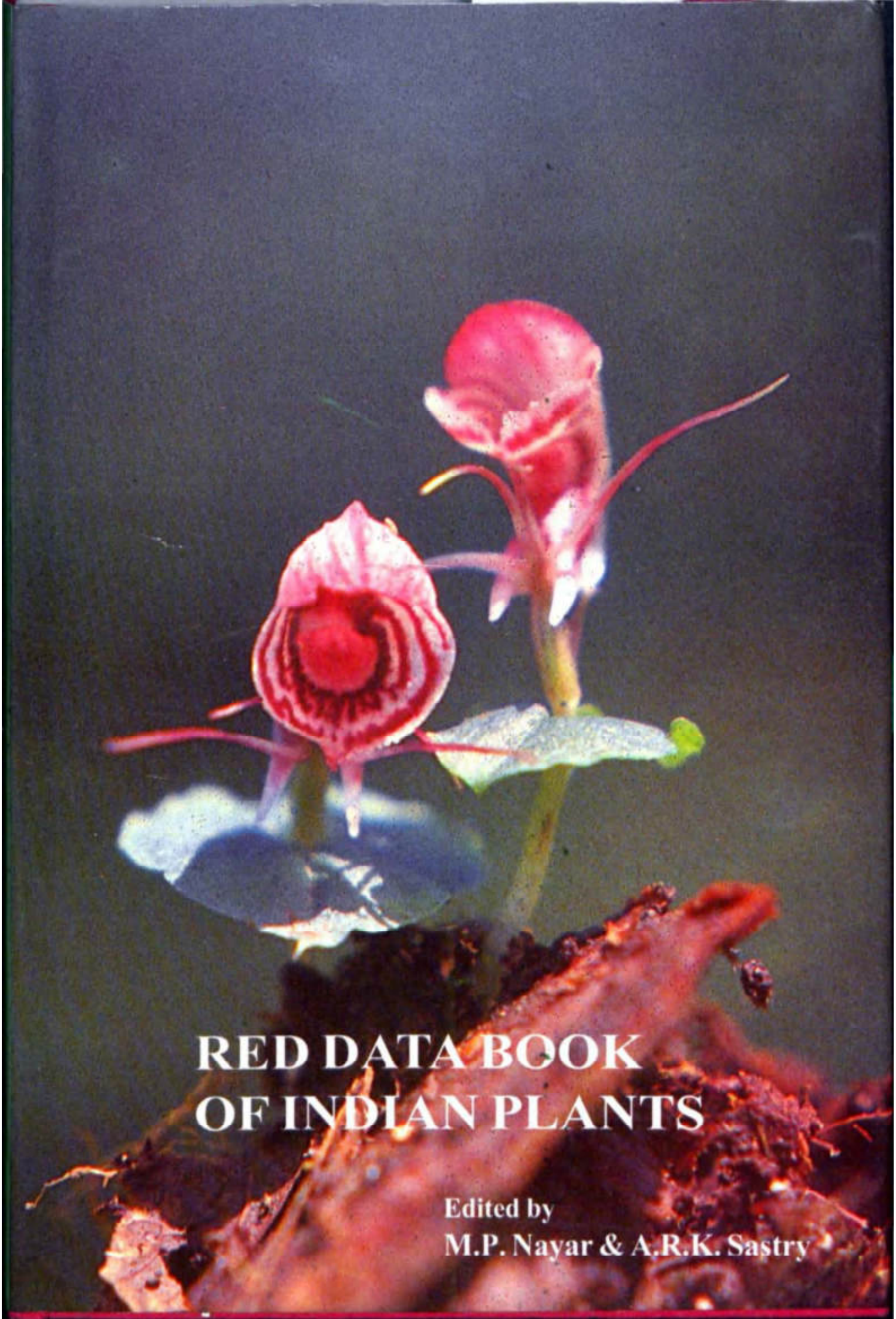

RED DATA BOOK OF INDIAN PLANTS

Edited by
M.P. Nayar & A.R.K. Sastry

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Volume 3

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M. P. Nayar
A. R. K. Sastry

BOTANICAL SURVEY OF INDIA

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Cover Photo :
Corybas purpureus Joseph & Yog.–Helmet Orchid.
A threatened ground orchid of Meghalaya. (data sheet in *R.D.B.* Vol. 2)
Courtesy : K. M. Joseph, BSI, Shillong.

Published by the Director, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700 001 and printed at Deep Printers, A-8, Mayapuri, Industrial Area, Phase-I, New Delhi - 110064.

PREFACE

The first and the second volumes of the Red Data Book on Indian Plants were published by the Botanical Survey of India in the years 1987 and 1988 and include 619 data sheets. The present volume deals with 195 threatened taxa of Indian flora.

The presentation of information in the data sheets included in this volume is on the lines followed in the earlier volumes.

In the introduction to the first volume the present editors, while mentioning the urgency and need to publish these volumes, have also provided the IUCN Red Data Book Categories and some other information on the extinction of species and concept of rarity of plants (Annexures I & II) for use in writing Red Data Sheets by different experts working on various plant groups, families, genera and on flora rich areas. To this, within the scope of the editors, efforts have been made to bring uniformity in the presentation of the data sheets as far as possible. However, scope still exists for improvement. It is accordingly emphasized that these publications are meant to provide forewarning on plants in need for conservation.

A few data sheets supplied by scientists on species with wider distribution areas covering parts of adjoining countries have been excluded in this volume. This is done on the argument which is often put forth that populations of such species, however rare and scattered may be in Indian areas, only represent the peripheral locations of larger and main distribution centres located elsewhere. However, some exceptions have also been made to this while considering inclusion of some over-exploited plants in trade, not only from our distribution localities but also in their entire range covering contiguous countries. This is done for conservation of such a species in its entire range. It is, therefore, hoped that this judgement is taken in its proper perspective.

As in the Vols. 1 & 2, a number of line drawings (placed nearest to corresponding data sheets) and eight colour plates have been included here. Of these, data sheets on *Cymbidium tigrinum* (Vol. 2, p. 168), *Cymbidium hookerianum* (Vol. 1, p. 241) and *Paphiopedilum villosum* (Vol. 1, p. 272) have already appeared.

A combined index to the species dealt in the three volumes published so far is presented at the end.

Suggestions for improving these publications are most welcome.

M. P. NAYAR
A. R. K. SASTRY
Editors

PREFACE TO THE FIRST REPRINT

The UN Biodiversity meeting at Earth Summit in Rio de Janeiro held in June 1992 laid immense stress on biological diversity of our globe and the need to preserve it for posterity. Over the past few decades, the populations of many plant and animal species have declined at an alarming rate due to ecological disturbances caused by human population explosion and industrial expansion. Some of them have even become extinct. The IUCN was the first to publish the accounts of plants and animals which have become rare, threatened and/ or extinct in the form of Red Data Books from time to time. Realising this alarming situation various countries in the world have brought out Red Data Books of plants and animals at country level. The Botanical Survey of India has published three volumes of "Red Data Book of Indian Plants" edited by M.P. Nayar and A.R.K. Sastry in the years 1987, 1988 and 1990. Two more volumes (4 & 5) are in various stages of publication. Since the publication of these volumes, there is a great demand for these books by people from all walks of life and stocks have exhausted. All these volumes provide basic data to undertake detailed study and conservation of species included. The Botanical Survey of India has initiated the Status Survey of all the species included in these volumes and since these studies take a very long time to produce revised editions of Red Data Books, to meet the pressing demand for books on my suggestion, the Programme Advisory Committee of BSI and ZSI, Ministry of Environment and Forests, Govt. of India, recommended the reprinting of the first editions of volumes as such. The Reprinted Volumes hope to meet the immediate demand of all who are in need of these volumes for study and conservation of Biodiversity.

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Botanical Survey of India
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Calcutta 700 001

ACKNOWLEDGEMENTS

The Botanical Survey of India places on record its grateful thanks to Smt. Maneka Gandhi, Hon'ble Minister of State, Ministry of Environment & Forests, Government of India, for the keen interest in the Survey and kind consent to release this volume.

The kind words and encouragement given by late Prof. B. P. Pal, FRS, FNA, Chairman of the former National Committees on NCEPC and MAB in his forewords to the BSI publications : *Threatened Plants of India — A State-of-the-Art Report* (Jain & Sastry, 1980) and *Red Data Book of Indian Plants* Vol. 1 (eds. Nayar & Sastry, 1987) have been a source of encouragement to the Survey. Humble tributes to his memory are placed on record.

Grateful thanks are due to Dr. M. S. Swaminathan, FRS, President, IUCN ; Professors A. K. Sharma and H. Y. Mohan Ram, past and the present Chairmen respectively of the Programme Advisory Committee, Botanical & Zoological Surveys ; Shri Mahesh Prasad, Secretary, Ministry of Environment & Forests, Government of India for their valuable suggestions and interest in this work.

Thanks are due to the scientists who authored and supplied the Red Data Sheets.

Sri M. Ahmedullah helped in verifying some scientific data. Sri S. C. Pal, Publication Officer and staff of the Publication Section, Sri D. C. Chakravarty, Stenographer, Botanical Survey of India and M/s. Prabartak Printing & Halftone Ltd., Calcutta have helped in various ways in bringing out this volume. We sincerely thank them all.

Vanda coerulea Courtesy : K. M. Joseph

National Orchidarium, Shillong-Inside view Courtesy : BSI, EC, Shillong

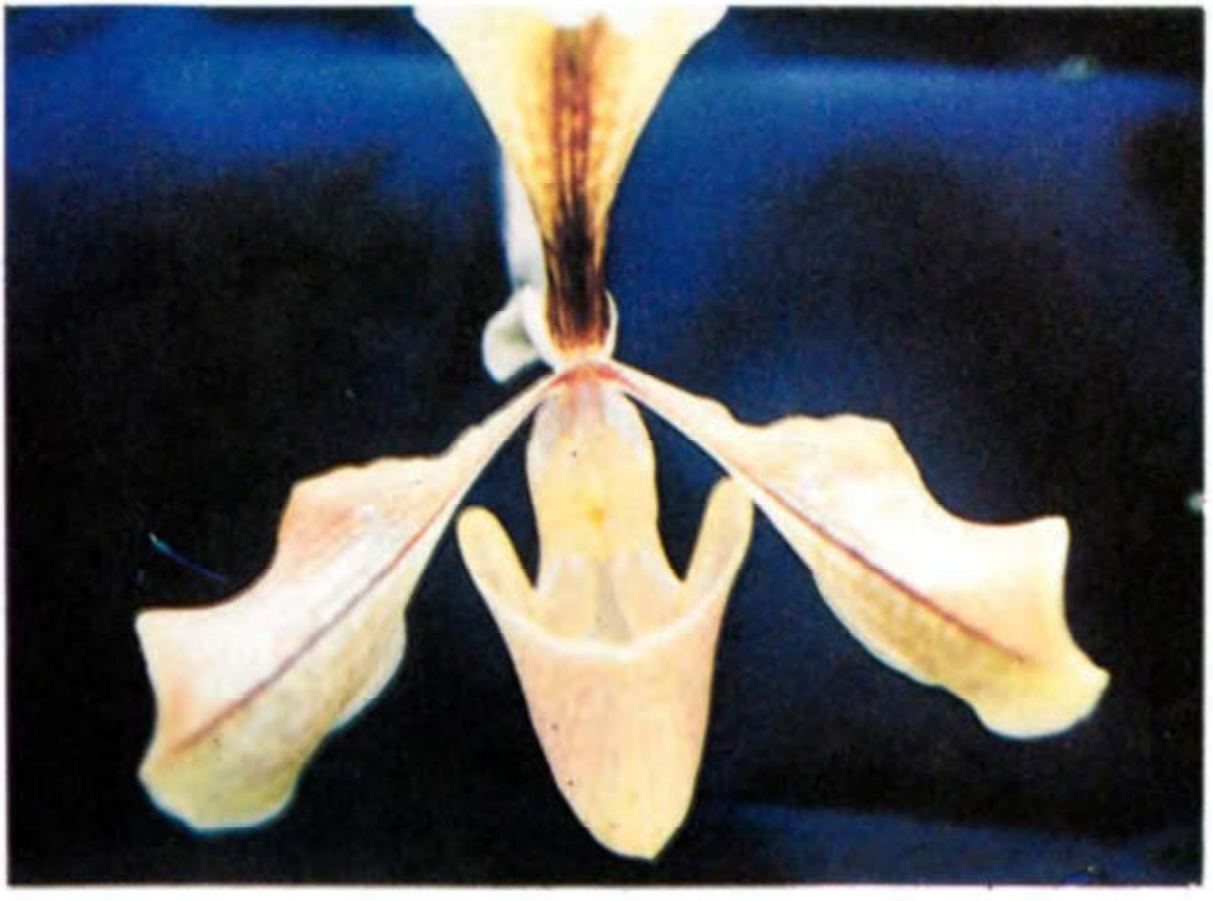
Frerea indica Courtesy : B. D. Sharma

Ceropegia sp. Courtesy : M. Sanjappa

Cymbidium tigrinum Courtesy : M. P. Nayar

Cymbidium hookerianum Courtesy : K. M. Joseph

Paphiopedilum hirsutissimum Courtesy : M. P. Nayar



Paphiopedilum villosum Ccurtesy : K. M. Joseph

STATUS : Rare. So far known from parts of Northern Western Ghats and Concan only. Dalzell described this species in 1850 from 'Concan' (Type in K). Thereafter Law collected this species from 'Bombay' in 1851 without stating precise locality. Its last collection (*Acland* 916) from Kherdi hill near Dapoli (Ratnagiri district, Maharashtra), made in December 1921, is the only specimen in BLAT.

DISTRIBUTION : Peninsular India : Northern W. Ghats, Concan (*Maharashtra* : Northern Concan; near Rohe in Raigad district (4); Dapoli in Ratnagiri district. Endemic.

HABITAT AND ECOLOGY : On low hills as forest undergrowth upto an elevation of 240 m (800 ft.) in Dapoli vicinity.

CONSERVATION MEASURES TAKEN : None. The species has been listed in the threatened plant lists by the Botanical Survey of India (6).

CONSERVATION MEASURES PROPOSED : Attempts to relocate the species and conservation of natural populations in its natural habitats, and introduction of a few plants in Botanic/ experimental gardens, are suggested.

BIOLOGY AND POTENTIAL VALUE ; It flowers in October-February.

CULTIVATION : None so far.

DESCRIPTION : Suffruticose herbs or undershrubs ; stems glaborous, ascending, geniculate. Leaves elliptic-lanceolate, acuminate, entire, sparsely hispid above, glabrous beneath. Inflorescence trichotomous, covered with white floccose hairs. Flowers light-purple, 1-3 in number, sessile, in opposite axils of floral leaves.

REFERENCES :

1. Ahmedullah, M. & Nayar, M.P. (1987). *Endemic Pl. Ind. Region* 1 : 149. Botanical Survey of India, Calcutta.
2. Clarke, C. B. (1885). *In :* Hooker, J. D., *Fl. Brit. India* 4 : 557.
3. Cooke, T. (1958). *Fl. Pres. Bombay* 2 : 477. (repr. ed.). Botanical Survey of India, Calcutta.
4. Dalzell, N. A. (1850). *Kew J. Bot.* 2 : 343.
5. Dalzell, N. A. & Gibson, A. (1861). *Bombay Flora*. p. 197. Bombay.
6. Raghavan, R. S. & Singh, N. P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Pl. Cons. Bull.* 3 : 7. Botanical Survey of India, Howrah.
7. Santapau, H. (1952). *Univ. Bombay Bot. Mem.* 2 : 76.

The material for this sheet was supplied by M. J. Kothari, Botanical Survey of India, Pune.

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HABITAT AND ECOLOGY : On low hills as forest undergrowth upto an elevation of 240 m (800 ft.) in Dapoli vicinity.

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CONSERVATION MEASURES PROPOSED : Attempts to relocate the species and conservation of natural populations in its natural habitats, and introduction of a few plants in Botanic/ experimental gardens, are suggested.

BIOLOGY AND POTENTIAL VALUE : It flowers in October-February.

CULTIVATION : None so far.

DESCRIPTION : Suffruticose herbs or undershrubs ; stems glaborous, ascending, geniculate. Leaves elliptic-lanceolate, acuminate, entire, sparsely hispid above, glabrous beneath. Inflorescence trichotomous, covered with white floccose hairs. Flowers light-purple, 1-3 in number, sessile, in opposite axils of floral leaves.

REFERENCES :

1. Ahmedullah, M. & Nayar, M.P. (1987). *Endemic Pl. Ind. Region* 1 : 149. Botanical Survey of India, Calcutta.
2. Clarke, C. B. (1885). *In :* Hooker, J. D., *Fl. Brit. India* 4 : 557.
3. Cooke, T. (1958). *Fl. Pres. Bombay* 2 : 477. (repr. ed.). Botanical Survey of India, Calcutta.
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5. Dalzell, N. A. & Gibson, A. (1861). *Bombay Flora.* p. 197. Bombay.
6. Raghavan, R. S. & Singh, N. P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Pl. Cons. Bull.* 3 : 7. Botanical Survey of India, Howrah.
7. Santapau, H. (1952). *Univ. Bombay Bot. Mem.* 2 : 76.

The material for this sheet was supplied by M. J. Kothari, Botanical Survey of India, Pune.

STATUS : Rare. There are only 4 herbarium specimens in MH collected from Ramanathapuram and Tirunelveli Districts, Tamil Nadu. No recent collection of this species could be made though the above districts have been well explored. Due to habitat loss, the species appears to have become very rare.

DISTRIBUTION : Endemic to southern Peninsular India in Western and Southern Carnatic, plains of Coimbatore, Madurai, Ramnad and Tirunelveli Districts.

HABITAT AND ECOLOGY : On dry sandy gravelly terrains of wastelands and scrub jungles, Its distribution areas receive less rainfall and remain dry for a large part of the year.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Efforts should be made to relocate this species in the above areas and to assess its populations, and to plan *ex situ* or *in situ* conservation measures.

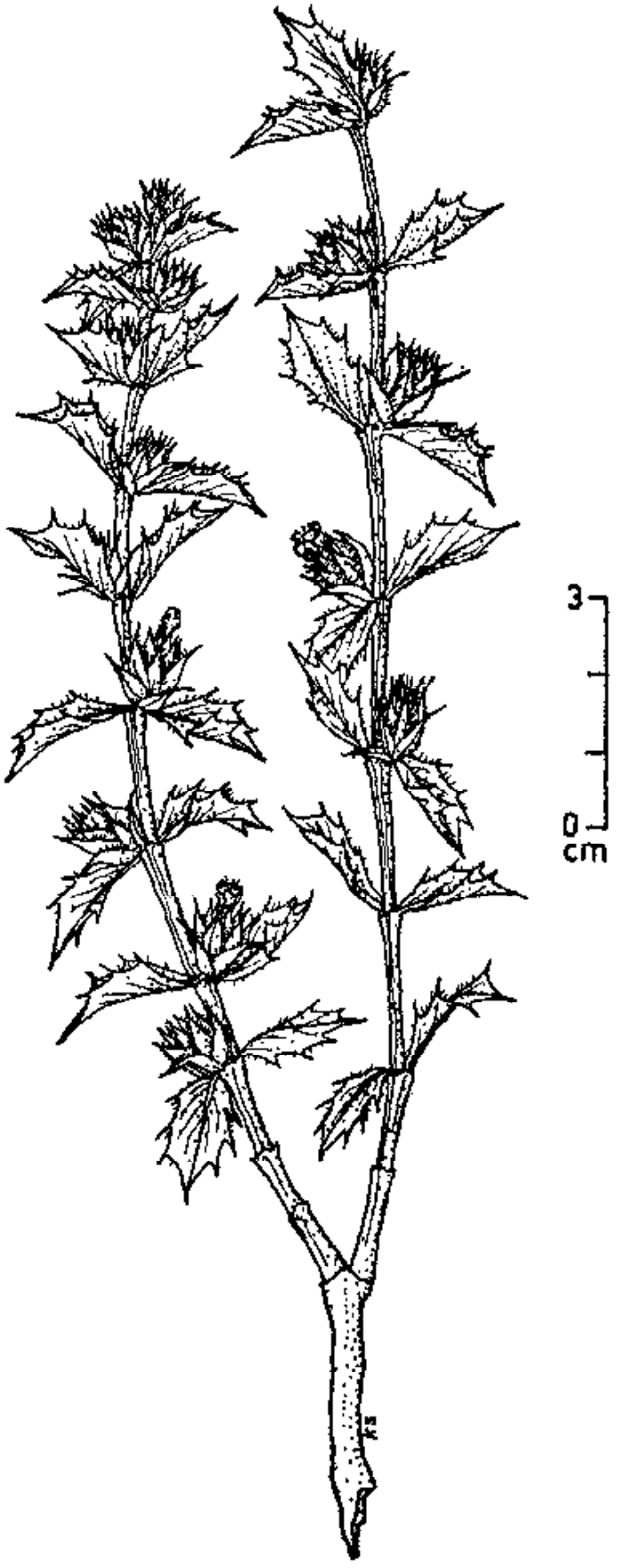
BIOLOGY AND POTENTIAL VALUE : A rare species of distributional and botanical interest.

DESCRIPTION : Much branched erect small shrubs, 30-70 cm high, branches white. Leaves 1-2×0.5-1 cm, opposite, ovate-oblong with 3 short spinous teeth on either side and one terminal. Spikes axillary, *ca* 1.5×1 cm, binate or ternate, capitately congested, villous; bracts closely appressed, ovate, shortly spinous-mucronate, softly hairy; bracteoles oblong-lanceolate, rigid, spinous at apex; calyx 4-partite; segments mucronate, spinulose; corolla 2-lipped; upper lip oblong; lower lip 3-lobed with brown spots at throat; midlobe larger than sidelobes; stamens 4; didynamous. Capsules compressed, oblong, 2-seeded.

REFERENCES :

1. Gamble, J. S. (1923). *Kew Bull.* 1923 : 375.
2. Gamble, J. S. (1924). *Fl. Pres. Madras*, p. 1067.
3. Kumari, G. R. (1987). *In :* Henry, A. N., *et al*, (ed.). *Fl. Tamil Nadu* Ser. I. *Analysis* 2 : 151. Botanical Survey of India, Coimbatore.
4. Wight, R. (1841). *Ic. Pl. Ind. Orient. t.* 456.

The material for this sheet was supplied by E. Vajravelu, Botanical Survey of India, Coimbatore.



Lepidagathis barberi Gamble

STATUS : Indeterminate. There are no specimens of this in the MH. The spacies has not been collected from its reported areas of distribution during the botanical explorations undertaken over three decades. Apparently the species has become very scarce due to habitat loss.

DISTRIBUTION : Peninsular India in parts of Deccan, Western Carnatic, Mysore, Bellary and Coimbatore. Endemic.

HABITAT AND ECOLOGY : On dry open gravelly terrain in plains and scrub jungles. Much of its distribution range falls under sub-desertic conditions with less rainfall.

CONSERVATION MEASURES TAKEN : No specific measures taken so far.

CONSERVATION MEASURES PROPOSED : This species should be relocated in the wild and protected *in situ*. On assessing its populations a few plants/seeds be collected and introduced in gardens for *ex situ* conservation and multiplication.

BIOLOGY AND POTENTIAL VALUE : The species grows in dry gravelly areas and can withstand dry conditions well and thus useful in vegetating semiarid parts. Flowering and fruiting during October-March.

DESCRIPTION : A low straggling shrublet from a woody root-stock. Branches 5-30 cm long, many, prostrate, nearly glabrous. Leaves *ca* 3 × 1 cm, sessile, linear or elliptic, entire, nearly glabrous, acute or mucronate. Spikes 1-2 cm long, dense, hairy, axillary, rarely aggregated at the base of the stems; bracts *ca* 1 cm long, lanceolate, acuminate, spinescent; calyx 4-partite, villous, 2 outer segments lanceolate, united at base; inner segments narrower, long acuminate, softly long hairy; corolla white or pink, dotted with brown or purple spots, bilipped, hairy outside; tube narrow, constricted below the limb and expanded upwards; upper lip oblong; lower lip divided nearly to the middle into 3 obovate-obtuse lobes; stamens slightly exerted; filaments glabrous. Capsules ovoid, glabrous, 2-seeded.

REFERENCES :

1. Clarke, C. B. (1885). *In :* Hooker, J. D., *Fl. Brit. India* 4 : 512.
2. Gamble, J. S. (1924). *Fl. Pres. Madras*, p. 1067.
3. Kumari, G. R. (1987). *In :* Henry, A. N., *et al* (ed.) *Fl.. Tamil Nadu*, Ser. 1. *Analysis* 2 : 151. Botanical Survey of India.

The material for this sheet was supplied by E. Vajravelu, Botanical Survey of India, Coimbatore.

STATUS : Indeterminate. It was collected by Beddome from Anamalai Hills in the Western Ghats and has not been collected so far from the above locality or elsewhere although the areas are fairly well-explored. There are no specimens of this in the MH.

DISTRIBUTION : Anamalais on the top of Nelliyampatty in the West Ghats of peninsular India. Endemic.

HABITAT AND ECOLOGY : In evergreen forests of higher Ghats and mountain slopes.

CONSERVATION MEASURES TAKEN : Anamalai hills have recently been declared as a National Wildlife Sanctuary.

CONSERVATION MEASURES PROPOSED : Intensive search should be made to relocate the species in the above areas and adjoinings ; if relocated *in situ* and *ex situ* conservation measures should be taken.

BIOLOGY AND POTENTIAL VALUE : The genus *Strobilanthes* is noted for protracted flowering periods, and it is of botanical interest and a curiosity. Some other species of the genus grow gregariously and form an important component in the shrubby stratum of evergreen forests in the most parts of the high rainfall Western Ghats. During flowering, the species from an important source of nectar for honey-bees.

DESCRIPTION : Shrubs, 1-2 m high. Leaves 7-12×3-8 cm, ovate, acuminate at apex, subcordate at base, crenate at margin, bristly pubscent on both the surfaces, main nerves 9-paired; raphids small, obscure; petioles 2-5 cm long. Spikes upto 6 cm long, large, subtetragonous-oblong, terminal and lateral on short peduncles, dense viscous, slightly hairy. Bracts *ca* 2×1.5 cm, 4-ranked, ovate, obtuse, reddish, closely imbricate, viscous, subscarious, decurrent at base; bracteoles small, lanceolate; calyx deeply 5-lobed; lobes *ca* 1.5 cm long, linear, green, acuminate, scarious; corolla large, blue; stamens equal, united by pairs in a short sheath at base. Capsules *ca* 1 cm long, ellipsoid, sessile, glabrous. Seeds 4, hairy.

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1. Clarke, C. B. (1884). *In :* Hooker, J. D., *Fl. Brit. India* 4 : 453.
2. Gamble, J. S. (1924). *Fl. Press. Madras*, p. 1043.
3. Henry, A. N., Vivekananthan, K. & Nair, N. C. (1979). *J. Bombay Nat. Hist. Soc.* 75 : 693.
4. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened Plants of India*, p. 31. POSSCEF, Botanical Survey of India, Howrah.

The material for this sheet was supplied by E. Vajravelu, Botanical Survey of India, Coimbatore.

STATUS : Rare, very scattered.

DISTRIBUTION : India: Sindhudurg district in Maharashtra and in Goa. Endemic.

HABITAT AND ECOLOGY : In freshwater-logged areas and small ponds on rocky plains.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and its neighbouring areas should be protected. Attempts should be made to introduce the plants in tanks and ponds in experimental gardens as a measure of *ex situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Probably grown in aquaria. Flowers and fruits during September-October.

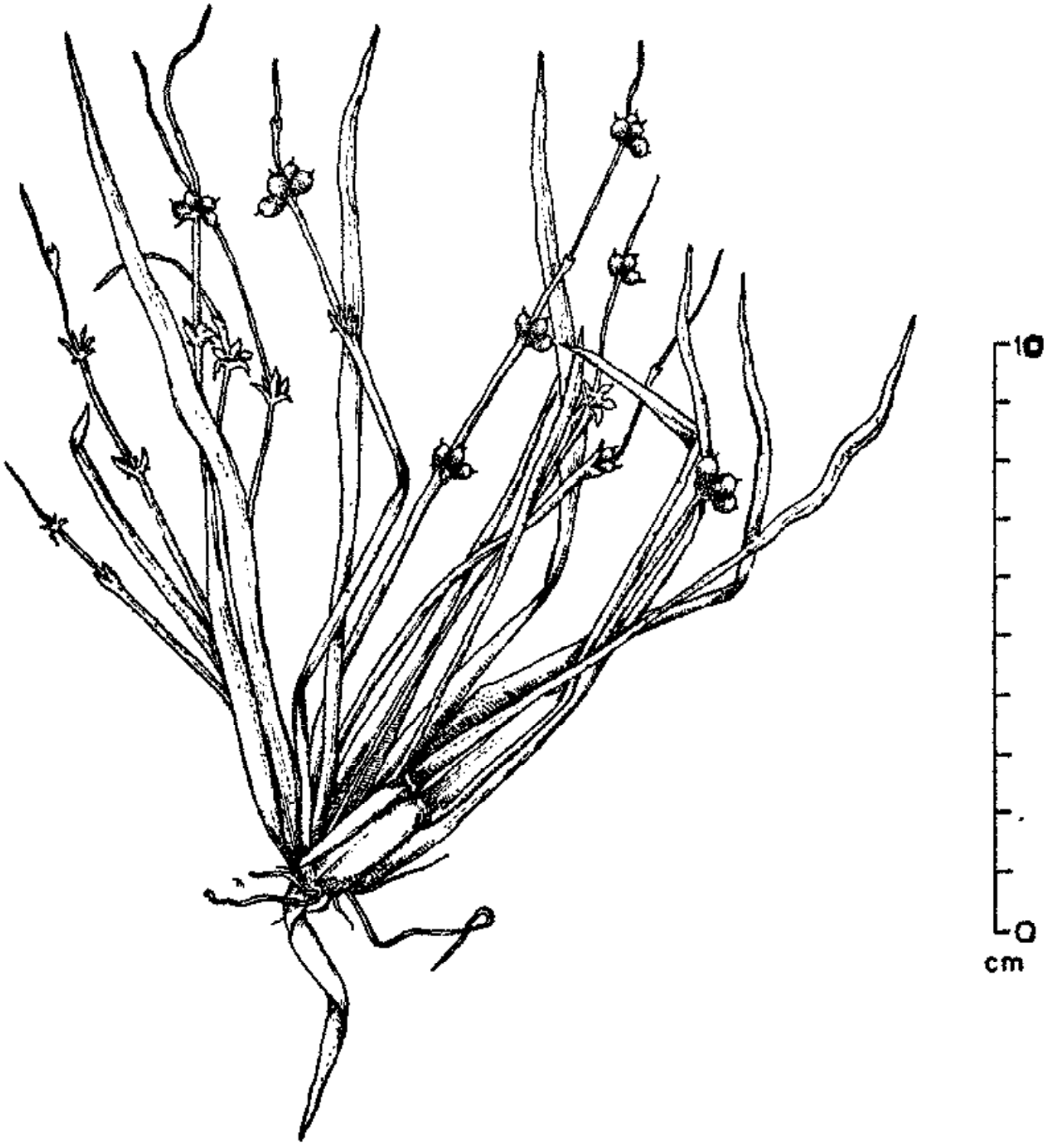
CULTIVATION : None.

DESCRIPTION : Submerged, 15 - 30 cm tall, scapigerous herbs with fibrous roots. Leaves linear-lanceolate, 5 - 12 × 0.4 - 0.9 cm, obscurely keeled on back; petioles terete. Flowers unisexual, white, in whorls, on 10 - 16 cm long scapes. Sepals and petals 3 each; anthers didymous. Fruits ovoid, 0.3 × 0.15 cm, apiculate.

REFERENCES :

1. Dalzell, N. A. (1850). *In* : Hooker, W. J., *J. Bot. & Kew Gard. Misc.* 2 : 144.
2. Cooke, T. (1958). *Fl. Pres. Bombay* 3 : 346. (repr. ed.). Botanical Survey of India, Calcutta.
3. Kulkarni, B. G. (1988). *Fl. Sindhudurg*, p. 471. Botanical Survey of India, Calcutta.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Weisneria triandra (Dalz.) Mitcheli

STATUS : Vulnerable; it is known in India from the collections of Strachey & Winterbottom, Gamble, Mackinon, Lace, Brandis, Duthie, Clarke, and Edgeworth from the W. Himalayas in Kashmir and Uttar Pradesh. No recent collections in 20th century, except for one gathering from Nepal in 1952 by Polumin, Sykes & Williams. The species is vulnerable due to overgrazing in the alpine meadows of the Himalayas.

DISTRIBUTION : Kashmir, Himachal and Uttar Pradesh in India; Nepal. Endemic to Himalayas.

HABITAT AND ECOLOGY : In the altitudes of 2400 - 2700 m on dry open mountain slopes.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Intensive search for the species in the region and adequate protection to its natural habitats and introduction into cultivation in the Western Himalayan areas are suggested.

BIOLOGY AND POTENTIAL VALUE : Of botanical interest. Like other Alliums this may have culinary and medicinal importance. All wild species of *Allium* are of germplasm value and need to be investigated for medicinal purpose.

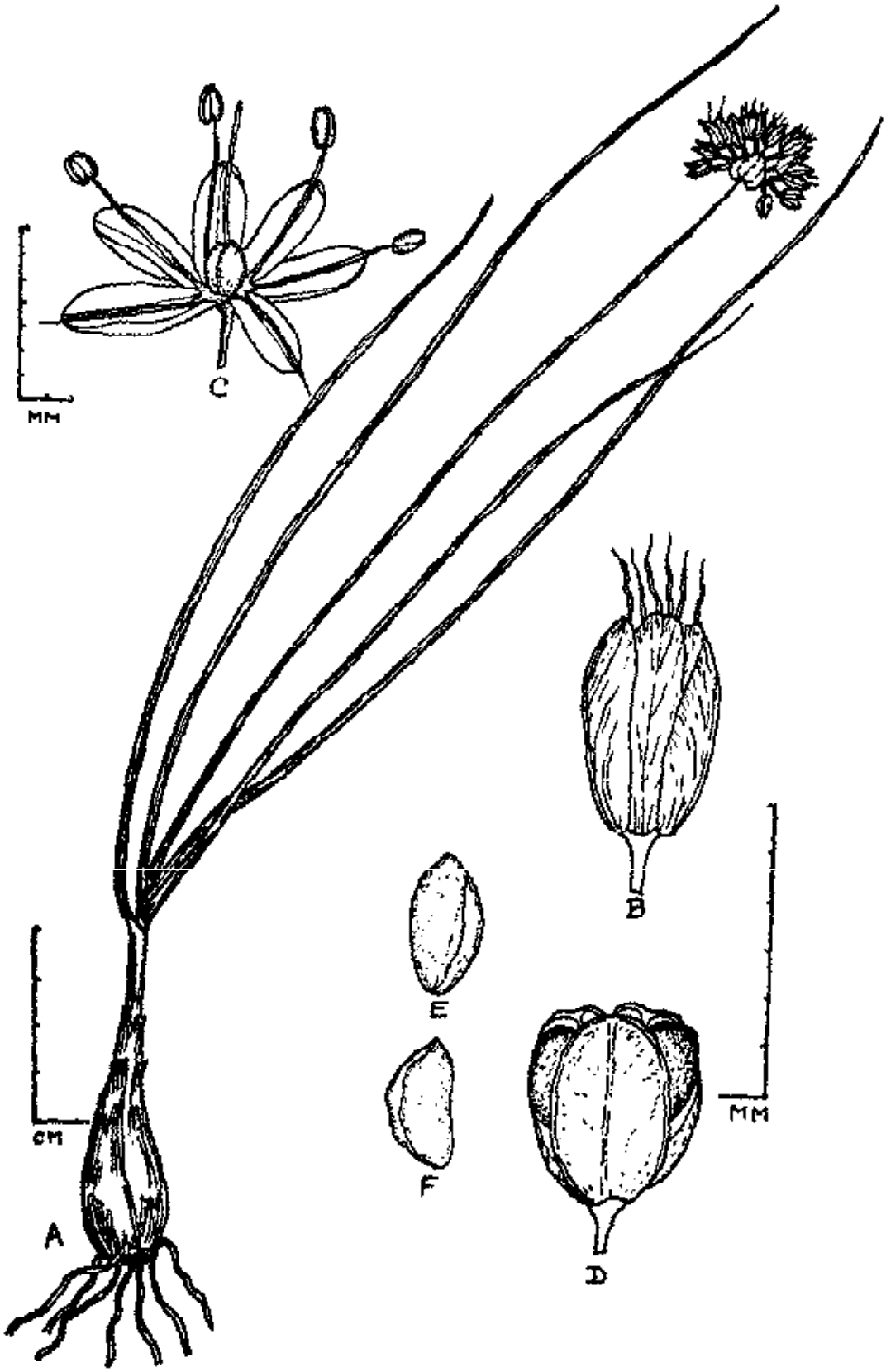
CULTIVATION : Not known.

DESCRIPTION : Small bulbous herbs, 8 - 20 cm tall; bulbs 3.5 - 5 cm long, elongate-ovoid with parallel fibrous scales. Leaves 2-4, 11-30 cm × 1-2 mm, linear, longer than scapes. Flowers purple or yellow-coloured. 4 - 5 mm long, oblong-campanulate, on 3-7 mm long pedicel, many, heads subglobose or hemispherical, 1.5 - 2.5 cm in diam. Stamens and pistil longer and exserted. Capsules *ca* 4 × 3 mm, globose, oblong, thin papery, with 6 black seeds.

REFERENCES :

1. Baker, J. G. (1874). On the *Alliums* of India, China and Japan. *J. Botany* 12 : 293.
2. Staern, W. T. (1960). *Allium & Milula* in the Central and Eastern Himalaya. *Bull. Brit. Mus. Nat. Hist.* 2 : 174.

The material for this sheet was supplied by Syamali Dasgupta, Botanical Survey of India, Howrah.



Allium stracheyi Baker—A. Habit. B. Flower. C. Flower-dissected. D. Capsule. E. Seed-dorsal view. F. Seed-lateral view

STATUS : Indeterminate. The species is so far known from its Type and another collection made from the vicinity of the type locality in 1914. It is not known to have been collected again even though its known localities have been fairly well-explored in the last few decades. Loss of natural habitats is the apparent cause of its depletion.

DISTRIBUTION : Endemic to the Tirunelveli hills in peninsular India (1). The species was originally collected by Robert Wight from Courtallum in Tirunelveli district of Tamil Nadu. Subsequently it was collected only once from the adjacent locality, Naterikal, in the year 1914. Both these collections are deposited in MH.

HABITAT AND ECOLOGY : Known to grow on the hills in evergreen forest areas. Data on specific habitat conditions in which it thrives is lacking.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Intensive surveys must be conducted in the Tirunelveli and adjoining hill ranges in an attempt to locate populations possibly surviving in specific niches. If located populations of this species and the habitat must be protected and some plants be introduced in botanic gardens. Study on biology could help to decide on the ways and means of conserving it.

BIOLOGY AND POTENTIAL VALUE : No information on its biology or phenology is available. Its potential uses are not yet known. However, its allied species, *Aerva lanata* (L.) Juss., is known to have diuretic and demulcent properties and to contain tannin. Another species, *Aerva javanica* (Burm. f.) Juss. ex Schult. is also used as a diuretic. The decoction of this plant (*A. javanica*) is used in local medicine as an antiinflamatory, while its root extract is known to cure headache. It is possible that *Aerva wightii* also has similar properties

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Undershrubs, 15 - 30 cm tall, scandent below, arising from a woody root-stock; branches profuse, stiff. Leaves alternate, *ca* 5×3.5 cm, orbicular or obovate, apex obtuse, base cuneate, sparsely pubescent above, densely tomentose below; petiole short. Spikes axillary, sessile, *ca* 0.6 cm long, yellowish-white, densely woolly; bracts acicular at apical end. Flowers *ca* 2 mm long, clustered; perianth lobes 5, outer tepals linear-oblong, aristate, inner ones obtuse; stigmas 2, short.

REFERENCES :

1. Ahmedullah, M. & Nayar, M.P. (1987). *Endemic Plants of the Indian Region* 1 : 71. Botanical Survey of India, Calcutta.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 825. (repr. ed.). Botanical Survey of India, Calcutta.
3. Hooker, J. D. (1885). *Fl. Brit. India* 4 : 728.

The material for this sheet was supplied by U. C. Bhattacharyya and Geeta Haldar, Botanical Survey of India, Howrah.

STATUS : Indeterminate, endemic to Andaman and Nicobar Islands; known only from Type collection.

DISTRIBUTION : Endemic to Andaman and Nicobar Islands.

HABITAT AND ECOLOGY : A tall tree growing in the evergreen forests.

CONSERVATION MEASURES TAKEN : Saddle Peak, Mount Harriet areas have been declared as National Parks ; the Great Nicobar Island is declared as a Biosphere reserve with the idea to protect the biological species of these Islands.

CONSERVATION MEASURES PROPOSED : The North Andamans including the Interview Island as the proposed North Andaman Biosphere reserve is likely to provide *in situ* protection for the species. It is necessary to introduce this tree in arboreta and botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Flowers during October. The biology of this endemic tree is not known. However, the kernels of the deciduous species, *B. lanzan*, are eaten.

CULTIVATION : Not cultivated so far.

DESCRIPTION : A moderate sized tree, bark greenish-grey, the outer layer thin and papery, blaze reddish-brown. Leaves 25 - 30×5 - 8 cm, lanceolate, oblong-lanceolate, acuminate, cuneate at base, glossy; lateral nerves 11-15-paired; petiole upto 3 cm long. Flowers in axillary panicles, crowded at the ends of branchlets; sepals 4; petals 4; stamens 8. Drupe *ca* 1.5 cm in diam, purplish black when ripe.

REFERENCES :

1. Brandis, D. (1907). *Ind. Trees*, p. 206.
2. Kurz, S. (1870). *Report on the vegetation of the Andaman islands*. Calcutta.
3. Parkinson, C. F. (1923). *For. Fl. Andaman Islands*, p. 139.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Vulnerable, due to loss of habitats.

DISTRIBUTION : Endemic to South Andaman Island.

HABITAT AND ECOLOGY : This species grows in the evergreen forests. The closely allied species *Mangifera camptosperma* is frequent and it is an important component of the evergreen forests, while the trees of *Mangifera andamanica* are scattered and vulenerable because of the habitat loss.

CONSERVATION MEASURES TAKEN : The South Andaman Island is much disturbed due to biotic pressures excepting the Jarwa reserve. Mount Harriet is declared as a National Park.

CONSERVATION MEASURES PROPOSED : The areas of Mount Harriet National Park should include northern portions of the peninsula, to protect the habitats of this species.

BIOLOGY AND POTENTIAL VALUE : This species is an important genetic resource. Its potential value for hybridisation and breeding is not yet assessed.

CULTIVATION : Nil.

DESCRIPTION : Trees, upto 100 m high. Leaves *ca* 10 cm long, ovate to broadly oblanceolate or elliptic, lateral nerves 10 - 12-paired, curving upwards; petioles upto 3 cm long, grooved. Inflorescence a lax terminal panicle. Flowers *ca* 5 mm across, 4-merous; petals twice longer than the sepals. Drupe 2.5 - 4 cm long, ellipsoid.

REFERENCES :

1. Brandis, D. (1907). *Ind. Trees*, p. 206.
2. Mukherjee, S. K. (1949). A monograph on the genus *Mangifera* L. *Lloydia* 12 : 73-136.
3. Mukherjee, S. K. (1950). Wild mangoes of India. *Sci. & Cult.* 15 : 469-471.
4. Thothathri, K. (1980). Plant resources and their utilization in the Andaman and Nicobar islands. *Journ. Econ. Tax. Bot.* 1 : 111-114. 1981.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Rare; due to loss of its habitat.

DISTRIBUTION : Endemic to Nicobar Islands.

HABITAT AND ECOLOGY : On hill slopes and in the openings of evergreen forests. The tall evergreen trees associated with this species are *Planchonella longipetiolata*, *Knema andamanica*, *Horsfieldia irya*, and *Calophyllum soulattri*. The species is under threat because of habitat loss and coppicing for poles and for firewood.

CONSERVATION MEASURES TAKEN : The Great Nicobar Island is recently declared as a Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : Introduction of this species into cultivation as an ornamental species to save the plant.

BIOLOGY AND POTENTIAL VALUE : The biology of the plant is not known. The flowers are reportedly fragrant and the species has horticulatural potential

CULTIVATION : Nil.

DESCRIPTION : Scandent shrubs with axillary curved hooks. Leaves coriaceous, 10-14×4-6 cm, elliptic, caudate at apex, cuneate at base, glabrous. Flowers greenish, many on fasciculate branches; sepals 3, ovate-acute, tomentose outside, 4×4 cm; petals 6 in two series; stamens many, *ca* 1.5 mm long, anther-cells short; carpels limited in number, *ca* 5 mm long, densely strigose; ovaries ovoid; stigma sessile. Ripe carpels not seen.

REFERENCES :

1. Das, Debika (1969). *Artabotrys nicobaricus* D. Das--a new species from the Nicobar islands. *Bull. Bot. Surv. India* 11 : 194-195. pl. 1.
2. Balakrishnan, N. P. (1977). Recent botanical studies in Andaman and Nicobar islands. *Bull. Bot. Surv. India* 19:122-138.
3. Balakrishnan, N. P. (1989). Andaman Islands—Vegetation and Floristics. *In :* Cecil J. Saldanha (ed.). *Andaman, Nicobar and Lakshadweep-an environmental impact assessment*, pp. 55-68. New Delhi.

The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Rare. It is of limited distribution.

DISTRIBUTION : Baratong Island in the Andaman Islands. The species is known only from its type locality.

HABITAT AND ECOLOGY : This tree species grows in the evergreen forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : It is recommended to include Baratong island in the network of National Parks in the Andaman Islands.

BIOLOGY AND POTENTIAL VALUE : This is a potentially attractive tree species for introduction in botanic gardens.

CULTIVATION : Not taken up any where.

DESCRIPTION : Shrubs, 1-1.5 m high; branchlets black, furrowed, puberulous. Leaves alternate, ovate-elliptic to oblong, 8.5 - 13 × 3.5 - 5.5 cm, coriaceous, glabrous above, puberullous on the veins between, acute at apex, cuneate at base; petiole short, 3 - 6 mm long. Inflorescence extra-axillary, leaf-opposed, 1-2-flowered cyme. Flowers creamy-yellow, 3 - 3.5 × 4.5 mm; pedicels short, 1 - 2 mm long, pubescent; sepals 3, triangular, free, 1.5 × 2 mm, pubescent; sepals 6, in 2 whorls of 3 each, outer *ca* 4 × 4 mm, acute at apex, cuneate at base, inner distinctly clawed, *ca* 3 × 3 mm, pubescent on both sides; stamens numerous, 0.75 - 1mm long, anther cells large, dorsal connective flat at top. Carpels 3, apocarpus, oblong, *ca* 1 mm long, styloidia absent; stigma discoid. Fruits unknown.

REFERENCES :

1. Balakrishnan, N. P. (1989). Andaman islands—Vegetation and Floristics. *In :* Cecil J. Saldanha (ed.). *Andaman, Nicobar and Lakshadweep-an environmental impact assessment*, pp. 55-68. New Delhi.
2. Thothathri, K. & Das, D. (1967). A new Annonaceae from the Andaman islands. *Journ. Bombay Nat. Hist. Soc.* 64 : 430-431.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Vulnerable due to habitat destruction. Represented by Type specimens. Vast forested tracts in its distribution range have been cleared for commercial crops and plantations during the last 5 - 6 decades.

DISTRIBUTION : Endemic to Wynaad and Tambracherry, Kerala.

HABITAT AND ECOLOGY : In evergreen forests at about 900 m alt.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : As it is confined to a small locality, intensive search should be undertaken to relocate the species, and if relocated *ex situ* and *in situ* conservation measures should be taken. The Wynaad and Tambracharry areas on the Western Ghats have many endemic and rare species and therefore deserves consideration as a nature reserve.

BIOLOGY AND POTENTIAL VALUE : Of academic interest.

CULTIVATION : Not known.

DESCRIPTION : Shrubs or small tress, 3 - 5 m tall; young parts rusty pubescent. Leaves subsessile, 10.0 - 16.5×2.5 - 5.0 cm, oblong-lanceolate, attenuate at apex, rounded or cordate at base, glabrous except the midrib below; petioles very short, pubescent. Flowers red, axillary or extra-axillary, 1.25 - 2.0 cm across; peduncles *ca* 1 cm long; bracts 2, minute, basal; sepals orbicular-ovate, acute; outer petals twice as large as the sepals, narrower, inner twice as large as the outer, cymbiform, fleshy, inflexed tips contiguous; styles short, clavate; ovules 1 - 2 on the ventral suture.

REFERENCES :

1. Beddome, R. H. (1868-74). *Ic. t.* 76.
2. Hooker, J. D. & Thomson, T. (1872). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 72.
3. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 12. (repr. ed.) Botanical Survey of India, Calcutta.
4. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed). *Pl. Conservation Bulletin* 4 : 16. POSSCEF, Botanical Survey of India, Howrah.

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Rare. The species has become rare apparently due to indiscriminate cutting for household purposes and loss of its habitats in the past.

DISTRIBUTION : Cochin and Travancore, Kerala; Tirunelveli, Tamil Nadu. Endemic.

HABITAT AND ECOLOGY : In evergreen forests, in the hills upto 800 m alt.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should be made to bring the species into cultivation in botanic gardens for *ex situ* conservation. It is suggested that nurseries be raised from seeds and the plants be rehabilitated in its distribution areas.

BIOLOGY AND POTENTIAL VALUE : Of economic importance, being a timber yielding tree.

CULTIVATION : Not taken up any where.

DESCRIPTION : Trees, 7 - 10 m; young branches densely tomentose. Leaves subsessile, 7.5-17.5 × 2.5 - 5.0 cm, narrow-oblong, acute or acuminate at apex, obliquely-cordate at base, glabrous except on the midrib beneath, shining above, pale below; petiole glabrous. Flowers 1.25 - 2.0 cm across, brown-tomentose; penduncles upto 2.5 cm long, solitary, stout, often leaf-opposed, jointed and minutely bracteate at the base; sepals small, broadly ovate, acute; petals ovate-oblong, subacute, thick, outer twice as long as the inner. Ovaries densely silky.

REFERENCES :

1. Hooker, J. D. & Thomson, T. (1872). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 65.
2. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Pl. Conservation Bulletin* 4 : 16. POSSCEF, Botanical Survey of India, Howrah.
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The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Rare, due to loss of its habitat.

DISTRIBUTION : Endemic to Andaman & Great Nicobar Islands.

HABITAT AND ECOLOGY : Humid evergreen forests of Andaman & Nicobar Islands. This species is an element of the tropical humid rain forests of Andaman & Great Nicobar Islands which are very rich in trees of multistructural canopied forest. Due to the opening of the forests for logging, evergreen tree species are getting depleted.

CONSERVATION MEASURES TAKEN : Saddle Peak in the North Andaman is a part of the N. Andaman Biosphere Reserve. The Great Nicobar Island is already declared as a Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : The North Andaman Island is proposed as a Biosphere Reserve. Introduction of this species in arboreta and gardens is proposed.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Nil.

DESCRIPTION : Trees, 10 - 15 m high; young branch-lets pubescent. Leaves membranous, 12 - 20 × 7 - 9 cm, elliptic-oblong, abruptly acuminate at apex, cuneate and often unequal sided at base. Flowers axillary, solitary, usually from the axils of fallen leaves, *ca* 6 mm in diam; sepals broadly ovate, acute, tomentose outside, glabrous inside; petals in two whorls; stamens in the male flower numerous, short, cunneate, the apical process of the connective truncate, concealing the apices of the dorsal anthers; pistils 0. Female flowers unknown. Ripe carpels sub-globose, truncate at both ends, rugose; seeds about 5, plano-convex.

REFERENCES :

1. Balakrishnan, N. P. (1977). Recent botanical studies in Andaman and Nicobar Islands. *Bull. Bot. Surv. India* 19 : 132-138.
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The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Rare. The species was first collected in April, 1952 and its Type is deposited in DD. Very few subsequent collections of this have been made.

DISTRIBUTION : Endemic to Great Nicobar Island.

HABITAT AND ECOLOGY : Occurs in the woody beach vegetation along Trinkat-Champlong Bay area of the island. It is associated with other trees and shrubs like *Atlantia monophylla*, *Cordia subcordata* and *Sophora tomentosa*.

CONSERVATION MEASURES TAKEN : The Great Nicobar island is declared as a Biosphere Reserve and is now protected.

CONSERVATION MEASURES PROPOSED : Though the Great Nicobar island is declared as a Biosphere Reserve, it is necessary to cultivate the several endemic and endangered species of the island in arboreta and gardens.

BIOLOGY AND POTENTIAL VALUE : Not known. Fruiting during October.

DESCRIPTION : Large woody climbers; young twigs dark-brown, stellate-pubescent, glabrous with age. Leaves 15 - 17×9.0 - 9.5 cm, broadly elliptic to oblanceolate, sometimes obovate, acuminate at apex, rounded or slightly cuneate, glabrous, midrib stellate-pubescent; petioles *ca* 5 mm long, stellate-pubescent. Flowers unknown. Ripe carpels many, 2.5 - 3.0 cm long, pericap yellow. Seeds *ca* 8 in number, *ca* 8×5 mm, uniseriate, dark brown, shining.

REFERENCES :

1. Balakrishnan, N. P. (1983). The Andaman and Nicobar Circle, Botanical Survey of India, Port Blair. *Bull. Bot. Surv. India* 25 336-340.
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4. Sahni, K. C. (1963). Botanical exploration in the Great Nicobar Island. *Indian For*, 79 (1) : 3-16.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Rare. The species is khown from earlier collections and listed as rare (1).

DISTRIBUTION : Anamalai hills, Coimbatore Dt., Madurai, Tamil Nadu. Endemic.

