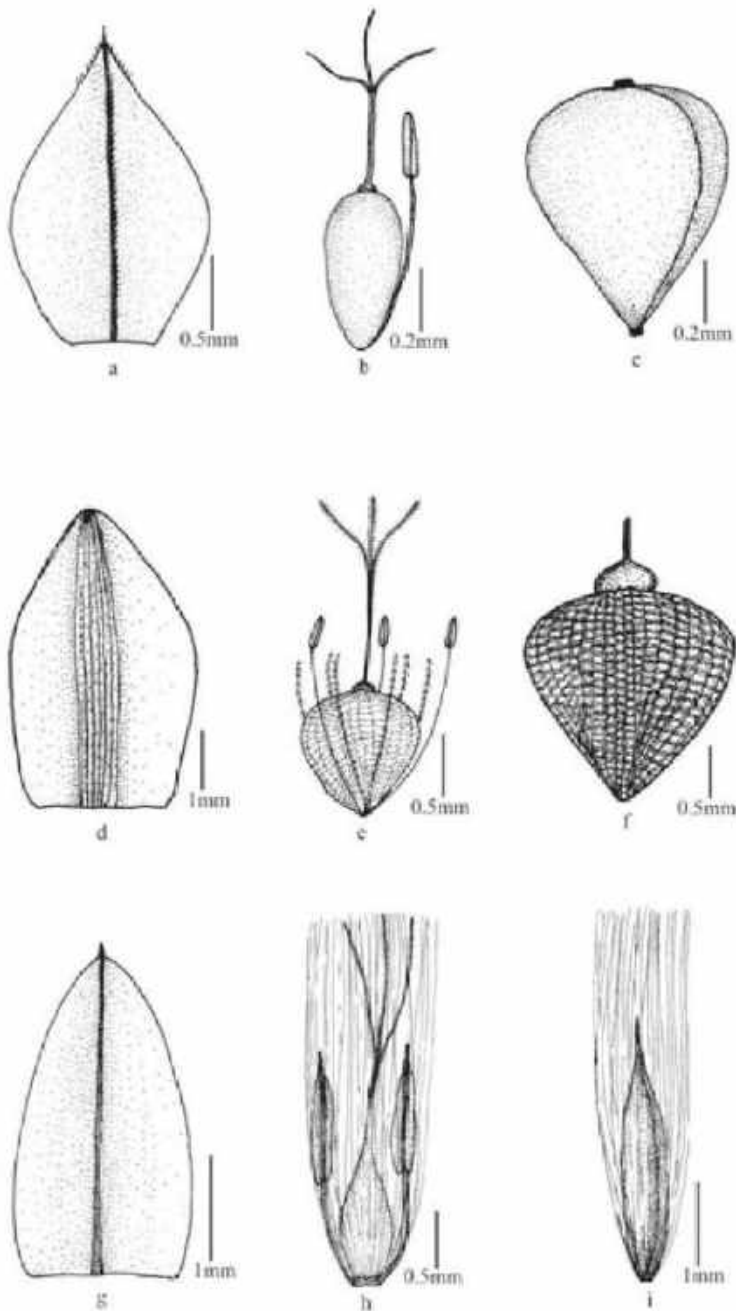


Fig. 128. *Bulbostylis barbata* (a-c): a. Glume; b. Flower; c. Nut (AK 52752); *Bleocharis acutangula* (d-f): d. Glume; e. Flower with perianth bristles; f. Nut with persistent style base (AK 56101); *Eriophorum comosum* (g-i): g. Glume; h. Flower with perianth bristles; i. Nut with persistent perianth bristles (AK 56178).

yellow, obovoid, slightly compressed, style base and perianth bristles persistent, epidermal cells transversely hexagonal; vertical rows 14–16, raised, made groove or canal.

Flowering & Fruiting: August–October.

Distribution. India: Assam, Bihar, Chhattisgarh, Goa, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56101.

2. *Eleocharis chaetaria* Roem. & Schult., Syst. Veg. ed. 15 bis 2: 154. 1817; C. B. Clarke in Hook. f., Fl. Brit. India 6: 629. 1893; Prain, Bengal Pl. 2: 1149. 1903.

Annual, suberect herb, 5–10 cm high. Leaves reduced to bladeless leaf sheaths. Spikelets few flowered, solitary, terminal, ovoid, 2–3.5 × c. 1 mm, slightly flattened, often proliferating into rays from the base. Glumes oblong-ovate, 2–2.5 × c. 1 mm, hyaline and thinly membranous, subobtuse, keeled. Perianth bristles 6, whitish, linear, up to 0.5 mm, unequal, smaller to longer than nuts in fruiting, smooth. Stamens 3; filaments c. 0.7 mm; anthers linear-lanceolate, connective appendage apiculate. Ovary obovoid; style c. 3 mm, conical at base; stigmas 3, scabrous. Nuts yellowish, trigonous, obovoid, c. 1.1 × 0.7 mm, with 3 acute angles projecting from the apex, epidermal cells very prominent, pitted.

Flowering & Fruiting: September–December.

Distribution. India: Andaman & Nicobar Islands, Assam, Chhattisgarh, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Tripura and West Bengal.

Specimen examined: Chuniajhora, 28.09.2012, AK 58508.

5. *Eriophorum* L.

Eriophorum comosum (Wall.) Nees in Wight, Contr. Bot. Ind.: 110. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 6: 664. 1893; Prain, Bengal Pl. 2: 1157. 1903. *Scirpus comosus* Wall. in Roxb., Fl. Ind. 1: 234. 1820. [Plate 278c; Fig. 128g-i]

Rhizomatous, perennial herb, up to 80 cm. Leaves linear, 2–3 mm wide, revolute and serrulate, acute, canaliculate. Inflorescences decompose, spreading, appearing white due to numerous, exserted perianth bristles. Spikelets brownish, solitary to cluster of 3, ellipsoid, 5–7 × 1.5–2 mm, pedunculate to sessile. Glumes brownish, closely imbricate, elliptic-ovate, 2–3 × 0.8–1 mm, subacute with short mucronate tip at apex, with whitish keel. Perianth bristles white, many, filiform, much overtopping the nuts, up to 1 cm. Stamens 2; filaments pale yellow, up to 3 mm; anthers linear, connective acicular, scabrous and brown at apex. Ovary elliptic, apiculate at apex; style c. 1 mm; stigmas 3, linear, scabrous. Nuts creamy white to blackish brown, trigonous, elliptic-oblong, 2.2–3.2 × c. 0.5 mm, apiculate, minute isodiametric epidermal cells on surface.

Flowering & Fruiting: September–December.

Distribution. India: Almost throughout India.

Specimen examined: Phashkhawa, 27.09.2012, AK 56178.

6. *Fimbristylis* Vahl

Key to the species

- | | | |
|------|---|---------------------------|
| 1a. | Inflorescences a single terminal spikelet, sometimes proliferate into 1–3 peduncled spikelets | 10. <i>F. schoenoides</i> |
| 1b. | Inflorescences simple to decomposed, with few to many spikelets | 2 |
| 2a. | Style usually flat; stigmas 2; nuts biconvex | 3 |
| 2b. | Style usually triquetrous; stigmas 3; nuts trigonous | 9 |
| 3a. | Ligule a fringe of hairs | 4 |
| 3b. | Ligule absent | 7 |
| 4a. | Perennials; stems 1–2 mm wide; style 1.5–3 mm | 7. <i>F. dichotoma</i> |
| 4b. | Annuals; stems 0.5–1 mm wide; style 1–1.5 mm | 5 |
| 5a. | Spikelets 4–7 × 2.5–4 mm; glumes 2–2.5 × 2–2.5 mm; nuts 1–1.7 × 0.7–1.1 mm, scaly verruculose | 2. <i>F. albovidis</i> |
| 5b. | Spikelets 3–4 × 1.5–2 mm; glumes c. 1.5 × 1.2–1.5 mm; nuts 0.7–1 × 0.4–0.8 mm, conspicuously tuberculate | 6 |
| 6a. | Inflorescences usually with many spikelets; spikelets angled; glumes membranous, with a prominent keel; stamen 1; style fimbriate; nuts c. 0.7 × 0.4 mm | 4. <i>F. bisumbellata</i> |
| 6b. | Inflorescences with 3–few spikelets; spikelets terete; glumes chartaceous, without a prominent keel; stamens 1–2; style with a few cilia at the top; nuts c. 1 × 0.8 mm | 9. <i>F. merrillii</i> |
| 7a. | Style base with a whorl of long pendant hairs | 11. <i>F. squarrosa</i> |
| 7b. | Style base without a whorl of long pendant hairs | 8 |
| 8a. | Annuals; leaves and glumes hairy; style fimbriate above | 1. <i>F. aestivalis</i> |
| 8b. | Perennials; leaves and glumes glabrous; style glabrous | 5. <i>F. clarkei</i> |
| 9a. | Ligule present; rachilla caducous with glumes; spikelets few flowered; glumes acute with mucro at apex, lower glumes scabrous on keel, upper ones glabrous | 6. <i>F. complanata</i> |
| 9b. | Ligule absent; rachilla persistent; spikelets many flowered; glumes obtuse and mucicous at apex (except lower glumes in <i>F. littoralis</i>), all glabrous on keel | 10 |
| 10a. | Perennials; leaves of fertile branches reduced to leaf sheaths; rachilla winged; stamens 3; anthers c. 0.8 mm; style glabrous at apex when young, fimbriate later | 3. <i>F. aphylla</i> |
| 10b. | Annuals or short-lived perennials; leaves well developed; rachilla not winged; stamens 1–2; anthers 0.3–0.7 mm; style fimbriate towards apex although | 8. <i>F. littoralis</i> |

1. *Fimbristylis aestivalis* (Retz.) Vahl, Enum. Pl. 2: 288. 1805; C. B. Clarke in Hook. f., Fl. Brit. India 6: 637. 1893; Prain, Bengal Pl. 2: 1154. 1903. *Scirpus aestivalis* Retz., Observ. Bot. 4: 12. 1786. [Plate 279a; Fig. 129a-c]

Annual, erect herb, up to 15 cm high. Leaves slender to filiform, up to 26 cm, c. 1 mm wide, hairy, acute, canaliculate, pubescent; ligule absent. Inflorescences decomposed, c. 3 × 6 cm, few to many spikelets. Spikelets brown, solitary, oblong-lanceolate to ovoid, 3–7 × 1–1.5 mm, angular, acute; rachilla wingless. Glumes brownish, spirally arranged, ovate, 1–1.5 × 0.5–0.7 mm, acute with mucro at apex, with 3-nerved keel, glabrous except lower glumes. Stamen 1; filament up to 1.2 cm; anther oblong. Ovary elliptic-oblong, shortly stipitate; style flat, 0.5–0.8 mm, fimbriate above; stigmas 2, hairy at base, scabrid throughout. Nuts pale yellow, biconvex, obovate, 0.5–0.8 × 0.2–0.3 mm, umbonate, margins corky, smooth, rarely with impression of isodiametric cells on surface.

Flowering & Fruiting: November–March.

Distribution. India: Almost throughout India.

Specimens examined: Newlands, 15.02.2012, AK 53037; Sankosh, 17.02.2012, AK 55659; Sankosh, 17.02.2012, AK 55660.

2. *Fimbristylis alboviridis* C. B. Clarke in Hook. f., Fl. Brit. India 6: 638. 1893. [Fig. 129d-f]

Annual, erect herb, 5–12 cm high. Leaves slightly falcate, 1–2 mm wide, scabrid at margins upwards, subacute; ligule a fringe of short white hairs. Inflorescences simple or subcompound, 0.8–1.2 × 0.5–1.2 cm, dense, with few to several spikelets. Spikelets brownish, many flowered, solitary, ovoid to oblong-ovoid, 2.5–5.5 × 2 mm, acute at apex; rachilla narrowly winged. Glumes pale brown, spirally arranged, ovate, c. 2 mm across, hyaline, obtuse with apiculate tip at apex, with 3-nerved keel. Stamen 1; filament c. 1 mm; anther oblong, c. 0.5 mm. Ovary elliptic-obovate, c. 0.5 mm across; style flat, c. 1 mm, fimbriate above; stigmas 2. Nuts pale yellow, biconvex, obovate, 1–1.3 × 0.7–0.9 mm, shortly stipitate, umbonate, obscurely reticulate, epidermal cells transversely elliptic or oblong, in 10–16 vertical rows on each face.

Flowering & Fruiting: September–December.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Telangana, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Newlands, 15.02.2012, AK 52751.

3. *Fimbristylis aphylla* Steud., Syn. Pl. Glumac. 2: 114. 1855. *Fimbristylis quinquangularis* (Vahl) Kunth var. *crassa* C. B. Clarke in Hook. f., Fl. Brit. India 6: 644. 1893. [Plate 279b; Fig. 129g-i]

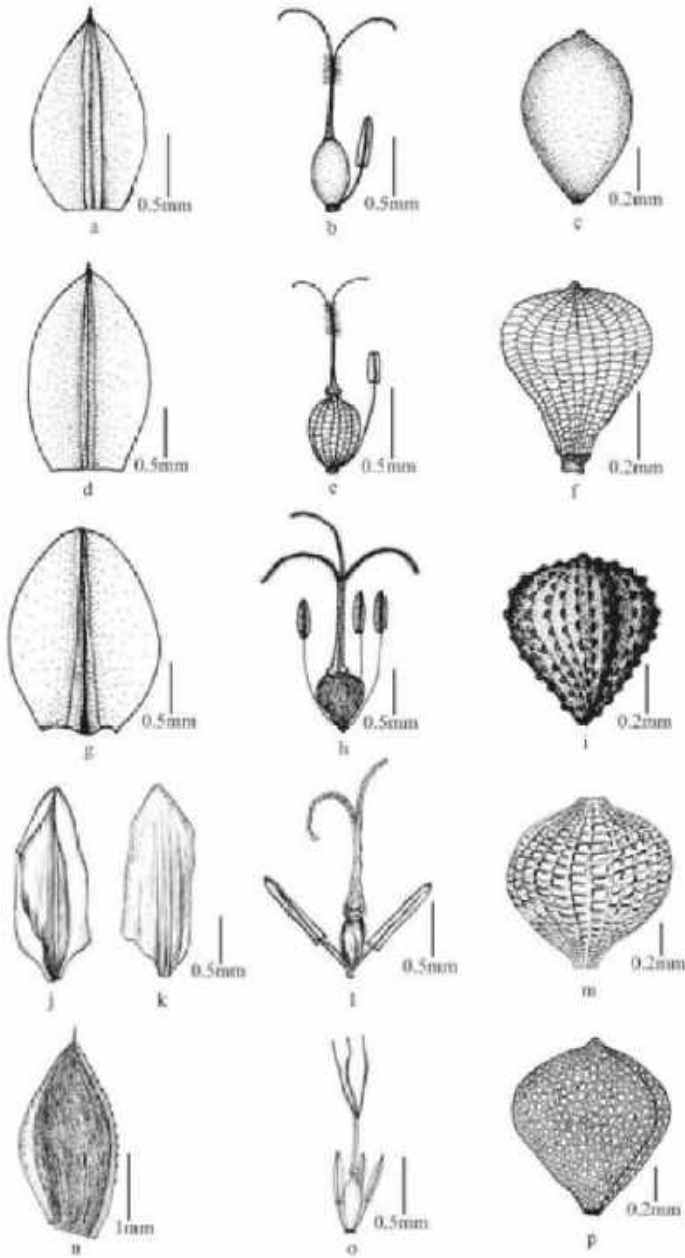


Fig. 129. *Fimbristylis aestivalis* (a-c): a. Glume; b. Flower; c. Nut (AK 53037); *Fimbristylis alboviridis* (d-f): d. Glume; e. Flower; f. Nut (AK 52751); *Fimbristylis aphylla* (g-i): g. Glume; h. Flower; i. Nut (AK 56105); *Fimbristylis clarkei* (j-m): j. Ventral view of glume; k. Dorsal view of glume; l. Flower; m. Nut (AK 52881); *Fimbristylis complanata* (n-p): n. Lateral view of glume; o. Flower; p. Nut (AK 58682).

Rhizomatous, perennial, erect herb, 12–52 cm high. Leaves of sterile shoots well developed, 2–3 mm wide, scabrid above; ligule absent. Leaves on the flowering shoots reduced to 3–4 bladeless sheaths. Inflorescences compound, sometimes decomposed, 1–3 × 1.5–2.5 cm, loose, with many spikelets. Spikelets many flowered, solitary, terete, ovoid to subglobose, 4–6 × 2–3.5 mm, obtuse; rachilla winged. Glumes brownish, spirally arranged, ovate, c. 2 × 1.5 mm, hyaline, obtuse, faintly keeled. Stamens 3; filaments up to 2 mm; anthers linear-oblong, c. 0.8 mm, connective appendage apiculate at apex. Ovary obovate, c. 0.3 mm, stipitate; style trigonous, c. 1 mm, glabrous when young, fimbriate later; stigmas 3, c. 1 mm, scabrid. Nuts creamy white, obtusely trigonous, obovoid, c. 0.7 × 0.5 mm, shortly stipitate, umbonulate, verruculose, epidermal cells transversely linear in six vertical rows on each face.

Flowering & Fruiting: September–November.

Distribution. India: Andaman & Nicobar Islands, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56105.

4. *Fimbristylis bisumbellata* (Forssk.) Bubani, Gazz. Tosc. Sci. Med.-Fis. 8 (5): 30. 1850. *Scirpus bisumbellatus* Forssk., Fl. Trop. Afric.: 15. 1775. *Fimbristylis dichotoma* auct. non Vahl 1806: C. B. Clarke in Hook. f., Fl. Brit. India 6: 635. 1893; Prain, Bengal Pl. 2: 1153. 1903. [Plate 279c]

Annual, erect herb, 5–27 cm high. Leaves linear, 0.7–2 mm wide, scabrous at margins, subobtuse; ligule a dense fringe of short white hairs. Inflorescences usually a decomposed corymb of many dense or loose spikelets, 1–5.5 × 1–5 cm. Spikelets many flowered, solitary, ovoid, ellipsoid or oblong, 3–7 × 1.5–3.5 mm, angled, acute; rachilla winged. Glumes pale yellowish to brownish, spirally arranged, ovate, 1.5–3 × 1.2–2 mm, acute with short mucro at apex, sharply 3-nerved keel. Stamen 1; filament c. 1.2 mm; anther linear-oblong, c. 0.5 mm, connective appendage apiculate at apex. Ovary oblong, c. 0.5 mm, stipitate; style 1–1.5 mm, fimbriate; stigmas 2, 0.6–1 mm, scabrid. Nuts creamy white, biconvex, obovate, 0.7–1 × 0.4–0.7 mm, stipitate, umbonulate, conspicuously trabeculate, epidermal cells impressed transversely linear in 5–9 vertical rows on each face.

Flowering & Fruiting: November–July.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 05.10.2009, SKS & GK 46157; Newlands, 15.02.2012, AK 53040; Kumargram, Hathinala, 21.02.2012, AK 55855; Checko-1, 25.09.2012, AK 56157; Phashkhawa, 27.09.2012, AK 56179, 56180; Hatipota, 29.09.2012, AK 58536; Phashkhawa river belt, 30.09.2012, AK 58553; Jainty-Phashkhawa, 02.10.2012, AK 58617.

5. *Fimbristylis clarkei* Anant Kumar, Halder & Venu, Kew Bull. 68: 669. 2013.
[Fig. 129j-m]

Rhizomatous, perennial, erect herb, 18–70 cm high. Leaves slender and flat, 1–2.5 mm wide, entire and revolute at margins, canaliculate; ligule absent. Inflorescences compound and spreading, 3–6 × 1.5–4 cm, anthelate, with 11–22 spikelets. Spikelets brownish, many flowered, one stalked and the other sessile when in twos, 2.5–4 mm, faintly angular; rachilla narrowly winged. Glumes spirally arranged, elliptic-ovate, c. 2 × 1 mm, acute, with 3-nerved keel. Stamens 2; filaments up to 1 cm; anthers oblong, 0.7–0.8 mm. Ovary oblong, stipitate; style c. 0.7 mm; stigmas 2, c. 0.7 mm, nodulose. Nuts creamy yellowish to brownish, biconvex, obovoid, c. 0.8 × 0.7 mm, shortly stipitate, scrobiculate.

Flowering & Fruiting: September–October.

Distribution. India: West Bengal.

Specimens examined: Kumargram, 19.09.2011, AK 52642; Marakata, 24.09.2011, AK 52881.

Notes: Endemic to Buxa Tiger Reserve.

6. *Fimbristylis complanata* (Retz.) Link, Hort. Berol. 1: 292. 1827; C. B. Clarke in Hook. f., Fl. Brit. India 6: 646. 1893; Prain, Bengal Pl. 2: 1155. 1903. *Scirpus complanatus* Retz., Observ. Bot. 5: 14. 1788. [Plate 279d; Fig. 129n-p]

Rhizomatous, perennial, suberect herb, 24–65 cm high. Leaves linear, 2–4 mm wide, thick and densely scabrous at margins, abruptly acute, striated, lower leaves reduced to bladeless sheaths; ligule a dense fringe of short white hairs. Inflorescences compound to decomposed, 4–13 × 4.5–12 cm, with many spikelets. Spikelets few flowered, solitary, lanceolate or ovoid-lanceolate, 4–6 × 1–1.5 mm, angled, acute; rachilla caducous. Glumes spirally arranged, ovate or oblong-ovate, 1.5–3 × 1.4–2 mm, acute with mucro at apex, hyaline at margins, keeled. Stamens 3; filaments up to 2.5 mm; anthers linear-oblong, c. 1 mm, apiculate. Ovary oblong to oblanceolate, c. 0.5 mm, shortly stipitate; style triquetrous, 1–1.3 mm; stigmas 3, 1.5–1.7 mm, scabrous. Nuts creamy white, trigonous, obovoid, 0.8–1 × 0.4–0.6 mm, shortly stipitate, umbonulate, verruculose, epidermal cells very minute in many rows.

Flowering & Fruiting: September–October.

Distribution. India: Almost throughout India.

Specimens examined: Checko-1, 25.09.2012, AK 56141; Hauda nala, 03.10.2012, AK 58682, 58683.

7. *Fimbristylis dichotoma* (L.) Vahl, Enum. Pl. 2: 287. 1806. *Scirpus dichotomus* L., Sp. Pl. 1: 50. 1753. *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2: 289. 1805;

C. B. Clarke in Hook. f., Fl. Brit. India 6: 636. 1894; Prain, Bengal Pl. 2: 1153. 1903. [Plate 280a; Fig. 130a-c]

Rhizomatous, perennial, erect herb, 8–50 cm high. Leaves flat, linear, 1–2 mm wide, acute to obtuse; ligule a dense fringe of short hairs. Inflorescences simple to decomposed corymbs of few to many spikelets. Spikelets many flowered, solitary, ovoid to ellipsoid, 4–8 × 2–3 mm, terete, acute; rachilla prominently winged. Glumes dark brown, spirally arranged, ovate, 1.8–3 × 1.5–2 mm, subacute with short mucro at apex, 3-nerved keel. Stamens 2; filaments up to 3 mm; anthers oblong-lanceolate, c. 0.7 mm, apiculate. Ovary oblong, c. 0.5 mm, stipitate; style flat, 1–1.5 mm, fimbriate; stigmas 2, 0.5–1.5 mm, fimbriate at base, scabrid above. Nuts creamy white, obovate, 1–1.2 × 0.8–1 mm, shortly stipitate, short umbonate, sparsely verruculose, trabeculate, epidermal cells transversely linear in 8–10 rows.

Flowering & Fruiting: February–September.

Distribution. India: Almost throughout India.

Specimens examined: Rydak river belt, 20.09.2011, AK 52684; Sankosh, 28.09.2011, AK 52994; Marakata, 22.02.2012, AK 55880; Checko-1, 25.09.2012, AK 56106.

8. *Fimbristylis littoralis* Gaudich., Voy. Uranie, Bot.: 413. 1829. *Fimbristylis miliacea* auct. non Vahl 1806: C. B. Clarke in Hook. f., Fl. Brit. India 6: 644. 1893; Prain, Bengal Pl. 2: 1155. 1903. [Plate 280b; Fig. 130d-f]

Bara javani (B).

Rhizomatous, perennial, erect herb, 4–13 cm high. Leaves linear, 1–1.5 mm, entire at margins, acute, sulcate. Inflorescences compound to decomposed, 1–3 × 0.7–2 cm, with many spikelets. Spikelets many flowered, ovoid to subglobose, 2–4 × 1.5–2.5 mm, acute to obtuse at apex; rachilla not winged. Glumes spirally arranged, ovate, 1–1.2 × 1 mm, hyaline at margins and towards base, obtuse and mucous at apex, long mucro in lower glume, faintly keeled. Stamens 1–2; filaments up to 2 mm; anthers linear-oblong, 0.3–0.5 mm. Ovary elliptic-oblong, c. 0.3 mm, stipitate; style triquetrous, c. 1 mm, fimbriate towards apex; stigmas 3, as equal as style, fimbriate and scabrid. Nuts creamy white to stramineous, faintly trigonous, obovate, c. 0.6 × 0.4 mm, shortly stipitate, umbonate, verruculose, epidermal cells densely transversely linear.

Flowering & Fruiting: September–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Himachal Pradesh, Jharkhand, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Rydak river belt, 20.09.2011, AK 52683; Newlands, 15.02.2012, AK 55620; Kumargram, Hathinala, 21.02.2012, AK 55845.

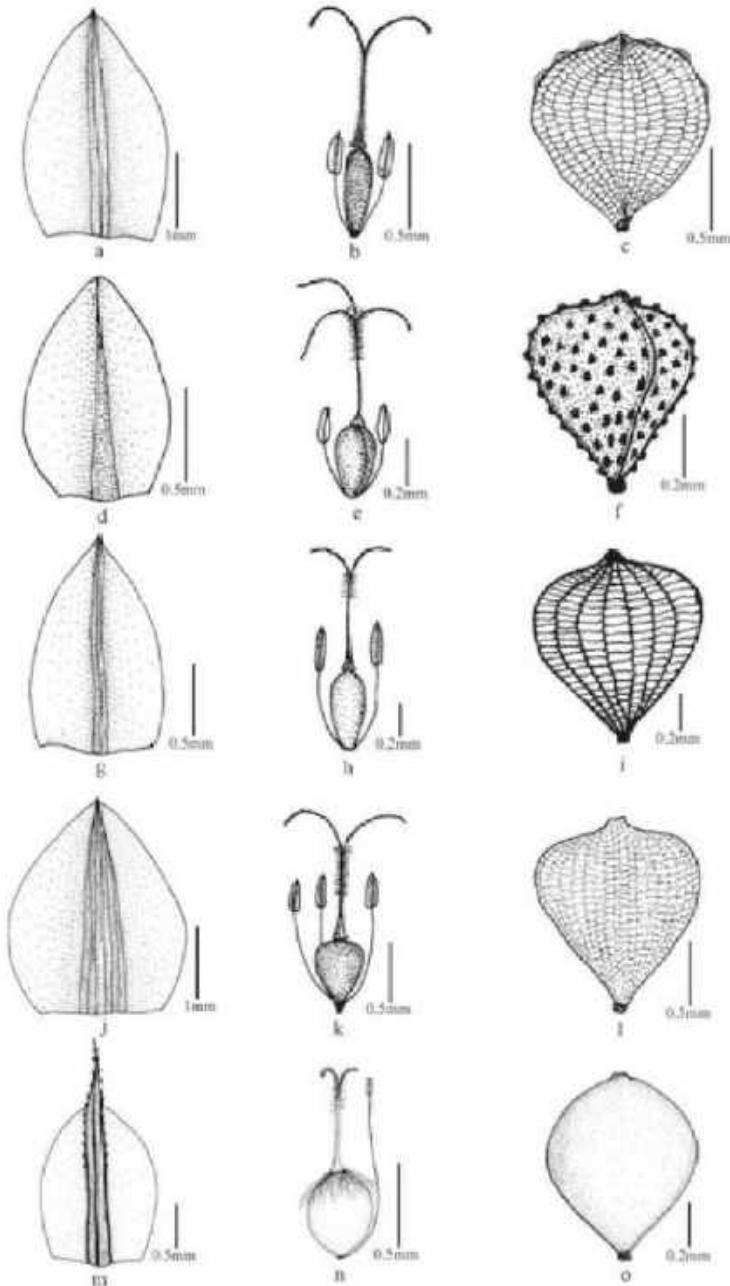


Fig. 130. *Fimbristylis dichotoma* (a-c): a. Glume; b. Flower; c. Nut (AK 52684); *Fimbristylis littoralis* (d-f): d. Glume; e. Flower; f. Nut (AK 55845); *Fimbristylis merrillii* (g-i): g. Glume; h. Flower; i. Nut (AK 52946); *Fimbristylis schoenoides* (j-l): j. Glume; k. Flower; l. Nut (AK 52831); *Fimbristylis squarrosa* (m-o): m. Glume; n. Flower; o. Nut (AK 55874).

9. *Fimbristylis merrillii* Kern, Blumea 8: 135, f. 6. 1955. *Fimbristylis ligulata* Govind., Proc. Ind. Acad. Sci., B 76 (5): 187, t. 3. 1972. [Fig. 130g-i]

Annual, erect herb, 3–10 cm high. Leaves linear, 0.5–0.8 mm wide, scabrous at margins above, abruptly acute; ligule a dense fringe of short hairs. Inflorescences simple to compound, 1–1.5 cm across, loose, with 3–5 spikelets, rarely reduced to a single spikelet. Spikelets few to several flowered, solitary, terete, ovoid or oblong-ovoid, 3–5 × 2 mm, acute; rachilla narrowly winged. Glumes pale yellow, spirally arranged, ovate, c. 1.6 × 1.5 mm, acute with slightly apiculate at apex, with 3-nerved keel. Stamens 1–2; filaments up to 2 mm; anthers oblong, c. 0.5 mm, apiculate. Ovary oblanceolate, c. 0.5 mm; style flat, c. 1 mm, few cilia at top; stigmas 2, scabrid. Nuts creamy white to yellowish brown, biconvex, obovate, c. 1 × 0.8 mm, stipitate, umbonulate, conspicuously trabeculate by the transversely oblong epidermal cells in 6 vertical rows on either face.

Flowering & Fruiting: July–October.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Telangana, Uttar Pradesh, Uttarakhand and West Bengal.

Specimen examined: Bhutanghat, 26.09.2011, AK 52946.

10. *Fimbristylis schoenoides* (Retz.) Vahl, Enum. Pl. 2: 286. 1806; C. B. Clarke in Hook. f., Fl. Brit. India 6: 634. 1893; Prain, Bengal Pl. 2: 1153. 1903. *Scirpus schoenoides* Retz., Observ. Bot. 5: 14. 1788. [Plate 280c; Fig. 130j-l]

Kesari malanga (B).

Annual or perennial with or without a short rhizome, suberect herb, 5–45 cm high. Leaves linear, 0.7–1 mm wide, scabrous above at margins, blunt or obtuse; ligule a fringe of short hairs. Inflorescences usually a solitary, terminal spikelet, often proliferates into 1–2 peduncled spikelets. Spikelets many flowered, solitary, ovoid, 4–11 × 2–5 mm, subacute. Glumes light brown, spirally arranged, ovate, 2.5–3 × 2–3 mm, obtuse with short apiculate at apex, with 7-nerved keel. Stamens 3; filaments up to 3 mm; anthers oblong, c. 1 mm, mucronate at apex. Ovary obovate, c. 0.5 mm; style flat, 1–1.5 mm, fimbriate above; stigmas 2, c. 0.7 mm, scabrid. Nuts whitish to brownish, biconvex, obovate 1.2–1.5 × c. 1 mm, stipitate, truncate-umbonate, smooth, epidermal cells isodiametric on surfaces.

Flowering & Fruiting: February–September.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 23.09.2011, AK 52831; Kumargram, Hathinala, 21.02.2012, AK 55848; Checko-1, 25.09.2012, AK 56103; Phashkhawa river belt, 30.09.2012, AK 58552.

11. *Fimbristylis squarrosa* Vahl, Enum. Pl. 2: 289. 1805; C. B. Clarke in Hook. f., Fl. Brit. India 6: 635. 1893; Prain, Bengal Pl. 2: 1153. 1903.

[Plate 281a; Fig. 130m-o]

Annual, suberect herb, 2.5–6.5 cm high. Leaves linear, 0.4–0.6 mm wide, revolute and pubescent at margins, abruptly acute, canaliculate, pubescent; ligule absent. Inflorescences compound to decomposed, 1–4 × 1–3 cm, loose, with few to many spikelets. Spikelets stramineous, many flowered, solitary, ovoid to oblong-ovoid, 3–4 × 1–1.5 mm, angular, acute; rachilla wingless. Glumes spirally arranged, ovate to oblong-ovate, 1–1.8 × 0.8–1 mm, cuspidate at apex, with 3-nerved keel. Stamen 1; filaments flat, up to 2 mm; anther linear-oblong, 0.2–0.3 mm, blunt at apex. Ovary oblong, c. 0.5 mm; style flat, 0.7–1 mm, long pendent hairs at base, sparsely fimbriate towards apex; stigmas 2, fimbriate at base, scabrid. Nuts stramineous, biconvex, obovate, 0.6–0.8 × 0.5 mm, shortly stipitate, umbonulate, obscurely reticulate, shiny, smooth, epidermal cells not prominently impressed.

Flowering & Fruiting: January–May.

Distribution. India: Almost throughout India.

Specimens examined: Marakata, 22.02.2012, AK 55874, 55887.

7. *Kyllinga* Rottb.

Key to the species

- 1a. Keel of the glumes not winged; nuts obovate, 0.5–0.8 mm wide, smooth
1. *K. brevifolia*
- 1b. Keel of the glumes winged; nuts elliptic-oblong, c. 0.5 mm wide, epidermal cells hexagonal with a grane at centre
2. *K. nemoralis*

1. *Kyllinga brevifolia* Rottb., Descr. Icon. Rar. Pl.: 13, t. 4, f. 3. 1773; C. B. Clarke in Hook. f., Fl. Brit. India 6: 588. 1893; Prain, Bengal Pl. 2: 1135. 1903.

[Plate 281b; Fig. 131a-c]

Rhizomatous, perennial, erect to suberect herb, 2–9 cm high. Leaves linear, 1.5–2.5 mm wide, scabrous above at margins, gradually acuminate, membranous; ligule absent. Inflorescences a terminal, globose or ovoid to cylindrical head, 4–8 × 4–5.5 mm, dense, with many spikelets. Spikelets 1–2-flowered, elliptic-oblong or oblong-lanceolate, 1.8–2.2 × 0.8–1 mm, strongly compressed. Glumes white, elliptic-ovate to boat-shaped; first glume 0.5–0.8 mm; second one 0.8–1 mm; third and fourth one 1.8–2 × c. 1.2 mm, subacute with mucronate tip at apex, with spinulose keel. Stamens 1–3; filaments up to 2.2 mm; anthers linear-lanceolate, c. 0.5 mm, apiculate. Ovary obovate, c. 0.8 × 0.5 mm, stipitate; style c. 0.5 mm; stigmas 2, c. 1 mm. Nuts brownish, biconvex, obovate, 1–1.5 × 0.5–0.8 mm, apiculate, compressed, smooth.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 18.09.2011, AK 52614; Newlands, 15.02.2012, AK 53043; Newlands, 15.02.2012, AK 55631; Kumargram, 18.02.2012, AK 55715;

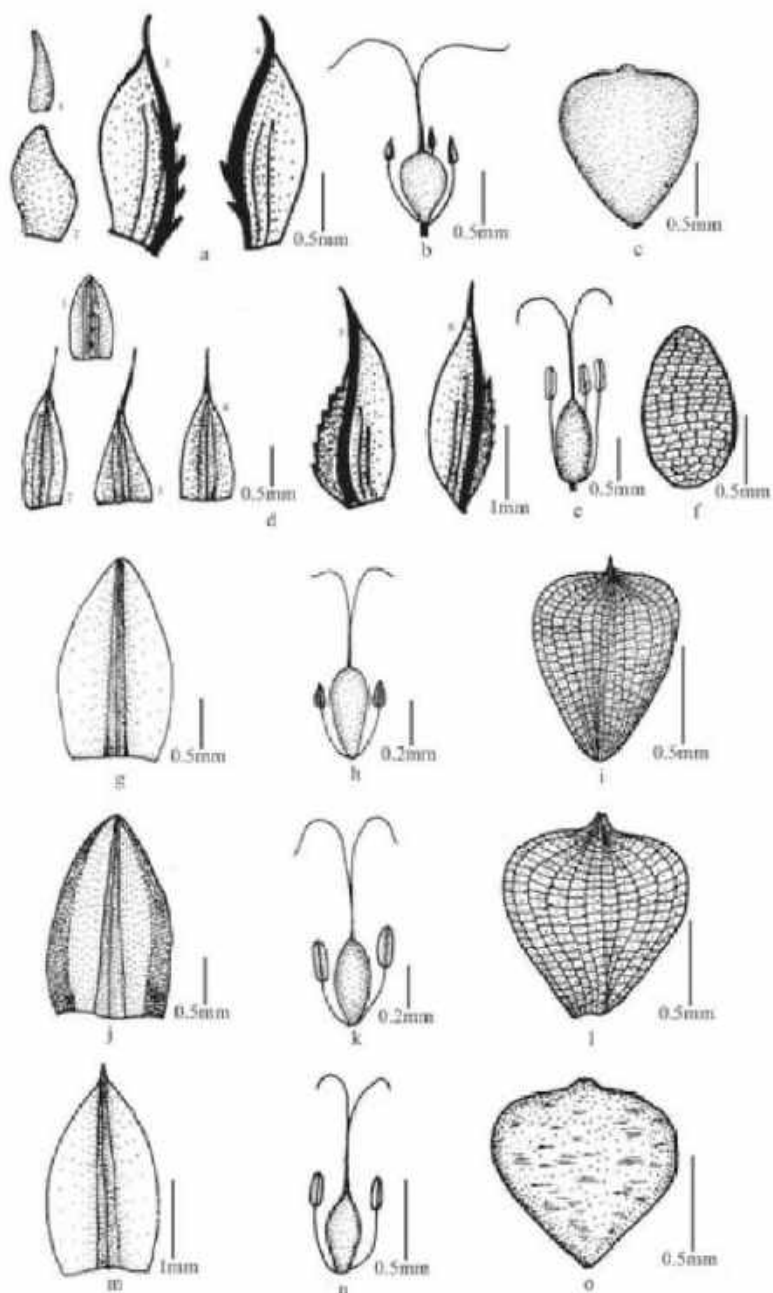


Fig. 131. *Kyllinga brevifolia* (a-c): a. Glumes; b. Flower; c. Nut (AK 55631); *Kyllinga nemoralis* (d-f): d. Glumes; e. Flower; f. Nut (AK 56158); *Pycurus flavidus* (g-i): g. Glume; h. Flower; i. Nut (AK 55879); *Pycurus sanguinolentus* (j-l): j. Glume; k. Flower; l. Nut (AK 52643); *Pycurus stramineus* (m-o): m. Glume; n. Flower; o. Nut (AK 52658).

Narathali, 20.02.2012, AK 55749; Kumargram, Hathinala, 21.02.2012, AK 55853; Hauda nala, 03.10.2012, AK 58686; Achalung to Lapchakhawa, 29.09.2013, AK 59657.

2. *Kyllinga nemoralis* (J. R. Forst. & G. Forst.) Dandy ex Hutch. & Dalziel, Fl. W. Trop. Africa 2: 487. 1936. *Thryocephalon nemorale* J. R. Forst. & G. Forst., Char. Gen. Pl.: 65. 1775. *Kyllinga monocephala* Stokes, Bot. Mat. Med. 1: 120. 1812; C. B. Clarke in Hook. f., Fl. Brit. India 6: 588. 1893. [Plate 281c; Fig. 131d-f]

Rhizomatous, perennial, erect herb, 15–45 cm high. Leaves linear, 1.5–3 mm wide, sharply acute, scabrous above at margins, membranous; ligule absent. Inflorescences many flowered, terminal, globose to ovoid head, 6–8 × 5–6 mm. Spikelets pale brown, many, densely arranged, obliquely elliptic, 2–3 × 0.8–1 mm, compressed. Glumes usually 5 or 6, strongly compressed; first glume linear-oblong, 1–1.2 mm, obtuse, with few spinulose hairs on back; second, third and fourth glumes ovate-elliptic, c. 1.5 mm, including acuminate apex; fifth and sixth ones ovate-elliptic, boat-shaped, 2.5–3 × 0.5–1 mm, slightly curved acuminate at apex, 3–5-nerved, with winged and spinulose keel. Stamens 3; filaments up to 2 mm; anthers linear-oblong, c. 0.5 mm. Ovary oblong, 0.5–1 mm; stigmas 2, longer than style. Nuts yellowish brown, biconvex, elliptic-oblong, c. 1.2 × 0.5 mm, compressed, apiculate at tip, epidermal cells hexagonal with a grane at centre.

Flowering & Fruiting: May–October.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, on the way to Bhutia pond, 08.10.2009, SKS & GK 46230; Checko-1, 25.09.2012, AK 56158; Hauda nala, 03.10.2012, AK 58679.

8. *Pycneus* P. Beauv.