HABITAT AND ECOLOGY : In hilly forests, in cool, shaded forest floor.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : A search in its distribution range to locate its plant populations to be undertaken, and it should be brought into cultivation through seeds for *ex situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Of botanical and phytogeographical interest due to its restricted distribution. Several other species of the family are either used as spices or are considered medicinal.

CULTIVATION : Not so far known.

DESCRIPTION : Perennial, glabrous herbs, 0.5 - 1.5 m tall. Leaves 2 - 4-pinnate, segments linear-lanceolate. Umbels compound, rays 4 - 8, 1.25 - 3.75 cm, divaricate; pedicels in fruits 4 - 8 mm long; bracts 0 or 1 - 4; style long. Mericarps 5 mm across, orbicular, dorsal and intermediate ridges scarcely excurrent, lateral with a prominent wing as thick as the seed, vittae 4 - 6, large.

REFERENCES :

1. Chandrabose, M. (1983). *In :* Nair, N. C. & Henry, A. N. (ed.). *Fl. Tamil Nadu* Ser. 1. *Analysis*. 1 : 180. Botanical Survey of India, Howrah.
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The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Rare. Known only from earlier collections of Dazell and Law and no recent collections could be made.

DISTRIBUTION : It is known from Malwan in Sindhudurg district and Dapoli in Ratnagiri district of Maharashtra and Law's collection from Kanara in Karnataka. Endemic.

HABITAT AND ECOLOGY : This species is reported to occur in coastal gravelly soils.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas be searched for this species and if located the areas be declared as protected places. The plants or seeds should be collected and propagated in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : It flowers and fruits during July-October. Of botanical and phytogeographical interest; many species of the family Apiaceae are of economic importance.

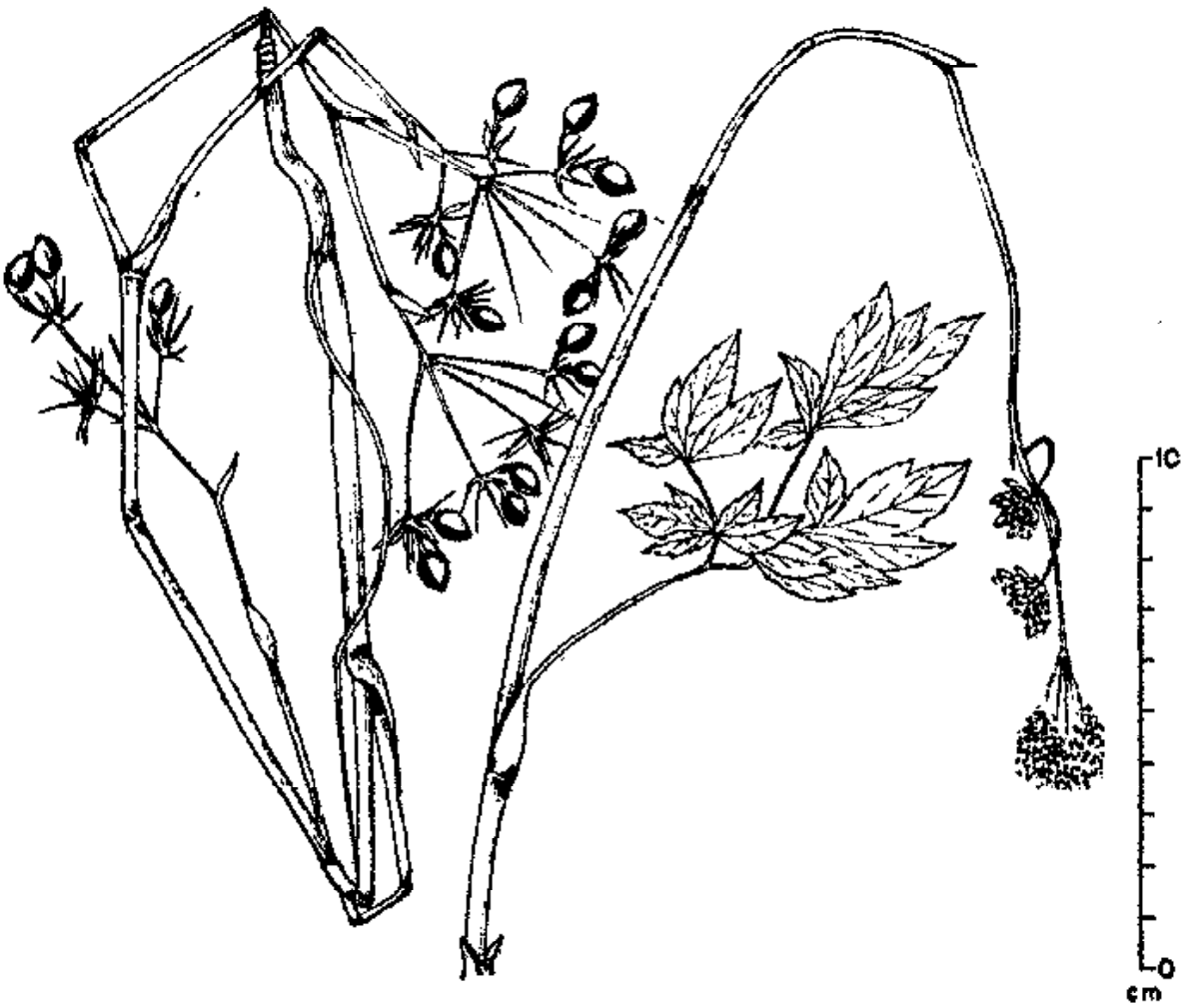
CULTIVATION : None.

DESCRIPTION : Erect herbs, 20 to 40 cm tall, glabrous; roots tuberous; stems sparingly branched, young branches angular, furrowed. Radical leaves deltoid in outline, triternate, petioles 7 - 10 cm long; pinnae distant, segments pinnatifid; cauline leaves few, smaller. Flowers white, small in terminal and axillary compound umbels; primary umbels 3 - 8-rayed; secondary umbels 6 - 12-flowered. Fruits ovoid, 3 mm long, dorsally compressed, many ribbed.

REFERENCES :

1. Dalzell, N. A. (1850). *In :* Hooker, W. J., *J. Bot. & Gard. Misc.* 2 : 260.
2. Cooke, T. (1958). *Fl. Pres. Bombay* 1 : 603. (repr. ed.). Botanical Survey of India, Calcutta.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Polyzygus tuberosus Dalz.

STATUS : Possibly Extinct. The species is so far known only by its Type collected in in 1859. Its type locality, along with its adjoining hill area, has been fairly well botanised during the last 3 - 4 decades, but the plant is not known to have been relocated. The possibility of its extinction cannot be ruled out.

DISTRIBUTION : Endemic to the Nilgiri hills in the Southern W. Ghats of Peninsular India. It was recorded from Sispara Ghat in the Nilgiris.

HABITAT AND ECOLOGY : Evergreen forest patches or *sholas* in the hills at *ca* 1800 m altitude and above.

CONSERVATION MEASURES TAKEN : None taken specifically for this literally non-existent species. However, its only known locality, Sispara falls within the limits of the recently established Nilgiri Biosphere Reserve by which reason its natural habitats are deemed to be under protection.

CONSERVATION MEASURES PROPOSED : An intensive search in the type locality and its vicinity is urgently warranted for the purpose of ascertaining its true status. Extensive surveys in parts of the Southern W. Ghats having conducive ecological factors might yet yield—though on a remote chance, some hitherto urecorded populations of this species. In such an eventuality no efforts must be spared to conserve and protect these populations. Incidentally the other related species of the genus are amenable to methods of artificial propagation by the way of mature wood cuttings, grafting or budding.

BIOLOGY AND POTENTIAL VALUE : No data on its biology is available. Some species of this genus—commonly referred to as the 'Hollies' are often cultivated as ornamentals or avenue plants for their attractive foliage and shapely canopy. The well known South American beverage, Paraguay Tea, is made from the leaf decoction of *Ilex paraguariensis*. Other species, viz., *I. malabarica*, *I. umbellulata*, *I. wightiana* yield useful timber. A few others, viz. *I. aquifolium*, *I. omitoria* have some medicinal properties attributed to them.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Trees or shrubs. Leaves 5 - 7.5 × 2 - 2.5 cm, ovate-lanceolate, apex long acuminate, rounded at base, entire, subcoriaceous, glabrous, midvein slightly impressed; petiole 5 - 6 cm long. Flowers solitary or in panicled umbellules, pedicillate; peduncle *ca* 1.2 cm long. Female flowers unknown. Male flowers *ca* 0.3 cm across. Sepals 5, ciliolate. Petals 5, oblong, obtuse, connate below. Stamens inserted on petals. Fruit not known.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian Region* 1 : 171. Botanical Survey of India, Calcutta.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 144. (repr. ed.). Botanical Survey of India, Calcutta.
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The material for this sheet was supplied by M. P. Nayar and M. Ahmedullah, Botanical Survey of India, Calcutta.

STATUS : Rare; causes for its rarity may be due to ecological disturbance in its specific niches.

DISTRIBUTION : South Andaman Island. Endemic.

HABITAT AND ECOLOGY : It occurs in the fringe areas of evergreen forests along water courses.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Since corms of *Amorphophallus* are potential food, it is necessary to locate this important wild species which is of high germplasm value. It is proposed that Mt. Harriet National Park be further extended to cover adjoining areas. It is necessary to develop a network of protected areas in the islands covering all fragile and vulnerable areas.

BIOLOGY AND POTENTIAL VALUE : The biology of this species is not known. Its potential as a wild genetic resource for *Amorphophallus* has to be assessed.

CULTIVATION : Not cultivated; the genetic resources of wild edible tubers is to be evaluated.

DESCRIPTION : Tuberous perennial herbs; tubers spherical, depressed, not bulbilliferous. Leaf very large, broadly elliptic-obovate or ovate, base contracted; petiole 0.5-1 m, green, spotted with purple; sheaths closely wrapping the base. Spathe 25 × 10 cm, dull red purple with darker blotches, sides infolding above the middle, convolute low down. Spadix sessile; infl. shorter than the spathe; female shorter appendaged, dark violet-purple. Anthers very short.

REFERENCES :

1. Balakrishnan, N. P. & Rao, M. K. V. (1983). *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India*, p. 190. Botanical Survey of India, Howrah.
2. Hooker, J. D. (1893). *Fl. Brit. India* 6 : 515.

The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and P. S. N. Rao, Botanical Survey of India, Port Blair.

STATUS : Rare.

DISTRIBUTION : South Andaman Island. This species is known only from the type collection. Endemic.

HABITAT AND ECOLOGY : Occurs in the fringe areas of evergreen forests along water courses.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED: It is necessary to locate its populations for multiplication of the species and introduction in the germplasm collection of wild aroids to be undertaken on priority basis.

BIOLOGY AND POTENTIAL VALUE : Species of *Amorphophallus* are important genetic resource of edible tuber yielding aroids. The biology of this species is not known.

CULTIVATION : This species is to be introduced in the experimental garden and arboretum of the Botanical Survey of India at Port Blair.

DESCRIPTION : Perennial herbs with depressed globose 13-25 cm diam. tubers, bulbilliferous. Leaf about 1 m broad, dull green, blotched with greenish-white. Peduncle 20-30 cm, longer in fruiting, very stout, sheaths 4-16 cm; tube of spathe 7 cm long and broad, whitish, obliquely streaked with green and spotted with dull green; limb 18 cm long by 5cm broad, inclined, dull red-purple with yellow blotches. Spadix 12-40 cm, sessile ; male inflorescence about equalling the female, appendage creamy yellow; anthers short; stigma 2-lobed.

REFERENCES :

1. Balakrishnan, N. P. & Rao, M. K. V. (1983). *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India*, p. 190. Botanical Survey of India, Howrah.
2. Hooker, J. D. (1893). *Fl. Brit. India* 6 : 516.

The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and P. S. N. Rao, Botanical Survey of India, Port Blair.

STATUS : Indeterminate. The species was described based on 2 specimens only and so far is not recollected after the type collections which are in K.

DISTRIBUTION : India; endemic to Konkan (coastal areas) in Maharashtra; exact locality not known.

HABITAT AND ECOLOGY : In open, moist situations along streams.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Attempts to find the precise locality of its occurrence and protection of its habitats should be made. The plants should be grown with the help of bulbs in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : An interesting endemic of phytogeographical significance. Other species of the genus are grown as aquarium plants for their elegance.

CULTIVATION : None.

DESCRIPTION : Bulbous, erect herbs. Leaves oblong-lanceolate, 15-25×2.0-3.2 cm, narrow at base, acute at apex, margins undulate; petioles shorter than or equal to leaf-blades. Spathes 2.25 cm long with short peduncles, limb much longer than the tube, narrowed into a tail, not twisted; naked portion in male & female flowers of spadix 3 cm long.

REFERENCES :

1. Cooke, T. (1958). *Fl. Pres. Bombay* 3: 329. (repr. ed.). Botanical Survey of India, Calcutta.
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The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.

Panax pseudo-ginseng Wall. ARALIACEAE

The Himalayan Ginseng (Nep. : Ajambari)

STATUS : Vulnerable. Ginseng from the Eastern Himalayas is threatened due to deforestation of habitat, road construction and cultivation. Though reported by Hooker (1879) as frequent, it is now found in very small and scattered populations. Our field observations indicate that the populations of Ginseng are disappearing fast.

DISTRIBUTION : Eastern Himalayas (2900-4000 m); S. E. Tibet, N. Burma, Western, Central and Northern China.

HABITAT AND ECOLOGY : In soils with deep humus in thick Conifer-Oak and Birch Forests of temperate zone. It is found along slopes of Tista Valley between Zema (3000 m) and Kalep (4000 m) in North Sikkim and in Lachung Valley under Hemlock-Acer-Silver Oak community very close to river bed. At Chhangu in East Sikkim it is sparse along the lake margin and the Rani Chhu river.

CONSERVATION MEASURES TAKEN : Not known.

CONSERVATION MEASURES PROPOSED : So far no effort has been made. Plant with as many as 32 annulate root-stock germplasm is available in nature. About a century ago the plants were frequent but now their population is decreasing alarmingly. The declaration of Dombeyang Valley in North Sikkim as a protected area may ensure conservation of the species *in situ*. There are three varieties viz. *angustifolia* (Burkill) Li, *bipinnatifidus* (Seem) Li and *himalaicus* Hara distributed in same range in the Eastern Himalayas.

BIOLOGY AND POTENTIAL VALUE : The Himalayan Ginseng is allied to Korean and Japanese Ginseng and is reported to have almost the same percentage of alkaloids. Ginseng has been found undoubtedly useful as a reputed tonic in increasing longevity, mental agility, in checking hypertension. It is also reported to be used locally for the treatment of cancer. Therefore, it is a much valued medicinal plant.

CULTIVATION : Cultivation in India has not been recorded. A few trials of culivation in simulated conditions in Gangtok (1800 m) of whole plant brought from natural habitat along with soil have not been successful. Though the umbels bear many flowers, it produces only 4-8 mature fruits per stem. Methods of propagation have not been studied. Being a very slow growing plant, efforts may be fruitful by the usage of techniques like tissue culture.

DESCRIPTION : Perennial herbs with horizontal, close to distantly knotted root-stock; produces one knot per year. Stems erect, usually growing after snow melts away, solitary, size of the aerial parts upto 40-80 cm high, terminating in a whorl of leaves. Leaves 5, 8-20 cm long, petioles terminated by a whorl of leaflets. Leaflets 5-6, digitate, basal pair smaller, 2-6 $\times$0.7-2.0 cm, terminal 5-11 $\times$1.0-2.5 cm, petiolules 5-12 mm long, lanceolate, variable, thinly crenate to shallowly to deeply lobed, obtuse to long acuminate. Peduncles 7-25 cm long, bearing 1-6 unequal umbells. Flowers minute, pale green. Fruits 3-5 mm across, globose, bright red with black tip.

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2. Cannon, J. F. M. (1979). *In :* Hara, H. & Williams, L. H. J. *An Enum. Flowering Plants of Nepal* 2 : 192.
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The material for this sheet was supplied by D. C. S. Raju and S. Singh, Botanical Survey of India, Gangtok.

STATUS : Rare. An endemic species with limited populations.

DISTRIBUTION : Andaman Islands. The species is known from the type collections.

HABITAT AND ECOLOGY : Not known.

CONSERVATION MEASURES TAKEN : The existing National Parks and Wild Life sancturies in Andamans are inadequate to protect the threatened and endemic species of these islands.

CONSERVATION MEASURES PROPOSED : A chain of well planned sanctuaries and National Parks is necessary for the protection of endemic island species. The following new National Parks are proposed: Little Andaman Island, Rutland Island, Mt. Diavolo in Middle Andaman, Interview Island, North Andaman Ridge, North Andaman Peninsula.

BIOLOGY AND POTENTIAL VALUE : Cane is an important forest resource for the economy of the people. This species is a potential resource. The biology of the species is not known. The species is to be brought under commercial cultivation.

DESCRIPTION : Tuft like erect stem?. Spadix erect, broadly paniculate, not flagelliferous, with branches erect, spreading, 25-35 cm long, with 8-10 spikes on either side, primary spathe short, lax, exsaccate and lacerated with spikes erect, black arm. Secondary spathe tubular to infundibuliform, lacerate to divided, brown without spines, spikes 4-7 cm long with pedicillate part slender, included, 1.5 cm long, the fruiting perianth divided into 6 equal lobes. Fruits small, broadly ovate, abruptly apiculate, 12 mm long, 6 mm broad with small pale brown straw coloured scales with apex minutely fimbriate; seeds ovate, rounded, both sides with a convex back and mere flat ventral side, the surface smooth, albumen homogenous, embryo basal.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and P. S. N. Rao, Botanical Survey of India, Port Blair.

STATUS : Endangered. This strong rattan species was once frequent in the mixed plain forest and lower hill forests of Sikkim Himalaya upto an altitude of 800 m (2). Now due to over-exploitation of canes for commercial use, its wild populations are depleting at a faster rate. This species is now represented with a few clumps in Latpanchar hill near Kurseong, West Bengal.

DISTRIBUTION : India : Sikkim Himalaya. Endemic.

HABITAT AND ECOLOGY : A plant component of moist tropical forests, grows along shaded *Jhoras*, in ravines, in association with *Eupetorium odoratum*, *Clerodendrum viscosum* and several species of ferns and aroids.

CONSERVATION MEASURES TAKEN : Forest department has recently increased the cutting cycle from 3 years to 5 years for facilitating natural regeneration by suckers.

CONSERVATION MEASURES PROPOSED : Efforts should be made by the Forest department to grow this rattan species through Silviculture programmes.

BIOLOGY AND POTENTIAL VALUE : It is one of the elite canes of the eastern India and has immense commercial value. Mostly utilised by furniture making industries. Strong unbent canes are used as Batton Sticks.

CULTIVATION : Not in cultivation.

DESCRIPTION : A robust climber, stem cluster forming; leafsheath 5-6 cm in diam. Leaves pinnate, cirrate, leaf sheath smooth on outer surface, with a distinct knee; leaflets numerous, equidistant, linear-lanceolate, in pairs on each side of the rachis. Inflorescence interfoliar, about 1 m long; rachillae 8-10 cm long, sinuous, inserted within the mouth of the respective basal bracts. Fruits ellipsoid, 3 cm across; fruit-scales deeply channelled at middle, brownish in colour.

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3. Basu, S. K. (1986). Threatened palms of India-some case studies. *J. Econ. Tax. Bot.* 7 : 494-497.

The material for this sheet was supplied by S. K. Basu and R. K. Chakraverty, Indian Botanic Garden, Botanical Survey of India, Howrah.

STATUS : Rare. Destruction of the forests depleted the species in natural habitats.

DISTRIBUTION : South Andaman Island. Endemic.

HABITAT AND ECOLOGY : Occurs in the inland forests, amidst the bamboo jungles of the western side of South Andaman Island.

CONSERVATION MEASURES TAKEN : Mt. Harriet and adjoining areas have been declared as a National Park in the South Andaman Island.

CONSERVATION MEASURES PROPOSED : It is proposed that a network of protected areas in the Island system covering all fragile and vulnerable Islands should be developed to protect many endemic species in these Islands.

BIOLOGY AND POTENTIAL VALUE : Corypha palm is economically important for toddy. The plams are also of ornamental value. The biology of the species is not studied.

CULTIVATION : Not known; high priority is to be given for locating and introducing the species in botanic gardens and arboreta.

DESCRIPTION : An evergreen palm. Leaves 2-3 m long, palmately flabellate, 3×6 m in diameter, divided to middle; petiole 6-8 m long, straight, slender, marginally armed with strong, incurved, compressed, glossy black spikes; pinnae united, 3-4 m long, linear, 2-lobed and blunt at apex, the ribs 4-cornered. Flowers unknown. Drupes olive-brown, the size of a cherry, globular, smooth, 1-seeded.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and J. L. Ellis, Botanical Survey of India, Port Blair.

STATUS : Rare. Known from a few collections earlier collected from type locality.

DISTRIBUTION : South Andamans : Havelock Island. It is possible that this species may be growing in other near by Islands.

HABITAT AND ECOLOGY : A species of evergreen forests climbing on large trees, prefers cool, shady areas in the islands.

CONSERVATION MEASURES TAKEN : In South Andaman, Mt. Harriet area is declared as a National Park.

CONSERVATION MEASURES PROPOSED : It is necessary to develop a chain of protected areas rich in plant diversity in the different Islands. This climbing palm should be introduced into the botanic gardens and arboreta.

BIOLOGY AND POTENTIAL VALUE : The value of this species as an ornamental climbing palm is not yet assessed. The biology of the species is not studied.

CULTIVATION : Not known.

DESCRIPTION : Climbing shrubs. Stems slender, sheated. Leaves having 4-leaflets on each side of the rhachis ; orchreae elongate, cylindrical, very closely sheathing, thinly membranous and fibrous; petiole short. Rachis sparingly and minutely clawed, leaflets small, 5-8 cm ×2.5-4 cm, broadly cuneate-rhomboid with acute apex or caudiculate, rigid-papyraceous, glabrous. Ansae strongly flattended, *ca* 5 cm long. Inflorescence *ca* 15 cm long, branched with 1-3 spikes, primary spathes unarmed, the branchlets tubular-infundibuliform. Fruit obovate-turbinate, 20-30 cm long, 2 cm broad, scales not strongly convex, straw-yellowish coloured, apices flattened.

REFERENCES :

1. Beccari, O. (1886). Nuovi studi sulle Palme Asiatiche. *Malesia* 3 : 58-149.
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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and Ramesh Kumar, Botanical Survey of India, Port Blair.

Livistona jenkinsiana Griff. ARECACEAE

(Assam Fan Palm)

STATUS : Endangered, due to extensive deforestation and degradation of its ecrlogical niche and exploitation.

DISTRIBUTION : Localised in some selected valleys of Sikkim, foot hills of Gubro Purbat, Assam, Naga hills, Khasi and Jaintia hills of Meghalaya and mountain valleys of Lohit and Tirap districts of Arunachal Pradesh (1-4). Endemic to N. E. India.

HABITAT AND ECOLOGY : Grows in the moist forests upto 1000 m. In Arunachal Pradesh it grows in association with wild *Musa* sp.

CONSERVATION MEASURES TAKEN : None for the species. However, some of its distribution areas in the Arunachal Pradesh and Meghalaya are now included in the Namdapha and Nokrek Biosphere Reserves, respectively.

CONSERVATION MEASURES PROPOSED : For protecting the wild populations from over-exploitation of its leaves for thatch and stem for making huts, this useful palm has to be introduced for cultivation in tribal populated areas of north-eastern India. This plam can also be introduced in Botanic Gardens.

BIOLOGY AND POTENTIAL VALUE : Apart from its usefulness to the tribal communities, this palm is the only endemic species of the genus distributed in India. It is one of the finest fan palm and can be cultivated indoors as pot plant for ornamental purpose. The endosperm of the seed is also edible. It is reported that about 500-700 leaves are required for thatching a hut which necessiates exploitation of 100 plants.

CULTIVATION : Cultivated in the Lloyd Botanic Garden, Darjeeling. A few young plants are being grown in the Indian Botanic Garden, Howrah.

DESCRIPTION : Shrubs, ca 1.5 m tall. Stem solitary, columnar, dull grey in colour. Leaves costapalmate; leafblade slightly bluish (glaucous) on lower surface, distinctly orbicular; leafsegments bilobed at apices. Flowers bisexual, sessile, borne on short tubercle. Fruits globose, about 3 cm in diameter, slightly attenuate at base; fruit skin deep blue. Seeds globose with broad, elongated raphae; endosperm horny.

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The material for this sheet was supplied by S. K. Basu and R. K. Chakraverty, Indian Botanic Garden, Howrah and J. Lal, Botanical Survey of India, Itanagar.

STATUS : Rare. The species, core of the stem is edible and eaten by the tribal people of north eastern India for which it is exploited.

DISTRIBUTION : Tista valley of Sikkim and West Bengal ; Mishmi hills of Arunachal Pradesh and Khasi, Jaintia hills of Meghalaya. Endemic. (1 & 2).

HABITAT AND ECOLOGY : Grows as isolated strands in rocky clefts below 450 m.

CONSERVATION MEASURES TAKEN : None at present.

CONSERVATION MEASURES PROPOSED : Reintroduction into the depleted habitats and introduction of the species into Botanical gardens for *ex situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Very ornamental in appearance. Unlike other date palms its leaves are soft and not stiffly spinuous at base, therefore can be grown as indoor potted plant. Ripe fruits are edible. Core of the stem is also edible.

CULTIVATION : Not common in cultivation. A few trees are seen in the Indian Botanic Garden, Howrah and elsewhere (4).

DESCRIPTION : A dioecious palm of medium height. Leaves are arching from stem; leaflets alternate to sub-opposite, linear, glossy, induplicately folded (folded like V), arranged in one plane on the rachis. Fruits oblong, 20 mm × 9 mm, deep crimson when ripe; fruit pulp sweet. Embryo dorsal (3).

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The material for this sheet was supplied by S. K. Basu and R. K. Chakraverty, Indian Botanic Garden, Howrah.

STATUS : Rare. So far known from Maharashtra only. The holotype was collected by Santapau in 1944-45 from Khandala. After a lapse of 34 years, the plant could be re-collected in 1979 from Raigad district by Kothari & Moorthy in 1983. The existance of this very rare species is much threatened due to biotic factors.

DISTRIBUTION : Maharashtra (Pune district : Khandala; Raigad: Masadi forests in Roha). Endemic.

HABITAT AND ECOLOGY : On hill slopes at an altitude of about 550 m and in moist deciduous forests, usually in association with *Ficus* sp.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : (*i*) It is suggested that alongwith conservation of natural habitat a few live plants should be collected and introduced into Botanic/experimental gardens. (*ii*) Control over biotic interference caused by tourists, traffic and grazing.

BIOLOGY AND POTENTIAL VALUE : It flowers and fruits from October to March. Leaves of its allied species *Gymnema sylvestre* R. Br. when chewed temporarily neutralise the taste of sugar and saccharine; hence known as 'Madhunasini' in Gujarati.

CULTIVATION : None so far.

DESCRIPTION : Large woody climbers. Stem cylindrical, twining, thick, hairy. Leaves opposite, elliptic-oblong, fulvous pubescent on nerves beneath. Flowers yellow, campanulate, in lateral umbellate cymes. Follicles cylindrical, straight or curved, greenish to brown, pubescent. Seeds compressed, prominently margined with terminal silky-white coma.

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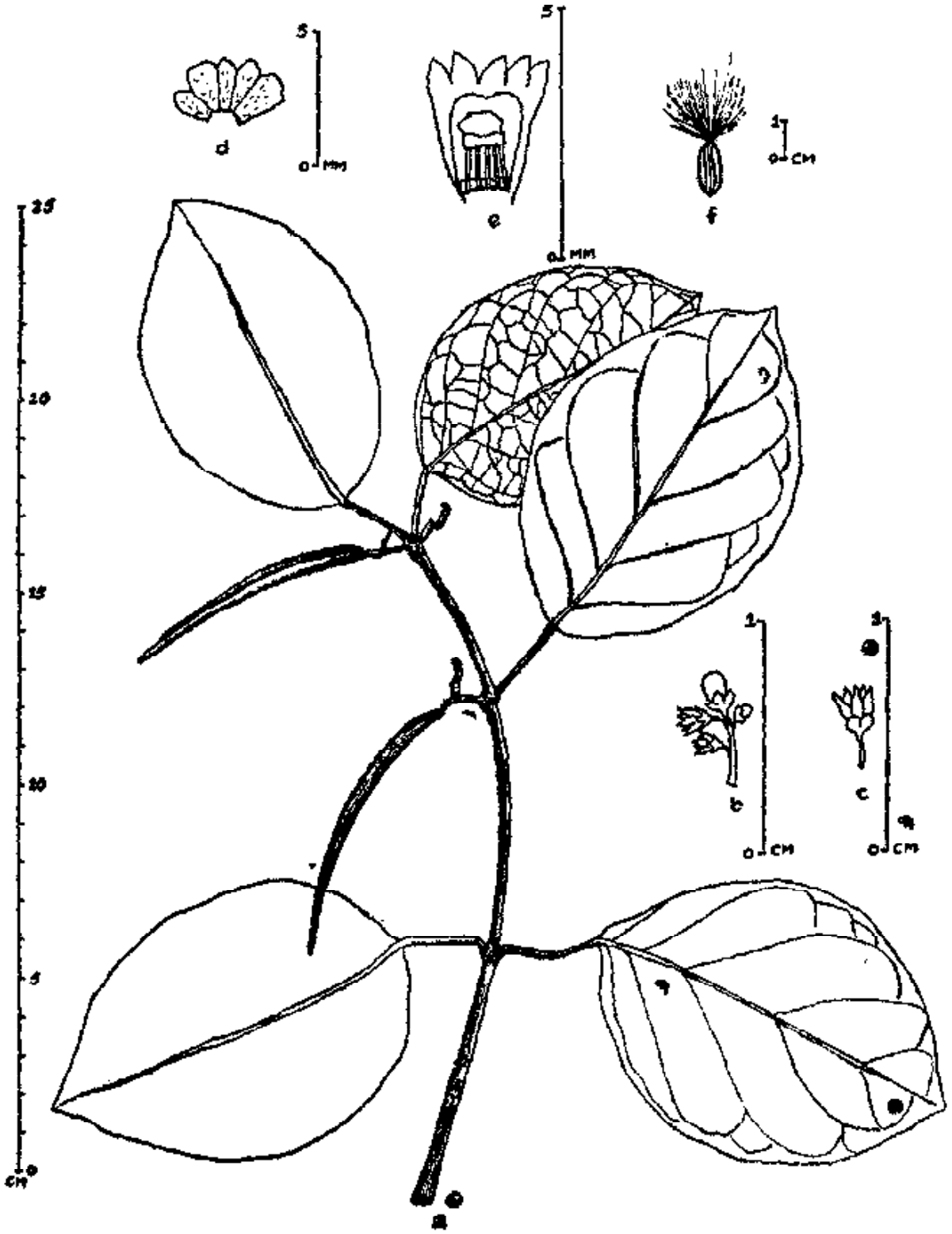
Material of this sheet was supplied by M. J. Kothari, Botanical Survey of India, Pune.



Gymnema khandalense Sant. a. Fruiting branch. b. Inflorescene. c. Flower. d. Corolla-spread open. e. L. S. of flower. f. Seed.

STATUS : Rare. This species is restricted to the southern end of the Western Ghats. The original material was collected by R. H. Beddome in 1870 and relocated by Henry & Swaminathan in the year 1979 (3). The greatest source of danger to this species is from the damage to its habitats by Kodayar hydro-electric project and pilgrimage.

DISTRIBUTION : India : Tamil Nadu, Kanniyakumari Dt., Muthukuzhivayal; Kerala, Trivandrum Dt.: Attyramalai. Endemic.

HABITAT AND ECOLOGY : Dense evergreen forests, at altitudes from 1300 to 1500 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : This species is included in the list of rare and threatened plants of India (2) & (5). The Southern most Western Ghats harbouring many rare, endangered/ threatened taxa has been proposed as a potential area for a Biosphere Reserve (4).

BIOLOGY AND POTENTIAL VALUE : Phytogeographic and scientific interest.

DESCRIPTION : Climbers with milky latex. Leaves upto 10.5×4.5 cm, lanceolate or elliptic -lanceolate, thick-margined, glabrous, glossy, pale when dry, acuminate at apex, cuneate or rounded at base; main nerves upto 8 pairs, reticulation prominent ; petioles upto 3.5 cm long, rusty puberulous. Flowers white, scented, in axillary, dichotomous cymes; peduncles rusty puberulous; pedicels upto 4 mm long, rusty puberulous ; corolla *ca* 1 cm long; tube short, villous within.

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2. Henry, A. N., Vivekananthan, K & Nair, N. C. (1979). Rare and threatened flowering plants of South India. *J. Bombay Nat. Hist. Soc.* 75 : 692.
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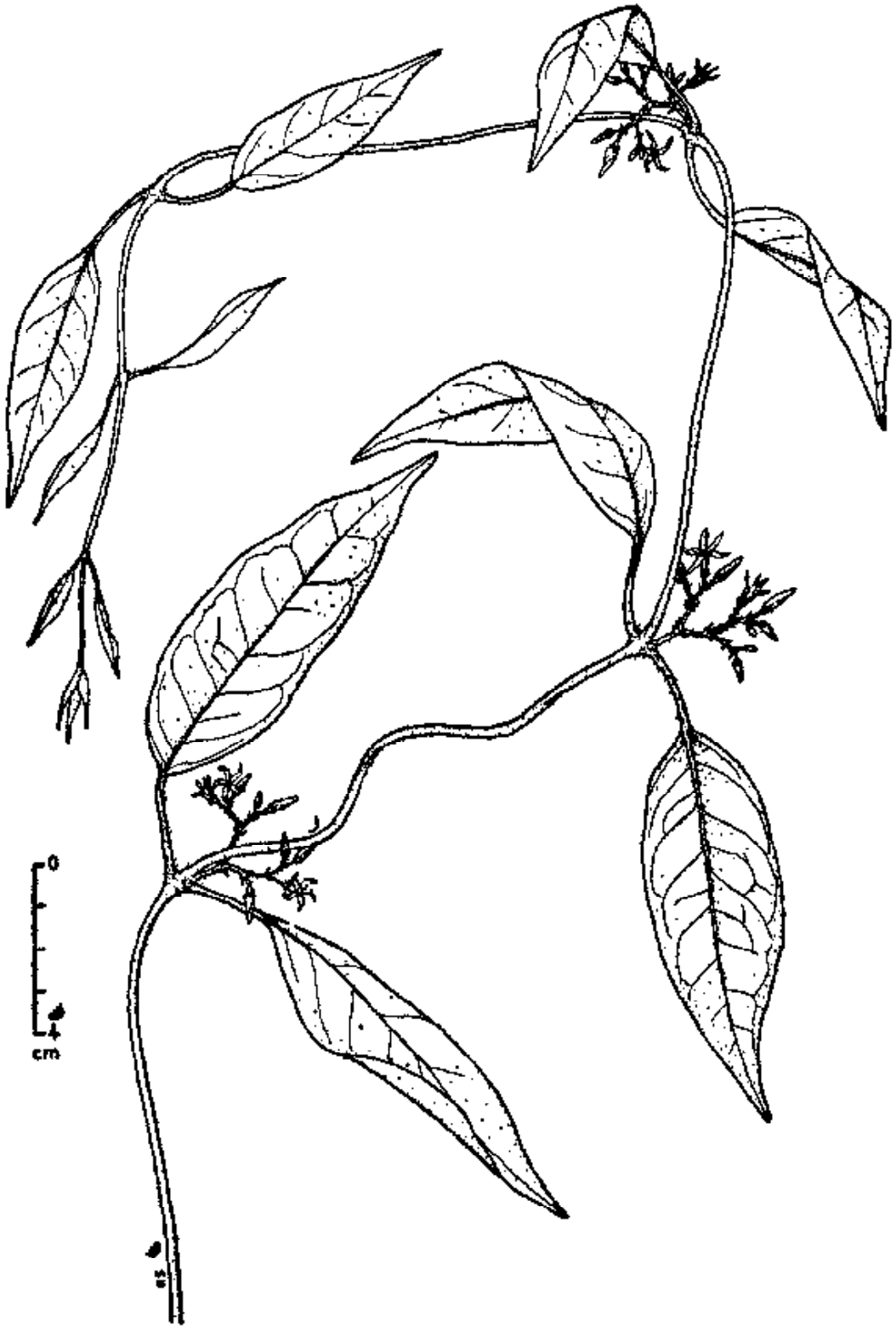
The material for this sheet was supplied by M. S. Swaminathan and A. N. Henry, Botanical Survey of India, Coimbatore.



Toxocarpus beddomei Gamble

STATUS : Indeterminate. Known only from the type collection by Jacquemont (Type K; Phtograph-CAL). The region-Lonavla-Khandala has been well explored in the recent years but this species has not been collected.

DISTRIBUTION : India; between Pune and Karla in Maharashtra. Endemic.

HABITAT AND ECOLOGY : The type was collected between Pune and Karla (near Lonavla). The species grows on open hill slopes in association with species of *Ziziphus*.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : The species should be searched in its type locality; if found attempts should be made for its introduction in botanic gardens and be protected *in situ*.

BIOLOGY AND POTENTIAL VALUE : This species being allied to *Asparagus racemosus* Willd., may be economically and medicinally important. Tubers are said to be used in diarrhoea, dysentry and general debility.

CULTIVATION : None on record.

DESCRIPTION : Tall subshrubs, somewhat climbing, very much branched, primary stems terete, smooth. Branches solitary, sometimes two-nate or subopposite, flexuose, angular, upto 18 mm long, spreading out and arching. Branchlets 1-2-nate, upto 3 cm long, angled, smooth, spreading or deflexed. The internodes of the branchlets *ca* 2.1-4.2 mm long. The leaves at the base of branches prolonged into hard spines of 4-7 mm long. Cladodes in clusters of 3-5, 8-11 mm long, much longer than the internodes, slender, triquetrous, ensiform, curved, acuminate, spreading out. Flowers bisexual in the axils, solitary or in twos, at times having very short common peduncle. Pedicels articulated in the middle. Perianth *ca* 1.5 mm long with segments oblong, obovate, obtuse, spreading in flower. Anthers very small, globose, four times smaller than the filaments Style short.

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The material for this sheet was supplied by S. Y. Kamble, Botanical Survey of India, Pune.

STATUS : Rare. Endemic.

DISTRIBUTION : India. So far known to occur in parts of Pune and Thane districts in Maharashtra State and Shimoga district in Karnataka, in the Western Ghats.

HABITAT AND ECOLOGY : In open, wet situations and in rice fields.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The species should be protected and propagated in experimental gardens.

BIOLOGY AND POTENTIAL VALUE : It flowers and fruits during September-October.

CULTIVATION : None.

DESCRIPTION : Erect herbs, 10-20 cm tall, branched, slender, gregarious. Leaves 1.5-2.5× 0.2-0.3 cm, bipinnatifid, sessile, glandular, mostly radical forming rosette; cauline leaves few, small. Heads 2-4 mm across, few in corymbs, flowers bright yellow; involucral bracts 1 mm long, linear-oblong. Pappus absent. Achenes oblong, 2 mm long, smooth.

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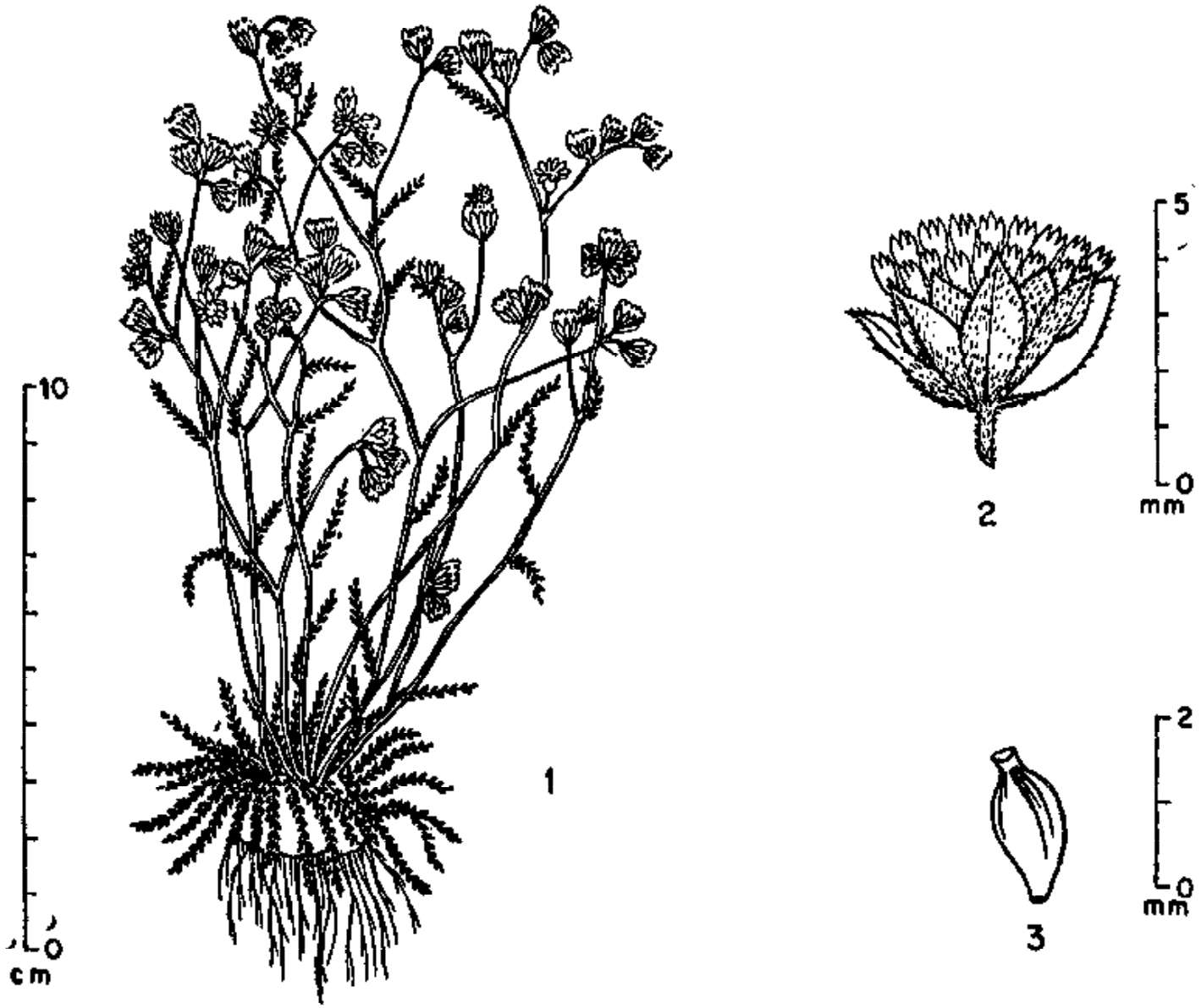
The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Cyathocline lutea Law ex Wt. 1. Habit. 2. Floral head. 3. Achene.

STATUS : Rare. The species is sparsely distributed in its distribution range.

DISTRIBUTION : India : Nasik & Pune districts in Maharashtra and Shimoga district in Karnataka. Endemic to N. Western Ghats.

HABITAT AND ECOLOGY : In open situations among grasses on gravelly soil.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The natural habitat should be protected.

BIOLOGY AND POTENTIAL VALUE : Fls. & frs. : March June.

CULTIVATION : None.

DESCRIPTION : Prostrate or decumbent, much branched herbs; branches radiating from centre. Radical leaves form a rosette, 2.5-7.0×0.6-1.9 cm, oblanceolate; cauline leaves smaller, lanceolate, sessile, woolly. Heads 1.2-2.0 cm across, yellow, in dense axillary or terminal clusters. Achenes obovoid, faintly ribbed. Pappus absent.

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The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.

STATUS : Rare, known only from its type collection.

DISTRIBUTION : Karnataka, Kemmongandi hills. Endemic.

HABITAT AND ECOLOGY : In open places, and forest cleared hill slopes, as undergrowth.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Field surveys should be undertaken to relocate this species in its type locality and similar adjoining areas. The habitats of this species should be conserved.

BIOLOGY AND POTENTIAL VALUE : An endemic species of taxonomic interest. Fls. & Frs.: November-December.

CULTIVATION : Not known.

DESCRIPTION : Annual undershrubs, stems dark brown, pubescent. Leaves lanceolate, acuminate, mucronately toothed, blackish brown, lower surfaces densely white tomentose with prominent dark brown venation. Capitula radiate, yellow, campanulate. Involucres thick, dark brown, hairy. Peduncles 1.5-3 cm long. Achenes *ca* 2 mm long, evident upwards, 8-ribbed. Pappus hairs brownish white, unequal, barbed.

REFERENCES :

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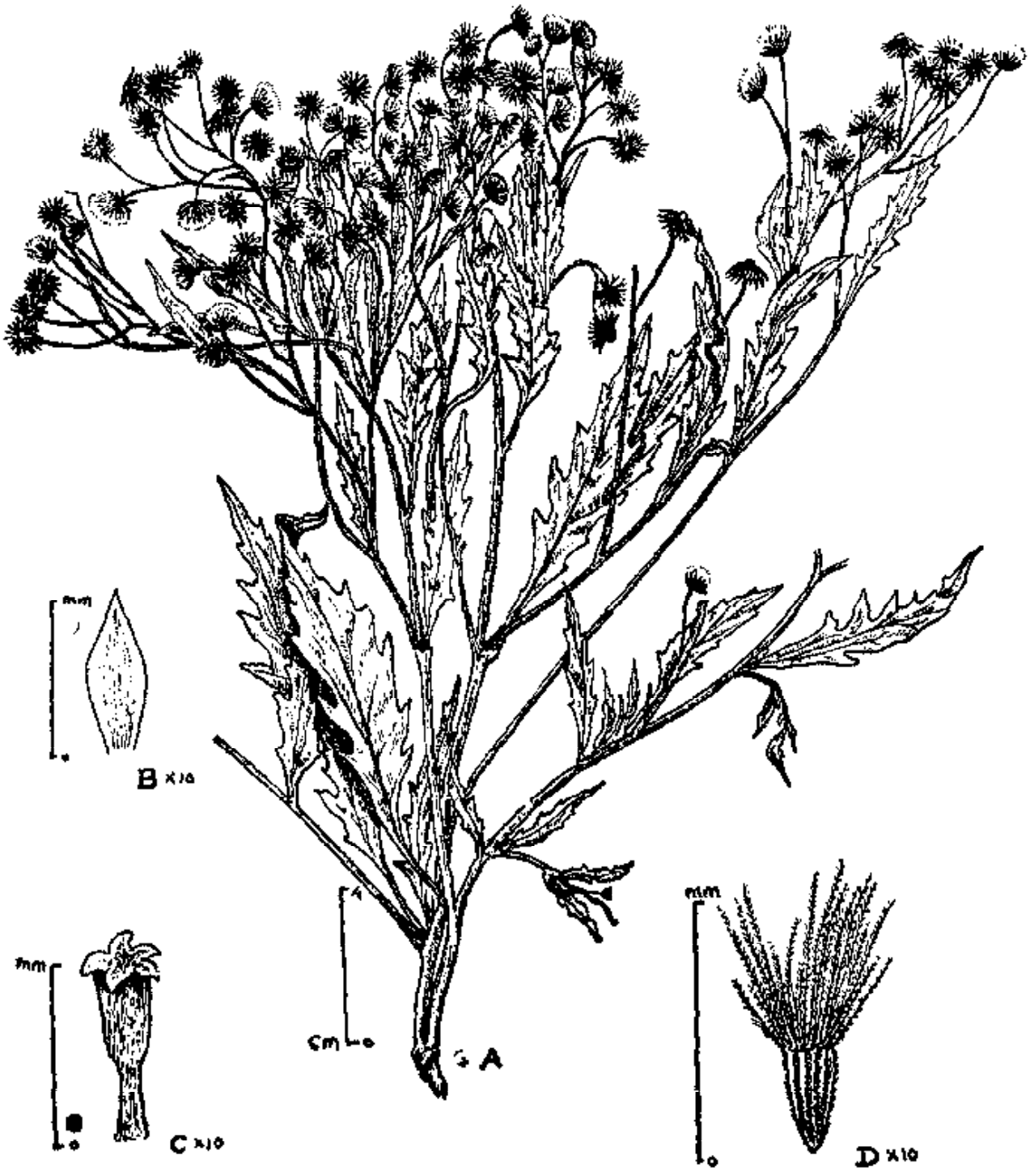
The material for this sheet was supplied by Reshma Mathur, Botanical Survey of India, Dehra Dun.



Senecio mayurii Fisch. A. Habit. B. Bract. C. Floret. D. Achene.

STATUS : Vulnerable or Indeterminate species, known so far only from its type collection. Its distribution areas in the N. Eastern India are subjected to extensive deforestation for timber and agricultural purposes.

DISTRIBUTION : Eastern Himalaya; Meghalaya, Mishmi hills. Endemic.

HABITAT AND ECOLOGY : On dry, exposed hilly slopes.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : The first priority is to find out its populations; the distribution localities should be given the full protection against any sort of biotic disturbances for *in situ* preservation. The species should also be introduced into experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : None.

DESCRIPTION : Herbs. Stems slender, reddish-brown on drying. Leaves broadly oblong, acuminate, glandular, pubsescent, sessile with broad auricles, auricles produced backwards. Capitula radiate, campanulate, yellow. Ray florets flat, ligulate, epappose. Discflorets yellow, pappose. Achenes small, oblong, 5-angled, glabrous. Pappus white.

REFERENCES :

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The material for this sheet was supplied by Reshma Mathur, Botanical Survey of India, Dehra Dun.

STATUS : Rare and restricted to N E. India. The species is known from a few collections only.

DISTRIBUTION : North-Eastern India: Nagaland, Manipur. Endemic.

HABITAT AND ECOLOGY : On exposed hill slopes at 1500-1850 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Needs intensive search in the type locality and near by localities. The species should also be introduced in the experimental gardens for *ex situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Not known so far.

CULTIVATION : Not known so far.

DESCRIPTION : Perennial sub-shrubs, stem and branches densely brownish-pubescent. Leaves elliptic-lanceolate, acute or acuminate, blackish, scabrid, reddish, pubescent on the veins on the upper surfaces; petioles biauriculate at the base. Capitula radiate, in terminal corymbs. Achenes cylindrical, pubescent. Pappus 3.5 mm long, yellowish.

REFERENCES :

1. Clarke, C. B. (1889). *J. Linn. Soc.* 25 : 40. t. 19.
2. Kanjilal, U. & Das, A (1939). *Fl. Assam* 3 : 124.
3. Rao, R. R. *etal* (1988). *Fl. Indicae Enumer. Asteraceae*, p. 70. Botanical Survey of India, Calcutta.

The material for this sheet was supplied by Reshma Mathur, Botanical Survey of India, Dehra Dun.

Synotis simonsii (Clarke) Jeffrey et Chen **ASTERACEAE**

(*Senecio simonsii* Clarke)

STATUS : Indeterminate. The species is known only from its type collection. The species has not been collected during the botanical explorations in this region during the last 3 decades.

DISTRIBUTION : Eastern India; Assam. Precise locaty is not known.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : It is neecessary to survey the type locality intensively ; if relocated, the species, may be introduced in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Clarke mentioned it to be a handsome shrub and the species in cultivation could be of ornamental potential.

CULTIVATION : None so far.

DESCRIPTION : Glabrous shrubs. Leaves broadly elliptic, actute, glaucous, venation prominent, reticulate, petioles 5-7 mm long. Capitula discoid, yellow, small, 8-16-flowered, in axillary corymbose panicles. Peduncles *ca* 2 mm long. Achenes 5-ribbed, glabrous. Pappus white.

REFERENCES :

1. Clarke, C. B. (1876). *Comp. Ind.*, p. 188.
2. Clarke, C. B. (1881). *In :* Hooker, J. D., *Fl. Brit. India* 3 : 356.
3. Kanjilal, U. & Das, A. (1939). *Fl. Assam* 3 : 124.
4. Rao, R. R. *et al* (1988). *Fl. Indicae Enumer. Asteraceae*, p. 75. Botanical Survey of India, Calcutta.

Material for this sheet was supplied by Reshma Mathur, Botanical Survey of India, Dehra Dun.

Synotis simonsii C. B. Cl.

STATUS : Rare. Endemic to North Andaman Island. The fringe of the evergreen forest near littoral forest is severely damaged due to biotic pressures, and therefore calls for inclusions of this rare species, though recently described.

DISTRIBUTION : This species is collected from Saddle Peak, North Andaman and it is known only from type collection.

HABITAT AND ECOLOGY : *V. andamanica* is a scandent shrub occurring in the thick evergreen forests on the hilltop of Saddle Peak.

CONSERVATION MEASURES TAKEN : Its habitat is a part of Saddle Peak National Park. There is degradation of forest beyond the peak due to biotic pressures.

CONSERVATION MEASURES PROPOSED : The North Andaman from Austin Strait to Cape Price is to be declared as the North Andaman Biosphere Reserve.

BIOLOGY AND POTENTIAL VALUE : This is an interesting species having scandent shrubby habit. Species of *Vernonia* range from herbaceous to shrubs, scandent shrubs and trees and some of the species are narrow endemics.

CULTIVATION : Nil.

DESCRIPTION : Scandent shrubs. Leaves spirally arranged, elliptic, ovate or obovate, apex acute or shortly acuminate, margin entire, 4.5-10.5 × 1.5-5.5 cm, glabrous, glossy green above, pale beneath, lateral nerves 5-7 pairs; petiole 3-8 mm long. Panicles terminal, short and composed of few heads, heads subsessile with many florets, involucral bracts many ; receptacle glabrous. Corolla tube 6-7 mm long, glabrous. Stamens 5, anthers sagittate at base, acute at apex. Style 7-8 mm long, stigmatic branches about 3 mm long, curved. Achenes 4 mm long, 10-ribbed, thinly pubescent, pappus hairs numerous, in 2 rows, pubescent; outer pappus 3-4 mm long; inner pappus 11-12 mm long.