Key to the species

- 1a. Primary rays absent; glumes acute with mucro at apex; nuts not punctulate, transversely rugulose, epidermal cells longitudinally linear 3. *P. stramineus*
- 1b. Primary rays present; glumes obtuse with mucicous tip at apex; nuts punctulate, not rugulose, epidermal cells isodiametric 2
- 2a. Stems without nodes at base; leaves 0.5–2 mm wide; primary rays 3–4; glumes oblong-ovate; stigmas longer than style 1. *P. flavidus*
- 2b. Stems with nodes at base; leaves 1–7 mm wide; primary rays 1–3; glumes ovate to ovate; stigmas shorter or equal to style 2. *P. sanguinolentus*

1. *Pycneus flavidus* (Retz.) Koyama, J. Jap. Bot. 51 (10): 313. 1976. *Cyperus flavidus* Retz., Observ. Bot. 5: 13. 1788. *Pycneus capillaris* (Koenig ex Roxb.) Nees ex C. B. Clarke in Hook. f., Fl. Brit. India 6: 591. 1893; Prain, Bengal Pl. 2: 1137. 1903. [Plate 281d; Fig. 131g-i]

Annual, erect herb, 6–14 cm high. Leaves linear, 0.5–2 mm wide, canaliculate, gradually narrowed towards apex, smooth or slightly scabrid above; ligule absent. Inflorescences compound or congest in a single head-like cluster, comprised of

5–20 spikelets. Spikelets pale brown, many flowered, linear-oblong, 5–10 × 1.5–2 mm, spreading, strongly compressed; rachilla wingless. Glumes pale brown to dark reddish brown, distichously arranged, oblong-ovate, 1.2–2 × 1–1.5 mm, hyaline at margins, obtuse and mucous at apex, with 3-nerved keel. Stamens 2; filaments up to 1.5 mm; anthers oblong to lanceolate, c. 0.5 mm, apiculate. Ovary obovate, c. 0.4 mm; style filiform, 0.6–0.8 mm; stigmas 2, longer than style. Nuts pale yellow to dark brown, biconvex, oblong-obovate, 0.8–1 × 0.4–0.5 mm, apiculate, compressed, punctulate, epidermal cells minute and isodiametric.

Flowering & Fruiting: January–April.

Distribution. India: Almost throughout India.

Specimens examined: Panbari 6, 31.03.2012, GK 56006; Marakata, 22.02.2012, AK 55879.

2. *Pycnus sanguinolentus* (Vahl) Nees, Linnæa 9: 283. 1834; C. B. Clarke in Hook. f., Fl. Brit. India 6: 590. 1893; Prain, Bengal Pl. 2: 1137. 1903. *Cyperus sanguinolentus* Vahl, Enum. Pl. 2: 351. 1806. [Plate 282a; Fig. 131j-l]

Annual or perennial with short rhizome, erect to suberect herb, 5–60 cm high. Leaves linear, 1–7 mm wide, scabrid at margins towards apex, acute, flat to canaliculate; ligule absent. Inflorescences simple to compound, congested into a cluster of few spikelets. Spikelets pale yellow to brownish, 10–18-flowered, ovate to oblong-lanceolate, 3–11 × 2–3 mm, subacute, compressed; rachilla wingless. Glumes ferruginous to dark brown, distichously arranged, ovate to ovate, 2–2.2 × 1.2–1.8 mm, obtuse and mucous at apex, with 3-nerved keel. Stamens 2–3; filaments up to 2 mm; anthers linear-oblong, 0.5–0.7 mm. Ovary obovate, c. 0.4 mm; style filiform, 1–1.5 mm; stigmas 2, shorter or equal to style. Nuts brownish to black when mature, biconvex, obovate, 1–1.2 × 0.8–1 mm, apiculate, compressed, wrinkled to punctulate, epidermal cells isodiametric.

Flowering & Fruiting: September–March.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52643; Narathali, 20.02.2012, AK 55818, 55819; Kumargram, Hathinala, 21.02.2012, AK 55844; Marakata, 22.02.2012, AK 55878; Hatipota, 29.09.2012, AK 58533, 58534.

3. *Pycnus stramineus* (Nees) C. B. Clarke in Hook. f., Fl. Brit. India 6: 589. 1893; Prain, Bengal Pl. 2: 1136. 1903. *Cyperus stramineus* Nees in Wight, Contr. Bot. India: 74. 1834. [Fig. 131m-o]

Annual, erect to suberect herb, 10–30 cm high. Leaves linear, 1–1.5 mm wide, scabrous at margins towards apex, gradually narrow towards apex, canaliculate; ligule absent. Inflorescences simple, spike-like cluster of 4–10 spikelets. Spikelets many flowered, oblong-lanceolate to linear-oblong, 7–10 × 1.8–2.5 mm, acute,

strongly compressed; rachilla wingless. Glumes yellowish, ovate, 2–2.6 × 1–1.4 mm, hyaline at margins, acute with mucro at apex, with strongly 3-nerved keel. Stamens 2; filaments up to 1.5 mm; anthers linear-oblong, c. 0.5 mm. Ovary oblong, c. 0.5 mm; style 0.8–1 mm; stigmas 2, as long as the style. Nuts brownish, biconvex, obovate, c. 1 × 0.8 mm, apiculate, compressed, transversely rugulose, epidermal cells longitudinally linear.

Flowering & Fruiting: August–October.

Distribution. India: Almost throughout India.

Specimens examined: Near Buxaduar, *KPB* 2037; Santrabari, 04.10.2009, *SKS & GK* 46117; Kumargram, 18.09.2011, *AK* 52613; Rydak river belt, 20.09.2011, *AK* 52658; Checko-1, 25.09.2012, *AK* 56130; Hatipota, 29.09.2012, *AK* 58532.

9. *Rhynchospora* Vahl

Rhynchospora corymbosa (L.) Britt., Trans. New York Acad. Sci. 11: 84. 1892. *Scirpus corymbosus* L. in Torner, Cent. Pl. 2: 7. 1756. *Rhynchospora aurea* Vahl, Enum. Pl. 2: 229. 1805; C. B. Clarke in Hook. f., Fl. Brit. India 6: 670. 1893 (as "*Rynchospora*"); Prain, Bengal Pl. 2: 1134. 1903. [Fig. 132a–e]

Rhizomatous, perennial, erect to suberect herb, up to 1 m high. Leaves linear, 7–15 mm wide, scabrous at margins, long acuminate, canaliculate. Inflorescences 2–5 corymbiform anthelas subtended by leafy bracts. Spikelets rusty brown, 2 or 3-flowered, subterete, lanceolate, 6–9 × 2 mm, acute. Glumes 5–7, subdistichously arranged, 3–7 mm, acute with mucro at apex; lower ones ovate; upper ones oblong-ovate. Lower flower bisexual; upper ones male. Bristles in bisexual flowers 6, unequal, 4–5.5 mm, exceeding the nut, antrorsely scabrous, and 1–3 in male flowers, shorter. Stamens 3; filaments up to 2 mm; anthers linear-oblong, 2–2.5 mm. Ovary obovate, 0.5–0.8 × 0.2–0.4 mm; style shortly bilobed at apex, elongated-conical in the nuts. Nuts brownish, obovate or oblong-obovate, 2.5–3.5 × 2 mm, compressed, style base persistent, tubercled at top at edges, finely transversely wrinkled, scaly punctate.

Flowering & Fruiting: July–April.

Distribution. India: Almost throughout India except North Western Region.

Specimen examined: Narathali, 20.02.2012, *AK* 55757.

10. *Schoenoplectiella* Lye

Key to the species

- 1a. Annuals, non-rhizomatous; stems terete; perianth bristles absent; style and stigmas not papillose; nuts trigonous 1. *S. articulata*
- 1b. Perennials, rhizomatous; stems trigonous; perianth bristles present; style and stigmas papillose; nuts biconvex 2. *S. mucronata*

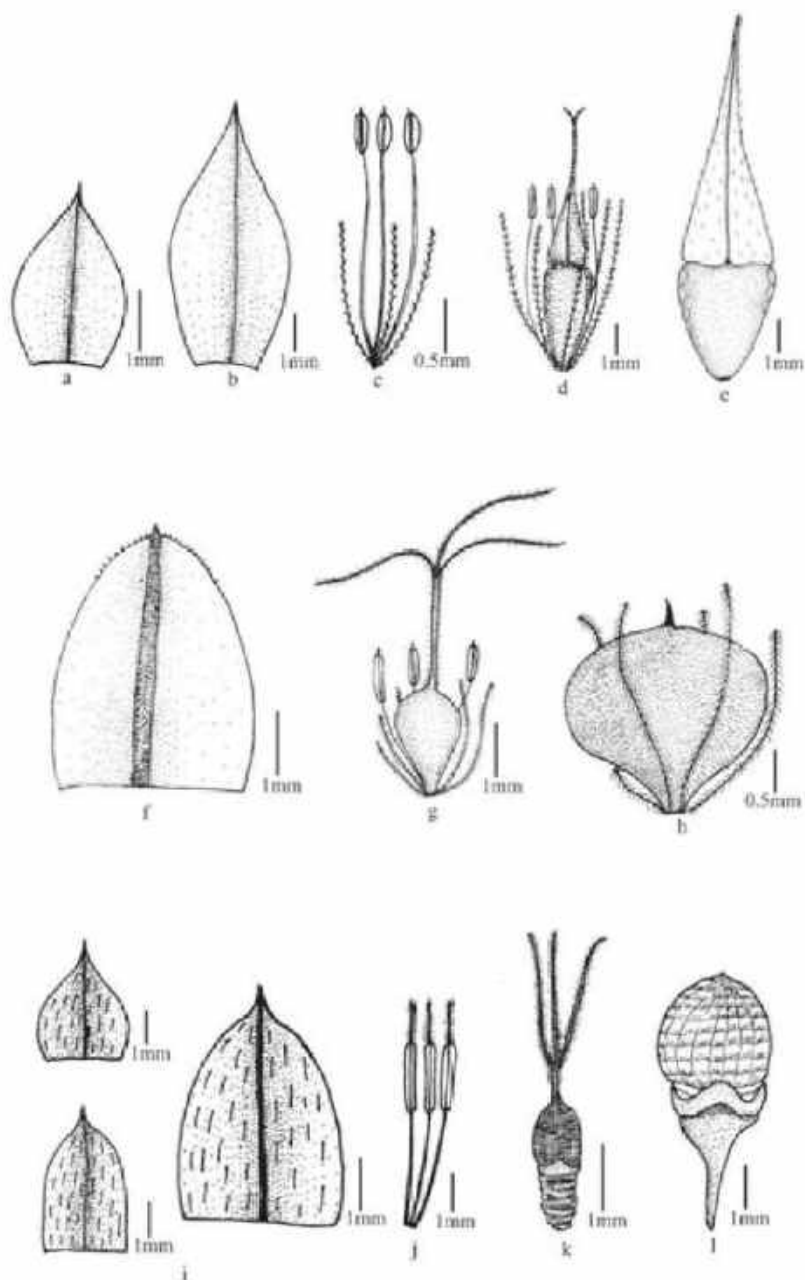


Fig. 132. *Rhynchospora corymbosa* (a-e): a. Lower glume; b. Upper glume; c. Male flower with bristles; d. Female flower with bristles; e. Nut with persistent style base (AK 55757); *Schoenoplectiella mucronata* (f-h): f. Glume; g. Flower with bristles; h. Nut with bristles (AK 55945); *Scleria terrestris* (i-l): i. Glumes; j. Male flower; k. Female flower; l. Nut with disk and stalk (AK 52790).

1. *Schoenoplectiella articulata* (L.) Lye, Lidia 6: 20. 2003. *Scirpus articulatus* L., Sp. Pl. 1: 47. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 6: 656. 1893.

[Plate 282b]

Annual, erect herbs, up to 80 cm high. Leaves reduced to basal leaf sheath; basal leaf sheaths 2–3, scale-like, 5–6 cm; upper leaf sheaths blackish brown, 7–14 cm, ridged, clasping the stem, entire at margins, acuminate. Inflorescences pseudolateral, dense clusters of spikelets. Spikelets reddish brown, sessile, many, up to 60 in each cluster, oblong-elliptic, c. 6 × 4 mm, acute at apex. Glumes pale reddish brown, spirally arranged, ovate, c. 5 × 3.5 mm, acuminate, stiff, prominently keeled. Perianth bristles absent. Stamens 3; filaments up to 4 mm; anthers oblong, c. 0.8 mm, apiculate with glandular appendages, slightly recurved at base. Ovary obovate, 0.8–1 × 0.2–0.4 mm; style short; stigmas 3, flat. Nuts creamish yellow to black, trigonous, obovoid, 1.8–1.9 × c. 1 mm, faces concave, apiculate, transversely wavy in early stages, smooth at maturity.

Flowering & Fruiting: July–April.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 26.09.2012, AK 56175.

2. *Schoenoplectiella mucronata* (L.) J. Jung & H. K. Choi, J. Pl. Biol. 53 (3): 230. 2010. *Scirpus mucronatus* L., Sp. Pl. 1: 50. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 6: 657. 1893. [Plate 282c; Fig. 132f-h]

Rhizomatous, perennial, erect to suberect herb, 14–28 cm high. Leaves reduced to 2–3 membranous leaf sheaths; leaf sheaths yellowish, cylindrical, up to 6 cm, oblique at mouth, subacute with mucro at apex. Inflorescences pseudolateral, hemispherical clusters of few to many spikelets. Spikelets yellow brownish, many flowered, sessile, ovoid to oblong-ovoid, 5–14 × 2.5–4 mm, acute, terete; rachilla winged. Glumes spirally arranged, ovate, 3.5–4 × 1.5–2 mm, ciliolate above, obtuse with mucro at apex, faintly keeled. Perianth bristles 3, unequal, 1–2 mm, shorter to equal than nuts, retrorsely scabrid. Stamens 3; filaments up to 3 mm; anthers linear-oblong, c. 1 mm, apiculate. Ovary obovate, 1–1.2 × 0.2–0.5 mm; style c. 2 mm, papillose; stigmas 3, as long as the style or slightly shorter, papillose. Nuts blackish brown, biconvex, obovate, 2–2.2 across, mucronate, compressed, perianth bristles persistent, smooth.

Flowering & Fruiting: April–January.

Distribution. India: Almost throughout India.

Specimen examined: Rydak river belt, 26.02.2012, AK 55945.

11. *Scleria* P. J. Bergius

Scleria terrestris (L.) Fassett, Rhodora 26: 159. 1924. *Zizania terrestris* L., Sp. Pl. 2: 991. 1753. *Scleria elata* Thwaites, Enum. Pl. Zeyl.: 353. 1864; C. B. Clarke in

Hook. f., Fl. Brit. India 6 (20): 690. 1894 (incl.: var. *laticor* and *decolorans*). *Scleria melanostoma* Boeckeler, Linnæa 38 (5): 514. 1874; C. B. Clarke in Hook. f., Fl. Brit. India 6: 692. 1894. [Plate 282d; Fig. 132i-l]

Charparian (N).

Rhizomatous, perennial, erect or straggling herbs, 1–2 m high. Leaves linear, 10–15 mm, retrorsely scabrous at margins, gradually narrowed to a long tapering apex, 3-veined, chartaceous; contraligule obtuse, ciliate. Inflorescences consisting of 2–4 distant compound panicles, with scabrous, angular branches. Spikelets dark brown, unisexual, solitary or in groups of 2–3, tuft of brown hairs at junction of rachis. Male spikelets oblong-lanceolate, 3.5–4 × 1–1.2 mm. Female spikelets elliptic-ovate, 3.5–5.5 × 1.5–2 mm, compressed. Glumes yellowish with dark brown linear spots, subdistichously arranged, ovate to ovate, 3.5–4.5 × 1.5–2 mm, subacute with mucro at apex, keeled. Male: stamens 3; filaments up to 3 mm; anthers linear-oblong, 1.5–1.8 mm, apiculate and scabrous at apex. Female: ovary elliptic-ovate, c. 1 × 0.3 mm, on stout base; style c. 0.5 mm, continuous with a constriction, pubescent; stigmas 3, spirally arranged, 2.5–2.8 mm, pubescent; disk shortly 3-lobed. Nuts creamy white, terete or faintly obtusely trigonous, ovoid to subglobose, 2.5–2.8 × 2–2.2 mm (including the disk), umbonulate, borne on slaver shape base, reticulate-cancellate, hairy on reticulate lines, ultimately smooth.

Flowering & Fruiting: August–December.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimens examined: Gadadhar range, 31.03.2012, GK 50691; Newlands, Sukno river, 22.09.2011, AK 52790; Hatijhora, on way to Mahakal cave, 01.10.2012, AK 58581.

Poaceae

Key to the genera

- | | |
|--|--------------------------|
| 1a. Culms woody, bearing bladeless sheaths | 2 |
| 1b. Culms herbaceous, bearing blade with sheaths | 3 |
| 2a. Inflorescence buds enclosed within a single, broad, 2-keeled prophylls; new culms usually covered with light, waxy deposits; lodicules present | 3. <i>Bambusa</i> |
| 2b. Inflorescence bud enclosed between two, narrow, single-keeled bracts; new culms covered with thick, dark, waxy deposits; lodicules absent | 10. <i>Dendrocalamus</i> |
| 3a. Glumes absent or minute | 4 |
| 3b. Glumes at least one well developed | 5 |

The Flora of Buxa Tiger Reserve, West Bengal, India

4a.	Leaf blade broadly ovate to oblong-lanceolate; leaf sheath inflated	15. <i>Hygroryza</i>
4b.	Leaf blade linear; leaf sheath compressed	19. <i>Leersia</i>
5a.	Leaf blade distinctly tessellate veined	6
5b.	Leaf blade not as above	7
6a.	Culms 30–135 cm high; glumes 5–7-veined; lowest lemma 7-veined	5. <i>Centotheca</i>
6b.	Culms reed like, 1.5–3 m high; glumes 1-veined; lowest lemma 1–3-veined	35. <i>Thysanolaena</i>
7a.	Spikelets 1 or 3 to many flowered or 2-flowered with both florets bisexual or the upper one barren, female or male	8
7b.	Spikelets 2-flowered, lower floret male or sterile, upper floret bisexual	16
8a.	Ovary hairy towards apex; glumes broadly winged along keel	27. <i>Phalaris</i>
8b.	Ovary glabrous throughout; glumes not as above	9
9a.	Fertile floret with 1 or 2 sterile florets below; both glumes awned, whip like	26. <i>Perotis</i>
9b.	Fertile floret without such sterile florets below; glumes unawned	10
10a.	Inflorescence of digitate, subdigitate or spicate racemes	11
10b.	Inflorescence panicle, if spicate then racemes in clusters of heads or spikelets in clusters	12
11a.	Rachis terminates into a sharp point	9. <i>Dactyloctenium</i>
11b.	Rachis terminates in a spikelet	13. <i>Eleusine</i>
12a.	Culms reed like, up to 3 m high; lemma villous or tuberculate hairy dorsally	28. <i>Phragmites</i>
12b.	Culms decumbent to erect, not reed like; lemma not villous dorsally	13
13a.	Spikelets with single floret	34. <i>Sporobolus</i>
13b.	Spikelets with more than one floret	14
14a.	Spikelet callus bearded; upper floret awned	2. <i>Arundinella</i>
14b.	Spikelet callus glabrous; upper floret unawned	15
15a.	Spikelets with more than 2 florets	14. <i>Eragrostis</i>
15b.	Spikelets with definite 2 florets	18. <i>Isachne</i>
16a.	Upper lemma usually awnless or with mucro up to 1 mm, if prominently awned, then spikelets with long hairs at margins	17
16b.	Upper lemma usually awned, if rarely awnless, then either racemes 1-noded with 3 spikelets (in <i>Apluda</i>) or rachis long hairy or jointed	28
17a.	Spikelets subtended by finely barbellate to scabrid bristles	18
17b.	Spikelets not subtended by bristles	19
18a.	Bristle solitary per spikelet; upper lemma rugose or rugulose	33. <i>Setaria</i>

Botanical Survey of India

18b. Bristles many per spikelet; upper lemma smooth	25. <i>Pennisetum</i>
19a. Glumes barbed awned at apex	21. <i>Oplismenus</i>
19b. Glumes not as above	20
20a. Inflorescences narrow, spiciform and cylindrical, at times slightly lobed at base	32. <i>Sacciolepis</i>
20b. Inflorescence not as above	21
21a. Fertile florets with lateral basal appendages	16. <i>Ichnanthus</i>
21b. Fertile florets lacks lateral basal appendages	22
22a. Spikelets arranged in open or contracted panicles	23
22b. Spikelets arranged in spikes or spike-like racemes	25
23a. Upper glume much shorter than spikelet	22. <i>Ottochloa</i>
23b. Upper glume more or less equalling spikelet	24
24a. Upper glume bearing stout hairs which become hooked at maturity	30. <i>Pseudechinolaena</i>
24b. Upper glume smooth or bearing hairs but never hooked	23. <i>Panicum</i>
25a. Lemma of upper floret cartilaginous	11. <i>Digitaria</i>
25b. Lemma of upper floret not cartilaginous	26
26a. Lower glume absent; spikelets flat to convex	24. <i>Paspalum</i>
26b. Lower glume present; spikelets not as above	27
27a. Ligule absent; upper glume and lower lemma aristate to awned, if not awned, then spikelets in 4-rows on racemes	12. <i>Echinochloa</i>
27b. Ligule present; upper glume and lower lemma acute to apiculate; spikelets not as above	4. <i>Brachiaria</i>
28a. Spikelets unisexual, male and female spikelets in different parts of same inflorescence or in separate inflorescence	7. <i>Coix</i>
28b. Spikelets not as above	29
29a. Inflorescence with an elongated central axis; racemes paniculate or pseudo-paniculate	30
29b. Inflorescence lacks an elongated central axis; racemes solitary, digitate or subdigitate	32
30a. Spikelet yellowish brown; callus decurrently pointed; lower and upper lemma present	6. <i>Chrysopogon</i>
30b. Spikelet silvery; callus not as above; either one or both lemma absent	31
31a. Ligule fimbriate; panicle contracted and silvery white; rachis of racemes hard; lower palea absent and upper palea present	17. <i>Imperata</i>
31b. Ligule not fimbriate; panicle effuse, if contracted not silvery white; rachis of racemes	

- flexuous; lower palea and upper palea absent 31. *Saccharum*
- 32a. Raceme solitary; spikelet callus hairs elongated 29. *Pogonatherum*
- 32b. Racemes 2 or more; spikelet callus hairs minute 33
- 33a. Spikelets of each pair similar; lower lemma minute, scale-like or absent; upper lemma reduced to hyaline base of awn 20. *Microstegium*
- 33b. Spikelets of each pair dissimilar; lower and upper lemma well developed 34
- 34a. Leaves not aromatic; raceme with 3 spikelets per node; rachis joints and pedicels stout, thickening upwards; upper lemma unawned 1. *Apluda*
- 34b. Leaves aromatic; spikelets paired; rachis joints and pedicels slender; upper lemma awned 8. *Cymbopogon*

1. *Apluda* L.

Apluda mutica L., Sp. Pl. 1: 82. 1753. *Apluda varia* Hack. subsp. *mutica* (L.) Hack. in A. DC. & C. DC., Monogr. Phan. 6: 197. 1889 (incl.: subsp. *aristata*); Hook. f., Fl. Brit. India 7: 150. 1896; Prain, Bengal Pl. 2: 1194. 1903.

Goroma (B); *Karuki* (N).

Tufted perennial, 20–50 cm high. Leaves elliptic to linear, 4.5–50 × 0.5–1 cm, serrulate at margins, acuminate, sparsely pilose hairy; ligule lacerate. Panicle 5.5–27 cm, hairy at apex. Spikelets oblong, 4.5–9 × c. 2.5 mm, awned. Lower glume greenish purple, ovate-lanceolate, 3.5–9 mm, acute to acuminate with shortly bifid at apex, broadly winged. Upper glume ovate-lanceolate, 4.3–6.5 mm, acuminate, scabrid and finely ciliolate at apex, winged, with apically serrulate keel. Lower lemma oblong to ovate-lanceolate, acute. Lower palea oblong to ovate-lanceolate, acute and bifid or obtuse. Upper lemma ovate-lanceolate, 2.8–5.3 mm, 2-toothed to deeply cleft at apex, awned; awn 7–17 mm, twisted, barbellate towards apex. Upper palea ovate-lanceolate, 1.2–3 mm, acute or obtuse. Stamens 3; anthers 1.4–3.3 mm. Ovary narrowly oblong-elliptic; stigma purplish brown, plumose. Caryopsis ovoid-ellipsoid.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Hatipota, 29.09.2012, AK 58537.

2. *Arundinella* Raddi

Arundinella bengalensis (Spreng.) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4 (Suppl. 2): 605. 1917. *Panicum bengalense* Spreng., Syst. Veg. 1: 311. 1824.

Phurki, *Darkharey* (N).

Perennial, 50–100 cm high. Leaves lanceolate, 6–32 × 0.5–1.2 cm, acute at apex,

densely tubercle-based hairy or glabrous; ligule membranous with ciliate rim. Panicle dark purplish, 6.5–28 cm. Spikelets oblong, 2.9–3.5 mm. Lower glume ovate-lanceolate, 1.9–2.8 × 0.5–1 mm, acuminate, usually glabrous. Upper glume ovate-lanceolate, 2.7–3.3 × 0.8–1.5 mm, acuminate. Lower lemma oblong-lanceolate, 1.9–3 × 0.3–0.8 mm, acute or truncate. Lower palea oblong-lanceolate, 1.7–2.7 × 0.6–0.7 mm. Upper lemma oblong, c. 2 mm, 2-fid to awned, 3-veined; awn geniculate, c. 2 mm long. Stamens 3; filaments short; anthers oblong. Ovary ovoid; style c. 0.7 mm; stigma purplish, plumose, 0.4–0.8 mm. Caryopsis ovoid.

Flowering & Fruiting: July–November.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Himachal Pradesh, Jharkhand, Manipur, Meghalaya, Mizoram, Odisha, Sikkim, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56140.

3. *Bambusa* Schreb.

Key to the species

- | | |
|---|--------------------------|
| 1a. Culm sheath auricles subequal and similar | 2. <i>B. cacharensis</i> |
| 1b. Culm sheath auricles unequal and dissimilar | 2 |
| 2a. Branch nodes armed; culm sheath densely dark brown hairy inside | 1. <i>B. bambos</i> |
| 2b. Branch nodes unarmed; culm sheath glabrous inside | 3. <i>B. tulda</i> |

1. *Bambusa bambos* (L.) Voss, *Vilm. Blumengartn.*, ed. 3. 1: 1189. 1895. *Arundo bambos* L., *Sp. Pl.* 1: 81. 1753. *Bambusa arundinacea* Willd., *Sp. Pl.*, ed. 4. 2 (1): 245. 1799.

Arborescent, densely tufted perennial, up to 30 m high. Culm sheaths triangular, 10–20 cm, ciliate, acute; ligule serrulate, ciliate; auricles wrinkled, densely dark brown hairy inside. Leaves linear-lanceolate, 7–20 × 1–2.5 cm, basal one rounded and apical one attenuate at base, serrate at margins, acuminate at apex, sparsely hairy at midrib below; ligule rounded-truncate; auricles rounded, sometimes elongated, bearing deciduous bristles. Panicle large, branched, branchlets spicate with few spikelets clusters at nodes. Pseudo-spikelets lanceolate, c. 1.6 cm. Glumes 2–3, ovate, 5–6 mm. Lemma ovate, 0.8–1 cm. Palea lanceolate, 5–9 mm, mature ones longer than lemma, 2-keeled, ciliate at keels. Lodicules 3, membranous, fimbriate. Stamens 6; anthers linear, with an apiculate bristle. Ovary oblong; styles 3 from base; stigma plumose. Fruits not seen.

Flowering: Flowering cycle is 30 to 45 years.

Distribution. India: Andhra Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Rajasthan, Tamil Nadu and West Bengal.

Specimen examined: Sankosh, 17.02.2012, AK 55662.

Uses: Culms used in making furniture, bow and arrow, constructions etc.

2. *Bambusa cacharensis* R. B. Majumdar, Bull. Bot. Surv. India 25: 237. 1983;
Anant Kumar & Venu, Indian J. Forest. 42 (3): 202. 2019. [Plate 283a]

Arborescent, densely tufted perennial, up to 20 m high. Culm sheaths triangular, 13–16 cm, ciliate, smooth later, acute, yellow brown hairy; ligule smooth; auricles wavy, fringed. Leaves linear-lanceolate, 15–20 × 2–2.5 cm, unequally rounded-attenuate at base, serrate at margins, acuminate and scabrous at apex, hairy below; ligule oblique; auricles elongated, bearing deciduous bristles. Panicle branchlets spicate with head like clusters of spikelets. Spikelets cylindrical, 1.5–2 cm. Glumes 1–3, ovate, 5–6 mm, acute with mucronate tip. Lemma ovate, 0.8–1.5 cm, acute with mucronate tip, fine hairy inside near apex. Palea shorter than or nearly equal to lemma, 2-keeled, ciliate at keels. Lodicules 3, ovate, fimbriate. Stamens 6; anthers linear, sometimes apiculate. Ovary ovate, hairy at apex; styles 3 from base; stigma plumose. Fruits not seen.

Flowering: February.

Distribution. India: Assam, Manipur, Meghalaya, Tripura and West Bengal.

Specimen examined: Panbari, Adma, 12.02.2013, AK 58885.

Notes: This species was recorded flowering in 2013 from Adma. It is restricted in India and Bangladesh. Culms used in constructions etc.

3. *Bambusa tulda* Roxb., Fl. Ind. 2: 93. 1832; Gamble in Hook. f., Fl. Brit. India 7: 387. 1897; Prain, Bengal Pl. 2: 1232. 1903. [Plate 283b]

Peka (H); *Tulda*, *Djowa*, *Mitenga*, *Matela bans* (B); *Singhane bans* (N).

Arborescent, densely tufted perennial, up to 20 m high. Culm sheaths triangular, 21–37 cm, ciliate, smooth later, cuspidate, appressed brown hairy outside; ligule faintly serrate, ciliate at mouth; auricles broad, bearing bristles. Leaves linear-lanceolate, 10–30 × 1–2.5 cm, basal one rounded and apical one unequally attenuate at base, ciliate near wrinkled base, serrate and scabrous at margins, acuminate and scabrous at apex, white hairy below; ligule narrow, truncate, ciliate at mouth; auricles rounded, deciduous, bearing deciduous bristles. Panicle branched, leafless, branchlets spicate with few spikelet clusters at nodes. Spikelets cylindrical, 1–5 cm. Glumes 1 or 2, ovate, c. 1 cm. Lemma ovate, 1.5–2.2 cm. Palea slightly shorter than lemma, lanceolate, 2-keeled, ciliate at keels above. Lodicules 3, fimbriate above. Stamens 6; anthers linear, apiculate. Ovary obovate, hairy; styles 3 from base; stigma plumose. Fruits not seen.

Flowering: Flowering cycle is 30 to 60 years.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Karnataka, Meghalaya, Mizoram, Nagaland, Odisha, Tripura, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Narathali, 23.09.2011, AK 52830; Sankosh, 17.02.2012, AK 55667; Phashkhawa river belt, 30.09.2012, AK 58539; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58594; Buxaduar to Chunabhati, 17.02.2014, AK 59989.

Notes: Culms used for making house hold items. Young shoots are eaten as pickle and vegetables; also used for paper pulp.

4. *Brachiaria* (Trin.) Griseb.

Key to the species

- 1a. Spikelets turgid, distantly arranged, pilose 1. *B. ramosa*
1b. Spikelets not turgid, closely arranged, glabrous 2. *B. subquadrifera*

1. *Brachiaria ramosa* (L.) Stapf in Prain, Fl. Trop. Africa 9 (3): 542. 1919. *Panicum ramosum* L., Mant. Pl.: 29. 1767; Hook. f., Fl. Brit. India 7: 36. 1896; Prain, Bengal Pl. 2: 1177. 1903.

Tufted annual or perennial, sometimes rosette like, 15–80 cm high. Leaves linear-lanceolate to ovate-lanceolate, 3.5–14 × 0.3–1.5 cm, serrulate at margins, acute to acuminate at apex, pilose hairy and scabrid; ligule a rim of hairs, sometimes membranous with fimbriate apex. Panicle effuse, 4–7 × c. 5 cm, pilose or glabrous. Spikelets ovate to obovate-elliptic, 2.8–3.5 × 1.2–1.6 mm. Lower glume broadly ovate, 1–1.8 mm, acute, pilose. Upper glume broadly ovate to elliptic, 2.4–3.2 mm, apiculate, ciliate. Lower lemma broadly elliptic, 2.2–3 mm, acute or apiculate, ciliate. Lower palea oblong-elliptic, acute to emarginate, sometimes reduced, 2-keeled; keels winged. Upper lemma broadly ovate-elliptic, 1.7–2.4 mm, acute with mucronate or small apiculate from apex. Upper palea elliptic, 1.8–2.3 mm, acute, glabrous to sparsely hairy. Stamens 3; anthers 0.8–1 mm. Ovary ovate-elliptic to oblong; stigmas plumose. Caryopsis greenish brown, elliptic, 1–2 mm, acute.

Flowering & Fruiting: June–March.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, 18.02.2012, AK 55718.

2. *Brachiaria subquadrifera* (Trin.) Hitchc., Lingnan Sci. J. 7: 214. 1931. *Panicum subquadrifera* Trin., Gram. Panic.: 145. 1826. *Brachiaria miliiformis* (J. Presl) Chase, Contr. U. S. Natl. Herb. 22: 35. 1920.

Tufted annual or perennial, sometimes rosette like, 20–55 cm high. Leaves linear-lanceolate, 7–18 × 0.7–0.9 cm, serrulate at margins, acute to acuminate at apex;

ligule membranous with hairs. Panicle 5–9 × 3–4 cm, sparsely hairy. Spikelets oblong-elliptic, obovate to oblanceolate, 3.2–3.6 × c. 1.2 mm, acute to apiculate. Lower glume ovate, 1.3–1.7 × 0.8–1 mm, acute to obtuse. Upper glume oblong to oblanceolate, 2.7–3 × c. 1.3 mm, acute to apiculate. Lower lemma ovate to elliptic, 2.6–3 × c. 1.2 mm, acute. Lower palea oblong, 1.4–2.5 × c. 0.8 mm, obtuse, narrowly 2-keeled, keels sometimes winged. Upper lemma elliptic, 2.3–2.6 × c. 1 mm, acute. Upper palea oblong to elliptic, 2–2.3 × c. 1 mm, acute, 2-keeled or not. Stamens 3; anthers 1–1.4 mm. Ovary oblong; stigmas plumose. Caryopsis greenish, obovate to elliptic, c. 1.8 × 1 mm, obtuse.

Flowering & Fruiting: July–February.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Delhi, Jharkhand, Karnataka, Kerala, Mizoram, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal.

Specimen examined: Newlands, 15.02.2012, AK 53034.

5. *Centotheca* Desv.

Centotheca lappacea (L.) Desv., *Nouv. Bull. Sci. Soc. Philom. Paris*, ser. 2, 2: 189. 1810; Hook. f., *Fl. Brit. India* 7: 332. 1896; Prain, *Bengal Pl.* 2: 1217. 1903. *Cenchrus lappaceus* L., *Sp. Pl.* ed. 2. 1488. 1763.

Perennial, 30–135 cm high. Leaves narrowly elliptic-lanceolate, c. 16 × 1.5 cm, narrowly oblique at base, finely serrulate at margins, acute to acuminate at apex, scabrid above; ligule membranous, lacerate. Panicle lax, 11–31 × c. 18 cm, sometimes spikelets compactly arranged in short racemes towards apex, finely scabrid. Spikelets ovate-elliptic to oblong, 5–8 × 0.8–1.7 mm. Lower glume ovate-lanceolate, 2–2.8 mm, acute to acuminate, keeled, scabrid on keel. Upper glume oblong-elliptic, 2.8–4 mm, acuminate, keeled, keel finely scabrid or not. Lower lemma oblong, 3.2–4.5 mm, acute to retuse with mucro at apex, keel serrulate. Lower palea oblong-elliptic, 2.4–3.4 mm, acute to obtuse, 2-keeled, scabrellate. Upper lemma oblong, 3.3–5 mm, mucronate. Upper palea c. 3.2 mm, same as lower palea. Stamens 2 or 3; anthers 0.8–1 mm. Ovary narrowly ovate-lanceolate; stigmas plumose. Caryopsis brownish, slightly oblique, ovate-elliptic, 1–1.4 × c. 0.8 mm.

Flowering & Fruiting: April–November.

Distribution. India: Almost throughout India.

Specimens examined: Jainti Range, 06.10.2009, SKS & GK 46232; SRVK 12–13, 29.11.2011, GK 47155; Newlands, 15.02.2012, AK 53090.

6. *Chrysopogon* Trin.

Chrysopogon aciculatus (Retz.) Trin., Fund. Agrost.: 188. 1820. *Andropogon aciculatus* Retz., Observ. Bot. 5: 22. 1789; Hook. f., Fl. Brit. India 7: 188. 1896; Prain, Bengal Pl. 2: 1205. 1903.

Chora-kanta (B).

Tufted perennial, 30–40 cm high. Leaves linear-lanceolate, 1.3–4.2 × 0.2–0.4 cm, rounded at base, serrate at margins, acute at apex; ligule membranous. Panicle effuse, c. 4.5 × 0.8 cm; lower branches whorled. Spikelets paired, sessile ones lanceolate, c. 3.5 × 1 mm, pedicellate ones c. 5 × 0.5–0.6 mm; callus decurrent, needle like, up to 5 mm long. Glumes of sessile spikelet oblanceolate, c. 3.5 × 1 mm, ciliate, acute, keeled. Lower lemma ovate-lanceolate, hyaline, Upper lemma oblong, c. 3.5 × 1.1 mm, acuminate at apex, awned, keeled; awn c. 4.5 mm, barbellate. Upper palea ovate, c. 2 × 1 mm, hyaline. Stamens 3; anthers 0.5–0.6 mm. Caryopsis oblong, c. 2 mm. Glumes of pedicelled spikelet lanceolate, c. 5 × 1.2 mm, acute, 3–5-veined, keeled, scabrid. Lemmas oblong-lanceolate, hyaline, ciliate in upper margins. Stamens 3.

Flowering & Fruiting: April–November.

Distribution. India: Almost throughout India.

Specimen examined: Panbari, 31.03.2012, GK 50692.

7. *Coix* L.

Coix lacryma-jobi L., Sp. Pl. 2: 972. 1753; Hook. f., Fl. Brit. India 7: 100. 1896; Prain, Bengal Pl. 2: 1210. 1903. [Plate 283c]

Gurgar, Kunch (B); *Sankru* (H); *Garday mala, Ghanrey mala* (N).

Tufted perennial or sometimes solitary, 1–2.5 m high. Leaves linear, c. 35 cm long, broadly cordate at base, cartilaginous and serrulate at margins, acuminate at apex; ligule membranous. Racemes terminal to axillary, c. 4.5 cm, drooping. Spikelets unisexual, 1 or 2 female spikelets at base and many male spikelets in terminal portion. Male spikelets loosely imbricate, subsecund, 2 or 3-nate, one sessile and rest pedicelled, lanceolate, c. 8 × 2–3 mm long. Lower glume ovate-lanceolate to oblong, c. 8 mm, acute, 2-keeled; keels ciliate, narrowly winged towards apex. Upper glume narrowly lanceolate, c. 7 mm, acute. Lower lemma oblong-lanceolate, c. 8 mm, acuminate. Lower palea hyaline, sometimes 2-keeled. Upper lemma c. 7 mm. Stamens c. 5 mm. Female spikelets enclosed in globose or oblong bead like, hard involucre, white to bluish. Glumes orbicular, beaked. Lemma lanceolate. Palea absent. Ovary ovoid; stigma exerted. Caryopsis subglobose, c. 6 mm, furrowed in middle, enclosed within involucre.

Flowering & Fruiting: November–February.

Distribution. India: Almost Throughout India.

Specimens examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52713; Kumargram, Hathinala, 21.02.2012, AK 55856.

Notes: Caryopsis with hard involucre used as ornamental bead or necklace.

8. *Cymbopogon* Spreng.

Cymbopogon nardus (L.) Rendle, Cat. Afr. Pl. 2: 155. 1899. *Andropogon nardus* L., Sp. Pl. 2: 1046. 1753; Hook. f., Fl. Brit. India 7: 205. 1896; Prain, Bengal Pl. 2: 1203. 1903. *Andropogon nardus* subsp. *nilagiricus* Hack. in A. DC. & C. DC., Monogr. Phan. 6: 604. 1889; Hook. f., Fl. Brit. India 7: 206. 1896.

Gandhabena (B).

Tufted perennial, 1.5–2.5 m high. Leaves linear-lanceolate, 17–46 × 1.4–1.6 cm, rounded to truncate at base, acuminate at apex, aromatic when crushed; ligule membranous, fimbriate at apex. Panicle 28–40 × 5–8 cm, spathaceous, pubescent. Spikelets purple to brownish yellow, paired, dissimilar, oblong-lanceolate, 3.6–5.2 × c. 0.8 mm, acuminate to lobed at apex, awn exerted. Lower glume oblong to elliptic-lanceolate, 3.6–5.2 mm, acute to retuse, 2-keeled, keels winged. Upper glume oblong-lanceolate, 3.6–4.5 mm, acuminate to retuse, 1-keeled, keel narrowly winged from middle above, ciliate towards apex. Lower lemma narrowly oblong-lanceolate, 3.3–4 mm, acuminate to retuse, ciliate towards apex. Lower palea absent. Upper lemma narrowly oblong, 1.2–1.5 mm, 2-lobed at apex; awn geniculate, 3–4.5 mm, barbellate. Upper palea oblong, 0.3–0.5 mm, acute. Stamens 3. Ovary oblong. Caryopsis brownish, oblong-lanceolate, c. 0.8 mm. Pedicelled spikelet oblong-elliptic, up to 5.2 mm long.

Flowering & Fruiting: July–April.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Odisha, Punjab, Sikkim, Tamil Nadu, Telangana, Tripura and West Bengal.