REFERENCES :

1. Balakrishnan, N. P. & Nair, N. G. (1982). *Bull. Bot. Surv. India* 24 : 32.
2. Rao, R. R. *etal* (1988). *Fl. Indicae Enumer. Asteraceae*, p. 86. Botanical Survey of India, Calcutta.

The material for this sheet was supplied by M. P. Nayer, Botanical Survey of India, Calcutta.

STATUS : Endangered or Possibly Extinct. This endemic species is known only by the type collection made by E. Barnes during the year 1933. (1, 2).

DISTRIBUTION : India. Anaimudi slopes, Idukki Dt., Kerala. Endemic to southern parts of Western Ghats. Types in K & MH.

HABITAT AND ECOLOGY : Anaimudi ridge (the highest peak in Peninsular India) and in dense undergrowth in sholas at about 2,500 m.

CONSERVATION MEASURES TAKEN. None.

CONSERVATION MEASURES PROPOSED : The area of its occurrence needs an extensive search to relocate the species. It is recommended that authorities of Eravikulam National Park, Idukki district in Kerala should take necessary steps to conserve the area. The species is included in the list of rare and threatened plants (3, 4).

BIOLOGY AND POTENTIAL VALUE : A species of scientific interest on account of its geographical isolation. Allied to *I. travancorica* Bedd., another endemic species confined to southern most hills of Western Ghats. Flowering was recorded during September to December.

CULTIVATION : Nil.

DESCRIPTION : Herbs; stems 15-25 cm high, erect or prostrate, reddish. Leaves 2-6.3 × 1.4-4.2 cm, alternate, broadly ovate to suborbicular, acute, base subtruncate, rounded or shortly cuneate, margins evenly crenate, nearly entire at base, glabrous or with scattered hairs on the nerves; primary nerves 5-7 pairs; petioles 1-4 cm long. Inflorescence axillary. Flowers 3-4, subumbellate; lateral sepals 6 mm long, ovate, slightly asymmetric, cuspidate, 5-7-nerved; lip 1-1.2 cm long, oblong-ovate, deeply concave, cuspidate; wing petals ±1.4 cm long; standard ±8 mm long, ovate-oblong, cuspidate. Capsules 6-7 mm long, ellipsoid, cuspidate-acuminate; seeds 3-4 mm long, subglobose.

REFERENCES :

1. Barnes, E. (1939). The species of Geraniaceae occurring on the Travancore High Range, including the description of a new Balsam. *J. Indian Bot. Soc.* 18 : 105.
2. Fischer, C. E. C. (1935). New or little known plants from South India V. *Bull. Misc. Inform. Kew* 1935 : 92-93.
3. Fischer, C. E. C. (1957). *In :* Gamble, J. S., *Fl. Pres. Madras* 3 : 1295. (repr. ed.) Botanical Survey of India, Calcutta.
4. Henry, A. N., Vivekananthan, K. & Nair, N. C. 1978 (1979). Rare and threatened flowering plants of South India. *J. Bombay Nat. Hist. Soc.* 75 : 685.
5. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened plants of India*, p. 12. Botanical Survey of India, Howrah.

The material for this sheet was supplied by K. Vivekananthan, Botanical Survey of India, Coimbatore.

STATUS : Endangered or Possibly Extinct. This endemic species yet is to be located after its original discovery. E. Barnes described this species based on his collections made during the years 1931-37. (1). Causes for its depletion may be due to the large scale destruction of evergreen forests in the High Range, Kerala.

DISTRIBUTION : INDIA. Kerala, Idukki Dt., Kalaar Valley (Former Travancore State).

HABITAT AND ECOLOGY : Along stream beds in dense evergreen forests at an altitude of about 1250 m.

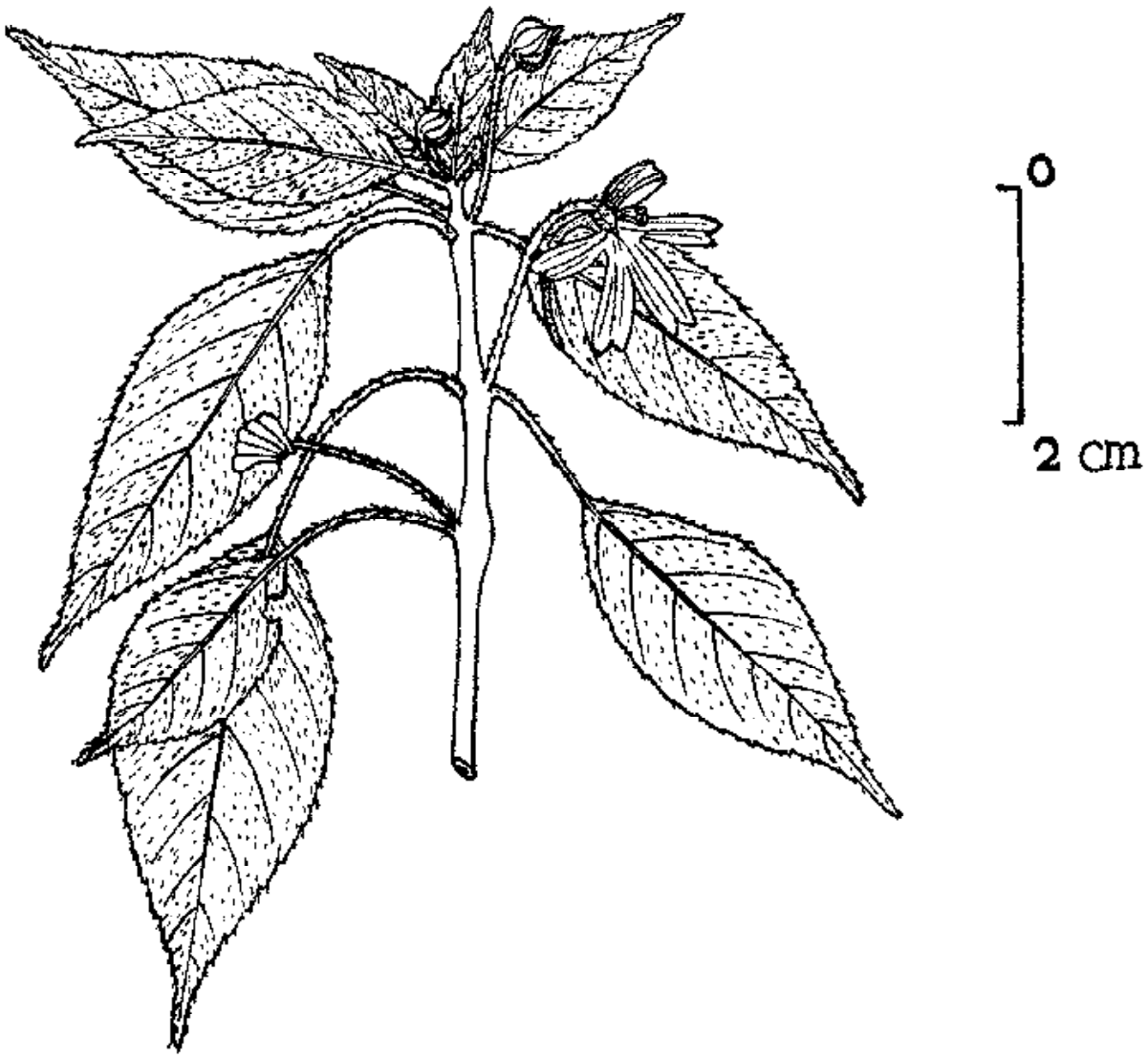
CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : An intensive search has to be made to relocate the species. It has already been catalogued in the endangered plants of South India (3) and India (4). The High Range in Idukki district should be protected as it is rich in endemics.

BIOLOGY AND POTENTIAL VALUE : A species of very restricted distribution. In respect of species of balsams, the type locality of the species *viz.*, High Range, Idukki Dt., Kerala is the richest area of the Western Ghats and consequently of the world. Out of the 83 species reported in the erstwhile Madras Presidency (2) about 39 species are located in this area (1). Allied to *I. hensloviana* Arn.

CULTIVATION : No attempt recorded so far.

DESCRIPTION : Erect shrubby plant upto 1 m high ; stem smooth, dilated at the nodes. Leaves opposite, whorled and alternate, upto 13.5×5 cm, ovate, acute at base, acuminate at apex, margins shallowly crenate-serrate, upper surface with scattered stiff white hairs; petiole slender upto 8 cm long. Flowers over 4 cm long ; pedicels solitary in upper leaf axlis; lateral sepal *ca* 1.3 cm long, broadly ovate, long acuminate; lip very shallowly boat-shaped, mucronate; spur upto 4 cm long, horizontal and then becoming slender and curved; wing petals bilobed; standard boat-shaped, keeled along the back. Capsules *ca* 2.8 cm long, acuminate at apex; seeds 5, *ca* 4 mm long, pear-shaped, somewhat flattened.



Impatiens jolnii Barnes

REFERENCES :

1. Barnes, E. (1939). The species of Geraniaceae occurring on the Travancore High Range including the description of a new Balsam. *J. Indian Bot. Soc.* 18 : 102.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 95-104. (repr. ed.). Botanical Survey of India, Calcutta.
3. Henry, A. N., Vivekananthan, K. & Nair, N. C. 1978 (1979). Rare and threatened flowering plants of South India. *J. Bombay Nat. Hist. Soc.* 75 : 686.
4. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened plants of India*, p. 12. Botanical Survey of India, Howrah.

The material for this sheet was supplied by K. Vivekananthan and C. P. Malathi, Botanical Survey of India, Coimbatore.

STATUS : Endangered or Possibly Extinct. Known only from the type specimen collected in 1910. J. D. Hooker described the species on a single collection made by A. Meebold (3). Subsequent workers like E. Barnes who have made extensive collections in the area, could not relocate it (1). It might have been lost forever due to the rapid destruction of its natural habitats.

DISTRIBUTION : India: Kerala, Idukki Dt., Devicolam (Former Travancore High Range).

HABITAT AND ECOLOGY : It is reported to grow at an altitude of 1829 m.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The first task is to find out if it still survives in the type locality and the adjoining natural habitats. The species is included in the catalogue of threatened plants of South India (2) and India (4).

BIOLOGY AND POTENTIAL VALUE : A species of scientific interest on account of its geographical isolation. Closely related to *I. cuspidata* Wight & Arn. which is also endemic to the Western Ghats.

CULTIVATION : Not known.

DESCRIPTION : Glabrous shrubby herbs, branches long spreading. Leaves 8-10 cm long, lower opposite, upper 3-5 together, verticillate, obovate-lanceolate, long acuminate, serrulate, nerves on each side 6-7; petiole 3-5 cm long. Inflorescence simply pedicellate; pedicels solitary or two together, subequal to petioles while in flower, 5-8 cm long while in fruits, robust with curved apex. Flowers up to 1.5 cm, white (?); sepals 2, 4-6 mm long, ovate, coriaceous, long cuspidate, acuminate; standard 1.5-2 cm broad, obcordate-reniform, mid-nerve shortly cuspidate. Wings sessile; basal lobes large, oblong or obovate, spreading or recurved; distant lobes small, erect, oblong, obtuse; dorsal auricles absent; labellum upto 6 mm long, deeply boat-shaped, long cuspidate. Spur twice longer than the limb, robust, curved; filaments short, subulate; ovary ovoid, obtuse. Capsules 1.5-2.2 cm long, oblique, ovoid, obtuse, beaked, many-seeded; seeds $\pm$5 mm long, chestnut-coloured, obovoid, granulate.

REFERENCES :

1. Barnes, E. (1939). The species of Geraniaceae occurring on the Travancore High Range including the description of a new Balsam. *J. Indian Bot. Soc.* 18 : 97.
2. Henry, A. N., Vivekananthan, K. & Nair, N. C. 1978 (1979). Rare and threatened flowering plants of South India. *J. Bombay Nat. Hist. Soc.* 75 : 686.
3. Hooker, J. D. (1911). On some Western Peninsular Indian Balsaminaceae collected by Mr. A. Meebold XLVIII. Indian species of Impatiens. *Bull. Misc. Inform. Kew* 1911 : 355.
4. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened plants of India*, p. 12. Botanical Survey of India, Howrah.

The material for this sheet was supplied by K. Vivekananthan, Botanical Survey of India, Coimbatore.

STATUS : Endangered. Originally collected from Munnar, it has not been recollected and reported afterwards from the same locality or elsewhere although the area is fairly well-explored. Causes for its decline and possible extinction may be due to massive deforestation for cultivation of commercial plantation crops in and around Munnar. Barnes (1) described and reported (2) this species based on his own collections, made during the years 1931-1937.

DISTRIBUTION : India : Kerala, Idukki Dt., High Range near Munnar Kanniamalai.

HABITAT AND ECOLOGY : On the edges of streams and in marshy places at an altitude of 1,300 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : This species is included in the list of threatened plants of South India (3) and India (4). The area of its occurrence needs an intensive search to relocate the species.

BIOLOGY AND POTENTIAL VALUE : A species of scientific interest on account of its endemic nature. Allied to *I. pusilla* Heyne ex Hook. f. & Thoms. Flowering & Fruiting was recorded between September-December.

DESCRIPTION : Weak erect or semi-erect herbs upto 1 m high; stem often procumbent below and rooting at the nodes. Leaves variable, up to 5.5 cm long, 1.7 cm wide, usually lanceolate, acute at apex, cordate at base or narrowly ovate, margins distantly serrate with apiculate teeth, pubescent above, glabrous and pale or glaucous below; petiole flattened, decurrent on the stem, red above. Flowers 1-1.3 cm long; lateral sepals *ca* 6 mm long, filiform, curved; lip boat-shaped, cuspidate, flattened with a small pit at bottom, white with purple streaks; standard ovate, keeled, mucronate at tip; wings white with liliac or violet markings; distal lobe obovate-triangular; basal lobe triangular. Capsule 1.3-1.5 cm long, fusiform, acuminate; seeds 1.5 mm long, black, glossy.

REFERENCES :

1. Barnes, E. (1938). New or little known plants from South India 8. *Bull. Misc. Inform. Kew* 1938 : 32.
2. Barnes, E. (1939). The species of Geraniaceae occurring on the Travancore High Range including the description of a new Balsam. *J. Indian Bot. Soc.* 18 : 100.
3. Henry, A. N., Vivekananthan K. & Nair, N. C. 1978 (1979). Rare and threatened flowering plants of South India. *J. Bombay Nat. Hist. Soc.* 75 : 686.
4. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened plants of India*, p. 12. Botanical Survey of India, Howrah.

The material for this sheet was supplied by K. Vivekananthan, Botanical Survey of India, Coimbatore.

STATUS : Rare. An endemic species confined to Anaimudi slopes at the High Range, Indukki Dt., Kerala (Former Travancore State). It was described (1) and reported (2) by E. Barnes based on his collection from Anaimudi slopes and Karankulam. By intensive search, this plant was relocated (4) in the type locality in the year 1967.

DISTRIBUTION : India. Kerala, Idukki Dt., confined to Anaimudi slopes and Karankulam.

HABITAT AND ECOLOGY : This scapigerous herb grows on wet rocks in cushions of moss and on cliffs in the shrub-savanna at high elevations above 1,800 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : This species is included in the list of rare (4) and threatened plants of South India (3) and India (5). Necessary steps to conserve the area and species should be ensured in the Eravikulam National Park, Kerala.

BIOLOGY AND POTENTIAL VALUE : A species of scientific interest on account of restricted distribution and of phytogeographical features. Its counterparts are *I. akka* Bedd. and *I. nilagirica* C. E. C. Fischer. They are similar plants occurring in similar situation in the Anamalais and Nilgiris. The geographical isolation of this species is apparently due to the feeble dispersal machanism of the plant by which the seeds are not carried out beyond the habitat of the plant (2 & 4). Flowering & Fruiting : August-September.

DESCRIPTION : Small, succulent, scapigerious herbs; tubers *ca* 7 mm diam, white, spherical. Leaves radical, solitary or few, 1.7-4.5 cm diam, orbicular-reniform, margins shallowly crenate, glabrous and green above, dark purple below, basal nerves 3-4 pairs, curved; petioles 2-6 cm long. Scape solitary, upto 20 cm long, pale green with numerous red streaks. Flowers solitary or in few-flowered racemes. Lateral sepals *ca* 5 mm long, brownish-red, streaked; lip spoon-shaped, spurless; standard *ca* 1 cm wide, broadly elliptic, concave; wings 3-lobed, upto 2.9 cm long, lobes oblong, rounded, the two upper curved outwards. Capsules *ca* 1.2 cm long, turgid, glabrous; seeds numerous, *ca* 1 mm long, narrowly ovoid, reddish-brown.

REFERENCES :

1. Barnes, E. (1938). New or little known plants from South India: VIII. *Bull. Mis. Inf. Kew* 1938 : 33-34.
2. Barnes, E. (1939). The species of Geraniaceae occurring in the Travancore High Range including the description of a new Balsam. *J. Indian Bot. Soc.* 18 : 98.
3. Henry, A. N., Vivekananthan, K. & Nair, N. C. 1978 (1979). Rare and threatened flowering plants of South India. *J. Bombay Nat. Hist. Soc.* 75 : 686.
4. Shetty, B. V. & Vivekananthan, K. 1972 (1975). New and little known taxa from Anaimudi and surrounding regions, Devicolam, Kerala-IV: Notes on some rare species. *Bull. Bot. Surv. India* 14 : 20-21.
5. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened plants of India*, p. 13. Botanical Survey of India, Howrah.

The material for this sheet was supplied by K. Vivekananthan, Botanical Survey of India, Coimbatore.

STATUS : Rare, endemic. The species is represented by a few old collections.

DISTRIBUTION : India; restricted in distribution only to Shimoga and North Kanara districts in Karnataka. Recently recollected by Bhaskar & Razi (1978) from N. Kanara district after Talbot & Meebold's old collections from Agumbe in Shimoga district.

HABITAT AND ECOLOGY : In moist, shady places along the ghat slopes.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas be searched throughly for the plant and natural habitats be protected. The live plants or seeds be procured and grown in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Worth growing in gardens as an ornamental plant. Flowering & fruiting in August-September.

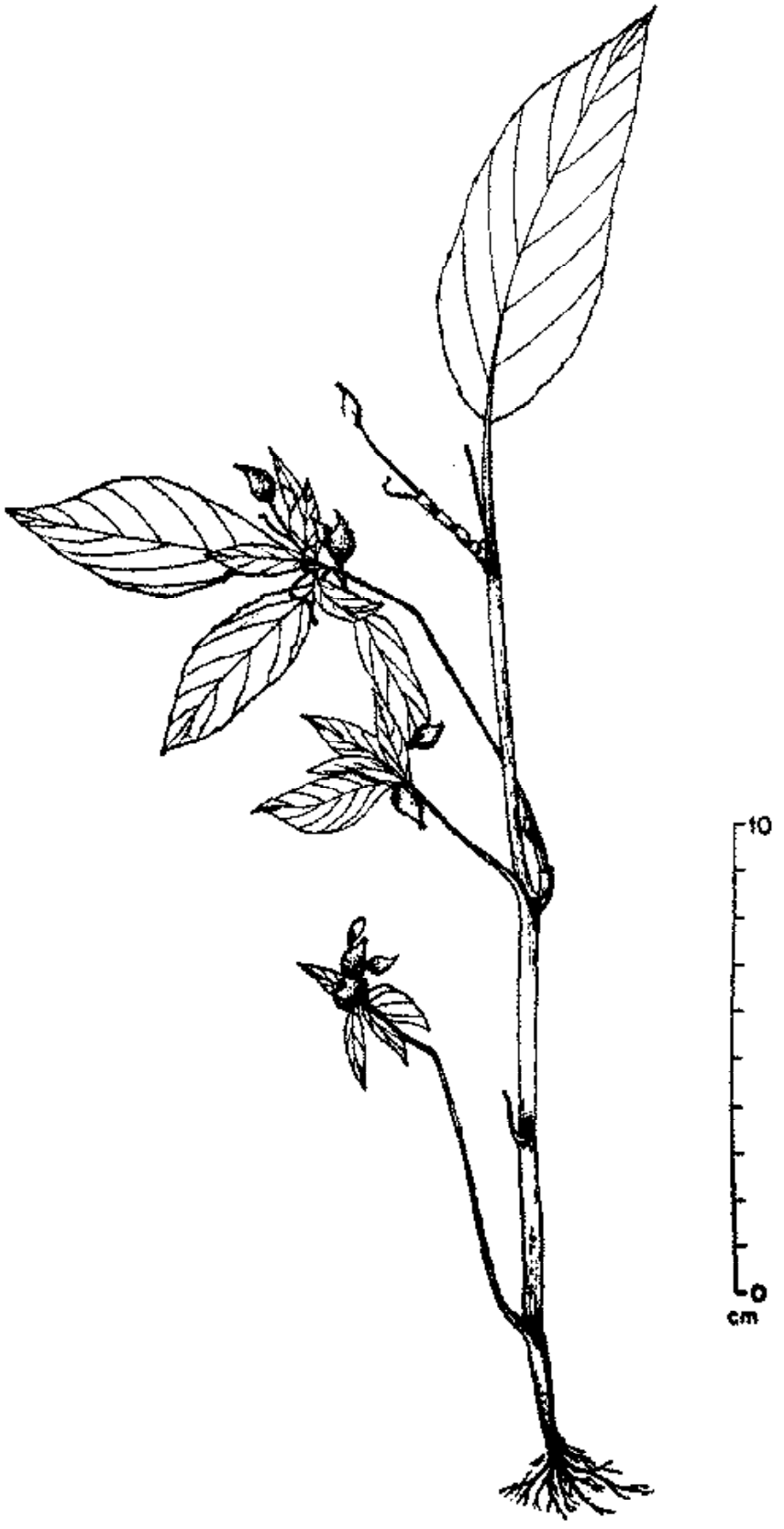
CULTIVATION : None.

DESCRIPTION : Annual herbs, 20-30 cm tall, glabrous or branchlets and leaves pubescent; stems simple, nude for a long distance, few leaved towards the apex. Leaves broadly or elliptic-ovate or oblong, tapering at both ends, 1-3 cm long, petiolate, remotely serrate. Flowers 2.0-2.5 cm across; sepals 2, standard orbicular, concave; wings sessile, lobes broadly obcordate; limb of labellum short, 1 cm long; spur 2-3 cm long, straight. Capsules globose, 0.5-0.8 cm across, obscurely rostrate. Seeds subglobose, compressed, tuberculate, brown.

REFERENCES :

1. Blatter, E. (1933). *J. Bombay Nat. Hist. Soc.* 35(2) : 314.
2. Bhaskar, V. & Razi B. A. (1978). *Ind. J. For.* 1(1): 75.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Impatiens talbotii Hook. f.

STATUS : Rare. The species has not been collected in the recent years although its distributional localities have been well botanized. All the four Syntypes present in the Central National Herbarium (CAL), are not having good flowers and no fruits.

DISTRIBUTION : Abor Hills, Arunachal Pradesh. Endemic.

HABITAT AND ECOLOGY : Grows on old overgrown clearings and extending just to the plains above Rotung at an alt. 300 m between Kebang and Dihong.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Protection of its known localities, collection of live plants and seeds, cultivation in botanic gardens and propagation through seeds in its natural distribution range.

BIOLOGY AND POTENTIAL VALUE : A herb with beautiful flowers blooming during January. Several species of *Begonia* are prized in horticulatural trade for their foliage and flowers.

CULTIVATION : This species was cultivated in the Lloyd Botanic Garden at Darjeeling when the plant was discovered.

DESCRIPTION : Acaulescent, rhizomatous herbs. Leaves petiolate, obliquely cordate-ovate, acuminate at apex, base sinuate, dentate to denticulate at margin, lamina variegated. Peduncle 20 cm long. Flowers rose in colour, 4-5 cm in diameter, umbellate, bracts oblong ovate, 2-3 cm long. Male flower: pedicillate, tepals 2+2, the outer rotundate to ovate, the inner ovate, small, stamens indefinite, filaments 7 mm long, anther 2 mm long. Female flower: 1-3, styles 3, jointed at the base, 7 mm long; fruit globose 1-8 cm in diameter, 4-loculed.

REFERENCE :

1. Dunn, S. T. (1920). *Kew Bull.* 1920 : 110.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Endangered. This is represented only by Type present at the Kew Herbarium and a single specimen (Isotype) is present at Southern Circle, Coimbatore (MH). It has not been collected since 1937 although its distributional localities are well botanized. It is likely that some populations may still be surviving. The species is a narrow endemic.

DISTRIBUTION : Southern W. Ghats, Kadalar valley and Nilgiri hills.

HABITAT AND ECOLOGY : Grows on rocks in evergreen forest, Kadalar valley, Travancore High Range at an altitude of 1500 m and Nilgiri Hills-Devala at an altitude of 920 m.

CONSERVATION MEASURES TAKEN : Specifically none for the species. However, The Nilgiri Hills-Devala areas are now included in the Niligiri Biosphere Reserve and are protected.

CONSERVATION MEASURES PROPOSED : The first priority is to find out if it still survives in the type locality and adjoining regions of evergreen forests. If relocated steps should be taken to protect the habitat and the species be introduced in horticultural or experimental gardens.

BIOLOGY AND POTENTIAL VALUE : This is a beautiful herb of horticultural importance. It blooms during September.

CULTIVATION : None on record.

DESCRIPTION : Scapigerous herb, rhizome short, apparently fleshy, with numerous fibrous rootlets. Leaves ovate to rotundate-ovate, acute or acuminate, base rounded, 5-13 × 3.2-8.5 cm; petioles 2.5-6.0 cm long. Scape 10-30 cm long, sometimes bearing a simple leaf similar to the radical, but much smaller. Flowers pink, monoecious, the male above the female . Male flowers: tepals 4, broadly elliptic or elliptic-obovate, 1 × 5 mm; stamens monadelphous. Female flowers : tepals 6, oblong, the innermost usually considerably smaller and narrower, styles 3, 2.6 mm long, stigma broad. Ovary subglobose, 2-celled, placentae 2 in each cell.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of Indian Region* 1 : 81. Botanical Survey of India. Calcutta.
2. Fischer, C. E. C. (1939). *Kew Bull.* 1939 : 247.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Endangered. It is endemic to South-Western Ghats at Anamalai hills of Tamil Nadu. It was reported by J. S. Gamble based on the collection of R. H. Beddome around the year 1864, from Anamalai hills of Coimbatore district. It may have been lost due to habitat destruction and clearing of forest for various purposes.

DISTRIBUTION : Southern-Western Ghats.

HABITAT AND ECOLOGY : Grows on moist regions of forests as under growth.

CONSERVATION MEASURES TAKEN : The Anamalai Wild Life Sanctuary having an area of about 960 km includes similar habitats.

CONSERVATION MEASURES PROPOSED : It is recommended that Anamalai Wild Life Sanctuary authorities should take necessary steps to conserve this rare and endangered species, if relocated. Attempts to cultivate the species in botanic gardens and conservatories should also be made.

BIOLOGY AND POTENTIAL VALUE : Not known. However, most of the species of *Begonia* are horticulatural favourites. This scapigerous herb is isolated only in one hill-range of the South-Western Ghats, and thus represents an extreme case of narrow endemism.

CULTIVATION : None on record.

DESCRIPTION : Scapigerous herb with very oblique reniform leaves, the younger very floccose, the older glabrous. The scape is many-flowered, much longer than the leaves. Male and female flowers have only 2 tepals.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian Region* 1 : 81. Botanical Survey of India. Calcutta.
2. Beddome, R. H. (1864). *Madras Journ. Sc.* ser. 3.1 : 48.
3. Beddome, R. H. (1865). *Trans. Linn. Soc. London* 25 : 217.
4. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 386 (repr. ed.). Botanical Survey of India, Calcutta.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Endangered or Possibly Extinct. This endemic species is known only from its type collection made around 1864. It might have been lost due to rapid destruction of the area for habitation and cultivation of commercial crops. The original material was collected by J. D. Hooker and T. Thomson and described by De Candolle.

DISTRIBUTION : Khasia, Terai, Meghalaya.

HABITAT AND ECOLOGY : Reported growing in the altitude *ca* 300 m in the moist shady forest undergrowth.

CONSERVATION MEASURES TAKEN : Not known.

CONSERVATION MEASURES PROPOSED : Intensive search should be made to re-locate the species from the above area. If it is rediscovered from any locality, its natural habitats should be protected and the species should be introduced into conservatories and experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Not known but this curious species may prove to be of horticultural interest.

CULTIVATION : Not cultivated anywhere.

DESCRIPTION : Rootstock tuberous. Stemless. Leaves 3-8 cm, nearly orbicular, not very unequal at the base, crenate-dentate at margin, hardly ciliate, glabrous or few scattered hairs above, rarely with minute pubescence on the nerves beneath ; petiole 2-7 cm long, succulent. Scape 7-12 cm long, sometimes with a small leaf above the base, weak with few small flowers. Male flowers: tepals 4, the outer 2, round, the inner 2, narrower, stamens numerous, shortly monadelphous, anthers oblong. Female flowers: not seen. Capsule 0.5-1 cm, recurved, styles deciduous, two smaller wings very narrow, broader wing descending, its upper margin concave, very thin. Seeds short, ellipsoid.

REFERENCES :

1. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 647.
2. De Candolle, A. (1859). *Ann. Sc. Nat.* ser. 4. 11 : 135.
3. De Candolle, A. (1864). *Reg. Veg. Prod.* 15. 1 : 350.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. There is no collection of this species since its type collections although its distributional localities are well botanized. It is represented by Syntypes in Central National Herbarium (CAL).

DISTRIBUTION : Restricted to Abor Hills in Arunachal Pradesh. Endemic.

HABITAT AND ECOLOGY : Recorded on rocks by streams in the outer hills, in dense evergreen forests at 300-1000 m altitude.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Intensive efforts should be made to relocate the plant and thereafter to introduce in botanic garden or experimental garden.

BIOLOGY AND POTENTIAL VALUE : Its beautiful flowers deserve attention for cultivation as an ornamental plant. It is known that female flowers appear three weeks after the male flowers.

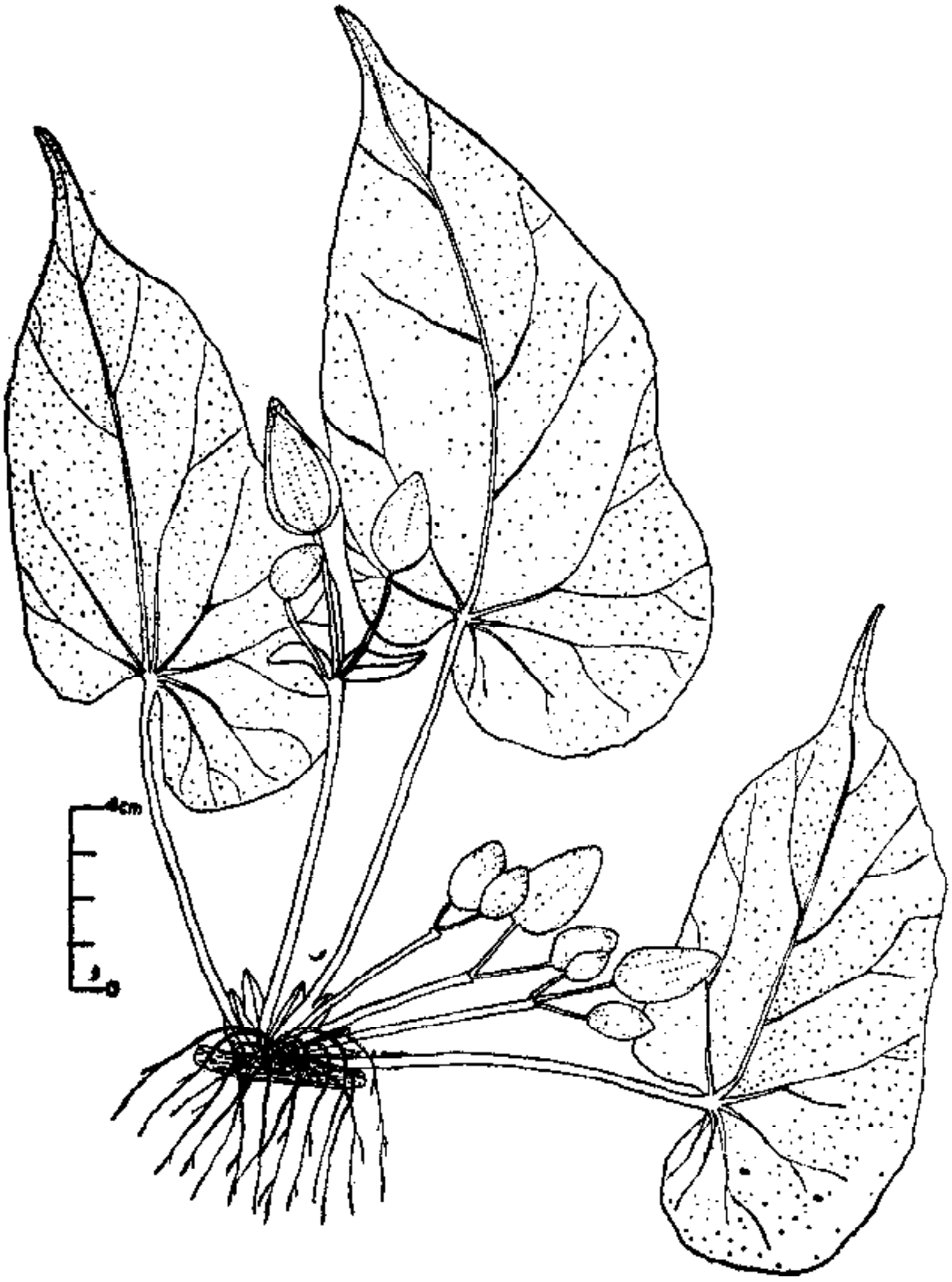
CULTIVATION : Not known to have been cultivated anywhere.

DESCRIPTION : Acaulescent glabrous herbs. Rhizome creeping. Leaves with 7-12 cm long petioles, lamina spotted becoming black, cordate-ovate or lanceolate, 10-20 cm long, sinuate-dentate or often entire at margin, acuminate at apex, oblique at base. Inflorescence 4-12 cm long, rising above, branched, 3-8-flowered. Pedicel slender, 3-5 cm long. Bract membranous, oblong-caudate, 1-2 cm long. Male flower: tepals 2+2, the outer pale rose, obovate or oblanceolate, acute, 3-4 cm long, the inner narrowly small; stamens indefinite, free, 7 mm long; anther 2 mm long. Female flower: solitary, thin slender scape 4-5 cm long; tepals are like of male flower; styles 2, united at base, 8 mm long, branched. Fruit rhomboid. 2 cm long, 1.5 cm in diam, 4-loculed.

REFERENCE :

1. Dunn, S. T. (1920). *Kew Bull.* 1920 : 110.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.



Begonia burkillii Dunn

STATUS : Endangered or Possibly Extinct. An endemic species known only from its Type collection represented at (K). The original material was collected in 1851, by R. F. Hohenacker from Mangalore, Canara. Since then it has not been recollected.

DISTRIBUTION : South-West India, Western Ghats.

HABITAT AND ECOLOGY : Along coastal plains of Dakhina Kannada, W. Coast and W. Ghats from S. Kanara, Wynaad upto 900 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Search for the plants in its locality; study of its biology and protection of its habitat are recommended. Intensive search should be made to find out whether it still survives in its type locality and adjoining regions. If located it should be introduced and multiplied in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : It is a curious species of botanical interest quite distinct from other species of the genus. Flowering and fruiting during July to October.

CULTIVATION : Not known so far.

DESCRIPTION : Tuberous slender herbs. Leaves membranous, 3×4 cm (sometimes much smaller), cordate at base, crenate or serrate at margin, acute at apex, glabrous or with slightly pubescent on the nerves beneath; petiole 1-4 cm long. Penduncle slender, nearly 12 cm. Flowers very small, not numerous, pedicel with gland tipped hairs. Male flower: the outer tepals 2, obovate, narrow, the inner tepals 2 narrower. Female flower : tepals 5, outer elliptic, inner oblong; styles 2, combined higher up, ovary 2-locular ; placentas 2 in each locule. Capsule with one wing much longer and broader than others.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of Indian Region* 1 : 81. Botanical Survey of India, Calcutta.
2. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 652.
3. De Candolle, A. (1864). *Reg. Veg. Prod.* 15. 1 : 356.
4. Gamble, J. S. (1919). *Fl. Pres. Madras,* p. 546.
5. Miquel, F. A. G. (1852). *Analect. Bot.* 3 : 18.
6. Rama Rao (1914). *Fl. Plants of Travancore,* p. 112.
7. Sharma, B. D., *et al* (1984). *Fl. Karnataka-Analysis,* p. 116. Botanical Survey of India, Howrah.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. It is known by very few collections made in India. The species has not been collected after Wight's collection from Peninsular India, although its distributional localities are well botanized. Causes of its rarity may be due to habitat destruction.

DISTRIBUTION : South Deccan Peninsula, Western Ghats and in forests from Malabar to Tinnevelly. In Sri Lanka, it is confined to South-Eastern intermediate zone at altit. of 100-500m.

HABITAT AND ECOLOGY : Principally in pockets of humus covered rocky surfaces; mostly in shade but occasionally on exposed moist surfaces.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : To protect its natural habitats and cultivation of the plant in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : A plant of academic and distributional interest. It is known to flower during December to March.

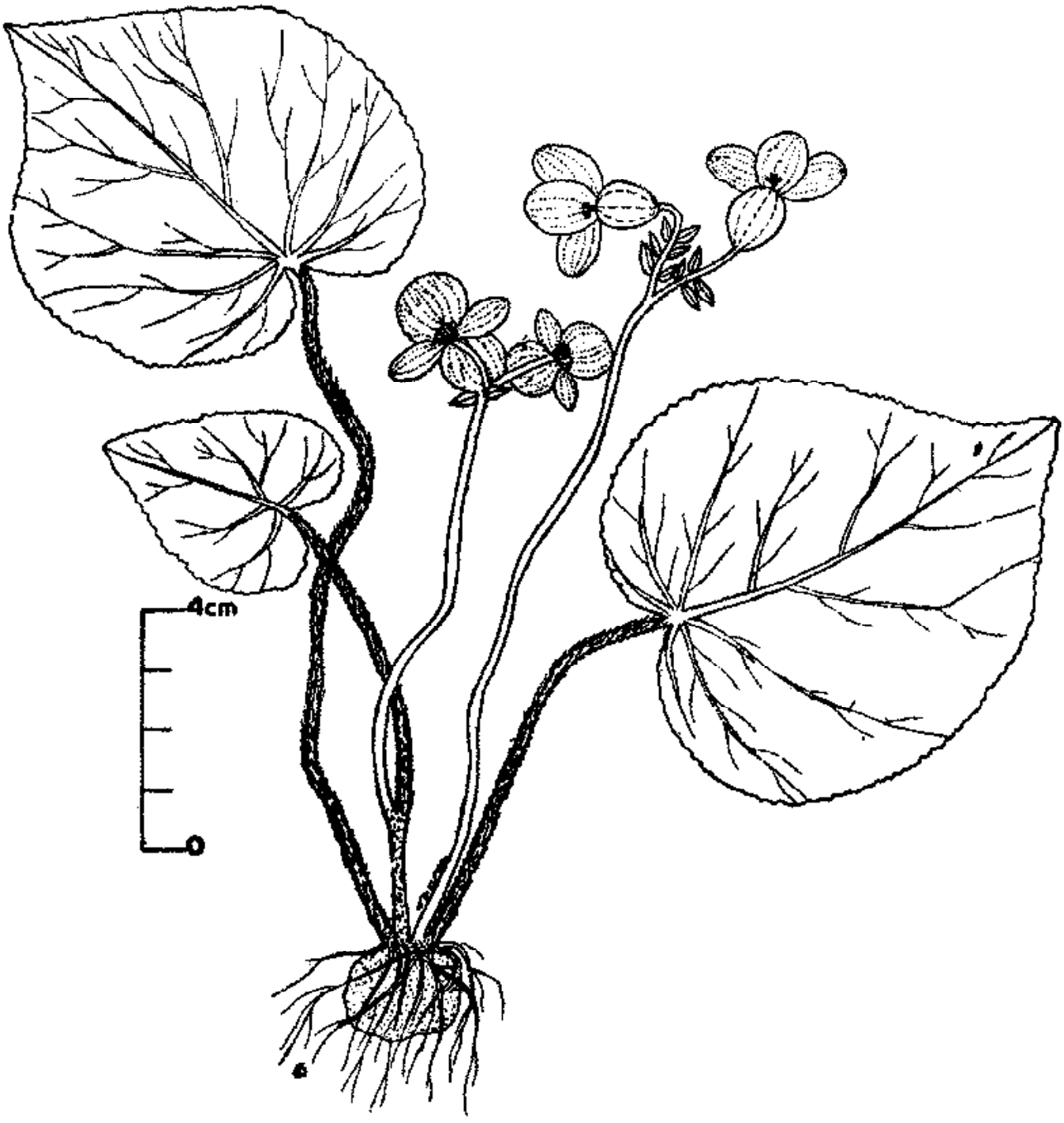
CULTIVATION : Not taken up anywhere.

DESCRIPTION : Perennial acaulescent herbs with horizontal, subterranean rhizomes upto 3 × 1.5 cm connected to the preceeding rhizome forming a short series of rhizomes and bearing upto 6 aerial leaves and 7 inflorescences when fully grown. Petioles erect to ascending, 5-40 cm long, cylindrical, pinkish, pubescent; stipules ovate to lanceolate; leaves ovate to rotundate, 3-20 × 4-23 cm, sometimes slightly lobed, deeply cordate at base; apex acute to obtuse; margin crenate to dentate, sparsely pilose in mature leaves, scapes 1-few per leaf axil, arising from top of rhizome, slender, transparent, reddish-pink, glabrous or with few scattered white hairs, 5-20 cm long, dichasium long up to 10-flowered. Male flower: pedicillate, pedicel 1.5-3 cm long, pale pink, tepals 2+2, the outer rotundate, *ca* 1.5 × 1.5 cm, truncate to cordate at base, glabrous, the inner oblanceolate, rounded at apex; stamens *ca* 45; connate at base, anther 1 mm long. Female flower pedicellate, pedicel 2-8 mm long, stout, almost glabrous, tepals 3-5, setnipersistent in capsule, outer pair rotundate, upto 17 mm wide, glabrous, the inner unequal, obovate to oblong, 12 × 5 mm. Ovary 5-20 × 5-15 mm inclusive of wings, styles 3, connate at base, stigma papillose, twisted. Capsule thick, whitish. Seeds ovoid.

REFERENCES :

1. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 641.
2. De Candolle, A. (1864). *Reg. Veg. Prod.* 15. 1 : 328.
3. Jaysuriya, A. H. M (1983). *In :* Dassanayake, M. D. & Fosberg, F. R., *A revised Hand Book to the Flora of Ceylon* 4 : 141.
4. Rama Rao (1914). *Flowering Plants of Travancore*, p. 192.
5. Thwaites, G. H. K. (1864). *Enum. Pl. Zeylanicae*, p. 129.
6. Trimen, H. (1888). *Hort. Zeylanicus*, p. 37-38.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India. Howrah.



Begonia cordifolia (Wt.) Thw.

STATUS : Rare. The species has not been collected in the recent years. This endemic species is known from one locality and is described only from the type specimen represented in Kew. It is represented only by its type photos in CAL. Large forested tracts in the entire N. E. India have been cleared for shifting cultivation during the last 5-6 decades.

DISTRIBUTION : Lushai Hills, Sialsuk, Mizoram. Endemic.

HABITAT AND ECOLOGY : Reported to grow in the alt. 1,300 m in the forest undergrowth.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Efforts should be made to find out whether it still remains in its type locality and adjoining region. If the species is located, its living plants should be planted in the horticulatural gardens and propagation through seeds be tried in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : It is a beautiful plant having more importance in horticulture. Flowers bright pink. Flowering and fruiting during July to September.

CULTIVATION : Not in cultivation so far.

DESCRIPTION : Erect herb, caulescent, puberulous. Leaves alternate, ovate, acuminate at apex, unequally truncate at base, sinuate to dentate at margin; petiole 1-8 cm long, pilose, stipule lanceolate to linear-lanceolate. Inflorescence both axillary and terminal. Male flowers: pedicillate, 1 cm long, the outer tepals 2 suborbicular to subcordate, subacute at apex, the inner tepals lanceolate to linear-lanceolate, acute at apex; stamens 18-20, each 4 mm long. Female flowers: pedicillate, tepals 5, the outermost suborbicular, 1-1.3 cm long, glabrous, the inner lanceolate. Ovary elliptic-oblong, 5-6 mm long, 3-locular; styles 3, stigma lunate, pubescent, placenta bifid.

REFERENCES :

1. Fischer, C. E. C. (1928). *Kew Bull.* 1928 : 273.
2. Fischer, C. E. E. (1938). *Rec. Bot. Surv. India* 12(2) : 98.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. This species is represented only by types located in the Kew Herbarium (K) and by a single specimen of Wallich (a Syntype) in Central National Herbarium (CAL). It is likely that further exploration in the area might help in locating more plants of the species.

DISTRIBUTION : India: Sikkim; Nepal. Endemic to outer parts of Eastern and Central Himalaya.

HABITAT AND ECOLOGY : Grows on moist shady banks at an altitude of 600-1800 m.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Search for the plants in its new locality; study of its biology and protection of its habitat are recommended.

BIOLOGY AND POTENTIAL VALUE : This species has medicinal value. It is known that flowering and fruiting during June to September.

CULTIVATION : Not reported.

DESCRIPTION : A rather delicate plant, 40 cm high with triangular long pointed leaves with often irregular heart-shaped bases, serrate to dentate at margin. Flowers pink, *ca* 2 cm across, borne on a long peduncle. Capsules glabrous with unequal wings.

REFERENCES :

1. Don, D. (1825). *Prod. Fl. Nepalensis*, p. 223.
2. Miquel, F. A. G. (1852). *Analecta Bot. Ind.* 3 : 18.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. The taxon was described by Clarke based on the specimens collected by Wallich in Khasi hills. It is likely that more populations of this species would be available in this area.

DISTRIBUTION : Khasi Hills, Meghalaya, India. Endemic.

HABITAT AND ECOLOGY : Grows in between moist rocks, shaded places in forest floors usually along stream sides at an altitude of 1064 m.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Efforts should be made to find out still surviving populations in its type locality and adjoining regions in the upland. If located, the plants should be cultivated in the BSI experimental garden at Barapani near Shillong.

BIOLOGY AND POTENTIAL VALUE : This taxon is of phytogeographical and botanical interest.

CULTIVATION : Not reported so far.

DESCRIPTION : Shortly caulescent. Leaves linear-lanceolate, densely tomentose on the nerves beneath, 5-9×1 cm; petiole nearly 1.5 cm long, pubescent, peduncles nearly 6 cm long, usually divided near the top and few-flowered. Male flower : tepals 2+2, the outer rounded, the inner narrower; stamens numerous, very shortly monadelphous. Female flower: tepals 3+2, inner gradually smaller. Capsules small, 1.5×2 cm including the wings, the broader wing much descending, its upper edge concave. Seeds ellipsoid.

REFERENCE :

1. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 645. 1879.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. The original materials were collected during 1875 to 1914 by C. B. Clarke, Ribu and Rhomo, G. H. Cave and I. H. Burkill from the hills at Rungeet, in Darjeeling dist. All the 5 sheets are not having good flowers. It has not been recollected although its locality is well botanized. Causes of its rarity not known.

DISTRIBUTION : Rungeet (Darjeeling district); Sikkim. Endemic.

HABITAT AND ECOLOGY : Grows on the slopes of Rungeet valley below Badamton at an altidude of 700 m.

CONSERVATION MEASURES TAKEN : Not known.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plant. If available, it should be cultivated in botanic garden at Darjeeling and in the BSI experimental garden at Ganglok.

BIOLOGY AND POTENTIAL VALUE : A herb with reniform leaves with 3 uniform wings and bright red peduncle with beautiful flowers blooming during August. It is of horticultural importance.

CULTIVATION : None on record.

DESCRIPTION : Rootstock of a few tubers. Stem erect, usually elongate above the leaves, pubescent, whole plant 24-30 cm high. Leaves reniform, 2-3×8-10 cm, nearly equally cordate, minutely denticulate-ciliate, closely pubescent above, rufous-villous on the nerves beneath. Petiole of the cauline leaf usually short, often less than 2 cm. Peduncle elongate, very pubescent, bright rose-red, often 12 cm long above the highest leaf. Bracts oblong-lanceolate, persistent. Male flower: tepals 2+2, the outer pubescent, the inner smaller, glabrous; stamens *ca* 50, monadelphous; anthers obovoid; connective not produced. Female flower: tepals 3+2, the outer larger, pubescent; styles 3, nearly separate, each divided halfway into two tortuose branches. Capsules large, very pubescent. Seeds light brown, shortly ellipsoid.

REFERENCES :

1. Biswas, K. (1966). *Plants of Darjeeling and the Sikkim Himalaya*, p. 382.
2. Clarke, C. B. (1879). *In :* Hooker, *J. D., Fl. Brit. India* 2 : 638.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Indeterminate. The species has not been collected since 1912 although its distributional localities have been well botanized. There are only two Syntypes present in the Central National Herbarium (CAL) without having good flowers. Causes of its rarity are not known.

DISTRIBUTION : It is so far reported only from the Abor Hills in Arunachal Pradesh. Endemic.

HABITAT AND ECOLOGY : Recorded around the mountain of Bapus, both on the south face and towards Wotung, between 1200-2000 maltitudes.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas should be well explored. If the species is found, the rhizome should be planted in suitable ecological nitches in Abor Hills and introduced in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Not known. However, several species of *Begonia* are horticulatural favourites.

CULTIVATION : Not reported anywhere.

DESCRIPTION : Acaulescent monoecious herbs; rhizome long, creeping. Leaves oblique-rotundate to cordate, 6-10 cm long, acuminate at apex, minute-dentate at margin, lamina densely pubescent, rarely pilose; inflorescence peduncled, peduncle 3-12 cm long having 2 male flowers and one female flower, outer sparsely pilose. Pedicel 2-3 cm long. Male flower: tepals 2+2, the outer 2 unequal, ovate, 2 cm long, the inner smaller, ovate ; stamens numerous, 3 mm long, anther 1 mm long. Female flower: tepals are like of male flower; styles 3, basal united, 4 mm long, stigma tortous. Fruit (immature) rhomboideous, 1 cm long and, 6 mm in diameter.

REFERENCE :

1. Dunn, S. T. (1920). *Kew Bull.* 1920 : 111.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. This species was first collected by Wallich in 1821 and described by De Candolle. It is reported from Eastern Himalaya (Sikkim, Darjeeling). Recently it was collected from altogether a new locality in Peninsular India after a lapse of one and half centuries. The type is available at CAL.

DISTRIBUTION : Himalaya : Sikkim, West Bengal (Darjeeling); Nepal; Peninsular India.

HABITAT AND ECOLOGY : Grows between 1000 to 1500 m altitudes.

CONSERVATION MEASURES TAKEN : So far none.

CONSERVATION MEASURES PROPOSED : Thorough explorations should be conducted in the above areas and similar areas of Peninsular India to relocate the plants. If relocated, seeds should be collected, plants be reintroduced in the wild hebitats.

BIOLOGY AND POTENTIAL VALUE : A very interesting species of disjunct distribution. It is known to flower during September.

CULTIVATION : No record so far.

DESCRIPTION : Tuberous herbs. Plants glabrous, 7-10 cm high, stem filiform. Leaves cordate at base, margin irregularly serrate, acute at apex, petiole 2-4 cm, terete, glabrous. Flowers in axillary or terminal dichasial cymes, 2-3-flowered, spreading, glabrous, monoecious; peduncle 5.5-6.5 cm; male flowers : tepals 2+2, the outer larger, 5×4 mm, the inner smaller, narrow-lanceolate, 2-3 mm long; stamens *ca* 20, 1 mm, shortly monadelphous, anthers obovoid. Female flowers : tepals 2+1, the outer rounded, 4-5 mm in diam, lateral one smaller, less than 5 mm; styles 3, 2 mm, unequally branched, divided halfway up into two unequally curved branches, persistent. Capsule with one wing 9 mm wide and the other 2 mm wide. Seeds ellipsoid.

REFERENCES :

1. Biswas, K. (1966). *Plants of Darjeeling and Sikkim Himalaya*, p. 377.
2. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 642.
3. De Candolle, A. (1864). *Reg. Veg. Prod.* 153 : 328.
4. Hara, H. (1966). *Fl. East. Himal.*, p. 215.
5. Kurz, S. (1877). *Journ. Asiat. Soc. Bengal.* 2 : 108.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Rare. The species is known from a few collections present in Coimbatore Circle (MH), from Tinnevely district. Factors responsible for its rarity are not known. It is reported endangered in Sri Lanka (3).

DISTRIBUTION : South Deccan Peninsula, Western Ghats and probably in Malabar; Sri Lanka.

HABITAT AND ECOLOGY : It is confined to lower hill regions at elevations of *ca* 1000 m.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Its known distribution area and neighbouring areas need to be explored for this species. If located, living plants or rhizomes are required to be collected and cultivated in botanic gardens and conservatories.

BIOLOGY AND POTENTIAL VALUE : A beautiful slender herb with membranous leaves and flowers blooming during January to March.

CULTIVATION : None on record.

DESCRIPTION : Perennial acaulescent herbs. Rhizome horizontal, up to 5×1.3 cm, covered with brownish scale-leaves and large leaf scars (when old) usually having 5 aerial leaves and 4 inflorescences when full grown, connected to a daughter rhizome by a stout, cylindrical, fleshy stolon up to 3 cm long. Leaves symmetrical, broadly ovate, acute to acuminate at apex, cordate at base, 8-14.5×10-15 cm, sometimes slightly lobed or angular, crenate, upper surface rather shiny, lower surface pale, glabrous, pilose along veins, petiole erect, 7-33 cm long. Scapes erect, almost glabrous, pale-pink, 10-55 cm long, axillary or arising near axils from top of rhizome, dichasium lax. Male flowers: pedicillate, 0.7-2.5 cm long, glabrous, tepals 2+2, the outer pair ovate, 10-20×8-13 mm, inner ovate-lanceolate, 13×7 mm ; stamens 35-40, free. Female flower : pedicillate, 5-15 mm, glabrous, pale-pink, elongating upto 2 cm in capsule, tepals 2+3, outer pair larger, rotundate, ovary glabrous, wings more or less equal, *ca* 5 mm broad. Capsule 10-15×15-24 mm inclusive of 5-9 mm broad wings. Seeds oblong-oval, 3 mm long, brown.

REFERENCES :

1. Clarke, C. B. (1879). *In* : Hooker, J. D., *Fl. Brit. India* 2 : 635.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 386 (repr. ed.).
3. Jayasurya, A. H. M. (1983). *In* : Dassanayake, M. D. & Fosberg, F. R. (ed.). *A Revised Hand Book to the Plants of Ceylon*, p. 143.
4. Sharma, B. D. *et al.* (1984). *Fl. Karnataka : Analysis*, p. 116.
5. Thwaites, G. H. K., (1859). *Enum. Pl. Zeyl.* 2 : 128.
6. Trimen, H. (1894). *Handb. Fl. Ceylon* 2 : 264.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Indeterminate; apparently rare and not collected since 1862. The species was described by Clarke based on the materials collected by Griffith. The area of its reported occurrence is not well botanized after Clarke and is likely that some populations may still be surviving. The type specimen is present in the Kew Herbarium.

DISTRIBUTION : Assam. (without specific locality). Apparently endemic.

HABITAT AND ECOLOGY : None on record.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Intensive search should be made to relocate the species from the above area for planning conservation measures. If located, its seedlings should be introduced in botanic gardens and conservatiories.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Not reported so far.

DESCRIPTION : Creeping herbs with 0-4 cm long stems. Leaves 4-8 cm long, broadly ovate, glabrous or minutely pubescent on the nerves beneath; petiole 12-25 cm long, pubescent upwards. Inflorescence much shorter than the petioles. Flowers much smaller and less succulent. Capsules subpyramidal, 4-celled, slightly pubescent, carpels acutely keeled, and ending upwards in a short linear patent horn. Seeds are alike.

REFERENCE :

1. Clarke, C. B. (1879). *In:* Hooker, J. D., *Fl. Brit. India* 2 : 636.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Vulnerable. Dalzell first collected and described this species in 1851. There are no collections of this after the type (in K) until recently in the year 1978, collected from Adoor in Quilon dist., Kerala. It is likely that more plants of this would be available in this area. However, large areas of forests in its distibution range in the Western Ghats have been cleared for plantation of commercial crops, resulting in vulnerability to several endemic species in this region.

DISTRIBUTION : Western Ghats, and South-West India. Endemic.

HABITAT AND ECOLOGY : Rare, in shaded areas along W. Ghats in Bababudan hills in Karnataka and at Adoor in Quilon dist., Kerala.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Detailed survey of possible distribution areas should be undertaken in W. Ghats, W. Peninsula and South-West India. If the species is located, its live plants should be planted in botanic gardens or experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Not known; however, several species of *Begonia* are horticultural favourities. Flowering and fruiting during August to November.

CULTIVATION : Not known.

DESCRIPTION : Caulescent tuberous herbs. Stem elongate, often 12 cm long; glabrous or nearly so. Leaves ovate, 13×9 cm, acute at tip, cordate at base, sparsely pubescent, serrate at margins. Peduncles scarcely elongate, dichotomous. Flowers white. Tepals 4 in male, elliptic, 5 in female. Ovary hispid, 3-locular; placenta single. Styles 3, each divided into two branches. Capsule wings subequal.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian region* 1 : 81. Botanical Survey of India, Calcutta.
2. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 653.
3. Cooke, T. (1903). *Fl. Pres. Bombay* 1 : 549.
4. Dalzell, N. (1851). *In :* Hooker, W. J., *Kew Journ.* 3 : 230.
5. De Candolle, A. (1864). *Reg. veg. Prod.* 15. 1 : 350.
6. Saldanha, C. J. (1984). *Fl. Karnataka* 1 : 291.
7. Sharma, B. D., *et al* (1984). *Fl. Karnataka : Analysis*, p. 116.
8. Woodrow, G. M. (1898). *Journ. Bombay Nat. Hist. Soc.* 5 : 1 : 641.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Endangered or Possibly Extinct. It is known only from its Type collected about hundred years ago from Naga hills. This species has not been collected during the recent botanical tours in Nagaland by the BSI. This may have been lost due to the habitat destruction for extensive shifting cultivation in the area. The Type is at Central National Herbarium (CAL.).

DISTRIBUTION : Naga Hills (Nagaland). Endemic.

HABITAT AND ECOLOGY : Not known.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Serious efforts should be made to collect the species from its type locality ; *in situ* preservation and cultivation in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : It is known to flower and fruit during September to October.

CULTIVATION : Not reported.

DESCRIPTION : Herbs, 10-15 cm high, puberulous. Rhizome short. Leaves large, petiolate, cordate-ovate, acute at apex, double serrate at margins. Flowers both axillary and terminal, rose-coloured. Male flowers : tepals 2+2, the outer two large, ovate-rotundate, the inner small, obovate. Female flowers : tepals 3+1, the outer larger, kidney-shaped, the inner smaller, elliptic. Capsule 3-winged, pubescent, wings one larger and two smaller, 2-locular, placenta bifid.

REFERENCES :

1. Clarke, C. B. (1889). *Journ. Linn. Soc.* 25 : 26. t. 11.
2. Fischer, C. E. C. (1938). *Rec. Bot. Surv. India* 12 : 98.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Indeterminate. The species known only from its Type (K) has not been collected in the recent years although its distributional localities have been well botainized. It is represented by type photos in the Central National Herbarium (CAL).

DISTRIBUTION : S. Lushai Hills (Mizoram). Endemic.

HABITAT AND ECOLOGY : Grows on moist shady banks, about 100 km south of Lungleh, in the alt. 456-760 m, in dense patches as undergrowth of dense evergreen forests.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas should be searched thoroughly. If located, it should be introduced into botanic gardens. The area is rich in endemic species and some flora rich areas should be identified and declared as 'protected'.

BIOLOGY AND POTENTIAL VALUE : It is a beautiful plant having pure white flowers and dense green leaves of horticultural importance. Flowers and fruiting during August.

CULTIVATION : None on record.

DESCRIPTION : Erect herbs; root-stock small, fibrous. Stem terete, wiry, sometimes rooting at the lower nodes, densely clothed with hairs, 5-10 cm high. Leaves membranous, rotund-ovate, 1.5-5.5 cm, base shallowly cordate, dark green and sparsely hairy; peduncle, its branches and pedicles densely hairy with crisped, multicellular, rufous hairs; bracts foliaceous, ovate to orbicular in outline. Male flowers : the outer tepals 2, broadly obovate, obtuse, 3 mm long, the 2 inner smaller, subacute; stamens about 12, united below, filaments short, anthers oblong. Female flowers : tepals 5, white, elliptic-oblong, the innermost smallest. Ovary trigonous, 3.5 mm long, puberulous on the angles; styles 4, shortly united at the base, hairy; stigma densely hairy. Capsule winged, 1 cm long, one wing wider than the other two, glabrous.

REFERENCES :

1. Fischer, C. E. C. (1932). *Kew Bull.* 1932 : 200.
2. Fischer, C. E. C. (1938). *Rec. Bot. Surv. India* 12 : 98.

The material for this sheet was supplied by K. D. Kumar and U. C. Bhattacharyya, Botanical Survey of India, Howrah.

STATUS : Indeterminate. The species is known only from Type collections made by Prain. Though further explorations have been made recently, no further collections could be made.

DISTRIBUTION : Endemic to Narcondam Island.

HABITAT AND ECOLOGY : Narcondam Island is an isolated island situated 13°30' NL and 95° EL and the area of the island is 12 ha. The island is known as Megapode Island. The Wildlife sanctuary covers *ca* 7 ha area in the altitude range from 0-400 m of the island. The vegetation comprises tropical evergreen forest. The famous Narcondam hornbill is endemic to this island.

CONSERVATION MEASURES TAKEN : Nardcondam Wildlife sanctuary with an area of 7 ha gives protection to the flora and fauna.

CONSERVATION MEASURES PROPOSED : Narcondam Island may be given the status of a National Park.

BIOLOGY AND POTENTIAL VALUE : The biology of this taxon is not known.

CULTIVATION : Nil.

DESCRIPTION : A large deciduous tree, up to 40 m tall, about 6 m in diam at base with large buttressus; branches armed with conical based prickles. Leaves 5-9-foliolate, leaflets ovate-oblanceolate. Flowers 8-12 cm in diam, solitary ; calyx *ca* 4 cm long, silky pubescent, within; petals red; stamens numerous, filaments united into 4 or 5 bundles. Pods elliposid, *ca* 25 cm long, 5 cm in diam.

REFERENCES :

1. Balakrishnan, N. P. (1989). Andaman islands-Vegetation and Floristics, pp. 55-68. *In :* Saldanha, C. J. (ed.). *Andaman, Nicobar and Lakshadweep—an environmental impact assessment.* New Delhi.
2. Prain, D. (1893). On the flora of Narcondam and Barren Islands. *Journ. Asiat. Soc. Bengal* II 62 : 39-86, maps 2.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Indeterminate. The species is known only from a very few original specimens of Beddome made in the previous century from a very narrow range. The area of its known distribution has been fairly well botanised in recent years, but this species is not known to have been located during those plant surveys. The probability that this species has already become extinct is rather high. Loss of natural habitat compounded by over exploitation or the classic "over-kill" are primarily responsible for its depletion in the wild. This species is one of the two constituent members of an endemic genus confined to southern Peninsular India and, as such, is of phytogeographical interest.

DISTRIBUTION : Endemic to "Travancore" and Tirunelveli hills of southern W. Ghats in Peninsular India (1). Only 2 separate gatherings are known. The earliest collections (of Beddome) are from Travancore Ghat and are housed at MH. Only one other specimen (also at MH) collected by an unknown collector is known. Gamble (5) reported it from Tirunelveli hills, but this could not be confirmed by the recent plant surveys.

HABITAT AND ECOLOGY : The species was recorded from the evergreen forests on the hills. It is known to grow particularly along river banks or water courses. It has been recorded between 600 and 1500 m in altitude.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The first priority is to clearly find out if the species still exists or has become extinct, through intensive surveys. If these status surveys do yield some surviving populations, the area must immediately be accorded full protection by setting up a plant sanctuary or nature reserve there. The next immediate step would be to find means of artificial regeneration so that sustainable populations can be raised. Towards this end tissue culture methods might perhaps prove to be suitable. Other vegetative means of regeneration could be employed if the tree coppices well enough. Direct sowing in suitable pristine sites with conducive growth conditions or ecological factors can help raise sustainable natural populations.

BIOLOGY AND POTENTIAL VALUE : Phenological data of this species is not on record. Its wood was presumably used as timber. According to Beddome it "...yields a valuable, hard, reddish timber which is used for building and other purposes.....". Its only other congener *Poeciloneuron indica* is still continued to be employed as a source of constructional timber (2).

CULTIVATION : Not known.

DESCRIPTION : Evergreen trees, 15-20 m tall. Leaves 12.5-15×2.5-2.7 cm, lanceolate or linear-oblong, obtuse to acuminate at apex, cuneate at base, margins entire, coriaceous, secondary veins closely arranged, parallel, with fine reticulation in between; petioles *ca* 0.8 cm long, minutely hairy. Flowers solitary, axillary, *ca* 1.3 cm across, yellowish-white. Sepals 4, unequal. Petals 6, imbricate. Stamens numerous; anthers subsessile with entire margins. Ovary 2-loculed, 2 ovules in each locule; styles 2, subulate. Capsule 2.5×1.2 cm, ovoid, 1-seeded, coriaceous.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian Region* 1:75. Botanical Survey of India, Calcutta.
2. Anonymous (1969). *Wealth of India : Raw Materials* 8 : 176. CSIR, New Delhi.
3. Beddome, R. H. (1871). *Fl. Sylvatica*, t. 93.
4. Hooker, J. D. (1874). *Fl. Brit. India* 1 : 270.
5. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 56. (repr. ed.).
6. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Materials for a Catalogue of Threatened Plants of India*, p. 10. Posscef, Botanical Survey of India, Howrah.

The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Vulnerable. The species is of restricted distribution with limited populations. Due to deforestation and human interference in its natural habitats, this has become rare. Except for the type collection from Tezu river banks by Kingdon-Ward and another from Aka hills by Bor, both in the year 1935, no other collection is known to exist.

DISTRIBUTION : Endemic to Lohit and Tirap Districts of Arunachal Pradesh.

HABITAT AND ECOLOGY : In subtropical evergreen forests from 600-1200 m, on cliffs and banks of river gorges in dry exposed habitats.

CONSERVATION MEASURES TAKEN : No specific measures taken but the recently set up Namdapha Biosphere Reserve area includes areas of the two districts, Lohit and Tirap, and may include some of its habitats which are likely to be protected.

CONSERVATION MEASURES PROPOSED : The species should be searched again and its seeds collected for propagation in the experimental gardens and botanic gardens. Efforts should be made for propagation by natural or tissue culture methods and reintroduction into the original habitats.

BIOLOGY AND POTENTIAL VALUE : One of the several endemic species of the genus occurring in one of its main centres of speciation and hence is of botanical interest. Berries of several species of the genus are edible and known for medicinal value and hence this species is also of potential value.

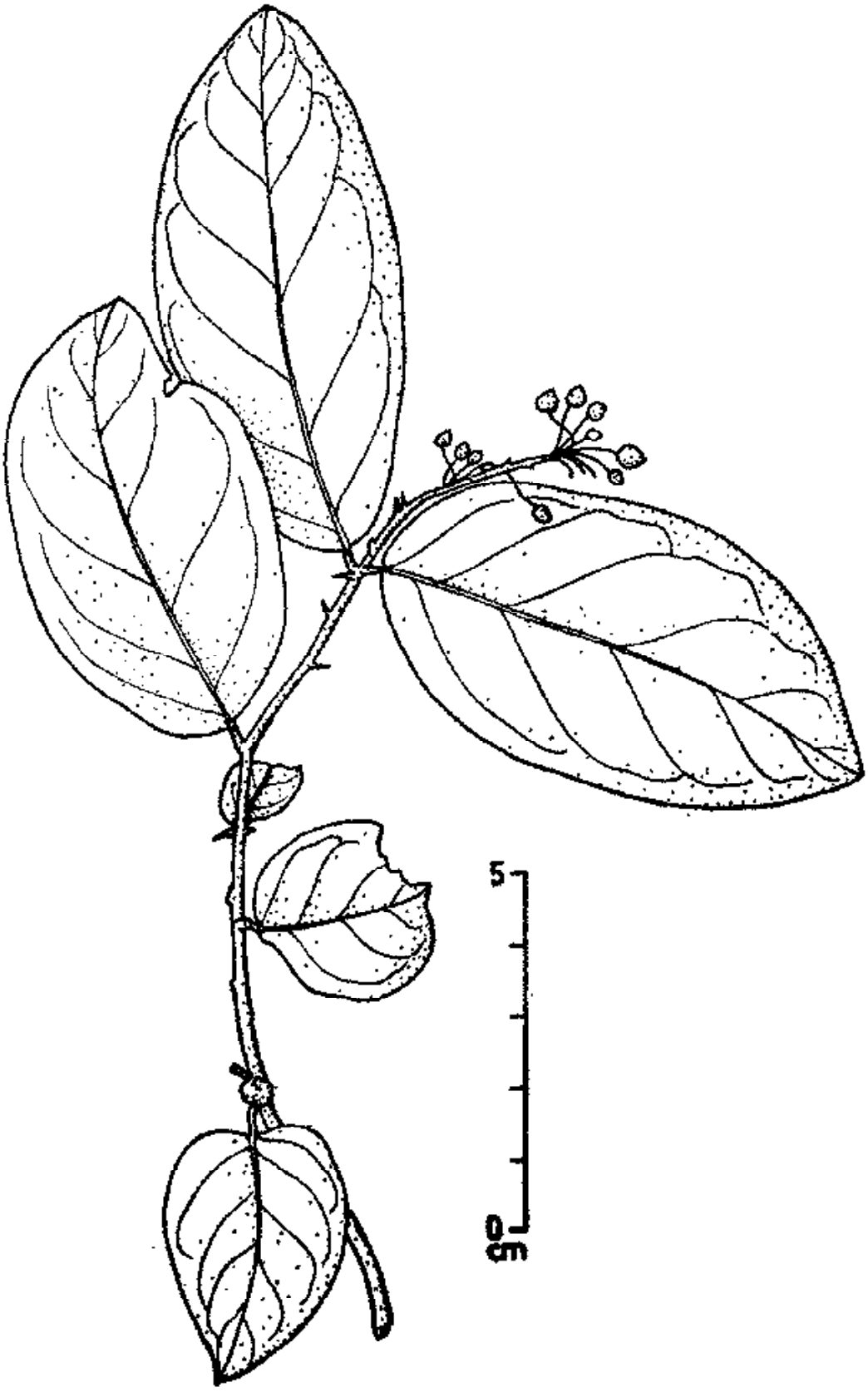
CULTIVATION : Not known in cultivation; however, this can be grown in shaded places on rocky soil in subtropical climates.

DESCRIPTION : Shrubs or small trees; branches scrambling; twigs brown-pubescent, later glabrescent; stipular spines patent, 1 - 3 mm long, straight or curved; cataphylls conspicuous at base of shoots. Leaves coriaceous, glabrous, elliptic-oblong, 8 - 13×4 - 5 cm, dark-green above, light-green beneath, subcordate at base, rounded, obtuse-mucronate at apex; lateral nerves 5 - 6 pairs; petioles 3 - 5 mm. Flowers white or purple, 6 - 8 (-10) together in racemose bundles on an axillary or lateral puberulous stalk, 2 - 3 cm long, sometimes in the form of a panicle; pedicels filiform, 5 - 7 mm long, subglabrous. Sepals subequal, 5 - 6×2 - 3 mm, sparsely puberulous inside, ciliate at margins. Petals 6 - 7×2 m, white, turning pink, puberulous inside, fringed with long hairs. Stamens 32 - 34. Gynophore glabrous; ovary small, glabrous. Fruits unknown.

REFERENCE :

Jacobs, M. (1965). The genus *Capparis* (Capparaceae) from Indus to Pacific. *Blumea* 12 : 385-541.

The material for this sheet was supplied by R. Sundara Raghavan, Retired Scientist, Botanical Survey of India, Western Circle, Pune.



Capparis pachyphylla Jacobs

STATUS : Vulnerable. First collected by R. Wight from near Tuticorin in May 1835. The only later collection of the plant is by K. M. Sebastine, from the same locality, in November 1961. It is likely that its habitats being in the coastal zone may have been subjected to degradation.

DISTRIBUTION : Endemic to Tuticorin in the district of Tinnevelly, Tamil Nadu. (Herb. Wight No. 2442).

HABITAT AND ECOLOGY : On sandy gravelly areas in sunny open situations along the coastal areas.

CONSERVATION MEASURES TAKEN : None for the wild habitat.

CONSERVATION MEASURES PROPOSED : Intensive search in the type locality may help to find out some populations of the species. Proper care is needed to promote survival of the species in the original habitats.

BIOLOGY AND POTENTIAL VALUE : A plant of botanical interest. Nothing is known about its potential value.

CULTIVATION : Not cultivated so far.

DESCRIPTION : Small slender, lax, 15 - 45 cm tall shrubs ; branches glabrous. Leaves linear, narrow, 6 - 12 mm, obtuse, pseudoveriticillate, stipules 0.75 mm long, lanceolate. Cyems lax, puberulous, corymbose, many-flowered. Flowers 2 mm long; sepals scarious, ovate-lanceolate, acuminate, nerveless; petals subequal to sepals, a little exceeding the stamens and acute capsule.

REFERENCES :

1. Edgeworth, M. P. & Hooker, J. D. (1874). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 245.
2. Gamble, J. S. (1915). *Fl. Pres. Madras* 1 : 65.
3. Ramamurty, K. (1982). *In :* Nair, N. C. & Henry, A. N. (ed.) *Fl. Tamil Nadu* Ser. I. *Analysis* 1 : 23. BSI. Howrah.
4. Wight, R. & Arnott, A. (1839). *Ann. Nat. Hist.* 3 : 91.

The material for this sheet was supplied by N. C. Majumdar, Botanical Survey of India, Howrah.

STATUS : Indeterminate. An endemic species not located after its original discovery. J. D. Hooker and T. Thomson collected the type material from the Khasi hills, in the virgin forests of Molim and Mauphlong in the year 1851.

DISTRIBUTION : Meghalaya, Khasi Hills, at an altitude of 1500-1800 m.

HABITAT AND ECOLOGY : Humid hilly regions, an mossy rocks and slopes, amidst undergrowth of forests.

CONSERVATION MEASURES TAKEN : Mauphlong is protected by local Khasi people as a 'Sacred forest' for several decades.

CONSERVATION MEASURES PROPOSED : Intensive search may be undertaken in the type locality. If relocated, it may be cultivated under proper care, for its conservation.

BIOLOGY AND POTENTIAL VALUE : Its flowering and fruiting is during July to August. Nothing is known about its potential value.

CULTIVATION : There is no record of its cultivation.

DESCRIPTION : A straggling brittle herb. Stem glandular-pubescent above, subscandent, branches stout. Leaves 25 - 40 mm long, 15 - 20 mm broad, sessile, ovate, acuminate, 3 - 5-nerved at base, pale beneath, glabrous or sparsely pubescent, ciliolate. Flowers in terminal short cymes or solitary, bracteate, erect, pedicels 12 - 25 mm; calyx 8 - 9 mm long, cylindric, with 10 ribs, base rounded, teeth broad-acute, petals pale-pink, claw cuneate, obtuse, scales small. Anthers didymous, filaments glabrous, gynophore very short. Capsule oblong, broad, with very small teeth. Seed dorsally rounded, sides convex with rows of tubercles.

REFERENCES :

1. Chowdhuri, P. K. (1957). *Notes Roy. Bot. Gard. Edin.* 22 : 251.
2. Edgeworth, M. P. & Hooker, J. D. (1874). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 221.
3. Rohrb. (1869-70). *Linnaea* 36 : 258.
4. Williams, F. N. (1896). *J. Linn. Soc. Bot.* 32 : 94.

The material for this sheet was supplied by N. C. Majumdar, Botanical Survey of India, Howrah.

STATUS : Indeterminate. The type material (K) was collected by C. B. Clarke in 1885. It has not been relocated afterwards. So far reported only from Kohima and Kegurina, at an altitude of 1675 m. Large forested hill slopes have been cleared for jhum cultivation in Nagaland.

DISTRIBUTION : Endemic to Nagaland.

HABITAT AND ECOLOGY : Moist hilly regions, on rocks and slopes. Flowers in November.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Intensive search in the type locality is needed to rediscover its populations that may still be surviving. If and when found out, protection of the plants in the original wild habitat is recommended.

BIOLOGY AND POTENTIAL VALUE : Apart from its botanical interest, nothing is known about its potential value.

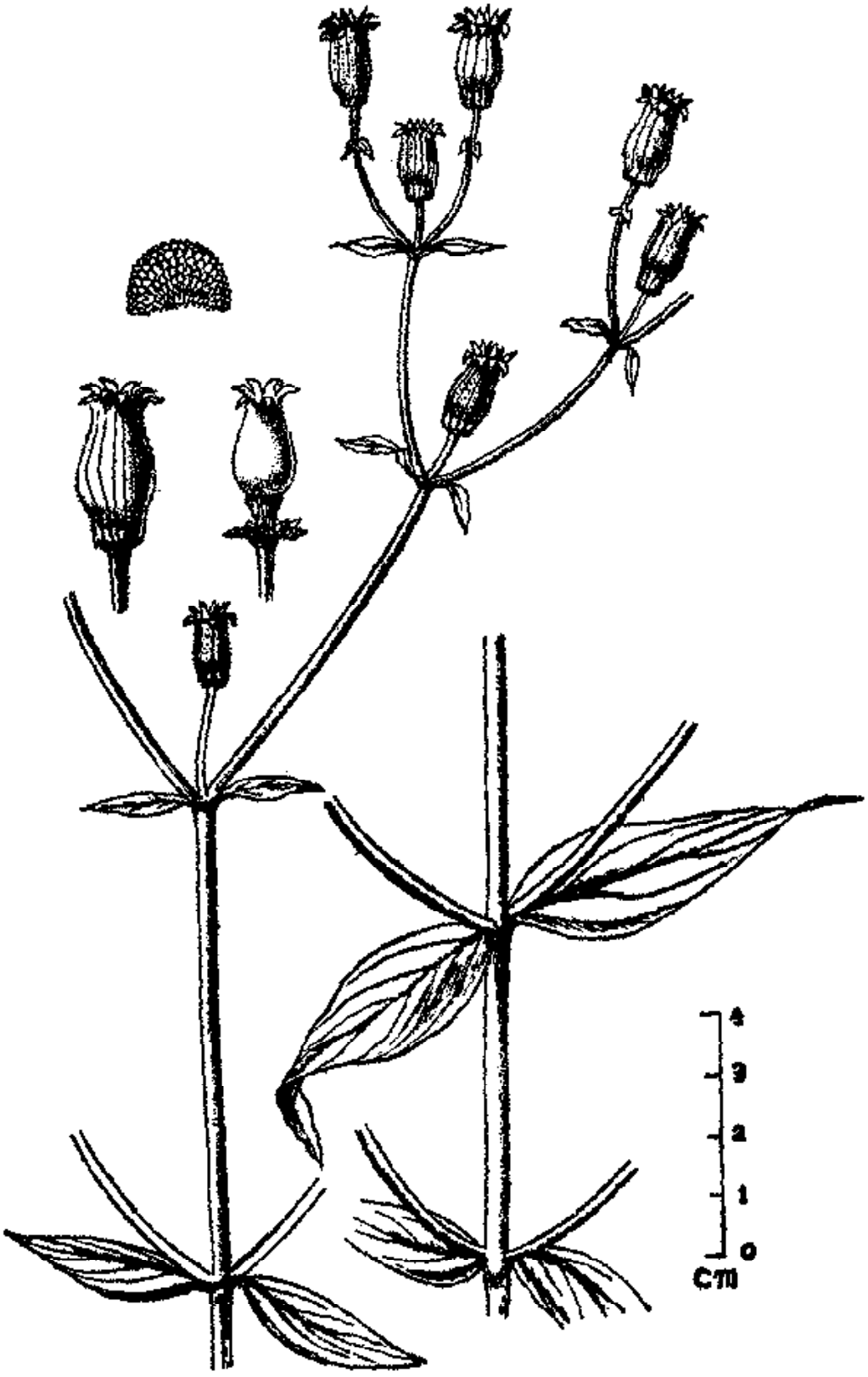
CULTIVATION : Not known in cultivation.

DESCRIPTION : A scandent herb with pubescent stems and climbing branches. Leaves lanceolate, acuminate, narrowed at the base, scarcely trinerved. Inflorescence terminal, lax dichotomous cymes, few-flowered. Bracts minute, inserted at the middle of pedicels. Calyx cylindric, pubescent, constricted below capsule, base truncate, pubescent, teeth lanceolate, acute. Capsule cylindric or ovoid, teeth 6, situated on a short carpophore. Seeds convex on the dorsal side, tuberculate.

REFERENCES :

1. Chowdhuri, P. K. (1957). *Notes Roy. Bot. Gard. Edin.* 22 : 253.
2. Clarke, C. B. (1889). *Journ. Linn. Soc.* 25 : 6.
3. Williams, F. N. (1896). *Jour. Linn. Soc. Bot.* 32 : 95.

The material for this sheet was supplied by N. C. Majumdar, Botanical Survey of India, Howrah.



Silene vagans Clarke

STATUS : Indeterminate. Since the type collections, there are no further collections though the island is well explored excepting the Jarwa Reserve.

DISTRIBUTION : Small tree endemic to South Andaman Island.

HABITAT AND ECOLOGY : This small tree reportedly grows in the evergreen tropical forests in the island. Its distribution status is not fully established and this species might occur in unexplored Jarwa belt.

CONSERVATION MEASURES TAKEN : Though Mt. Harriet and Wandoor Marine Park are protected areas, there is scope for extending limits of these National Parks and sanctuaries to nearby areas. It is proposed to create a sanctuary in West Rutland Island covering Mt. Ford.

CONSERVATION MEASURES PROPOSED : To extend protected zones to nearby areas.

BIOLOGY AND POTENTIAL VALUE : Not studied.

CULTIVATION : Nil.

DESCRIPTION : Medium sized trees up to 15 m high, young branchlets polished and brownish on drying. Leaves 9.0 - 14.0 cm, broad, elliptic to elliptic-oblong, base cuneate, thinly coriaceous and shining, with 10 - 12 pairs of lateral nerves arching and joining along the margin. Flowers *ca* 1 cm in diam. in dense axillary fascicles, female flowers and fruits unknown.

REFERENCES :

1. Balarkrishnan, N. P. (1989). Andaman Islands—Vegetation and Floristics, pp. 55 - 68. *In :* Saldanha, C. J. (ed.). *Andaman, Nicobar and Lakshadweep- an environmental impact assessment.* New Delhi.
2. King, G. (1890). *In : J. Asiat. Soc. Bengal* 2 : 154.
3. Maheshwari, J. K. (1964). Taxonomic studies on Indian Guttiferae-3. The genus *Garcinia* Linn. (*s. l.*) *Bull. Bot. Surv. India* 6 : 107-135, pl. 4.
4. Parkinson, C. E. (1923). *For. Fl. Andaman Islands*, p. 90.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Indeterminate. There is no collection of it after the Type collections. There is an urgent need for relocating the species.

DISTRIBUTION : Small tree endemic to Andaman Islands.

HABITAT AND ECOLOGY : Small tree growing in the evergreen forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : It is necessary to identify areas where this species can be conserved *in situ*. Introduction of *Garcinia kingii* and cultivation in botanic gardens and arboreta is suggested, when this species is relocated.

BIOLOGY AND POTENTIAL VALUE : The biology of this species is not known.

CULTIVATION : Nil.

DESCRIPTION : Small sized trees; branchlets terete. Leaves 12 - 15 × 4.5 - 6.5 cm, elliptic or ovate-oblong, shortly obtuse-acuminate at apex, margin narrowly repand, chartaceous, lateral veins *ca* 15, arcuate. Male flowers 2.5 cm across; pedicel 1.5 cm long; sepals orbiculate, *ca* 0.7 cm long, subequal, concave, membranous ; petals 1.5 × 1.0 cm, obovate, obtuse, obscurely veined; androecium below cupuliform rudimentary pistil, margin 4-lobed, lobes opposite petals ; anthers numerous, oblong, apex recurved, theca parallel. Rudimentary pistil columnar, stigma smooth, convex.

REFERENCES :

1. Balakrishnan, N. P. & Rao, M. K. Vasudeva (1983). The dwindling plant species of Andaman and Nicobar Islands, pp. 186 - 201. *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India.* Botanical Survey of India, Howrah.
2. Vesque, Julians (1893). Guttiferae. *In :* De Candolle, A. P., *Monogr. Phan.* 8 : 1-669.

The material for this sheet was supplied by M. P. Nayar and M. Ahmedullah, Botanical Survey of India, Calcutta.

Mesua manii (King) Kosterm. **CLUSIACEAE**

(*Kayea manii* King)

STATUS : Indeterminate. The species is not collected since the type collections. The forest on South Andaman Island is much depleted, excepting the area of Jarwa Reserve.

DISTRIBUTION : Endemic; reported from South Andaman Island.

HABITAT AND ECOLOGY : This shrub occurs in the evergreen tropical forests of this island. The forests are dwindling due to excessive logging.

CONSERVATION MESAURES TAKEN : Mt. Harriet National Park has a depleted and puaperised flora. The flora is on the verge of extinction as the adjoining areas are logged exceeding to the carrying capacity of the forests resulting in depletion of plant diversity.

CONSERVATION MEASURES PROPOSED : It is necessary to create a sanctuary in West Rutland and to extend geographical limits of Mount Harriet National Park to cover adjoining rich forest areas for protection.

BIOLOGY AND POTENTIAL VALUE : The biology of the species is not studied; potential value could not be estimated for want of further collections and study.

CULTIVATION : Not known.

DESCRIPTION : Medium sized trees up to 15 m high, branches glabrous and shiny. Leaves 10 - 13 cm × 2.5 - 4.0 cm, narrowly oblong, tapering at apex and base; lateral nerves *ca* 15-paired, arching; petiole short. Flowers *ca* 1.5 cm in diam, pedicels slender, in fasciculate racemes; petals 4, concave; stamens many, longer than the petioles. Fruits (unripe) compressed and enclosed in the accrescent calyx.

REFERENCES :

1. Balakrishnan, N. P. (1989). Andaman Islands: Vegetation and Floristics, pp.-55 - 68. *In :* Saldanha, C. J. (ed.). *Andaman, Nicobar and Lakshadweep-an environmental impact assessment.* New Delhi.
2. Maheshwari, J. K. (1963). Taxonomic studies on Indian Guttiferae-2. The genus *Maesua* Linn. *Bull. Bot. Surv. India* 5 : 335-343.
3. Parkinson, C. E. (1923). *For. Fl. Andaman Islands*, p. 88.

The material for the sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Rare. The species was first collected by Wight but was wrongly identified as *C. benghalensis*. Later, Barnes collected the species and after cultivating and studying, found it to be a new species. Subsequently several collections of this species were made from some areas in Western Ghats, but has now become rare due to habitat loss.

DISTRIBUTION : Karnataka, Kerala and Tamil Nadu. Endemic to Western Ghats.

HABITAT AND ECOLOGY : Grows along the margins of evergreen forests and in open areas on humus covered soils & rocks, spreading to over 3 m long.

CONSERVATION MEASURES TAKEN : This species was collected from various places in Western Ghats and grown in the experimental garden, Western Circle, Pune, where it grew well for several years.

CONSERVATION MEASURES PROPOSED : *In situ* conservation by protecting the habitat and introduction of the species in other ecologically suitable areas and *ex situ* cultivation in Botanical Gardens/Conservatories.

BIOLOGY AND POTENTIAL VALUE : Endemic to selected pockets of Western Ghats, with long trailing branches and with cleistogamous capsules. A high polyploid with n=75.

CULTIVATION : The plants were cultivated by Barnes in 1940. During 1963 several populations of this with other species of Commelinaceae were successfully cultivated in BSI Experimental Garden at Pune.

DESCRIPTION : Perennial herbs. Root-stock thick; roots thick, fibrous. Stems about 100 - 200 cm long, trailing, branched, rooting at nodes, glabrous. Leaf-sheath and internodes reddish-brown, finely pubescent or hispid. Leaves 2.5 - 8 × 1 - 3.5 cm, ovate to oblong-lanceolate, acute, shortly petioled, base oblique. Spathes aerial and subterranean; aerial spathes axillary, 2 - 3 per branch, 2 - 3 × 1.4 × 2.5 cm, base rounded, peduncle 1.5 - 3.5 cm, finely pubescent; subterranean spathes small. Aerial cymes 2-fid, outer 1-3 flowered or suppressed; inner cymes 3 - 4-flowered. Petals blue. Capsule 1 -2 per spathe, about 1 cm long, spindle shaped, slightly curved, 3-locular; upper 2 locules idehiscent, empty, lower locules gibbous, indehiscent, 1-seeded. Seed often attached to locular wall, ovoid, 0.5 cm, slightly reticulate after clearing the cell-wall. Underground capsules similar to aerial ones.

REFERENCES :

1. Kammathy, R. V. (1983). Rare and endemic species of Commelinaceae, pp. 213-221. *In :* Jain,S. K. & Rao, R. R. (ed.). *An assessment of Threatened plants of India.* Botanical Survey of India, Howrah.
2. Barnes, E. (1946). Some observations on south Indian Commelinas; two new species of *Commelina* from south India. *J. Bombay Nat. Hist. Soc.* 46 : 70-89. (with illustration).

The material for this sheet was supplied by R. V. Kammathy, Botanical Survey of India, Calcutta.

STATUS : Rare; known to occur in a few localities only in Maharashtra.

DISTRIBUTION : India; scattered at higher elevations along Western Ghats in Thane, Pune and Nasik districts; endemic.

HABITAT AND ECOLOGY : On gravelly-rocky substrate or on rocks among bushes of *Carvia* sp.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The area should be protected for habitat conservation and a thorough search be made for more areas of its possible occurrence. The plant should be propogated in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Worth introducing in rock gardens as an ornamental plant. Flowers & fruits in September.

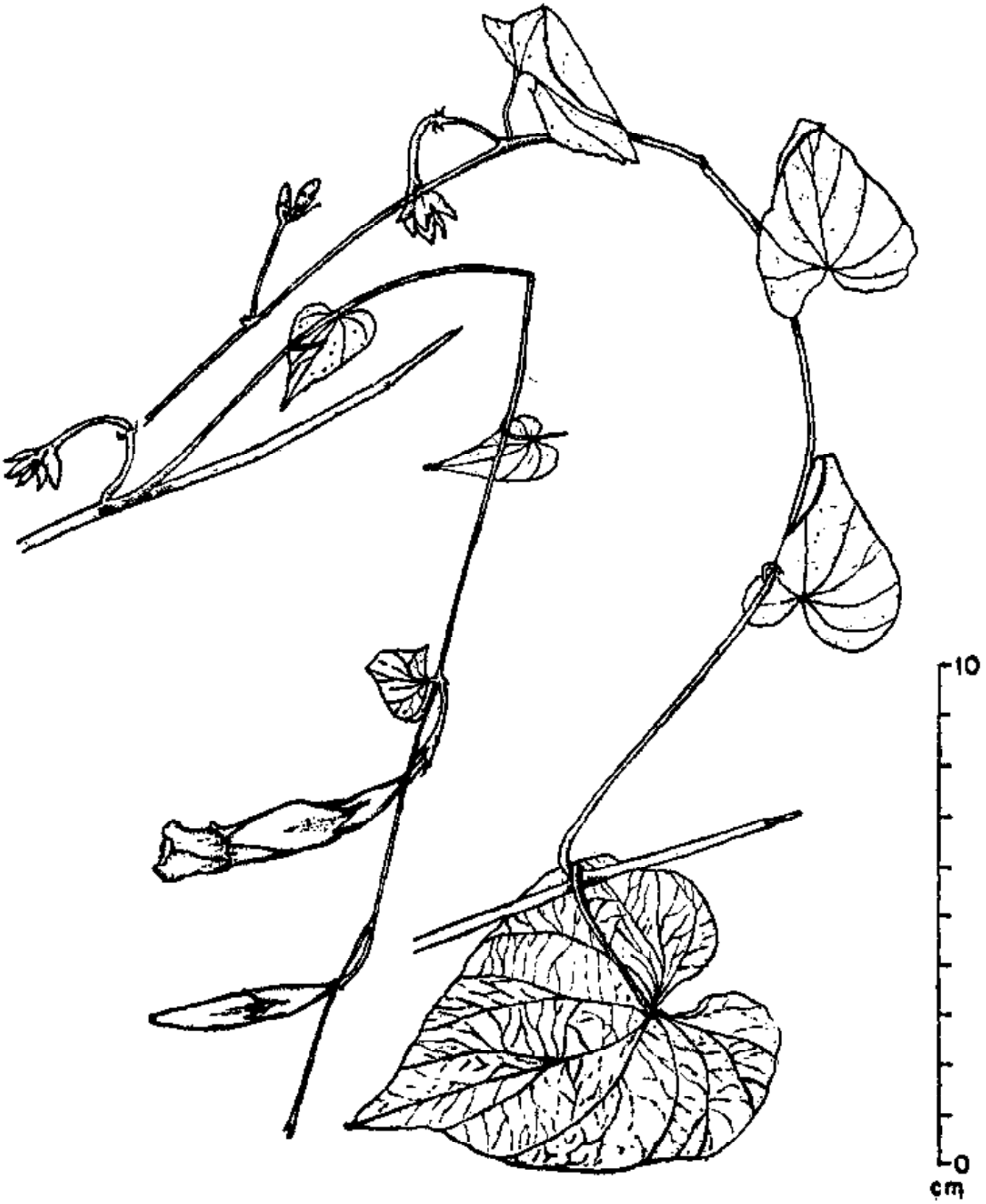
CULTIVATION : None.

DESCRIPTION : Herbaceous climbers with woody root-stock; stem slender, wiry, hairy. Leaves broadly ovate, 2 - 3×1.9 - 6.5 cm, hairy on both sides, apex acute or acuminate, base deeply cordate. Flowers bright yellow, funnel-shaped, solitary or 2 - 3 on hairy peduncles. Capsules 1.3×1.0 cm, ovoid. Seeds cuneate, brownish, finely puberulous.

REFERENCES :

1. Cooke, T. (1958). *Fl. Pres. Bombay* 2 : 314. (repr. ed.).
2. Santapau, H. (1947). *J. Bombay Nat. Hist. Soc.* 47 : 346.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Ipomoea clarkei Hook. f.

STATUS : Rare and endemic. The species is represented by a few old collectings only and has not been collected recently.

DISTRIBUTION : Attakati and Kadamparai in Anamalai hills, Coimbatore dist., Tamil Nadu.

HABITAT AND ECOLOGY : Among rocks and under cliffs at 1200 - 1700 m altitude.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Intensive search should be undertaken to relocate the species and to introduce its plants in to botanic gardens for *ex-situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Several species of *Kalanchoe* are of ornamental value and are grown as indoor plants easily.

CULTIVATION : Not known.

DESCRIPTION : Erect succulent olive brown herbs up to 30 cm high, glabrous except the inflorescence. Leaves fleshy, 8.5 - 12.5 × 2.5 - 5.0 cm, ovate, elliptic or broadly lanceolate, base cuneate, irregularly crenate-serrate, dotted with blood-red spots, nerves immersed, upper leaves smaller. Flowers white or pale-pink in supra-axillary paniculate cymes; pedicels, calyx and corolla clothed with glandular viscid hairs; hypogynous scales white, slightly bifid at the apex ; glands situated behind each ovary at the base. Follicles membranous, glabrous. Seeds numerous.

REFERENCES :

1. Dalzell, N. (1861). *In :* Dalzell & Gibson., *Bombay Fl.*, p. 313.
2. Gamble, J. S. (1919). *Fl. Pres. Madras*, p. 319.
3. Fischer, C. E. C. (1921). *Rec. Bot. Surv. India* 9 : 78.
4. Vajravelu, E. (1983) *In :* Jain, S. K. & Sastry, A. R. K. (ed.) *Plant Conservation Bulletin* 4 : 27. Botanical Survey of India, Howrah.
5. Srinivasan, S. R. (1983) *In :* Nair, N. C. & Henry, A. N. (ed.). *Fl. Tamil Nadu*, Ser. 1. *Analysis* 1 : 146. Botanical Survey of India, Coimbatore.

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Endangered. After the original collection by C. B. Clarke in 1881, it was located by F. Kingdom-Ward in the vicinity of Kohima (Nagaland) in 1948, and was last collected by D. B. Deb from Mao (Manipur) in 1954.

DISTRIBUTION : N. E. India; Kohima (Nagaland)-Mao (Manipur) region; endemic.

HABITAT AND ECOLOGY : On sandstone rocks at 1500–1800 m in alt.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Deserves to be cultivated in Botanic Gardens as a plant of horticulural and medicinal importance.

BIOLOGY AND POTENTIAL VALUE : A showy horticultural plant. The thick juice from the leaves is used by the local people in snake bite. It should, therefore, be chemically investigated. Fls. & frs.; February-April.

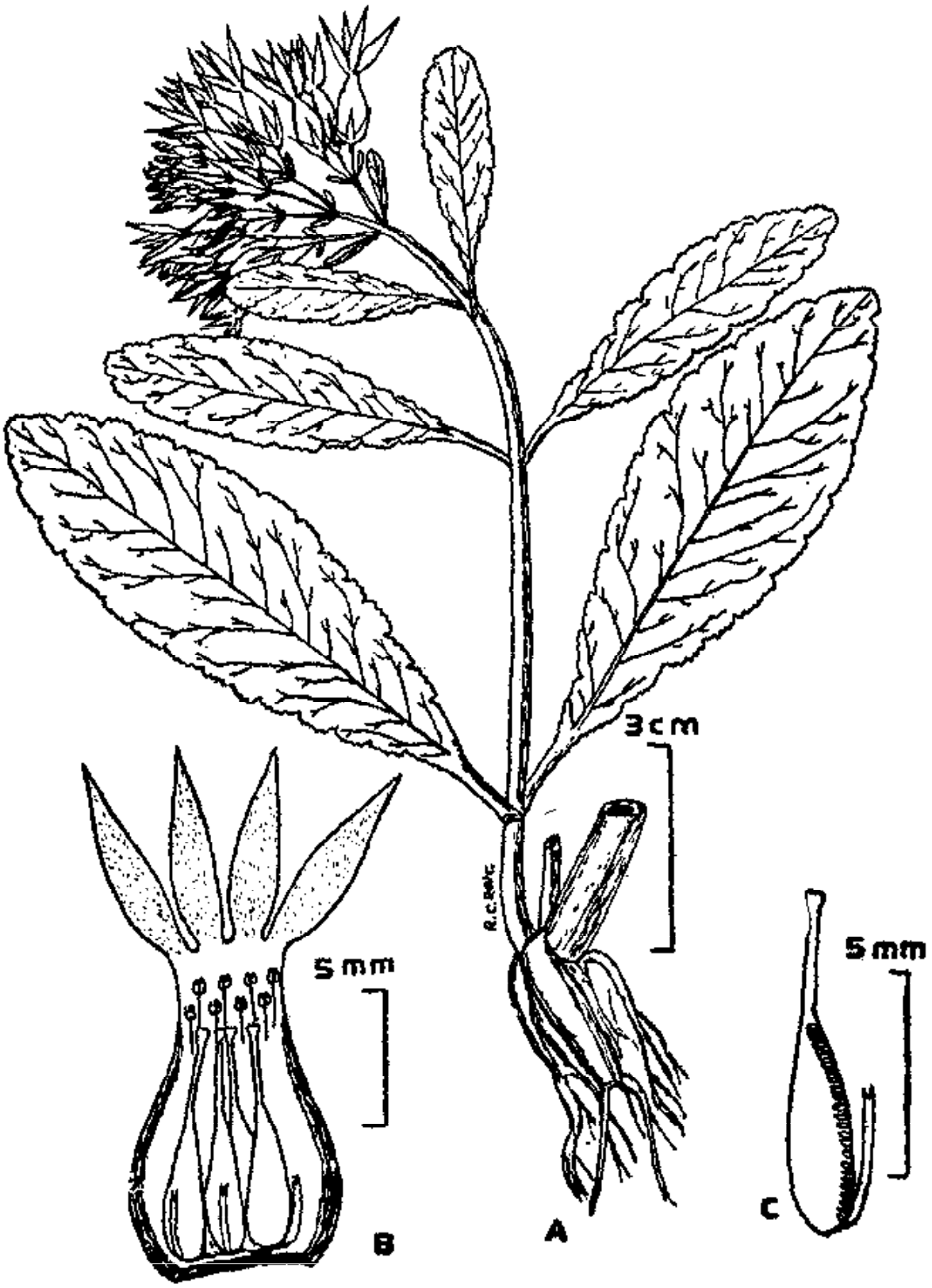
CULTIVATION : The local people in Nagaland cultivate very rarely as a pot plant and for use as an antidote in snake bites.

DESCRIPTION : Succulent perennial herbs, erect branched; stem stout, terete, glabrous; roots fascicled, tuberous above. Leaves persistent, petiolate, exstipulate, simple, opposite, decussate, 3.8 - 9.5 × 0.8 - 2.8 cm, elliptic or narrowly obovate, obtuse at apex, acute at base, serrulate at margin, glabrous; lateral nerves 5 - 8 pairs, alternate or subopposite. slender; petioles 0.5 - 1.0 cm, glabrous. Inflorescence terminal peduncled paniculate cymes, *ca* 6 cm across, glabrous; bracts 3 - 15 × 0.5 - 3.0 mm, linear or narrowly elliptic obovate, glabrous. Flowers 20 or more, bracteate, pedicellate, 4-merous; pedicel 4 - 7 mm, stout, glabrous; calyx tube 1.0 - 2.0 × 4.5 - 5.0 mm, obconic, glabrous; teeth 4; corolla pink or rose coloured, tube 10 - 11 mm long, urceolate, glabrous; lobes 4, twisted, acute at apex, glabrous outside, puberulous within; stamens 8 in two whorls, slender, glabrous, adnate near the mouth of the corolla tube; anthers globoid, basifixed, dehising longitudinally; hypogynous scales 4 at the base of carpels outside, linear, notched at apex, glabrous; carpels 4, 8 - 9 mm, free; ovary 5 - 6 × 1.5 - 2.0 mm, 1-loculed with many ovules attached at the edge; style 13 mm, glabrous; stigma 0.3 - 0.5 mm, simple, glabrous.

REFERENCES :

1. Clarke, C. B. (1889). On the plants of Kohima and Munneypore. *J. Linn. Soc.* 25 : 21. f. 8.
2. Deb, D. B. (1961). Dicotyledonous plants of Manipur Territory. *Bull. Bot. Surv. India* 3 : 327.
3. Kingdon-Ward, F. W. (1948). *Plant Hunting in Manipur*, pp. 146, 204. London.

The material for this sheet was supplied by D. B. Deb and R. C. Rout, Botanical Survey of India, Howrah.



Kalanchoe roseus Clarke A. Habit. B. Flower-split open. C. Ovary with ovules.

STATUS : Indeterminate. The species has been collected only once from Quilon, Kerala by R. Wight.

DISTRIBUTION : Kerala : Quilon. Endemic.

HABITAT AND ECOLOGY : Not known.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Intensive search for the species in the region and if relocated, adequate protection to its natural habitat is the only suitable measure.

BIOLOGY AND POTENTIAL VALUE : Apart from its botanical interest, nothing more is known.

CULTIVATION : So far unknown.

DESCRIPTION : Annual herbs. Leaves shorter than the stems or sometimes subequalling it. Inflorescence a terminal subglobose head ; spikelets linear-lanceolate, compressed. Bristles 6, subequalling the nut beak. Nut oblong, compressed; beak triangular, decurrent on the shoulders of the nut, scabrous.

REFERENCES :

1. Kern, J. H. (1974). *In :* van Steenis, C. G. G. J., *Fl. Malesiana* 7(3) : 718. f. a-b.
2. Verma, D. M. & Chandra, V. (1981)). *Bull. Bot. Surv. India* 22 : 134.

The material for this sheet was supplied by Miss Veena Chandra, Herbarium, Forest Research Institute, Dehra Dun.

STATUS : Indeterminate. The species is represented by only two old collections, one probably a duplicate of type by J. D. Hooker and T. Thomson and the other by Griffith.

DISTRIBUTION : Assam, Meghalaya.

HABITAT AND ECOLOGY : Not known.

CONSERVATION MEASURES PROPOSED : Intensive search for the species and if collected attempts through *in situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Not known.

DESCRIPTION : Perennial, robust herbs. Leaves 30 - 60 cm long, middle leaf sheaths winged, secondary bracts very long, nuts globose, slightly depressed, cancellate, lobes of disk margin 3, united at the base.

REFERENCES :

1. Boeckler, O. (1874). *Linnaea* 38 : 485.
2. Clarke, C. B. (1894). *In :* Hooker, J. D., *Fl. Brit. India* 6 : 690.
3. Chandra, Veena (1981). *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India*, p. 276. Botanical Survey of India, Howrah.
4. Kern, J. H. (1961). *Blumea* 11 : 164.

The material for this sheet was supplied by Miss Veena Chandra, Herbarium, Forest Research Institute, Dehra Dun.

STATUS : Indeterminate. Endemic.

DISTRIBUTION : Andaman islands. The species is known only from the type collection. It is necessary to survey its distribution areas, for understanding its status and threat factors.

HABITAT AND ECOLOGY : It occurs in the fringes of inland forests and the climber forms festoons on the canopies of tall forest trees.

CONSERVATION MEASURES TAKEN : Some Island area is now brought under National Parks and Wildlife sanctuaries in Andaman Islands, but is inadequate to protect many rare endemics.

CONSERVATION MEASURES PROPOSED : Since species of *Dioscorea* are important genetic resource for medicine and food, it is necessary to locate its viable populations. Such populations are to be protected. Multiplication of the species and introduction in botanic gardens are to be taken up. A Gene Bank of all wild yams in the country should be considered on a priority basis, at a suitable place.

BIOLOGY AND POTENTIAL VALUE : The biology of the species is not known. This is a potential food and medicinal plant.

CULTIVATION : This species is to be introduced in to the Experimental garden and arboretum of the Botanical Survey of India at Port Blair.

DESCRIPTION : Tuber elongated, fleshy, white; stem glabrous, smooth, round with purple spots. Leaves alternate, ovate-cordate, acuminate, 13 cm long, 11 cm broad, glabrous, lateral nerves 9, venation almost obliquely passing over to apex. Male flowers in spikes of 1 - 4, inflorescence axillary, up to 20 cm long. Axis angular, bract boat-shaped, ovate, acuminate, 1 mm long; bracteoles linear, acuminate, 0.5 mm long. Flower buds elliptical-ovoid; perianth lobes basally connected, equally long, outer and inner lobes smaller, angular and thick. Stamens 3, with small filaments all inserted at the base of perianth lobes. Female flowers not known.

REFERENCES :

1. Balakrishnan, N. P. (1989). Andaman islands-Vegetation and Floristics. *In :* Saldanha, C. J. (ed.). *Andaman, Nicobar and Lakshadweep- an environmental impact assessment*, p. 55-48. New Delhi.
2. Kunth, K. (1924). *Das Pflanzenreich* 87 : 91.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta, and P. S. N. Rao, Botanical Survey of India, Port Blair.