Specimen examined: Kumargram, 18.02.2012, AK 55728.

9. *Dactyloctenium* Willd.

Dactyloctenium aegyptium (L.) Willd., Enum. Pl.: 1029. 1809. *Cynosurus aegyptius* L., Sp. Pl. 1: 72. 1753. *Eleusine aegyptiaca* (L.) Desf., Fl. Atlant. 1: 85. 1798; Hook. f., Fl. Brit. India 7: 295. 1896. [Plate 283d]

Tufted annual or perennial, 8–55 cm high. Leaves linear to ovate-lanceolate, 1.5–21 × 0.2–0.5 cm, cartilaginous and serrulate at margins, acuminate at apex; ligule membranous with fimbriate apex. Spikes 2–5, digitate. Spikelets greenish to brownish, secund, biseriate, broadly ovate, c. 4 × 3 mm, acute. Lower glume broadly ovate-lanceolate, c. 2.3 mm, acute to acuminate, mucronate, 1-keeled, finely serrulate. Upper glume broadly ovate, c. 3 mm, acute to emarginate, aristate,

1-keeled, keel serrulate. Lemma narrowly ovate, 2.5–3.2 mm, acute, aristate, 1-keeled, keel at times winged, serrulate towards apex. Palea ovate, 2.2–2.8 mm, acute, emarginate, mucronate, 2-keeled, keels winged. Stamens 3; anthers 0.3–0.6 mm. Ovary ovate or globose; stigma plumose. Caryopsis brownish, ovate to elliptic, 0.8–1 mm, acute to obtuse, wrinkled, wavy at margins.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Narathali, 23.09.2011, AK 52824.

10. *Dendrocalamus* Nees

Dendrocalamus hamiltonii Nees & Arn. ex Munro, Trans. Linn. Soc. London 26 (1): 151. 1868; Gamble in Hook. f., FL Brit. India 7: 405. 1897.

[Plate 284a; Fig. 133]

Tama bans (N).

Arborescent, densely tufted perennial, up to 25 m high. Culm-sheaths triangular, 32–70 cm, ciliate, smooth later, acute, deciduous, thick, coriaceous, striated, sparsely appressed brown hairy outside; ligule 4–5 mm, faintly serrate, ciliate; auricles minute and pointed triangular. Leaves oblong-lanceolate, 20–30 × 3–7 cm, unequally obliquely rounded at base, serrate at margins, acuminate and scabrous at apex; ligule obliquely truncate, ciliolate; auricles obscure. Panicle large, branched, leafy or leafless, branchlets bearing half verticillate, semi-globular bracteates heads of densely packed spikelets. Spikelets cuneate, c. 1 cm. Glumes broadly ovate, 5–6 mm, minutely ciliate. Lemma broadly ovate, c. 7 mm. Palea as long as or shorter than lemma, 2-keeled, ciliate at keels and margins, hairy inside. Stamens 3–6; anthers linear, penicillate. Ovary ovate, hairy; style solitary or 3-fid at above, hairy; stigma plumose. Fruits not seen.

Flowering: Flowering cycle is very common.

Distribution. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand and West Bengal.

Specimens examined: Narathali, 23.09.2011, AK 52830; Sankosh, 17.02.2012, AK 55667; Phashkhawa river belt, 30.09.2012, AK 58539; Hatijhora, way to Mahakal cave, 01.10.2012, AK 58594; Buxaduar to Chunabhati, 17.02.2014, AK 59989.

11. *Digitaria* Haller

Key to the species

- 1a. Lower glume absent; upper glume less than 1 mm long 3. *D. setigera*
1b. Lower glume present, though sometimes small; upper glume more than 1 mm long 2



Fig. 133. *Dendrocalamus hamiltonii*: a. Leaves; b. Culm sheaths; c. Portion of inflorescence axis (AK 58594).

- 2a. Upper glume more than $\frac{1}{2}$ of spikelet; lateral veins of lower lemma more or less smooth 1. *D. ciliaris*
2b. Upper glume less than $\frac{1}{2}$ of spikelet; lateral veins of lower lemma scabrous towards apex 2. *D. sanguinalis*

1. *Digitaria ciliaris* (Retz.) Koeler, Descr. Gram.: 27. 1802. *Panicum ciliare* Retz., Observ. Bot. 4: 16. 1786. *Digitaria adscendens* (Kunth) Henrard, Blumea 1: 92. 1934.

Makur-jali (B).

Annual or perennial, 20–75 cm high. Leaves linear to oblong-lanceolate, 3.5–13 × 0.5–0.8 cm, rounded to narrowly acute at base, cartilaginous and serrulate at margins, acuminate at apex, sparsely tuberculate hairy to glabrous; ligule membranous, lacerate. Racemes 2–9, digitate to subdigitate. Spikelets greenish yellow, paired, oblong to elliptic-lanceolate, 2.7–3.2 × 0.7–1 mm, acuminate. Lower glume reduced to triangular scale, c. 0.3 mm, acute to obtuse. Upper glume lanceolate, 1.7–2.6 mm, acute to obtuse, ciliate. Lower lemma oblong to elliptic-lanceolate, 2.6–3 mm, acuminate to apiculate, ciliate. Lower palea absent, sometimes reduced. Upper lemma oblong to elliptic-lanceolate, 2.5–3 mm, acuminate to apiculate. Upper palea ovate-lanceolate, 2.4–2.8 mm, acuminate. Stamens 3. Ovary narrowly oblong-lanceolate; stigma plumose. Caryopsis greenish, oblong-lanceolate, c. 1.5 mm.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Newlands, 15.02.2012, AK 53032.

2. *Digitaria sanguinalis* (L.) Scop., Fl. Carniol., ed. 2. 1: 52. 1771. *Panicum sanguinale* L., Sp. Pl 1: 57. 1753.

Annual, 10–80 cm high. Leaves linear-lanceolate, 5–20 × 0.4–1.2 cm, cuneate at base, thick and scabrous at margins, acuminate at apex, glabrous or pilose; ligule membranous. Racemes 3–10, digitate. Spikelets elliptic-lanceolate, 3–3.5 mm. Lower glume triangular. Upper glume lanceolate, pubescent, 3-veined. Lower lemma as long as spikelet, 7-veined, appressed-pubescent on lateral intervein spaces and margins. Upper lemma lanceolate, as long as spikelet, acuminate. Stamens 3; anthers linear. Ovary oblong-lanceolate; style short; stigma plumose. Caryopsis oblong-elliptic.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Andaman & Nicobar Islands, Bihar, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Kerala, Lakshadweep, Maharashtra, Manipur, Meghalaya, Rajasthan, Sikkim, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Kumargram, 18.09.2011, AK 52608.

3. *Digitaria setigera* Roth in Roem. & Schult., Syst. Veg., ed. 15 bis 2: 474. 1817. *Digitaria microbachne* (J. Presl) Henrard, Meded. Rijks-Herb. 16: 13. 1930. *Paspalum sanguinale* Lam. var. *extensum* Hook. f., Fl. Brit. India 7: 15. 1896.

Banso (N).

Annual or perennial, 20–60 cm high. Leaves oblong to elliptic-lanceolate, 4–25 × 0.5–2.2 cm, rounded at base, cartilaginous, ciliate and serrulate towards apex at margins, acuminate at apex, sparsely tuberculate hairy below; ligule membranous. Racemes 3–10, digitate. Spikelets greenish yellow, elliptic-lanceolate, 2–3 × 0.7–1 mm, acute to acuminate. Lower glume absent, rarely a rim in lower spikelets. Upper glume lanceolate, c. 1 mm, ciliate, acute. Lower lemma oblong to elliptic-lanceolate, 2–3 mm, ciliate, acute. Upper lemma oblong to elliptic-lanceolate, 2–2.5 mm, acuminate. Upper palea ovate to elliptic-lanceolate, 1.8–2.2 mm, acuminate. Stamens 3. Ovary narrowly oblong-lanceolate, c. 0.6 mm; stigma plumose. Caryopsis greenish brown, oblong-elliptic, 1.6–2 mm, planoconvex, acute.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 13.02.2012, AK 53002; Sankosh, 17.02.2012, AK 55676.

12. *Echinochloa* P. Beauv.

Key to the species

- 1a. Spikelet unawned; lower lemma acuminate 1. *E. colona*
- 1b. Spikelet with a definite awn; lower lemma awned, sometimes cuspidate 2. *E. crus-galli*

1. *Echinochloa colona* (L.) Link, Hort. Berol. 2: 209. 1833. *Panicum colonum* L., Syst. Nat., ed. 10. 2: 870. 1759; Hook. f., Fl. Brit. India 7: 32. 1896; Prain, Bengal Pl. 2: 1177. 1903. [Plate 284b]

Sanwal (H); *Sama*, *Molera* (N).

Tufted annual, 16–85 cm high. Leaves linear-lanceolate, 5–20 cm, narrowly rounded at base, more or less cartilaginous at margins, acuminate at apex, scabrid; ligule absent. Inflorescence panicle. Spikelet greenish to purplish, paired, ovate-elliptic to subglobose, 2.2–4 × 1.4–1.8 mm, acute to acuminate, apiculate or cuspidate, scabrid. Lower glume ovate, 1.2–1.8 mm, acute to cuspidate, pubescent. Upper glume ovate to elliptic, 2.2–3.6 mm, acute to acuminate, beaked, pubescent. Lower lemma ovate to elliptic-lanceolate, 2–3.4 mm, acute to acuminate. Lower

palea oblong to elliptic, 1.8–2.4 mm, acute to retuse or emarginate. Upper lemma ovate to broadly elliptic, 2.2–3 mm, acute. Upper palea ovate to broadly elliptic, acute, mucronate to rarely beaked. Stamens 3. Ovary oblong; stigma plumose. Caryopsis brown, elliptic to oblong, 1.2–1.6 mm, planoconvex.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Rydak river belt, 20.09.2011, AK 52685; Newlands, 15.02.2012, AK 53041.

2. *Echinochloa crus-galli* (L.) P. Beauv., Ess. Agrostogr.: 53. 1812. *Panicum crus-galli* L., Sp. Pl. 1: 56. 1753; Prain, Bengal Pl. 2: 1177. 1903. [Plate 284c]

Bara-shama (B); *Sama, Molera* (N).

Tufted annual or perennial, 35–50 cm high. Leaves lanceolate, 14–50 × 0.5–1.5 cm, narrowly rounded to acute at base, scabrid and sparsely tuberculate hairy towards base at margins, acuminate at apex, scabrid; ligule absent. Spikelet ovate to elliptic, 3.5–4 mm, scabrid to hirsute. Lower glume broadly ovate, ciliate, cuspidate. Upper glume broadly ovate, 3.8–4.2 mm, acute to acuminate. Lower lemma broadly ovate, 3–4 mm. Lower palea elliptic, 2.4–2.8 mm, acute to emarginate, 2-keeled, keels scabrellate to ciliolate. Upper lemma broadly elliptic to ovate, 3–3.5 mm, acute to shortly acuminate. Upper palea broadly oblong-elliptic, 2–3 mm, 2-veined. Stamens 3. Ovary oblong; stigma plumose. Caryopsis elliptic-oblong to subglobose.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Marakata, 22.02.2012, AK 55877, 55899.

13. *Eleusine Gaertn.*

Eleusine indica (L.) Gaertn., Fruct. Sem. Pl.: 8. 1759; Hook. f., Fl. Brit. India 7: 293. 1896; Prain, Bengal Pl. 2: 1229. 1903. *Cynosurus indicus* L., Sp. Pl. 1: 72. 1753. [Fig. 134]

Shade jhar, Daday, Kodho jhar (N).

Tufted annual, 18–35 cm high. Leaves linear-lanceolate, 9–32 × c. 0.4 cm, finely serrulate at margins, acute to acuminate at apex; ligule membranous, sometimes hairy on back. Racemes digitate or subdigitate, 2.3–15 cm. Spikelets sessile, secund, compactly arranged in 2 rows, ovate, 4–5.4 × 1.5–4.5 mm. Lower glume ovate-lanceolate, 1.8–3.8 mm, acute to obtuse, 1-keeled; keel winged, serrulate. Upper glume ovate-lanceolate to elliptic, 2–4.2 mm, acute, 1-keeled, narrowly winged and finely serrulate. Lemma elliptic to broadly ovate-lanceolate, 2.8–4.3



Fig. 134. *Eleusine indica*: a. Habit; b. Ligule; c. Spikelet; d. Lower glume; e. Upper glume; f. Lemma (dorsal & lateral views); g. Palea; h. Stamens; i. Lodicules; j. Caryopsis (GK 52336).

mm, acute, keel winged. Palea elliptic, 2.4–3.3 mm, acute, 2-keeled, winged, smooth to finely serrulate. Stamens 3. Ovary ovate to elliptic; stigma plumose. Caryopsis brownish, ovate, 1–1.4 mm, more or less 3-angled, transversely wavy to rugose.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 04.12.2011, GK 52336; Newlands, 15.02.2012, AK 53035, 55628; Narathali, 20.02.2012, AK 55813.

14. *Eragrostis* Wolf

Key to the species

- | | |
|--|------------------------|
| 1a. Florets disarticulating from above downwards; rachilla fragile | 2 |
| 1b. Florets disarticulating from below upwards; rachilla strong | 4 |
| 2a. Lemma ciliate at margins | 3. <i>E. coarctata</i> |
| 2b. Lemma glabrous at margins | 3 |
| 3a. Keels of palea ciliate | 1. <i>E. amabilis</i> |
| 3b. Keels of palea serrulate | 2. <i>E. aspera</i> |
| 4a. Spikelets 2–4 mm wide, usually purplish-brown | 6. <i>E. unioides</i> |
| 4b. Spikelets less than 2 mm wide, if more, then spikelets blackish or greyish | 5 |
| 5a. Plants glandular or at times eglandular; panicles with whorled or subwhorled branches at lower nodes, axils long hairy; lower glume less than 1 mm | 5. <i>E. pilosa</i> |
| 5b. Plants eglandular; panicles with alternate racemes; if lowest node subwhorled, then lower glume more than 1 mm | 4. <i>E. gangetica</i> |

1. *Eragrostis amabilis* (L.) Wight & Arn. in Hook. & Arn., Bot. Beechey Voy.: 251. 1833; Prain, Bengal Pl. 2: 1222. 1903. *Poa amabilis* L., Sp. Pl. 1: 68. 1753. *Eragrostis tenella* (L.) P. Beauv. ex Roem. & Schult., Syst. Veg., ed. 15. 2: 576. 1817; Stapf in Hook. f., Fl. Brit. India 7: 315. 1896 (incl.: var. *plumosa*); Prain, Bengal Pl. 2: 1221. 1903.

Koni (B).

Tufted annual, 18–47 cm high. Leaves linear-lanceolate, 3.5–14 × c. 0.4 cm, rounded to truncate, long villous at base, inrolled, serrulate towards apex at margins, acuminate at apex; ligule membranous with fimbriate apex. Inflorescence panicle. Spikelets greenish purple, ovate to oblong-lanceolate, 2–3.4 × 0.8–1 mm, acute. Lower glume oblong-lanceolate, 0.4–0.7 mm, acute, keel finely serrulate. Upper glume lanceolate, 0.6–1 mm, acute to acuminate, keel serrulate towards apex. Lemma ovate-lanceolate, 0.8–1.1 mm, acute, obtuse to emarginate, 1-keeled, smooth or scaberrate. Palea elliptic, 0.6–1 mm, acute, 2-keeled with long cilia. Stamens 3. Ovary ovate to oblong; stigma plumose. Caryopsis brownish, ovate-lanceolate to elliptic, 0.3–0.5 mm, acute to acuminate.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Rydak river belt, 20.09.2011, AK 52659.

2. *Eragrostis aspera* (Jacq.) Nees, Fl. Afr. Austral. III. 3: 408. 1841; Stapf in Hook. f., Fl. Brit. India 7: 314. 1896. *Poa aspera* Jacq., Hort. Bot. Vindob. 3: 32, t. 56. 1777.

Annual, 30–40 cm high. Leaves linear-lanceolate, 17–39 × c. 0.6 cm, rounded at base, serrulate at margins, attenuate at apex, scabrid; ligule membranous with elongated hairy. Panicle lax, 27–63 × 10–35 cm. Lower glume ovate-lanceolate, 0.8–1.2 mm, acute, mucronulate, serrulate at apex at margins, 1-keeled, keel serrulate. Upper glume ovate-lanceolate, 1–1.5 mm, acute, bifid, mucronulate, 1-keeled, keel serrulate. Lemma oblong, 1.3–1.5 mm, emarginate to truncate, serrulate on midrib. Palea obovate to oblanceolate, 1–1.2 mm, narrowly truncate at base, 2-keeled, serrulate on keels. Stamens 3. Ovary ovate-elliptic; stigma plumose. Caryopsis brownish yellow, ovate to elliptic, c. 0.4 × 0.2 mm.

Flowering & Fruiting: November–February.

Distribution. India: Andhra Pradesh, Bihar, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana and West Bengal.

Specimen examined: Rydak river belt, 20.09.2011, AK 52657.

3. *Eragrostis coarctata* Stapf in Hook. f., Fl. Brit. India 7: 313. 1896; Prain, Bengal Pl. 2: 1221. 1903. [Plate 284d; Fig. 135a-d]

Jinkua (H).

Tufted perennial, 23–60 cm high. Leaves oblong to linear-lanceolate, 4–20 × 0.5–0.6 cm, truncate to rounded at base, incurved at margins, acuminate at apex; ligule hairy. Panicle spiciform, 5–15 × 0.8–1.8 cm. Spikelets yellow to greenish, oblong-lanceolate, 2–4.5 × 1–2 mm, acute. Lower glume lanceolate, 0.8–1.2 mm, acute, keel scabrid or ciliate. Upper glume 1.2–1.6 mm, same as lower glume. Lemma oblong-lanceolate, 1.3–1.7 mm, acute to acuminate with mucro apex, keel scabrid or ciliate to hispid. Palea oblong-elliptic, 1.2–1.4 mm, acute to obtuse, 2-keeled, ciliate. Stamens 3. Ovary narrowly elliptic; stigma plumose. Caryopsis brownish, oblong-elliptic to obovate, 1–1.4 × c. 0.5 mm.

Flowering & Fruiting: October–February.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: Newlands, 15.02.2012, AK 53049; Newlands, 15.02.2012, AK 53074.

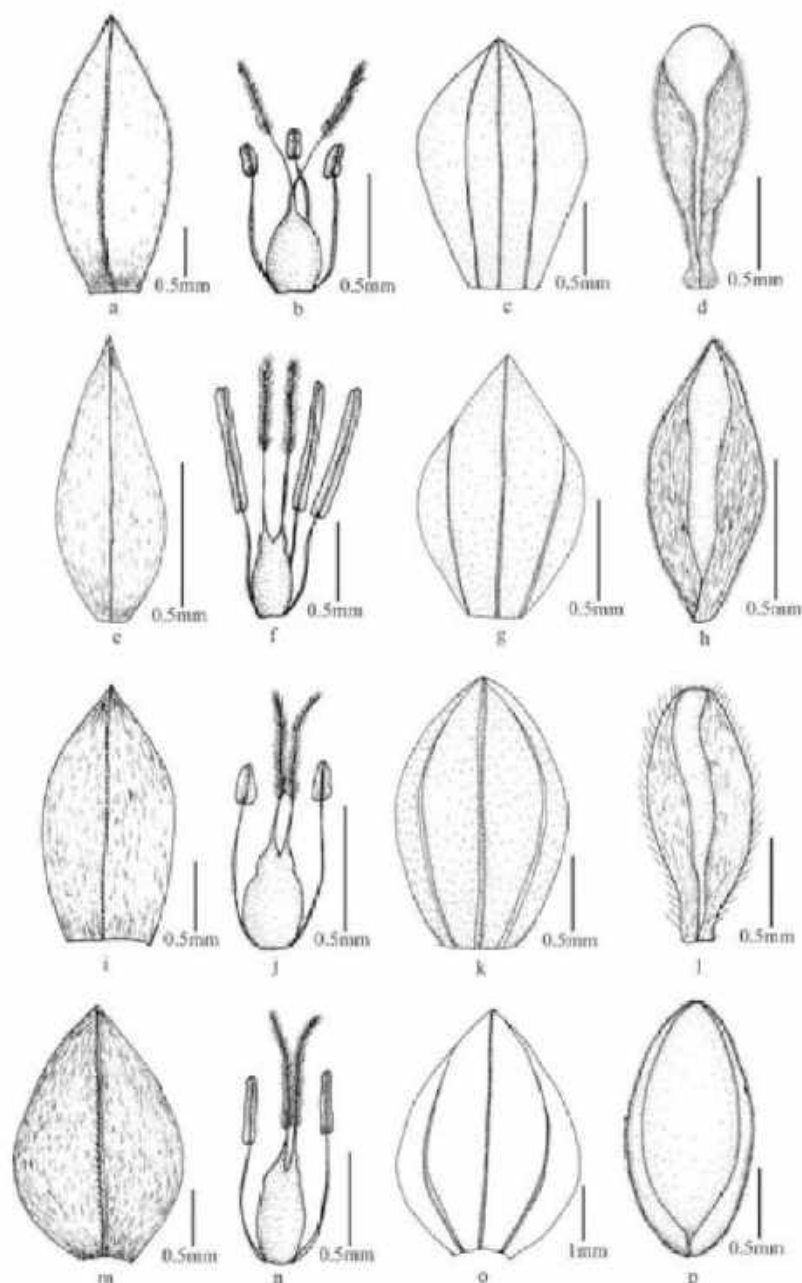


Fig. 135. *Eragrostis coarctata* (a-d): a. Glume; b. Flower; c. Lemma; d. Palea (AK 53074); *Eragrostis gangetica* (e-h): e. Glume; f. Flower; g. Lemma; h. Palea (AK 55787); *Eragrostis pilosa* (i-l): i. Glume; j. Flower; k. Lemma; l. Palea (AK 55823); *Eragrostis unioides* (m-p): m. Glume; n. Flower; o. Lemma; p. Palea (AK 55820).

4. *Eragrostis gangetica* (Roxb.) Steud., Syn. Pl. Glumac. 1: 266. 1854; Prain, Bengal Fl. 2: 1222. 1903. *Poa gangetica* Roxb., Fl. Ind. 1: 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq., Anal. Bot. Ind. 2: 27. 1851; Stapf in Hook. f., Fl. Brit. India 7: 318. 1896. [Plate 285a; Fig. 135e-h]

Tufted annual, 26–58 cm high. Leaves linear-lanceolate, 6–13.5 × c. 0.4 cm, acuminate, infolded and villous hairy basally at margins, smooth to scabrid; ligule membranous, fimbriate. Inflorescence panicle, 8–17 × 1.5–3 cm. Spikelet oblong to linear-lanceolate, sometimes ovate-lanceolate, 4.5–7.5 × c. 1.2 mm. Lower glume ovate-lanceolate, c. 0.8 mm, acuminate, keel serrulate. Upper glume ovate-lanceolate, c. 1 mm, acuminate, keel scabrid. Lemma ovate-lanceolate, 1.2–1.3 mm, acute, emarginate. Palea oblanceolate to elliptic, 0.8–1 mm, acute, 2-keeled, scabrid. Stamens 2. Ovary oblong; stigma plumose. Caryopsis brownish, elliptic to subglobose, c. 0.5 × 0.3–0.4 mm.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 20.02.2012, AK 55747, 55787, 55810, 55825.

5. *Eragrostis pilosa* (L.) P. Beauv., Ess. Agrostogr.: 71. 1812; Stapf in Hook. f., Fl. Brit. India 7: 323. 1896; Prain, Bengal Fl. 2: 1223. 1903. *Poa pilosa* L., Sp. Pl. 1: 68. 1753. [Fig. 135i-l]

Tufted annual, 8–40 cm high. Leaves linear-lanceolate, 7–27 × c. 0.2 cm, acuminate to attenuate, flat to folded, scabrellate towards apex; ligule membranous with rim of hairs. Panicle effuse, 4.3–28 × 3–6 cm. Spikelet narrowly lanceolate, 3–4.5 × 0.8–1.3 mm, acuminate. Lower glume lanceolate, 0.3–0.6 mm, acute, keeled. Upper glume ovate-lanceolate, 0.8–1.2 mm, acuminate, keeled. Lemma ovate-lanceolate, 1.4–1.8 mm, acuminate to obtuse or acute, keeled, finely serrulate. Palea ovate to elliptic, 1.2–1.4 mm, acute to emarginate, 2-keeled, keels serrulate. Stamens 3. Ovary oblong-elliptic; stigma plumose. Caryopsis brown, oblong to globose, 0.4–0.7 × c. 0.3 mm.

Flowering & Fruiting: May–March.

Distribution. India: Almost throughout India.

Specimen examined: Narathali, 20.02.2012, AK 55823.

6. *Eragrostis unioloides* (Retz.) Nees ex Steud., Syn. Pl. Glumac. 1: 264. 1854. *Poa unioloides* Retz., Observ. Bot. 5: 19. 1789. *Eragrostis amabilis* sensu Hook. f., Fl. Brit. India 7: 317. 1896, non (L.) Wight & Arn. ex Hook. & Arn. 1838. [Fig. 135m-p]

Tufted annual, 25–40 cm high. Leaves linear-lanceolate, 2–25 × c. 0.3 cm, infolded at margins, acuminate and serrulate at apex, scaberulous; ligule membranous with

fimbriate apex. Panicle lax, 8–30 × 0.6–9 cm. Spikelet ovate, 4–15 × 3–4 mm. Lower glume ovate-lanceolate, 1–2 mm, acute, keel serrulate. Upper glume 1.5–2.3 mm, mucronate, otherwise same as lower glume. Lemma ovate-lanceolate, 1.3–2.2 mm, acute to obtuse, keel serrulate. Palea elliptic to lanceolate, 1–1.8 mm, reflex or rounded, 2-keeled; keels serrulate to ciliolate, narrowly winged. Stamens 2. Ovary oblong to elliptic; stigma plumose. Caryopsis narrowly elliptic to obovate or rarely globose, 0.5–0.6 mm, stipitate.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Jainti range, 09.10.2009, SKS & GK 46280; Narathali, 20.02.2012, AK 55820; Kumargram, Hathinala, 21.02.2012, AK 55846.

15. *Hygroryza* Nees

Hygroryza aristata Nees, Edinburgh New Philos. J. 15: 380. 1833; Hook. f., Fl. Brit. India 7: 95. 1896; Frain, Bengal Pl. 2: 1185. 1903.

Aquatic perennial, spongy. Leaves broadly ovate to oblong-lanceolate, 4–6 × 1–1.6 cm, subcordate or narrowed to a short petioliform base, undulate at margins, acute to blunt at apex; ligule membranous. Inflorescence short panicle, c. 6 × 4 cm. Spikelet oblong-lanceolate, c. 7 × 1.7 mm. Glumes absent. Lemma oblong to elliptic-lanceolate, c. 6.6 mm, aristate, 1-keeled; arista c. 7 mm, barbellate. Palea oblong to elliptic-lanceolate, c. 6.6 mm, acuminate, scabrid keeled. Stamens 6; anthers 3–3.2 mm. Ovary oblanceolate; style c. 0.7 mm; stigma yellow to brownish, plumose. Caryopsis not seen.

Flowering: November–January.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Kumargram, Hathinala, 21.02.2012, AK 55842.

16. *Ichnanthus* P. Beauv.

Ichnanthus vicinus (E. M. Bailey) Merr., Enum. Philipp. Fl. Pl. 1: 70. 1923. *Panicum vicinum* E. M. Bailey, Syn. Queensl. Fl. Suppl. 3: 82. 1890. *Ichnanthus pallens* sensu Hook. f., Fl. Brit. India 7: 60. 1896, non Munro 1861.

Annual or perennial, 24–47 cm high. Leaves ovate-lanceolate to elliptic, 3–8 × 1–2 cm, rounded to oblique at base, finely serrulate at margins, acuminate at apex, sparsely pilose; ligule membranous, pilose at apex. Inflorescence panicle, 8–10 × c. 4 cm. Spikelets paired, ovate to elliptic-lanceolate, 3.8–4 × 1–2 mm,

acuminate. Lower glume ovate-lanceolate, 2.6–3 mm, acuminate, keel serrulate. Upper glume 3.4–3.6 mm, same as lower glume. Lower lemma ovate-lanceolate, 3–3.3 mm, acute to obtuse, keel finely serrulate above middle. Lower palea ovate to elliptic, c. 2.3 mm, acute, winged, keels finely serrulate. Upper lemma oblong, 1.8–2 mm, obtuse, stipitate, with 2 lateral appendages at base. Upper palea ovate-oblong to elliptic-lanceolate, 1.8–2 mm, obtuse. Stamens 3. Ovary elliptic; stigma plumose. Caryopsis brown, oblong to narrowly elliptic, 0.6–0.8 mm.

Flowering & Fruiting: July–January.

Distribution. India: Andhra Pradesh, Assam, Delhi, Kerala, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Checko-1, 25.09.2012, AK 56113.

17. *Imperata* Cirillo

Imperata cylindrica (L.) Rausch., *Nomencl. Bot.*: 10, no. 89. 1797. *Lagurus cylindricus* L., *Syst. Nat.*, ed. 10. 2: 878. 1759. *Imperata arundinacea* Cirillo, *Pl. Rar. Neapol.* 2: 26, t. 11. 1792, *nom. illeg.*; Hook. f., *Fl. Brit. India* 7: 106. 1896; Prain, *Bengal Pl.* 2: 1188. 1903.

Ulu (B); *Dabh* (H); *Siru, Khar* (N).

Rhizomatous perennial, 25–180 cm high. Leaves linear-lanceolate, 4–60 × 0.3–0.6 cm, narrowly truncate at base, serrulate towards apex at margins, acuminate at apex; ligule membranous with fimbriate apex. Panicle cylindrical, spiciform, 5–19 × c. 2 cm. Spikelets ovate-lanceolate, 2.6–3.4 × 0.3–0.5 mm, acute, enclosed by white hairs of callus and glumes. Lower glume oblong to ovate-lanceolate, 2.6–3.3 mm, acute to 2 or 3-lobed, long villous. Upper glume ovate-lanceolate, 3–3.3 mm, acuminate, long villous. Lower lemma broadly ovate or oblong-lanceolate, 1.3–2.2 mm, ciliate to fimbriate, acuminate to 2-lobed, hairy at apex. Lower palea absent. Upper lemma oblong, 1.3–1.8 mm, acute, lobed, apex long fimbriate hairy. Upper palea broadly oblong, 0.8–1.4 mm, acute and fimbriate at apex. Stamens 2. Ovary ovate to oblong, beaked; stigma plumose. Caryopsis greenish brown, ovate to oblong, c. 1 × 0.4 mm.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Newlands, Sukno river, 22.09.2011, AK 52791.

18. *Isachne* R. Br.

Isachne globosa (Thunb.) Kuntze, *Revis. Gen. Pl.* 2: 778. 1891. *Milium globosum* Thunb., *Fl. Jap.*: 49. 1794. *Isachne australis* R. Br., *Prodr. Fl. Nov. Holland.*: 196. 1810; Hook. f., *Fl. Brit. India* 7: 24. 1896; Prain, *Bengal Pl.* 2: 1172. 1903. *Isachne dispar* sensu Hook. f., *Fl. Brit. India* 7: 26. 1896, non Trin. 1828. [Fig. 136a]

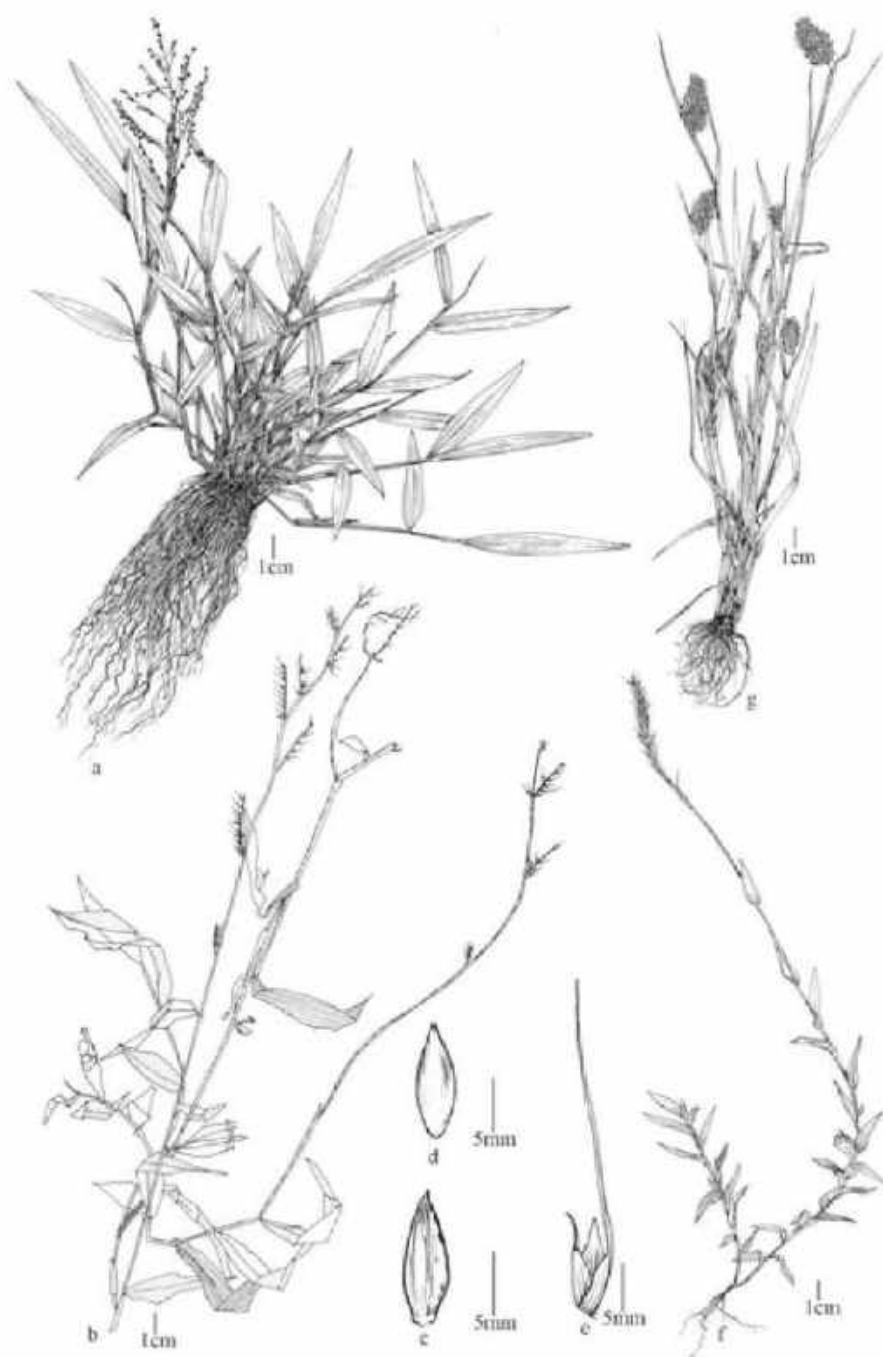


Fig. 136. *Isachne globosa*: a. Habit (AK 55966); *Oplismenus compositus*: b. Habit; c. Dorsal view of upper floret; d. Ventral view of upper floret; e. spikelet (GK 47139); *Perotis indica*: f. Habit (AK 52793); *Phalaris minor*: g. Habit (AK 55973).

Annual or perennial, 25–40 cm high. Leaves lanceolate to linear-lanceolate, 1.5–8 × 0.5–1.4 cm, rounded to shallowly cordate at base, acuminate at apex, pubescent to scabrid; ligule a fringe of hairs. Panicle effuse, 3–12 cm. Spikelet subglobose, 1.5–2 mm. Lower glume ovate-oblong to obovate, 1.5–2 mm, obtuse, hirsute to glabrous below. Upper glume ovate, concave, c. 1.5 mm, obtuse to emarginate, hirsute or glabrous below. Lower lemma ovate to oblong-elliptic, c. 2 mm, obtuse. Lower palea similar to lemma, 2-keeled. Upper lemma broadly elliptic, c. 1.8 mm, pubescent below. Upper palea broadly ovate to elliptic, c. 1.2 mm. Stamens 3. Ovary oblong; stigma plumose. Caryopsis reddish brown, elliptic, subglobose, c. 1.5 mm wide.

Flowering & Fruiting: May–February.

Distribution. India: Almost throughout India.

Specimens examined: East Damanpur range, 27.11.2011, GK 50573; Rydak river belt, 26.02.2012, AK 55966.

19. *Leersia* Sw.

Leersia hexandra Sw., Prodr.: 21. 1788; Hook. f., Fl. Brit. India 7: 94. 1896; Prain, Bengal Fl. 2: 1185. 1903. [Plate 285b]

Annual or short-lived perennial, 35–60 cm high. Leaves linear-lanceolate, 7.5–9 × c. 0.3 cm, rounded to truncate at base, involute at margins, acuminate at apex, sparsely scabrid towards apex; ligule membranous. Panicle 6–13 cm long. Spikelet oblong, planoconvex, 3–3.2 × c. 1.2 mm, acute. Lower glume reduced to a rim or absent. Upper glume absent. Lemma broadly oblong, planoconvex, 3–3.6 × c. 1.3 mm, beaked, 1-keeled, narrowly winged, scabrid to spinulose on keel. Palea oblong, 3.2–3.6 × c. 0.7 mm, acute to truncate, mid vein prominently keeled, scabrid to spinulose on keel. Stamens 6. Ovary ovate to elliptic; stigma plumose. Caryopsis not seen.

Flowering & Fruiting: June–August.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 13.02.2012, AK 53001; Narathali, 20.02.2012, AK 55746, 55803; Kumargram, Hathinala, 21.02.2012, AK 55863.

20. *Microstegium* Nees

Microstegium ciliatum (Trin.) A. Camus, Ann. Soc. Linn. Lyon ser. 2, 68: 201. 1921. *Pollinia ciliata* Trin., Mem. Acad. Imp. Sci. St.-Petersbourg, ser. 6, Sci. Math. 2: 306. 1832; Hook. f., Fl. Brit. India 7: 116. 1896; Prain, Bengal Fl. 2: 1190. 1903.

Stoloniferous to rambling perennial, 43–65 cm high, sparsely villous. Leaves oblong-lanceolate, 6–12 × 0.9–1.2 cm, narrowly acute at base, finely serrulate at margins, acuminate at apex, hairy; ligule membranous. Racemes 3–8, subdigitate.

Spikelets paired, sessile and pedicelled, oblong, c. $3.2 \times 0.7-0.8$ mm. Lower glume oblong, c. 3.2 mm, notched at apex, keels slightly ciliate to hairy towards apex. Upper glume ovate to oblong-lanceolate, c. 3.2×0.8 mm, with a bristle, acuminate, keel finely serrulate. Lower lemma minute, scale like. Upper lemma reduced to hyaline base of awn, 0.2-0.3 mm; awn brownish, c. 4 mm, geniculate, twisted; bristle c. 5.2 mm, barbellate. Upper palea ovate, c. 0.5 mm. Stamens 3. Ovary oblong; stigma plumose. Caryopsis brownish, ovate to oblong, $0.7-1 \times c. 0.4$ mm.

Flowering & Fruiting: August-January.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Specimens examined: SRVK 12-13, 27.11.2011, GK 47153; Newlands, 15.02.2012, AK 53076.

21. *Oplismenus* P. Beauv.

Key to the species

- | | |
|---|-------------------------|
| 1a. Awns of glumes and lemma antrorsely scabrid, very slender | 1. <i>O. burmannii</i> |
| 1b. Awns of glumes and lemma smooth, sticky, stout | 2. <i>O. compositus</i> |

1. *Oplismenus burmannii* (Retz.) P. Beauv., Ess. Agrostogr.: 54, 168, 169. 1812; Hook. f., Fl. Brit. India 7: 68. 1896; Prain, Bengal Pl. 2: 1173. 1903. *Panicum burmannii* Retz., Observ. Bot. 3: 10. 1783.

Annual or straggling stoloniferous perennial, 16-22 cm high. Leaves ovate to elliptic-lanceolate, $2-3.5 \times 0.4-1.2$ cm, rounded to oblique at base, serrulate, finely undulate on one side at margins, acuminate at apex, sparsely hairy; ligule membranous, hairy at apex. Panicle 3.4-4.5 cm. Spikelets paired, ovate to oblong-lanceolate, $2.6-3 \times c. 0.8$ mm, sparsely hispidulous. Lower glume ovate-lanceolate, 1.5-1.8 mm, ciliate, acute, awned, 1-keeled; awn 5-6.5 mm, antrorsely barbellate. Upper glume with shorter awn, similar to lower glume. Lower lemma elliptic-lanceolate, c. 2.2 mm, ciliate, acute to aristate, 1-keeled; arista 0.8-1.3 mm, barbellate. Upper lemma oblong to elliptic, 1.8-2 mm, acute to apiculate. Upper palea narrowly oblong to elliptic, 1.6-1.8 mm, acute to apiculate. Stamens 3. Ovary narrowly obovate to oblong; stigma plumose. Caryopsis brownish, oblong, 0.8-1 mm.

Flowering & Fruiting: November-January.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 19.09.2011, AK 52635; Newlands, 15.02.2012, AK 53031, 53089.