STATUS : Rare. There is only one collection of this species (*Jacob Cherian* 16903, Type: K.). This plant has not been recollected after the type collection.

DISTRIBUTION : India; endemic to Kodugu (Coorg) district in Karnataka.

HABITAT AND ECOLOGY : In evergreen forests.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality be protected and neighbouring areas be thoroughly searched for this species. If found, the plant should be propagated and grown in the forest nurseries or in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Not known. Other tree species of the family are of timber value.

CULTIVATION : None.

DESCRIPTION : Trees, 8 - 15 m tall, young parts glabrous. Leaves ovate, 4 - 5 × 3.5 - 4.0 cm, chartaceous, apex caudate-acuminate, obtuse or sub-acute, base rounded, margins sub-undulate. Flowers in panicles, shorter than leaves; petals oblong, minutely puberulous without and margins ciliate. Fruits enclosed in accrescent calyx.

REFERENCES :

1. Fischer, C. E. C. (1932). *Bull. Misc. Infor. Kew*, p. 245.
2. Gamble, J. S. (1918). *Fl. Pres. Madras*, p. 1292.
3. Saldanha, C. J. & Eswar Rao, M. S. (1984). *In :* Saldanha, C. J., *Fl. Karnataka* 1 : 19.
4. Tewari, P. K. & Janardhanan, K. P. (1983). *Ind. For.* 6 : 80-81.

The material for this sheet was supplied by N. P. Singh, B. G. Kulkarni, Botanical Survey of India, Pune and A. A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Endangered. Known from type locality only and by very limited collections in the herbaria.

DISTRIBUTION : N. E. India: Khasia Mountains. Endemic.

HABITAT AND ECOLOGY : In sub-tropical forested hill slopes. The area receives high rainfall.

CONSERVATION MEASURES TAKEN : A few sacred groves represent relic vegetation of Khasi hills; Balphakram area is now protected as a Sanctuary. It is likely the species may be found in at least small numbers.

CONSERVATION MEASURES PROPOSED : Efforts should be made to determine the extent to which this species is found in nature and its habitat should be preserved; it should be introduced into the existing sacred groves and protected reserves in this region.

BIOLOGY AND POTENTIAL VALUE : Of botanical interest, not collected again after type collection.

CULTIVATION : None on record.

DESCRIPTION : Small or medium-sized trees. Leaves eliptic-oblong, 5 - 8 × 3 - 5 cm, rounded at base, acute at apex, undersurface clothed with shiny, silvery scales; petioles 8 - 10 mm long. Flowers trumpet-shaped, bracts 1 mm long. Fruits 15 mm long, ribbed, densely silvery scaly, ellipsoid.

REFERENCES :

1. Basu, D. (1985) : *J. Econ. Tax. Bot.* 7(3) : 658.
2. Hart, E. T. & Veldkamp, J. F. (1980). *Blumea* 26(2) : 396-397.

The material for this sheet was supplied by Debjani Basu, Botanical Survey of India, Dehra Dun.

STATUS : Rare; main cause for its rarity appears to be habitat destruction.

DISTRIBUTION : India; Meghalaya and adjacent Bangladesh. Localized within a restricted geographical area. In Meghalaya the species is restricted to only Mawsmai sacred forest grove, which represents the relic vegetation of Khasi Hills.

HABITAT AND ECOLOGY : Moist evergreen sub-tropical forest, in humid situations at an altitude of 1200 m.

CONSERVATION MEASURES TAKEN : The type locality is conserved due to local religious belief; the Mawsmai Forest is treated by local Khasi tribes as 'Sacred'.

CONSERVATION MEASURES PROPOSED : Intensive search for the species in adjoining forests; if the plants are located, they should be introduced into the garden and arboretum of the Botanical Survey of India at Shillong and Barapani and into the other protected forest areas in Meghalaya.

BIOLOGY AND POTENTIAL VALUE : Nothing is recorded about its biology; the species is of distributional interest due to its restricted geographical distribution and rarity; trees may be of timber value. Flowers during July-September and fruiting during October-December.

CULTIVATION : None on record.

DESCRIPTION : Trees, 15 - 20 m tall. Leaves 5 - 14 × 1.5 - 3 cm, lanceolate, elliptic-lanceolate or elliptic-oblong, acuminate at apex, acute at base, margins crenate-serrate, glabrous with age, coriaceous. Petioles 1 1.5 cm long, thickened at apex, geniculate, pubescent. Inflorescence axillary, racemose. Flowers 1 1.5 cm across, white. Pedicels 1 - 2 cm long. Sepals 5, 8 - 10 mm long, villous without, adpressed pubescent within. Petals 5, 7 - 9 mm long, oblong-cuneate, narrowed at base, laciniate, long silky hairy on both surfaces. Stamens 35 - 40; filaments *ca* 2 mm long; anthers 3 - 4 mm long, shortly awned. Ovary superior, 2-loculed; ovules in 2 rows in each locule. Drupes *ca* 2.5 cm long, oblong, smooth.

REFERENCES :

1. Haridasan, K. & Rao, R. R. (1985). *For. Fl. Meghalaya.* Dehra Dun.
2. Rao, R. R. & Haridasan, K. (1983). Threatened plants of Meghalaya—a plea for conservation. *In :* Jain, S. K. & Rao, R. R. (ed). *An assessment of Threatened Plants of India*, pp. 94-103. Botanical Survey of India, Howrah.

The material for this sheet was supplied by S. K. Murti, Botanical Survey of India, Dehra Dun.

Elaeocarpus acuminatus Wall. ex. Mast.

A. Habit. B. Flower bud. C. Flower. D. Petal. E. Stamen. F. Sepal.

STATUS : Rare; there is no recent collection of this species since its type collection. Causes for its rarity and possible extinction may be deforestation for developmental or agricultural purposes.

DISTRIBUTION : Tamil Nadu: Madurai Distt., Palni and Kodaikanal Hills. Endemic.

HABITAT AND ECOLOGY : Fringe areas of moist evergreen forests, in open places, at an altitude of 2150 m.

CONSERVATION MEASURES TAKEN : Some parts of its distribution range are now included in the Nilgiri Biosphere Reserve, set up recently.

CONSERVATION MEASURES PROPOSED : Intensive search for the species in and around the type locality; if the plants are located, should be introduced and cultivated in the botanic gardens in the region.

BIOLOGY AND POTENTIAL VALUE : Nothing is recorded about its biology; the species is of distributional interest due to its endemicity and rarity; trees may be of timber value. Flowers during January—April and fruiting during June-September.

CULTIVATION : None on record.

DESCRIPTION : Trees, 15 - 20 m tall. Leaves 5 - 7.5 × 2 - 3 cm, ovate-elliptic or elliptic, obtuse, base rounded or broadly cuneate, sparsely appressed hirtous or glabrescent underneath, margins obscurely serrate. Inflorescence 4 - 6 cm long, axillary, racemose. Flowers 1 1.5 cm across, white. Pedicels 1 1.2 cm long, usually densely shortly sericeous. Sepals 5, 10 - 11 cm long, lanceolate, silky hairy without, velvety at margins. Petals 5, 12 mm long, broader towards apex, laciniate, densely sericeous without. Stamens *ca* 35, appressed hirtellous; filaments 2 - 3.3 mm long; anthers 2.5 - 4 mm long, awned. Ovary superior, ovoid, 2 - 3-locular; ovules 6 in each locule. Drupes 1.5 cm long, ellipsoid, rounded at ends.

REFERENCE :

1. Weibel, R. (1972). Deux especes nouvelles du genere *Elaeocarpus* provenant des montagnes du sud de l' Inde. *Candollea* 27(1) : 15 - 19.

The material for this sheet was supplied by S. K. Murti, Botanical Survey of India, Dehra Dun.

STATUS : Rare; there is no collection of this species since its type collection. Causes for its rarity and possible extinction may be deforestation for developmental or agricultural purposes.

DISTRIBUTION : India: Western Ghats; no precise locality is mentioned in the protologue. Endemic.

HABITAT AND ECOLOGY : Moist evergreen forests in shady humid places at an altitude of 1500 m.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Intensive search for the species in the Western Ghats which covers the type locality; if the plants are located, should be introduced in to the botanic gardens in the region.

BIOLOGY AND POTENTIAL VALUE : Nothing is recorded about its biology; the species is of distributional interest due to its endemicity and rarity; trees may be of timber value, and fruiting during April-October.

CULTIVATION : None on the record.

DESCRIPTION : Tress 10 - 20 m tall. Leaves 6.5 - 7.5 × 3.5 - 4.5 cm, elliptic or obovate, obtuse or rounded, base broadly or narrowly cuneate, glabrous with age, serrated. Petioles 1 1.5 cm long, appressed hirtous or glabrous. Inflorescence 5 - 6 cm long, axillary racemes. Flowers 4 - 5 mm across, white. Pedicels sparsely appressed hirtous or glabrate. Sepals 5, 4 - 4.5 mm long, sparsely appressed hairy, pustulate without. Petals 5, 1.5 mm long, broader towards apex, laciniate. Stamens 15 - 17 ; filaments *ca* 1 mm long ; anthers 1.5 mm long, bearded at apex. Ovary superior, broadly ovoid, 3-locular: ovules 2 in each locule. Drupes 2.5 cm long, broadly ovoid, rounded at base and apex, laterally compressed. Pyrenes ellipsoid, longitudinally 3-grooved, obsoletely tuberculate.

REFERENCE :

1. Weibel, R. (1972). Deux especes nouvelles du genere *Elaeocarpus* provenant de montagnes due sud de l'Inde. *Candollea* 27(1) : 15-19.

The material for this species was supplied by S. K. Murti, Botanical Survey of India, Dehra Dun.

STATUS : Rare; represented by a few collections; cause for its rarity may be loss of its habitats.

DISTRIBUTION : Tamil Nadu, Karnataka, Maharashtra. Endemic.

HABITAT AND ECOLOGY : Evergreen and Shola forests between 600-2000 m alt.

CONSERVATION MEASURES TAKEN : Though some of its distribution areas in the Western Ghats and the Nilgiris are protected either as Sacred groves or Biosphere Reserve, the species is rather rare in its range.

CONSERVATION MEASURES PROPOSED : Introduction and cultivation of the species in experimental gardens and declaration of specific pockets of its distribution in the evergreen, Shola forests, as Reserves, should be considered for *in situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Nothing is recorded about its biology; the species is of distributional interest due to its endemicity, rarity and being a component of evergreen forests; trees may be of timber value. Flowers during October-November and fruiting during March-April.

CULTIVATION : None on the record.

DESCRIPTION : Trees, 40 - 50 m tall. Leaves 5 - 10 × 2.5 - 4.5 cm, ovate or ovate-lanceolate, caudate-acuminate or acute, base rounded and sub-cordate or truncate, crenate-serrate, glabrous. Petioles 2.5 - 3.5 cm long. Flowers 1 - 1.5 cm across, white. Pedicels 5.15 mm long, curving in fruits. Sepals 5, 7 - 9 mm long, linear-lanceolate. Petals 5, 7 - 9 mm long, elliptic-oblong, laciniate, silky hairy on both surfaces. Stamens 20 - 40; filaments 1 mm long; anthers 3 - 4 mm long, shortly awned. Ovary superior, silky hairy, 2-locular. Drupes 1.5 - 2 cm long, elliptic or oblong, smooth.

REFERENCES :

1. Chithra, V. (1983). *Elaeocarpaceae. In :* Nair, N. C. & Henry, A. N. (ed.). *Fl. Tamil Nadu*, Ser. 1.—*Analysis* 1 : 46. Botanical Survey of India, Coimbatore.
2. Saldanha, C. J. (1984). *Fl. Karnataka.* New Delhi.

The material for this sheet was supplied by S. K. Murti, Botanical Survey of India, Dehra Dun.

STATUS : Rare; causes for its rarity may be habitat destruction.

DISTRIBUTION : India: Meghalaya, Manipur; and adjacent Bangladesh. Localized within a restricted geographical area. The species is restricted to 'Sacred groves', in India.

HABITAT AND ECOLOGY : Moist evergreen and semi-evergreen forests between 900 - 1800 m.

CONSERVATION MEASURES TAKEN : The localities are conserved due to religious belief of the tribal people of Meghalaya and Manipur and the forests are treated as 'Sacred'.

CONSERVATION MEASURES PROPOSED : Intensive search for the species in other adjoining regions; if the plants are located, should be introduced and cultivated in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Nothing is recorded about its biology ; the species is of restricted geographical distribution and rare ; fruits are said to be edible, trees may be of timber value. Flowers and fruits during March-October.

CULTIVATION : None on the record.

DESCRIPTION : Trees, 5 - 20 m tall. Leaves 5 - 12 × 2 - 2.5 cm, oblong-lanceolate to elliptic-acute to acuminate, base cuneate, crenate-serrate or sub-entire. Petioles 1 - 3 cm long, swollen and geniculate at apex. Inflorescence 3 - 9 cm long, axillary racemes, silky pubescent. Bracts leafy, spathulate, caducous. Flowers 5 - 10 mm across, white or pale yellowish. Sepals 5, 5 - 8 mm long, pilose or glabrate without, thinly appressed hairy within. Petals 5, 5 - 10 mm long, oblong, laciniate, adpressed silky on both surfaces. Stamens 15 - 30; anthers *ca* 2 mm long, shortly awned. Ovary superior, oblong, silky. Drupes 1.5 - 2 cm long, oblong-ovoid. Pyrenes ovoid, rugose, obscurely 3-angled.

REFERENCES :

1. Balakrishnan, N. P. (1981). *Fl. Jowai* 1 : 105. Botanical Survey of India, Howrah.
2. Rao, R. R. & Haridasan K. (1983). Threatened plants of Meghalaya—a plea for conservation. *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India.* Botanical Survey of India, Howrah.

The material for this species was supplied by S. K. Murti, Botanical Survey of India. Dehra Dun.

STATUS : Rare, due to loss of its habitats. Evergreen forest tracts in the Southern Peninsula have been vastly altered and replaced by plantation crops, rendering many endemic species vulnerable.

DISTRIBUTION : Tamil Nadu. Endemic.

HABITAT AND ECOLOGY : Evergreen and Shola forests between 2000-2500 m.

CONSERVATION MEASURES TAKEN : Some evergreen forest areas and sholas in Tamil Nadu, Silent Valley in adjoining Kerala are now declared as Biosphere Reserve or National Park.

CONSERVATION MEASURES PROPOSED : Introduction and cultivation of the species in botanic gardens in the region.

BIOLOGY AND POTENTIAL VALUE : Nothing is known about its biology; the species is of distributional and forest constituent value due to its endemicity and rarity; timber of other species is suitable for building purposes. Flowers during March-June and fruiting during July-October.

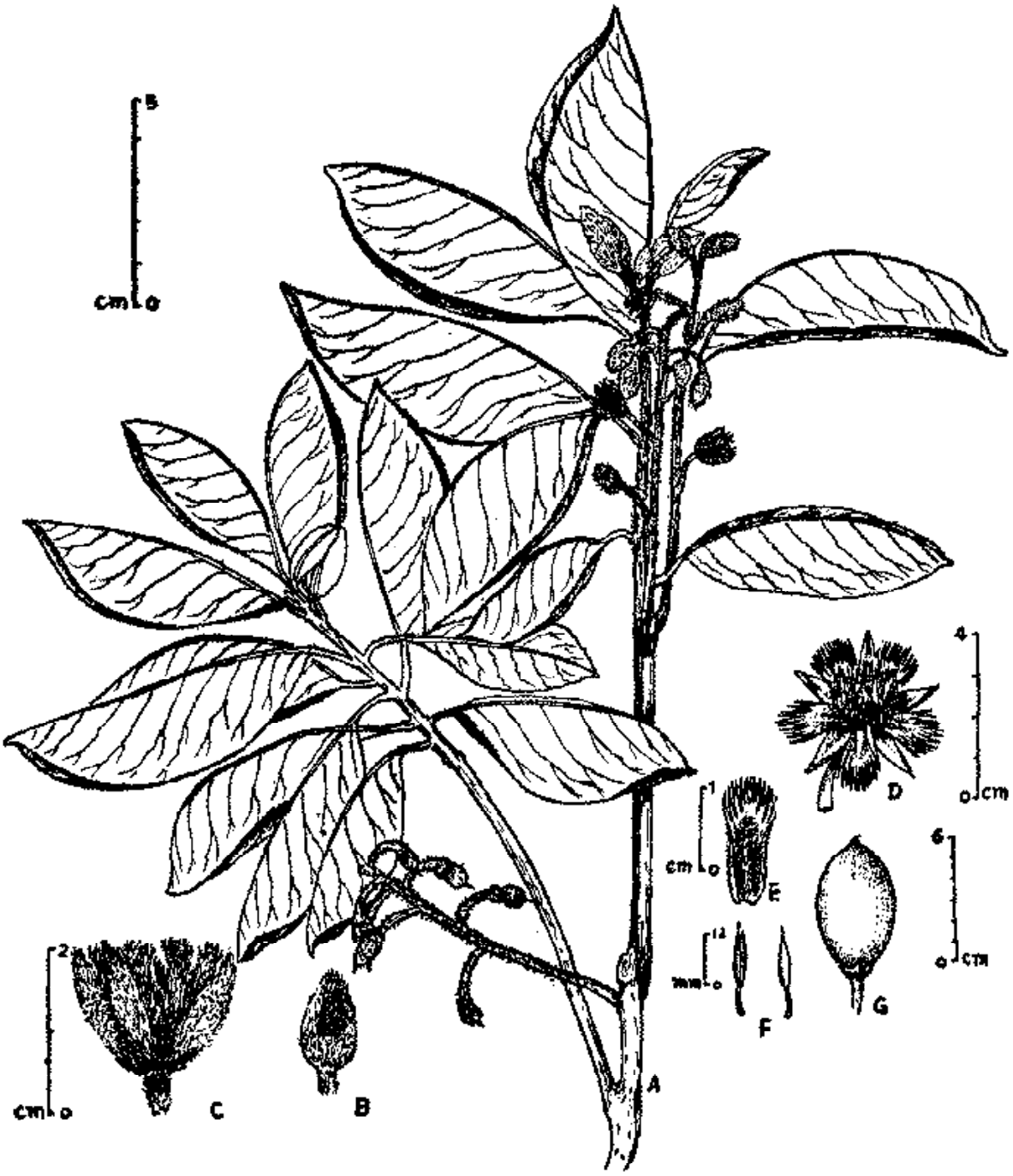
CULTIVATION : None on record.

DESCRIPTION : Trees, 30 - 40 m tall. Leaves 7.5 - 15 × 4 - 7 cm, oblong-ovate or elliptic, very convex, the two halves bent back so as to look like an inverted boat, acuminate or acute, base narrowed, cinnamon-tomentose beneath. Petioles 1.5 - 2.5 cm long, tomentose. Inflorescence 5- 10 cm long, of axillary racemes, rusty tomentose. Flowers 1.5 - 1.8 cm across, white. Pedicels 1.5 - 2 cm long, hispid tomentose. Sepals 5, 1.5 cm long, densely tomentose without. Petals 5, 1.5 cm long, broader at apex, laciniate, long appressed hairy. Stamens 20 - 30; filaments *ca* 1 mm long, puberulous; anthers 2.5 - 4 mm long, puberulous, shortly awned. Ovary superior, elliptic or oblong-ovoid, densely hairy, 3-loculed. Drupes 1.5 - 1.8 cm long, ovoid or elliptic. Pyrenes 3-celled.

REFERENCES :

1. Brandis, D. (1906). *Indian Trees* (repr. ed. 1971).
2. Chithra, V. (1983). *Elaeocarpaceae*. *In* : Nair, N. C. & Henry, A. N. (ed). *Fl. Tamil Nadu*, Ser. I—*Analysis* 1 :46. Botanical Survey of India, Coimbatore.
3. Fyson, P. F. (1932). *Fl. South Indian Hill Stations* 1. (repr. ed. 1977). Today & Tomor-Tomorrow's Publishers, New Delhi.

The material for this sheet was supplied by S. K. Murti, Botanical Survey of India, Dehra-Dun.



Elaeocarpus recurvatus Corner

A. Habit. B. Flower bud. C. & D. Flower. E. Petal. F. Stamen. G. Fruit.

STATUS : Vulnerable. So far known from the Western Ghats in Maharashtra only. Moldenke (1949) described the species based on the collections of Blatter, Hallberg & McCann from Khandala in 1918. Thereafter, it was collected by Irani in 1959 from Matheran hill, but the author could not recollect it during recent explorations. Because of its rare occurrence, Raghavan & Singh (1983) remarked that the plant is very rare or possibly extinct. Ahmedullah & Nayar (1987) also remarked it as 'rare' in the Western Ghats. Its habitats are subjected to stress as Khandala is a tourist spot.

DISTRIBUTION : Western Ghats Maharastra : Khandala in Pune district; Matheran in Raigad district. Endemic.

HABITAT AND ECOLOGY : Among grasses in marshy open situations.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : It is suggested that habitat of the plant should be conserved; intensive search of the plant should be made in the known localities to assess its present status.

BIOLOGY AND POTENTIAL VALUE : It flowers from September to November.

CULTIVATION : None so far.

DESCRIPTION : Herbs. Leaves linear, acute, glabrous, basal rosulate, 2 - 4 cm long. Heads hemispheric, greyish, 2 - 3 mm across; peduncles slender. Ovary subglobose, 3-celled; style 1, stigmas 3.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of Indian Region* 1 : 210. Botanical Survey of India, Calcutta.
2. Moldenke, H. N. (1949). *Phytologia* 3 : 162.
3. Raghavan, R. S. & Singh, N. P. (1983). *Plant Cons. Bull.* 3 : 3. Botanical Survey of India, Howrah.
4. Santapau, H. (1967). *Rec. Bot. Surv. India* 16(1) : 294.

The material for this sheet was supplied by M. J. Kothari, Botanical Survey of India, Pune.

STATUS : Vulnerable. The species was first collected from the Kamorta Island in the Nicobars (2) and later reported from the Andamans (3). Due to loss of its habitats, the species is now seen only in isolated forest patches in the Islands.

DISTRIBUTION : Endemic to the Andaman & Nicobar Islands.

HABITAT AND ECOLOGY : In evergreen forests in the Islands.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : The Mt. Harriet National Park in the S. Andaman Island is to be extended to cover adjoining areas. The future of this species is assured to a certain extent as the Jarwa reserve is still undisturbed. It is necessary to introduce this tree species in the experimental garden and Arboretum of the Botanical Survey of India, at Port Blair.

BIOLOGY AND POTENTIAL VALUE : Not known. An Island endemic with restricted distribution.

CULTIVATION : Not cultivated.

DESCRIPTION : Small trees, branches slender becoming black on drying. Leaves 10 - 14 ×4 - 6 cm, oblong, obtuse at apex, rounded at base, glabrous, glaucous beneath; lateral nerves 10 - 12-paired, nearly straight. Flowers minute, in small axillary clusters; calyx lobes usually 5, *ca* 4 mm long, triangular-acute; petals smaller than the calyx lobes. Fruit *ca* 8 mm in diam, sub-globose.

REFERENCES :

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2. Hooker, J. D. (1887). *In :* Hooker, J. D., *Fl. Brit. India* 5 : 272.
3. Parkinson, C. E. (1923). *Forest flora of Andaman Islands.* Dehra Dun.

The material for this sheet was supplied by M. P. Nayar and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Rare; endemic. Though there is no immediate danger of its extinction, this species being arborescent, is vulnerable due to heavy logging in the island.

DISTRIBUTION : This tree species occurs in S. Andaman Island.

HABITAT AND ECOLOGY : It occurs in the evergreen forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : The Mt. Harriet National Park area is to be extended so that the adjoining areas come under protection. This endemic tree species may be introducted into the BSI botanic garden at Port Blair.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Not cultivated.

DESCRIPTION : Tree, 12 - 15 m tall, bark white. Leaves 7.5 - 9 cm long, oblong-ovate to lanceolate, caudate-acuminate, entire or repand-crenate, minutely reticulate, thinly coriaceous, puberulous when young. Flowers large, puberulous; sepals rounded, concave, 2 inner thinner; stamens many. Fruit ellipsoid or obvoid, shortly peduncled, terete.

REFERENCES :

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3. Pax, F. & Hoffmans, K. (1922). Euphorbiaceae-Phyllanthoideae-Phyllantheae. *In* : Engler, A., *Pflanzenr.* 81(IV-147) : 1-349, fig. 1-26.

The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and H. S. Debnath, BSI, Port Blair.

STATUS : Rare. The species is known from the type locality only.

DISTRIBUTION : India; endemic to Pune district in Maharashtra.

HABITAT AND ECOLOGY : Along slopes of Katraj ghat.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The plant habitat be protected. If possible its plants be grown in the experimental gardens from viable seeds. Also a search in the neighbouring ghat areas around Katraj in Pune district be made.

BIOLOGY AND POTENTIAL VALUE : It flowers and fruits during September-October.

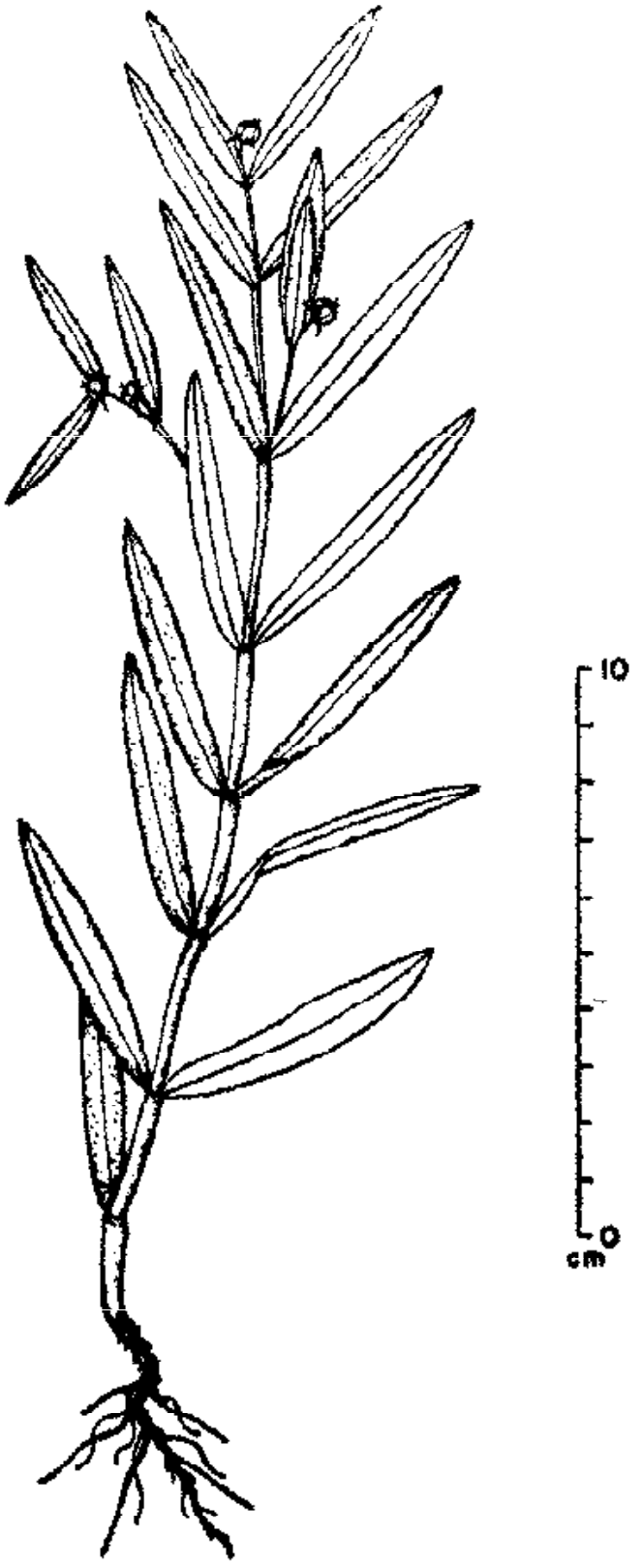
CULTIVATION : None.

DESCRIPTION : Erect herbs, 20 - 40 cm tall; stems terete, slightly brown to green, branching dichotomous with 1.0 - 5.5 cm long internodes. Leaves oblong-elongate or broadly linear, 2.5 - 6.0 × 0.3 - 0.8 cm, membranous, margins serrulate, lower surface glaucous or subglaucous. Involucres solitary in the axils of stem or branches, pedicelled, 0.2 - 0.3 cm long, lobes 5, fimbriate; glands 4, sessile, obconic-elliptic, appendiculate. Male flowers few with plumose bracteoles. Ripe capsules 0.3 cm across, 3-lobed; cocci keeled or rounded. Seeds broadly ovoid, reddish-brown.

REFERENCE :

1. Santapau, H. (1954). *Bull. Bot. Soc. Bengal* 8 : 14.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Euphorbia katrajensis Gage

STATUS : Rare; known to occur sporadically in a few localities in its distribution range.

DISTRIBUTION : India ; Pune, Satara and Sindhudurg districts only in Maharashtra. Endemic.

HABITAT AND ECOLOGY : In open gravelly dry situations among grasses.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and other areas should be protected for habitat conservation. It may be propagated in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : Flowering and fruiting occurs in October. Perhaps may be of ornamental potential with its attractive cymes.

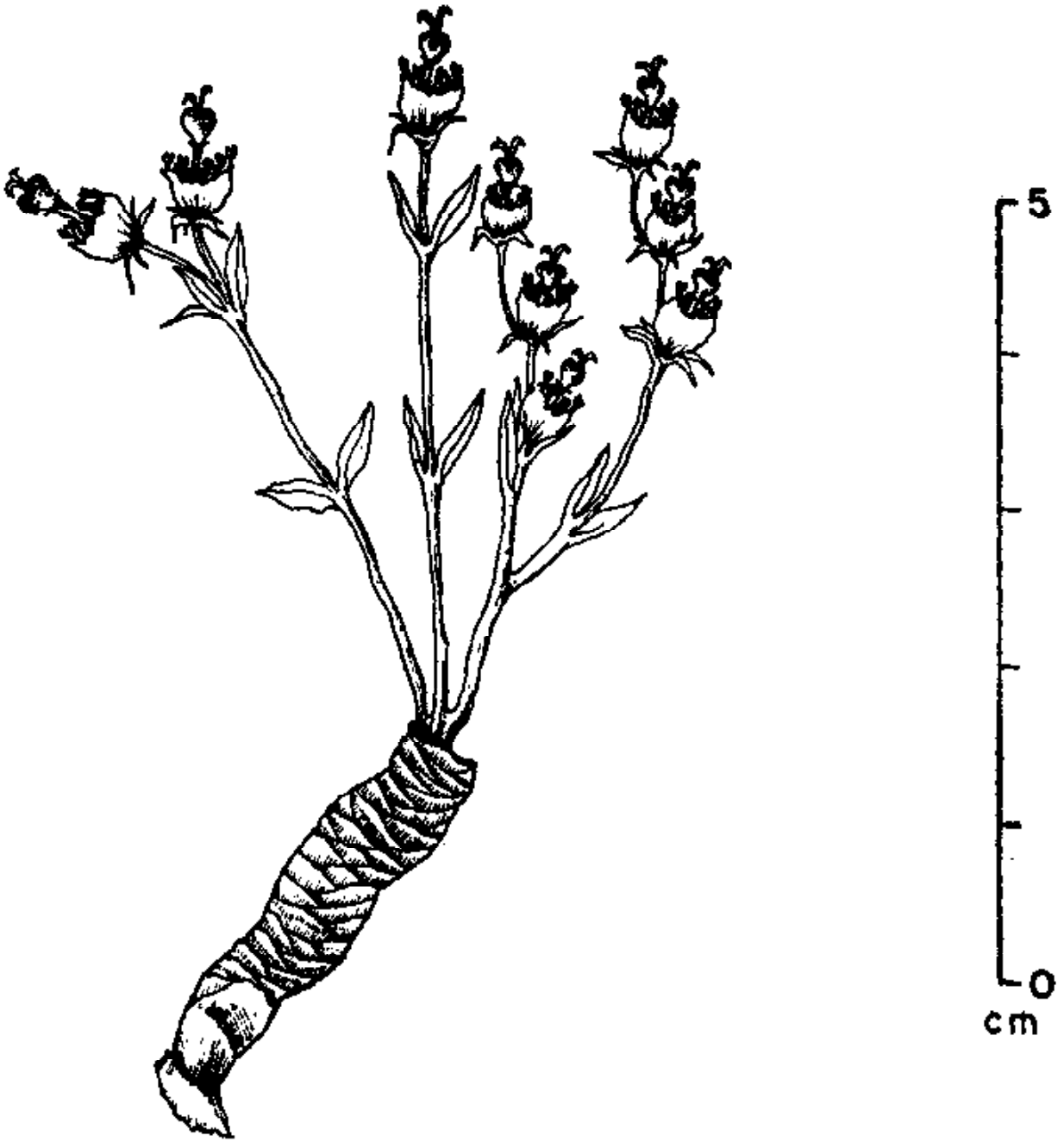
CULTIVATION : None.

DESCRIPTION : Herbs with irregularly cylindric underground root-stock. Leaves broadly or narrowly lanceolate, oblong or oblanceolate, radical, green, red, purple or mottled, appearing after flowering. Cymes up to 6 cm long, stout, fleshy, reddish or purple or greenish all over except for the lobes of involucre which are pink or whitish, dichotomous. Bracts very variable, rigid, usually turning white, margins wavy. Involucre 0.6 cm across, lobes spathulate, fimbriate, pink; glands broadly oblong. Anthers ellipsoid, yellow. Styles connate up to the middle. Capsules 0.4×0.7 cm, compressed or sometimes rounded. Seeds globose, smooth, grey when dry.

REFERENCE :

1. Santapau, H. (1954). *Bull. Bot. Soc. Bengal* 8 : 4.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Euphorbia panchganiensis Blatt. & McCann.

STATUS : Rare. Known from few collections only.

DISTRIBUTION : India ; first reported from North Kanara (1918 & 1919) and recently recollected after about five decades from Shimoga district, both in Karnataka State. Endemic.

HABITAT AND ECOLOGY : In wet places near water courses or streams.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The plant should be searched in the neighbouring similar areas. It should also be introduced into the experimental gardens for *ex situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Flowers & fruits are reported in May and October.

CULTIVATION : None.

DESCRIPTION : Shrubs, 1.0 - 1.5 m tall; stems simple, black, striate; leafy branches 12 - 18 cm long. Leaves distichous, numerous, crowded, 0.3 - 0.4 × 0.15 cm, oblong, glabrous or glabrescent or puberulous above; stipules linear, broad at base. Flowers monoecious, white; male flowers with 4 perianth parts, often fascicled, rarely solitary; female flowers with 6 perianth parts, axillary, solitary. Capsules scabrid; cocci dorsally rounded. Seeds glabrous, yellow.

REFERENCES :

1. Sedgwick, L. J. (1921). *J. Ind. Soc.* 2 : 124.
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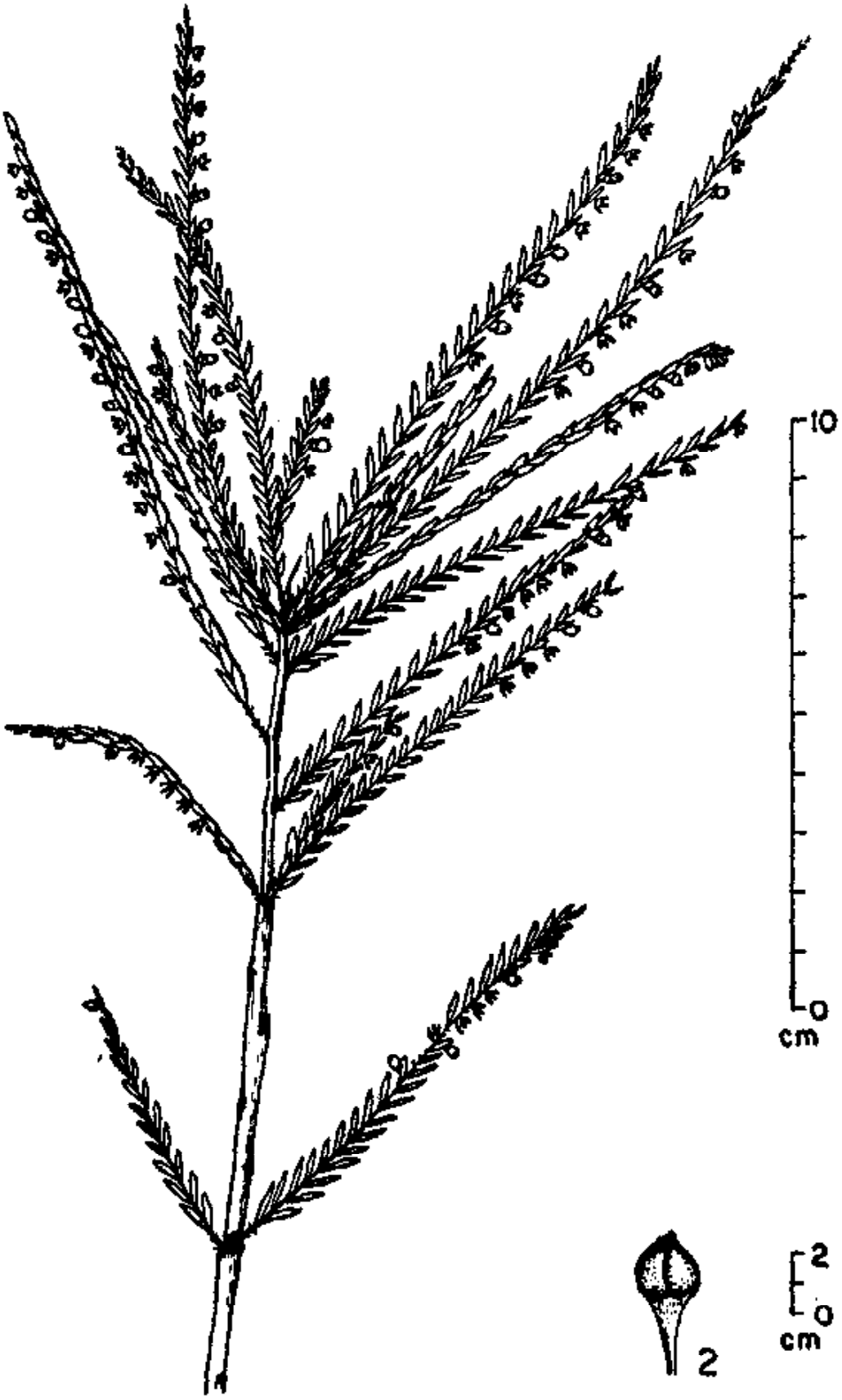
The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Phyllanthus talbotii Sedgew. Flowering twig & fruit.

STATUS : Indeterminate. This arborescent species is so far known only by its type gatherings made by Barber in 1901 and Fischer in 1912. The species is not known to have been collected again during the last 86 years. The area of its distribution has been subjected to a fairly good degree of botanization, particularly during the last few decades, but this species could not be located. The natural forests in the area are being gradually degraded owing to the pressure of rapidly spreading urbanisation—the deleterious anthropogenic effects stemming from it taking toll of the natural habitats of many a species. This species is of special interest as it represents an arborescent monotypic genus, which is endemic.

DISTRIBUTION : Endemic to Anamalai hills (Coimbatore District of Tamil Nadu) in Peninsular India (1). It was recorded only from 2 localities in the Anamalais. Barber originally collected it from "Monica" and subsequently Fischer located it at "Aiyarapadi" in the same hill range. In the Indian herbaria it is represented only by Barber's earlier collection which is housed at MH. The other type gathering made by Fischer is deposited at the herbarium of Kew Gardens (K) in United Kingdom.

HABITAT AND ECOLOGY : The species was recorded from the evergreen forest areas of the Anamalai hills in southern W. Ghats. At "Monica" in the Anamalais it was collected from an altitude of *ca.* 1300 m.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Status evaluation; intensive field surveys in the vicinity of its type locality as well as in the adjoining hill ranges, to determine its true status. If the status surveys are successful in locating some populations, the area of its occurrence must be immediately fenced off from biotic interference. Means of artificial regeneration should be found out and employed to raise stocks in plant conservatories or arboreta. The seedlings must then by rehabilitated into suitable sites.

BIOLOGY AND POTENTIAL VALUE : The only 2 known collections were made during the months of October and March. Its potential utility is not known as yet. But for the present it is too rare to be of any use. Being an arborescent species of the family Euphorbiaceae it is a biologically interesting plant.

CULTIVATION : Not known.

DESCRIPTION : Evergreen small trees or shrubs, 5 - 6.5 m tall. Leaves alternate, 4 - 9 × 1.5 - 3 cm, lanceolate, apex acute, base cuneate, upper surface glabrous, glaucous below, entire, secondary veins 8 - 12 pairs; stipules minute, subulate, caducous; petioles short up to 3 mm long. Flowers dioecious, in axillary clusters. Calyx biseriate, imbricate ; lobes 6, ovate-lanceolate, glabrous, 2 - 3 mm long in female flowers, smaller in male flowers. Petals 0. Male flower: disc annular, crenate. Stamens 3, erect, slightly connate or free; filaments connate in a short column; anthers extrorse, dehiscing longitudinally, apiculate. Female flower: disc conspicuous with 6 limbriate glands. Ovary ovoid; 3-locular; ovules 2 in each locule; styles connate in a cylindric column, minutely 6-toothed at apex. Capsules *ca.* 0.8 - 1.1 mm long, 3 - 4-lobed, glabrous, depressed; seeds trigonous, rounded on the back with pitted surface; cotyledons fleshy, unequal.

REFERENCES :

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2. Gamble, J. S. (1925). *Kew Bull.* 1925 : 330.
3. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 899. (repr. ed). Botanical Survey of India, Calcutta.

The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Rare, due to habitat destruction and exploitation of its hard-wood for fuel. It is represented in the Herbaria by old collections only.

DISTRIBUTION : Godavari to Nellore, Kurnool, Cuddapah in Andhra Pradesh; Deccan and Carnatic. Endemic.

HABITAT AND ECOLOGY : In deciduous forests and open thorny scrub near the coast, often on black cotton soil.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Search should be made to locate the species in its distribution range; its protection in its natural habitats.

BIOLOGY AND POTENTIAL VALUE : Of botanical and distributional interest. Species of *Acacia* are excellent for fuel and are easily grown in wastelands and semi-arid areas.

CULTIVATION : Not known.

DESCRIPTION : Small trees; blaze hard, yellowish-white; stipular spines straight, slender, white. Leaves bipinnate, upto 2.7 cm long; pinnae 6 - 10-paired; leaflets minute, ovate-oblong, hairy. Flower-heads pink, 8 mm across; peduncles fairly stout, bracteate about the middle. Pods papery, 5 - 8 cm long, obtusely pointed, straight or curved.

REFERENCES :

1. Arnott, G. A. (1836). *Nov. Act. Nat. Cur.* 18(1) : 333.
2. Baker, J. G. (1876) *In :* Hooker J. D., *Fl. Brit. India* 2 : 293 (under *A. planifrons* Wight & Arn.; p.p.)
3. Gamble, J. S. (1915). *Fl. Pres. Madras*, p. 302.
4. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed). *Plant Conservation Bulletin* 4 : 26. Posscef, Botanical Survey of India, Howrah.

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Rare. The species is sparse and is represented by a few old specimens. Much of the forests in its range have been depleted.

DISTRIBUTION : Cuddapah, Andhra Pradesh; Ganjam, Orissa; Coimbatore, Tamil Nadu. Endemic.

HABITAT AND ECOLOGY : In deciduous and open scrub forests upto 912 m in alt.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should be made to locate its plants in the existing habitats; to collect seeds and to grow its plants and replanting them in its distribution areas.

BIOLOGY AND POTENTIAL VALUE : Not specifically known but timber of lesser value. Species of *Albizia* are generally fast growing and survive in semi-arid conditions. They can be useful in greening wastelands and enriching the soils. Some of the species are also grown as shade trees along avenues and road-sides and in tea gardens. The species with creamy yellow flower heads will be of horticultural potential.

CULTIVATION : None on record.

DESCRIPTION : Large deciduous trees. Leaves evenly bipinnate; leaflets slightly falcate, upto 1.3 cm long, oblong, broadest on the lower side of the mid-rib, base rounded or semicordate, appressed pubescent when young, ash-grey when dry. Flowers pale-yellow, in globose heads; anthers pink. Pods long, moderately thick, red.

REFERENCES :

1. Brandis, D. (1899). *Indian For.* 25 : 284.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 306 (repr. ed). Botanical Survey of India, Calcutta.

The material for this sheet was supplied by A. A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Indeterminate. The species is known only by one collection of Beddome made in 1870 from Tambacherry Ghat, Wynaad in Kerala. The species is probably extinct as no collections are made despite intensive plant explorations in the area. Destruction of primary forest-cover for plantation crops may be the causal factor.

DISTRIBUTION : Endemic to evergreen forests of Tambacherry Ghat, Wynaad in Kerala. Although Prain (1) included South Canara of Karnataka in its distribution, the specimen (Syntype) from South Canara actually belongs to the allied species *Cynometra bourdillioni* Gamble (1).

HABITAT AND ECOLOGY : In evergreen forests at an altitude of 900 m especially on the moist slopes near streams.

CONSERVATION MEASURES TAKEN : The habitat of the species forms a part of the already declared Nilgiri Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : To locate the species if not already extinct in the type locality and adjoining similar habitats in Karnataka, particularly the underexplored primary forests; to collect seeds when located for *ex-situ* multiplication and reintroduction of plants in the original habitats.

BIOLOGY AND POTENTIAL VALUE : Being a large tree probably yields hard-wood timber like its allied species. The crimson coloured flowers and young leaves may prove this species to be of horticultural value.

CULTIVATION : Not known.

DESCRIPTION : Large trees (height and size of the trunk not recorded), branchlets lenticellate with fissured membranous bark. Leaves 12.0 - 13.5 cm long, abruptly pinnate; pulvinous, 4×2 mm, finely pubescent ; rachis *ca* 1.5 cm long, canaliculate above, glabrescent, 4 - 6-foliolate; leaflets 2.5 - 9.3×1.3 - 3.2 cm, obovate-oblong, apex obtusely-acuminate to slightly emarginate, base oblique. glabrous, lateral veins 5 - 8 pairs, usually more in upper leaflets. Racemes 2 - 2.5 cm long, sessile, axillary, sometimes 1 - 2 racemes in each axil; young racemes conical with 2-ranked bracts; rachis upto 2 cm long, pubescent, upto 15-flowered; bracts 3.5 - 6.0×2.5 - 3.5 mm, ovate, acute, finely pubescent outside, base densely long reddish-brown hairy; bracteoles 2, folded lengthwise, 2.5×0.5 mm, linear-oblong, obtuse, long hairy on midrib and margins, glabrous inside; pedicels 1 cm long, pubescent ; sepals 5, 3.5 - 5.0×2 mm, oblong-rounded, glabrous, ciliate ; petals 5, 5 - 6 ×1.5 mm, oblong to elliptic-lanceolate, acute, ciliate towards apex; stamens 10; filaments 5 - 9 mm long; anthers 1 mm long, medi-dorsifixed, connective apiculate, dehiscence longitudinal; receptable 1.5 mm long, campanulate, glabrous ; ovary 3×1.5 mm, obvovate, densely velvety; stipe 1.0 - 1.5 mm long, central in receptacle; style 4.5 mm long, in line with dorsal side of ovary, glabrous; stigma capitate. Pods not known.

REFERENCES :

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2. Prain, D. (1897). Noviciae Indicae XV. Some additional Leguminosae. *J. Asiat. Soc. Bengal* 65 : 348-518.

The material for this sheet was supplied by M. Sanjappa, Botanical Survey of India, Howrah.

STATUS : Indeterminate. The species is so far known only by the Type collected by Bourdillon around 1898. It is not known to have been located again during the last 100 years inspite of several botanical surveys in its distribution areas during the last three or four decades. The possibility of its extinction cannot be ruled out in this case. Indiscriminate destruction of natural forest cover, resulting in the loss of of its habitat might well have been the causal factors. In fact, only a vestige of the former verdant rain forests now remain in its range. Being the sole representative of the genus in India this species is of phytogeographical interest.

DISTRIBUTION : Endemic to a very narrow range, Ponmudi—Ariankavu (Kerala), in the southern Western Ghats of Peninsular India (1). The type of this narrow endemic was collected by Bourdillon "near Ponmudi" in Trivandrum district, and he again collected it from 'Aryankavu' (Ariankavu) in the adjacent district of Quilon. (Incidentally this is the only complete specimen representing the species in CAL. An imperfect specimen-with only seeds remaining-collected by Lawson from Travancore and annotated by Gamble as *D. travancoricum* is also housed at CAL. No specimens are traceable either at MH or FRI. Two collections of Bourdillon from the vicinity of Ponmudi are reportedly housed in the herbarium of University College, Trivandrum, India).

HABITAT AND ECOLOGY : The species was recorded from the evergreen tropical rain forest of Ponmudi—Ariankavu hill range betweeen 300 and 600 m altitude.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Status evaluation through intensive field surveys in its range, particularly in the Ponmudi Reserve Forest area. If some sustainable populations are located, they must be accorded complete protection from further biotic interference. Efforts must be made to raise its seedlings in botanical conservatories or arboreta. Artificial regeneration must be employed for stocking the area and subsequently transferring the species to suitable pristine sites for rehabilitation.

BIOLOGY AND POTENTIAL VALUE : This tree species flowers from July-September, fruits by November-December, ripening by May-June. The main trunk of the tree is reportedly straight reaching up to 30 m in height with a girth of about 1 m and, as such, has a potential for yielding timber. However, the grey hard wood is said to be susceptable to boring by beetles. The fruits are perhaps edible as they are known locally as 'Mallam Puli' meaning 'Hill Tamarind'. This handsome tree is worth cultivating in gardens for ornamental purposes (3). However, at present it is too rare to be of any economic value.

CULTIVATION : Not known.

DESCRIPTION : Evergreen trees upto 30 m tall. Leaves imparipinnate, pulvinous 5.5×2.5 mm, rachis up to 11 cm long, glabrous, 7 - 11-foliolate; leaflets 5 - 9.5×2 - 3.7 cm, subopposite to opposite, ovate to ovate-oblong, base rounded to slightly oblique, apex obtusely-caudate, margin entire, thinly coriaceous, glabrous. Panicles 8 - 14 cm long, axillary or terminal, densely brown tomentose. Flowers not seen; flower buds 3 - 4 mm long, brown; pedicels

1 - 1.5 mm long, brown tomentose; bracts 1.5×0.5 mm, ovate, tomentose outside, caducous; bracteoles 2 from base of sepals, 1.5 mm long, narrowly triangular, tomentose outside, caducous; sepals 5, imbricate, 2.0 - 2.5×0.8 - 1.5 mm, ovate to ovate-oblong, obtuse, brown tomentose outside, thinly fine pubescent inside; petals 0; stamens 2, erect; anthers 1.5 - 2 mm long, oblong, longitudinally dehiscent, basifixed, connective with fine brown hairs and cleft at base; filaments *ca* 0.5 mm long, stout; ovary 1.5 mm long, sessile, oblong, densely brown tomentose, 1-locular, 2-ovuled; style *ca* 1 mm long, flat, thickened at base, tapering upwards, curved, glabrous or with a few hairs along the curve; stigma capitate. Pods 2 - 2.5×1.3 cm, ovoid-globose, densely pubescent, brown, 1-seeded; exocarp thick, woody, endocarp spongy red; seeds almost rounded, compressed, pale brown.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian Region* 1 : 93. Botanical Survey of India, Calcutta.
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The material for this sheet was supplied by M. Ahmedullah and M. Sanjappa, Botanical Survey of India, Howrah.

Dialium travancoricum Bourd

STATUS : Rare. The species was recollected by Singh (1981) after 8 decades, about 160 km away from the type locality in Badami.

DISTRIBUTION : India; endemic to Badami area in Bijapur and Bellary & Chitradurg districts, all in Eastern Karnataka.

HABITAT AND ECOLOGY : In open situations on gravelley soil.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The natural habitats be protected and the neighbouring areas be searched for this plant. The seeds procured should be grown in the experimental gardens.

BIOLOGY AND POTENTIAL VALUE : It flowers & fruits during September to November. A species of semi arid tracts.

CULTIVATION : None.

DESCRIPTION : Prostrate herbs; stems many, caespitose, nearly 30 - 45 cm long, striate. Leaves trifoliolate, leaflets equal or terminal one slightly larger, broadly obovate, 0.9 - 1.5 $\times$ 0.9 - 1.9 cm, glabrous above, appressed hairy beneath. Flowers white or dark orange, in aggregate, few-flowered racemes (peduncles elongated in fruits). Pods 0.6 - 1.5 cm long, oblong-subreniform, dull brown, *ca* 3.5 $\times$ 1.5 mm.

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1. Cooke, T. (1958). *Fl. Pres. Bombay* 1 : 365. (repr. ed.).
2. Singh, N. P. (1979). *Bull. Bot. Surv. India* 21 : 234.
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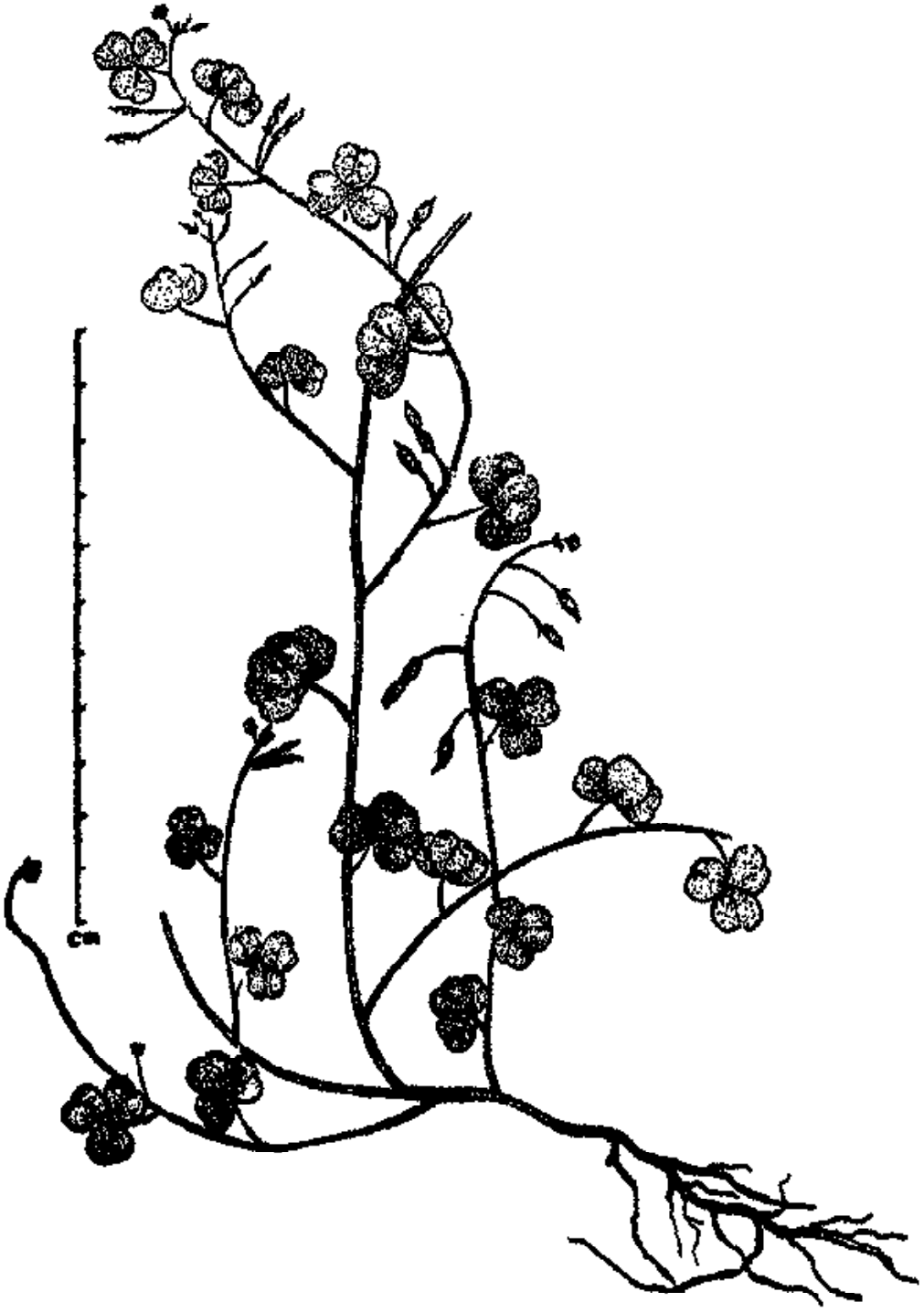
The material for this species was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Elelotis trifoliata Cooke

STATUS : Rare. Mukerjee described this species based on plants collected from Castle Rock (N. Kanara) by Bell in 1918 and by Santapau from Khandala (Pune district) in 1942. Thereafter, Reddi collected it from Sakarpathar plateau-Lonavala in 1964. Last collected from Matheran hill, Raigad district, in 1979.

DISTRIBUTION : Maharashtra: Khandala & Lonavala in Pune district; Matheran in Raigad district. Karnataka: Chikmagalur. Endemic.

HABITAT AND ECOLOGY : In rocky areas upto an elevation of 600 m, amidst grasses on steep cut slopes and plateaux.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Conservation of its habitats; control over biotic interference from tourists and plant collectors in areas like Matheran and Lonavala; introduction of a few plants in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : It flowers in September; other uses are unknown.

CULTIVATION : None.

DESCRIPTION : Prostrate or trailing herbs. Stem slender, hairy. Leaves trifoliate; leaflets ovate-lanceolate, acute, densely pubescent, glaucous green and nigro-punctate beneath, 2.4 - 7.5 × 1.5 - 4.4 cm. Flowers deep violet, 3 - 6 in terminal, capitulate clusters; corolla papilionaceous.

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2. Kothari, M. J. & Moorthy, S. (1983). *Journ. Bombay Nat. Hist. Soc.* 80 : 259.
3. Mukerjee, S. K. (1953). *Bull. Bot. Soc. Bengal* 6 : 22.
4. Reddi, B. V. (1969). *Bull. Bot. Surv. India* 11 : 145.
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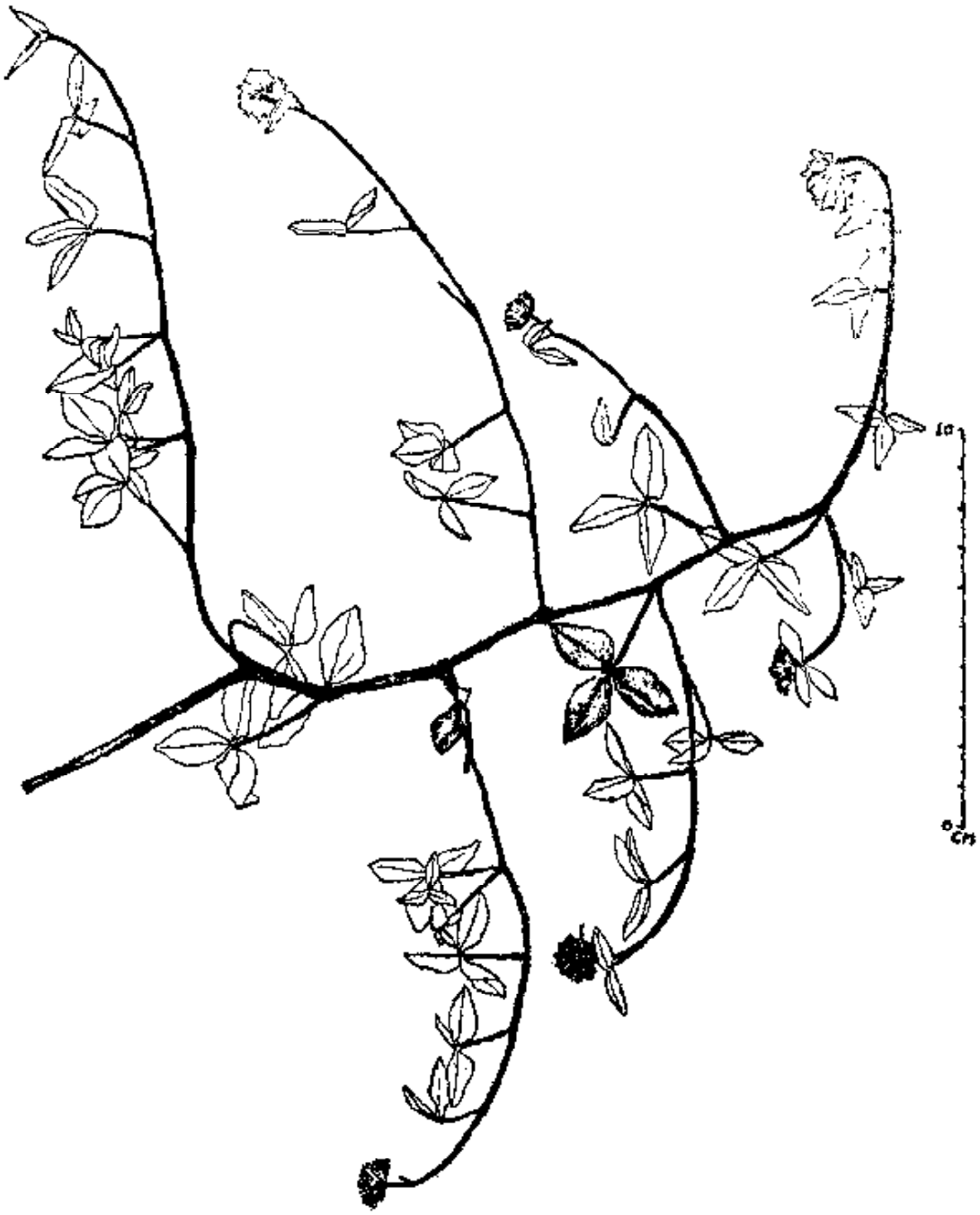
The material for this sheet was supplied by M. J. Kothari, Botanical Survey of India, Pune.



Flemingia gracilis (Mukerjee) Ali

STATUS : Indeterminate. This species is so far known by three collections from Aka Hills, Naga Hills and Garo Hills. Despite recent botanical explorations in the above areas, it has not been collected again. The species has either been lost due to the practice of "slash and burn cultivation" by the local tribals or it has escaped attention of plant collectors as it does not flower every year(1).

DISTRIBUTION : Endemic to hills of N.E. India, particularly in Arunachal Pradesh, Meghalaya and Nagaland.

HABITAT AND ECOLOGY : In open situations in evergreen forests. The entire distribution range in the N. E. India receives moderate to high rainfall annually and forest soils are rich in humus and loam.

CONSERVATION MEASURES TAKEN : None so far. The recently established Nokrek and Balphakram Wildlife Sanctuaries cover some forest areas in Garo Hills, Meghalaya.

CONSERVATION MEASURES PROPOSED : Location of the species in the type localities and in similar habitats near to known localities; on locating the habitats and the plants, measures should be taken to protect the sites and plants from the practice of "slash and burn cultivation"; efforts to collect fruits and seeds for introduction and multiplication in experimental gardens.

BIOLOGY AND POTENTIAL VALUE : The fruits of all the species of *Gleditsia* are rich in saponins. The potentiality of *Gleditsia assamica* in particular is not known. The species is recorded to produce flowers and fruits at irregular intervals of time, rather than every year.

CULTIVATION : Cultivated in arboretum of the Forest Research Institute, Dehra Dun.

DESCRIPTION : Trees, upto 10m tall; trunk cylindrical with branched thorns towards base; bark conspicuously lenticellate; branchlets tomentose. Leaves 15 cm long, pinnate, alternate; rachis grooved, tomentose; leaflets 30 or more, alternate or subopposite, 3.0-3.5 $\times$0.8 - 1.0 cm, oblong, sometimes falcate, base oblique, margin serrulate-crenate, apex obtuse, venation reticulate, distinct. Racemes congested, axillary from the scars of fallen leaves or terminal; rachis striate, densely fulvous-pubescent, many-flowered; bracts minute; pedicels 4 mm long, adpressed pubescent. Receptacle 3 mm long, dark brown, bowl-shaped, densely hairy without, sparcely within, rim ciliate with yellow silky hairs. Sepals 5, 3 mm long, oblong-lanceolate, acute, densely tomentose outside and sparasely inside. Petals 5, 3 mm long, oblong or oblanceolate, obtuse, tomentose on both surfaces. Stamens 10, very rarely 12, inserted on the tip of hypanthium; filaments 4 mm long, strap-shaped, silky hairy on the inner face towards base ; anthers oblong-obtuse, versetile with cordate base. Ovary 4 - 5 mm long, oblong, densely yellow tomentose. Pods 4.0 - 4.5$\times$3.0 - 4.5 cm, oblong, acute, shortly stipitate, flat, leathery, dark brown. Seeds not seen.

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1. Bor. N. L. (1938). Some new Indian flowering plants. *Ind. For. Rec.* 2 : 231-233.
2. Robertson, K. R. & Y. T. Lee (1976). The genera of Caesalpinioideae (Leguminosae) in the South Eastern United States. *J. Arn. Arb.* 57 : 26 - 32.

The material for this sheet was supplied by M. Sanjappa, Botanical Survey of India, Howrah.

STATUS : Indeterminate, due to loss of habitats for plantation crops. Known only from its type material collected by Beddome, and is very much restricted in distribution.

DISTRIBUTION : South Travancore hills (Rosemalai estate), Kerala. Endemic to a narrow distribution range.

HABITAT AND ECOLOGY : In evergreen forests at 760-1064 m altitudes.

CONSERVATION MEASURES TAKEN : None so far. However, the species is listed in the Threatened Plants Lists.

CONSERVATION MEASURES PROPOSED : Intensive search should be undertaken in the Southern Western Ghats to locate if it still exists and to study the biology of the species for future conservation measures.

BIOLOGY AND POTENTIAL VALUE : Of phytogeographical interest due to its restricted distribution.

CULTIVATION : Not so far known.

DESCRIPTION : Glabrous middle-sized trees with thorny branches. Leaves pinnate; leaflets 2, rigidly sub-coriaceous, 8.0 - 10.5 cm long, obliquely oblong, sub-acute. Flowers in axillary short peduncled solitary capitate heads; calyx and corolla 3-lobed; stamens numerous, monadelphous. Pods coriaceous, sessile, 8.0 - 10.5 cm long, linear, flat, decurved, glabrous, sutures thickened, the apex with a prominent hook. Seeds 3 - 6, rhomboid, brown, shining.

REFERENCES :

1. Beddome, R. H. (1869-74). *Fl. Sylv.* t. 317. (as *Calliandra cynometroides*).
2. Baker, J. G. (1876). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 306.
3. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 309. (repr. ed.). Botanical Survey of India, Calcutta.
4. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Plant Conservation Bulletin* 4 : 26. Botanical Survey of India, Howrah.

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Rare. Scattered in a few localities but restricted to the evergreen forests on the slopes of Southern Western Ghats. Although sporadic collections were made from different localities of Southern Western Ghats since 1804, its recent collections are made from a very few localities of Karnataka (Coorg and Hassan districts) and Tamil Nadu (Kanniyakumari and Tirunelveli districts). The greatest source of danger to this species is the destruction of its habitats for cultivation of plantation crops.

DISTRIBUTION : Endemic to Southern Western Ghats in Karnataka, Tamil Nadu and Kerala.

HABITAT AND ECOLOGY : Slopes of hills in evergreen forests between 200-1000 m altitudes. Soils are loamy and rich in humus. The areas receive moderate to high rainfall.

CONSERVATION MEASURES TAKEN : None so far. However, the species is called 'Malabar Mahagony' as it was once collected from Malabar region (Wynaad) which is a part of the recently enacted Nilgiri Biosphere Reserve, in which, if the species still grows, is accorded protection.

CONSERVATION MEASURES PROPOSED : To collect seeds from the trees of all the known localities for multiplication in forest nurseries and Botanic Gardens. Seeds if collected in large quantities should be broadcast in suitable habitats of the species, particularly in the Wynaad part of the Nilgiri Biosphere Reserve to protect it *in situ*. To restrict expansion of plantation crops in and around suspected habitats of the species, necessary steps should be taken.

BIOLOGY AND POTENTIAL VALUE : *Kingiodendron* is a small genus of 4 species restricted to the evergreen forests of S. E. Asia and the Pacific Islands. The species under consideration is the only endemic representative of the genus in India, hence of phytogeographical interest. Flowers from Jan.-Feb. and fruits from May-Oct. It is one of the timber-yielding species and its wood is used for beams, ceiling, boards, flooring and furniture. The species is a source of resin-like balsam which is of medicinal value.

CULTIVATION : Cultivated in Indian Botanic Garden, Howrah, from seeds collected from Travancore and received through Dr. A. Berry in 1809. Roxburgh (3, 4) named the species as *Hardwickia pinnata* which was later validly published by De Candolle (1) and subsequently transferred under *Kingiodendron* by Harms (2).

DESCRIPTION : Evergreen trees, upto 100 m tall; trunk 1 - 2 m in diameter; branchlets terete, lenticellate, glabrous. Leaves 12 - 22 cm long, imparipinnate, alternate, pulvinate; stipules very small, fugaceous; rachis 4 - 7 cm long, 3 - 7 -foliolate; petiolules 6 - 9 mm long; leaflets 5.5 - 10.0 × 2.5 - 4.0 cm, elliptic, elliptic-oblong to ovate, base rounded, apex acute, obtusely acuminate to cuspidate, glabrous, venation reticulate with arching veins. Inflorescence 10-12 cm long, axillary panicle of racemes, finely puberulous; raches 1.5 - 5.0 cm long, lax-flowered; flowers small, white; bracts and bracteoles small, triangular, ciliate. Receptacle short. Calyx 5-lobed, orbicular, white, petaloid, ciliate and hairy within, gland-dotted, imbricate. Petals absent. Stamens 10, 2.5 - 3.2 mm long, alternately long and short, filaments filiform, villous at base; anthers versetile, dehiscence longitudinal. Ovary sessile,

villous, 1-ovuled; style subulate; stigma minutely oblique. Pods brownish, 4.0 - 4.5×2.2 - 2.7×0.8 - 1.0 cm, ellipsoid, flattened along edges especially towards base, abruptly short beaked, lenticellate, glabrous, 1-seeded, dehiscing at apex; stipe 1 mm long, stout. Seeds brown, 3×1.5 - 1.8×0.3 - 0.5 cm, ellipsoid, flattended, rugulose, hard.

REFERENCES :

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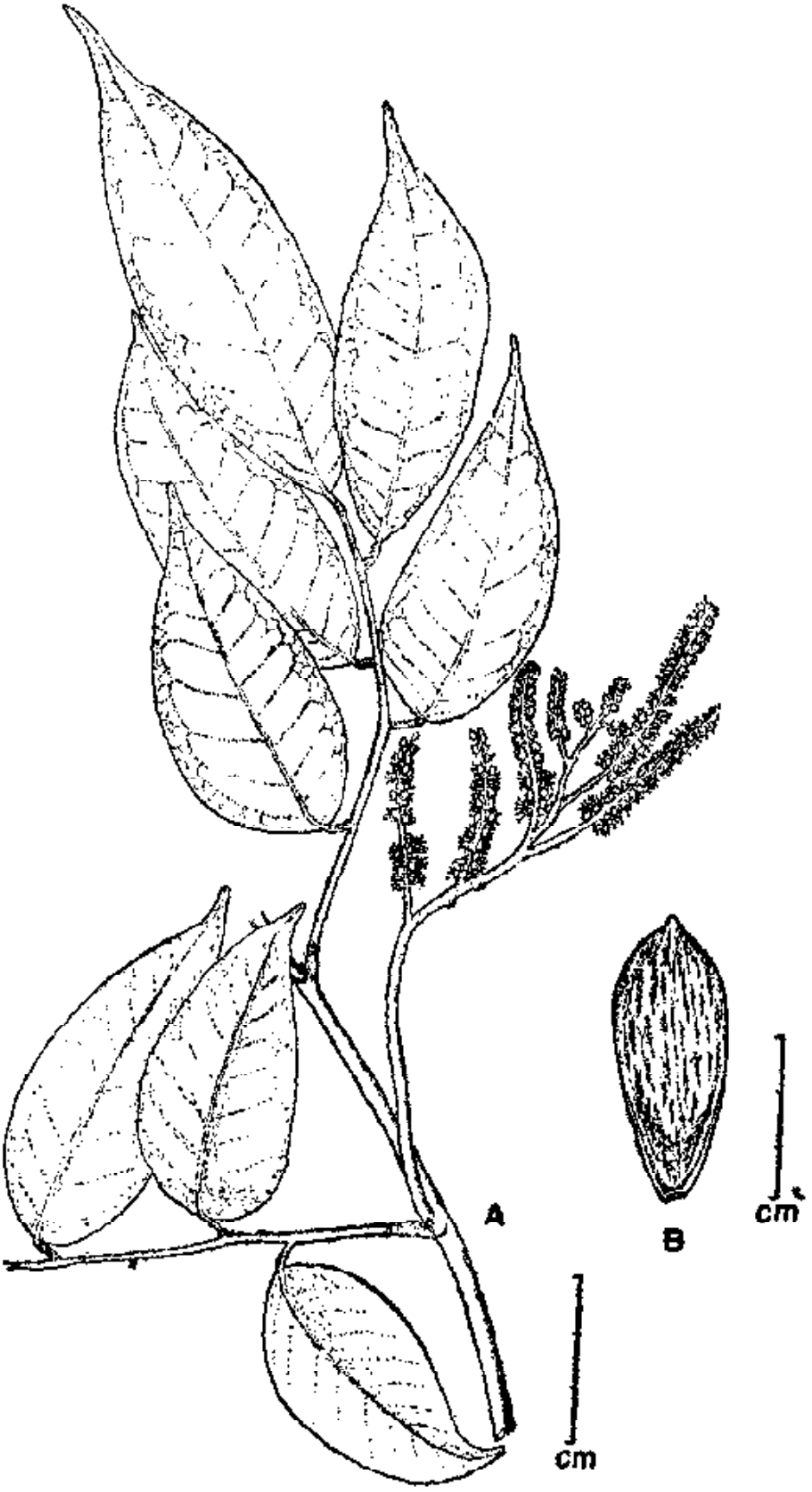
2. Harms, H. (1897). Leguminosae. *In :* Engler, A. & Prantl, *Die Nat. Pflanzenfam.* 1 : 190-204.
3. Roxburgh, W. (1814). *Hort. Bengalensis*, p. 33.
4. Roxburgh, W. (1832). *Fl. Ind.* 2 : 425.

The material for this sheet were supplied by M. Sanjappa and M. Ahmedullah, Botanical Survey of India, Howrah.



Kingiodendron pinnatum (Roxb. ex DC.) Harms.
A. Flowering twig. B. Fruit.

STATUS : Vulnerable. The species is known from a few gatherings made sporadically over the years from far-flung isolated localities in the Sahyadri hills along the northern W. Ghats. At present the species apparently has very few fragmented populations widely scattered in a narrow range. Owing to various anthropogenic factors, its natural habitats are gradually shrinking, which obviously accounts for its rarity and steady decline in numbers. If the causative factors continue to operate the species could be irrevocably lost.

DISTRIBUTION : Endemically restricted to the northern W. Ghats of Maharashtra and Karnataka in Peninsular India. It has been recorded from a few localities like Telavaree (Type locality), Harishchandragad, Mahabaleshwar, Panchgani, Satara, "Bombay" etc., in Maharashtra, while it is known from Karnataka by a solitary collection of Talbot made from Poondra in Belgaum District. Cooke's (1902) indication of its occurrence in Bengal and Santapau & Henry's (1973) report from Bihar are both erroneous. No specimens substantiating these two reports are traceable.

HABITAT AND ECOLOGY : The plant is found growing as an undergrowth component in deciduous or moist deciduous forests in the hills at considerably high elevations.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Concerted efforts to locate populations of this species must be made particularly along the Sahyadri ranges. Monitoring of all remnant populations through genetic and resource allocation approaches is urgently warranted. Assessment of its natural habitat should be done expeditiously with the primary intent of identifying the principal threat factors. Thereon, steps must be taken to curtail or mitigate as far as practicable the adverse conditions that are proving detrimental to its survival. Towards this end the first step would be to preserve the remaining populations by making its habitat inviolate. Propagation of this wild legume species in botanical gardens or conservatories could go a long way in its preservation.

BIOLOGY AND POTENTIAL VALUE : The plant flowers between September and October. No specific uses of this legume species are presently known. Being an endemic species it is of phytogeographical interest.

CULTIVATION : None on record.

DESCRIPTION : Twining herbs; stems filiform, with dense hispid retorse hairs. Leaves 1-foliolate; petioles 2.5 - 3.8 cm long, hairy; stipules ovate, acute, hairy, caducous; leaflets 4.5 - 11.5 × 3.5 - 10 cm, ovate, acute, mucronate at apex, cordate at base, glabrous above, glaucous and sparsely hairy beneath, ciliate; stipels *ca* 5 mm long, linear-subulate, hairy, persistent. Racemes 10 - 18 cm long, flowers in dense clusters along a hairy rachis; bracts *ca* 6 - 7 mm long, ovate, acuminate, deciduous, stiff reddish hairs outside, enclosing a small head of 1 - 3 subsessible flowers in bud condition; bracteoles *ca* 6 mm long, narrowly ovate-lanceolate, densely hairy. Calyx 6 - 8 mm long, tube campanulate, densely clothed with long reddish-brown hairs; teeth longer than tube, upper 2 teeth connate half of their length, lower 3 teeth lanceolate, subequal. Corolla *ca* 1.2 cm long, blue; standard petal

ca 9 mm across, clawed with 2 auricles at the base; wings falcate; keel obtuse, almost straight. Stamens diadelphous; anthers uniform. Ovary subsessile; ovules numerous; style long, filiform, glabrous; stigma capitate. Pods 5 - 7 × 0.8 cm, linear, straight, acuminate, clothed with brownish hairs, 8 - 10-seeded; seeds orbicular, compressed.

REFERENCES :

1. Baker, J. G. (1876). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 191.
2. Cooke, T. (1902). *Fl. Pres. Bombay* 1 : 368.
3. Merrill, E. D. (1935). *Trans. Amer. Phil. Soc.* n. s. 24(2) : 201.
4. Santapau, H. & Henry, A. N. (1973). *A Dictionary of the Flowering Plants of India,* p. 116. CSIR, New Delhi.
5. Sharma, B. D. *et al.* (1986). *Fl. Karnataka-An Analysis,* p. 79. Botanical Survey of India, Calcutta.

The material for this sheet was supplied by M. Ahmedullah and S. V. Pradeep, Botanical Survey of India, Calcutta.

STATUS : Endangered. The plant is so far known only from three separate gatherings made over a period of more than hundred years. At present the species is known to be extant in only one locality. Specific causative or threat factors responsible for its rarity are yet to be ascertained, though loss of natural habitats is obviously a cardinal one.

DISTRIBUTION : At present it is known only from Central India (Madhya Pradesh), where it is very much localised. Though apparently disjunct in India and Burma, it is known from the latter only by a solitary type collection made from Pegu in the year 1870. No other collections or even reports are known to have been made from Burma ever since. In India it has been recorded from two far-flung localities. An old collection housed at BSIS indicates its occurrence at Singbhum, Gidung, in the state of Bihar. The only other known collection was made by Tiwari, who recorded it in 1973 from Senna forest, Jashpur Plateau, in the state of Madhya Pradesh. This rediscovery was reported by Panigrahi and Tiwari (1975).

HABITAT AND ECOLOGY : The plant grows in lateritic soils under shade in mesophytic mixed deciduous forests, where *Shorea robusta* is often predominant.

CONSERVATION MEASURES TAKEN : None as yet.

CONSERVATION MEASURES PROPOSED : Since the species is known from far-flung localities, it could perhaps be worthwhile to search for it in similar habitats in the intervening range in an effort to locate any surviving populations. For the present, however, its only known population(s) should be cordoned off and its habitat be accorded full protection on a priority basis. Propagation of this wild legume in botanical conservatories is recommended.

BIOLOGY AND POTENTIAL VALUE : The plant appears to have a rather short life span. The young seedlings begin to sprout with the onset of monsoon in the month of June. The plants come to flower by September and continue to bloom upto early October, setting fruit subsequently. The flowers are diurnal; opening in the forenoon and remaining so only for a short while. By November the fruits are ripe, consequent upon which the aerial parts wither away and fall off by the time winter sets in. This legume is of biological and academic interest. Its uses, if any, are not yet known to science.

CULTIVATION : Not known.

DESCRIPTION : Slender trailing herb, *ca* 2 m long, often rooting adventitiously at lower creeping portions. Leaves 1-foliolate, rarely 3-foliolate; stipules lanceolate, pubescent; petioles 1.5 - 2.5 cm long; leaflets 5 - 9 × 3.5 - 6 cm, narrowly to broadly ovate-cordate, sometimes slightly 3-lobed, sparsely hirsute. Flowers axillary, solitary or 2 - 3 together; bracts paired, linear; pedicels 1 mm long, accrescent to 2 - 3 mm; bracteoles inserted just below the calyx, ovate-lanceolate, prominently nerved. Calyx 3 mm long, hairy; upper lobes joined almost to their tips, blunt; lateral lobes triangular-lanceolate. Standard *ca* 7 mm long, ovate-elliptic, yellow to light pink, auriculate at base with a pair of lammellar appendages, glabrous. Wings narrowly oblong; keel 7 mm long, slightly falcate-oblong, upcurved and rounded at the tip. Stamens diadelphous; anthers small, uniform, dorsifixed. Ovary subsessile; style horny, thickened at base and bent at right angle, gradually tappering

upwards, glabrous; stigma capitate. Pod 5.5 - 6×0.4 - 0.5 cm, shortly stipitate, linear-oblong, sometimes slightly curved, compressed, minutely hairy when young, soon glabrescent, *ca* 10-seeded. Seeds assymetrically oblong-ellipsoid, smooth, brown; hilium with a conspicuous aril.

For illustration see (4).

REFERENCES :

1. Kurz, S. (1874). *Journ. Asiat. Soc. Bengal* 42 : 232.
2. Merrill, E. (1935). *Trans. Amer. Phil. Soc.* II, 25(2) : 201.
3. Panigrahi, G. (1975) 1978. Location of the holotype of *Grona filicaulis* Kurz (Leguminosae). *Bull. Bot. Surv. India* 17 : 205-206. 1 fig.
4. Panigrahi, G. & Tiwari, S. D. N. (1975). Rediscovery of *Nogra filicaulis* (Leguminosae) after one hundred years. *Kew Bull.* 30 : 459-461.

The material for this sheet was supplied by M. Ahmedullah and S. V. Pradeep, Botanical Survey of India, Calcutta

STATUS : Rare. The species is so far known only by four seperate collections since its original description in 1898 (4). The latest known collection was made in 1958. Loss of natural habitat is the apparent cause of its rarity.

DISTRIBUTION : In India, it is restricted to Abor hills, Mishmi hills and Tirap district of Arunachal Pradesh in N. E. Region. It is known from the adjacent Kachin hills in Northern Burma only by its type collection made in 1898. It was last recorded from Chelang-Khela, Tirap Frontier Division. The species is apparently endemic to a particular phytogeographic area, where "slash and burn" of forests is practised for cultivation.

HABITAT AND ECOLOGY : The species grows in evergreen forests in hilly regions between 200 - 1000 m altitudes. On one instance its was found growing amongst boulders in a dry river-bed.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : An intensive search must be made to collect this species in its known range of distribution. If the search yields some populations of this species, it must be accorded protection along with its natural habitat, and its plants and seeds be introduced into suitable niches in the Namdapha Biosphere Reserve in the same area.

BIOLOGY AND POTENTIAL VALUE : The plant was collected in flowering in August and December. The potential uses of this particular plant are not known. However, some other species of the genus are found to be useful as food plants. The tuberous roots of these species are edible and often used locally as food especially during scarcity. Some of the related species are also used as medicine. It is possible that *P. bella* has similar potentiality

DESCRIPTION : Perennial woody climber. Leaves 3-foliolate; petiole 6 - 8 cm; leaflets ellipitic, 8 - 18 × 3.5 - 8 cm, long acuminate, subcoriaceous. Inflorescence unbranched pseudoracemes, up to 35cm long ; bracts and bracteoles caducous. Calyx campanulate, shortly pubescent on both sides, tube 4 - 6 cm long, teeth unequal. Vexillum orbicular-ovate, 14 - 17 × 12 mm, white or pale violet ; wings pale-violet, 14 - 16 × 4 - 6 mm; keels 13 - 16 × 4 - 5 mm, pale violet. Stamens monadelphous, *ca* 14 mm long. Ovary elongate, 9 mm long, pubescent, with *ca* 15 ovules; style short, glabrous; stigma subglobose. Pods unknown.

REFERENCES :

1 Burkill, I. H. (1925). *Rec. Bot. Surv. India* 10 : 271.
2. Pottinger & Prain, D. (1898). The Botany of Kachin Hills, North-East of Myitkyina. *Rec. Bot. Surv. India* 1(11) : 239.
3. Prain, D. (1898). Descriptions of some new plants from the North-Eastern Frontiers of India. *Journ. Asiat. Soc. Bengal* 67 : 288.
4. Van der Maesen, L. J. G. (1985). Revision of the genus *Pueraria* DC. with some notes on *Teyleria* Backer (Leguminosae). *Agric. Univ. Wageningen Papers* 85: 18.

The material for this sheet was supplied by S. V. Pradeep and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Rare. The species is known by very few collections. The species was last collected from Sayalgudi (Ramanathpuram Dist.) in 1977. The rarity of the species is due to habitat destruction, grazing and other biotic effects.

DISTRIBUTION : Southern and Eastern parts of Tamil Nadu (Tirunelveli, Tuticorin, Sayalgudi). Endemic.

HABITAT AND ECOLOGY : *It grows usually upto an elevation of 75 m in hill slopes and* occasionally in sandy loamy soils.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Efforts to preserve its natural habitat and introduction of the species in Botanic Gardens through seeds must be undertaken.

BIOLOGY AND POTENTIAL VALUE : Flowers during November-December. The plant is of much scientific interest due to its endemicity. Species of *Tephrosia* grow in a variety of situations and can be gainfully employed in enriching wastelands and are used as fodder for cattle.

CULTIVATION : None so far.

DESCRIPTION : Undershrubs, erect, branched, young branches angled. Leaves imparipinnate, 6 cm long, rachis slender, brownish hairy; leaflets 7 - 9, 0.8 - 1.5 × 0.5 - 1.0 cm, obovate, emarginate, upper surface glabrous, lower densely pubescent ; petioles 1 mm long, densely grey hairy, veins prominent on the back ; stipules subulate, 5 mm long, densely hairy on back surface. Racemes 15 cm long, axillary or terminal. Flowers 5 mm long, pedicels 3 mm long. Calyx 3 mm long, teeth 5, equal to the tube in length, densely hairy. Vexillum 4 × 5 mm, broadly ovate; wings 3 × 4 mm, keels 3 × 2 mm ; Pods 2.3 × 0.5 cm, compressed, curved at the tip with an appendage, 3 - 4 -seeded.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian Region* 1 : 102. Botanical Survey of India, Calcutta.
2. Drummond, J. R. (1918). *In :* Gamble, J. S., *Fl. Pres. Madras*, p. 320.
3. Henry, A. N, *et al* (1983). *Fl. Tamil Nadu-Analysis* 1 : 122. Botanical Survey of India, Coimbatore.

The material for this sheet was supplied by D. N. Das and K. Thothathri, Botanical Survey of India, Howrah.

STATUS : Rare. The only specimen available in the Indian Herbaria is the Type collected by Beddome from East Nilgiri during 1868-1874. It could not be collected again from its known area of distribution. Loss of natural habitat is the apparent cause of its rarity.

DISTRIBUTION : Tamil Nadu (North Coimbatore); Karnataka (Hassan). Endemic.

HABITAT AND ECOLOGY : Grows on dry rocky hill slopes upto 1000 m alt. Its distribution areas receive comparatively much less rainfall to some areas in the Nilgiris, and S. Western Ghats.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas need to be explored for the species. Plants or seeds are required to be collected and cultivated in experimental gardens and for rehabilitating the species in as many localities as possible within its range.

BIOLOGY AND POTENTIAL VALUE : Being an endemic species in South India, it is of phytogeographical significance. It is worth introducing in Botanic Gardens as an ornamental for its beautiful purple-red flowers. Its capacity to endure dry areas and grow in poorer gravelly soils should be of value to use this species in vegetating wastelands and enriching their soils through nitrogen fixation, being a leguminous plant.

CULTIVATION : None so far.

DESCRIPTION : Undershrubs, 20 cm high, with woody root stock and crown stem; stem glabrous, angled or almost winged; stipules 4 mm long. Leaves 1-foliate, narrow-lanceolate, downy when very young, soon becomes perfectly glabrous, primary veins numerous, thick, prominent and much raised on both sides. Racemes terminal, elongated ; pedicels 1 cm long, pubescent in flowers, glabrous in fruit with subulate bract at base ; calyx teeth equal ; corolla purplish-red; upper stamens free to the middle ; style glabrous, stigma penicillate. Pods 7×5 cm, 6 - 9-seeded.

REFERENCES :

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5. Saldanha, C. J. (1976). *Fl. Hassan Dist.*, p. 265.

The material for this sheet was supplied by D. N. Das and K. Thothathri, Botanical Survey of India, Howrah.

STATUS : Rare. It is known by very few gatherings. The species has not been collected after 1974. The type was collected from Western Ghats.

DISTRIBUTION : Endemic to Palghat district in Kerala.

HABITAT AND ECOLOGY : Not known.

CONSERVATION MEASURES TAKEN : It is likely that the species may be growing in some parts of the Silent Valley area in Palghat district, which is declared as a National Park.

CONSERVATION MEASURES PROPOSED : Intensive search should be made in and around the type locality to relocate the species, to ascertain present status of its populations and to grow the plants in botanic gardens for future rehabilitation and reintroduction in its natural areas.

BIOLOGY AND POTENTIAL VALUE : It is of phytogeographical significance and botanical interest. Being a legume its role in enriching soils is well known. Species of *Tephrosia* grow easily from seeds.

CULTIVATION : Not known.

DESCRIPTION : Herbs, erect, woody, younger parts somewhat grooved, minutely silky hairy. Leaves 4 - 6 cm long, thinly hairy; leaflets 7 - 11, oblong, elliptic, upperside glabrous, lower with thin hairs having a shining appearance. Stipules 3 mm long, lanceolate, lower surface hairy. Racemes axillary or terminal, 10 cm long. Flowers 2.0 cm long ; calyx 5 mm long, teeth twice the length of the tube, back surface grey hairy. Vexillum 1.7 × 1.4 cm. broadly ovate, wings 1.4 × 0.4 cm, keels 1.5 × 0.5 cm Pods 7.0 × 0.5 cm, straight, compressed, glabrous, 6 - 7-seeded.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of Indian Region* 1 : 102. Botanical Survey of India, Calcutta.
2. Drummond, J. R. (1918). *In :* Gamble, J. S., *Fl. Pres. Madras*, p. 320.

The material for this sheet was supplied by D. N. Das and K. Thothathri, Botanical Survey of India, Howrah.

STATUS : Rare. Its distribution areas are being depleted for developmental activities.

DISTRIBUTION : India; restricted in distribution to higher ghats in the Sahyadri range and also very scattered in distribution in Ahmednagar, Pune and Satara districts in Maharashtra only. Endemic.

HABITAT AND ECOLOGY : Along hill slopes, usually in open situations.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Location of its actual distribution sites and populations for *in situ* conservation. The seeds be procured and grown in the experimental gardens. The moist as well as drier adjoining hills in the Sahyadri ranges are rich in several endemic plants, which should be protected through Biosphere Reserve management.

BIOLOGY AND POTENTIAL VALUE : The species is of considerable germplasm potential and may be useful for improving cultivated varieties of *Vigna*. Flowers and fruits develop from September to October.

CULTIVATION : None.

DESCRIPTION : Erect annual, herbs, 0.5 - 1.25 m tall. Leaves trifoliate ; leaflets broadly ovate or ovate-oblong, oblique at base, 6 - 10 × 5 cm, as long as broad, terminal one 3-lobed, laterals 2-lobed; stipules leafy, 2 - 4 cm broad. Flowers yellow in spicate racemes on stout 15 - 20 cm long peduncles; petals 0.8 cm long. Pods cylindrical, 3 - 6 × 0.5 - 0.6 cm, dark green. Seeds 5 - 10 per pod, subcylindric, dark brown-black, 0.4 cm long.

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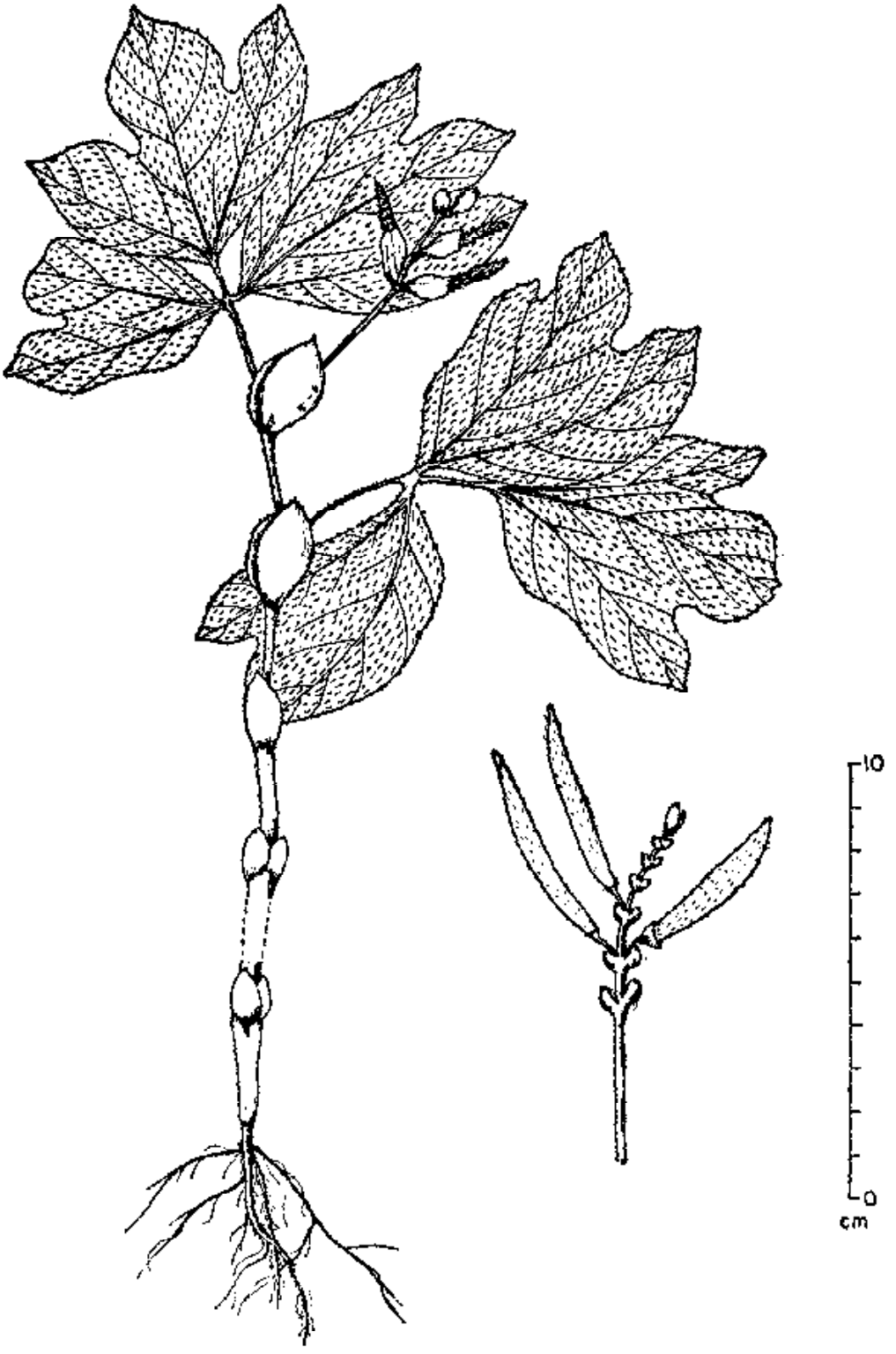
2. Santapau, H. (1948). *Kew Bull.* 1948 : 276.
3. Raghavan, R. S. & Wadhwa, B. M. (1972). *Curr. Sci.* 41 (11) : 429.

The material for this species was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Vigna khandalensis (Sant.) Raghavan & Wadhwa, habit & young pods.

STATUS : Endangered. The species is at present known only from a single locality where the few surviving populations are under grave threat due to habitat alteration for plantation crops.

DISTRIBUTION : Endemic to the southern W. Ghats in Peninsular India. The earliest few collections are those of Lawson and Bourdillon from Travancore (Kerala). Since Bourdillon last collected it from Merchison Estate near Ponmudi (Travancore) in 1895, it was not known to have been collected until 1979 when Henry located it between Balamore and Muthukuzhivayal in Kanyakumari district of Tamil Nadu. This is the only known record for the species in recent years.

HABITAT AND ECOLOGY : The species is found growing in dense evergreen hill forests and has been recorded between 500 and 900 m altitude.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Complete protection and preservation of the only known populations near Muthukuzhivayal is of primary importance. Intensive search in all places in the southern W. Ghats, where it is likely to be found. Steps must be taken to establish 'Plant sanctuaries' in Muthukuzhivayal, Kanyakumari district so that they can act as refugia for many of the rare endemic species in the region. Both *in situ* and *ex situ* conservation of this endangered tree species is necessary.

BIOLOGY AND POTENTIAL VALUE : The tree comes to flower during March-April, setting fruit subsequently. The flowers have a characteristic pungent smell. The fruits remain attached to the tree almost throughout the year. The wood is said to be soft and hence useless as timber, but nevertheless the long straight boles are known to have been used locally for makeshift accommodation. The seeds of several other species of the genus, viz. *H. laurifolia* of W. Ghats in particular, yield fatty oils generally known as Chaulmoogra Oils, which are extensively used for the treatment of leprosy and other cutaneous diseases.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Large evergreen trees, 10 - 15 m tall. Leaves alternate, 20.5 - 30.0 × 7.5 - 10.0 cm, oblong, abruptly acute at apex, entire, glossy and dark above, pale beneath. Flowers white, *ca* 2.5 cm across, in axillary fascicles or clustered on old stems. Sepals 4, imbricate. Petals 12 - 16, shorter than sepals, ciliate, scaly within at base; scales 3-lobed. Stamens numerous, serrate. Ovary sessile, 1-loculed, ovules many in 6 - 7 parietal placentas; stigma sessile, 2-lobed. Berries globose, 12.5 - 15.0 cm in diameter, woody with hard rind, dark brown. Seeds many.

Hutchinson (1967) in his treatment of the family Flacourtiaceae treated the genus *Taraktogenos* Hassk. as distinct from *Hydnocarpus* Gaertn. Accordingly, Balakrishnan (1970) transferred this species under the genus *Taraktogenos* Hassk. However, Sleumer, who monographed the genus *Hydrocarpus* Gaertn. is inclined to think otherwise and in a personal communication to Mukherjee (1972) says that there is not sufficient ground to keep these two genera separate.

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2. Balakrishnan, N. P. (1970). Nomenclatural notes on some flowering plants I. *Journ. Bombay Nat. Hist. Soc.* 67 (1) : 327.
3. Beddome, R. H. (1872). *Fl. Sylv.* 2 : t. 266.
4. Beddome, R. H. (1969 - 74). *Icon.* t. 242. Madras.
5. MUKHERJEE, N. (1972). Revision of the family Flacourtiaceae of India, Burma and Ceylon. *Bull. Bot. Soc. Bengal* 26 : 31-45.

The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Rare; an endemic species restricted to the southern end of the Western Ghats. The type collections were made in 1832 and one more in 1874. After a lapse of 100 years this was relocated by Henry and Swaminathan (4).

DISTRIBUTION : India: Kanniyakumari District, Tamil Nadu.

HABITAT AND ECOLOGY : Dense evergreen forests, often by riverside, on wet rocks about 700 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : The tail end of Southern Western Ghats harbouring many rare, endangered/threatened taxa, has been proposed as a potential area for a Biosphere Reserve (5).

BIOLOGY AND POTENTIAL VALUE : Isolated only on one hill range and hence of distributional interest.

DESCRIPTION : Scapigerous, somewhat succulent herbs. Leaves upto 16×9 cm, ovate to ovate-lanceolate, succulent (appearing membranous in dried specimens), entire, pellucid white-hairy, acute at apex, cordate and unequal at base; petioles upto 13 cm long, white-hairy. Flowers 1.2 - 1.4 cm long, blue, funnel-shaped in racemes on scapes upto 24 cm long. Capsules 3 - 4 cm long, slender, finely apiculate, glabrous.

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3. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 694. (repr. ed.). Botanical Survey of India, Calcutta.
4. Henry, A. N. & Swaminathan, M. S. (1980). Rare or little known plants from South India. *J. Bombay Nat. Hist. Soc.* 7 (2) : 373.
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The material for this sheet was supplied by M. S. Swaminathan and A. N. Henry, Botani-Botanical Survey of India, Coimbatore.

STATUS : Rare. The species occurs sporadically in the wild. It was first collected by N. L. Bor from Aka Hills (Kameng district) in 1936 and later by G. K. Deka from Balipara Frontier (falling in the kameng and Subansiri districts). J. Joseph and A. R. K. Sastry collected it again in flowers and fruits from Kameng and Subansiri districts respectively, in 1964, and noted it to be rare and in small numbers. Recently, it has been collected again from Kameng district. The species is yet to be recorded from other adjacent districts further east, in Arunachal Pradesh.

DISTRIBUTION : Arunachal Pradesh : Kameng and Subansiri districts. Endemic to a narrow distribution range.

HABITAT AND ECOLOGY : Occurs sporadically in small numbers in cool, shady, evergreen sub-tropical and temperate forest floors near springs and water courses, in the altitudes of 1250-1500 m. The soils are deep, rich in humus.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : Some plant diversity areas in the Kameng and Subansiri districts should be selected and protected as Natural areas, and plants of this species be rehabilitated in such areas for *in situ* conservation, besides introducing them into botanic gardens in the region.

BIOLOGY AND POTENTIAL VALUE : The species with about 30 cm long inflorescence having showy bright blue violet flowers can be of horticultural importance. Fls. & frs. : September-November.

DESCRIPTION : Succulent, malodorus herbs, *ca* 1 m tall. Leaves alternate, 15 - 30 × 7 - 10 cm, broadly elliptic, unequal sided, oblique at base, acute at apex ; petiole upto 34 cm long. Inflorescence a terminal receme, 15.0 - 30.0 cm long, 6 - 15-flowered; calyx *ca* 4 cm long, infundibuliform, 5-lobed, lobes lanceolate; corolla *ca* 6 - 8 cm long, *ca* 4 cm across, bilabiate, bright bluish-violet; tube upto 6 cm long, falcate; lobes 5, lower 3 unequal, suborbicular, upper 2 equal, ovate-rounded; stamens 4, included in the corolla-tube; style slender, included, stigma bilobed; ovary *ca* 1.5 × 0.6 cm, oblong-ovoid. Seeds many, ovoid, reticulate-veined.

REFERENCE :

1. Rao, A. S. & Joseph, J. (1967). *Bull. Bot. Surv. India* 9(1 - 4) : 280 - 282, f. 1 - 6.

The material for this sheet was supplied by Jagdish Lal, Botanical Survey of India, Itanagar.

STATUS : Rare, due to logging of forests and habitat loss. Its collections are known only from the type locality, where the species is sparse.

DISTRIBUTION : The species is restricted to South Andaman Islands.

HABITAT AND ECOLOGY : It occurs in the evergreen forests.

CONSERVATION MEASURES TAKEN : Mt. Harriet National Park is the only National Park in the South Andaman Island. The Jarwa reserve is not presently subjected to biotic pressures and hence the possibility of occurrence of the species in the Jarwa reserve.

CONSERVATION MEASURES PROPOSED : It is proposed that the Mt. Harriet National Park be extended to cover the adjoining areas and to accord protection. The species is to be introduced into the experimental garden and arboretum of Botanical Survey of India at Port Blair.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Not in cultivation so far.

DESCRIPTION : Woody climber. Leaves 10 - 15×4 - 7 cm, oblong to elliptic, acute or obtusely cuspidate, entire, glabrous, with 5 - 7 pairs of ascending lateral nerves. Petioles 1 - 1.5 cm long. Inflorescence a cyme often in simple terminal panicles. Flowers 4 - 5 mm in diameter.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and H. S. Debnath, BSI, Port Blair.

STATUS : Rare; endemic. King (1) described this species from the collections made from the South Andaman Island. There are also other collections of this species from North Andaman and Nicobar Islands.

DISTRIBUTION : Endemic to Andaman & Nicobar Islands.

HABITAT AND ECOLOGY : It occurs in the evergreen forests.

CONSERVATION MEASURES TAKEN : Though the South and North Andamans have National Parks but the areas are highly affected due to biotic pressures; the Great Nicobar Island has recently been declared as a Biosphere Reserve, wherein the species is likely to be protected.

CONSERVATION MEASURES PROPOSED : For *in situ* conservation, efforts should be made to introduce the species in ecologically suitable areas in its distribution range and *ex situ* conservation in botanical garden and arboretum at Port Blair.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Not yet cultivated.

DESCRIPTION : Small tree, 4-8 m high. Leaves 9-15 x 4-5 cm, oblong to elliptic-oblong, shortly acuminate, narrowed at base, alternate. Inflorescence an umbellate cyme. Flowers white; petals 4 - 5, broadly oblong; stamens 4 - 5; filaments flattened with a large tuft of hairs near the apex. Fruit 2 - 2.5 cm long, narrowly ellipsoid, vertically grooved.

REFERENCES :

1. Balakrishnan, N. P. & Rao, M. K. V. (1983). *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India*, p. 191. Botanical Survey of India, Howrah.
2. King, G. (1895). *J. Asiat. Soc. Bengal* 64 (2) : 115.

The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and H. S. Debnath, Botanical Survey of India, Port Blair.

STATUS : Rare. Represented only by old collection of Sir J. D. Hooker.

DISTRIBUTION : India. So far known from Sikkim Himalaya only.

HABITAT AND ECOLOGY : A perennial herb found at higher altitudes (4000 - 4500 m). Nothing is known about its ecology.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Attempts should be made to grow it from the seeds.

BIOLOGY AND POTENTIAL VALUE : Nothing is recorded.

CULTIVATION : No attempt made so far.

DESCRIPTION : Perennial, glabrous herbs. Rootstocks very stout, creeping. Stem base stout, clothed with red-brown rigid sheaths, 1.2 - 2.5 cm long; stem and channelled leaf solid, soft. Leaves solitary or few, terete or compressed, equalling the stem. Floral bracts broad, membranous, equalling the flower; lower bracts foliaceous, sheathing, longer than the heads. Flowers sessile, sepals 8.5 - 12 mm long, smooth, shining, dark brown, linear with membranous tips. Stamens 4 - 6 mm long ; anthers linear, at length twisted. Ovary small ; style very slender, exserted; stigmas long. Capsules hardly exceeding the sepals, obovoid, acute, shortly beaked, dark brown, shining, 3-septate. Seeds with short stout tails.

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2. Hooker, J. D. (1892). *Fl. Brit. India* 6 : 399.

The material for this sheet was supplied by R. C. Srivastava and B. Mitra, Botanical Survey of India, Gangtok.