2. *Oplismenus compositus* (L.) P. Beauv., Ess. Agrostogr.: 168. 1812; Hook. f., Fl. Brit. India 7: 66. 1896; Prain, Bengal Fl. 2: 1173. 1903. *Panicum compositum* L., Sp. Pl. 1: 57. 1753. [Plate 285c; Fig. 136b-c]

Tufted perennial, 45–55 cm high. Leaves elliptic-lanceolate, 1.2–6.5 × 0.5–1.5 cm, rounded at base, fimbriate at margins, acute at apex, densely hairy; ligule membranous, ciliate. Panicle 24–30 cm. Spikelets on lateral axis, trigetous, densely hairy. Lower glume oblong-ovate, 1.5–2 mm, 3-veined, hairy outside, awned; awn 7–9 mm, fimbriate. Upper glume oblong-ovate, c. 2 mm, 3–5-veined, awned; awn 1–1.2 mm. Lower lemma ovate, c. 3 mm, acute, 2–3-veined, sparsely hairy. Lower palea absent. Upper lemma elliptic, c. 2.5 mm, acute. Upper palea elliptic or lanceolate, c. 2.2 mm, acute, keeled. Stamens 3; anthers c. 2 mm. Ovary ovate-oblong; stigma plumose. Caryopsis oblong-elliptic, 1.5–2 × c. 0.6 mm.

Flowering & Fruiting: July–March.

Distribution. India: Almost throughout India.

Specimens examined: On the way to Buxaduara, 2000ft, 28.02.1934, KPB 1796; Bhutanghat, 28.05.1949, VN & party 3095; Poro, 22.02.1975, JKS 794; Garam, 23.11.1975, JKS 859; East Damanpur Range, SRVK 12-13, 27.11.2011, GK 47139.

22. *Ottochloa* Dandy

Ottochloa nodosa (Kunth) Dandy, J. Bot. 69: 55. 1931. *Panicum nodosum* Kunth, Enum. Pl. 1: 97. 1833; Hook. f., Fl. Brit. India 7: 43. 1896; Prain, Bengal Fl. 2: 1178. 1903.

Decumbent annual or perennial, 30–65 cm high, sparsely ciliate to glabrous. Leaves ovate to oblong-lanceolate, 5–11 × 0.8–1.5 cm, cordate to amplexicaul and slightly asymmetrical at base, cartilaginous, serrulate at margins, acuminate at apex, sparsely hairy; ligule membranous. Panicle effuse, 11–21 × 9–10 cm, scabrid. Spikelets 4–6 in a group, ovate to elliptic-lanceolate, 2.8–3.3 × 1–1.2 mm, acuminate. Lower glume ovate-lanceolate, 0.8–2 mm, ciliate, acute to acuminate. Upper glume ovate-lanceolate, 1.5–2.3 mm, acuminate. Lower lemma ovate-lanceolate, 2.5–3.2 mm, sparsely ciliate. Lower palea absent. Upper lemma ovate to elliptic, lanceolate, 2.5–3.2 mm, finely scabrelate and acuminate, granulose. Upper palea elliptic-lanceolate, 2.2–2.9 mm, acute to acuminate, smooth to granulose, faintly 2-keeled. Stamens 3. Ovary narrowly oblong-elliptic; stigma plumose. Caryopsis yellowish, obovate or oblanceolate to elliptic, 1–1.2 mm, flat.

Flowering & Fruiting: July–December.

Distribution. India: Andhra Pradesh, Assam, Jharkhand, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal.

Specimen examined: Bhutanghat, 26.09.2011, AK 52948.

23. *Panicum* L.

Key to the species

- | | |
|--|--------------------------|
| 1a. Spikelets 4.3–5.8 mm | 4. <i>P. miliaceum</i> |
| 1b. Spikelets 2–3.6 mm | 2 |
| 2a. Lower and upper glume cuspidate-acuminate at apex | 3. <i>P. curviflorum</i> |
| 2b. Lower glume acute to obtuse at apex; upper glume acute to acuminate at apex | 3 |
| 3a. Culms erect; leaves truncate at base | 6. <i>P. paludosum</i> |
| 3b. Culms decumbent, at times trailing and woody; leaf blade strongly amplexicaul or semiamplexicaul at base | 4 |
| 4a. Leaves ovate, strongly amplexicaul at base | 2. <i>P. brevifolium</i> |
| 4b. Leaves linear-lanceolate, semiamplexicaul at base | 5 |
| 5a. Glumes subequal | 5. <i>P. notatum</i> |
| 5b. Lower glumes distinctly shorter than upper | 1. <i>P. auritum</i> |

1. *Panicum auritum* J. Presl ex Nees, Fl. Bras. Enum. Pl. 2 (1): 176. 1829; Hook. f., Fl. Brit. India 7: 40. 1837; Prain, Bengal Fl. 2: 1178. 1903.

Slender perennial, 62–200 cm high. Leaves linear-lanceolate, 21–40 × 1.2–4 cm, semiamplexicaul with few long cilia at base, minutely hispid at margins, acute at apex, glabrous; ligule membranous. Panicle 12–36 × 1.5–4 cm, narrowly cylindrical, very dense. Spikelets oblong-lanceolate, c. 2.5 × 1 mm. Lower glume broadly asymmetrically ovate, c. 1.2 mm, blunt, 3-veined, slightly keeled. Upper glume lanceolate, c. 2.5 mm, convex, acute, 5-veined, keeled. Lower lemma similar to upper glume, c. 2.4 mm, not keeled. Lower palea narrowly oblong to oblanceolate, 1.1–1.5 mm, blunt or subacute. Upper lemma lanceolate, c. 2.1 mm, convex, acuminate. Upper palea lanceolate, 1.8–2 mm, acute. Stamens 2 or 3. Ovary c. 1 mm; stigma plumose. Caryopsis ovate, 1–1.5 mm.

Flowering & Fruiting: August–October.

Distribution. India: Andaman & Nicobar Islands, Assam, Bihar, Jharkhand, Karnataka, Kerala, Meghalaya, Odisha, Sikkim, Tripura and West Bengal.

Specimen examined: East Damanpur range, 01.12.2011, GK 47197.

2. *Panicum brevifolium* L., Sp. Pl. 1: 59. 1753; S. Moulik, Grass. Bamb. India 1: 115, t. 17. 1997. *Panicum ovalifolium* Poir. in Lam. & al., Encyc. Suppl. 4. 279. 1816.

Tufted annual, 15–18 cm high. Leaves ovate, 11–9 × 0.6–3.1 cm, hairy and amplexicaul at base, undulate-serrate at margins, acuminate at apex, chartaceous, sparsely hairy; ligule membranous, hairy at apex. Panicle 4.5–7.5 × 3.5–6.5 cm. Spikelets ovate-elliptic, c. 2 × 1 mm. Lower glume oblong-lanceolate, c. 2 mm,

acute, 3-veined. Upper glume ovate, c. 1.5 mm, acute, 5-veined, keeled, hairy outside. Lower lemma ovate, c. 1.2 mm, acute, folded. Lower palea oblong-lanceolate, c. 1.5 mm, ciliate, acute. Upper lemma broadly ovate, c. 1.5 mm, acute, keeled. Upper palea ovate-elliptic, 1.3–1.5 mm, acute, 2-veined. Stamens 3. Ovary oblong-elliptic; stigma plumose. Caryopsis brownish, elliptic, c. 1.2 mm.

Flowering & Fruiting: November–May.

Distribution. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Tripura and West Bengal.

Specimens examined: Jainti 5a, 06.10.2009, SKS & GK 46191; Tashigaon 1, 12.10.2009, SKS & GK 46321.

3. *Panicum curviflorum* Hornem., Suppl. Hort. Bot. Hafn.: 116. 1819; Hook. f., Fl. Brit. India 7: 47. 1896. [Plate 285d]

Tufted annual or perennial, 21–130 cm high. Leaves linear-lanceolate, 3–24 × 0.5–0.8 cm, sparsely hairy, serrulate towards apex at margins, acuminate at apex; ligule membranous, fimbriate. Panicle effuse, 8–50 × 2–9 cm, sparsely ciliate. Spikelets ovate to oblong-lanceolate, 2.4–3.2 × 1–1.2 mm, acuminate to narrowly acute. Lower glume ovate to lanceolate, 1.5–2 mm, cup like at base, acuminate, faintly keeled, keel serrulate towards apex. Upper glume elliptic to ovate-lanceolate, 2–3 mm, curved and acuminate to cuspidate. Lower lemma ovate to elliptic-lanceolate, 2–2.8 mm, acuminate. Lower palea ovate-lanceolate, 1–1.8 mm, acute, emarginate, 2-keeled. Upper lemma ovate-elliptic, 1.4–2 mm, acute to obtuse. Upper palea ovate to elliptic, 1.3–1.8 mm, acute to obtuse. Stamens 3. Ovary oblong-elliptic; stigma plumose. Caryopsis brownish, elliptic, c. 1.2 mm.

Flowering & Fruiting: May–February.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Rajasthan, Tamil Nadu, Telengana, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Marakata, 24.09.2011, AK 52867.

4. *Panicum miliaceum* L., Sp. Pl. 1: 58. 1753; Hook. f., Fl. Brit. India 7: 45. 1896; Prain, Bengal Fl. 2: 1179. 1903.

Cheena (B).

Tufted annual or perennial, 5–120 cm high. Leaves linear-lanceolate, 14–30 × 0.8–1 cm, rounded to truncate at base, acuminate at apex, sparsely long shaggy hairy; ligule membranous, fimbriate. Panicle effuse, 18–23 × 12–13 cm, glandular,

scabrid. Spikelets paired, broadly ovate to elliptic-lanceolate, 4.5–5.8 × 1.7–2 mm, acuminate. Lower glume ovate, 2.8–4 mm, acuminate, cuspidate, keeled. Upper glume broadly ovate to elliptic-lanceolate, 4–5.3 mm, acuminate. Lower lemma broadly ovate to elliptic-lanceolate, 4–4.5 mm, acuminate. Lower palea ovate to oblong, 1–1.2 mm, acute, 2-lobed. Upper lemma elliptic, 2.5–3.2 mm, acute. Upper palea ovate-elliptic, 2.5–2.8 mm, acute. Stamens 3. Ovary oblong; stigma plumose. Caryopsis greenish yellow, elliptic to globose, c. 2.5 mm.

Flowering & Fruiting: September–November.

Distribution. India: Almost throughout India.

Specimens examined: SRVK 11, 21.09.2011, GK 50630; Newlands, Sukno river, 22.09.2011, AK 52792; Checko-1, 25.09.2012, AK 56139; Hauda nala, 03.10.2012, AK 58657.

5. *Panicum notatum* Retz., *Observ. Bot.* 4: 18. 1786. *Panicum montanum* Roxb., *Fl. Ind.* 1: 315. 1820; Hook. f., *Fl. Brit. India* 7: 53. 1896. Prain, *Bengal Pl.* 2: 1180. 1903.

Tufted perennial, c. 1.5 m high. Leaves broadly ovate-lanceolate, 13–17 × 2–2.8 cm, semiamplexicaul at base, serrulate and hairy at margins, acuminate at apex, sparsely hispid; ligule membranous, fimbriate. Panicle effuse, 22–40 × c. 20 cm. Spikelets ovate to elliptic-lanceolate, 2–2.4 × 0.8–1 mm, acute or acuminate. Lower glume ovate-lanceolate, 1.8–2.3 mm, acute, ciliate towards apex at margins. Upper glume ovate to elliptic-lanceolate, 2–2.5 mm, acute. Lower lemma ovate to elliptic-lanceolate, 2–2.3 mm, obtuse to acute. Upper lemma ovate to elliptic, 1.8–2.2 mm, curved and acute to apiculate. Upper palea ovate to elliptic-lanceolate, 1.8–2.2 mm. Stamens 3. Ovary ovate to oblong; stigma plumose. Caryopsis yellowish, obovate-lanceolate, 0.8–1 mm.

Flowering & Fruiting: July–March.

Distribution. India: Almost throughout India.

Specimen examined: Kumargram, 18.09.2011, AK 52606.

6. *Panicum paludosum* Roxb., *Fl. Ind.* 1: 310. 1820. *Panicum proliferum* sensu Hook. f., *Fl. Brit. India* 7: 50. 1896, non Lam. 1797.

Aquatic perennial, 0.4–1.2 m high. Leaves linear-lanceolate, c. 40 × 0.8 cm, finely serrulate and cartilaginous at margins, acuminate at apex; ligule membranous, fimbriate. Panicle effuse, c. 26 × 5 cm, scabrid. Spikelets paired, oblong-lanceolate to elliptic, c. 3.6 × 1.3 mm, acute to acuminate. Lower glume ovate, cup-like, c. 1.3 mm, acute. Upper glume broadly ovate to elliptic-lanceolate, 3–3.6 mm, acute to acuminate. Lower lemma oblong-lanceolate to elliptic, 3–3.2 mm, acute. Lower palea elliptic, 2.2–3 mm, obtuse, 2-keeled. Upper lemma elliptic, c. 2.8 mm, acute. Upper palea elliptic, c. 2.6 mm, acute. Stamens 3. Ovary oblong; stigma plumose.

Caryopsis yellowish to brown, oblong to elliptic, 1.8–2 mm.

Flowering & Fruiting: August–December.

Distribution. India: Almost throughout India.

Specimens examined: Narathali, 20.02.2012, AK 55804; Checko-1, 26.09.2012, AK 56164.

24. *Paspalum* L.

Key to the species

- 1a. Spikelets up to 2 mm, ciliate; racemes conjugate; anthers less than 0.6 mm
L. *P. conjugatum*
- 1b. Spikelets more than 2 mm, glabrous or nearly so; racemes not conjugate; anthers more than 0.8 mm
2. *P. scrobiculatum*

Paspalum conjugatum P. J. Bergius, Acta Helv. Phys.-Math. 7: 129, t. 8. 1772; Hook. f., Fl. Brit. India 7: 11. 1896; Prain, Bengal Pl. 2: 1182. 1903.

Bonso jhar; Hathi doubo (N).

Stoloniferous, decumbent perennial, 25–65 cm high. Leaves linear-lanceolate, 6–18 × 0.6–1 cm, rounded to truncate at base, cartilaginous towards apex at margins, acuminate at apex, scabrid to sparsely tuberculate hairy; ligule membranous. Racemes 2, digitate to conjugate. Spikelets sessile, 2-rowed, compactly arranged, broadly ovate to elliptic, basal ones oblong-elliptic, 1.3–2 × c. 1.2 mm, acute, compressed, flat or convex. Lower glume absent. Upper glume broadly ovate to elliptic, 1.3–1.8 mm, acute, ciliate. Lower lemma broadly ovate to elliptic, 1.3–1.6 mm, apiculate. Upper lemma broadly ovate-elliptic, 1.3–1.7 mm, acute, dorsally finely granulate. Upper palea broadly ovate-elliptic, 1.2–1.4 mm, finely granulate. Stamens 3. Ovary ovate to oblong; stigma plumose. Caryopsis brown to more or less orange, broadly elliptic, c. 0.8 mm, flat to convex.

Flowering & Fruiting: June–April.

Distribution. India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Specimen examined: Jainty-Pashkhawa, 02.10.2012, AK 58622.

Paspalum scrobiculatum L., Mant. Pl.: 29. 1767; Hook. f., Fl. Brit. India 7: 10. 1896; Prain, Bengal Pl. 2: 1182, 1903; C. E. C. Fisch., Rec. Bot. Surv. India 9 (1): 189. 1921. *Paspalum commersonii* Lam., Tabl. Encycl. 1: 175, t. 43, f. 1. 1791.

Khodoa dhan (B); *Kodo, Kodaka* (H).

Tufted annual or stoloniferous perennial, 20–60 cm high. Leaves linear-lanceolate, 5.5–40 × c. 0.4 cm, rounded at base, finely serrulate towards apex at margins, acuminate at apex; ligule membranous. Racemes digitate, terminal to subterminal. Spikelets securd, sessile, compact, 2-rowed, rotundate to elliptic, 2–3 × 1.3–2 mm, obtuse to subacute. Lower glume absent. Upper glume obovate to orbicular-elliptic, 2–2.7 mm, acute to obtuse. Lower lemma obovate to elliptic, 2–2.6 mm, acute to rotundate. Upper lemma elliptic, 1.8–2.2 mm, acute. Upper palea elliptic to ovate, 1.7–2.1 mm, obtuse to acute. Stamens 3. Ovary ovoid; stigma plumose. Caryopsis brownish, oblong, c. 1 mm, truncate at apex.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 18.09.2011, AK 52615; Newlands, 15.02.2012, AK 53044, 55607; Naratbali, 20.02.2012, AK 55769.

25. *Pennisetum* Rich. ex Pers.

Key to the species

- 1a. Involucre with 1 sessile and 2 pedicellate spikelets; lower glume of sessile spikelet, 1.7–3 mm 1 *P. pedicellatum*
1b. Involucre with 1 sessile spikelet only; lower glume 0.2–0.8 mm 2. *P. polystachion*

1. *Pennisetum pedicellatum* Trin., Mem. Acad. Imp. Sci. Saint-Petersbourg ser. 6, Sci. Math., Seconde Pt. Sci. Nat. 3: 184. 1835; Hook. f., Fl. Brit. India 7: 86. 1896; Prain, Bengal Fl. 2: 1169. 1903.

Tufted annual or perennial, 70–85 cm high. Leaves linear-lanceolate, 13–21 × c. 0.8 cm, cordate or rounded at base, finely serrulate at margins, acuminate at apex, sparsely tuberculate hairy; ligule membranous, fimbriate. Raceme terminal, 6–14 cm, sparsely hairy below; finely barbellate to scabrid. Spikelets in involucre, ovate-lanceolate, 3.5–4.6 × 0.7–1.6 mm, acuminate. Lower glume ovate-lanceolate, 1.7–3 mm, acute to 2-lobed, scabrid towards apex, hairy on dorsal. Upper glume broadly ovate-lanceolate, 2.5–4.5 mm, shortly 3-lobed, ciliate to ciliolate towards apex, minutely hairy dorsally. Lower lemma ovate-lanceolate, 2.8–3.8 mm, 3-lobed, finely scabrellate to ciliolate. Lower palea elliptic-lanceolate, 2.3–3.2 mm, scabrellate at apex, 2-keeled. Upper lemma ovate-lanceolate, 1.8–2.5 mm, scabrellate to ciliate at apex. Upper palea narrowly ovate-lanceolate, 1.7–2.5 mm, scabrellate to ciliate at apex. Stamens 3. Ovary ovate-lanceolate; stigma plumose. Caryopsis brownish green, oblong-elliptic to obovate, 1–2 mm.

Flowering & Fruiting: July–February.

Distribution. India: Almost throughout India.

Specimen examined: Sankosh, 28.09.2011, AK 52995.

2. *Pennisetum polystachion* (L.) Schult., Mant. 2: 146. 1824. *Panicum polystachion* L., Syst. Nat., ed. 10. 2: 870. 1759. [Plate 286a]

Tufted annual or perennial, 1–1.5 m high. Leaves linear-lanceolate, 11–32 × 0.6–1.8 cm, rounded at base, inrolled at margins, acuminate to attenuate at apex, sparsely tuberculate hairy towards base; ligule membranous. Raceme narrowly oblong to cylindrical, spiciform, 12–23 × 1.5–1.8 cm. Spikelet solitary per involucre, ovate to oblong-lanceolate, 3–4 × c. 1 mm, acuminate. Lower glume oblong, 0.2–0.8 mm. Upper glume ovate to oblong-lanceolate, 3.2–4 mm, acuminate. Lower lemma ovate to oblong, 3–3.7 mm, 3-lobed, finely ciliate at apex. Lower palea narrowly ovate-lanceolate, 3–3.2 mm, acuminate, ciliolate at apex, 2-keeled. Upper lemma ovate-lanceolate, 2–2.3 mm, hairy at apex. Upper palea ovate-lanceolate, 1.8–2.2 mm, faintly lobed. Stamens 3. Ovary narrowly oblong; stigma plumose. Caryopsis greenish brown, oblong to lanceolate, c. 1.2 mm.

Flowering & Fruiting: July–April.

Distribution. India: Almost throughout India.

Specimens examined: Bhutanghat, 26.09.2011, AK 52947; Hauda nala, 03.10.2011, AK 58669.

26. *Perotis* Aiton

Perotis indica (L.) Kuntze, Revis. Gen. Pl. 2: 787. 1891. *Anthoxanthum indicum* L., Sp. Pl. 1: 28. 1753. *Perotis latifolia* Aiton, Hort. Kew., ed. 1. 1: 85. 1789; Hook. f., Fl. Brit. India 7: 98. 1896; Prain, Bengal Pl. 2: 1186. 1903. [Fig. 136f]

Tufted annual, 20–45 cm high. Leaves lanceolate, 1–4 × 0.7 cm, rounded to semiamplexicaul at base, scabrid at margins, sometimes cartilaginous, acute at apex; ligule membranous, fimbriate at apex. Raceme single, fox tail like, 9–16 cm. Spikelets many, compactly arranged, oblong-lanceolate, 1.4–2.3 mm. Lower glume linear-lanceolate, 1.3–2.2 mm, acute to emarginate, awned, with serrulate keel, pubescent to scabrid; awn purplish to brown, 8–16 mm, barbellate, whip like. Upper glume linear-lanceolate, 1.5–2.2 mm, acuminate, awned, pubescent; awn as in lower glume. Lemma 0.8–1 mm, membranous. Palea similar to lemma. Stamens 3. Ovary c. 0.3 mm; stigma plumose. Caryopsis greenish to brownish, elliptic-oblong, 1.3–1.8 mm, turgid.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Daman and Diu, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh and West Bengal.

Specimen examined: Newlands, Sukno river, 22.09.2011, AK 52793.

27. *Phalaris* L.

Phalaris minor Retz., *Observ. Bot.* 3: 8. 1783. *Phalaris minor* var. *nepalensis* (Trin.) Bor, *Grass. Burma, Ceylon, India & Pakistan*: 616. 1960. [Fig. 136g]

Ghongeys banso, Ragate jhar (N).

Tufted annual or perennial, 43–54 cm high. Leaves linear-lanceolate, 8–20 × 0.9–1.2 cm, rounded to semiamplexicaul at base, serrulate at margins, acuminate at apex; ligule membranous. Panicle cylindrical, dense head like, 2.5–4.5 × 1.5–2.3 cm. Spikelets ovate to elliptic, c. 5 × 3.2 mm, acute. Glumes broadly ovate-lanceolate to elliptic, 4.5–5 mm, acute, with broadly winged keel. Lower lemma lanceolate, reduced, scale-like, subulate, 1–1.2 mm, acute, ciliate. Lower palea absent. Upper lemma broadly ovate, c. 3 mm, acute, appressed hairy. Upper palea ovate to elliptic-lanceolate, c. 2.3 mm, 1-keeled towards middle, sometimes faintly 2-keeled, ciliate on keels. Stamens 3. Ovary oblong; stigma brown, plumose. Caryopsis greenish, ovate to broadly elliptic, 1.6–2 mm, flat.

Flowering & Fruiting: March–April.

Distribution. India: Andhra Pradesh, Assam, Bihar, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

Specimens examined: Jainti range, 08.04.2012, GK 56065; Rydak river belt, 26.02.2012, AK 55973.

28. *Phragmites* Adans.

Phragmites karka (Retz.) Trin. ex Steud., *Nomencl. Bot.*, ed. 2. 2: 324. 1841; Hook. f., *Fl. Brit. India* 7: 304. 1896; Prain, *Bengal Pl.* 2: 1218. 1903. *Arundo karka* Retz., *Observ. Bot.* 4: 21. 1786. [Plate 286b]

Nal (N).

Tufted perennial, c. 3 m high. Leaves oblong to linear-lanceolate, 35–57 × 1–2.3 cm, rounded to truncate at base, thick and finely scabrid at margins, acuminate to attenuate at apex, scabrellate on veins, stripe like black glands evident between veins; ligule membranous, fimbriate at apex. Panicle 30–52 × 8–21 cm, effuse when young and bushy when mature, scabrellate. Spikelets oblong, c. 1.4 × 0.7 mm. Lower glume oblong to elliptic-lanceolate, 2.8–4 mm, acute to acuminate. Upper glume 4.3–6 mm, similar to lower glume. Lemma linear to oblong-lanceolate, 9–10.5 mm, awned; awn 0.8–5 mm. Palea oblong to elliptic, 3.1–3.4 mm, acute and notched at apex, 2-keeled. Stamens 2 or 3. Ovary narrowly oblong; stigma plumose. Caryopsis brownish, elliptic, c. 1 mm.

Flowering & Fruiting: June–March.

Distribution. India: Almost throughout India

Specimen examined: Narathali, 20.02.2012, AK 55762.

29. *Pogonatherum* P. Beauv.

Key to the species

- 1a. Callus hairs longer than spikelet; awns up to 2.5 cm, curved to geniculate; anthers c. 0.5 mm 1. *P. crinitum*
1b. Callus hairs shorter than spikelet; awns up to 1.5 cm, slender; anthers 1–1.5 mm 2. *P. panicum*

1. *Pogonatherum crinitum* (Thunb.) Kunth, Enum. Pl. 1: 478. 1833; Hook. f., Fl. Brit. India 7: 141. 1896; Prain, Bengal Pl. 2: 1197. 1903. *Andropogon crinitus* Thunb. in Murray, Syst. Veg. ed. 14. 903. 1784. [Plate 286c]

Tufted annual or perennial, 13–35 cm high. Leaves linear-lanceolate, 2.2–6 × 0.1–0.2 cm, flat to inrolled and scabrid at margins, acuminate at apex, pubescent to scabrellate; ligule membranous. Racemes 2–4 cm, terminal. Spikelets paired, ovate-lanceolate, 1.2–2 × c. 0.8 mm, callus hairs longer than spikelets. Lower glume oblong-lanceolate, 1–1.8 mm, 1-keeled, ciliate at apex. Upper glume ovate to oblong-lanceolate, 1.3–2 mm, 2-lobed or not, long awned, 1-keeled, scabrid on keel, ciliate towards apex at margins; awn capillary, 1.1–2.3 cm, barbellate. Lower lemma broadly oblong-lanceolate, 0.8–1.3 mm. Lower palea absent. Upper lemma oblong-lanceolate, 0.8–1.6 mm, 2-lobed, awned; awn 1.6–2.6 cm, curved to geniculate, barbellate. Upper palea obscure or absent. Stamens 1 or 2. Ovary narrowly oblong-lanceolate; stigma plumose. Caryopsis greenish brown, narrowly oblong, c. 0.8 × 0.4 mm.

Flowering & Fruiting: May–March.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, Kalikhola river belt, 21.09.2011, AK 52703; Newlands, 15.02.2012, AK 53096.

2. *Pogonatherum panicum* (Lam.) Hack., Allg. Bot. Z. Syst. 12: 178. 1906. *Saccharum panicum* Lam., Encycl. 1: 595. 1785. *Pogonatherum saccharoideum* P. Beauv., Ess. Agrostogr.: 176, 177. 1812; Hook. f., Fl. Brit. India 7: 141. 1896.

Densely tufted perennial with woody rootstock, 10–45 cm high. Leaves elliptic to linear-lanceolate, 2–5 × 0.1–0.3 cm, abruptly contracted near base, serrulate at margins, acuminate at apex; ligule obscure. Raceme solitary, terminal, 1–3 cm. Spikelets paired, elliptic-lanceolate, 2.5–3.2 × 1–2 mm, acute, callus hairs shorter than spikelets. Lower glume oblong, obtuse or truncate to 2 or 3-lobed at apex, densely ciliate at apex, 2-keeled. Upper glume ovate-lanceolate, 2–3 mm, ciliate above middle at margins, awned; awn slender, 10–15 mm. Lower lemma oblong, c. 2 mm, truncate and ciliate. Lower palea linear-oblong, 1.5–2 mm, same as lower lemma. Upper lemma notched, awned from sinus; awn slender, c. 1.5 cm. Upper palea ovate-oblong, c. 2 mm, fimbriate at apex. Stamens 2. Ovary oblong; stigma plumose. Caryopsis obovate, laterally compressed.

Flowering & Fruiting: August–June.

Distribution. India: Almost throughout India.

Specimens examined: NRVK 5a, 06.12.2011, GK 52354; SRVK 12-13, 30.03.2012 GK 50649; Bhutanghat, 25.02.2012, AK 55935.

30. *Pseudechinolaena* Stapf

Pseudechinolaena polystachya (Kunth) Stapf in Prain, *Fl. Trop. Africa* 9: 495. 1919. *Echinolaena polystachya* Kunth, *Nov. Gen. Sp.* 1: 119. 1816.

Rhizomatous perennial, 24–48 cm high. Leaves lanceolate, 1.9–6.5 × 0.7–1 cm, acute at base, inrolled or finely serrate at margins, acute at apex, sparsely hispid; ligule membranous. Spikes unifateral. Spikelets 4–4.5 × 2–2.5 mm. Lower glume broadly ovate, c. 4 × 2 mm, acute at apex, villous. Upper glume oblong-lanceolate, c. 4.5 mm, acute at apex, 3-veined, keeled, pubescent at keel. Lower lemma elliptic-ovate, c. 2.7 mm, acute, keeled. Lower palea elliptic-ovate, c. 2.6 mm, acute, keeled. Upper lemma oblong-ovate, c. 3.5 mm, acute, 5-veined, keeled. Upper palea lanceolate, c. 3 mm, acute, 2-veined, keeled. Stamens 3. Ovary narrowly ovoid; stigma plumose. Caryopsis fusiform, c. 2.5 mm.

Flowering & Fruiting: July–January.

Distribution. India: Arunachal Pradesh, Assam, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu and West Bengal.

Specimens examined: SRVK 11-12, 01.12.2011, GK 47194; East Damanpur range, 29.11.2011, GK 47154.

31. *Saccharum* L.

Key to the species

- 1a. Leaf sheath puberulent; glumes greenish-silver, thin-textured, the lower hairy; culms glabrous below inflorescences 1. *S. arundinaceum*
- 1b. Leaf sheath glabrous; glumes golden to reddish-brown below, hyaline above, thick below, glabrous; culms silky-hairy below inflorescence 2. *S. spontaneum*

1. *Saccharum arundinaceum* Retz., *Observ. Bot.* 4: 14. 1786; S. Moulik, *Grass. Bamb. India* 1: 319. 1997.

Chokti-phul, Kans, Tolu kans (N).

Rhizomatous perennial, 1–1.5 m high. Leaves linear, 60–65 × 0.5–0.7 cm, truncate at base, serrate at margins, acuminate at apex, coriaceous; ligule membranous. Panicle 25–35 cm. Spikelets lanceolate, 3.5–4.5 × 1–1.2 mm, covered with silver hairs exceeding the spikelets. Lower glume oblong-lanceolate, 3.5–4 mm, acuminate, hairy on back. Upper glume oblong-lanceolate, 2.7–3.6 mm, acuminate, margins ciliate above. Lower lemma oblong-lanceolate, c. 4.2 mm, acuminate,

2-veined, 2-keeled. Upper palea lanceolate, c . 3.2 mm, acute. Stamens 3; anthers 1.8–2 mm. Ovary elliptic-oblong; stigma plumose. Caryopsis elliptic-oblong, c . 1.5 mm.

Flowering & Fruiting: January–February.

Distribution. India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Bhutia Pond, 17.02.2010, SKS & GK 47137; Jaini range, Tashigaon hills, 13.10.2009, SKS & GK 46341.

2. *Saccharum spontaneum* L., Mant. Pl. Altera: 183. 1771; Hook. f., Fl. Brit. India 7: 118. 1896.

Samskars, Kush, Kash (N).

Tufted, rhizomatous perennial, 1–1.8 m high. Leaves linear-lanceolate to narrowly elliptic-lanceolate, 43–60 \times c . 0.4 cm, narrowly truncate at base, finely serrulate and scabrid at margins, attenuate at apex; ligule membranous. Panicle 25–45 cm. Spikelets paired, ovate-lanceolate, 3.2–4 \times c . 1.2 mm, acute to acuminate. Lower glume ovate to linear-lanceolate, 3.2–4 mm, acuminate, 2-keeled, glabrous to ciliate towards apex at margins. Upper glume ovate-lanceolate, 3.2–4.2 mm, acuminate, keeled, keel finely ciliate below, margins ciliate above middle towards apex. Lower lemma ovate to oblong-lanceolate, 2.8–3.2 mm, acute, ciliate. Lower palea absent. Upper lemma narrowly lanceolate, 2–2.7 mm, acuminate, sparsely ciliate. Upper palea absent. Stamens 3. Ovary oblong; stigma plumose. Caryopsis brownish, elliptic-oblong, 2–2.5 mm.

Flowering & Fruiting: July–April.

Distribution. India: Almost throughout India.

Specimens examined: Phashikawa river belt, 30.09.2012, AK 58556; way to Mahakal cave, 20.02.2013, AK 59866.

32. *Sacciolepis* Nash

Key to the species

- 1a. Culms not spongy below; ligule 0.3–0.5 mm; racemes spiciform, compactly, spirally and alternately arranged at central axis; upper glume ciliate to hispid 1. *S. indica*
- 1b. Culms spongy below; ligule 1.8–2.5 mm; racemes in many interrupted groups arranged at central axis; upper glume glabrous 2. *S. interrupta*

1. *Sacciolepis indica* (L.) Chase, Proc. Biol. Soc. Washington 21: 8. 1908. *Ainz indica* L., Sp. Pl. 2: 1231. 1753. *Panicum indicum* (L.) L., Mant. Pl. Altera: 184. 1771, non Mill. 1768; Hook. f., Fl. Brit. India 7: 41. 1896; Prain, Bengal Pl. 2: 1178. 1903. [Plate 286d]

Tufted annual or perennial, 12–65 cm high. Leaves linear-lanceolate, 2.3–18 × 0.6 cm, narrowly truncate at base, inrolled at margins, acuminate at apex; ligule membranous, hairy at apex. Raceme terminal, solitary, spiciform, 2–11 cm. Spikelets obliquely ovate-lanceolate, 2.4–3.2 × 0.8–1 mm, acuminate, sparsely ciliate to scabrellate towards apex. Lower glume ovate-lanceolate, 1.2–1.8 mm, acute to obtuse, hairy towards apex. Upper glume ovate-lanceolate, 2.4–3.2 mm, acuminate, ciliate or hispid dorsally and at margins towards apex. Lower lemma ovate-lanceolate, 2.2–3 mm, acute to obtuse, ciliate to hispid above and dorsally. Lower palea lanceolate, 0.6–1.2 mm, acute, reduced, flap like. Upper lemma ovate-lanceolate to elliptic, 1–1.4 mm, acute to obtuse. Upper palea 1.2–1.3 mm. Stamens 3. Ovary narrowly oblanceolate. Caryopsis greenish brown, oblong to elliptic, 1–1.2 mm.

Flowering & Fruiting: Almost throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: Checko-1, 25.09.2012, AK 56104.

2. *Sacciolepis interrupta* (Willd.) Stapf in Prain, Fl. Trop. Africa 9: 757. 1920. *Panicum interruptum* Willd., Sp. Pl., ed. 4. 1: 341. 1798; Hook. f., Fl. Brit. India 7: 40. 1896.

Nardula (B).

Perennial, up to 65 cm high. Leaves linear-lanceolate, 8–27 × 0.7–1.2 cm, serrulate towards apex at margins, acute to acuminate, scabrid towards apex; ligule membranous, lacerate. Raceme terminal, solitary, cylindrical, spiciform, 21–24 cm. Spikelets ovate-lanceolate, 3–4 × 1–1.4 mm, acute to acuminate. Lower glume ovate, 1–1.2 mm, obtuse to subacute. Upper glume ovate-lanceolate, 2.8–4 mm, acute. Lower lemma oblong to elliptic-lanceolate, 2.3–4 mm, acute. Lower palea ovate to oblong-lanceolate, 1.6–2.3 mm, acute, 2-keeled or not. Upper lemma broadly ovate to elliptic-lanceolate, 2.2–2.4 mm, acute. Upper palea incurved laterally, c. 2 mm. Stamens 3. Ovary narrowly oblong; stigma greenish brown, plumose. Caryopsis brown, elliptic, 1–1.3 mm.

Flowering & Fruiting: August–April.

Distribution. India: Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Pana, 08.10.2013, AK 58740.

33. *Setaria* P. Beauv.

Key to the species

- | | |
|--|-------------------------|
| 1a. Annual; culms smooth, glabrous; leaves flat to folded | 1. <i>S. intermedia</i> |
| 1b. Perennial; culms faintly ribbed, glabrous to scabrid; leaves plicate | 2. <i>S. palmifolia</i> |

1. *Setaria intermedia* Roem. & Schult., Syst. Veg., ed. 15. 2: 489. 1817; Hook. f., Fl. Brit. India 7: 79. 1896; Prain, Bengal Fl. 2: 1170. 1903. *Setaria tomentosa* (Roxb.) Kunth, Revis. Gramin. 1: 47. 1829. *Panicum tomentosum* Roxb., Fl. Ind. 1: 303. 1820.

Tufted annual, 14–55 cm high. Leaves narrowly oblong-lanceolate, 3.5–16 × 0.2–0.6 cm, narrowly acute to rounded and long hairy at base, serrulate at margins, acuminate at apex, tuberculate to tomentose hairy; ligule membranous, fimbriate at apex. Panicle with short racemes, 3.5–10 × 0.7–1.5 cm. Spikelets ovate, 1.7–2 × c. 1 mm, acute, deciduous, each spikelet with one barbellate bristle, sometimes bristles 3 due to reduced spikelets. Lower glume broadly ovate, c. 0.8 mm, acute. Upper glume broadly elliptic, 1–1.2 mm, acute. Lower lemma ovate, 1.6–1.8 mm, acute. Lower palea elliptic, c. 1.4 mm, acute, 2-keeled, keels winged. Upper lemma ovate, 1.7–1.8 mm, acute. Upper palea elliptic, c. 1.5 mm, acute, 2-keeled, keels serrulate, granulose. Stamens 3. Ovary ovate to oblong; stigma purplish, plumose. Caryopsis brownish yellow, elliptic, 1–1.2 mm.

Flowering & Fruiting: June–February.

Distribution. India: Almost throughout India.

Specimen examined: Newlands, 15.02.2012, AK 55636.

2. *Setaria palmifolia* (J. Koenig) Stapf, J. Linn. Soc., Bot. 42: 186. 1914. *Panicum palmaefolium* J. Koenig, Naturforscher (Halle) 23: 208. 1788. *Setaria paniculifera* (Steud.) E. Fourn. ex Hemsl., Biol. Centr. Amer. Bot. 3: 505. 1885.

Tufted perennial, up to 1.3 m high. Leaves broadly elliptic-lanceolate, 11–38 × 0.8–4.2 cm, narrowly acute at base, serrulate at margins, acuminate at apex, plicate, scabrid to sparsely tuberculate; ligule membranous, hairy. Panicle narrowly linear to broadly effuse, 23–65 × 2–20 cm, finely scabrid. Spikelets ovate to elliptic, 2.5–3.8 × 1.3–1.5 mm, acute, each with solitary scabrid bristle. Lower glume broadly ovate, 1–1.5 mm, acute. Upper glume ovate-lanceolate, 1.7–3 mm, obtuse to subacute. Lower lemma ovate-lanceolate to elliptic, 2.5–3.2 mm, acute to acuminate. Lower palea lanceolate, 1.5–2.5 mm, acute, 2-keeled. Upper lemma oblong to elliptic-lanceolate, 2.5–3 mm, acute, apiculate. Upper palea ovate to elliptic-lanceolate, 2.3–2.5 mm, acute. Stamens 3. Ovary oblong to narrowly elliptic; stigma plumose. Caryopsis yellowish, oblong-elliptic, 1–1.8 mm.

Flowering & Fruiting: July–April.

Distribution. India: Almost throughout India.

Specimens examined: Jainti Range, 08.10.2009, SKS & GK 46233; Sankosh, 17.02.2012, AK 55693; Hatijaora, way to Mahakal cave, 01.10.2012, AK 58576.

34. *Sporobolus* R. Br.

Key to the species

- 1a. Panicle effuse or laxly contracted, branches spreading 1. *S. diandrus* var. *flaccidus*
1b. Panicle linear, dense, branches often appressed 2. *S. fertilis*

1. *Sporobolus diandrus* (Retz.) P. Beauv. var. *flaccidus* (Roth ex Roem. & Schult.) Veldkamp, *Blumea* 35: 433. 1991. *Agrostis elongata* Lam. var. *flaccida* Roth ex Roem. & Schult., *Syst. Veg.*, ed. 15 bis 2: 368. 1817.

Tufted annual or perennial, 21–90 cm high. Leaves linear-lanceolate, 6.5–33 × c. 0.4 cm, attenuate and inrolled towards apex, basal margins ciliate, scaberulous towards apex; ligule membranous, fimbriate at apex. Panicle 6.5–54 × 1–9 cm. Spikelets narrowly elliptic or oblong to ovate, 1.2–1.8 × c. 0.6 mm, acute. Lower glume obovate or ovate, 0.3–0.6 mm, obtuse or truncate to 2 or 3-lobed at apex. Upper glume ovate to oblong-lanceolate, 0.6–1.2 mm, acute, finely serrulate towards apex at margins. Lemma lanceolate, 1.2–1.8 mm, acute. Palea ovate to elliptic-lanceolate, 1.2–1.5 mm, acute to obtuse. Stamens 2, rarely 3. Ovary elliptic-oblong or oblanceolate; stigma plumose. Caryopsis brownish, oblanceolate, 0.6–1 mm, narrowly grooved on one side.

Flowering & Fruiting: May–March.

Distribution. India: Almost throughout India.

Specimens examined: Kumargram, 18.02.2012, AK 55730; Rydak river belt, 26.02.2012, AK 55949.

2. *Sporobolus fertilis* (Steud.) Clayton, *Kew Bull.* 19 (2): 291. 1965. *Agrostis fertilis* Steud., *Syn. Fl. Glumac.* 1 (3): 170. 1854.