STATUS : Indeterminate. The species is represented only by two type specimens collected in 1911 by C. E. C. Fischer. Though the area is subsequently well explored, no specimens of this could be collected. Habitat disturbance could be one of the factors for its non-availability in the type locality and neighbouring areas. Palni Hills form an important centre of pilgrimage where thousands visit the area every year.

DISTRIBUTION : South India, Tamil Nadu, Upper Palnis. Endemic.

HABITAT AND ECOLOGY : Along margins of evergreen forests at an altitude of *ca* 2300 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas need to be thoroughly explored; if the plants are relocated, the area should be protected and the plants be introduced into the botanic garden of the Botanical Survey of India at Yercaud. The Palni Hills harbour many narrow endemics and deserve consideration as a Biosphere Reserve to protect the leftover rare endemic species of flora.

BIOLOGY AND POTENTIAL VALUE : This species is of phytogeographical interest.

CULTIVATION : Not known.

DESCRIPTION : Erect herbs, 20 - 40 cm tall, woody below. Stems branched, quadrangular, sulcate, puberulous. Leaves 2.0 - 4.5×0.5 - 1.2 cm, narrowly ovate or obovate, cuneate at base, obtuse or acute at apex, margin serrate, pubescent; lower petiolate. Flowers in terminal, pyramidal heads, 10 - 20×6 - 10 mm; bracts 7×6 mm, ovate, mucronate at apex, densely hairy; calyx 2 mm long, campanulate, bilobed, densely pubescent without; upper lip entire, ovate; lower 4-dentate, teeth acuminate; fruiting calyx 3 - 4 mm long, tubular; corolla 2.5 mm long, bilabiate; upper lip 4-lobed; lobes subequal, acute; stamens 4, didynamous, included, hairy at the base of filaments ; anthers reniform ; style 2 mm long, bifid at the apex. Nutlets 0.7 - 0.8 mm long, ovoid, dark brown.

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4. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K., *Materials for a catalogue of threatened plants of India*, p. 31. Botanical Survey of India, Howrah.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Vulnerable. Due to large scale removal of forests for plantation crops, the species has become rare and its habitats threatened. It was first collected by A. G. Bourne during 1897-1898 from Kodaikanal of Palni Hills. A. Meebold collected it in 1910 from Devicolam of the then Travancore State, now a part of Kerala. Recently, the species has been collected by Saldanha from Kodaikanal in 1960.

DISTRIBUTION : Endemic to South India.

HABITAT AND ECOLOGY : In hills of Western Ghats at an altitude of *ca* 2000 m as undergrowth.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The species should be collected from its known localities and should be introduced in Botanic Gardens. Once they are successfully multiplied, efforts should be made to reintroduce them in their natural habitats.

BIOLOGY AND POTENTIAL VALUE : Being an endemic species, it is phytogeographically interesting.

CULTIVATION : None on record.

DESCRIPTION : Perennial undershrubs, with erect silvery branches, grooved. Leaves opposite or whorled, 15 - 20 × 5 - 7 mm, oblanceolate or obovate, acute at apex, margin entire, pubescent; nerves many, nearly parallel. Spikes 5 - 10 × 0.7 - 1.0 cm, cylindrical; bracts ovate, acuminate, pubescent; calyx bilipped, pubescent without; corolla bilipped, upper lip curved outside; lower lip longer; stamens 4, exerted; style bifid at apex. Nutlets 4, very small.

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4. Srinivasan, S. R. (1987). *In :* Henry, A. N. *et al* (ed.). *Fl. Tamil Nadu*, Ser. I. *Analysis* 2 : 171. Botanical Survey of India, Coimbatore.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Rare. The plant was first collected from Anamalai hills by Robert Wight in 1851. Later C. A. Barber collected it from the same area. J. Joseph reported the plant around Attakkati of Anamalai hills in 1961 after a lapse of a few decades.

DISTRIBUTION : *Tamil Nadu : Anamalai hills. Endemic.*

HABITAT AND ECOLOGY : In deciduous forests at an altitude of 990 m.

CONSERVATION MEASURES TAKEN : Not known.

CONSERVATION MEASURES PROPOSED : Protection should be provided to the existing natural sites as far as possible. The species should be brought into cultivation and propagated in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Phytogeographically interesting since it is restricted in distribution.

CULTIVATION : Not known.

DESCRIPTION : Erect herbs, densely pubescent. Leaves 2 - 5 × 1 - 3 cm, ovate or oblong, cuneate or truncate at base, obtuse at apex, margin crenate, pubescent. Flowers in narrow cylindric spikes; calyx *ca* 2 mm long, bilabiate, pubescent; upper lip short, acute; lower lip truncate, obscurely toothed; corolla 4 × 2 mm, much bent, tube slender below, inflated above and decurved; upper lip 3 - lobed; lower elongate, concave; stamens 4, didynamous, the posterior pair longer ; style bifid at the tip. Nutlets 4, ovoid, brownish black, smooth.

REFERENCES :

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3. Hooker, J. D. (1885). *Fl. Brit. India* 4 : 628.
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5. Srinivasan, S. R. (1987). *In : Fl. Tamil Nadu*, Ser. I. *Analysis* 1 : 172. Botanical Survey of India, Coimbatore.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Possibly Extinct. The species is so far known only from its type collections made by A. G. Bourne from Palni hills in 1899 and 1901. Although the area of its occurrence is well botanised no recent collections could be made in later decades. The main cause of threat is apparently due to biotic pressure as Palni Hills are visited by thousands for pilgrimage every year.

DISTRIBUTION : Endemic to Palni hills (Kodaikanal), Tamil Nadu.

HABITAT AND ECOLOGY : Undershrub in 'Shola' forest at about 2300 m altitude.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and its neighbouring areas be searched for this species for planning appropriate conservation measures.

BIOLOGY AND POTENTIAL VALUE : Being an endemic species to Palni hills, it is of phytogeographical and botanical interest. It is reported that the seed maturity is poor (1).

CULTIVATION : Not known.

DESCRIPTION : Erect undershrubs; stems more or less succulent, branched, 4 - angled, glabrous. Leaves 4 - 8 × 2 - 6 cm, ovate, base rounded or slightly cuneate, acute at apex, margin upper part crenate, towards base entire, nerves 5 - 6 pairs, pubescent; petiole 2.4 - 4 cm long, pubescent. Flowers in slender, thyrsoid panicles; bracts ovate, acute at apex, caducous; calyx 6 mm long, bilabiate, hairy; upper lip ovate; lower lip 4-dentate, subequal, subulate; corolla *ca* 1.5 cm long, bell-shaped, lilac, puberulous; upper lip 4-lobed; lower lip entire, narrow; subobtuse; stamens 4, didynamous, slightly exserted; style slender, subequally bifid at the apex.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic plants of the Indian Region* 1 : 135. Botanical Survey of India, Calcutta.
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5. Srinivasan, S. R. (1987). *In :* Henry, A. N. *et al* (ed). *Fl. Tamil Nadu,* Ser. I. *Analysis* 2 : 181. Botanical Survey of India, Coimbatore.
6. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K., *Materials for a catalogue of threatened plants of India.* p. 32. Botanical Survey of India, Howrah.

The material for this sheet was supplied by R. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Indeterminate ; not collected since 1901, though botanical explorations have been carried out in recent decades in Palni and Nilgiri hills. Causes of its depletion are not clearly known, but forest clearing for plantation crops largely accounts for.

DISTRIBUTION : The species was first collected by J. S. Gamble (1883) from Coonoor in Nilgiri hills, but not known to have been collected thereafter from these hills. However, A G. Bourne collected it from Palni hills during 1897 to 1901.

HABITAT AND ECOLOGY : Along streams, in ravines and under rocks at an altitude of *ca* 2000 m.

CONSERVATION MEASURES TAKEN : The Nilgiri hills, from where the plant was first collected, has recently been declared as a Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : Intensive search must be made to locate the species in its known distribution areas to confirm its status and to introduce it into experimental gardens for propagation and reintroduction.

BIOLOGY AND POTENTIAL VALUE : Not known. Like some other species of *Plectranthus* the possibility of occurrence of the essential oils in this species should be explored.

CULTIVATION : Not known.

DESCRIPTION : Succulent undershrubs ; stems thick, angled, pubescent. Leaves 2.5 - 5.0 × 2 - 4 cm, orbicular or ovate, somewhat cuneate at base, obtuse at apex, margin upper side crenate or dentate, lower entire, nerves 4 - 6 pairs, pubescent on both sides; petiole thick, 5 - 15 mm long. Flowers in 2 - 4 cm long racemes; calyx bilipped, villous, upper lip entire, lower 4-toothed, subequal, teeth subulate or lanceolate, acuminate at apex; corolla 12 - 18 mm long, lilac, bilipped; upper lip 4-lobed, recurved, lower lip narrow, acute; stamens 4, didynamous, declinate ; style slender, subequally bifid at apex. Nutlets 4, dry, black or brown, smooth.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic plants of the Indian Region* 1 : 136. Botanical Survey of India, Calcutta.
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5. Srinivasan, R. S. (1987). *In :* Henry, A. N. *et al* (ed.). *Fl. Tamil Nadu,* Ser. I. *Analysis* 2 : 181. Botanical Survey of India, Coimbatore.
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The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Rare. Though known from several earlier gatherings, deforestation for reliabilation purposes rendered it rare.

DISTRIBUTION : Endemic to southern Western Ghats in Penninsular India. The species was earlier collected from the Nilgiri hills by Perrottet, Robert Wight and Gardner(4). Beddome collected this species in 1859 from Penninsular India (precise locality not known). In 1883 J. S. Gamble collected it from Sispara of Nilgiri hills. M. A. Lawson collected the same species in 1883 and 1887 from the same locality. It was also reported from Coonoor, Nilgiri hills (2). No report of its existence was recorded thereafter from these hills. But after a lapse of eight decades, B. V. Shetty reported it from Umaiyamalai and Anaimudi sholas of Kottayam District (Kerala) in 1966 and 1970, respectively.

HABITAT AND ECOLOGY : In moist forest floor at an altitude of *ca* 2000 m.

CONSERVATION MEASURES TAKEN : The type locality is covered under the recently declared Nilgiri Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : Introduction of the plants in suitable places in its distribution areas; propagation through seeds and other techniques be tried for its multiplication.

BIOLOGY AND POTENTIAL VALUE : It is very closely related to *Pogostemon speciosus* and and *P. reflexus*.

CULTIVATION : Not known.

DESCRIPTION : Erect undershrubs ; stems branched, terete, woody, pubescent. Leaves 6 - 8 (-10) × 2 - 3 cm, ovate, cuneate at base, acute at apex, margin doubly crenate, pubescent; petioles 2 - 4 cm long, pubescent. Spikes 20 × 2.0 - 2,5 cm; bracts and bracteoles minute, setaceous; calyx 4 - 6 mm long, tubular, 5-toothed, pubescent; teeth triangular, obtuse, ciliate; corolla dark purple, tube slender, exserted ; stamens 4, exserted; filaments glabrous ; style slender, bifid at apex; stigmatic lobes slender.

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The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Endangered. Known on the basis of a few old collections. Due to developmental activities its original habitats have undergone changes leading to the loss of populations of the species.

DISTRIBUTION : Endemic to Nilgiri hills of Western Ghats. It was first collected by Robert Wight(2) and was again collected by A. G. Bourne in 1908 and P. F. Fyson (1). It was last collected in 1923 by J. S. Gamble from the same hills, and has not been seen during the recent field surveys in the area.

HABITAT AND ECOLOGY : On the outskirts of woods, and in neglected, broken ground on Nilgiri hills at about 2000 m alt.

CONSERVATION MEASURES TAKEN : Recently the area has been declared as Biosphere Reserve and the type locality of the species falls within this area.

CONSERVATION MEASURES PROPOSED : The locality and its adjacent places to be extensively surveyed; if rediscovered, the collection of the plants to be banned; to be propagated and introduced in other areas having similar ecological environment.

BIOLOGY AND POTENTIAL VALUE : The species differs from the *P. mollis* in respect of leaves which are larger, racemes shorter and stouter. Flowering October to March.

CULTIVATION : Not known.

DESCRIPTION : Herbaceous plants with woolly white hairs on the stem. Leaves 4 - 5 $\times$ 2.5 - 3.0 cm, ovate, acute to acuminate at apex, base rounded, margin crenate, pubescent; petiole 7 - 12 mm long, pubescent. Spikes 7 - 12 $\times$ 1.0 - 1.5 cm, the whorls of clusters close; bracts linear or lanceolate; bracteoles linear; calyx 6 - 7 mm long, tubular, bilabiate, pubescent on outside; teeth equal, *ca* 1 mm long, lanceolate, acuminate at apex; corolla white, *ca* 6 mm long, bilipped; upper lip 3-lobed, subequal ; lower lip narrower and longer; stamens 4, exserted, subsequal; filaments bearded; anther cells confluent; style slender, bifid at the apex; stigmatic lobes subulate. Nutlets 4, ovoid, smooth.

REFERENCES :

1. Fyson, P. F. (1932), *Fl. South Indian Hill Stations* 1 : 471.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 791. (repr. ed.).
3. Mukerjee, S. K. (1940). *Rec. Bot. Surv. India* 14 (1) : 73.
4. Srinivasan, R. S. (1987). *In :* Henry, A. N. *et al* (ed.). *Fl. Tamil Nadu*, Ser. I. *Analysis* 2 : 184. Botanical Survey of India, Coimbatore.
5. Wight, R. (1850). *Icon. Plant. Ind. Orient.* 4 : t. 1441.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Endangered. Known on the basis of very few old gatherings. It has not been collected in this century though the area has been thoroughly explored by various botanists. Causes for its depletion are : narrow distribution, limited number of individuals and deforestation of natural habitats.

DISTRIBUTION : Endemic to Nilgiri hills in Western Ghats of Tamil Nadu. The species was described on the basis of Perrottet's collection from Ootacamund (2). Robert Wight also reported it from the same hill (3, 4). In 1883 and 1885, M. A. Lawson reported it from Sispara of Nilgiri hills.

HABITAT AND ECOLOGY : In wet places of hill forests at an altitude of *ca* 2000 m.

CONSERVATION MEASURES TAKEN : The Nilgiri area has been recently declared as a Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : To search in the surrounding areas. If relocated, the plants should be introduced in botanic gardens for multiplication and reintroduction in the original habitat.

BIOLOGY AND POTENTIAL VALUE : This species is botanically interesting due to its narrow endemism and more details on potential value yet to be known.

CULTIVATION : Not known.

DESCRIPTION : Erect herbs. Stems branched, glabrate. Leaves 4-6×3-4 cm, ovate, rounded or slighly cuneate at base, obtuse at apex, margin crenate, sparingly hairy above and nerves beneath; petioles 1 1.5 cm, slender. Racemes 7-12×0.7-0.8 cm, solitary and terminal, with distant few flowered whorls; bracts and bractcoles minute; calyx 2.5 mm long, tubular, 5-toothed, teeth triangular, ciliate; corolla small, bilipped; stamens 4, exserted; filaments bearded; style slender, bifid at apex; stigmatic lobes slender.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic Plants of the Indian Region* 1 : 137. Botanical Survey of India, Calcutta.
2. Bentham, G. (1848). *In :* DC., *Prodr.* 12 : 154.
3. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 791-793 (repr. ed.).
4. Hooker, J. D. (1885). *Fl. Brit. India* 4 : 635.
5. Srinivasan, R. S. (1987). *In :* Henry, A. N., *et al* (ed.). *Fl. Tamil Nadu*, Ser. I. *Analysis* 2 : 184. Botanical Survey of India, Coimbatore.
6. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K., *Materials for a Catalogue of Threatened Plants of India*, p. 32. Botanical Survey of India, Howrah.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar. Botanical Survey of India, Calcutta.

STATUS : Rare. Earlier known only from two collections made by R. H. Beddome around 1874 and by K. Venkoba Rao in 1915 (2) from Attraymalay Ghat and Mankulam of the then Travancore now a part of Kerala, respectively. Recently, it was reported by M. Mohanan from Poonkulam of Trivandrum district in 1980. Causes of rarity not clearly known, but habitat destruction for raising plantation crops has been a major factor.

DISTRIBUTION : Endemic to Western Ghats of Kerala.

HABITAT AND ECOLOGY : It occurs in the evergreen forests at an altitude of about 1000-1600 m.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Conservation of its popul tion in its natural habitats. The species be introduced for cultivation in botanic gardens and conservatories.

BIOLOGY AND POTENTIAL VALUE : The species is endemic to Western Ghats and is of phytogeographical significance.

CULTIVATION : Not known.

DESCRIPTION : Undershrubs, 60 - 70 cm high. Stem woody below, branched, angled, glabrous. Leaves 8 - 12 × 2 - 4 cm, ovate, base rounded or cuneate, acute at apex, margin doubly crenate or serrate, glabrous; petiole 4 - 6 cm long, glabrous. Racemes 7 - 15 cm long; bracts minute; clayx 5 - 8 mm long, bilipped, glabrous; upper lip 3 - toothed, teeth triangular; lower lip entire, acute; corolla 7 - 10 cm long, funnel shaped, pubescent; stamens 4, 1.0 - 1.2 cm long, hairy at the base; style 1.2 - 1.4 cm long, bifid at apex; stigmatic lobes filiform.

REFERENCES :

1. Ahmedullah, M. & Nayar, M. P. (1987). *Endemic plants of the Indian Region* 1 : 137. Botanical Survey of India, Calcutta.
2. Beddome, R. H. (1874). *Icon. Pl. Ind. Orient.* t. 159.
3. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 792-794 (repr. ed). Botanical Survey of India, Calcutta.
4. Hooker, J. D. (1885). *Fl. Brit. India* 4 : 637.
5. Vajravelu, E. & Daniel, P. (1983). *In :* Jain, S. K. & Sastry, A. R. K., *Materials for a Catalogue of Threatened Plants of India*, p. 32. Botanical Survey of India, Howrah.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Rare (1). Till date, the taxon has been collected only from South Andaman Island which is subjected to pressures of urbanisation and logging operations. Unless protective measures are employed this species may become endangered in the near future.

DISTRIBUTION : Restricted to South Andaman Island (1). This plant was first collected by David Prain in 1889 from Rauga Chang. Later it was collected by G. King in 1891, 1893 and 1898 from different localities. David Prain again collected it in 1899 and 1901. Recently it was collected by N. Bhargava during 1976-1978 from the same island.

HABITAT AND ECOLOGY : In rocks, in stream beds of South Andaman Island.

CONSERVATION MEASURES TAKEN : Not known.

CONSERVATION MEASURES PROPOSED : Protection of its known habitats and prohibition of over collection of the taxon from the wild; to be conserved and grown in experimental gardens

BIOLOGY AND POTENTIAL VALUE : Since the species has narrow distribution it is biologically interesting. Flowers during November to January.

DESCRIPTION : Erect perennial herbs, 25 - 45 cm high. Stems many from a woody rootstock, rigid, quadrangular above, grooved, glabrous. Leaves 6.0 - 7.5 × 1.0 - 1.5 cm, oblong-lanceolate, cuneate at base, obtuse at apex, margin crenate-dentate, pubescent; 4 - 6 pairs of nerves, prominent on under surface; petiole 3 cm long, pubescent. Racemes 10 - 15 cm long; pedicels 3 cm long, pubescent; bracts 3 cm, linear, pubescent; calyx 3 × 2 mm, campanulate, bilipped, pubescent; corolla 14 - 16 × 1.0 - 1.5 mm, light blue, bilabiate; upper lip notched; lower lip 3 - lobed, the mid lobe emarginate at apex; stamens 4, ascending, didynamous; style bifid at the apex; stigmatic lobes subequal. Nutlets 1 mm, pale brown, scabrid.

REFERENCES :

1. Balakrishnan, N. P. & Vasudeva Rao, M. K. (1983). *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India*, p. 191. Botanical Survey of India, Howrah.
2. Mukerjee, S. K. (1940). *Rec. Bot. Surv. India* 14 (1): 144.
3. Prain, D. (1890). *Journ. As. Soc. Beng.* t 59 : 307.

The material for this sheet was supplied by B. D. Sharma and V. Sampath Kumar, Botanical Survey of India, Calcutta.

STATUS : Indeterminate. An endemic tree species, known only from its Type so far. Further explorations in the Middle Andaman, which is botanically not well explored, may locate this interesting tree species. The Jarwa reserve, which is less disturbed, may prove also to be a safe sanctuary with chances of survival for this species.

DISTRIBUTION : The type of this was species collected from the Middle Andaman Island.

HABITAT AND ECOLOGY : Tree species of evergreen forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Mount Diavolo in the Middle Andaman is to be considered as National Park. Once located, this tree species is to be brought under cultivation in gardens and arboreta.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Not on record.

DESCRIPTION : A small tree, *ca* 10 m tall, branches elongate, branchlets very finely rusty pubescent. Leaves about 14.0×3.5 cm, narrowly linear-oblong, acute or acuminate, tapering into the petiole at base, very finely rusty tomentose beneath, thinly coriaceous, subglaucous beneath, nerves 12 - 15 pairs, prominent beneath. Panicles very long peduncled. Flowers small. Fruits 1 cm long, smooth, even obtuse or narrowly ovoid, with 0.7 cm long, stout stalks.

REFERENCES :

1. Balakrishnan, N. P. & Rao, M. K. V. (1983). *In :* Jain, S. K. & Rao, R. R., (ed.). *An assessment of Threatened Plants of India*, p. 191. Botanical Survey of India, Howrah.
2. Kostermans, A. J. G. H. (1957). *Reinwardtia* 4 : 192-256.
3. Kostermans, A. J. G. H. (1964). Bibliographia Lauracearum Bogor, i-xvi, 1-1450.

The material for this sheet was supplied by M. P. Nayar, A. R. K. Sastry, (Calcutta), & J. L. Ellis, (Port Blair), Botanical Survey of India.

STATUS : Vulnerable, endemic species. Its populations are widely separated and sparse in a small area, and it is known so far from the type locality and nearby areas in the S. Andaman Island. Being a tree species in the forests, its chances of further getting depleted are rated high due to logging operations in the forests and other biotic pressures.

DISTRIBUTION : The species is endemic and occurs sporadically in the South Andaman Island.

HABITAT AND ECOLOGY : Evergreen forests; the islands receive high rainfall spread over nearly 300 days in a year; soils are rich loamy with appreciable amount of humus.

CONSERVATION MEASURES TAKEN : Although none for the species specifically, the Mt. Harriet National Park in the South Andaman embraces a few trees and habitat and thus provides chances for its survival.

CONSERVATION MEASURES PROPOSED : Extention of boundaries of the Mt. Harriet National Park to cover more habitats of the species; introduction of saplings into the core of the Park for *in situ* conservation and into the BSI arboretum near Port Blair for *ex situ* protection, are suggested.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : None so far. Attempts to cultivate it in the experimental garden and Arboretum of BSI at Port Blair, are being made.

DESCRIPTION : 10-15 m tall, small tree, glabrous. Leaves 14×5 cm, lanceolate, acute or subacute, base acute, margins undulate; nerves 6 - 8 pars, lowest longest; petiole 2 cm long, slender. Flowers pale greenish brown, 0.75 cm across, in racemes 3 cm long, clustered, shortly pedicellate; bracts 0.7 cm across, coriaceous; perianth villous within, segments concave; filaments and anthers short; ovary glabrous, stigma discoid. Fruit unknown.

REFERENCES :

1. Balakrishnan, N. P. & Rao, M. K. V. (1983). *In :* Jain, S. K. & Rao, R. R. (ed.). *An assessment of Threatened Plants of India*, p. 191. Botanical Survey of India, Howrah.
2. Kostermans, A. J. G. H. (1964). Bibliographia Lauracearum Bogor i-xvi, 1-1450.
3. Kurz, S. (1870). *Report on the vegetation of the Andaman Islands.* Calcutta.
4. Parkinson, C. E. (1923). *A Forest Flora of the Andaman Islands,* Simla.

The material for this sheet was supplied by M. P. Nayar, (Calcutta) and J. L. Ellis, (Port Blair), Botanical Survey of India.

STATUS : It is known to occur sporadically in its range, where the forests have been over exploited for various needs.

DISTRIBUTION : India; in evergreen forests along the Western Ghats, known to occur only from a few localities after the type locality. Recently collected from South Kanara in Karnataka and Cannanore in Kerala. Endemic.

HABITAT AND ECOLOGY : In evergreen forests, overgrowing on trees.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The Western Ghats in Maharashtra & Karnataka are rich in endemic plants. Such areas should be identified and accorded protection status. Seeds and seedlings of this species be grown in such protected areas and suitable botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Flowers and fruits appear in March and April. A woody climber of botanical interest.

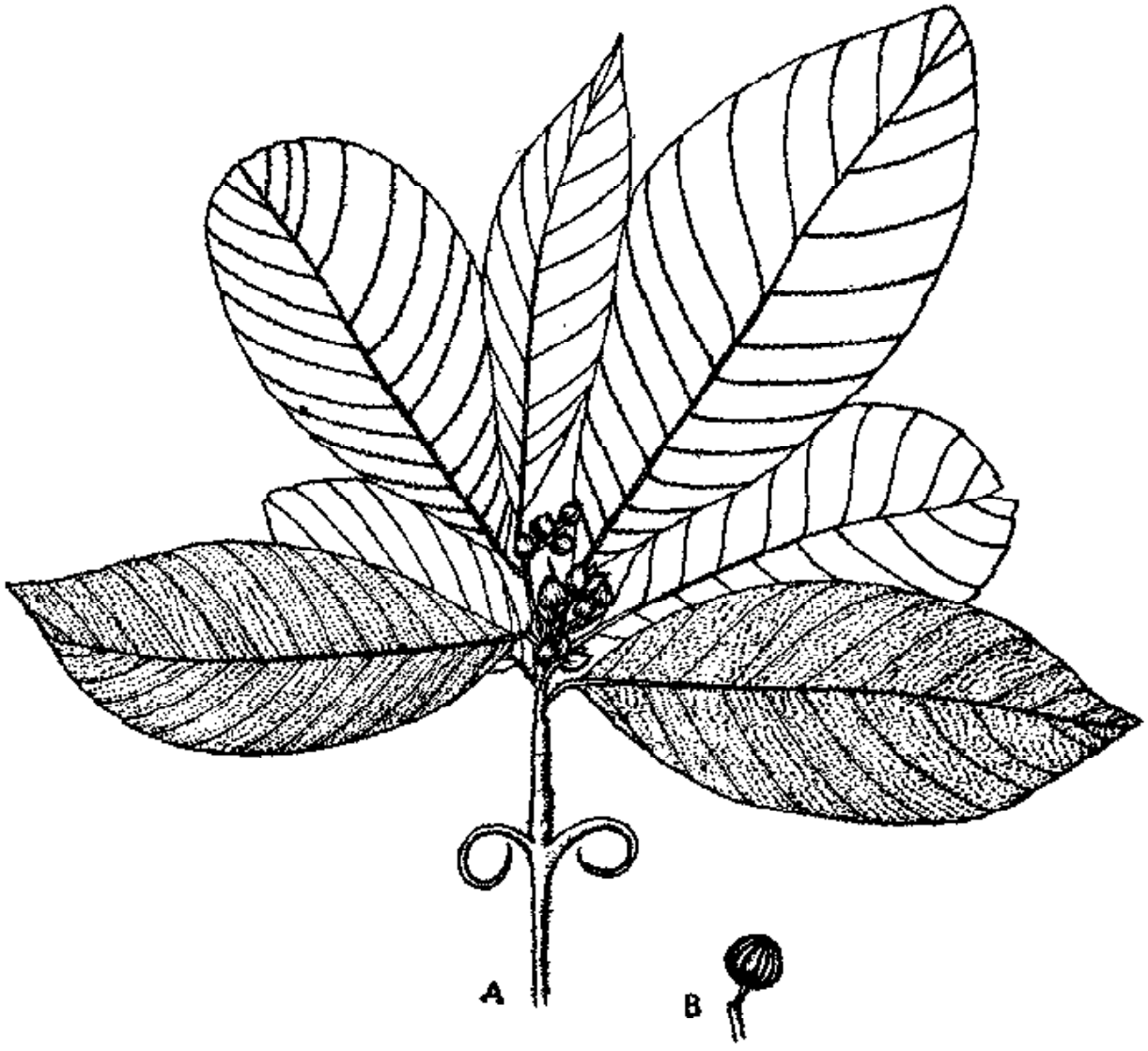
CULTIVATION : None.

DESCRIPTION : Climbing shrubs, upto 2 m, climbing by hooked lower peduncles; young parts yellowish hairy. Leaves elliptic-lanceolate, 10 - 18 × 4 - 6 cm, hairy on both the surfaces, hairs more prominent on the nerves beneath, margins serrate-dentate. Flowers in axillary short racemes; calyx yellow hairy; corolla yellowish-white. Berries depressed-globose, 1.0 - 1.5 cm across, brown, ribbed.

REFERENCES :

1. Sedgwick, L. J. (1920). *Indian For.* 46 : 426.
2. Ramachandran, V. S. & Nair, V. J. (1988). *Fl. Cannanore*, p. 74. Botanical Survey of India, Coimbatore.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Hugonia bellii Sedgw. A. Flowering branch. B. Berry.

STATUS : Indeterminate as it is not recollected from anywhere after its original collection by Meebold in 1908.

DISTRIBUTION : India : Arsikere, Hassan district, Karnataka; endemic.

HABITAT AND ECOLOGY : Semi parasitic shrubs, on forest trees, in moist decidous forests.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality and neighbouring areas to be searched for this species and, if found, the host plants to be protected and the area to be declared protected area as this plant cannot be grown in gardens, being a semi parasite.

BIOLOGY AND POTENTIAL VALUE : As the plant is a semi-parasite, it is of biological interest.

CULTIVATION : None.

DESCRIPTION : Parasitic shrubs, drying yellow; internodes of branchlets angular or flattened. Leaves few and sparse, 2.0 - 3.75 × 0.5 - 0.75 cm, oblanceolate, 3-nerved. Flowers greenish-yellow; in 3-flowered glomerules, outer 3-males.

REFERENCES :

1. Gamble, J. S. (1957). *Fl. Pres. Madras* 2 : 881. (repr. ed.). Botanical Survey of India, Calcutta.
2. Ramamoorthy, T. P. (1976). *In :* Saldanha, C. J. & Nicolson, D. H., *Fl. Hassan District*, p. 311.

The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.

STATUS : Rare; known to occur only in two localities i the north-eastern India. It was first collected from Kerempani in Assam by U. N. K: jilal in 1913 and subsequently from Singtam in Sikkim by Ribu & Rhomoo. It was ag: in recollected from Kerempani, Assam, by P. C. Kanjilal in 1931 and was last collected from Kerim Forest, Assam, by Deka in 1938.

DISTRIBUTION : Endemic to Assam and Sikkim.

HABITAT AND ECOLOGY : This species was collected from the subtropical forest of Assam at 100 - 120 m alt. and from hills of Sikkim 1200 - 1500 m alt.

CONSERVATION MEASURES TAKEN : No conservation measure has been taken to protect the species in its habitats so far.

CONSERVATION MEASURES PROPOSED : Efforts should be made to locate them in the type locality to raise plants from seeds for introducing in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Use and potential value of this species are not known. But in the case of other species of *Lagerstroemia* the timber is useful and some are grown for their beautiful flowers. This flowers during August-October; fruits throughout the cold season.

CULTIVATION : This species is not known so far in cultivation.

DESCRIPTION : A tree, up to 35 m tall; stem very irregularly fluted; bark greenish white, exfoliating in large thin papery sheets of scrolls. Leaves opposite, 6 - 12×3 - 5 cm, elliptic or oblong, acuminate at apex, sub-rounded at base, sub-coriaceous, glabrous above, midrib and veins pubescent beneath, petiolate. Panicles terminal, 7 - 10 cm long, densely pubescent. Calyx tube broadly campanulate, *ca* 6 mm long, pubescent, 12-ribbed; lobes 6, triangular, acuminate, upper half pubescent within. Petals 6, *ca* 2.5 mm long, oblong, crumpled. Stamens numerous, 6 stouter and longer than the rest. Ovary subglobose, 6-loculed; style long, exserted; stigma capitate. Capsule *ca* 5×3 mm; ellipsoid, 3 - 6 - valved. Seeds *ca* 5 mm long, winged.

REFERENCES :

1. Furtado, C. X. & Srisuko, M. (1969). *Gard. Bull. Singapore* 24 : 287.
2. Kanjilal, P. C. (1934). *Assam For. Rec. Bot.* 1 : 9.
3. Kanjilal, U. N. *et al.* (1938). *Fl. Assam* 2 : 311.

The material for this data sheet was supplied by Thomas Mathew and M. P. Nayar, Botanical Survey of India, Howrah.

STATUS : Endangered. Gamble (1919) described it as one of the most beautiful plants tinging the forest with red when in bloom, but it could not be recollected since then even after the intensive surveys in the area. The main cause of its depletion is clearing of forests for plantation crops, especially tea. It is represented in MH by two old specimens (Acc. No. 21365 & 21366).

DISTRIBUTION : Anamalai hills, Coimbatore Dt., Tamil Nadu; it is of doubtful occurrence in Sri Lanka.

HABITAT AND ECOLOGY : Epiphytic in evergreen forests at 912 - 1520 m altitudes.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should be made to relocate the species and introduce it in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Of ornamental value.

CULTIVATION : Not known.

DESCRIPTION : Ornamental epiphytic ivy-like climbing shrubs. Leaves opposite, fleshy, 2.5 - 5.5 cm long, oblong or obovate, obtuse, base narrow, nerves 2-paired. Flowers fleshy, large, red, in few-flowered terminal umbels; bracteoles 2. Capsules globose, opening at the apex by 4 - 6 valves. Seeds numerous, minute, prismatic.

REFERENCES :

1. Clarke, C. B. (1879). *In :* Hooker, J. D., *Fl. Brit. India* 2 : 526.
2. Gamble, J. S. (1919). *Fl. Pres. Madras*, p. 350.
3. Triana (1871). *Trans. Linn. Soc. London* 28 : 75 t. 5. f. 70.
4. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Plant Conservation Bulletin* 4 : 15. Botanical Survey of India, Howrah.
5. Vivekananthan, K. (1983). *In :* Nair, N. C. & Henry, A. N. (ed.) *Fl. Tamil Nadu*, Ser. 1-*Analysis* 1 : 159. Botanical Survey of India, Coimbatore.
6. Wight, R. (1840). *Ill.* 1 : 217 (As *Medinilla*? *walkeri*).

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Endangered due to loss of habitats. After the type collection in 1889, it was re-collected only once in 1972. Since then it has not been found even after repeated surveys of the area.

DISTRIBUTION : Endemic to Kundha and Avalanche, Nilgiris in Tamil Nadu.

HABITAT AND ECOLOGY : In evergreen Shola forests at about 2400 m.

CONSERVATION MEASURES TAKEN : Nilgiri-Wynaad region has been declared as Biosphere Reserve, and its habitats are now being protected which in turn may protect surviving plants of the species.

CONSERVATION MEASURES PROPOSED : To search in the Nilgiri and adjoining areas for its plants and their introduction in botanic gardens for *ex situ* conservation.

BIOLOGY AND POTENTIAL VALUE : Of botanical and phytogeographical interest as it is confined to a narrow distribution range.

CULTIVATION : Not known.

DESCRIPTION : Large shrubs or small trees. Leaves small, elliptic or elliptic-obovate, nerves obscure; petioles very short. Flowers pale blue, sessile or subsessile in fascicles on axillary or lateral tubercles. Berries greyish.

REFERENCES :

1. Gamble, J. S. (1919). *Bull. Misc. Inf. Kew*, p. 226.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 355 (repr. ed.)
3. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Plant Conservation Bulletin* 4 : 28. Botanical Survey of India, Howrah.

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri-Garhwal.

STATUS : Indeterminate. Represented by type specimens only. Though the Nilgiri area has been well botanised in the recent years by the BSI, the species has not been collected again. The main cause for its possible total depletion in the area is possibly due to large scale denudation of its habitats for plantation crops. Sispara-Nilgiri area is rich in several endemics which have not been located after their type collections.

DISTRIBUTION : Sispara, Nilgiri Hills in Tamil Nadu. Endemic.

HABITAT AND ECOLOGY : In evergreen forests at about 1700 m.

CONSERVATION MEASURES TAKEN : The Nilgiri area has been recently declared as Biosphere Reserve, and thus may now protect its habitats and surviving plants, if any.

CONSERVATION MEASURES PROPOSED : Status survey for the species in the wild habitats and introduction of the plants into botanic gardens through seeds for *ex-situ* conservation; protection of its surviving plants in its natural areas are suggested.

BIOLOGY AND POTENTIAL VALUE : Of botanical and phytogeographical interest due to its restricted distribution.

CULTIVATION : Not known so far.

DESCRIPTION : Large shrubs or small trees. Leaves sub-sessile, up to 9 cm long, ovate-oblong, apex obtuse, base rounded or slightly cordate, nerves 5-paired, conspicuous. Flowers bluish-red, fascicled, 2.5 cm across, singly or in very short peduncled cymes on lateral tubercles or rarely axillary.

REFERENCES :

1. Gamble, J. S. (1919). *Bull. Misc. Inf. Kew* 227.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 356. (repr. ed.). Botanical Survey of India, Calcutta.
3. Vajravelu, E. (1983). *In :* Jain, S. K. & Sastry, A. R. K. (ed.). *Plant Conservation Bulletin* 4 : 28. Botanical Survey of India, Howrah.
4. Vivekananthan, K. (1983). *In :* Nair, N. C. & Henry, A. N. (ed.) *Fl. Tamil Nadu,* Ser. 1-*Analysis* 1 : 161. Botanical Survey of India, Coimbatore.

The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Indeterminate or Possibly Extinct. There is no record of its occurrence in the wild after its type collection. This species was based on the collection of Griffiith made in the last century from Assam. In the recent decades this area has been floristically explored by Kanjilal *et al* (2); Balakrishnan (3) and Haridasan & Rao (4), but this species has not been recorded. The species may have been lost due to extensive loss of forest areas in the region.

DISTRIBUTION : Its precise locality of occurrence is not available in records. Assam and Meghalaya. Endemic.

HABITAT AND ECOLOGY : Data not available; but it is likely that the species grows in the evergreen forests on trees, at low altitudes.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Further botanical explorations in these areas and adjacent areas following Griffith's itinerary, to collect this species, if still surviving. If located, it must be introduced for propagation and further studies into botanical gardens.

BIOLOGY AND POTENTIAL VALUE : A climber of botanical and distributional interest.

DESCRIPTION : Large climbers; branchlets ferrugineous tomentose when young, with cup-like petiole scars present. Leaves 17 - 22 × 4 - 7 cm, lanceolate-oblong, acuminate at apex, rounded at base, glabrous above, pubescent or tomentellous on midrib and nerves beneath; nerves 7 pairs, ascending, anastomosing near margin; petioles 3-5 cm long, swollen, tomentellous. Male inflorescence axillary, tomentose when young. Male flowers: sepals tomentose above; stamens many. Female flowers and fruits not seen.

REFERENCES :

1. Forman, L. L. (1975). *Kew Bull.* 30 (1) : 84.
2. Kanjilal, U. N. *et al* (1934). *Fl. Assam.*
3. Balakrishnan, N. P. (1981). *Fl. Jowai* 1 : Botanical Survey of India, Howrah.
4. Haridasan, K. & R. R. Rao (1985). *For. Fl. Meghalaya.*

The material for this sheet was supplied by Mohan Gangopadhyay, Botanical Survey of India, Central National Herbarium, Howrah.

STATUS : Indeterminate or Possibly Extinct. The species is based on the collection (a male plant) of J. D. Hooker and T. Thomson from Meghalaya in 1850. Later Gallatly collected another fruiting material from Meghalaya in 1878. Afterwards its area has been floristically explored by Kanjilal *et al* (2), Balakrishnan (3) and Haridasan & Rao (4), but this species has not been relocated. Much of the forest areas in Meghalaya have been transformed for cultivation crops. The sacred groves in Meghalaya represent the relict flora of the area, and the species may still be found in some of those groves.

DISTRIBUTION : Endemic to Meghalaya.

HABITAT AND ECOLOGY : Subtropical evergreen forest, between 600 - 1200 m altitudes.

CONSERVATION MEASURES TAKEN : Nokrek and Balphakram areas in Meghalaya are now protected as reserves. The Sacred Groves in Meghalaya form the last refugia of many a rare species.

CONSERVATION MEASURES PROPOSED : Exploration of the type locality and adjacent areas to collect this species; if located, the species must be introduced for propagation and further studies into botanical gardens as also into the Sacred Groves in Meghalaya.

BIOLOGY AND POTENTIAL VALUE : Flowers and fruits in May. A climber of botanical interest.

DESCRIPTION : Climbers, branches striate, pilose or glabrous. Leaves 8 - 15 × 5 - 8 cm, deltoid-ovate, mucronate at apex, truncate or rounded at base, papery, glabrous above, pilose beneath, palmately 5 - 7 -nerved; petioles 1.0 - - 2.5 cm long. Male inflorescences lax, branches filiform. Male flowers: Sepals campanulate, glabrous. Petals cyathiform, 1 1.5 mm long. Synandrium *ca* 2.5 mm long. Female flowers not seen. Infructescence up to 12 cm long. Drupes obovoid, compressed, pilose; endocarp tuberculate; seeds curved.

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The material for this sheet was supplied by Mohan Gangopadhyay, Botanical Survey of India, Central National Herbarium, Howrah.

STATUS : Insufficiently Known. The species is suspected to be extremely rare and endangered. At present this species is known to be extant only at a single locality where its populations are extremely rare. It could not be collected from its type locality during the field surveys conducted in the area in recent years. After a lapse of over 70 years or more since its original gathering, it was located in the submergible area of the proposed dam site on the banks of Kunthipuzha river in Silent Valley, Palghat District. Notwithstanding the fact that the natural habitats in the region are by and large under threat due to various anthropogenic causes, this particular area in Silent Valley will be under threat of complete inundation if the earlier proposed plan to construct a dam across Kunthipuzha river is revived and executed. This could only mean extinction for the species in question.

DISTRIBUTION : Endemic to a very narrow range of the Southern W. Ghats in Peninsular India (1). The species was first reported from Wynaad in 'Malabar' region. However, at present the species is apparently restricted only to Silent Valley area in Palghat District of Kerala. A dubious report (5) from Khandala in Northern W. Ghats remains unconfirmed. It was also reported from Goa (4) apparently based on very scant material and, as such, this report needs to be confirmed through further field studies.

HABITAT AND ECOLOGY : The species is found growing as an undergrowth component in evergreen forests in the hills at moderate elevations. The only populations found in recent years were found growing along a river bank.

CONSERVATION MEASURES TAKEN : The Silent Valley area has been declared as protected, following the conservation movement against the plan on Hydroelectric project.

CONSERVATION MEASURES PROPOSED : Monitoring of all known surviving populations is a primary requisite. Further surveys must be conducted in its natural range in an attempt to locate some extant populations, if any. However, priority must be given to protect the only known pocket. Construction of a dam across the Kunthipuzha river at this particular site could inundate a large forest area destroying this rare endemic species alongwith many other interesting elements of local flora. As such, the proposal to construct a dam in the Silent Valley area should not be taken up in the interest of the overall ecology of the area. Attempts must be made expeditiously to raise seedlings under laboratory conditions so as to facilitate transfer and rehabilitation in conducive sites along its natural range. Preservation of this species in botanical gardens and conservatories is also called for.

BIOLOGY AND POTENTIAL VALUE : The species comes to flower during January-April. Besides being of biological and phytogeographical interest, its potential in any particular sphere of utility is not yet known. However, its allied species, *Cyclea peltata* (Lam.) Hook. f. & Thoms., a climber found both in wild and under cultivation in subtropical parts of the region, is a useful plant; its leaves being used to prepare a local beverage while its rhizome is used in antifebrile medicine. Pharmacognostic studies may be undertaken to examine if *C. fissicalyx* has any similar properties. However, at present *C. fissicalyx* is rather too rare to be put to any use.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Slender glabrous woody climbers. Leaves peltate, 12×6 cm, ovate, acuminate at apex, palmately nerved. Flowers greenish yellow, in small panicled heads. Calyx campanulate; sepals 4-lobed, cleft almost to the base. Corolla globular; petals connate. Anthers (in male flowers) connate into a ring atop the staminal column, transversely dehiscent. Ovary 1; pistil (in female flowers) short and hairy ; style trifid. Fruits drupaceous, ovoid, dorsally tuberculate, with style-scar near basal end. Seeds curved into horse-shoe shape; embryo slender, semi-terete, embedded in endosperm.

This species does not appear to be very much distinct from *Cyclea peltata* (Lam.) Hook. f. & Thoms. except for the deeper lobation of its sepals, which are divided nearly to the base. According to Rao (1955) it seems rather variable on this count too, showing teeth-like calyx segments in some flowers (buds) of the same specimen. As such, the taxonomic status of this species merits a review.

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The material for this sheet was supplied by M. Ahmedullah and Geeta Haldar, Botanical Survey of India, Howrah.

STATUS : Indeterminate or Possibly Extinct. Diels (1) described this species based on the collection (a male plant) of G. Watt from Nagaland. However, there has been no further collection for over 7 - 8 decades.

DISTRIBUTION : Endemic to Nagaland.

HABITAT AND ECOLOGY : No data available.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Exploration in the type locality and adjacent areas to search out this species. It must be introduced into botanical gardens for propagation and further studies, if located.

BIOLOGY AND POTENTIAL VALUE : Flowers in May. Fruits not known. A climber of botanical and distributional interest.

DESCRIPTION : Climbers. Leaves 6 - 9×3 - 5 cm, broadly ovate or lanceolate, acuminate at apex, truncate at base, glabrous above, pilose beneath; petioles 3 - 5 cm long, glabrous. Male inflorescence subaxillary, 4 - 6 cm long, pilose; pedicels 1 1.5 mm long; bracts foliaceous; bracteoles 1 - 1.5 mm long, ovate, acute, pilose. Flowers glabrous; sepals 5 - 8; 1 1.5 mm long, oblong or elliptic ; petals 4 - 7, unequal, obovate or linguiform; synandrium 0.5 - 1 mm long. Female flowers and fruits not seen.

REFERENCE :

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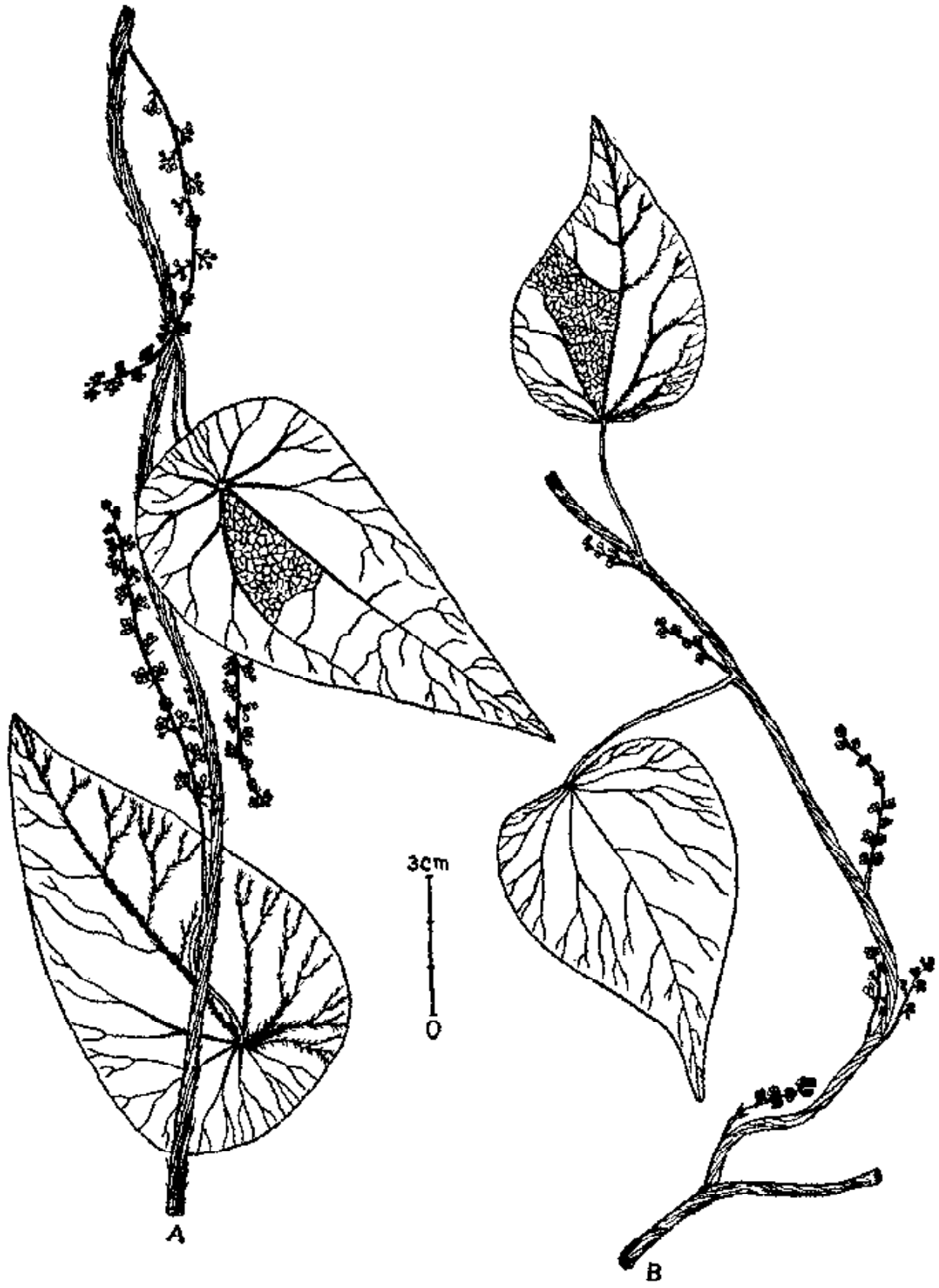
The material for this sheet was supplied by Mohan Gangopadhyay, Botanical Survey of India, Central National Herbarium, Howrah.



A. *Cyclea debiliflora* Miers. B. *Cyclea watti* Diels

STATUS : Indeterminate. Only a few collections are available.

DISTRIBUTION : South Andamans. Endemic, apparently rare.

HABITAT AND ECOLOGY : In inland forests amidst understorey as climbers.

CONSERVATION MEASURES TAKEN : Mt. Harriet in South Andamans is declared as National Park.

CONSERVATION MEASURES PROPOSED : Intensive explorations may help in locating it in other areas of the islands. Its introduction in gardens is worthy for multiplication and studies.

BIOLOGY AND POTENTIAL VALUE : Not known. Many other menispermaceous taxa are of ethnobotanical interest and medicinal value with alkaloid contents.

CULTIVATION : Not known.

DESCRIPTION : Climbers. Leaves rotund, peltate. Male inflorescence paniculate, pendulous glabrous, 40 - 60 cm long, arising on stems, branches primarily divaricate spreading, basal ones 20 - 25 cm long, gradually reduced towards above, and apically corymbose-umbellate, for most of the length without flowers. Pedicels filiform, 5 - 7 mm long. Sepals glabrous, obovate-elliptic, with slightly less broad. Petals 3, thickened, margins incurved. Filaments synadrous, less than 1.2 mm long; anther disc 0.8 mm diam. Female flowers and fruits unknown.

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The material for his sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and M. K. Vasudeva Rao, Botanical Survey of India, Port Blair.

STATUS : Rare.

DISTRIBUTION : Endemic to South Andaman Island. Apprently sparsely distributed.

HABITAT AND ECOLOGY : Occurring in tropical evergreen forests.

CONSERVATION MEASURES TAKEN : Mt. Harriet in South Andaman is declared as a National Park.

CONSERVATION MEASURES PROPOSED : The species should be located in the South Andamans and introduced in gardens and arboreta.

BIOLOGY AND POTENTIAL VALUE : May be an useful ornamental avenue tree.

CULTIVATION : Not known.

DESCRIPTION : Glabrous, evergreen trees about 24 m tall; branchlets hollow. Stipules linear-lanceolate. Leaves obovate-oblong, rounded or attenuate at base, bluntly acuminate at apex, entire or obscurely wavy crenate, thin chartaceous, 12 - 25 cm long, 3 - 5 - nerved at base, nerves uniting near margin; petiole slender, stiff, 2 - 6 cm long. Receptacles arising in dense clusters from tubercle-like leafless branchlets or stems, or in pairs in axils of leaves, globular or umbonate, size of a small cherry, borne on peduncles of 2 - 2.5 cm. Male flowers monandrous. Female with stigma usually thickened and papillose. Seeds reticulate.

REFERENCES :

1. Corner, E. J. H. (1959). Taxonomic notes on *Ficus* Linn. in Asia and Australia. 1. Subgen. Urostigma (Gasp.) Miq. *Gard. Bull. Singapore* 17 : 368-485.
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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and M. K. Vasudeva Rao, Botanical Survey of India, Port Blair.

STATUS : Endangered. This arborescent species is at present known to be extant at a single discrete locality, where its natural habitat is under threat due to various anthropogenic factors. The last remaining populations of this extremely rare species are being reduced to critically low levels by exploitation and steady degradation of natural forests. As such, the species is in imminent danger of extinction. The species represents a monotypic endemic genus of very narrow distribution, by virtue of which it is phytogeographically and biologically a very interesting plant.

DISTRIBUTION : Endemic to Southern W. Ghats of Peninsular India (1). Though it was earlier recorded from Wynaad (Kerala) and Nilgiri hills (Tamil Nadu) by Beddome and Lawson respectively, no latter day collections from these two areas are known to date. It was reportedly quite common in its type locality, 'Devala' (Devalicottah), in SE Wynaad (4), but at present the species has become completely depleted in that area. After a lapse of about 100 years it was located at Theerthundamala (975 m altitude), Chandanthode, Cannanore District of Kerala in 1979. At present it is very much localised, being restricted to Theerthundamala only.

HABITAT AND ECOLOGY : This tree species is found growing as a component of evergreen forest in the hills of Southern Western Ghats. It has been recorded between 600 and 1000 m altitude.