Rhizomatous perennial, 0.7–1 m high. Leaves linear to oblong, 5–29 × 0.2–0.6 cm, flat or inrolled at margins, acute at apex, glabrous. Panicle up to 22 cm, appressed hairy. Spikelets 1.7–2.2 mm. Lower glume elliptic-ovate, c. 3 mm, acute, 2-veined, villous beneath, glabrous outside. Upper glume elliptic-ovate, c. 3.2 mm, acute, 3-veined, hairy. Lemma elliptic-lanceolate, c. 2.5 mm, ciliate, acute, faintly 1–3-veined. Palea lanceolate, c. 2 mm, fimbriate at margins, acute, hyaline. Stamens 3. Ovary obovate; stigma plumose. Caryopsis yellowish brown or reddish brown, oblong, 0.8–1.2 mm.

Flowering & Fruiting: Throughout the year.

Distribution. India: Almost throughout India.

Specimen examined: East Damanpur range, 29.03.2012, GK 50616.

35. *Thysanolaena* Nees

Thysanolaena latifolia (Roxb. ex Hornem.) Honda, *J. Fac. Sci. Univ. Tokyo*, Sect. 3, Bot. 3: 312. 1930. *Melica latifolia* Roxb. ex Hornem., *Suppl. Hort. Bot. Hafn.*: 117. 1819. *Thysanolaena maxima* (Roxb.) Kuntze, *Revis. Gen. Pl.* 2: 794.

1891. *Agrostis maxima* Roxb., Fl. Ind. 1: 319. 1820. *Thysanolaena agrostis* Ness, Edinburgh New Philos. J. 18: 180. 1835; Hook. f., Fl. Brit. India 7: 61. 1896; Prain, Bengal Pl. 2: 1172. 1903.

Tufted, rhizomatous perennial, 1.5–3 m high. Leaves lanceolate, 20–45 × 2–4 cm, subcordate to semiamplexicaul at base, acuminate at apex; ligule membranous, hairy. Panicle affuse, 20–60 × c. 10 cm, drooping. Spikelets ovate-lanceolate or lanceolate, 1–2 mm. Lower glume ovate, 0.5–1 mm, acute. Upper glume c. 1 mm long, more or less similar to lower one. Lemma lanceolate, 1–1.5 mm, ciliate, glabrous or with few setose hairs. Palea absent in sterile florets, oblong-lanceolate in fertile one, 0.5–1 mm. Stamens 2 or 3. Ovary elliptic-oblong; stigma plumose. Caryopsis brownish, elliptic, c. 0.5 mm.

Flowering & Fruiting: April–December.

Distribution. India: Almost throughout India.

Specimens examined: Tashigaon 2, Bhutia Pond, 06.03.2011, GK 47299; Tashigaon 2, Bhutia Pond, 11.02.2010, SKS & GK 47046; Newlands, 15.02.2012, AK 53083; Kumargram, 18.02.2012, AK 55739.

Notes: Inflorescence used for making brooms.

The Floral Analyses

The Buxa Tiger Reserve is rich in endemic, rare, threatened and many botanically interesting species. Angiosperms are the key elements and their richness established through surveys conducted between 2009 and 2015. Some blocks have been recognized as species rich areas. Rajabhatkhawa, Jainty, Buxaduar range in their entirety (Buxaduar, Santrabari, Chunabhati, Tashigaon, Lepchakhawa, Tobgaon blocks) and Pana range in part (Adma block) exhibit a greater number of species and also with rare and botanically interesting species. Other parts of the reserve have more commonly distributed species. Many blocks are badly disturbed by human activities.

Botanical explorations in all seasons could yield 3277 field numbers comprising 8530 specimens. The analysis reveals that it comprises 988 taxa distributed in 574 genera and 135 families. The break-up of families/genera and species is given (Table 2).

Table 2: Floral Diversity of the Buxa Tiger Reserve

Sl. No.	Group	Families	Genera	Species	Subspecies	Varieties
1.	Angiosperms	135	574	961	08	19

Angiosperms are represented by 113 dicot families and 22 monocot families. The families/genera/species representation are shown in Table 3.

Table 3. Angiosperm Diversity of Buxa Tiger Reserve

S.N.	Class	Subclass	Families	Genera	Species	Subspecies	Varieties
1.	Dicots	Polypetalae	64	192	303	05	09
		Gamopetalae	28	193	300	03	03
		Monochlamydeae	21	75	157	...	06
2.	Monocots		22	114	201	...	01
		Total	135	574	961	08	19

Thirteen families had 10 or more genera representation and the family, Fabaceae (*s. l.*), ranks first with 35 genera and 76 taxa (Table 4).

Table 4: First 10 dominant families in Buxa Tiger Reserve

Sl. No.	Name of family	No. of taxa	No. of genera
1.	Fabaceae (<i>s. l.</i>)	76	35
2.	Poaceae	59	35
3.	Asteraceae	56	42
4.	Rubiaceae	44	27

5.	Cyperaceae	42	11
6.	Orchidaceae	37	24
7.	Acanthaceae	30	16
8.	Phyllanthaceae	25	09
9.	Scrophulariaceae	24	11
10.	Lamiaceae	24	15

The comparison of family representation is made between of Buxa wildlife sanctuary (BWLS) and Buxa national park (BNP).

Dicots: BWLS and BNP share 86 families together while 20 families (Violaceae, Portulacaceae, Tamaricaceae, Linaceae, Saxifragaceae, Haloragaceae, Trapaceae, Passifloraceae, Molluginaceae, Araliaceae, Sambucaceae, Carlemanniaceae, Sapotaceae, Menyanthaceae, Lentibulariaceae, Plantaginaceae, Proteaceae, Santalaceae, Cannabaceae and Juglandaceae) are found exclusive to BWLS and 8 families (Actinidiaceae, Burseraceae, Aquifoliaceae, Hippocastanaceae, Lecythidaceae, Datisceae, Styracaceae and Myristicaceae) are exclusive to BNP. In monocots, BWLS and BNP share 14 families together while 5 families (Amaryllidaceae, Hypoxidaceae, Arecaceae, Lemnaceae and Potamogetonaceae) are exclusive to BWLS and 2 families, Dracaenaceae and Acoraceae are found only in BNP.

Table 5: Life-form composition of Buxa Tiger Reserve

Sl. No.	Life-form	No. of species/ taxa	Percentage (%)
1.	Herbs	428	43.3
2.	Undershrubs	43	4.4
3.	Shrubs	166	16.8
4.	Climbers	159	16.1
5.	Trees	192	19.4
	Total	988	100

The life-form analysis reveals that there are 428 herbaceous species (43.3%), followed by trees (192 species; 19.4%), shrubs (166; 16.8%), climbers (159; 16.1%) and undershrubs (43; 4.4%) (Table 5). Relating to habitat, 916 are terrestrial, 44 are epiphytic, 26 are aquatic and 2 are parasitic species.

New species/New records

A new species of *Fimbristylis*, *F. clarkei* Anant Kumar, Halder & Venu was published based on a collection from Kumargram and Marakata forest blocks. This is similar to *Fimbristylis griffithii* Boeck. but differs from it in being perennial with very short rhizome; spikelets giving an antherlate appearance; glumes elliptic-ovate, acute;

style bases dilated and nutlets rough with pits, scrobiculate and not terminated by an umbo.

Markhamia tomentosa is a native of Africa. It is collected for the first time from Checko forest block in the reserve from India. A single individual was found in the study area.

The reserve has 04 species that were reported for the first time from Eastern India. These are *Cirsium shansiense* (It was collected from Tiamari, Rydak range. It is allied to *Cirsium arvense*, but differs in presence of bisexual flowers); *Lindernia rotundifolia* (collected from Narathali); *Syzygium smalianum* (collected from Buxaduar to Chunabhati) and *Torenia flava* (collected from Hauda nala and on the way from Santrabari to Buxa Fort).

11 species or infra specific taxa (*Acacia caesia* var. *subnuda*; *Bambusa cacharensis*; *Breynia trinervia*; *Cocculus laurifolius*; *Ficus fulva*; *Ficus heteropleura*; *Gymnema latifolium*, *Mimosa diplotricha*; *Trachelospermum assamense*; *Zeuxine clandestina*; *Zeuxine lindleyana*) are additions for West Bengal flora.

Endemic plants

Taxa that are confined to a narrow phytogeographic range because of their isolation by geographical, ecological, or temporal (genetic, adaptive, etc.) barriers are called endemics. Two species (*Eranthemum erythrochilum* and *Fimbristylis clarkei*) found in the reserve are strictly endemic to India (Table 6).

Table 6: Endemic Plants to India from BTR

Sl.No.	Name of species
--------	-----------------

- | | |
|----|---|
| 1. | <i>Eranthemum erythrochilum</i> (Acanthaceae) |
| 2. | <i>Fimbristylis clarkei</i> (Cyperaceae) |

A few species which are found in BTR share endemism between India and Bhutan. These include *Acanthus carduaceus*, *Actinodaphne sikkimensis*, *Aeschynanthus micranthus*, *Agapetes bhutanica*, *Ardisia involucreta*, *Beilschmiedia dalzellii*, *Ceropegia macrantha*, *Commelina sikkimensis*, *Dioscorea prazeri*, *Ehretia psilosiphon*, *Elaeagnus pyriformis*, *Eranthemum griffithii*, *Impatiens latiflora*, *Lindenbergia hookeri*, *Lindenbergia titensis*, *Phlogacanthus thyrsiformis*, *Piper beteloides*, *Rubia sikkimensis*, *Synotis bhot* and *Trachelospermum assamense*.

The species that share endemism between India and Nepal: *Crepidium josephianum*, *Homalium napaulense* and *Zeuxine lindleyana*.

Zeuxine lindleyana, an endemic orchid of India and Nepal, is reported from the reserve and this constitutes a new distributional record from the state of West Bengal and first secured collection for CAL. The species was found growing on

moist, loamy soil in open places among grasses and herbs at 200 to 800 m. Its distribution in India is confined to Arunachal Pradesh, Odisha and West Bengal. Its reported occurrence from Bhutan is not true (Pearce & Cribb, 2002).

The species that share endemism between India and Bangladesh: *Bambusa cacharensis*, *Claoxylon khasianum* and *Hoya parasitica*.

The species that share endemism between India and Sri Lanka: *Zeuxine longilabris*.

IUCN Red List species

The IUCN Red List of Threatened Species (<http://www.iucnredlist.org>) categorized threatened plants under 3 categories (CR, EN, and VU). Five species collected in the present investigation are found in this list under different categories. *Zeuxine reflexa*, a less known terrestrial orchid collected from Checko forest block in dry soil in open places and in dry leaf litter among grasses and herbs. The species has been assessed as Critically Endangered [CR B2ab (ii, iv)] based on collections from Assam, Sikkim, and West Bengal (Table 7).

Table 7: Red List species in Buxa Tiger Reserve

Name of species	Threat status
<i>Vatica lanceifolia</i> (Dipterocarpaceae)	Assessed as Critically Endangered (CR) under criteria A1cd, C2a in 1998.
<i>Elaeocarpus rugosus</i> (Elaeocarpaceae)	Assessed as Vulnerable (V) under criteria B1+2c in 1998.
<i>Mucuna imbricata</i> (Papilionoideae)	It is rather rare in the study area. Rezia Khatun (2009) reported it as vulnerable in Bangladesh. Placed in the least concern (LC) category globally.
<i>Prunus ceylanica</i> (Rosaceae)	Assessed as Endangered (EN) under criteria B1+2c in 1998.
<i>Zeuxine reflexa</i> (Orchidaceae)	Assessed as Critically Endangered (CR) nationally.

CITES species

Only 43 CITES listed species were collected from the reserve that includes 37 spp. of orchids and 05 spp. of *Dalbergia*. Bist & Katham (1999) reported 141 species, including 05 varieties of orchids, from the BTR without citing any specimens for verification.

Table 8: CITES species from Buxa Tiger Reserve.

Sl. No.	Name of species	Family	Appendix
1.	<i>Magnolia hodgsonii</i>	Magnoliaceae	III (It is also in the negative list of exports of Nepal).
2.	Orchids (37 spp.)	Orchidaceae	I & II
3.	<i>Dalbergia</i> (05 spp.)	Fabaceae	I & II

Plants of economic importance

1. Timber yielding plants

The reserve is dominated by many tree species viz., *Albizia procera*, *Albizia lucidior*, *Dipterocarpus retusus*, *Gmelina arborea*, *Lagerstroemia parviflora*, *Polyalthia simiarum*, *Shorea robusta*, *Sterculia villosa*, *Schima wallichii*, *Terminalia arjuna*, *Terminalia crenulata*, *Terminalia chebula*, *Terminalia myriocarpa* and *Toona ciliata* are used for making furniture; the timber of *Albizia procera*, *Lagerstroemia speciosa*, *Terminalia bellirica*, *Terminalia chebula* are used for construction purpose; the wood of *Acacia pennata*, *Phyllanthus emblica*, and *Terminalia arjuna* used for making agricultural implements; the wood of *Acacia* spp., *Albizia procera*, *Syzygium* spp. and *Terminalia bellirica* are used for making carts and accessories; timber of *Dillenia pentagyna*, *Lagerstroemia parviflora*, *Terminalia bellirica*, *Terminalia arjuna*, etc. are used in plywood industry; wood of *Butea monosperma*, *Glochidion lanceolarium*, and *Hiptage benghalensis* used as firewood; *Turpinia pomifera* wood is used for house building, toy making, and walking sticks. *Aphananixis polystachya*, *Bombax ceiba*, *Duabanga grandiflora*, *Lagerstroemia parviflora*, *Shorea robusta*, *Schima wallichii*, *Terminalia bellirica*, *Toona ciliata*, etc. wood is used in house-building purposes.

2. Non-Timber Forest Products (NTFPs): NTFPs include fruits and nuts, vegetables, medicinal plants, resins, essences, and a range of barks and fibers such as bamboo, rattans, and a host of other palms and grasses. These species have been listed in Table 9.

Table 9: Plants with NTFPs significance in Buxa Tiger Reserve

1. Medicinal

Sl. No.	Name of species	Parts used
1.	<i>Abroma augusta</i>	Leaves, Bark
2.	<i>Acacia catechu</i>	Leaves, Bark
3.	<i>Achyranthes aspera</i>	Leaves, Roots
4.	<i>Ageratum conyzoides</i>	Leaves, Stem
5.	<i>Albizia lebbeck</i>	Bark
6.	<i>Albizia procera</i>	Bark

The Flora of Buza Tiger Reserve, West Bengal, India

7.	<i>Asclepias curassavica</i>	Leaves
8.	<i>Baliospermum solanifolium</i>	Seeds
9.	<i>Bauhinia purpurea</i>	Bark
10.	<i>Boerhavia diffusa</i>	Roots
11.	<i>Bombax ceiba</i>	Flowers
12.	<i>Brucea mollis</i>	Leaves, Bark
13.	<i>Butea monosperma</i>	Flowers, Roots, Seeds
14.	<i>Calotropis gigantea</i>	Leaves
15.	<i>Cassia fistula</i>	Leaves
16.	<i>Centella asiatica</i>	Whole plant
17.	<i>Datura metel</i>	Leaves
18.	<i>Elephantopus scaber</i>	Roots
19.	<i>Euphorbia hirta</i>	Latex
20.	<i>Holarrhena pubescens</i>	Bark, Seeds
21.	<i>Hyptis suaveolens</i>	Leaves
22.	<i>Justicia adhatoda</i>	Leaves
23.	<i>Marsdenia tinctoria</i>	Fruits
24.	<i>Mallotus philippensis</i>	Roots
25.	<i>Mimosa pudica</i>	Leaves
26.	<i>Oroxylum indicum</i>	Flowers
27.	<i>Phlogacanthus thyrsoformis</i>	Leaves, Seeds
28.	<i>Phyllanthus emblica</i>	Fruits
29.	<i>Plantago asiatica</i> subsp. <i>erosa</i>	Seeds
30.	<i>Ricinus communis</i>	Seeds
31.	<i>Sida acuta</i>	Leaves, Roots
32.	<i>Terminalia bellirica</i>	Seeds
33.	<i>Tridax procumbens</i>	Leaves
34.	<i>Ventilago denticulata</i>	Root bark
35.	<i>Woodfordia fruticosa</i>	Flowers
36.	<i>Ziziphus mauritiana</i>	Leaves

2. Wild edible plants

1.	<i>Annona reticulata</i>	Fruits
2.	<i>Boerhavia diffusa</i>	Leaves
3.	<i>Centella asiatica</i>	Leaves
4.	<i>Citrus medica</i>	Fruits

Botanical Survey of India

5.	<i>Dillenia indica</i>	Sepals
6.	<i>Dregea volubilis</i>	Flowers
7.	<i>Diplazium esculentum</i>	Leaves
8.	<i>Elaeagnus pyriformis</i>	Fruits
9.	<i>Erydra fluctuans</i>	Leaves
10.	<i>Ficus hispida</i>	Receptacle
11.	<i>Ficus racemosa</i>	Receptacle
12.	<i>Glycosmis cymosa</i>	Fruits
13.	<i>Morus indica</i>	Perianth
14.	<i>Paederia cruddasiana</i>	Leaves
15.	<i>Persicaria nepalensis</i>	Whole plant
16.	<i>Phlogacanthus thyrsoformis</i>	Inflorescences
17.	<i>Phoenix sylvestris</i>	Fruits
18.	<i>Stixis suaveolens</i>	Fruits
19.	<i>Syzygium claviflorum</i>	Fruits
20.	<i>Ziziphus mauritiana</i>	Fruits

3. Fodder Plants

1.	<i>Acacia catechu</i>	Roots
2.	<i>Acacia pennata</i>	Shoots
3.	<i>Albizia lucidior</i>	Leaves
4.	<i>Dendrocnide sinuata</i>	Shoots
5.	<i>Dillenia indica</i>	Fruits
6.	<i>Ficus hispida</i>	Shoots
7.	<i>Gmelina arborea</i>	Twigs
8.	<i>Hedychium thyrsoforme</i>	Shoots
9.	<i>Mallotus philippensis</i>	Leaves
10.	<i>Saccharum arundinaceum</i>	Shoots
11.	<i>Ophiopogon intermedius</i>	Whole plant
12.	<i>Thysanolaena latifolia</i>	Shoots

4. Fish poison

1.	<i>Archidendron clypearia</i>	Bark
2.	<i>Falconeria insignis</i>	Fruits
3.	<i>Gynocardia odorata</i>	Fruit pulp
4.	<i>Meyna spinosa</i>	Crushed fruits

5. Dye

1.	<i>Butea monosperma</i>	Flowers
2.	<i>Bombax ceiba</i>	Flowers
3.	<i>Marsdenia tinctoria</i>	Leaves
4.	<i>Rubia sikkimensis</i>	Stems

6. Miscellaneous

Sl. No.	Name of species	Parts used as snake repellents
1.	<i>Crotalaria pallida</i> var. <i>obovata</i>	Bark
2.	<i>Phanera scandens</i>	Stem

Sl. No.	Name of species	Parts used as broom
1.	<i>Parthenium hysterophorus</i>	Whole plant
2.	<i>Thysanolaena latifolia</i>	Whole plant

Major issues

[Plate VII]

The establishment of PAs in developing countries has placed heavy stress on the rural and tribal populations since they directly depend on these natural resources for their subsistence. Various forms of land use, such as agriculture, livestock grazing, collection of fuelwood and other non-timber forest products, coupled with the population increase in protected areas, pose a serious threat to the conservation policies of the state administration.

There are 37 forest villages in BTR with a population of 18,100 (Census, 1991). A substantial proportion of the population is of various tribes, namely, Bhutia, Garo, Mechia, Modesia, Nepali, Rajbanshi, Rava, Santhal, etc. They are mostly farmers or laborers, and a majority of them depend on forests for their livelihoods.

Many villages in this reserve have been expanding year by year. The reserve is also thronged by thousands of pilgrims and visitors every year in February to worship Lord Shiva in Mahakal Cave and Pokhri and to see Buxa Fort. There are weekly markets in Santrabari and Buxaduar.

The illegal collection of timber and other forest products was widespread in Bholka, Rajabhatkhawa, Damanpur, Kumargram, Newlands, Sankosh, and Rydak blocks. Villagers are sometimes caught while cutting or logging trees inside the reserve. Some active groups block the forest roads to cut the trees using mechanised saws. Local people collect thatching and fencing materials illegally.

The cattle population in BTR is 41,694 (Census, 1984). Grazing has been a serious problem, posing immense pressure on the ground vegetation of the reserve. The loss of native flora makes the study area vulnerable to invasive species. The excessive growth of *Mikania micrantha*, *Mimosa diplotricha*, *Parthenium hysterophorus*, and *Senna alata* is often seen in the reserve area. *Mikania micrantha*

can be controlled by promoting the cultivation of *Thysanolaena latifolia* broom grass and *Curcuma longa*. A list of alien species found in the Buxa Tiger Reserve is given in Table 10. It is one of the major issues to be tackled administratively.

Table 10: Alien species from Buxa Tiger Reserve

Sl. No.	Name of species	Sl. No.	Name of species
1.	<i>Alternanthera sessilis</i>	21.	<i>Merremia umbellata</i>
2.	<i>Ageratum conyzoides</i>	22.	<i>Merremia vitifolia</i>
3.	<i>Asclepias curassavica</i>	23.	<i>Mikania micrantha</i>
4.	<i>Bidens pilosa</i>	24.	<i>Mimosa diplotricha</i>
5.	<i>Blumea lacera</i>	25.	<i>Mimosa pudica</i>
6.	<i>Calotropis gigantea</i>	26.	<i>Ocimum americanum</i>
7.	<i>Chenopodium album</i>	27.	<i>Parthenium hysterophorus</i>
8.	<i>Cleome houteana</i>	28.	<i>Physalis angulata</i>
9.	<i>Cleome raietosperma</i>	29.	<i>Pontederia crassipes</i>
10.	<i>Crotalaria pallida</i> var. <i>obovata</i>	30.	<i>Saccharum spontaneum</i>
11.	<i>Datura metel</i>	31.	<i>Scoparia dulcis</i>
12.	<i>Euphorbia hirta</i>	32.	<i>Senna alata</i>
13.	<i>Evolvulus nummularius</i>	33.	<i>Senna occidentalis</i>
14.	<i>Hyptis suaveolens</i>	34.	<i>Senna tora</i>
15.	<i>Indigofera tinifolia</i>	35.	<i>Sida acuta</i>
16.	<i>Indigofera zollingeriana</i>	36.	<i>Soianum torvum</i>
17.	<i>Ipomoea carnea</i> subsp. <i>fistulosa</i>	37.	<i>Synedrella nodiflora</i>
18.	<i>Lantana camara</i>	38.	<i>Tridax procumbens</i>
19.	<i>Ludwigia hyssopifolia</i>	39.	<i>Urena lobata</i>
20.	<i>Ludwigia octovalvis</i>	40.	<i>Xanthium indicum</i>

The degradation that happens in the tiger reserve often forces elephants to encroach into the villages in search of fodder. As per the 2010 census, the forests of North Bengal have a healthy population of 550 elephants. In the past ten years, about 50 of them have been killed on railway tracks. The State Forest department has urged the railways to reduce the existing speed of trains from 40 to 25 km per hour along the 168 km track. The other remedy is to ensure fodder for the elephants through the restoration of degraded habitats. During summer, especially from the middle of

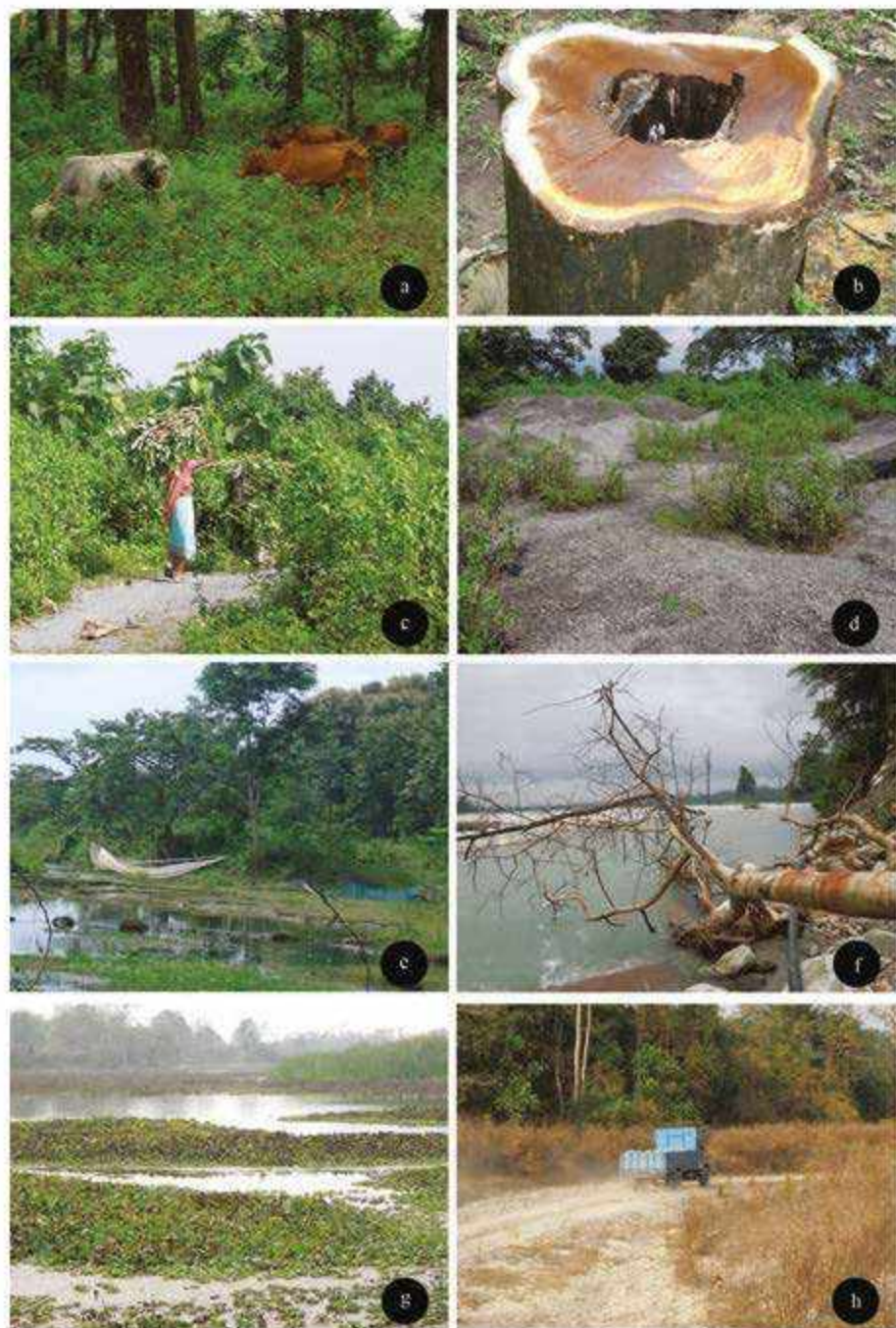


Plate VII. Threats: a. Cattle grazing; b. Cutting of trees; c. Illegal collection of firewood; d. Dolomite chips in Hatipota; e. Fishing; f. Soil erosion and uprooting of trees in Sixty river; g. Narathali lake filled-in with *Pongatia crassipes*; h. Boulder transportation in Newlands forest.

March, forest fires induced by habitations in the fringe areas are quite common in Rajabhatkhawa, Jainty, Checko, and Kumargram blocks of the reserve. It destroys most of the ground vegetation, including some important ground orchids. Forest fires are now planned to be monitored using remote sensing technology by the state forest department. While human disturbance is nothing new, the poaching of wild animals is on the rise in the Buxa Tiger Reserve. Several news reports and photographs show villagers, mostly tribals, prowling in the forest with bows, arrows, and daggers. At least four elephants have been poached in Buxa in the last three years. Buxa has only 50-60 forest guards instead of the sanctioned 160. Each beat is supposed to have four guards while each range has eight guards, but this is not the case on the ground. With adequate protection and awareness of the identified threat issues among foresters, as well as their correction through action plans, it could possibly restore its glory as one of the most important tiger reserves in this country.

Dolomite extraction was a major problem earlier in Hatipota and Phashkhawa blocks which is stopped. In the neighbouring Bhutan, it is still on and the dust from blasts affects the vegetation of area.

Boulders are often excavated from dry river beds to support chip-making industries. This promotes erratic flow of the rivers during the rainy season, sometimes destroying the flora in the banks.

Encroachment of land for orange orchards (Adma, Chunabhati, Santrabari, and Tobgaon blocks) comprising c. 700 hectares disturbed the native flora. BTR is bordered by 33 tea gardens (Bhutri, Newlands, Raimatang, Kartika, Hatipota, Kumargram, and Sankosh) and they are on increase and spreading towards forest areas.

Fishing in large scale in Narathali lake disrupts aquatic flora. The lake is majorly occupied by *Pontederia crassipes*.

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INDEX TO THE LOCAL NAMES

- Aank 533
Achanta 228
Ajeru 784
Akanda 533
Akand-phul 322
Akhane 345
Algulata 561
Alipat 932
Amarbel 561
Amarfata 561
Amaroo 233
Ambake 306
Ambarke 306
Amli Tanki 241
Amila 504
Amila-bel 965
Andekhi 653
Apang 737
Aputo 649
Arjhan 302
Arklejhar 621
Arupate lahara 558
Asan 303
Asar 176
Asaro 553, 646, 806
Aselu 295, 296
Asna 303
Assamey 526
Asuro 623
Atwapali 611
Aulo bohori 552
Aule Kapase 799
Bahri 478
Bad-bhota 549
Bainsi Khanra 213
Bakas 623
Baksi lahara 437
Baldengra 287
Bamunhatti 645
Ban baldi 932
Ban kadam 457
Ban-bakul 794
Bandarlata 238
Bandre 150, 205
Bandrephal 202
Bangikath 814
Ban-jam 507
Ban-jamb 306
Bankar 644
Ban-mallika 513
Ban-okra 497
Banso 1019
Ban-tipariya 572
Bara guthubi 982
Bara javani 996
Bara shil-kanta 141
Bara-koksing 471
Bara-shama 1020
Bara-suksung 471
Barikaunli 806
Barra 302
Barra mase 651
Batulpati 134
Beduwar jhar 584
Bepura 193
Behagur 943
Behua 983
Bekh-unjubaz 750
Belati-menah 305
Bepari 790, 803
Bhadrase 181
Bhainsi katra 457
Bhakimlo 234
Bhalayo 234
Bhale Kaulo 776
Bhangra 478
Bhant 644
Bhegar 943
Bherseri 222
Bhui-okra 651
Bhumi-nim 586
Bilari 328
Bilanne 508
Bil-rai 142
Bimera 193
Bimira 193
Bin 574
Biral 287
Biral Lahara 284
Bishoti 279
Bisi 507
Boga-kainla 133
Bogati 193
Bogote 509
Bohnari 552
Bohori 552
Bojho 972
Boka kane 644
Boke Timur 197
Bokri lahara 437
Bokshi Khanra 237
Bon golcal 452
Bon Kalra 324
Bonso jhar 1035
Bormafia 614
Brahmamanduki 339
Bulyetra 226
Bun Mara 288
Burbec 573
Buri Damera 318
Byakar 576
Chalta 125
Chandra 525
Charchare 219
Charcharey Lahara 140
Chare hare 223
Charpartan 1006

Botanical Survey of India

Charpate Lahara 185	Dhobine phul 445	Gucula 641
Chatiwari 518	Dhobi sara 938	Gucnyho 641
Chocna 1033	Dhondul 326	Gucnylo 641
Chhattin 518	Djowa 1011	Guhuicha 140
Chhota-gokhru 497	Dozo 659	Gulam 307
Chickweed 157	Dode lahara 523, 536	Guhur 325
Chila Pati 144	Dudhis lahara 527	Guma 664
Chilame 160	Dudhi 529	Gusgar 1014
Chilekath 211	Dudh-koraiya 529	Gurjo 140
Chiple 147, 176	Ekleja 134	Gurkamai 576
Chitu 436, 643	Etami-paat 468	Gurtakand 533
Chiwaripat 174, 440	Gamar 649	Gwelo 641
Chokti-phul 1040	Gambar 646	Hai 145
Chomik 520	Gammari 649	Haldi aigul 561
Chora-kanta 1014	Gande jhar 663	Haldi kath 444, 813
Chota-chand 525	Gandhabena 1015	Hai-kusa 664
Chua 631	Gante 150	Hapar 527
Chukrassi 203	Gaori-Sheora 848	Hara lahara 514
Chaletro 343	Garday mala 1014	Harid-kat 444
Chalumpa 930	Garay malajhar 957	Hare 127
Chamiani 506	Gathalo phul 520	Hare Bepari 790
Chusre 659	Gaunji Lahara 287	Hare Kusum 806
Dabdabe 200	Gautali phul 520	Hare lahara 649
Dabh 1027	Gayo 811	Harra 303
Daday 1020	Ghanrey mala 1014	Harre 305
Daliap 161	Ghekul 972	Harre Jamna 307
Damai gera 507	Ghentu 644	Hathi doubo 1035
Damai phal 507	Ghet-kachchu 972	Hati paile 208
Darkharey 1009	Ghima 155	Hatisur 556
Dasi 617	Ghita torul 941	Hattipaile 173
Debri Lahara 287	Ghongey bamso 1038	Helencha 480
Devil's Cotton 171	Ghora-mang 292	Hik-shut-up 582
Dhaman-papar 447	Gincri 652	Himalchhari 806
Dhani 320	Gita 941	Himche 480
Dhanyaro 320	Githa lahara 941	Hingcha 480
Dharani 295	Githa 941	Hollang 162
Dharmar 611	Gobre 182	Hookiphul 487
Dhas 320	Gobura 659	Hurhuria 147
Dhobi kat 445	Goroma 1009	Indian Mahogany 205
Dhobine 445	Gota-begun 574	Isha-langulia 551
Dhobine ghas 445	Gotale phul 520	Jagat-madan 624

The Flora of Buxa Tiger Reserve, West Bengal, India

Jaharu 168	Kancy jhar 951	Khola bohar 520
Jalkumbhi 970	Kange lahara 445	Khorsane 207
Jalpai 181	Kankra jat 435	Khutti 133
Jaman 307	Kans 1040	Kodaka 1035
Jamjobi 490	Kanta maris 743	Kodho jhar 1020
Jamuna 305	Kanta notey 743	Kodo 1035
Jangjubi 465	Karanta 536	Koljhan 605
Jangli dhaniya 340	Karbuз 324	Koni 1022
Jangli haldi 932	Karela 327	Kopat 936
Jarila Lahara 216	Karkotta 126	Kudali 936
Jarool 318	Karpati Lahara 138	Kufyer 936
Jat bahori 552	Karuki 1009	Kuh 811
Jat toral 942	Kash 1041	Kukshim 477
Jata-kanchira 952	Kasauli Lahara 148	Kukur dyoti 946
Jati 615	Kasre Malata 801	Kukur toral 944
Jhangi 599	Kasreto 811	Kukur-afu 944
Jhau 153	Kaschira 551	Kukursanga 471
Jhikrai 290	Kaili lahara 649	Kui 215
Jhinga 326	Kauscho 168	Kula-aja 555
Jia 233	Kauso 281	Kumarika 946
Jirkua 1023	Kautcho 281	Kumbhi 309
Jogi Malata 801	Kawaipat 936	Kumbi 309
Jul-lata 669	Kawla 776	Kunchong simpot 941
Kachera kamra 576	Keboo 621	Kum-jameva 511
Kachuri pana 949	Kesari 478	Kunch 1014
Kadam bent 962	Kesari malanga 998	Kurchi 522
Kainjal 808	Kesuti 478	Kurey Pat 170
kakri 324	Keu 928	Kurku 278
Kala dhutra 570	Khajur 963	Kurkus 279
Kala-jhira 477	Khak Balaiyo 232	Kuro 469
Kali Lahara 231	Khalo argale 507	Kursimlo Lahara 343
Kalo kymuna 516	Khamari 649	Kush 1041
Kalo Vahak 623	Khar 1027	Kust 928
Kalo-daduna 570	Khareto 168	Kusum 807
Kamrup-Zir 843	Khari 511	Lahara 287
Kanak Champa 173	Khet papra 338, 447	Lahara Anp 233
Kanchira 951	Khutira 522	Lahara Bilauncy 221
Kanchirna 508	Khirpatcy 555	Lahara Gayo 811
Kanchiru 437	Khirra 529	Lahasume 201, 204
Kanduli 958	Khissa 522	Lai angeri 315
Kanesi 637	Khodsa dhan 1035	Lali Kawla 776

Botanical Survey of India

Lampate 320	Nagpat 229	Pati-pati 937
Lanka 569	Nak-chikni 538	Peka 1011
Lashora 552	Nal 1038	Phaksangme 508
Lasuni 202	Namuti 483	Pharke Sisi 769
Lasumli 205	Nanbhantur 800	Phurki 1009
Lasura 552	Nanriki 495	Pipal-pali Lahara 139
Latijhara 439	Nar kachur 935	Piralay 950
Latikaram 439	Nardula 1042	Prickly Poppy 141
Larka 807	Narki 145	Puceni 218
Madar-pati 937	Nasona 610	Purlane 157
Madhabi-lata 185	Neem 204	Puttokbok 560
Maha bari bach 935	Neemda 549	Ragate jhar 1038
Maidal 435, 512	Nera Khar Shing 796	Ranguwa 768
Maidalu 435	Nil-kalmi 565	Ranjani 508
Maina-kath 337	Nim-puteh 800	Ranjita 799
Makaspate 940	Nona 129	Ram-Tejpata 772
Makur-jali 1018	Nukha 950	Rani-champa 127
Malala 798	Nandhaki 495	Reri 803
Mali 527	Odai 175	Rheem 539
Malkonia 290	Okane 345	Runche 769
Mandala kanra 443	Ongarey 504	Runchey 769
Mandame 236	Ochronti 466	Runchey Kath 769
Manjito 453	Oslijat 465	Sadi-modi 479
Mastaru 483	Paka Saj 303	Saj 304
Matela bans 1011	Palamkath 299	Sakhua 162
Mechia Sag 196	Palyun 293	Sakupaan 928
Mechitta 473	Panchkul 125	Sama 1019, 1020
Mexican Poppy 141	Panchphal 125	Sanduhun 479
Mirey pati 660	Pangla toral 944	Samphor 193
Mitanga 1011	Pangiang 944	Sane 131
Mitna salu 564	Pani Saj 304	Sankalu 282
Mochkand 478	Pani-malanga 984	Sankru 1014
Mogra 513	Pan-turas 341	Santepru 784
Moira 337	Panu toral 941	Saru 218
Molera 1019, 1020	Panyan 555	Saru Jhingni 160
Morichi-kat 436	Parari 611	Saru kans 1041
Motna 987	Parkat-Dumar 48	Saru Kapasi 171
Mothey 983, 986, 987	Parnikalla 907	Sarumaldal 512
Mukta-jhuri 787	Parpar Timur 198	Sarwai 1019
Mukta-pati 937	Pat Pate 213	Sarpagantha 525
Muse Gayo 812	Patipata 937	Satlun 518

The Flora of Buxa Tiger Reserve, West Bengal, India

Saipate 229	Somon-rik 561	Tilki 297, 459
Seto Champ 127	Somri 342	Titakunga 538
Sewali 654	Sona 610	Togar 526
Shada Jhar 1020	Soupatti 610	Tolu kana 1040
Shingane 196	Swarnalata 561	Tong kribi 484
Shinganjhar 957	Syala 907	Toon 205
Shituli 516	Tagar 526	Totilla 610
Shora-ahu 942	Takapana 970	Totola 610
Shrubang Lahara 184	Takaule Lahara 211	Tsare Lahara 222
Sida 318	Tama bans 1016	Techethangru 139
Sidha 318	Tanki 236, 237	Tulasi 313, 315
Simali 654	Tantri 126	Tulda 1011
Sindure 799	Taro 930	Tulsi 667
Singari 345	Taruko 930	Tumberh-rik 445
Singhane bans 1011	Taru-lata, Kam-lata 566	Tun 205
Singhane lahara 567	Thakauley Thulo 211	Ulu 1027
Siris Lahara 263	Thali 229	Vasaka 623
Siru 1027	Thamecke 134	Wurdo lago 938
Soltraj 954	Tiki-okra 172	

INDEX TO THE SCIENTIFIC NAMES

- Abelmoschus manihot* (L.) Medik. 165
Abelmoschus manihot subsp. *manihot* 165, 166
Abelmoschus manihot subsp. *tetraphyllus* (Roxb. ex Hornem.) Benth. 165, 166
Abelmoschus Medikus 165
Abelmoschus moschatus Medik. 166
Abronia rugosa (L.) L.f. 35, 171, 1050
Abronia Jacq. 171
Abrus Adams 253, 255
Abrus melanospermus Hassk. 255
Abrus pulchellus Wall. ex Thwaites 255
Abrus pulchellus Wall. ex Voigt 255
Acacia caesia (L.) Willd. var. *subnuda* (Craib) L.C. Nielsen 245
Acacia catechu (L. f.) Willd. 245, 1050, 1052
Acacia concinna (Willd.) DC. 246
Acacia intata (L.) Willd. var. *oxyphylla* (Graham ex Benth.) Baker 245
Acacia leucouliaris Buch.-Ham. ex Benth. 246
Acacia oxyphylla Benth. var. *subnuda* Craib 245
Acacia pennata (L.) Willd. 246, 1052
Acacia pennata var. *arropulata* (D. Don) Baker 246
Acacia Willd. 244
Acalypha indica L. 787
Acalypha L. 787
Acanthe Lindl. 908, 910
Acaespe papillosa (Lindl.) Lindl. 910
ACANTHACEAE 429, 611
Acaanthus carduaceus Griff. 613
Acaanthus L. 613
Achyranthes amaranthoides Lam. 745
Achyranthes aspera L. 737, 1050
Achyranthes bidentata Blume 738
Achyranthes ferruginea Roxb. 745
Achyranthes L. 737
Achyranthes prostrata L. 744
Achyranthes sanguinolenta L. 738
Achyranthes scandens Roxb. 738
Achyrosperrmann Blume 636
Achyrosperrmann wallichianum (Benth.) Benth. ex Hook. f. 636
Acmella calva (DC.) R.K. Jansen 465
Acmella paniculata (Wall. ex DC.) R.K. Jansen 465
Acmella Rich. ex Pers. 465
ACORACEAE 906, 972, 1047
Acorus ananum L. 972
Acorus L. 972
Acrocarpos fraxinifolius Wight & Arn. 236
Acrocarpos Wight & Arn. 236
ACTINIDIACEAE 118, 161, 1047
Actinodaphne Nees 769
Actinodaphne obovata (Nees) Blume 769
Actinodaphne sikkimensis Meisn. 769
Adenia Forsk. 322
Adenia trilobata (Roxb.) Engl. 322
Adenosma capitatum Benth. ex Harce 578
Adenosma indicum (Lour.) Merr. 378
Adenosma R.Br. 578
Adenostemma J.E. Forst. & G. Forst. 466
Adenostemma laevica (L.) Kunze 466
Adenostemma viscosum var. *elata* Hook. f. 466
Adhatoda vesica Nees 623
Adhatoda zeylanica Medik. 623
Aechmanthera toneritosa Nees 634
Aechmanthera toneritosa var. *mallicha* C.B. Clarke 634
Aerides lasiopetalia Willd. 917
Aeridae Lour. 909, 910
Aerides multiflorum Roxb. 910
Aerva Forsk. 738
Aerva sanguinolenta (L.) Blume 738
Aeschynanthus grandiflorus var. *parviflorus* (Roxb.) C.B. Clarke 602
Aeschynanthus Jack 601
Aeschynanthus ulmerianus C.B. Clarke 602
Aeschynanthus parviflorus (Roxb.) Wall. 602
Aeschynanthus parviflorus (D. Don) Spreng. 603
Aeschynanthus ramosissimus Wall. 603
Aesculus sumatrensis Griff. 229
Aesculus L. 229
Aesculus pumiliata Wall. ex Hilleb. 229
Aganoma (Blume) G. Don 518
Aganoma gracilis Hook. f. 518
Agapetes auriculata 504
Agapetes birutanica N.P. Balakr. & Sed. Chowdhury 502
Agapetes D. Don ex G. Don 502
Agapetes saligna (Hook. f.) Hook. f. 504
Agapetes sikkimensis Airy Shaw 504
Ageratum conyzoides L. 466, 1050, 1054
Ageratum houstonianum Mill. 466
Ageratum L. 466
Aglaia polystachya Wall. 201
Agrostis elongata Lam. var. *flaccida* Roth ex Roem. & Schult. 1044
Agrostis ferrilis Steud. 1044
Agrostis maxima Roxb. 1045
Agryneis multilocularis Rottler ex Willd. 815
Ailanthus Desf. 198, 199
Ailanthus integrifolia Lam. 199
Aira indica L. 1041

The Flora of Buxa Tiger Reserve, West Bengal, India

- Ajuga* L. 656
Ajuga macrosperma var. *breviflora* Hook.f. 656
Ajuga macrosperma Wall. ex Benth. 656
ALANGIACEAE 345
Alangium chinense (Lour.) Harms 345
Alangium Lam. 345
Albizia Durazz. 244, 247
Albizia lobbekii (L.) Benth. 247, 1050
Albizia lucida Benth. 248
Albizia inciditor (Steud.) Nielsen 248, 1050, 1052
Albizia procera (Roxb.) Benth. 248, 1050
Albizzia karzii Hook.f. 839
Allophylus ebartaceus (Kurz) Radlk. 227
Allophylus L. 227
Allophylus zeylanicus var. *grandifolia* Hiern 227
Alouatta (Schott) G.Don 964
Alouatta forbesata (Roxb.) Schott 964
Alouatta odora (Roxb.) K. Koch 963
Alpinia albugha (Retz.) Roscoe 930
Alpinia malaccensis (Burn.f.) Roscoe 929
Alpinia nigra (Gaertn.) R.L.Burr 930
Alpinia Roxb. 929
Alysicarpus media L. 157
Alysicarpus prostratus Persak. 155
Alstonia R.Br. 518
Alstonia scholaris (L.) R.Br. 518
Altermanthera ficoides (L.) F. Beauv. 740
Altermanthera Poiteac. 740
Altermanthera paronychioides A. St. Hil. 742
Altermanthera sessilis (L.) R. Br. ex DC. 742, 1054
Altermanthera tenella Colla 740
Alysicarpus Neck. ex Desv. 254, 255
Alysicarpus vaginalis (L.) DC. 255
AMARANTHACEAE 734, 736
Amaranthus gangeticus L. 743
Amaranthus L. 743
Amaranthus spinosus L. 743
Amaranthus tricolor L. 743
Amaranthus viridis L. 744
AMARYLLIDACEAE 907, 937, 1047
Amischotolypa Hasek. 950, 951
Amischotolypa hookeri (Hasek.) H. Hara 951
Ammannia baccifera L. 317
Ammannia L. 316, 317
Ammannia mana Roxb. 319
Ammannia peploides Spreng. 319
Ammannia rotundifolia Buch.-Ham. ex Roxb. 319
Amomum zerumbet L. 935
Amora decandra Hiern 205
Amora rohinia (Roxb.) Wight & Arn. 201
Amorphophallus Blume ex Decn. 964, 965
Amorphophallus bulbifer Blume 965
Ampelocissus barbata (Wall.) Planch. 216
Ampelocissus Planch. 216
ANACARDIACEAE 232
Andropogon aciculatus Retz. 1014
Andropogon cristatus Thunb. 1039
Andropogon muris L. 1015
Andropogon muris subsp. *nigrescens* Hack. 1015
Androsace L. 505
Androsace saxifragifolia Bunge 505
Androsace umbellata (Lour.) Merr. 505
Anisema lineolatum Kunth. 957
Anisema loxifera Hasek. 958
Anisema nudiflorum (L.) R.Br. 958
Anisema scaberrimum Kunth 960
Anisema spiratum (L.) R.Br. 959
Anisochilus pallidus Wall. ex Benth. 658
Anisochilus Wall. ex Benth. 658
Anisomeles indica (L.) Kuntze 658
Anisomeles ovata R.Br. 658
Anisomeles R.Br. 658
Annua L. 829
Annua reticulata L. 129, 1051
ANNONACEAE 119, 829
Anthoantheum indicum L. 1037
Anticrema buntus (L.) Spreng. 806
Anticrema L. 806
Antistrophe A.DC. 506
Antistrophe cyantha A.DC. 506
Aphananixis Blume 201
Aphananixis polytachys (Wall.) R. Parker 201, 1050
Aphanochilus blandus Benth. 660
APLACEAE 339
Apluda L. 1009
Apluda matica L. 1009
Apluda varia Hack. subsp. *aristata* (L.) Hack. 1009
Apluda varia Hack. subsp. *matica* (L.) Hack. 1009
APOCYNACEAE 428, 517
Apocynum frutescens L. 523
Aporosa Blume 806
Aporosa octandra (Buch.-Ham. ex D.Don) A.R. Vickary 806
AQUILFOLIACEAE 119, 208, 1047
ARACEAE 905, 964
Aralia foliolosa Seem. ex C.B. Clarke 342
Aralia foliolosa var. *sikkimensis* C.B. Clarke 342
Aralia L. 342
ARALIACEAE 122, 342, 1047
Archidendron clypearia (Jack) I.C. Nielsen 249, 1052
Archidendron F. Muell. 244, 249
Ardisia humilis 507
Ardisia involucreata Kurz 506
Ardisia macrocarpa Wall. 507

Botanical Survey of India

- Ardisia solanacea* Roxb. 507
Ardisia Sw. 506
ARRECADACEAE 905, 963, 1047
Argemone L. 141
Argemone mexicana L. 25, 141
Argyrea capilliformis (Poir.) Oeststr. 539
Argyrea hookeri C.E. Clarke 560
Argyrea Lour. 359
Argyrea roxburghii (Wall.) Arn. ex Choisy 560
Arisaema constrictum Schott 967
Arisaema Mart. 964, 967
Arisaema tortuosum (Wall.) Schott 968
Aristolochia acuminata Lam. 759
Aristolochia L. 759
Aristolochia roxburghiana Klotzsch 759
Aristolochia sagala Cham. 759
ARISTOLOCHIACEAE 734, 759
Artemesia maderaspatana L. 483
Artemisia austroyunnanensis L. Ling & Y.R. Ling 468
Artemisia hemisphaerica Roxb. 476
Artemisia L. 468
Artemisia minima L. 473
Arthropodium paniculatum D. Don 315
Artocarpus heterophyllus Lam. 838
Artocarpus integrifolia 838
Artocarpus J.R. Forst. & G. Forst. 838
Arum fornicatum Roxb. 964
Arum odoratum Roxb. 965
Arum tortuosum Wall. 967
Arum trilobatum L. 972
Arum viviparum Roxb. 971
Arundina bambusifolia Lindl. 910
Arundina Blume 908, 910
Arundina graminifolia (L. Don) Hochr. 910
Arundina revoluta Hook.f. 910
Arundinella bengalensis (Spreng.) Druce 1009
Arundinella Raddi 1007, 1009
Arundo bambus L. 1010
Arundo karka Retz. 1038
ASCLEPIADACEAE 428, 532
Asclepias curassavica L. 533, 1051, 1054
Asclepias gigantea L. 533
Asclepias L. 533
Asclepias parviflora Roxb. 544
Asclepias volubilis L.f. 538
Aspidopterys Foss. 184
Aspidopterys nutans (Roxb. ex DC.) A. Juss. 41, 184
ASTERACEAE 427, 459
Azystema Blume 615
Azystema macrocarpa Nees 615
Atractis zeylanica L. 124
Atylaria scarabaeoides (L.) Benth. 257
Baccharis Lour. 807
Baccaurea ramiflora Lour. 807
Baccaurea sapida (Roxb.) Müll. Arg. 807
Bacobotrys indica Roxb. 508
Bacobotrys macrophylla Wall. 509
Balaicata bacocara (Roxb.) Esser 788
Balaicata Esser 788
Baliospermum axillare Blume 789
Baliospermum Blume 788
Baliospermum calycinum var. *bracteatum* Chakrab. & N.P. Balakr. 788
Baliospermum solanifolium (Burm.) Suresh 788, 1051
Balkata amavolens L. 663
BALSAMINACEAE 117, 187
Bambusa arundinacea Willd. 1010
Bambusa bambus (L.) Voss 1010
Bambusa cacharensis R.B. Majumdar 1011, 1048
Bambusa Schreb. 1006, 1010
Bambusa tulda Roxb. 1011
Banisteria benghalensis L. 185
Banksia speciosa J. Koenig 928
Barleria aristata L. 615
Barleria L. 615
Barleria strigosa Willd. 617
Bassia laevis Roxb. 509
Bauhinia angusta Roxb. 239
Bauhinia L. 235, 236
Bauhinia malabarica Roxb. 241
Bauhinia porpurea L. 236, 1051
Bauhinia scandens L. 239
Bauhinia variegata L. 237
Beaumontia grandiflora Wall. 520
Beaumontia Wall. 520
Begonia gigantea (A. DC.) Wall. ex C.E. Clarke 333
Begonia katocca Buch.-Ham. ex D. Don 333
Begonia L. 332
Begonia nepalensis (A. DC.) Warh. 339
Begonia ovatifolia A. DC. 334
Begonia roxburghii (Miq.) A. DC. 335
Begonia rubrovenia Hook. 333
Begonia xanthina Hook. 335
BEGONIACEAE 332
Beilschmiedia masamica Meisn. 771
Beilschmiedia dalzielii (Meisn.) Kosterm. 771
Beilschmiedia fagifolia var. *dalzielii* Meisn. 771
Beilschmiedia Nees 771
Beakara Adans. 432, 434
Beakara fasciculata (Roxb.) Ridgdale 434
Bergera integerrima Roxb. ex DC. 195
Bergera koenigii L. 196
Bhesa Arn. 209
Bhesa robusta (Roxb.) Ding Hsu 209
Bidens L. 469
Bidens pilosa L. 469, 1054
Bignonia colais Buch.-Ham. ex Dillwyn 610
Bignonia indica L. 610

BIGNONIACEAE 429, 609

- Biophytum* DC. 185
Biophytum raiwardinii (Zucc.) Klotzsch 185
Bischofia Blume 808
Bischofia javanica Blume 808
Bischofia nepalensis DC. 182
Bleia granulifolia D. Don 910
Biuma clarkei Hook.f. 470
Biuma DC. 469
Biuma fatulosa (Roxb.) Kurz 470
Biuma glomerata DC. 470
Biuma lacera (Burm.f.) DC. 471, 1054
Biuma laciniata DC. 471
Biuma lanceolaria (Roxb.) Druce 472
Biuma malabarica Hook. f. 470
Biuma membranacea DC. 472
Biuma myriocepala DC. 472
Biuma nodiflora Hook. f. 470
Boea flocculosa C.B. Clarke 607
Boea multiflora R.Br. 607
Boehmeria glomeruliflora Miq. 822
Boehmeria hamiltoniana Wedd. 823
Boehmeria Jacq. 822
Boehmeria macrophylla Hornem. 823
Boehmeria macrophylla Hornem. var. *macrophylla* 824
Boehmeria macrophylla Hornem. var. *rotundifolia* (D. Don) W.T. Wang 824
Boehmeria macrophylla Hornem. var. *scabrella* (Wedd.) D.G. Long 824
Boehmeria malabarica Wedd. 822
Boehmeria penduliflora Wedd. ex D.G. Long 824
Boehmeria platyphylla D. Don var. *hamiltoniana* (Wedd.) Wedd. 823
Boehmeria platyphylla var. *rotundifolia* Wedd. 824
Boehmeria platyphylla var. *scabrella* (Roxb.) Wedd. 824
Boehmeria rotundifolia D. Don 824
Boenninghausenia Rehb. ex Meisn. 191
Boenninghausenia sessilicarpa H.Lév. 44, 191
Boerhavia diffusa L. 736, 1051
Boerhavia L. 736
Boerhavia repens var. *diffusa* (L.) Hook.f. 736
Boesenbergia kingii Mood & L. M. Prince 930
Boesenbergia Kuntze 929, 930
BOMBACACEAE 120, 170
Bombax ceiba L. 35, 170, 1050, 1051, 1053
Bombax L. 170
Bombax malabaricum DC. 170
Bonnaya brachyata Link & Otto 586
Bonnaya repens (Roxb.) Spreng. 589
Bonnaya venicifolia (Retz.) Spreng. 586
BORAGINACEAE 428, 532
Borreria exilis L.O. Williams 455

- Bractearia* (Trin.) Griseb. 1008, 1012
Bractearia multiflora (J. Presl) Chase 1012
Bractearia ramosa (L.) Stapf 1012
Bractearia subquadripata (Trin.) Hitchc. 1012
Brachyotemma calycinum D. Don 31, 153, 154
Brachyotemma D. Don 152, 153
Bradia hirsuta Roxb. 816
Bradia lanceolaria Roxb. 814
Braemioptis Decne. & Planch. 342, 343
Braemioptis hainia (Burm.-Ham. ex D. Don) Seem. 343
BRASSICACEAE 117, 142
Breynia androgyna (L.) Chakrab. & N.P. Balakr. 809
Breynia J.R. Forst. & G. Forst. 808
Breynia rhamnoides Müll. Arg. 810
Breynia rigida (Thwaites) Chakrab. & N.P. Balakr. 809
Breynia trinervis (Hook.f. & Thomson ex Müll. Arg.) Chakrab. & N.P. Balakr. 810
Breynia vitis-idaea (Burm.f.) C.B.C. Fisch. 810
Bridelia retusa (L.) A. Juss. 811
Bridelia retusa var. *roxburghiana* Macell. Arg. 811
Bridelia stipularis (L.) Blume 811
Bridelia tomentosa Blume 812
Bridelia Willd. 810
Broussonetia kurzii (Hook.f.) Corner 839
Broussonetia L'Hér. ex Vent. 839
Brucea J.H. Mill. 198, 199
Brucea mollis Wall. ex Kurz 199, 1051
Brugmannia Pers. 569
Brugmannia suaveolens (Humb. & Boopl. ex Willd.) Benth. & C. Presl 569
Bryonia japonica Thunb. 331
Bryonia mysorensis Wight & Arn. 332
Bryonia palmata L. 324
Buddleja asiatica Lour. 549
Buddleja L. 549
Bulbophyllum caryosum var. *crassipes* (Hook.f.) Pradhan 911
Bulbophyllum crassipes Hook.f. 911
Bulbophyllum Thourne 909, 911
Bulbostylis barbata (Roth.) C.B. Clarke 974
Bulbostylis Kunth 974
BURSERACEAE 120, 200, 1047
Butea frondosa Roxb. ex Willd. 257
Butea monosperma (Lam.) Tausch 257, 1050, 1051, 1053
Butea parviflora Roxb. ex DC. 287
Butea Roxb. 251, 257
Byttneria grandifolia DC. 36, 172
Byttneria Loefl. 171, 172
Cacalia sonchifolia L. 479
CASALPINIACEAE 237
Casalpinia ocellata Roxb. 237
Casalpinia L. 236, 237

Botanical Survey of India

CASALPINIOIDEAE 235

- Cajanus* DC. 252, 257
Cajanus scarabaeoides (L.) Thouars 257
Calamus erectus Roxb. 962
Calamus L. 962
Callerya oliverae (Benth.) Schot 258
Callerya Endlicher 253, 258
Callicarpa arborea Roxb. 641
Callicarpa L. 641
Callicarpa macrophylla Vahl 642
Callicarpa macrophylla var. *sinensis* C.B. Clarke 642
Calotropis gigantea (L.) Wt. & Aiton 333, 1051, 1054
Calotropis R.Br. 333
Campanula marginata Thunb. 501
CAMPANULACEAE 427, 498
CANNABACEAE 735, 837
Cannabis L. 837
Cannabis sativa L. 837
CAPPARACEAE 118, 143
Capparis acutifolia subsp. *viminea* Jacobs 144
Capparis L. 144
Capparis multiflora Hook. f. & Thomson 26, 144
Capparis olachfolia Hook. f. & Thomson 27, 145
Capparis viminea 144
Capparis crustacea L. 587
CAPRIFOLIACEAE 427, 429
Capsicum annuum L. 569
Capsicum frutescens auct. non L. 569
Capsicum L. 569
Carallia breschiana (Lour.) Merr. 299
Carallia integerrima DC. 299
Carallia lanceifolia Roxb. 299
Carallia lucida Roxb. 299
CARALLIA Roxb. 299
Cardamine debilis D. Don 142
Cardamine hexгона With. 26, 142
Cardamine hirsuta var. *syriaca* (Link) Hook. & Arn. 142
Cardamine L. 142
Cardiospermum halimifolium L. 227
Cardiospermum L. 226, 227
Carex caricina (D. Don) Ghildyal & U.C. Bhattach. 977
Carex caricina var. *glauca* (Boeckler) Ghildyal & U.C. Bhattach. 977
Carex filicina Nees 977
Carex indica L. 977
Carex indica var. *laetaberrima* C.B. Clarke 977
Carex L. 974, 975
Carex longipes D. Don 978
Carex myosuroides Nees 978
Carex orcutta Wahlenb. 975
Carya arborea Roxb. 309

- CAREYA** Roxb. 309
Carlmannia Benth. 459
Carlmannia griffithii Benth. 459
CARLEMANNIACEAE 427, 439
CARYOPHYLLACEAE 117, 151
Cassaria Jacq. 130
Cassaria varzea Roxb. 6, 30, 150, 151
Cassia alata L. 242
Cassia betula L. 238, 1051
Cassia hirsuta L. 242
Cassia javanica subsp. *nodosa* (Buch.-Ham. ex Roxb.) K. Larsen & S.S. Larsen 239
Cassia L. 235, 238
Cassia nodosa Buch.-Ham. ex Roxb. 239
Cassia occidentalis L. 243
Cassia rhombifolia Roxb. 238
Cassia siamea Lam. 243
Cassia tora L. 243
Cassine discolor Wall. 211
Castanea indica Roxb. ex Lindl. 855
Castanopsis (D. Don) Spach 855
Castanopsis ferox (Roxb.) Spach 855
Castanopsis indica (Roxb. ex Lindl.) A. DC. 855
Castanopsis lanceifolia (Oerst.) Hickel & A. Caron 857
Castanopsis triboloides var. *ferox* (Roxb.) King ex Hook. f. 855
Catunaregam longispina (Link) Tirveng. 435
Catunaregam Wolf 435
Cayratia geniculata (Blume) Gagnep. 217
Cayratia japonica (Thunb.) Gagnep. 217
Cayratia Juss. 216, 217
Ceanothus nepalensis Wall. 214
Cedrela toona Roxb. ex Retzler 205
CELASTRACEAE 208
Celastrus champsonii Benth. 209
Celastrus L. 209
Celastrus monosperma Roxb. 209
Celastrus robustus Roxb. 209
Celtis orientalis L. 836
Cenchrus lappaceus L. 1013
Centella asiatica (L.) Urb. 939, 1051
Centella L. 339
Centipeda Lour. 473
Centipeda minima (L.) A. Brum. & Asch. 473
Centipeda orbicularis Lour. 473
Centotheca Desv. 1007, 1013
Centotheca Japponea (L.) Desv. 1013
Centranthera grandiflora Wall. ex Benth. 578
Centranthera R.Br. 578
Centrosema (DC.) Benth. 252, 258
Centrosema pubescens Benth. 258
Centrosema virginianum (L.) Benth. 258
Ceriseoides (Benth. & Hook. f.) Tirveng. 435
Ceriseoides campanulata (Roxb.) Tirveng. 435

- Ceropegia* L. 534
Ceropegia macrantha Wight 534
Chamaelirium multiflorum C.B. Clarke 605
Chassalia Comm. ex Patr. 436
Chassalia curviflora (Wall.) Thwaites 436
Chassalia ophiosyloides (Wall.) Craib 436
Chaetochloa odorata Roxb. 150
Chavica thomsonii C. DC. 767
CHENOPODIACEAE 735, 747
Chenopodium album L. 747, 1054
Chenopodium umbrosioides L. 748
Chenopodium L. 747
Chionanthus smilacifolius Wall. 514
Chisocheton balsamea C. DC. 202
Chisocheton Blume 201, 202
Chisocheton cumingianus (C. DC.) Harris var. *balsamea* (C. DC.) Mabb. 202
Chisocheton paniculatus (Roxb.) Hiern 202
CHLORANTHACEAE 733, 767
Chloranthus elatior Link. 767
Chloranthus elatior R.Br. 767
Chloranthus officinalis Blume 767
Chloranthus Sw. 767
Chonemorpha fragrans (Moore) Alston 520
Chonemorpha G. Don 520
Chonemorpha macrophylla G. Don 520
Chromolaena DC. 473
Chromolaena odorata (L.) R.M. King & N. Rob. 473
Chrysopogon aculeatus (Retz.) Trin. 1014
Chrysopogon Trin. 1008, 1014
Chukrasia A. Juss. 201, 203
Chukrasia tabularia A. Juss. 203
Cinchona arizensis Roxb. 439
Cinnamomum hojoleghota (Buch.-Ham.) Sweet 772
Cinnamomum Schneff. 772
Cipadessa baccifera (Roxb. ex Roth) Miq. 202
Cipadessa Blume 201, 202
Cipadessa fruticosa Blume 202
Citrum arvense (L.) Scop. 474
Citrus P. Mill. 474
Citrus shensiensis Petr. 474
Cissampelos hirsuta Buch.-Ham. ex DC. 134
Cissampelos L. 134
Cissampelos pareira L. 22, 134
Cissampelos parsonsii var. *hirsuta* (Buch.-Ham. ex DC.) Forstn. 134
Cissus muriculata Roxb. 220
Cissus cordata Roxb. 219
Cissus discolor Blume 218
Cissus elongata Roxb. 219
Cissus gemiculata Blume 217
Cissus L. 216, 218
Cissus leucostaphylis Dennst. 222
Cissus repens Lam. 219
Citrus L. 193
Citrus medica L. 193, 1051
Claosylon A. Juss. 790
Claosylon khasianum Hook.f. 790
Claosylon khasianum var. *serrulata* Hook.f. 790
Clavinyrtus ruscoides Blume 307
Cleidion Blume 790
Cleidion javanicum Blume 790
Cleistanion micranthum (Lindl.) King & Pantl. 924
Clematis gowriana Roxb. ex DC. 16, 122, 123
Clematis L. 117, 122
Clematis smilacifolia Wall. 16, 123, 124
Clematis zeylanica (L.) Poir. 17, 124
Cleome hassleriana Choisy 146
Cleome hortiana Schindl. 27, 146, 1054
Cleome L. 143, 145
Cleome rotidisperma DC. 28, 146, 1054
Cleome viscosa L. 28, 147
Clerodendrum bracteatum Wall. ex Walp. 643
Clerodendrum chinense (Osbeck) Mabb. 643
Clerodendrum colebrookianum Walp. 644
Clerodendrum cordatum D. Don 644
Clerodendrum fragrans (Vent.) R. Br. 643
Clerodendrum glandulosum Lindl. 644
Clerodendrum indicum (L.) Kuntze 646
Clerodendrum infirmatum Auct. non L. 644
Clerodendrum japonicum (Thunb.) Sweet 646
Clerodendrum L. 642
Clerodendrum laevifolium Blume 647
Clerodendrum mutans Wall. ex D. Don 647
Clerodendrum serratum (L.) Moon 653
Clerodendrum serratum var. *wallichii* C.B. Clarke 653
Clerodendrum siphonanthus R.Br. 646
Clerodendrum viscosum Vent. 644
Clinogyne dichotoma Salisb. 937
Clitoria virginiana L. 258
Climacium hamiltonii Kuntze 174
Clusia androgyna L. 809
Clusia retusa L. 811
Clusia stipularis L. 811
Clypea discolor Blume 140
Cnicus arvensis (L.) Hoffm. 474
Cnicus sinensis (Gard. & Champ.) C.B. Clarke 474
Cocculus DC. 133, 136
Cocculus laurifolius DC. 23, 135, 136, 1048
Coelogyne arunachalensis H.J. Chowdhery & G.D. Pal 911
Coelogyne fuliginosa Lodd. ex Hook. 911
Coelogyne Lindl. 909, 911
Coelogyne ovalis Lindl. 911
Coelogyne prolifera Lindl. 912
Coffea benghalensis B. Hayne ex Schult. 436
Coffea L. 436

Botanical Survey of India

- Copa* L. 1008, 1014
Copa lacryma-jobi L. 1014
Calobrookea oppositifolia Sm. 659
Calobrookea Sm. 659
Columnnea chinensis Osbeck 581
COMBRETACEAE 300
Combretum flagrocarpum C.B. Clarke 301
Combretum griffithii Van Heurck & Müll.Arg. 300
Combretum Loefl. 300
Combretum punctatum subsp. *squamosum* (Roxb. ex D. Don) Benth 300
Combretum squamosum Roxb. ex D. Don 300
Combretum wallichii var. *flagrocarpum* (C.B. Clarke) M. Gangop. & Chakrab. 301
Combretum wallichii var. *griffithii* (Van Heurck & Müll. Arg.) M. Gangop. & Chakrab. 300
Commelina axillaris L. 954
Commelina benghalensis L. 951
Commelina cristata L. 954
Commelina diffusa Burm.f. 952
Commelina japonica Thunb. 957
Commelina L. 950, 951
Commelina nudiflora auct. non L. 952
Commelina nudiflora L. 958
Commelina obliqua Buch.-Ham. ex D. Don 952
Commelina pseudos Blume 952
Commelina scaberrima Blume 960
Commelina sikkimensis C.B. Clarke 953, 1048
Commelina spinata L. 959
COMMELINACEAE 905, 950
Conocephalus lanceolatus Frescul. 832
Conocephalus nanus L. 832
CONYLIARIACEAE 906, 938
CONVOLVULACEAE 428, 558
Convolvulus batatas L. 564
Convolvulus capitiformis Poir. 559
Convolvulus Nil L. 565
Convolvulus mammillaris L. 563
Convolvulus roxburghii Wall. 560
Convolvulus umbellatus L. 566
Convolvulus vitifolius Burm.f. 567
Conyza cineria L. 477
Conyza fistulosa Roxb. 470
Conyza lacera Burm.f. 471
Conyza lanceolaria Roxb. 472
Conyza Less. 474
Conyza leucantha (D. Don) Ludlow & Raven. 474
Conyza viscidula Wall. ex DC. 474
Conyza viscosa Mill. 487
Corchorus acutangulus Lam. 175
Corchorus aestivus L. 22, 175
Corchorus L. 175
Cordia dichotoma G. Forst. 552
Cordia grandis Roxb. 553
Cordia L. 552
Cordia obliqua Willd. 552
COSTACEAE 906, 928
Cosmos spectatus (J. Koenig) Sm. 928
Cotula divaricata Wall. ex DC. 492
Cotula hemisphaerica (Roxb.) Wall. ex C.B. Clarke 476
Cotula L. 476
Cotula latifolia Pers. 476
Covellia cyzophylla Miq. 844
Covellia prostrata Wall. ex Miq. 850
Cracca purpurea L. 288
Craspedum tectorium Lour. 181
Crassocephalum crepidioides (Benth.) S. Moore 476
Crassocephalum Moench. 476
Crateva L. 147
Crateva religiosa G. Forst. 10, 28, 147
Crepidium Blume 908, 912
Crepidium josephianum (Reich.f.) Marg. 912, 1048
Crepis japonica Benth. 497
Crinum amoenum Roxb. ex Ker Gawl. 937
Crinum L. 937
Crotalaria alata Buch.-Ham. ex D. Don 260
Crotalaria albida Heyne ex Roth 261
Crotalaria cytisoides Roxb. ex DC. 261
Crotalaria L. 254, 260
Crotalaria obovata G. Don 262
Crotalaria pallida var. *obovata* (G. Don) Polhill 262, 1053, 1054
Crotalaria parvifolia D. Don 261
Croton bangladesicus Bail. 792
Croton candelatus Geiseler 793
Croton L. 792
Croton oblongifolius Roxb. 793
Croton permixtus Müll. Arg. 793
Croton philippensis Lam. 799
Croton repandus Rottler 800
Croton solanifolius Burm. 789
Cryptanthus chinensis Osbeck 643
Cryptocarya assyriana Nees 772
Cryptocarya R. Br. 772
Cryptolepis buchamanii R. Br. ex Roem. & Schult. 536
Cryptolepis dubia (Burm.f.) M.R. Almeida 536
Cryptolepis elagans Wall. ex G. Don 536
Cryptolepis R. Br. 536
Cryptolepis sinensis (Lour.) Merr. 536
Cucumis acutangula L. 326
Cucumis L. 324
Cucumis maderaspatanus L. 328
Cucumis melo L. 324
CUCURBITACEAE 323
Cudrania javanensis Trécul 852
Cuphea carthagenensis (Jacq.) J.E. Macbr. 317

- Cuphea* P. Browne 316, 317
Curculigo recurvata Wt. Aiton 938
Cutunna aromatica Salisb. 932
Curema L. 929, 932
Cuscuta L. 561
Cuscuta reflexa Roxb. 361
Cyanotis axillaris (L.) D.Don ex Sweet 954
Cyanotis barbata D.Don 955
Cyanotis cristata (L.) D.Don 954
Cyanotis D.Don 951, 953
Cyanotis vaga (Lour.) Schult. & Schult.f. 955
Cyanthillium Blume 477
Cyanthillium cinereum (L.) Robinson 477
Cyathula Blume 744
Cyathula prostrata (L.) Blume 744
Cyclea Arn. ex Wight 134, 136
Cyclea barbata Michx. 23, 136, 137
Cyclos bicristata (Griff.) Diels 24, 134, 138
Cyclos populifolia Hook.f. & Thomson 138
Cyclostemon assamicus Hook.f. 794
Cymbidium aloifolium (L.) Sw. 914
Cymbidium aphyllum (Roxb.) Sw. 914
Cymbidium bambusaefolium Roxb. 910
Cymbidium iridifolium Roxb. 920
Cymbidium moschatum (Buch.-Ham.) Willd. 916
Cymbidium Sw. 909, 914
Cymbopogon nardus (L.) Rendle 1015
Cymbopogon Spreng. 1009, 1015
Cynanchum inodorum Lour. 539
Cynoglossum L. 555
Cynoglossum lanceolatum Forsk. 555
Cynosuavis aegyptius L. 1015
Cynosuavis indicus L. 1020
CYPERACEAE 905, 973, 1047
Cyperus compactus Retz. 980
Cyperus cuspidatus Kunth 980
Cyperus cyperinus (Retz.) Walck. Sur. 982
Cyperus cyperoides (L.) Kuntze 982
Cyperus difformis L. 983
Cyperus diffusus Vahl 983
Cyperus digitatus Roxb. 984
Cyperus distans L.f. 984
Cyperus flavidus Retz. 1001
Cyperus haspan L. 986
Cyperus iris L. 986
Cyperus L. 974, 979
Cyperus nudans auct. non Vahl 984
Cyperus platystylis R.Br. 987
Cyperus pubescens Steud. 983
Cyperus rotundus L. 987
Cyperus sanguinalis Vahl 1002
Cyperus tillandsiae Nees 988
Cyperus stramineus Nees 1002
Cyphostemma (Planch.) Alston 216, 220
Cyphostemma auriculatum (Roxb.) P. Singh & B.V. Shetty 220
Dactyloctenium aegyptium (L.) Willd. 1015
Dactyloctenium Willd. 1007, 1015
Daedalacanthus griffithii T. Anderson 621
Daedalacanthus nervosus (Vahl.) T. Anderson 621
Dalbergia L.f. 252, 262
Dalbergia lanceolaria L. f. 263
Dalbergia planata (Lour.) Prain 263
Dalbergia sissoo Roxb. ex DC. 264
Dalbergia stipitacea Roxb. 264
Dalbergia tamarindifolia Roxb. 263
Dalbergia volubilis Roxb. 266
Dalrympleia pomifera Roxb. 229
DATISACEAE 120, 337, 1047
Datura fastuosa L. 570
Datura fastuosa var. *alba* (Rumph. ex Nees) C.B. Clarke 570
Datura L. 570
Datura metel L. 570, 1051, 1054
Datura suaveolens Humb. & Bonpl. ex Willd. 569
Deeringia amaranthoides (Lam.) Merr. 745
Deeringia celastroides R. Br. 745
Deeringia R. Br. 745
Dendrobium aphyllum (Roxb.) C.E.C. Fisch. 914
Dendrobium calceolaria Carey ex Hook. 916
Dendrobium cridiflorum Griff. 915
Dendrobium criflorum var. *mittense* Lucknow 915
Dendrobium fimbriatum Hook. 915
Dendrobium figar Rehb.f. 917
Dendrobium moschatum (Buch.-Ham.) Sw. 916
Dendrobium sordidum King & Pantl. 917
Dendrobium Sw. 909, 914
Dendrobium teres Roxb. 922
Dendrobium terminale C.S.P. Parish & Rehb.f. 916
Dendrocalamus hamiltonii Nees & Arn. ex Munro 1016
Dendrocalamus Nees 1006, 1016
Dendrocalme Miq. 826
Dendrocalme sinensis (Blume) Chew 826, 1052
Dendrolabium (Wight & Arn.) Benth. 254, 266
Dendrolobium triangulare (Retz.) Schindl. 266
Dendrophthoe falcata (L. f.) Etingsh. 781
Dendrophthoe falcata var. *pubescens* (Hook. f.) V. Chandras 781
Dendrophthoe Mart. 781
Dentella J.R. Forst. & G. Forst. 437
Dentella repens (L.) J.R. Forst. & G. Forst. 437
Dentella repens var. *repens* 437
Dentella repens var. *serpyllifolia* (Wall. ex Craib) Verdc. 437
Dentella serpyllifolia Wall. ex Craib 437
Derris pinnata Lour. 263

Botanical Survey of India

- Desmodium caudatum* (Thunb.) DC. 268
Desmodium cephalotes (Roxb.) Wall. ex Wight & Arn. 266
Desmodium confertum DC. 268
Desmodium Desv. 254, 267
Desmodium gangeticum (L.) DC. 269
Desmodium gangeticum var. *maculatum* (L.) Baker 269
Desmodium gyrans DC. 272
Desmodium heterocarpon (L.) DC. 269
Desmodium khasianum Prain 271
Desmodium laxiflorum DC. 272
Desmodium motorium (Houtt.) Merr. 272
Desmodium polycarpum (Poir.) DC. 269
Desmodium sequans Wall. 272
Desmodium stuartianum (Miq.) Blume ex Baker 272
Desmodium triflorum (L.) DC. 274
Desmodium triquetrum (L.) DC. 274
Desmos chinensis Lour. 20, 130
Desmos Lour. 129, 130
Dialium coromandelinum Houtt. 233
Dianthera virgata Benth. ex C.B. Clarke 625
Dioscorea brachystis Lour. 299
Dicrocephala integrifolia (L.f.) Kuntze 478
Dicrocephala L. Herit ex DC. 478
Dicliptera bupleuroides Nees 618
Dicliptera chinensis (L.) Juss. 618
Dicliptera Juss. 617
Dicliptera roxburghiana Nees 618
Dicliptera roxburghiana var. *bupleuroides* (Nees) C.B. Clarke 618
Dicliptera roxburghii T. Anderson 618
Didymocarpus pedunculatus R.Br. 603
Didymocarpus Wall. 603
Digitaria niscandens (Kunth) Henrad 1018
Digitaria ciliaris (Rata.) Koeler 1018
Digitaria Haller 1008, 1016
Digitaria microbachne (J. Presl) Henrad 1019
Digitaria sanguinalis (L.) Scop. 1008
Digitaria setigera Roth 1019
Dillenia indica L. 18, 125, 786, 1052
Dillenia L. 125
Dillenia pentagyna Roxb. 10, 18, 126, 1050
DILLENIACEAE 118, 125
Dioscorea Buch.-Ham. ex Sweet 941
Dioscorea racemosa (Roxb.) Buch.-Ham. ex Sweet 941
Dioscorea anguina Roxb. 944
Dioscorea bolophylla (Prain) Voigt ex Haines 941
Dioscorea bulbifera L. 944
Dioscorea bulbifera var. *crispata* Prain 941
Dioscorea bulbifera var. *pulchella* Prain 941
Dioscorea bulbifera var. *sativa* Prain 941
Dioscorea deltoidea Wall. ex Griseb. var.
- sittimensis* Prain 944
Dioscorea glabra Roxb. 942
Dioscorea hamiltonii Hook.f. 942
Dioscorea L. 940
Dioscorea mammillaria Lam. var. *helophylla* Prain 941
Dioscorea mammillaria 942
Dioscorea pentaphylla L. 943
Dioscorea prazeri Prain & Barkill 944, 1048
Dioscorea pubera Blume 944
Dioscorea sativa 941
DIOSCORACEAE 906, 940
Diplazium roxburghii Miq. 335
Diplocyclos (Bndl.) T. Post & Kuntze 323, 324
Diplozyclon palmatum (L.) C. Jeffrey 324
DIPTEROCARPACEAE 118, 162, 1049
Dipterocarpus Gaertn. f. 162
Dipterocarpus macrocarpus Vesque 162
Dipterocarpus rotundus Blume 162, 163, 1050
Dischidia bengalensis Colch. 536
Dischidia R.Br. 536
Dolichos erosus L. 262
Dolichos phaseoloides Roxb. 283
Dolichos pilosus J.G. Klein ex Willd. 290
Dolichos pilosus Willd. 275
Dolichos pruriens L. 281
Dolichos scarabaeoides L. 257
Dracaena angustifolia (Medik.) Roxb. 940
Dracaena Vind. 940
DRACAENACEAE 906, 940, 1047
Dracontium spinosum L. 968
Drosera B. Meyer 528
Drosera volubilis (L.f.) Benth. ex Hook.f. 538, 1052
Drimys indica (Roxb.) Jessop 946
Drimys Jacq. ex Willd. 946
Drimysarpus Hook. f. 232
Drimysarpus racemosus (Roxb.) Hook.f. ex Marchand. 232
Drosera umbellata Lour. 505
Dryasaria cordata (L.) Willd. ex Schult. 153
Dryasaria Schult. 153
Drypetes assamien (Hook. f.) Pax & K. Hoffm. 794
Drypetes Vahl 794
Duabanga Buch.-Ham. 320
Duabanga grandiflora (Roxb. ex DC.) Walp. 320, 1050
Duabanga sonneratioides Buch.-Ham. 320
Duabanga peploides Gandh. 831
Dufrenoyia Chatin 786
Dufrenoyia platyphylla (Spreng.) Stauffer 786
Dysoxylum (Benth.) Prain 252, 275
Dysoxylum pilosum (Willd.) Marchal 275
Dysophylla auriculata (L.) Blume 668
Dysophylla crassicaulis Benth. 670

- Dysophylla erasicaulis* var. *pumila* (Graham) Hook.f. 670
Dysophylla verticillata Benth. 672
Dysoxylum binectariferum Hook.f. ex Bedd. 204
Dysoxylum Blume 201, 203
Dysoxylum excoecum Blume 204
Dysoxylum gotachara (Buch.-Ham.) Mabb. 204
Dysoxylum procerum Hiern 204
Dysoxylum umbroscoides (L.) Mosyakiti & Clemens 748
Dysoxylum R. Br. 748
Echinocarpus assamicus Benth. 183
Echinocarpus darycarpus Benth. 182
Echinocarpus sterculiaceus Benth. 182
Echinochloa colona (L.) Link 1019
Echinochloa crum-galli (L.) P. Beauv. 1020
Echinochloa P. Beauv. 1008, 1009
Echinolaena polystachya Kunth 1040
Echites fragrans Moon 520
Echites pubescens Buch.-Ham. 522
Echites scholaris L. 518
Eclipta alba (L.) Hassk. 478
Eclipta L. 478
Eclipta prostrata (L.) L. 478
Ehretia acuminata R.Br. 535
Ehretia P. Browne 535
Ehretia pallens R.Br. Mill 556
Ehretia umbellulata Wall. 208
Eichhornia crassipes (Mart.) Solms 949
ELAEAGNACEAE 734, 780
Elaeagnus L. 780
Elaeagnus pyriformis Hook.f. 780, 1048, 1052
ELAEOCARPACEAE 120, 178, 1049
Elaeocarpus angustifolius Blume 39, 179
Elaeocarpus ganitrus Roxb. ex G. Don 179
Elaeocarpus L. 178, 179
Elaeocarpus robustus Roxb. 181
Elaeocarpus rugosus Roxb. ex G. Don 40, 179, 180, 1049
Elaeocarpus toctorius (Lour.) Poir. 181
Elaeocarpus varunus Buch.-Ham. ex Mast. 6, 40, 181
Elate sylvestris L. 963
Elatostema J.R. Forst. & G. Forst. 826
Elatostema lineolatum Wight 827
Elatostema parvum (Blume) Blume ex Miq. 827
Elatostema platyphyllum Wedd. 828
Elatostema raphan Hook.f. 827
Eleocharis acutangula (Roxb.) Schult. 988
Eleocharis chelidaria Roem. & Schult. 990
Eleocharis fatulosa Schult. 988
Eleocharis R.Br. 974, 988
Elephantopus L. 479
Elephantopus scaber L. 479, 1051
Eleusine aegyptiaca (L.) Desf. 1015
Eleusine Gaertn. 1007, 1020
Eleusine indica (L.) Gaertn. 1020
Eleocharis blanda (Benth.) Benth. 660
Eleocharis Willd. 660
Emilia Cass. 479
Emilia sonchifolia (L.) DC. 479
Engelhardtia Lessch. ex Blume 834
Engelhardtia epicata Lessch. ex Blume 834
Erydra sucteans Lour. 480, 1052
Erydra Lour. 480
Epidendrum aloifolium L. 914
Epidendrum moscharum Buch.-Ham. 916
Epidendrum pendulum Roxb. 914
Epidendrum retusum L. 924
Epidendrum sessilatum Roxb. 925
Eragrostis amabilis (L.) Wight & Arn. 1022
Eragrostis amabilis 1025
Eragrostis aspera (Jacq.) Nees 1023
Eragrostis coarctata Stapf 1023
Eragrostis gangetica (Roxb.) Steud. 1025
Eragrostis pilosa (L.) P. Beauv. 1025
Eragrostis stenophylla Hochst. ex Miq. 1025
Eragrostis tenella (L.) P. Beauv. ex Roem. & Schult. (Including var. *plumosa*) 1022
Eragrostis unioloides (Retz.) Nees ex Steud. 1025
Eragrostis Wolf 1007, 1022
Eranthemon erythrochilum J.R.I. Wood 619
Eranthemum griffithii (T. Anderson) Bremek. & Nan.-Bremek. 621
Eranthemum indicum (Nees) C.B. Clarke 627
Eranthemum L. 619
Eranthemum palatiferum Nees 631
Eranthemum palatiferum var. *elanum* (Kurz) C.B. Clarke 631
Eranthemum palatiferum var. *levicapsum* C.B. Clarke 631
Eranthemum pulchellum Andrews 621
Erechtites Raf. 480
Erechtites valerianifolius (Link ex Spreng.) DC. 480
Eria dasyphylla E.C. Parish & Rehb.f. 924
Eria flava Lindl. 917
Eria lasiopetala (Willd.) Ormerod 917
Eria Lindl. 909, 916
Eria stricta Lindl. 917
ERICACEAE 427, 502
Erigeron leucanthus O'Don 474
Erinus procumbens Mill. 591
Eriophorum comosum (Wall.) Nees 990
Eriophorum L. 974, 990
Eryum hirtatum L. 289
Erycibe paniculata Roxb. 563
Erycibe Roxb. 563
Eryngium foetidum L. 340

Botanical Survey of India

- Bryngium* L. 339, 340
Erythrina L. 251, 275
Erythrina monosperma Lam. 257
Erythrina stricta Roxb. 273
Eugenia formosa Wall. 306
Eugenia fruticosa (DC.) Roxb. 306
Eugenia kurzii Duthie 307
Eugenia oblata Roxb. 307
Eugenia sumatranensis (Blume) Wall. ex Duthie 307
Eugenia smaliana Brandis 309
Eupatorium coryzoides Vahl 473
Eupatorium odoratum L. 473
Euphorbia hirta L. 795, 1051, 1054
Euphorbia L. 794
Euphorbia pilulifera L. 795
Euphorbia thymifolia L. 795
RUPHORBIACEAE 735, 786
Eurya acuminata DC. 33, 159, 350
Eurya japonica var. *phyllanthoides* (Blume) Dyer 160
Eurya Thunb. 160
Evolvulus L. 563
Evolvulus nummularius (L.) L. 563, 1054
RAGACEAE 735, 855
Ragaria nitida Roxb. 198
Palaemonia insignis Royle 796, 1052
Palaemonia Royle 796
Ficus altissima Blume 842
Ficus auriculata Lour. 842
Ficus benjamina L. 843
Ficus chrysocarpa Reinw. ex Blume 846
Ficus corda Buch.-Ham. ex Roxb. 850
Ficus curtipes Corner 843
Ficus cyrtophylla (Miq.) Miq. 844
Ficus elastica Roxb. ex Hornem. 844
Ficus flabellifera Reinw. ex Blume 844
Ficus fulva Reinw. ex Blume 846
Ficus geniculata Kurz 846
Ficus glomerata Roxb. 850
Ficus hederacea Roxb. 848
Ficus heterophylla L.f. 848
Ficus heterophylla Blume 849
Ficus hispida L.f. 849, 1052
Ficus L. 839
Ficus obtusifolia Roxb. 843
Ficus prostrata (Wall. ex Miq.) Miq. 850
Ficus racemosa L. 850, 1052
Ficus retusa var. *nitida* (Thunb.) Miq. 843
Ficus roxburghii Miq. 842
Ficus semicordata Buch.-Ham. ex Sm. 850
Fimbristylis neotivialis (Retz.) Vahl 992
Fimbristylis albovidua C.B. Clarke 992
Fimbristylis aphylla Steud. 992
Fimbristylis bisumbellata (Poirak.) Bubani 994
Fimbristylis clarkei Anant Kumar, Halder & Venu 993, 1047, 1048
Fimbristylis complanata (Retz.) Link 995
Fimbristylis dichotoma (L.) Vahl 995
Fimbristylis dichotoma var. non Vahl 994
Fimbristylis diphylla (Retz.) Vahl 995
Fimbristylis ligulosa Girard. 998
Fimbristylis littoralis Gandh. 996
Fimbristylis merrilli Kern 998
Fimbristylis nitida var. non Vahl 996
Fimbristylis quibaguaiaris (Vahl) Karth var. *crenata* C.B. Clarke 992
Fimbristylis schoenoides (Retz.) Vahl 998
Fimbristylis aquarosa Vahl 998
Fimbristylis Vahl 974, 991
FLACOURTIACEAE 118, 150
Flemingia grandiflora Roxb. ex Retz. 639
Flemingia Roxb. ex Wt. Aiton 254, 276
Flemingia stricta Roxb. 276
Flickingeria A.D. Hawkes 909, 917
Flickingeria fugax (Robb.f.) Scident. 917
Floscopa Lour. 950, 955
Floscopa scandens Lour. 955
Floscopa microcarpa Blume 813
Floscopa villosa (Roxb. ex Willd.) Royle 813
Floscopa Willd. 813
Forrestia hookeri Hassk. 951
Fragaria indica Andrews 292
Galinsoga ciliosa (Raf.) Blake 481
Galinsoga quadriradiata Ruiz & Pav. 481
Galinsoga Ruiz & Pav. 481
Gardenia campanulata Roxb. 435
Garuga floribunda var. *gamblei* (King ex W.W. Sm.) Kalkman 200
Garuga gamblei King ex W.W. Sm. 200
GARUGA Roxb. 200
Gastrochilus D.Don 909, 918
Gastrochilus obliquus (Lindl.) Kuntze 918
GESNERIACEAE 429, 601
Girardinia diversifolia (Link) Friis 828
Girardinia Gandh.-Beaup. 828
Girardinia heterophylla Decne. 828
Glinus L. 337
Glinus hirtellus L. 338
Glinus oppositifolius (L.) A. DC. 338
Glinoides Kunth 251, 276
Glinoides repens (Jacq.) Karth 276
Globba L. 929, 932
Globba racemosa Sm. 932
Glochidion asananicum (Mull. Arg.) Hook.f. 813
Glochidion ellipticum Wight 813
Glochidion hirsutum (Roxb.) Voigt 816
Glochidion J.R. Forst. & G. Forst. 813
Glochidion lasceolarium (Roxb.) Voigt 814, 1050
Glochidion multiloculare (Roxb. ex Willd.) Voigt 815

- Glochidion rubiginum* Hook.f. 815
Glochidion tomentosum Dalzell 815
Glochidion tomentosum var. *albostriatum* Hook.f. 816
Glochidion zeylanicum (Gaertn.) A. Juss. var. *tomentosum* (Dalzell) Trimen 815
Glycine inodiscrata Wall. 285
Glycoemia Correa 194
Glycoemis cynosuza (Blume) Spreng. var. *cynosa* Kurz 194
Glycoemia cynosa (Kurz) V. Nary 194, 1052
Glycoemis pentaphylla (Retz.) DC. 194
Glycoemis pentaphylla auct. non DC. 194
Glycoemis pentaphylla 194
Glycoemis pentaphylla var. *nitida* Prain 194
Gmelina arborea Roxb. 647, 1050, 1052
Gmelina arborea var. *glaucescens* C.B. Clarke 647
Gmelina L. 647
Gnaphalium affine DDon 487
Gnaphalium flaccidum Kurz 482
Gnaphalium indicum 483
Gnaphalium L. 481
Gnaphalium lutescens L. 482
Gnaphalium luteo-albescens var. *multiceps* (DC.) Hook.f. 487
Gnaphalium multiceps Roxb. 483
Gnaphalium pennsylvanicum Willd. 482
Gnaphalium polygonatum Pers. 483
Gnaphalium purpureum 482
Gnaphalium strictum Roxb. 483
Gomphostemma ovatum Wall. ex Benth. 660
Gomphostemma parviflorum Wall. ex Benth. 662
Gomphostemma Wall. ex Benth. 660
Gomphrena ficoides L. 740
Gomphrena sessilis L. 742
Goniotalamus (Blume) Hook. f. & Thomson 129, 131
Goniotalamus sesquipedalis (Wall.) Hook.f. & Thomson 21, 128, 131
Goodyera procera (Retz. Gawl.) Hook. 918
Goodyera R.Br. 908, 918
Gouania wallichii DC. 160
Gouania Jacq. 213
Gouania leptostachya DC. 213
Grangea Adans. 483
Grangea raderaspata (L.) Desf. 483
Gratiola ciliata Colam. 586
Gratiola parviflora Roxb. 588
Gratiola pusilla Willd. 588
Gratiola rotundifolia L. 589
Gratiola ruellioides Colam. 589
Gratiola veronicifolia Retz. 586
Grewia L. 175, 176
Grewia laevigata auct. non Vahl 176
Grewia micrantha L. 176
Grewia multiflora auct. non Juss. 176
Grewia nervosa (Lour.) Panigrahi 176
Grewia serrulata DC. 176
Guarea gosadhora Buch.-Ham. 204
Guatteria sesquipedalis Wall. 131
Guatteria simarum Hook. f. & Thomson 133
Gymnema inoderum (Lour.) Donn. 539
Gymnema latifolium Wall. ex Wight 540
Gymnema R.Br. 539
Gymnema ringens Roxb. ex Spreng. 539
Gynopetalum cochinchinense (Lour.) Kurz 330
Gynocardia odorata R. Br. 10, 30, 150, 1052
Gynocardia R. Br. 150
Gynura Cass. 484
Gynura cratichoides Benth. 476
Gynura foetida Wall. ex DC. 484
Gynura nepalensis DC. 484
Gynura nepalensis var. *thomsoni* C.B. Clarke 484
Habenaria stenopetala Lindl. 918
Habenaria Willd. 908, 918
HALORAGACEAE 122, 297, 1047
Hedera himalaica Buch.-Ham. ex D. Don 343
Hedyotium J. Koenig 928, 934
Hedyotium thyriforme Sm. 934, 1052
Hedyotis diffusa Willd. 447
Hedyotis erecta Manilal & Sivur. 448
Hedyotis herbacea L. 448
Hedyotis hispida Retz. 448
Hedyotis L. 437
Hedyotis pinifolia var. *caespitosa* Hook.f. 454
Hedyotis pinifolia Wall. ex G.Don 454
Hedyotis scandens Roxb. 437
Hedyotis wightiana Wall. ex Wight & Arn. 446
Hedysarum alatum Roxb. 274
Hedysarum caudatum Thunb. 268
Hedysarum gangeticum L. 269
Hedysarum heterocarpon L. 269
Hedysarum sinifolium L.f. 277
Hedysarum motorium Houtt. 272
Hedysarum triangulare Retz. 266
Hedysarum triflorum L. 274
Hedysarum triquetrum L. 274
Hedysarum vaginale L. 255
Helicia erratica Hook.f. 777
Helicia Lour. 777
Helictis allagrica Bedd. 777
Heliotropium indicum L. 556
Heliotropium L. 556
Helixanthera ligustrina (Wall.) Danser 781
Helixanthera Lour. 781
Hellania Retz. 928
Hellania speciosa (J. Koenig) S.R. Datta 928
Hemiorchis Kurz 929, 934
Hemiorchis pentlingii King 934
Hemistaphylemys Bunge 488

Botanical Survey of India

Hemikovia heterantha Hook.f. & Thomson ex A.DC. 786
Herpatis chamaedryoides Kunth 591
Hibiscus abelmoschus L. 166
Hibiscus L. 165, 166
Hibiscus lobatus (Murray) Kunze 167
Hibiscus manihot L. 165
Hibiscus radiatus Cav. 167
Hibiscus solandra L'Hér. 167
Hibiscus surattensis L. 168
Hibiscus tetraphyllus Roxb. ex Hornem. 165
Hippia integrifolia L.f. 478
HIPPOCASTANACEAE 119, 229, 1047
Hippocratea arborea Roxb. 211
HIPPOCRATIDACEAE 211
Hiptage benghalensis (L.) Kurz 42, 185, 1030
Hiptage Gaertn. 184, 185
Hiptage madagascariensis Gaertn. 185
Hiraea mazans Roxb. ex DC. 184
Hodgsonia heteroclitia (Roxb.) Hook.f. & Thomson 325
Hodgsonia Hook.f. & Thomson 323, 325
Holarrhena antilyaenensis Wall. ex A.DC. 522
Holarrhena pubescens (Buch.-Ham.) Wall. ex G.Don 522, 1051
Holarrhena R.Br. 522
Holigarna racemosa Roxb. 232
Holmakioidia Retz. 649
Holmakioidia sanguinea Retz. 649
Holostean confertum L. 153
Homalium Jacq. 150, 152
Homalium napaulense (DC.) Benth. 151, 152, 1048
Horsfieldia kingii (Hook.f.) Warb. 768
Horsfieldia Willd. 768
Hottonia sessiliflora Vahl 582
Hoya globulosa Hook.f. 542
Hoya lanceolata Wall. ex G.Don 542
Hoya longifolia Wall. ex Wight 542
Hoya parviflora (Wall. ex Hornem.) Wight 544
Hoya R.Br. 540
Hoya verticillata (Vahl) G. Don 544
HYDROCHARITACEAE 905, 907
Hydrocotyle asiatica L. 339
Hydrocotyle javanica Thunb. 340
Hydrocotyle L. 339, 340
Hydrocotyle rotundifolia Roxb. ex DC. 341
Hydrocotyle sibthorpioides Lam. 341
Hydrolea L. 551
Hydrolea zeylanica (L.) Vahl 551
HYDROPHYLLACEAE 428, 551
Hygrophila polypetala (Roxb.) T. Anderson 622
Hygrophila R.Br. 622
Hygrophila ringens (L.) R.Br. ex Spreng. 622
Hygrophila salicifolia (Vahl) Nees 622

Hygroryza aristata Nees 1026
Hygroryza Nees 1007, 1026
Hymenodictyon excelsum Wall. 439
Hymenodictyon orizense (Roxb.) Mabb. 439
Hymenodictyon Wall. 439
HYPERICACEAE 118, 158
Hypericum japonicum Thunb. 33, 158
Hypericum L. 158
HYPOKIDACEAE 907, 938, 1047
Hypilanthra stricta (Roxb. ex Schult.) Wight & Arn. 439
Hypilanthra Wight & Arn. 439
Hypis brevipes Poit. 663
Hypis Jacq. 663
Hypis succolepis (L.) Poit. 663, 1051, 1054
ICACINACEAE 207
Ichsanthia P. Beauv. 1008, 1026
Ichsanthia pallens 1026
Ichsanthia vicinus (R.M. Bailey) Merr. 1026
Ichnocarpus frutescens (L.) R.Br. 523
Ichnocarpus R.Br. 523
ILEX L. 208
Ilex sulcata Wall. ex Hook.f. 208
Ilex umbellulata (Wall.) Loes. 208
Iysanthes parviflora Benth. 588
Iysanthes rotundifolia (L.) Benth. 589
Impatiens balsamina L. 43, 187
Impatiens exilis Hook.f. 43, 188
Impatiens jarpia Buch.-Ham. ex Hook.f. & Thomson 43, 188, 189
Impatiens latiflora Hook.f. & Thomson 43, 190, 1048
Impatiens Riv. ex L. 187
Impatiens tripetala Roxb. & DC. 44, 190
Imperata arundinacea Cirillo 1027
Imperata Cirillo 1008, 1027
Imperata cylindrica (L.) Nees. 1027
Incarvillea pansitica Roxb. 602
Indigofera L. 254, 277
Indigofera tinifolia (L. f.) Retz. 277, 1054
Indigofera tzymannii Miq. 278
Indigofera zollingeriana Miq. 278
Ipomoea carnea
Ipa chynaria Jack 249
Ipa lucidior Steud. 248
Ipomoea batatas (L.) Lam. 564
Ipomoea carnea subsp. *batatas* (Mart. ex Choisy) DE Austin 564, 1054
Ipomoea cymosa (Desr.) Roem. & Schult. 566
Ipomoea fistulosa Mart. ex Choisy 564
Ipomoea hederacea Jacq. 565
Ipomoea hederifolia L. 565
Ipomoea L. 564
Ipomoea nil (L.) Roth 565
Ipomoea quamoclit L. 566
Ipomoea vitifolia (Burn.f.) Sweet 567

- Inachne australis* R.Br. 1027
Inachne dispar 1027
Inula globosa (Thunb.) Kuntze 1027
Inula R.Br. 1007, 1027
Itea L. 297
Itea macrophylla Wall. 297
Inula Cass. 484
Inula polyccephala Cass. 484
Inula strobilata Breckel 440
Inula L. 440
Inula tomentosa Roxb. ex Sm. var. *glabrescens* Kurz 452
Inula nigricans R.Br. ex Wight & Arn. 440
Jasminum amplexicaule Buch.-Ham. ex Wall. & G.Don 512
Jasminum aromosans DC. 513
Jasminum elongatum (Bergius) Willd. 512
Jasminum L. 512
Jasminum multiflorum (Burns.f.) Andrews 512
Jasminum nervosum Lour. 513
Jasminum pubescens (Retz.) Willd. 512
Jasminum sambac (L.) Aiton 513
Jasminum scandens (Retz.) Vahl 514
Jasminum undulatum Ker-Gawl. 512
Jatropha curcas L. 796
Jatropha L. 796
JUGLANDACEAE 735, 854
JUNCACEAE 903, 960
Juncus bufonius L. 960
Juncus L. 960
Juncus prismatocarpus R.Br. 962
Jussiaea hyssoyifolia G. Don 321
Jussiaea suffruticosa L. 321
Justicia adhatoda L. 623, 1051
Justicia canescens Lam. 628
Justicia chinensis L. 618
Justicia gendarussa Burm.f. 624
Justicia L. 623
Justicia latifolia Vahl 631
Justicia peotinata L. 624
Justicia polypserma Roxb. 622
Justicia speciosa Roxb. 628
Justicia thyriformis Roxb. ex Hardw. 630
Justicia virgata T. Anderson 625
Kurrimia maingayi M. A. Lawson 209
Kurrimia pulcherrima Wall. 209
Kyllinga brevifolia Roth. 999
Kyllinga cyperina Retz. 982
Kyllinga monocephala Stokes 1001
Kyllinga nemoralis (L.R. Forst. & G. Forst.) Dandy ex Hitch. & Dalziel 1001
Kyllinga Roth. 974, 999
Lactuca dolichocephala Kitam. 485
Lactuca L. 485
Lactuca longifolia DC. 485
Lactuca polyccephala (Cass.) Benth. & Hook.f. 484
Lagerstroemia flor-reginae Retz. 318
Lagerstroemia grandiflora Roxb. ex DC. 320
Lagerstroemia L. 318, 317
Lagerstroemia parviflora Roxb. 308, 1050
Lagerstroemia speciosa (L.) Pers. 318, 1050
Lagera aurita Sch.Bip. ex Schweinf. 487
Lagurus cylindricus L. 1027
LAMIACEAE 429, 634
Lamnia A. Rich. 232, 283
Lamnia coronandeleica (Houtt.) Merr. 233
Lantana camara L. 651, 1054
Lantana L. 651
Laportea bulbifera (Siebold & Zucc.) Wedd. 829
Laportea crenulata Gaudich. 826
Laportea Gandich. -Beaup. 829
Laportea terminalis Wight 829
Lasia Lour. 964, 968
Lasia spinosa (L.) Thwaites 968
Lasia heterophylla (Roxb.) Schott 968
LABIACEAE 734, 768
Laurus cubeba Lour. 774
Laurus villosa Roxb. 776
Laurus bejolghota Buch.-Ham. 772
LECYTHIDACEAE 121, 309
Leea acuta L. 224
Leea odatata (L.) Ridgdale 224
Leea aspera H&Gw. 224
Leea bracteata C.B.Clark 225
Leea cinerea M.A.Lawson 226
Leea compactiflora Kurz 225
Leea crispata L. 224
Leea diffusa M.A.Lawson 226
Leea guineensis G. Don 225
Leea hirta Roxb. ex Hornem. 224
Leea indica (Burm.f.) Merr. 225
Leea integrifolia Roxb. 226
Leea L. 223
Leea macrophylla Roxb. ex Hornem. 226
Leea parvifolia Wall. ex M.A. Lawson 226
Leea paniculata Kurz 224
Leea robusta Roxb. 226
Leea sambucina Willd. 225
Leea trifoliata M.A. Lawson 225
Leea umbraculifera C.B.Clark 225
LEBACEAE 223
Leersia hexandra Sw. 1029
Leersia Sw. 1007, 1029
LEGUMINOSAE (RABACEAE (s.l.)) 235
Lemna aquinoctialis Wclw. 973
Lemna L. 973
Lemna paucicostata Hagalm. 973
LEMNACEAE 905, 973, 1047
LENTIBULARIACEAE 427, 599
Leonurus L. 664

Botanical Survey of India

- Leonurus sibiricus* L. 664
Lepidagathis hypoleuca Nees 627
Lepidagathis incurva Buch.-Ham. ex D.Don 627
Lepidagathis Willd. 627
Lepionurus Blume 207
Leptonurus oblongifolius (Griff.) Mast. 207
Lepionurus sylvatica Blume 207
Lepisanthes Blume 226, 228
Lepisanthes somaliensis (Juss. ex Poir.) Leerb. 228
Leptobaea Benth. 605
Leptobaea multiflora (C.B. Clarke) Benth. ex Gamble 605
Leptoderma lamocolata Wall. 442
Leptoderma Wall. 442
Lettsomia strigosa Roxb. 559
Leucas leucandulifolia Sm. 664
Leucas trifolia (Roth) Spreng. 664
Leucas R.Br. 664
Leucosium capitatum Lour. 938
LILACEAE 906, 946
Limnanthemum cristatum (Roxb.) Griseb. 551
Limnophila chinensis (Osbeck) Merr. 581
Limnophila hirsuta (Hayne ex Benth.) Benth. 581
Limnophila R.Br. 581
Limnophila sessiliflora (Vahl) Blume 582
Limodorum apyllum Roxb. 914
Limodorum tankervilleae Banks ex L.Hér. 922
Limonia pentaphylla Retz. 194
LINACEAE 117, 183, 1047
Lindenbergia bhutanica T. Yamaz. 582
Lindenbergia hookeri C.B. Clarke ex Hook.f. 582
Lindenbergia Lehm. 582
Lindenbergia mauraria (Roxb. ex D.Don) Bruhl 584
Lindenbergia titensis Sikdar & Maiti 585
Lindenbergia urticifolia Lehm. ex Link & Otto 584
Lindernia All. 585
Lindernia antipoda (L.) Aiton 586
Lindernia ciliata (Colson.) Pennell 586
Lindernia crustacea (L.) E. Muell. 587
Lindernia parviflora (Roxb.) Haines 588
Lindernia pusilla (Willd.) Bold. 588
Lindernia rotundifolia (L.) Aiton 589
Lindernia ruelliaeoides (Colson.) Pennell 589
Lipoblepharis Orchard 485
Lipoblepharis urticifolia (Blume) Orchard 485
Lippia nodiflora (L.) Michx. 651
Litsea citrata Blume 774
Litsea cubeba (Lour.) Pers. 774
Litsea Lam. 774
Litsea monopetala (Roxb.) Persoon 774
Litsea polycarpa Juss. 774
Litsea salicifolia (Roxb. ex Nees) Hook.f. 775
Lobelia affinis Wall. ex G.Don 501
Lobelia stanooides Lam. 498
Lobelia L. 498
Lobelia zuzumularis Lam. 499
Lobelia pumila Burm.f. 591
Lobelia rosea Wall. 499
Lobelia trigona Roxb. 498
Lobelia asyriaca L. 501
LOGANIACEAE 428, 548
Lophophyllum bicristata Griff. 138
LORANTHACEAE 734, 780
Loranthus ampullaceus Roxb. 782
Loranthus cochinchinensis Leav. 782
Loranthus falcatus L.f. 781
Loranthus globosus Roxb. 783
Loranthus gracilifolius Roxb. ex Schult. f. 783
Loranthus involucreus Roxb. 784
Loranthus ligustrinus Wall. 781
Loranthus longiflorus var. *pubescens* Hook. f. 781
Loranthus scurrula L. 784
Ludwigia hymenophylla (G. Don) Hazli 321, 1054
Ludwigia L. 321
Ludwigia octovalvis (Jacq.) P.H. Raven 321, 1054
Luffa acutangula (L.) Roxb. 326
Luffa acutangula var. *amara* (Roxb.) C.B. Clarke 326
Luffa aegyptiaca Mill. 326
Luffa amara Roxb. 326
Luffa cylindrica (L.) M. Roem. 326
Luffa Mill. 323, 325
Luisia brachystachys (Lindl.) Blume 919
Luisia filiformis Hook. f. 919
Luisia Gaudich. 909, 919
Luisia grevesii Hook. f. 919
Lysianthes (Dunal) Hassl. 570
Lysianthes crassipetala (Wall.) R.R. Mill 570
Lycopus dianthera Buch.-Ham. ex Roxb. 665
Lysionotus D.Don. 605
Lysionotus serratus D.Don 605
Lysionotus ternifolia Wall. 605
LYTHRACEAE 316
Lythrum carthagenense Jacq. 317
Lythrum fruticosum L. 320
Masaranga denticulata (Blume) Mull.Arg. 798
Masaranga Thouars 798
Machilus glaucescens (Nees) Wight 776
Machilus Nees 776
Machilus odoratissima Nees 776
Machilus villosa (Roxb.) Hook.f. 776
Mackaya Harvey 627
Mackaya indica (Nees) Engelm 627

- Maclura cochinchinensis* (Lour.) Corner 832
Maclura Nutt. 832
Macrosaronium strictum Roxb. ex Schult. 439
Macrosolen (Blume) Rehb. 782
Macrosolen cochinchinensis (Lour.) Tiegh. 782
Macrosolen gibosus (Roxb.) Tiegh. 783
Maddenia pedicellata Hook. f. 293
Maduca Buch.-Ham. ex J.F. Smel. 309
Maduca longifolia (J. Koernig ex L.) J.E. Macbr. var. *latifolia* (Roxb.) A. Chev. 309
Maesa Forst. 308
Maesa indica (Roxb.) A.DC. 308
Maesa macrophylla (Wall.) A.DC. 309
Magnolia deltoidea (Buch.-Ham. ex DC.) Figlar. 19, 127
Magnolia hodgsonii (Hook. f. & Thomson) H. Keng 10, 19, 127, 128, 1050
Magnolia L. 127
MAGNOLIACEAE 118, 127, 1050
Malaixis josephiana (Rehb. f.) Kuntze 912
Mallotus albus Nutt. non Roxb. ex Jacq. 801
Mallotus ferrugineus (Roxb.) Muell. Arg. 801
Mallotus Lour. 799
Mallotus nudiflorus (L.) Kunju & Weizner 799
Mallotus philippensis (Lam.) Muell. Arg. 799, 1051, 1052
Mallotus repandus (Rottler ex Willd.) Muell. Arg. 800
Mallotus roxburghianus Muell. Arg. 800
Mallotus tetraoocous (Roxb.) Kurz 801
MALPIGHIACEAE 118, 184
MALVACEAE 120, 165
Marsilea indiana Lour. 578
Mappa denticulata Blume 798
Marsilea malaccensis Burm. f. 929
MARANTACEAE 906, 935
Mariscus cyperinus (Retz.) Vahl 982
Mariscus cyperinus var. *bengalensis* C.B. Clarke 982
Mariscus microcephalus J.Preal & C.Preal 980
Mariscus sibiricus Nees ex C.B. Clarke 982
Markhamia Seem. ex Baill. 609
Markhamia tomentosa (Benth.) K. Schum. ex Engl. 609
Marsilea hegouii f. Roxb. 345
Marsdenia calostiana Wight 545
Marsdenia R.Br. 545
Marsdenia tinctoria R.Br. 545, 1051, 1053
Marus Lour. 391
Mazus paniculatus (Burm. f.) Steenis 391
Mazus rugosus Lour. 391
Meacardonia pneumonanthe (Mill.) Small 391
Meacardonia Ruiz & Pav. 391
Medinilla Gaudich. 311
Medinilla rubicunda (Jack) Blume 311
Melanthera L. 311, 313
Melanthera malabarica L. 313
Melanthera rubicandula Jack 311
MELASTOMACEAE 311
Melia azadirach L. 204
Melia baccifera Roxb. ex Roth 202
Melia L. 204
MELIACEAE 201
Melica latifolia Roxb. ex Hornem. 1044
Melicoma Blume 230
Melicoma simplicifolia (Roxb.) Walp. 230
Melochia corchorifolia L. 36, 172
Melochia L. 171, 172
Melochia indica Lour. 331
MENISPERMACEAE 117, 133, 136,
Menispermum cordifolium Willd. 140
Menispermum glaucum Lam. 139
Menispermum japonicum Thunb. 140
Mentha auriculata L. 668
Mentha pumila Graham 670
Mentha stellata Lour. 672
MENYANTHACEAE 428, 551
Meyanthes cristata Roxb. 551
Merronia Donist. ex Endl. 566
Merronia umbellata (L.) Hallier f. 566, 1054
Merronia vitifolia (Burm. f.) Hallier f. 567, 1054
Mesoclasia brachystachya Lindl. 919
Meyna erecta Benth. 639
Meyna latiflora Robyns 442
Meyna pubescens (Kurz) Robyns 443
Meyna Roxb. ex Link 442
Meyna spinosa Roxb. ex Link 443, 1052
Mesjera nepalensis A. DC. 333
Mezosaurus cucullatus (Roxb.) Wight & Arn. 237
Mezosaurus cucullatus var. *grandis* Heyne ex Baker 237
Michelia dolostopa Buch.-Ham. ex DC. 127
Mimosa L. 175, 176
Mimosa paniculata L. 38, 176
Miomelasma Blume 195
Miomelasma integerrimum (Roxb. ex DC.) Wight & Arn. ex Veijs 195
Miomelasma pubescens Nutt. non Blume 195
Mimrostegium siliatum (Trin.) A. Camus 1029
Mimrostegium Nees 1009, 1029
Microstylis josephiana Rehb. f. 912
Mimrostegium discolor (Wall.) Wall. ex Meisn. 211
Microstegium Wall. ex Meisn. 208, 211
Middletonia C. Puglisi 607
Middletonia multiflora (R. Br.) C. Puglisi 607
Mikania micrantha Kunth 486, 1054
Mikania scandens Nutt. non (L.) Willd. 486
Mikania Willd. 486

Botanical Survey of India

- Milium globosum* Thunb. 1027
Milium dionae (Roxb.) Chaowasit & Keasler 21, 131, 132
Milium Lesch. ex A. DC. 129, 131
Milium razburghiana (Wall.) Hook. f. & Thomson 131
Millettia auriculata Baker ex Brandis 278
Millettia cinerea Benth. 258
Millettia extensa (Benth.) Baker 278
Millettia glabrescens Kurz 279
Millettia pachycarpa Benth. 279
Millettia Wight. & Arn. 251, 278
Millingtonia simplicifolia Roxb. 230
Mimosa caesia L. 245
Mimosa catechu L. f. 245
Mimosa caribaea Willd. 245
Mimosa diplotricha C. Wright 249, 1048, 1054
Mimosa himalayana Gamble 250
Mimosa L. 244, 249
Mimosa lebeck L. 247
Mimosa pennata L. 246
Mimosa procera Roxb. 248
Mimosa pudica L. 250, 1051, 1054
Mimosa rubicaulis auct. non Lam. 250
Mimosa rubicaulis subsp. *himalayana* (Gamble) H. Ohashi 250
MIMOSODEAE 235, 244
Mimulus bhutanicus T. Yamaz. 392
Mimulus L. 392
Mimulus violaceus Azaola ex Blanco 596
Mintzelia diversifolia Hamal. 492
Mitracarpus hirtum (L.) DC. 444
Mitracarpus Zucc. 444
Mitrasacme alsinoides auct. non R. Br. 549
Mitrasacme indica Wight 549
Mitrasacme Labill. 549
Modecca trilobata Roxb. 322
Molineria capitulata (Lour.) Hort. 938
Molineria Colla 938
MOLLUGINACEAE 121, 397, 1047
Mollugo hirta Thunb. 338
Mollugo L. 337, 338
Mollugo oppositifolia L. 338
Mollugo pentaphylla L. 338
Mollugo spargua L. 338
Mollugo stricta L. 338
Momordica charantia L. 327
Momordica charantia var. *muricata* (Willd.) Chakrav. 327
Momordica cylindrical L. 326
Momordica dioica Roxb. ex Willd. 327
Momordica L. 323, 327
Monochilus longilabris Lindl. 926
Monochilus nervosus Will. ex Lindl. 927
MONOCHLAMYDEAE 793
Monochoria hastifolia C. Presl 949
Monochoria vaginalis (Burm.f.) C. Presl 930
MONOCOTYLEDONS 15, 905
MORACEAE 735, 838
Morinda angustifolia Roxb. 444
Morinda L. 444
Morus indica L. 852, 1052
Morus L. 852
Mosla Buch.-Ham. ex Benth. 665
Mosla dianthera (Duch.-Ham. ex Roxb.) Maxim. 665
Mucuna Adanson 253, 281
Mucuna imbricata DC. ex Baker 281, 1049
Mucuna nigricans (Lour.) Steud. 281
Mucuna parviflora (L.) DC. 281
Muerteria tomentosa Scop. 609
Mukia Arn. 324, 328
Mukia maderaspatana (L.) M. Roem. 328
Mukia scabrella Arn. 328
Munchausia speciosa L. 318
Murdannia japonica (Thunb.) Faden 957
Murdannia loriformis (Hassk.) R.S. Rao & Kamrath 958
Murdannia nudiflora (L.) Brenan 958
Murdannia Royle 951, 957
Murdannia spirata (L.) Brackn. 959
Murraya exotica L. 196
Murraya Koenicg ex L. 195
Murraya koenigii (L.) Spreng. 196
Murraya paniculata (L.) Jack 196
Mussaenda andersonii Soumen K. Basu & T.K. Paul 445
Mussaenda glabra Vahl 445
Mussaenda L. 445
Mussaenda razburghii Hook.f. 445
Myrica octandra Buch.-Ham. ex D. Don 806
Myriophyllum indicum Wall. ex C. B. Clarke 297
Myriophyllum L. 297
Myriophyllum tetrandrum Roxb. 297
Myristica kingii Hook.f. 768
MYRISTICACEAE 735, 768
Myrobalanus ballaria Gaertn. 302
MYRSINACEAE 427, 503
MYRTACEAE 121, 904
Myrtus cinnam L. 305
Myrcopyrum Blume 514
Myrcopyrum smilacifolium (Wall.) Blume 514
Nama zeylanica L. 551
Naravella zeylanica (L.) DC. 124
Nasturtium benghalensis DC. 142
Nasturtium indicum DC. 143
Nasturtium indicum var. *benghalensis* (DC.) Hook.f. & T. Anderson 142
Nasturtium Buch.-Ham. 207
Natalium herpeticum Buch.-Ham. ex Arn. 207
Nauclea scandens Sm. 457

- Neanotis* W.H. Lewis 446
Neanotis wightiana (Wall. ex Wight & Arn.) W.H. Lewis 446
Nelsonia campestris R.Br. 626
Nelsoxia canescens (Lam.) Spreng. 626
Nelsoxia R.Br. 626
Neottia procera Ker. Gawl. 918
Nepeta indica L. 658
Nerium coccineum Roxb. ex Hornem. 530
Nerium divaricatum L. 526
Neuranthus subspicatus Benth. 284
NYCTAGINACEAE 734, 736
Nyctanthes arbor-tristis L. 516
Nyctanthes elongata Bergius 512
Nyctanthes L. 516
Nyctanthes multiflora Burm.f. 512
Nyctanthes sambac L. 513
Nyctanthes scandens Retz. 514
Nymphoides cristata (Roxb.) Kunze 551
Nymphoides Seg. 551
Oberonia iridifolia var. *denticulata* (Wight) Hook.f. 920
Oberonia Lindl. 908, 920
Oberonia macronata (D.Don) Ormerod & Seidenf. 920
Ocimum americanum L. 666, 1054
Ocimum canum Sims 666
Ocimum gratissimum L. 666
Ocimum L. 665
Ocimum sanctum L. 667
Ocimum tenuiflorum L. 667
Ocotea glaucescens Nees 776
Ocotea lanceolata Nees 777
Odina woderi Roxb. 233
Oenanthe javanica (Blume) DC. 341
Oenanthe L. 339, 341
Oenanthe stolonifera DC. 341
Oenothera octovalvis Jacq. 321
Oldenlandia corymbosa L. 447
Oldenlandia diffusa (Willd.) Reeb. 447
Oldenlandia erecta (Manilal & Sivur.) R.R. Mill 448
Oldenlandia herbacea (L.) Roxb. 448
Oldenlandia heynei G. Don 448
Oldenlandia L. 446
Oldenlandia repens L. 437
Oldenlandia verticillata L. 448
Olea dioica Roxb. 516
Olea L. 516
OLEACEAE 428, 511
ONAGRACEAE 921
Ophiopogon intermedius D.Don 938, 1052
Ophiopogon Ker. Gawl. 938
Ophiorrhiza fasciculata D.Don 449
Ophiorrhiza heterostyla Datta 450
Ophiorrhiza L. 449
Ophiorrhiza seshagiriana Sildar & Maiti 450
Ophioclyon serpentinum L. 525
OPILIACEAE 207
Opilismenus burmannii (Retz.) P. Beauv. 1030
Opilismenus compositus (L.) P. Beauv. 1031
Opilismenus P. Beauv. 1008, 1030
ORCHIDACEAE 905, 908, 1047
Orchis strausmannica L. 928
ORCONEIDE Miq. 829
Orconeide rubescens (Blume) Miq. 829
Origanum bengalense Burm.f. 669
Oroxylum indicum (L.) Kurz 610, 1051
Oroxylum Vest. 610
Osbeckia ornata Benth. ex Naudin 314
Osbeckia L. 311, 315
Osbeckia nepalensis Hook.f. 314
Osbeckia nutans Wall. ex C.B. Clarke 314
Osbeckia rostrata D. Don 315
Osbeckia staltata Buch.-Ham. ex D. Don 315
Ostodes Blume 803
Ostodes paniculata Blume 803
Otchilus albus var. *lanatilabris* (Seidenf.) Pradhan 920
Otchilus lanatilabris Seidenf. 920
Otchilus Lindl. 909, 920
Otophora panchajanya Hoen 228
Otosema emensa Benth. 278
Ottelia aluminodes (L.) Pezz. 907
Ottelia Pers. 907
Ottokloa Dandy 1008, 1031
Ottokloa nodosa (Kunth) Dandy 1031
OXALIDACEAE 118, 185
Oxalis corymbosa DC. 186
Oxalis debilis Kunth 42, 186
Oxalis L. 185, 186
Oxalis reinwardtii Zucc. 186
Oxyopora DC. 311, 315
Oxyopora paniculata (D. Don) DC. 315
Pachyrhizus angulatus Rich. ex DC. 282
Pachyrhizus erosus (L.) Urb. 282
Pachyrhizus Rich. ex DC. 253, 282
Paederia erubescens Prain 451, 1052
Paederia foetida L. var. *microcarpa* Kurz 451
Paederia L. 451
Panicum auritum J. Presl ex Nees 1032
Panicum bengalense Spreng. 1009
Panicum brevifolium L. 1032
Panicum burmannii Retz. 1030
Panicum cilense Retz. 1018
Panicum colomum L. 1019
Panicum compositum L. 1031
Panicum crus-galli L. 1020
Panicum curviflorum Hornem. 1033
Panicum indicum (L.) L. 1041
Panicum interruptum Willd. 1042

Botanical Survey of India

- Panicum* L. 1008, 1032
Panicum miliaceum L. 1033
Panicum montanum Roxb. 1034
Panicum nodosum Kunth 1031
Panicum notatum Retz. 1034
Panicum ovalifolium Poit. 1032
Panicum palmatifidum J. Koenig 1043
Panicum pahnifolium Roxb. 1034
Panicum polystachion L. 1037
Panicum proflerum 1034
Panicum ramosum L. 1012
Panicum sanguinale L. 1018
Panicum subquadrifarium Trin. 1012
Panicum tomentosum Roxb. 1043
Panicum victimum F.W. Bailey 1026
PAPAVBRACEAE 118, 141
Papilionantha Schltr. 909, 922
Papilionantha toros (Roxb.) Schltr. 922
PAPILIONGIDEAE 235, 251
Parabona Miex 133, 138
Parabona sagittata Miex ex Hook.f. & Thomson 138
Parabona multiflora (R. Br.) B. L. Burtt 607
Parietaria zeylanica L. 835
Parietaria microphylla L. 830
Parthenium hysterophorus L. 486, 1053, 1054
Parthenium L. 486
Paspalia lanceifolia Geest. 857
Paspalum commersonii Lam. 1035
Paspalum conjugatum P.J. Bergius 1035
Paspalum L. 1008, 1035
Paspalum sanguinale Lam. var. *extensum* Hook.f. 1019
Paspalum scrobiculatum L. 1035
PASSIFLORACEAE 126, 322, 1047
Passiflora asiatica L. 196
Pavetta indica L. var. *glabrescens* (Kurz) Deb & R.C. Rout 452
Pavetta L. 452
Pegia Colub. 232, 233
Pegia nitida Colubr. 233
Peltanthera tokaracea Roth 527
Pennisetum pedicellatum Trin. 1036
Pennisetum polystachion (L.) Schult. 1037
Pennisetum Rich. ex Pers. 1008, 1036
Pentapetes acerifolia L. 173
Pentaptera arjuna Roxb. ex DC. 302
Pentaptera crenulata Roxb. 303
Peperomia pellucida (L.) Kunth 761
Peperomia Ruiz & Pav. 761
Pepis indica Willd. 319
Pergularia sinensis Lour. 536
Pericampylus glaucus (Lam.) Merr. 139
Pericampylus incanus (Colubr.) Miex ex Hook.f. & Thomson 139
Pericampylus Miex 133, 139
Periploca arborea Dammst. 529
Periploca dubia Burm.f. 536
Peristrophe Nees 628
Peristrophe speciosa (Roxb.) Nees 528
Peroxis Aiton 1007, 1037
Peroxis indica (L.) Kunth 1037
Peroxis lanifolia Aiton 1037
Percalaria (L.) P. Müller 740
Pernisaria barbata (L.) Hara 750
Pernisaria barbata (L.) Hara var. *barbata* 750
Pernisaria barbata var. *gracilis* (Dammst.) H. Hara 750
Pernisaria capitata (Buch.-Ham. ex D.Don) H. Gross 751
Pernisaria chinensis (L.) H. Gross 751
Pernisaria chinensis (L.) H. Gross var. *chinensis* 752
Pernisaria chinensis (L.) H. Gross var. *ovalifolia* (Meisn.) H. Hara 752
Pernisaria hydropiper (L.) Delarbre 752
Pernisaria minor (Huds.) Opiz 753
Pernisaria nepalensis (Meisn.) H. Gross 754, 1052
Pernisaria strigosa (R.Br.) H. Gross 755
Pernisaria viscosa (Buch.-Ham. ex D.Don) H. Gross ex T.Mori 758
Pharus Lour. 908, 922
Pharus tancarvilleae (Banks ex L'Hér.) Blume 922
Phalaris L. 1007, 1038
Phalaris minor Retz. 1038
Phalaris minor var. *nepalensis* (Trin.) Bor 1038
Phanera Lour. 235, 239
Phanera scandens (L.) Lour. ex Raf. 239, 1053
Phaseolus calcaratus Roxb. 292
Phaseolus sublobatus Roxb. 292
Phaulopsis imbricata (Forsk.) Sweet 630
Phaulopsis parviflora Willd. 630
Phaulopsis Willd. 630
Phellandrium stoloniferum Roxb. 341
Phlogacanthus Nees 630
Phlogacanthus thyrsoiflorus (Roxb.) Nees 630
Phlogacanthus thyrsoiflorus (Roxb. ex Harms.) Mabb. 630, 1051, 1052
Phoebe laucolata (Nees) Nees 777
Phoebe Nees 777
Phoenix L. 962, 963
Phoenix sylvestris (L.) Roxb. 963, 1052
Pholidota articulata Lindl. 923
Pholidota griffithii Hook.f. 923
Pholidota imbricata Hook. 923
Pholidota Lindl. ex Hook. 909, 923
Pholidota obtusa Hook.f. 923
Phragmites Adans. 1007, 1038
Phragmites karka (Retz.) Trin. ex Steud. 1038
Phrymian capitatum Willd. 936

- Phrynium dichotomum* Roxb. 937
Phrynium parviflorum Roxb. 936
Phrynium placantarium (Lour.) Merr. 936
Phrynium pubinerve Blume 936
Phrynium Willd. 935, 936
Phylla Lour. 631
Phylla nodiflora (L.) Greene 631
PHYLLANTHACEAE 735, 805
Phyllanthus airy-shawii Jean RDrucel & Jacq. Roux 817
Phyllanthus amarus Schumacher & Thonn. 817
Phyllanthus debilis Wall. ex Hook. f. 817
Phyllanthus emblica L. 818, 1050, 1051
Phyllanthus hamiltonianus Müll.Arg. 819
Phyllanthus L. 816
Phyllanthus nanus Hook.f. 817
Phyllanthus niruri 817
Phyllanthus reticulatus Poit. 818
Phyllanthus ruseoides Wight 819
Phyllanthus sikkimensis Müll.Arg. 819
Phyllanthus simplex Retz. 820
Phyllanthus simplex var. *oblongifolius* (Wight) Müll.Arg. 820
Phyllanthus urinaria L. 820
Phyllanthus virginicus 820
Phyllanthus viridis Roxb. ex Willd. 813
Phyllodes placantarum Lour. 936
Phyllis angulata L. 572, 1054
Phyllis L. 572
Phyllis minima L. 572
Phytolacca asiatica L. 224
PHYRASEA Blume 198, 200
Pierasma javanica Blume 199
Pierardia sapida Roxb. 807
Pilea anisophylla (Hook. f.) Wedd. 830
Pilea anisophylla var. *robusta* Hook.f. 830
Pilea Lindl. 830
Pilea microphylla (L.) Liebm. 830
Pilea muscosa Lindl. 830
Pilea peploides (Gaudich.) Hook. & Arn. 831
Pilea symmetrica Wedd. 831
Piliostigma Hochst. 235, 241
Piliostigma malabaricum (Roxb.) Benth. 241
Piliostigma malabaricum var. *reniforme* (Rayle ex Baker) Thoth. 241
Pinalia stricta (Lindl.) Kuntze 917
Piper argyrophyllum Miq. 762
Piper attenuatum Buch.-Ham. ex Miq. 763
Piper betleoides C.DC. 763
Piper brachystachyum Wall. ex Hook.f. 764
Piper L. 762
Piper kengium L. 764
Piper nullifera Buch.-Ham. ex D. Don 764
Piper nepalense Miq. 766
Piper pepuloides Roxb. 764
Piper pellucidum L. 761
Piper subpigrum Buch.-Ham. ex D. Don 766
Piper sylvaticum Roxb. 766
Piper thomsonii (C. DC.) Hook.f. 767
PIPERACEAE 735, 761
Pistia L. 964, 970
Pistia stratiotes L. 970
Pithecellobium angulatum Benth. 249
PLANTAGINACEAE 429, 673
Plantago asiatica subsp. *occoca* (Wall.) Z. Yu Li 673, 1051
Plantago ariza Wall. 673
Plantago L. 673
Plantago major 673
Poa amabilis L. 1022
Poa aspera Jacq. 1023
Poa gangetica Roxb. 1025
Poa pilosa L. 1025
Poa unioloides Retz. 1025
POACEAE 905, 1006, 1045
Pogonatherum caekatum (Thunb.) Kunth 1039
Pogonatherum P. Beauv. 1009, 1039
Pogonatherum panicum (Lam.) Hack. 1039
Pogonatherum saccharoides P. Beauv. 1039
Pogostemon auricularis (L.) Hook. 668
Pogostemon benghalensis (Burm.f.) Kuntze 669
Pogostemon Desf. 667
Pogostemon alahaltisoides Benth. 669
Pogostemon glaber Benth. 670
Pogostemon parviflorus Benth. 670
Pogostemon plectranthoides Desf. 669
Pogostemon pusillus (Graham) Presl. 670
Pogostemon stellatus (Lour.) Kuntze 672
Poikilospermum lanceolatum (Trecul.) Merr. 832
Poikilospermum Zipp. ex Miq. 832
Pollia subumbellata C.B. Clarke 959
Pollia Thunb. 950, 959
Pollinia ciliata Trin. 1029
Polyalthia Blume 129, 139
Polyalthia sinilarum (Hook. f. & Thonson) Hook. f. & Thomson 132, 133, 1050
Polygonum L. 153, 155
Polygonum isefungiae Benth. & Hook.f. 155
Polygonum prostratum (Pers.) A. Sch. & Schweinf. 155
Polyntia ceylanica Wight 295
POLYGONACEAE 734, 748
Polygonum alatum Buch.-Ham. ex D. Don 754
Polygonum barbatum L. 750
Polygonum barbatum L. subsp. *gracile* Danser 751
Polygonum capitatum Buch.-Ham. ex D. Don 751
Polygonum chinense L. 751
Polygonum chinense var. *ovatifolium* Meisn. 752
Polygonum hydropiper L. 752

Botanical Survey of India

- Polygonum* L. 735
Polygonum minus Huds. 753
Polygonum nepalense Meisn. 754
Polygonum plebeium R. Br. 756
Polygonum possumbii Buch.-Ham. ex D. Don 756
Polygonum runcinatum Buch.-Ham. ex D. Don 756
Polygonum strigosum R. Br. 755
Polygonum viscosum Buch.-Ham. ex D. Don 758
Pongamia angustifolia Buch.-Ham. ex Baker 279
Pontederia crassipes Mart. 949, 1054
Pontederia hastata L. 949
Pontederia L. 947
Pontederia plantaginea Roxb. 950
Pontederia sagittata Roxb. 949
Pontederia vaginalis Burm.f. 950
PONTEDERIACEAE 906, 947
Porana Burm.f. 567
Porana paniculata Roxb. 567
Porana racemosa Roxb. 561
Portulaca L. 157
Portulaca oleracea L. 157
PORTULACACEAE 118, 157, 1047
Posoqueria fasciculata Roxb. 434
Posoqueria longispina Link 435
Potamogeton indicus Roxb. 973
Potamogeton L. 973
Potamogeton nodosus Poir. 973
POTAMOGETONACEAE 905, 973, 1047
Potentilla indica (Andrews) Th. Wolf 292
Potentilla L. 292
Pothos L. 964, 970
Pothos scandens L. 970
Pouzolzia calophylla W.T. Wang & C.J. Chen 834
Pouzolzia Gaudich. 832
Pouzolzia hirta (Blume) Hassk. 834
Pouzolzia indica (L.) Gaudich. 835
Pouzolzia indica var. *alienosa* Wedd. 835
Pouzolzia sanguinea (Blume) Merr. 835
Pouzolzia viminea Wedd. 835
Pouzolzia zeylanica (L.) Benn. 835
Pratia begoniifolia (Wall.) Lindl. 499
Prema barbata Wall. ex Vojgt 652
Prema L. 652
Prema latifolia Roxb. 652
Prema latifolia var. *mollissima* (Roxb.) C.B. Clarke 652
Prema latifolia var. *mucronata* (Roxb.) C.B. Clarke 652
Prema latifolia var. *viburnoides* (Wall. ex Schauer) C.B. Clarke 652
Prema mollissima Roth 652
Prema mucronata Roxb. 652
Premnanthes japonica L. 497
PRIMULACEAE 427, 505
Prionopsis cyrtoides (Roxb. ex DC.) Wight & Arn. 261
Proctis parva Blume 827
PROTEACEAE 734, 777
Prunus cerasoides Buch.-Ham. ex D. Don 293
Prunus ceylanica (Wight) Miq. 293, 1049
Prunus L. 292, 293
Prunus pudica (Roxb. ex Ser.) Miq. 293
Pseudochinolaena polystachya (Kunth) Stapf 1040
Pseudochinolaena Stapf 1006, 1040
Pseudocanthosium latifolium (Vahl) B. Hansen 631
Pseudocanthosium Radlk. ex Lindau 631
Pseudocoryza Cuscut. 487
Pseudocoryza viscosa (Mill.) D'Arcy 487
Pseudoglyphium affine (D. Don) Ander. 487
Pseudoglyphium Kirpich. 487
Ptilotrichum Blume 743
Ptilotrichum ferrugineum (Roxb.) Moq. 745
Ptilotrichum trichotomum Blume 745
Psychotria dentonata Wail. 452
Psychotria erratica Hook.f. 453
Psychotria L. 452
Psychotria epilaxioides Wall. 456
Pterospermum acerifolium (L.) Willd. 173
Pterospermum Schreb. 171, 175
Pueraria DC. 253, 283
Pueraria phaseoloides (Roxb.) Benth. 283
Pueraria phaseoloides var. *phaseoloides* 283
Pueraria phaseoloides var. *mispicata* (Benth.) Massee 284
Pueraria subspicata Benth. 284
Pueraria sikkimensis Prain 284
Pycnarhema Miens ex Hook.f. & Thomson 133, 139
Pycnarhema planiflora Miens ex Hook.f. & Thomson 24, 139
Pycnos capillaris (Koenig ex Roxb.) Nees ex C.B. Clarke 1001
Pycnos flavidus (Retz.) Koyama 1001
Pycnos P. Beauv. 974, 1001
Pycnos sanguinolentus (Vahl) Nees 1003
Pycnos stramineus (Nees) C.B. Clarke 1002
Pygeum acuminatum Colabr. 295
Pygeum glaberrimum Hook.f. 295
Quercoclis pinna Bojer 566
Quercus ferox Roxb. 855
Quercus lanceaeifolia Roxb. 857
Randia domestica 435
Randia fasciculata DC. 434
RANUNCULACEAE 118, 123
Ranunculus L. 122, 125

- Ranunculus aculeatus* L. 17, 125
Rauwolfia canescens L. 525
Rauwolfia L. 523
Rauwolfia serpentina (L.) Benth. ex Kurz 525
Rauwolfia tetraphylla L. 525
Ruellia hamiltoniana (Moll.Arg.) A.M. Cowan & Cowan 819
Reinwardtia Dumort. 183
Reinwardtia indica Dumort. 41, 183
Reinwardtia trigyna (Rohb.) Planch. 183
Reissantia arborea (Roxb.) Hara 211
Reissantia Halle 211
Remusatia Schott 964, 971
Remusatia vivipara (Roxb.) Schott 971
RHAMNACEAE 213
Rhamnus jujuba L. 215
Rhamnus L. 213, 214
Rhussums napalensis (Wall.) M.A. Lawson 214
Rhamnus vitis-idaea Burm.f. 810
Rhaphidophora calophylla Schott 971
Rhaphidophora Hassk. 964, 971
Rhaphidophora paeppii 971
RHIZOPHORACEAE 299
Rhopalephora Hassk. 951, 969
Rhopalephora scaberrima (Blume) Paden 960
Rhus chinensis MiB. 234
Rhus L. 232, 234
Rhus semialata Murray 234
Rhynchospora Blume 607
Rhynchospora obliquum Blume 607
Rhynchospora obliquum var. *parviflorum* C.B. Clarke 607
Rhynchospora aurea Vahl 1003
Rhynchospora corymbosa (L.) Britton 1003
Rhynchospora Vahl 974, 1003
Rhynchosstylis Blume 909, 924
Rhynchosstylis rotunda (L.) Blume 924
Richardia L. 453
Richardia scabra L. 453
Ricinus communis L. 809, 1051
Ricinus L. 803
Robinia septem Jacq. 276
Rondeletia pendula Wall. 458
Rondeletia tinctoria Roxb. 459
Rorippa benghalensis (DC.) Hara 142
Rorippa indica (L.) Hiern 26, 143
Rorippa Scop. 142
ROSACEAE 292
Rotala indica (Willd.) Koehne 319
Rotala L. 315, 319
Rotala rotundifolia (Buch.-Ham. ex Roxb.) Koehne 319
Rotheca Raf. 653
Rotheca serrata (L.) Steane & Mabb 653
Rottlera ferruginea Roxb. 801
Rottlera tetraevca Roxb. 801
Roydsia suaveolens Roxb. 148
Rubia L. 453
Rubia tikimaniensis Kurz 453, 1053
RUBIACEAE 427, 432
Rubus calycinoides Kuntze 295
Rubus ellipticus Sm. 295
Rubus L. 292, 295
Rubus moluccanus 295
Rubus moluccanus var. *calcinodes* (Kuntze) Kuntze 295
Rubus rosifolius Sm. 296
Ruellia antipoda L. 586
Ruellia hamiltoniana Steud. 632
Ruellia imbricata Forsk. 630
Ruellia peraclypta Lindl. 633
Ruellia ringens L. 622
Rumex dentatus L. 759
Rumex L. 758
Rumex maritimus L. 759
Rungia parviflora var. *pectinata* (L.) C.B. Clarke 624
Rungia pectinata (L.) Nees 624
RUPTACIACEAE 118, 191
SABIA Colebr. 230, 231
Sabia limoniaca Wall. ex Hook.f. & Thomson 231
Sabia pentanata Edgew. ex Hook.f. & Thomson 231
SABIACEAE 230
Saccharum arundinaceum Retz. 1040, 1052
Saccharum L. 1009, 1040
Saccharum panicum Lam. 1039
Saccharum spontaneum L. 1041, 1054
Sacciolepis indica (L.) Chase 1041
Sacciolepis interrupta (Willd.) Stapf 1042
Sacciolepis Nash 1008, 1041
Saccolabium micranthum Lindl. 924
Saccolabium obliquum Lindl. 918
Saccolabium papillosum Lindl. 910
Sagina japonica (Sw. ex Steud.) Ohwi 32, 156
Sagina L. 153, 156
Sagina procumbens 156
Salvia occidens Buch.-Ham. ex Etl. 672
Salvia L. 672
SAMBUCACEAE 427, 431
Sambucus adnata Wall. ex DC. 431
Sambucus canadensis L. 431
Sambucus L. 431
SANTALACEAE 734, 786
SAPINDACEAE 226
Sapindus attenuatus Wall. ex Hiern 228
Sapindus bifoliolatus (Thunberg) Hiern 228
Sapindus L. 226, 228
Sapindus mukorosi Gaertn. 228
Sapindus senegalensis Juss. ex Poir. 228
Sapium baccatum Roxb. 788

Botanical Survey of India

- Sapthm lasigne* (Royle) Trimen 796
Sapthm lasigne var. *malabaricum* (Wight) Hook.f. 796
- SAPOTACEAE** 427, 509
- Saurauia roxburghii* Wall. 34, 161
Saurauia Willd. 161
Saururus albicans Blume 809
Saururus compressus Muell.Arg. 809
Saururus lanceolatus Hook.f. 809
Saururus oblongifolius Hook.f. 809
Saururus rigidus Thwaites 809
Saururus trinervis Hook.f. & Thomson ex Muell.Arg. 810
Sausurea affinis Spreng. ex DC. 488
Sausurea DC. 488
Sausurea lyrata Franch. 488
- SAKIFRAGACEAE** 121, 297, 1047
- Schefflera bengalensis* Gamble 343
Schefflera J.R. Forst. & G. Forst. 342, 343
Schima Reine ex Blume 160
Schima wallichii (DC.) Korth. 6, 10, 33, 160, 1050
Schmidelia chartacea Kurz 227
Schoenoplectiella articulata (L.) Lye 1005
Schoenoplectiella Lye 974, 1003
Schoenoplectiella mucronata (L.) J. Jung & H.K. Choi 1005
- Schumannianthus dichotomus** (Roxb.) Gagnep. 937
Schumannianthus Gagnep. 935, 937
Scilla indica Roxb. 946
Scirpus acutangulus Roxb. 988
Scirpus aestivalis Retz. 992
Scirpus articulatus L. 1005
Scirpus barbatus Roth. 974
Scirpus bisumbellatus Forsk. 994
Scirpus comatus Wall. 990
Scirpus complanatus Retz. 995
Scirpus corymbosus L. 1003
Scirpus cyperoides L. 982
Scirpus dichotomus L. 995
Scirpus mucronatus L. 1005
Scirpus schoenoides Retz. 998
Scleria elata discolorans Thwaites 1006
Scleria elata Thwaites 1005
Scleria elata var. *latior* Thwaites 1006
Scleria melanostoma Boeckeler 1006
Scleria P.J. Bergius 974, 1005
Scleria terrestris (L.) Fasset 1005
Scleromitron (Wight & Arn.) Meisn. 454
Scleromitron pinifolium (Wall. ex G. Don) R.J. Wang 454
Scoparia dubia L. 592, 1054
Scoparia L. 592
- SCROPHULARIACEAE** 429, 577
- Scorriula gracilifolia* (Roxb. ex Scholt.) Dummer 783
Scorriula L. 783
Scorriula parvifolia L. 784
Semecarpus amacordium L. f. 234
Semecarpus L. f. 232, 234
Senecio bhui C.B. Clarke 490
Senecio valerianifolius Link. ex Spreng. 480
Senna alata (L.) Roxb. 242, 1054
Senna hitroba (L.) H.S. Irwin & Burnsby 242
Senna occidentalis (L.) Link. 243, 1054
Senna P. Miller 235, 241
Senna siamea (Lam.) H.S. Irwin & Burnsby 243
Senna tora (L.) Roxb. 243, 1054
Serratula arvensis L. 474
Setaria intermedia Roem. & Schult. 1043
Setaria P. Beauv. 1007, 1042
Setaria palmifolia (J. Koenig) Stapf 1043
Setaria paniculifera (Steud.) B. Fourr. ex Hemsl. 1043
Setaria tomentosa (Roxb.) Kunth 1043
Shorea robusta C.F. Gaertn. 6, 34, 162, 1050
Shorea Roxb. ex C.F. Gaertn. 162
Shusteria hirsuta Baker 285
Shusteria involucreata (Wall.) Wight & Arn. 285
Shusteria vestita (Wall.) Wight & Arn. var. *involucreata* Baker 285
Shusteria Wight & Arn. 253, 284
Sida acuta Burm. f. 168, 1051, 1054
Sida carpinifolia Mart. 168
Sida cordifolia L. 169
Sida L. 165, 168
Sida rhombifolia L. 169
Sigesbeckia L. 488
Sigesbeckia orientalis L. 488
- SITIFRAGACEAE** 198
- Siphonanthus indicus* L. 546
Sium javanicum Blume 341
Sloanea darycarpa (Benth.) Hemsl. 182
Sloanea L. 178, 182
Sloanea sterculiacea (Benth.) Rabder & Wilson 6, 182
Sloanea sterculiacea var. *assamica* (Benth.) Cooke 40, 183
Sloanea sterculiacea var. *merculacea* 183
- SMILACACEAE** 906, 946
- Smilax* L. 946
Smilax macrophylla Roxb. 946
Smilax ovalifolia Roxb. ex D. Don 946
Smilax perfoliata Lour. 947
Smilax prolixa Roxb. 947
Smilax roxburghiana Wall. ex Hook.f. 947
Smithia Aiton 254, 287
Smithia sensitiva Aiton 287
Smithiantha Holttum 909, 924
Smithiantha micrantha (Lindl.) Holttum 924
- SOLANACEAE** 428, 568

- Solanum lobatum* Murray 167
Solanum americanum Mill. 573
Solanum crassipetalum Wall. 570
Solanum erianthum D.Don 573
Solanum inebriatum L.
Solanum khasianense var. *chattisjarjanense*
 Sengupta 576
Solanum L. 572
Solanum spicatum Roxb. 574
Solanum sramonifolium 574
Solanum torvum Sw. 574, 1054
Solanum verbascifolium 573
Solanum visnagum Dunal 576
Solanum violaceum Ortega 576
Solanum heterophyllum Lour. 328
Solema Lour. 323, 328
Sonchus arvensis auct. non L. 488
Sonchus L. 488
Sonchus wallichianus DC. 488
Sonchus wightianus DC. 488
Sonchus wightianus subsp. *wallichianus* (DC.)
 Boulay 489
Sonchus wightianus subsp. *wightianus* 489
SONNERATIACEAE 330
Spathodea zomemosa Benth. 609
Spatholobus Haussk. 253, 287
Spatholobus parviflorus (Roxb. ex DC.) Kuntze
 287
Spatholobus roxburghii Benth. 287
Spergula japonica Sw. ex Steud. 156
Sperlingia verticillata Vahl 544
Spermacoce decandrollei Deb & Raina Dutta 455
Spermacoce exilis (L.O. Williams) C.R. Adams
 ex W.C. Burger & C.M. Taylor 455
Spermacoce hirta L. 444
Spermacoce hispida L. 455
Spermacoce L. 455
Spermacoce latifolia Aubl. 455
Spermacoce oeymoides Burmf. 456
Sphaeranthus indicus L. 489
Sphaeranthus L. 489
Sphaerocneme decandra (Hiera) T.D. Penn. 205
Sphaerocneme Wall. ex Royle 201, 205
Spilanthes acmella var. *caha* (DC.) C. B. Clarke
 465
Spilanthes acmella var. *paniculata* (DC.) C. B.
 Clarke 465
Spilanthes paniculata Wall. ex DC. 465
Sponia politoria Planch. 837
Sporobolus diandrus var. *faccidus* (Roth ex
 Roem. & Schult.) Veldkamp 1044
Sporobolus fertilis (Steud.) Clayton 1044
Sporobolus R.Br. 1007, 1044
Staphylea indica Burmf. 225
STAPHYLEACEAE 229
Stelis mucronata D.Don 920
Stellaria alba Griseb. 32, 156
Stellaria L. 153, 156
Stellaria media (L.) Vill. 32, 157
Stellaria uliginosa Murray 156
Stemodia muraria Roxb. ex D.Don 584
Stephania hernandifolia (Willd.) Walp. 140
Stephania japonica (Thunb.) Miq. 140
Stephanis japonica var. *discolor* (Blume)
 Forster 25, 140
Stephania japonica var. *japonica* 140
Stephanis Lour. 134, 140
Sterculia coccoloba Roxb. 174
Sterculia hamiltonii (Kuntze) Adelt. 174
Sterculia L. 171, 173
Sterculia lamosifolia Roxb. 174
Sterculia roxburghiana Wall. 174
Sterculia villosa Roxb. ex Smith 10, 37, 175,
 1050
STERCULIACEAE 120, 171
Stereospermum Cham. 610
Stereospermum cheimoides 611
Stereospermum colais (Buch.-Ham. ex
 Dillwyn) Mabb. 610
Stereospermum tetragonum DC. 611
Stilago hirsuta L. 806
Stixis Lour. 143, 148
Stixis suaveolens (Roxb.) Pierre 10, 29, 148,
 1052
Stratiotes alismoides L. 907
Strobilus asper Lour. 854
Strobilus Lour. 854
Strobilanthes anisophylla (G. Lodd.) T. Anderson
 633
Strobilanthes Blume 633
Strobilanthes colorata T. Anderson 632
Strobilanthes hamiltoniana (Steud.) Booser &
 Heino 632
Strobilanthes persicifolia (Lindl.) J.R.I. Wood
 633
Strobilanthes pubiflora J.R.I. Wood 633
Strobilanthes sabiniana Nees 634
Strobilanthes tomentosa (Nees) J.R.I. Wood
 634
Strophanthus DC. 526
Strophanthus wallichii A.DC. 526
Styidium chinense Lour. 345
STYRACACEAE 511
Styrax L. 511
Styrax serrulatus Roxb. 511
Synedrella Gaertn. 490
Synedrella nodiflora (L.) Gaertn. 490, 1054
Synotis (C.B. Clarke) C. Jeffrey & Y.L. Chen
 490
Synotis (C.B. Clarke) C. Jeffrey & Y.L.
 Chen 490

Botanical Survey of India

Synbrium indicum L. 143
Syzygium claviformum (Roxb.) Wall. ex Steud. 305, 1052
Syzygium cumini (L.) Skeels 305
Syzygium formosum (Wall.) Masam. 306
Syzygium fruticosum Roxb. ex DC. 306
Syzygium Gaertn. 304
Syzygium kurrallii (Duthie) N.P. Balatr. 307
Syzygium oblatum (Roxb.) Wall. ex A.M. Cowan & Cowan 307
Syzygium ramosissimum (Blume) N.P. Balatr. 307
Syzygium smallianum (Brandis) D.G. Long 309, 1048
Tabernaemontana coronaria (Jacq.) Willd. 526
Tabernaemontana divaricata (L.) R.Br. 526
Tabernaemontana L. 526
Talassia hodgeana Hook. f. & Thomson 127
TAMARICACEAE 117, 158, 1047
Tamarix gallica auct. non L. 158
Tamarix gallica var. *indica* (Willd.) Ehrenb. 158
Tamarix indica Willd. 158
Tamarix L. 158
Taptia hirsuta Hook. f. 233
Tephrosia candida DC. 288
Tephrosia Pers. 254, 288
Tephrosia purpurea (L.) Pers. 288
Tephrosia purpurea var. *pubescens* Baker 288
Terminalia alata B. Heyne ex Roth 303
Terminalia arjuna (Roxb. ex DC.) Wight & Arn. 302, 1050
Terminalia bellirica (Gaertn.) Roxb. 302, 1050, 1051
Terminalia chabala Retz. 303, 1050
Terminalia crenulata Roth 303
Terminalia elliptica Willd. 303
Terminalia L. 300, 301
Terminalia myriocarpa Van Heurck. & Mull. Arg. 304, 1050
Terminalia tomentosa Wight & Arn. 303
Terminalia tomentosa Wight & Arn. var. *crenulata* C.B. Clarke 303
Terminalia angustifolia Medik. 940
Tetradenia obovata Nees 769
Tetrameles medifera R. Br. 337
Tetrameles R. Br. 337
Tetranthera monopetala Roxb. 774
Tetranthera salicifolia Roxb. ex Nees 775
Tetrastigma (Miq.) Planch. 215, 220
Tetrastigma bracteolatum (Wall.) Planch. 221
Tetrastigma dabênum (M.A. Lawson) Planch. 221
Tetrastigma leucostaphyllum (Dennst.) Alston 222
Tetrastigma planicanis (Hook.f.) Gagnep. 222

Tetrastigma serrulatum (Roxb.) Planch. 223
Teucrium L. 673
Teucrium stoloniferum Roxb. 673
Teucrium viciatum Blume 673
TEBACEAE 118, 160
Theobroma angustata L. 171
Thepis DC. 492
Thepis divaricata (Wall. ex DC.) DC. 492
Thysocaphelos nemorale J.R. Forst. & G. Forst. 1001
Thysocanthus indicus Nees 627
Thunbergia coecinea Wall. 637
Thunbergia erecta (Benth.) T. Anderson 639
Thunbergia grandiflora (Roxb. ex Rottl.) Roxb. 639
Thunbergia Retz. 637
Thysanolaema agrostis Nees 1045
Thysanolaema latifolia (Roxb. ex Hornem.) Honda 1044, 1052, 1053
Thysanolaema maxima (Roxb.) Kuntze 1044
Thysanolaema Nees 1007, 1044
TILIACEAE 120, 175
Tinospora cordifolia (Willd.) Miers 23, 140
Tinospora Miers 133, 140
Tithonia Desf. 492
Tithonia diversifolia (Hemsl.) A. Gray 492
Toddalia aculeata Pers. 196
Toddalia asiatica (L.) Lam. 196
Toddalia Juss. 196
Tolypanthus (Blume) Rehb. 784
Tolypanthus involucreatus (Roxb.) Tiegh. 784
Toona (Endl.) M. Roem. 201, 205
Toona ciliata M. Roem. 205, 1050
Torenia cordifolia Roxb. 593
Torenia diffusa EdDon. 594
Torenia flava Buch.-Ham. ex Benth. 594
Torenia L. 593
Torenia peduncularis Benth. ex Hook.f. 596
Torenia vagans Roxb. 594
Torenia violacea (Azzola ex Blanco) Pennell 596
Tournefortia hookeri C.B. Clarke 558
Tournefortia hookeri var. *subtropica* C.B. Clarke 558
Tournefortia L. 558
Toxocarpon himalensis Falc. ex Hook.f. 547
Toxocarpon Wight & Arn. 547
Trachelospermum assamense Woodson 527
Trachelospermum Lam. 527
Tridacanthia vaga Lour. 935
Trapa L. 322
Trapa natans L. 322
TRAPACEAE 121, 322, 1047
Trema Lour. 836
Trema orientalis (L.) Blume 836
Trema polibertia (Planch.) Blume 837

The Flora of Buxa Tiger Reserve, West Bengal, India

- Trewia nudiflora* L. 799
Trichosanthes cordata Roxb. 329
Trichosanthes costata Blume 330
Trichosanthes heteroclitia Roxb. 325
Trichosanthes himalensis C.B. Clarke 330
Trichosanthes himalensis var. *glabrior* C.B. Clarke 330
Trichosanthes L. 323, 329
Trichosanthes ovigera Blume 330
Trichosanthes palmata Roxb. 331
Trichosanthes tricuspidata Lour. 331
Trichosporon parviflorum D.Dou 603
Trichostema Blume 909, 924
Trichostema daayphylla (E.C. Pariah & Rech.f.) Kraenzl. 924
Tridax L. 493
Tridax procumbens L. 493, 1051, 1054
Triumfetta namo L. 38, 177
Triumfetta L. 175, 177
Triumfetta pilosa Roth 38, 39, 178
Triumfetta rhomboides Jacq. 39, 178
Turpinia pomifera (Roxb.) DC. 229, 1030
Turpinia Vent. 229
Tylophora hirsuta (Wall.) Wight 547
Typhonium L. 964, 972
Typhonium trilobatum (L.) Schott 972
ULMACEAE 735, 836
Uncaria macrophylla Wall. 457
Uncaria pilosa Roxb. 457
Uncaria scandens (Sw.) Hutch. 457
Uncaria Schreb. 456
Uncaria acutifruetus Roxb. 457
Urena discolor Vahl 130
Urena L. 165, 170
Urena lobata L. 170, 1054
Urginea indica Konth 946
Urtica bulbifera Siebold & Zucc. 829
Urtica diversifolia Link 828
Urtica hirta Blume 834
Urtica L. 835
Urtica parviflora Roxb. 835
Urtica rubescens Blume 829
Urtica sanguinea Blume 835
Urtica sinuata Blume 826
URTIACEAE 735, 821
Utricularia aurea Lour. 599
Utricularia flexuosa Vahl 599
Utricularia L. 599
Utricularia orbicularis Wall. ex A. DC. 599
Utricularia striatula Sm. 599
Uvaria dioeca Roxb. 131
Vaccinium salignum Hook. f. 504
Vallisneria haynei Spreng. 527
Vallisneria N. Burman 527
Vallisneria salmonea (Roth) Kuntze 527
Vallisneria L. 907
Vallisneria spiralis L. 907
Vanda Jones ex R.Br. 909, 925
Vanda roxburghii R.Br. 925
Vanda tessellata (Roxb.) Hook. ex G. Don 925
Vandellia crustacea Benth. 587
Vandellia scabra Benth. 588
Vangueria pubescens Kurz 443
Vangueria spinosa Roxb. var. *molle* Hook. f. 443
Vangueria spinesca (Roxb. ex Link) Roxb. 443
Vasneria cochinchinensis Lour. 852
Vateria lanceolata Roxb. 164
Vatica L. 162, 164
Vatica lamellifolia (Roxb.) Blume 163, 164, 1049
Ventilago calyculata Tul. 214
Ventilago denticulata Willd. 214, 1051
Ventilago Gaertn. 213, 214
Ventilago madraspatana var. *calyculata* King 214
Verbena nodiflora L. 651
VERBENACEAE 429, 640
Verbesina laevia L. 466
Verbesina nodiflora L. 490
Verbesina urticifolia Blume 485
Verbesina prostrata L. 478
Vernonia attenuata DC. 495
Vernonia cinerea (L.) Less. 477
Vernonia saligna DC. 495
Vernonia Schreb. 495
Vernonia volkammerifolia DC. 495
Veronica anagallis 596
Veronica anagallis var. *punctata* Hook. f. 596
Veronica anagallis-aquatica L. 596
Veronica javanica Blume 597
Veronica L. 596
Viburnum celebrense Wall. ex DC. 429
Viburnum L. 429
Vicia hirsuta (L.) Gray 289
Vicia L. 252, 289
Vicia anthra L. 289
Vigna pilosa (J.C. Klein ex Willd.) Baker 275
Vigna pilosa (Klein ex Willd.) Baker 290
Vigna radiata var. *amblylobata* (Roxb.) Verdc. 292
Vigna Savi 252, 290
Vilhelbunea integrifolia var. *sylvatica* (Blume) Hook. f. 829
Vincetoxicum hirsutum (Will.) Kuntze 547
Vincetoxicum Wolf 547
Viola difflua Ging. 29, 148, 149
Viola L. 148
VIOLACEAE 117, 148, 1047
Viscum platyphyllum Spreng. 786
VITACEAE 216
Vitex L. 654
Vitex negundo L. 654

Botanical Survey of India

- Vitis auriculata* (Roxb.) Wall. 220
Vitis barbata Wall. 216
Vitis bracteolata Wall. 221
Vitis capreolata D. Don 223
Vitis discolor (Blume) Daltzell. 218
Vitis dubia M.A. Lawson 221
Vitis elongata (Roxb.) Wall. ex M.A. Lawson 219
Vitis gericulata (Blume) Miq. 217
Vitis japonica Thunb. 217
Vitis lanceolata Wall. 222
Vitis mollis Wall. ex M.A. Lawson 217
Vitis oxyphylla Wall. 221
Vitis planicaulis Hook. f. 222
Vitis rotundifolia (Lam.) Wight & Arn. 219
Vitkoneria japonica Thunb. 646
Vitkoneria serena L. 633
Wahlenbergia gracilis (G.Forst.) A. DC. 501
Wahlenbergia marginata (Thunb.) A. DC. 501
Wahlenbergia Schrad. ex Roth 501
Wedelia urticifolia DC. 485
Wedelia wallichii Less. 485
Wendlandia Bartl. ex DC. 458
Wendlandia pendula (Wall.) DC. 458
Wendlandia timorica (Roxb.) DC. 459
Woodfordia floribunda Salisb. 320
Woodfordia fruticosa (L.) Kurz 320, 1051
Woodfordia Salisb. 316, 320
Wrightia arborea (Dennis.) Mabb. 529
Wrightia coccinea (Roxb. ex Hornem.) Sims 530
Wrightia R. Br. 529
Wrightia tinctoria R. Br. 530
Wrightia tomentosa Roem. & Schult. 529
Xanthium indicum Koenig 497, 1054
Xanthium L. 497
Xanthium strumarium L. 497
Youngia Cass. 497
Youngia japonica (L.) DC. 497
Zanthoxylum acanthopodium DC. 197
Zanthoxylum acanthopodium var. *timbor* Hook. f. 197
Zanthoxylum hamiltonianum var. *tomentosum* Wall. 198
Zanthoxylum hamiltonianum Wall. ex Hook. f. 198
Zanthoxylum L. 197
Zanthoxylum nitidum (Roxb.) DC. 198
Zehneria Endl. 324, 334
Zehneria japonica (Thunb.) H.Y. Liu 331
Zehneria mayracensis (Wight & Arn.) Arn. 332
Zexmone clandestina Blume 926, 1048
Zexmone Lindl. 908, 925
Zexmone Hindleyana A.N. Rao 926, 1048
Zexmone longilabris (Lindl.) Trimen 926
Zexmone nervosa (Wall. ex Lindl.) Trimen 927
Zexmone reflexa King & Presl. 927, 1049
Zexmone stratonematica (L.) Schltr. 928
Zingiber Mill. 929, 935
Zingiber nigrum Gaertn. 930
Zingiber serumbet (L.) Roscoe ex Sm. 935
ZINGIBERACEAE 906, 929
Zizania terrestris L. 1005
Ziziphus aetnae Hook. f. 215
Ziziphus jujuba Lam. 215
Ziziphus mauritiana Lam. 215, 1051
Zizyphus Mill. 213, 215