CONSERVATION MEASURES TAKEN : None specifically for the plant in question. Though the Nilgiri area has been declared as a Biosphere Reserve this particular species has apparently become depleted in that area, even earlier.

CONSERVATION MEASURES PROPOSED : The foremost task would be to fence off the remnant of the natural vegetation at Theerthundamala, so that the last surviving populations of this species can be protected. A thorough assessment of habitat conditions is called for. Attempts must be made to remove altogether or at least mitigate the causes that are threatening the survival of this species. Artificial regeneration methods must be employed to raise populations in arboreta or plant conservatories. Studies must be made to see if the plant coppices well enough for propagation by vegetative means. Tissue culture technique might well turn out to be a viable alterative. Seedlings thus raised must then be rehabilitated into the wild for natural growth and spread.

BIOLOGY AND POTENTIAL VALUE : Earlier records indicate that the tree flowers during December-April, but at its present known locality (Theerthundamala) it has been observed to flower during February-August. Fruiting specimens could not be collected so far. Its potential uses, if any, are not yet known. But other myrtaceous species of its allied genera are useful.

DESCRIPTION : Small trees, up to 5 m tall. Leaves opposite, 8.5×2.5 cm elliptic-oblong to oblong lanceolate, apex acuminate, base acute, entire, membranous, villous when young, later glabrous, secondary veins distantly spaced and looping into an intramarginal vein. Flowers *ca* 2 cm long, white, solitary or on supra-axillary pedicels; pedicels villous;

bracteoles linear. Calyx-tube with annular disc at the mouth; lobes 4, lanceolate, longer than the petals, villous. Petals 4, oblong, pellucid-punctate, cilliate. Stamens numerous, inserted in a ring on the disc; anthers small, dehiscing longitudinally. Ovary 2-locular, ovules 4 in each locule, pendulous from apex; style elongate; stigma sub-capitate. Fruits not known.

REFERENCES :

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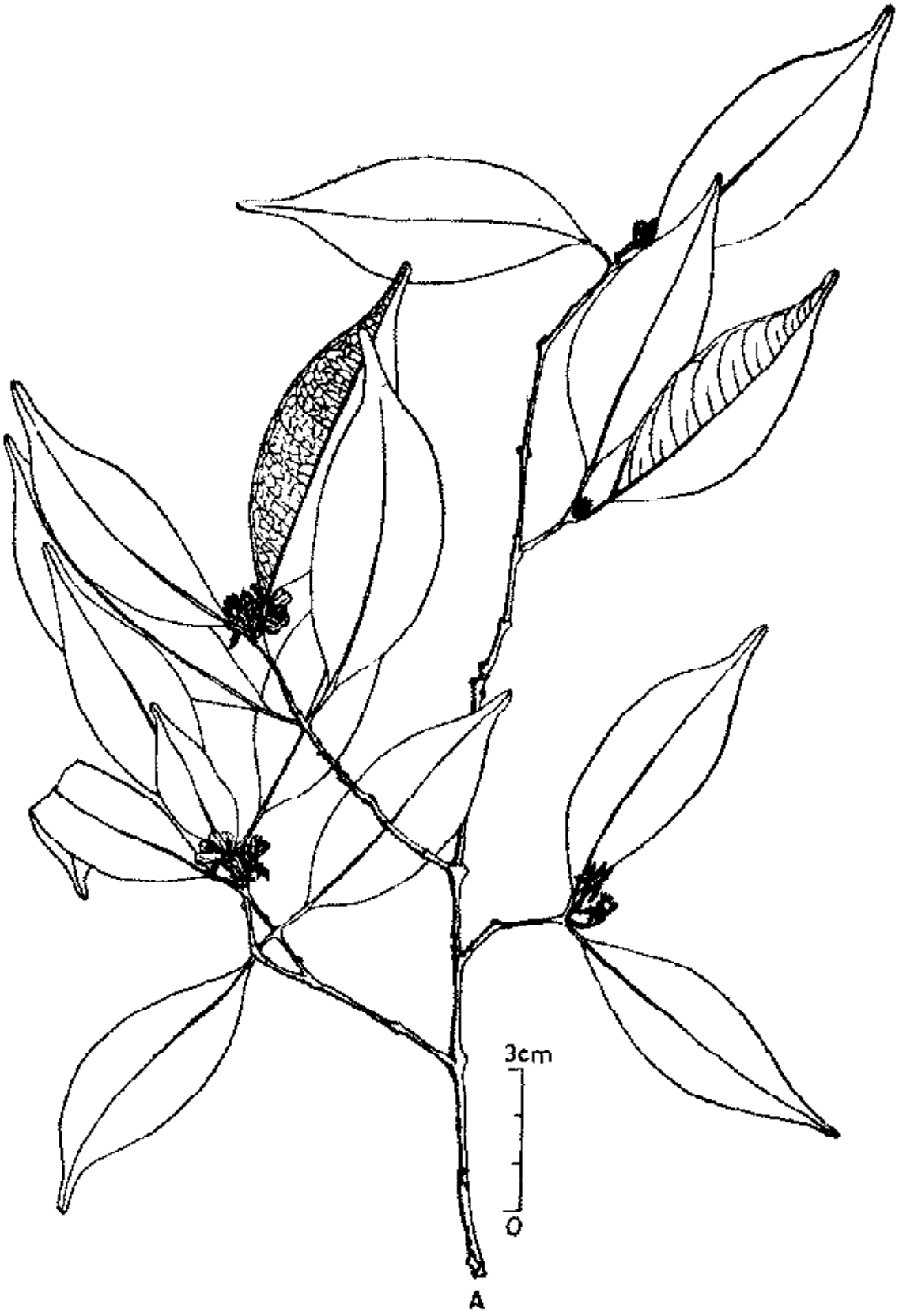
The material for this sheet was supplied by M. Ahmedullah, Botanical Survey of India, Calcutta.



Meteoromyrtus wynaadensis (Bedd.) Gamble

STATUS : Indeterminate; known only from type collections.

DISTRIBUTION : Andaman Islands. Endemic.

HABITAT AND ECOLOGY : Evergreen rain forests.

CONSERVATION MEASURES TAKEN : The protected areas come under Wildlife Sanctuaries and National Parks. They are : Saddle Peak National Park, Button National Park, Mt. Harriet National Park, Narcondum Wildlife Sanctuary, Barron Island Wildlife Sanctuary; North Reef Wildlife Sanctuary and South Sentinal Wildlife Sanctuary. The species may still be present in these protected areas which need intensive survey.

CONSERVATION MEASURES PROPOSED : It is proposed to develop more protected areas in these islands covering all fragile vulnerable ecosystems. They are: Land Fall Island, Table Island, Shearme Island, Sir Hugh Rose Island, Interview Island, Outram and Button island group, Spike Island, Kyd Island, South Islands, Parkinson Island, Flat Island, Rutland Island and Little Andaman. These islands are small and unless biotic pressure is reduced, they may become 'death traps' of many endemic species in the islands.

BIOLOGY AND POTENTIAL VALUE : The biology of this species is not known.

CULTIVATION : Not cultivated; high priority is to be given for locating the species and for introducing the species in botanic garden and arboretum of the Botanical Survey of India at Port Blair.

DESCRIPTION : Glabrous small trees. Leaves 4 - 8×2.5 - 5 cm, rotund-ovate to broadly elliptic, base acute, apex acuminate, coriaceous, lateral nerves more than 20; petioles *ca* 6 mm long. Inflorescence terminal or axillary, fasciculate compound cymes; peduncles quadrangular. Flowers tetramerous, white. Calyx tube nearly 12 mm long, with four erect, triangular teeth. Petals orbicular. Fruits not known.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and M. K. Vasudeva Rao, Botanical Survey of India, Port Blair.

STATUS : Rare. It is a sparsely distributed narrow endemic and an island species, which faces extinction unless conservation measures are taken up.

DISTRIBUTION : Restricted to Middle Andaman Island; endemic. The collections are so far only from the type locality in the island.

HABITAT AND ECOLOGY : The species occurs in the semi-evergreen forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Since there are no National Parks in the Middle Andaman, it is proposed that the Mount Diavolo area be protected as a National Park.

BIOLOGY AND POTENTIAL VALUE : Species of *Syzygium* are known for their edible fruits. The biology of the species is not studied.

CULTIVATION : Not known; however, it is necessary to identify viable populations in Middle Andaman for *in situ* conservation. *Ex situ* introduction of species in the experimental garden and arboretum of BSI at Port Blair is proposed.

DESCRIPTION : A moderate sized tree with a light brown smooth bark; branchlets rounded. Leaves 6 - 12 cm long, 4 - 7 cm broad, elliptic, shortly acuminate, base acute, lateral nerves 5 - 8 pairs, joined by the intramarginal veins rather far from the margin; petiole 1 cm long. Flower 1 cm in diam., white, fragrant, in axillary panicles from the scars below the leaves. Fruit nearly 1.25 cm in diam., depressed globose.

REFERENCES :

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and Ramesh Kumar, B. S. I., ANC, Port Blair.

STATUS : Rare; endemic, known only from the type locality. Though the species is recently described (1) its is seen to be growing in habitats which are much disturbed and hence the possibility of its loss in the near future.

DISTRIBUTION : Saddle Peak in North Andaman Island. This species is sparesely distributed.

HABITAT AND ECOLOGY : The species occurs in the scrub forests on red laterite soil. The wind exposed mountain peak of Saddle Peak has a characteristic stunted flora. The species is characterised by usually one leaf, rarely with one lateral leaflet.

CONSERVATION MEASURES TAKEN : The Saddle Peak area has been recently declared as National Park, and may provide protection to the species.

CONSERVATION MEASURES PROPOSED : It is necessary to introduce *Jasminum unifoliolatum* in the experimental garden of the Botanical Survey of India at Port Blair and to popularise it as an ornmenatal plant.

BIOLOGY AND POTENTIAL VALUE : Species of *Jasminum* are of ornamental value. The biology of the species is not studied.

CULTIVATION : Not cultivated.

DESCRIPTION : Scandent shrubs. Leaves opposite, usually simple unifoliolate, very rarely with one lateral leaflet, glabrous, dark green above, 7 - 11 × 4 - 6 cm; petioles articulate, geniculate, terminal. Flowers white, heterostylous, sessile or subsessile; calyx tube 2 mm long, pubescent, lobes 4 - 5, 2 mm long, ovate-triangular; corolla funnel-shaped, white, tube 1.6 - 2 cm long, lobes 5, 5 - 6 × 3 - 4 mm; stamens 2; in long-styled flowers attached below the middle of the corolla tube, in short-styled flowers attached above the middle of the corolla tube; anthers 3.0 - 3.5 mm long; ovary 2-loculed; locules 2-ovuled or rarely 1-ovuled; style filiform, longer style 2 mm long, shorter style 1 mm long, stigma bilobed. Fruit carpels 1.2 - 1.5 cm long, ellipsoid-oblong.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Endangered, due to the restricted distribution, limited number of individuals in each population and deforestation and logging of its host trees for timber extraction and rehabilitation purposes.

DISTRIBUTION : Endemic to Middle Andaman Island. Since the type collection, the species was collected only once from Rangat forests of Middle Andamans on 4 Nov. 1977 by Bhargava (6372 in PBL).

HABITAT AND ECOLOGY : Epiphytic on trees in lowland semievergreen inland forests, often associated with *Dendrobium crumenatum* Sw.

CONSERVATION MEASURES TAKEN : No specific measures taken. All orchids are included in Appendix 2 of CITES, hence export of their plants from the wild is banned from India.

CONSERVATION MEASURES PROPOSED : This species should be collected again and cultivated in Port Blair Botanic Garden and other tropical botanic gardens and propagated. Efforts should be made for mass propagation by tissue culture methods and reintroduction in original natural habitats. The forest should be conserved as Biosphere Reserve.

BIOLOGY AND POTENTIAL VALUE : Botanically interesting, being one of the few species of the section *Rhopalanthe* of the genus, closely related to certain Malaysian species.

CULTIVATION : Can be grown on tree trunks or in pots with charcoal mixed with brick pieces and humus. The species thrives well in hot humid climate with adequate sunlight

DESCRIPTION : Epiphytic with many stems clustered together, 25 - 45 cm long, rooting at bases of branches; basal 1 - 2 nodes not thickened, next 3 - 4 pseudobulbous, 6-10 cm long, 4 - 6 mm thick; upper portions branched, slender, *ca* 2 mm thick, covered with striate leaf-sheaths. Leaves linear, filiform, semi-terete, 10 - 15 cm long, 1 - 2 mm thick, strongly nerved. Flowers solitary in axils of leafless nodes of previous year's branch, *ca* 1.8 cm long, *ca* 1.5 cm wide, white with yellow stripe on lip ending into a papillate green patch at base of midlobe. Dorsal sepal elliptic-ovate; lateral sepals falcate, acute. Petals lanceolate, acute. Lip wedge-shaped; lobes thin, flimsy, rounded; side lobes erect; midlobe strongly bent downward. Column *ca* 4 mm long; operculum ovoid; pollinia 4, unequal, ellipsoid.

REFERENCES :

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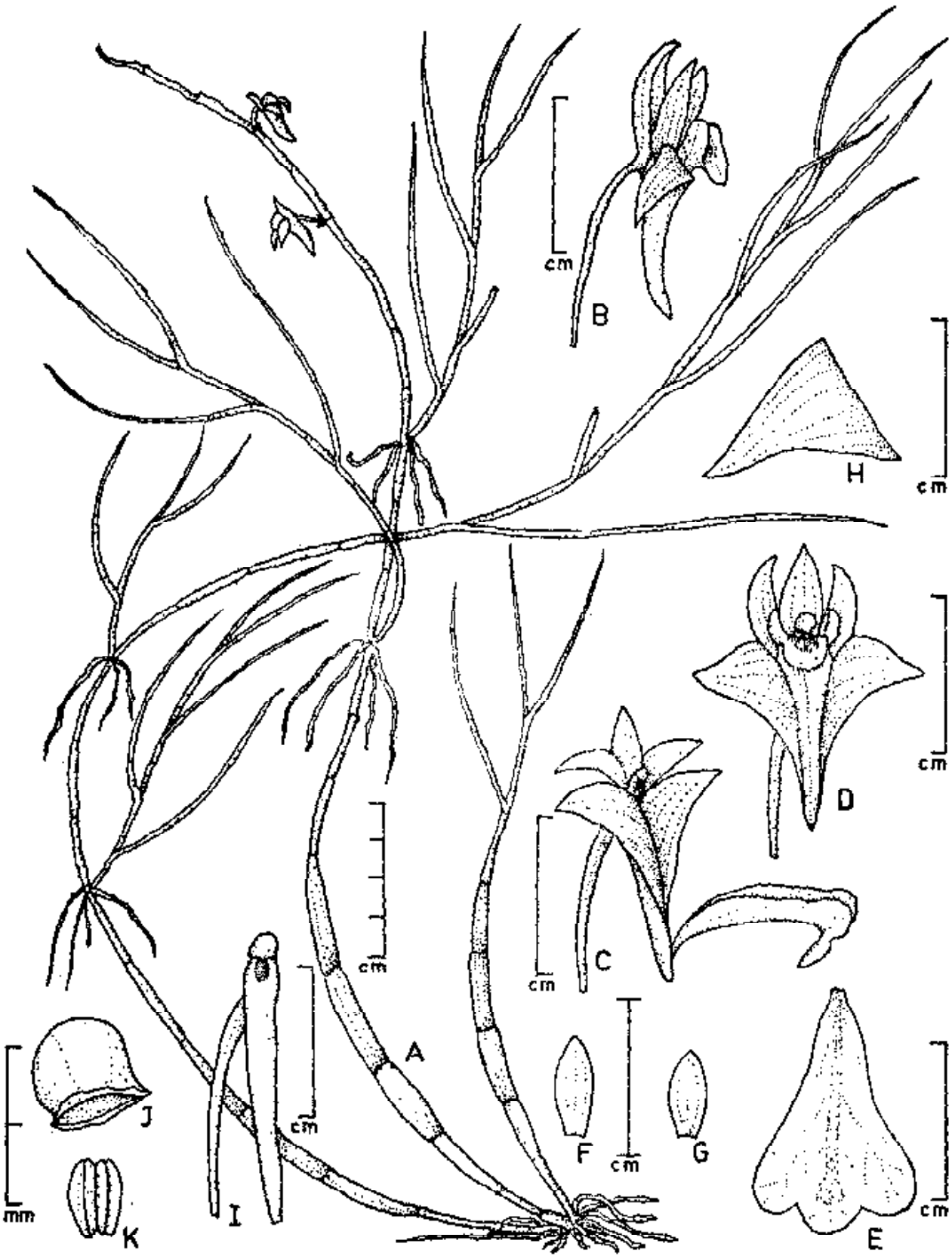
The material for this sheet was supplied by N. P. Balakrishnan, Botanical Survey of India, Southern Circle, Coimbatore.



Dendrobium tenuicaule Hook. f. A. Habit. B, C, D. Flower—different views. E. Lip. F. Dorsal sepal. G. Petal. H. Lateral sepal. I. Column, foot & pedicel. J. Operculum. K. Pollinia.

STATUS : Rare. The species is sparsely distributed in localised area being known from type locality.

DISTRIBUTION. South Andaman Island, Mt Augusta. Endemic.

HABITAT AND ECOLOGY : Terrestrial herb and occurs amidst other ground flora in shady, moist parts of the inland forests. The soils are rich in humus and are slightly acidic.

CONSERVATION MEASURES TAKEN : Mt. Harriet in South Andaman has been recently declared as a National Park, which gives partial protection.

CONSERVATION MEASURES PROPOSED : It is proposed to develop more protected areas in the island system covering all fragile and vulnerable areas. Andaman and Nicobar Islands are small and unless biotic pressure is reduced, the islands may become 'death-traps' of several island endemic species.

BIOLOGY AND POTENTIAL VALUE : The biology of the species is not studied; potential value as an ornamental plant is to be assessed.

CULTIVATION : Not cultivated. Priority is to be given for cultivating this species in botanic garden.

DESCRIPTION : Terrestrial tuberous herbs; stem 20 - 30 cm. Leaves crowded ovate-lanceolate, acute. Racemes 12 - 16 cm long, lax-fid; bracts lanceolate, rather shorter than the ovary, upper segment of petals very slender, lower broader divided above the middle into 3 filiform laciniae, side lobes of lip palmately multifid, mid-lobe linear, 3-fid; spur shorter than the ovary; anther cells parallel, tubes rather shorter than the cells; glands of pollina minute; stigmatic processes subcylindric elongate; rostellum erect.

REFERENCES :

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and P. S. N. Rao, Botanical Survey of India, Port Blair.

STATUS : Rare; only known from 2 localities including the collection of its type in Satara district. Endemic.

DISTRIBUTION : India. Satara and Sindhudurg districts, Western Ghats in Maharashtra State.

HABITAT AND ECOLOGY : In moist open situations among grasses.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : The type locality should be protected and neighbouring areas be thoroughly searched for this species. Though it presently faces no immediate threat in the locality, but being restricted to a very small area in Western Ghats in Maharashtra it needs conservation. The plants be introduced and grown in the National Orchidaria of the Botanical Survey of India.

BIOLOGY AND POTENTIAL VALUE : Flowers in August-September. Most of the Habenarias are biologically interesting ground orchids with underground tubers and many flowered attractive long inflorescences of ornamental value.

CULTIVATION : None.

DESCRIPTION : Terrestrial orchid, 10 - 20 cm tall, tuberous. Leaves radical or subradical, oblong or oblong-lanceolate or elliptic, 2 - 8 × 0.6 - 2.5 cm, apex acute, minutely papillate. Flowers white, faintly fragrant, in 5 - 15 cm long racemes; sepals unequal; petals obliquely ovate, lip broadly ovate in outline, 3 - lobed, lateral lobes oblong, midlobe broadly lanceolate, slightly longer than laterals; spur straight or slightly curved, 0.8 - 1.1 cm long. Capsules spindle-shaped, 2.5 cm long.

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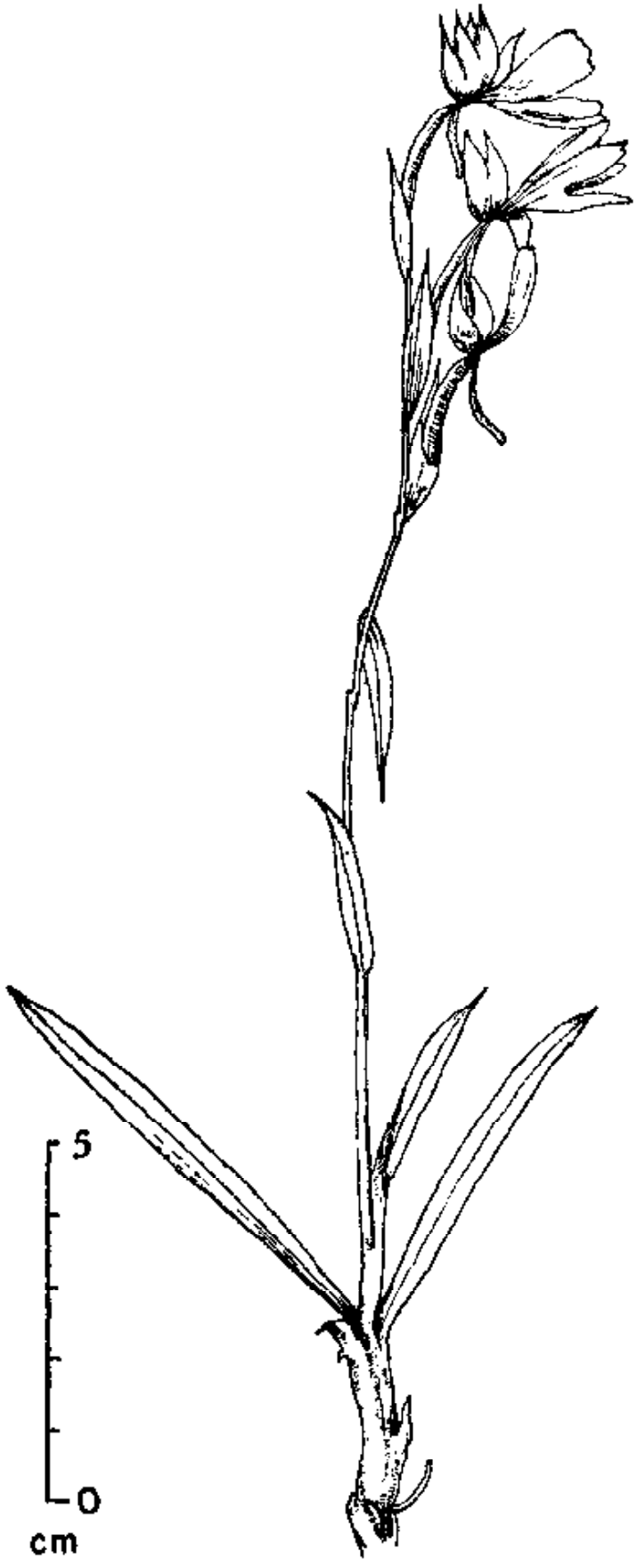
The material for this sheet was supplied by N. P. Singh and B. G. Kulkarni, Botanical Survey of India, Pune.



Habenaria panchganiensis Sant. & Kapad.

STATUS : Rare. The apparent cause of its rarity is overexploitation of natural populations. Loss of habitat is also another causative factor. This Lady's Slipper Orchid is of high ornamental value and, as such, is being indiscriminately collected for use in private gardens as well as for commercial trade. At present wild populations of this species are virtually on the verge of depletion, being found only in isolated pockets in its entire distribution range.

DISTRIBUTION : NE India. The species was first located in the Khasia hills by Capt. Williamson during 1868 - 69. At present it is thinly scattered in Mizo, Naga and Jowai hills, where it was recently located. Outside India, it is also reported from Thailand and Vietnam.

HABITAT AND Ecology : It is found growing in hilly forest tracts, usually as an undergrowth component. It grows well in humus-rich soils. It was recorded between 1200 - 1500 m altitudes.

BIOLOGY AND POTENTIAL VALUE : It is lithophytic and, rarely, semi-epiphytic. Its flowering period is February-April. Other Lady Slipper Orchids, viz. *Paphiopedilum bellatulum*, *P. fairrieanum*, *P. insigne*, *P. spicerianum*, *P. venustum* and *P. villosum* have been popularly used for producing exquisitely beauteous hybrids of high commercial value. *P. hirsutissimum* might be gainfully employed for creating horticultural novelties.

CONSERVATION MEASURES TAKEN : None for this species in particular. However the species is included in Appendix II of CITES (Orchidaceae) which calls for a ban on their illegal trade.

CONSERVATION MEASURES PROPOSED : Intensive search in its natural range for the purpose of monitoring all existing populations is a prerequisite of primary importance. Subsequently specific areas which form its natural habitats must be identified and duly protected, by the way of declaring those as plant sanctuaries. Collection of this plant must be brought to an end through imposition of stringent laws. It must be extensively propagated in Botanical gardens, conservatories or orchidaria.

CULTIVATION : It is in cultivation in the national orchidaria of the Botanical Survey on India at Shillong, Barapani and Yercaud and also in some private nurseries in NE India.

DESCRIPTION : Herbs. Leaves 3 - 5, 30 - 40 × *ca* 4 cm, linear-lanceolate, acute, fleshy, dark olive green. Scape up to 30 cm long, purple hairy, with solitary flower at the apex. Flowers 12.5 - 15 cm across, segments ciliated; dorsal sepal 4.0 × 3.5 cm, ovate, distinctly keeled, pale green with darker shade in the centre and base, veins purplish; petals spreading, 6.5 - 7.6 cm long, spathulate, hairy, waxy at base, dark purple and green; labellum 5.0 cm long, green, with dark purple spots, minutely warted; staminode quadrate, angles rounded, green with hirsute base and 2 white spots.

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The material for this sheet was supplied by M. Ahmedullah and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Rare. Popularly known as the 'Blue Vanda', this species is much in demand for its beautiful ornamental flowers. Being a commercially marketable orchid it was indiscriminately collected by both amateurs as well as by professionals. Way back in 1847 when J. D. Hooker botanised the Khasia hills he reportedly remarked upon the abundance of *V. coerulea* blooms in the forests. Unfortunately it is no longer so now. The wild populations of this species have been greatly depleted due to exploitation and habitat destruction throughout its distribution range.

DISTRIBUTION : India : E. Himalayas and NE region. (The species was first collected from Khasia hills by Griffith. Subsequently it was located in parts of Assam, Arunachal Pradesh, Manipur, Meghalaya and Nagaland in NE India). Also reported from Burma and Thailand.

HABITAT AND ECOLOGY : Found growing in mixed pine forests on hills between 1300 - 2000 m altitudes, usually on *Quercus* spp.

BIOLOGY AND POTENTIAL VALUE : Flowering and fruiting period is September-February, with peak flowering season being October-November. The species is rated high in breeding new horticultural varieties. It has been widely used in the breeding of hybrid novelties like *Vanda rothschildiana*, which is highly valued in horticulture trade. Immense scope yet remains to fully exploit the potential of this species through interspecific or intergeneric hybridisation.

CONSERVATION MEASURES TAKEN : This species is included in the Appendix I of CITES and its trade is totally banned. A few sets of the species are under *ex situ* conservation in the National orchidaria of the BSI at Shillong, Barapani, Yercaud and in some private nurseries and orchidarium of the Arunachal Pradesh State Govt., at Tipi.

CONSERVATION MEASURES PROPOSED : Monitoring of all existing wild populations and protecting their natural habitats is the foremost requirement. Except for scientific studies, collection of this species from the wild must be totally stopped. The species must be well stocked in botanical gardens, conservatories and local orchidaria for *ex situ* conservation.

CULTIVATION : It is locally cultivated although its natural populations have been much depleted in the past.

DESCRIPTION : Epiphytic herbs; stems stout, robust, upto 15 - 60 cm high. Leaves 10 - 20 $\times$ 1.4 $\times$ 2.5 cm, strap-shaped, obliquely truncate at apex, leathery, keeled, stiff, dark green. Inflorescences 1- 3, erect or suberect, 25 - 60 cm long, 10 - 20 -flowered. Flowers 7 - 10 cm across, pale lavender or dark blue; sepals and petals 4.0 - 4.5 $\times$ 2.0 - 2.5 cm, obovate or orbicular-oblong, obtuse or rounded at apex, spreading, obscurely tessellate; labellum 3-lobed, 2.2 cm long, linear-oblong, dark blue; lateral lobes *ca* 2 mm long, cuspidate, incurved; middle or apical lobe linear-oblong, emarginate at apex, fleshy, with 2 keels ending in swollen tips; spur *ca* 5 mm, concial, obtuse.

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The material for this sheet was supplied by M. Ahmedullah, and A. R. K. Sastry, Botanical Survey of India, Calcutta.

STATUS : Endangered. The only known surviving populations of this arborescent species are from a single locality, where its natural habitat is threatened by various anthropogenic factors. The species was originally recorded from Anamalai hills in Coimbatore, but is apparently depleted in the type locality now. Recent plant surveys did not yield this species in the Anamalai hills. After a lapse of over seven decades it was located at Irumbupalem, Trivandrum District in Kerala in 1981. This species is of special interest as it represents a monotypic endemic genus with a very narrow restricted distribution.

DISTRIBUTION : Endemic to the Southern W. Ghats in Peninsular India (1). It was originally collected from a few localities viz. Poonachi, Tarakadavu Valley etc. in Anamalai hills, Coimbatore, Tamil Nadu. A solitary collection is also known from the adjoining Palghat area in Kerala. Its record from Irumbupalem in Trivandrum (Kerala) is new to that district.

HABITAT AND ECOLOGY : Known to grow in evergreen forests between 600 m and 1500 m altitudes in the hills. It is found growing in open rocky slopes or in crevices of rocks.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : The last known surviving populations at Irumbupalem must be given protection on priority basis. The area must be included within a nature reserve or plant sanctuary. Preservation of the species in plant conservatories is essential at this juncture. Artificial regeneration methods must be used to raise stocks in arboreta or botanical gardens for subsequent transfer of the species to suitable pristine sites with conducive ecological conditions. Concerted efforts must be made to locate this species in the adjoining hill ranges. Monitoring of all surviving populations must be made through demographic approaches.

BIOLOGY AND POTENTIAL VALUE : Flowering specimens were collected in April, May and October. At present its potential is not known. However, it is of phytogeographical and biological interest.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : A shrub, up to 1.5 m high, glabrous. Leaves opposite, whorled or scattered, usually clustered at the ends of young branches, 6.5 - 8.5 × 0.8 - 1.0 cm, linear-lanceolate, apex attenuate, base cuneate, margin subcrenulate. Cymes dichotomous, axillary or terminal, on glabrous branches. Calyx 5-lobed; lobes ovate. Corolla rotate, 5-lobed, slightly overlapping and twisted to the right; corona scales 5, small, rounded. Stamens inserted at the base of the corolla-tube; filaments short; anthers ovate, pointed at apex, connivent over and adnate to the style apex; arms of pollinia short, almost rounded. Ovary bicarpellate; ovules numerous in each locule; stigmatic disc convex on the top. Follicles with 2 mericarps; mericarps *ca* 0.5 cm long, lanceolate, divaricate, smooth, glabrous. Seeds broadly ovate, thin, white coma at micropylar end.

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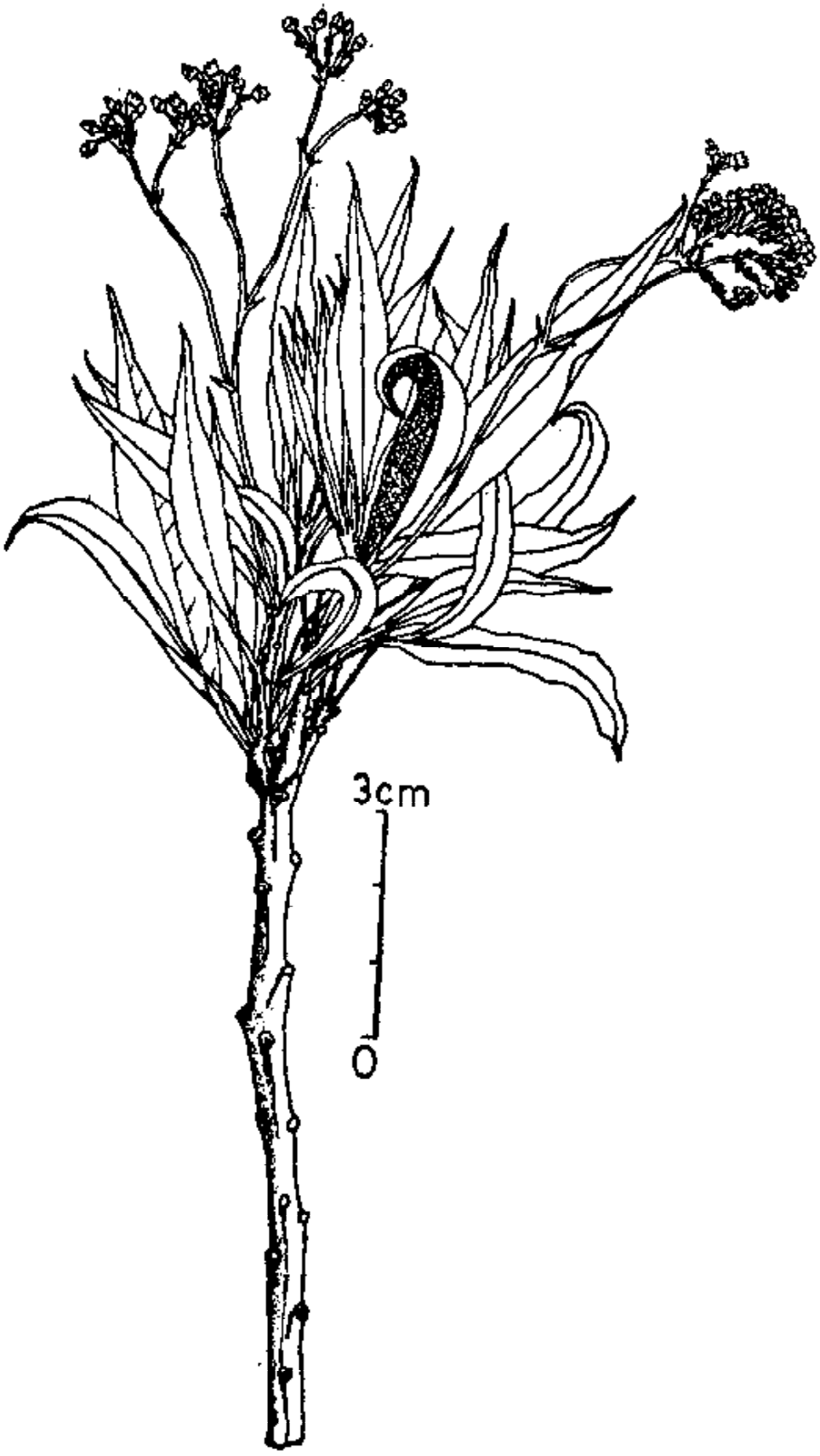
The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.



Utleria salicifolia Bedd.

STATUS : Vulnerable. Due to clearing of forests for commercial plantations such as rubber, cocoa, the species and its habitats are threatened. It is represented by old collections and has not been collected during recent botanical explorations in the region.

DISTRIBUTION : Endemic to Merchiston Estate, Travancore, Kerala.

HABITAT AND ECOLOGY : Found in evergreen forests at about 750 m altitude.

CONSERVATION MEASURES TAKEN : The species though included in threatened plants list, no conservation measures have been taken so far.

CONSERVATION MEASURES PROPOSED : The destruction of its habitats should be checked. Intensive search for the species should be undertaken. If located the area should be protected.

BIOLOGY AND POTENTIAL VALUE : Of botanical and phytogeographical importance as it belongs to a primitive family and is confined to a restricted locality.

CULTIVATION : None on record.

DESCRIPTION : Climbing shrubs. Leaves 3-foliolate, sometimes coarsely toothed. Flowers many in panicles; sepals puberulous; petals absent; stamens many, connective produced considerably beyond the anther; carples numerous. Fruit a head of many stalked achenes with long feathery styles.

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The material for this sheet was supplied by Anis A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Rare; due to habitat destruction.

DISTRIBUTION : Endemic to Nilgiri (Coonoor, Korakundha, Naduvattum), Tamil Nadu. The last collection was made by Shetty in January, 1971 from Korakundha (MH-37713). Since then several botanists have visited the area but the species has not been spotted. It seems it is surviving by very few individuals.

HABITAT AND ECOLOGY : In evergreen forests from 1800-2400 m.

CONSERVATION MEASURES TAKEN : Nilgiri has recently been declared as Biosphere Reserve; populations of the species and habitats are now protected.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the germplasm and introduce in the botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Of botanical interest due to its restricted distribution.

CULTIVATION : Nil.

DESCRIPTION : Climbing shrubs. Leaves opposite, 3-foliolate, leaflets usually 7-ribbed, margins serrate. Flowers few in a panicle; sepals 4, petaloid, velvety brown outside; petals absent; stamens many, with connective not produced beyond anthers. Fruit a head of achenes with long feathery styles.

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The material for this sheet was supplied by A. A. Ansari, Botanical Survey of India, Pauri Garhwal.

STATUS : Vulnerable. Its natural populations have been exploited for trade for its medicinal rhizomes. Its habitats in its distribution range have been affected due to clearing for jhum cultivation.

DISTRIBUTION : Endemic to Arunachal Pradesh : Lohit district; Dibang Valley district, Siang district and upper reaches of Upper Subansiri district.

HABITAT AND ECOLOGY : At altitudes of 2500 m - 3000 m in damp and shady conditions of forest floor consisting of sandy peat soil.

CONSERVATION MEASURES TAKEN : It is now being cultivated by the Forest Department of Arunachal Pradesh to meet demands in trade. Local people in Dibang Valley are also cultivating the species on a small scale. The Namdapha Biosphere Reserve in Arunachal Pradesh includes some of its habitats and populations and thus offers protection and *in situ* conservation.

CONSERVATION MEASURES PROPOSED : Should be introduced in the Botanic Gardens. Propagation through tissue culture method should be adopted to acclimatise this plant at the lower elevations, and for mass propagation to meet demands in trade and also to enhance export quantities of its rhizomes.

BIOLOGY AND POTENTIAL VALUE : A reputed medicinal herb known as 'Mishmi tita'. Rhizome is known to contain alkaloids of berberine group. Flowers during February-March and fruiting during April-May.

CULTIVATION : Under cultivation only in small areas of Lohit and Siang districts in Arunachal Pradesh at higher elevations.

DESCRIPTION : Stemless perennial herbs. Rhizomes finger thick with persistent leaf-bases and fibrous roots, yellowish-brown externally and golden-yellow internally. Leaves 5 - 6, petioled; lamina 3-lobed, pinnatifid. Inflorescence panicled. Flowers small, pedicelled, greenish. Fruit a follicle, many-seeded.

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The material for this sheet was supplied by Jagdish Lal, Botanical Survey of India, Itanagar.

STATUS : Indeterminate. The species is known from a few old collections only. Its habitats have been altered for raising plantation crops which may have been the cause for its rarity. Since 1891 it has not been collected again though the areas have been botanised.

DISTRIBUTION : Bababudan hills, Mysore, Karnataka; Purandhar, Maharashtra. It is localised in distribution.

HABITAT AND ECOLOGY : Found in hill forests.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Status survey for the species and, if relocated, efforts should be made for *in situ* conservation. Propagation through seeds and other techniques be tried for its multiplication and reintroduction in its distribution range.

BIOLOGY AND POTENTIAL VALUE : Flowering in August. Of botanical and distributional interest.

CULTIVATION : Not in cultivation.

DESCRIPTION : Perennial erect stiff herbs up to 30 cm tall; stem and branches glabrous, grooved. Leaves 3-foliolate, glabrous, uppermost sessile, usually 1-foliolate; leaflets 2.5 - 6 cm across, mostly suborbicular, cordate or reniform with a deep acute sinus, margins crenately and irregularly lobed and toothed, nerves and veins prominent on both the surfaces; petioles up to 5 cm long, deeply grooved, glabrous; stipules membranous. Flowers white, in small leafy panicles crowded at the ends of the branches; sepals 4, petaloid; petals absent. Fruit a head of many shortly stalked, deeply furrowed, glabrous achenes.

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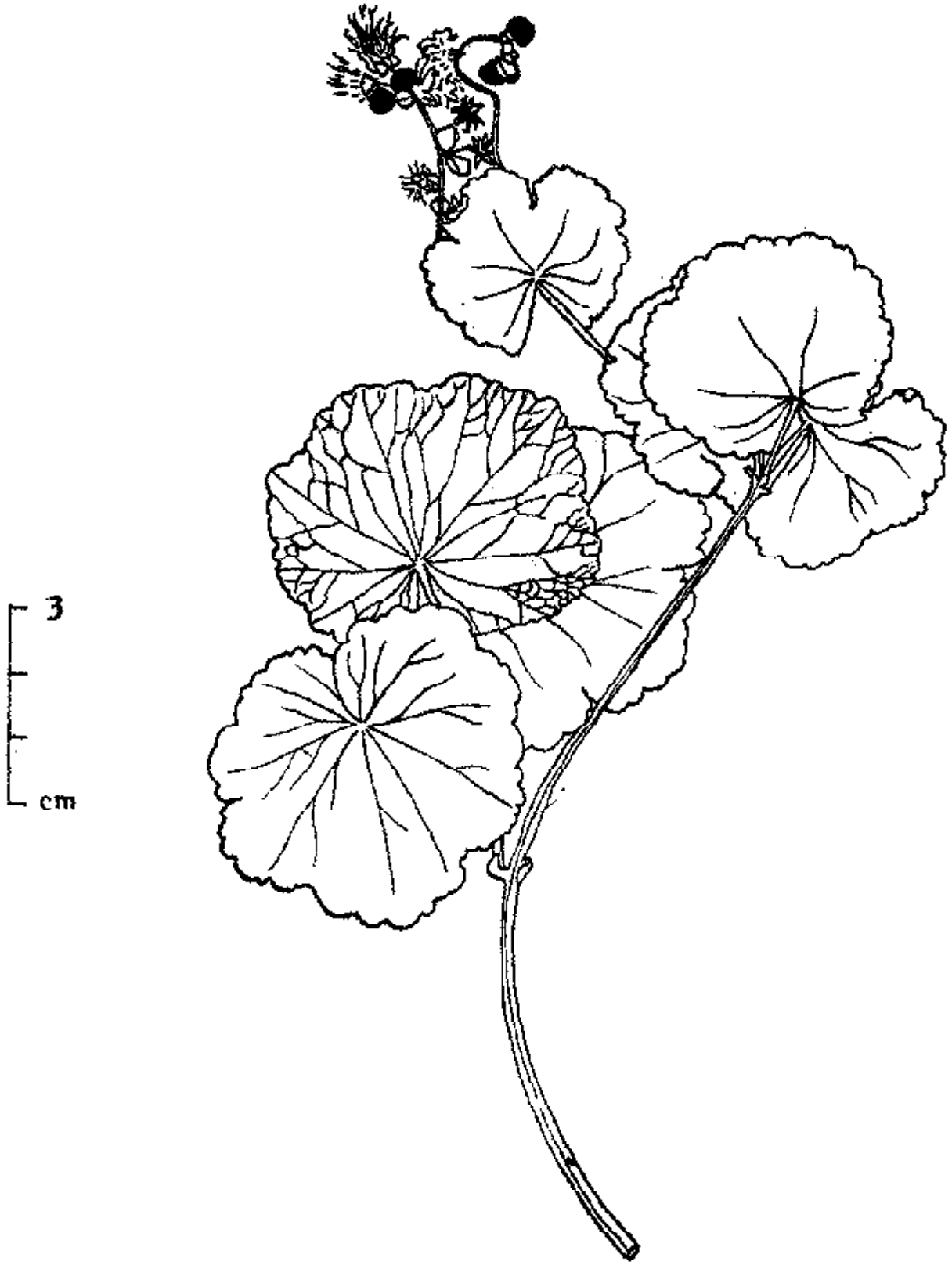

Thalictrum dalzellii Hook.

STATUS : Indeterminate. The species has not been collected after the type gathering, though the locality has been botanised in the recent years.

DISTRIBUTION : North-east India-Meghalaya; endemic.

HABITAT AND ECOLOGY : Rocky moist places in forest floors in the alt. of 1000-1500 m.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plants from the type locality and introduce the species in the protected sanctuaries and sacred groves in Meghalaya.

BIOLOGY AND POTENTIAL VALUE : A plant of academic interest. Its biology is not studied thoroughly. Flowers during July-December.

CULTIVATION : Not in cultivation.

DESCRIPTION : Erect delicate herbs, unbranched, rooting at the base. Leaves opposite or in whorls, petiolate, membranous, ovate or elliptic-lanceolate, acute or subacute at apex, cuneate at base, 8 - 13 × 4 - 8 mm, glabrous, midrib not so prominent, lateral veins 4 - 5 pairs, proceeding to some extent along the midrib and then arching towards the margin; petiole 2 - 4 mm long, slightly pubescent; stipules persistent, interpetiolar, 0.3 × 0.2 mm, triangular, acute at apex, pubescent. Inflorescence pedunculate, solitary or 2 - 3 together. Flowers white; peduncle *ca* 8 mm long, bracteolate, pubescent; pedicel 3 - 4 mm long, pubescent. Hypanthium 0.7 × 0.8 mm, ovate, pubescent; calyx tube 0.3 × 1.0 mm obovate, pubescent outside, glabrous within; teeth 4, 1.3 × 0.8 mm, elliptic-ovate, acute at apex, hirsute; corolla tube 1.2 mm across, puberulous outside, glabrous within; lobes 4, 2.3 × 0.5 mm, membranous, oblong-lanceolate, acute at apex, cuneate at base, hairy at margin; stamens 4, free, filament very short; anthers *ca* 2 mm long, linear-oblong, basifixed; ovary small, obovate; style as long as or slightly longer than the stamens, filiform; stigma capitate. Fruit not known.

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The material for this sheet was supplied by D. B. Deb and S. K. Basu, Botanical Survey of India, Howrah.

Clarkella nana (Edgew.) Hook. f. **RUBIACEAE**

(*Ophiorrhiza nana* Edgew.)

STATUS : Rare. The species is represented by a few collections. Its natural habitats have been depleted due to developmental activities.

DISTRIBUTION : Western Himalayas.

HABITAT AND ECOLOGY : Lithophytic on lime stone rocks.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Protection of its habitats and introduction of the plants in other protected areas in its distribution range.

BIOLOGY AND POTENTIAL VALUE : A plant of botanical and distributional interest. Sufficient study of the plant has not yet been made. Flowers : June- October. Fruits : July-October.

CULTIVATION : Not in cultivation.

DESCRIPTION : Slender herbs, 1.0 - 10.0 cm long, sometimes branching, curved upwards, terminating below in a fleshy tuber enclosed in a rather thick sheating coat, clothed with short rigid rootlets which adhere to soil by suckers. Leaves 1 - 4 - paired, basal largest, 1 - 3 × 0.5 - 2 cm. Radical leaf 2 - 3 cm in diam., solitary, orbicular, oblong, ovate or cordate, obtuse or acute, attenuate and sheathing at base, membranous; lateral nerves 3 - 6 pairs, spreading, arching; petiole 1 - 6 cm long, slender; stipules minute, broadly ovate or obsolete. Inflorescence terminal peduncled bracteate cymes; peduncle 4 - 7 mm long, bracts small, oblong. Flowers 1 - 6, erect, 1.2 cm long; pedicel up to 3 mm, erect; hypanthium rigid, obconic; calyx persistent, tube dilated, distantly reticulately veined in fruit; teeth 5 - 7, *ca* 2 mm long, acuminate; corolla white, pubescent, *ca* 12 mm long, infundibuliform; tube slender; throat glabrous; lobes 5, valvate, lanceolate; stamens 5, near the corolla base; filaments 0.2 mm long, slender; anthers *ca* 1 mm, linear-oblong; ovary 2-loculed, with many ovules on the ascending placenta attached to the septum below its middle; style short, 1 mm long, arms 2, slender *ca* 1.3 mm, hairy. Capsule 5 × 7 mm, obconic, 5 - 7 - ribbed, crowned with the dilated calyx tube, dehiscing through pores; seeds many, 0.7 × 0.5 mm, irregularly ellipsoid, testa black papillose.

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The material for this sheet was supplied by D. B. Deb and R. C. Rout, Botanical Survey of India, Howrah.

Indopolysolenia wallichii (Hook. f.) Bennet **RUBIACEAE**
(*Polysolenia wallichii* Hook. f.)

STATUS : Rare. Its natural habitats are vulnerable due to shifting cultivation.

DISTRIBUTION : Northeast India : Jowai & Cachar, Meghalaya. Endemic.

HABITAT AND ECOLOGY : In moist shady floors of the forest at 600 - 900 m.

CONSERVATION MEASURES TAKEN : None for the species; however, it is likely the species may be growing in the protected forest groves in the area.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plants from its distributional localities and introduce them in the protected sacred groves in the region.

BIOLOGY AND POTENTIAL VALUE : A plant of botanical and distributional interest; fls. & frs. during June-December

CULTIVATION : Not known in cultivation.

DESCRIPTION : Erect, branched herbs; stems stout, terete or 4-angled, pubescent, internodes short. Leaves opposite, decussate, petiolate, 2.5 - 9.5×0.3 - 1.4 cm, linear-lanceolate, acuminate at apex, acute at base, subcoriaceous, glabrous above, pubescent on the nerves beneath; lateral nerves 7 - 18 pairs, alternate, slender, more prominent beneath; petioles 0.3 - 1.0 cm, pubescent; stipules persistent, interpetiolar, 4 - 8×2.5 - 4.0 mm, 3-fid, membranous, sparsely pubescent. Inflorescence terminal peduncled heads, 2 - 3 cm across, pubescent; peduncle 0.7 - 2.5 cm, pubescent; bracts *ca* 4×3 mm, 3-fid, membranous, pubescent. Flowers 5 - 16, bracteate, subsessile, 5-merous; pedicels up to 2 mm, pubescent; hypanthium *ca* 2×2 mm, obovate, pubescent; calyx tube *ca* 2.5×2.5 mm, obovate, pubescent on both sides; teeth 5, *ca* 1.3×1.0 mm, ovate, subacute at apex, pubescent; corolla tube 22 - 30 mm long, 1 - 3 mm across, infundibuliform, pubescent outside, villous within above; lobes 5, *ca* 2.0×1.5 mm, ovate-triangular, acute at apex, pubescent; stamens 5, attached at the middle of the corolla tube; filaments *ca* 2 mm, stout, glabrous; anthers *ca* 2 mm, dorsifixed, 2-lobed, pubescent, dehiscing longitudinally; ovary *ca* 1.5×1.2 mm, 2-loculed; ovules many in each locule on peltate placentas; disk *ca* 0.4×1.5 mm, conical; style 16 - 23 mm, slender, glabrous; stigma 2-lobed, lobes 0.5 mm, pubescent. Capsules 3 - 4×3 - 5 mm, hemispherical, membranous, pubescent, dehiscing at the top through operculum; seeds many, 0.6 - 0.7×0.3 mm, obovate-triangular, sparsely pubescent.

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The material for this sheet was supplied by D. B. Deb and R. C. Rout, Botanical Survey of India, Howrah.

Indopolysolenia wallichii (Hook. f.) Bennet

STATUS : Indeterminate; endemic. King described the species in the year 1884 ; there is no further report of its collection though 40% of the Andaman & Nicobar islands are explored.

DISTRIBUTION : Andaman Islands: Middle & South Andamans.

HABITAT AND ECOLOGY : The ecology of this species is not known.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : The distribution, status and habitat preference of this endemic species should be studied. In order to conserve good proportion of island species, it is necessary to establish several Biosphere Reserves of rich floristic diversity.

CULTIVATION : Not cultivated. It is necessary to take special plant exploration to locate this species. The species should be multiplied in gardens and arboreta.

DESCRIPTION : Large deciduous trees. Leaves thickly coriaceous, broadly ovate-elliptic, sub-rhomboidal, 10 - 28 × 5 - 13 cm ; petiole 1 - 2 cm long, flattened. Heads 2.5 - 3.7 cm in diam. 1 - 3, terminal; peduncles stout, 1 - 4 cm long with a pair of large 3 cm long sub-persistant bracts above the middle. Flowers yellowish or cream coloured, fragrant, 14 - 15 mm long; calyx short, cylindric, densely sericeous, 2.5 mm long, mouth very short, with 5 broad truncate lobes; corolla infundibuliform, 10 - 12.5 mm long; petals 5, united, ovate; stamens 5, anthers *ca* 1.5 mm long, filaments *ca* 0.5 mm long ; stigma bilobed. Fruits villous.

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2. Balakrishnan, N. P. (1989). Andaman Islands-Vegetation and Floristics, pp. 55-68. *In :* Saldanha, C. J. (ed.). *Andaman, Nicobar and Lakshadweep-an environmental impact assessment*. New Delhi.
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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and Ramesh Kumar, BSI, ANC, Port Blair.

STATUS : Indeterminate; known only from Talbot's collection from Kulhatti, Kadur Distr., Karnataka made in 1897. Though the region has been well explored, the species could not be collected since its original discovery.

DISTRIBUTION : India : Karnataka, S. Kanara coast (Malwan). Endemic.

HABITAT AND ECOLOGY : At altitudes of 1600-1700 m, in moist shady situations in the forest floors.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plant from the original habitat and introduce its plants in the botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Flowers & Fruits : September-October. A plant of botanical interest; its biology requires to be studied.

CULTIVATION : Not in cultivation.

DESCRIPTION : Annual herbs, 5 - 15 cm in height. Leaves petioled, 1.5 - 2.5×0.5 - 1 cm, ovate or elliptic-oblong, acute or obtuse at apex, attenuate at base, fleshy, recurved at margin, sparsely pubescent above and along nerves beneath; stipules triangular acute or truncate with few margined bristles. Inflorescence terminal peduncled capitate cymes of 3 - 5 flowers. Flowers sessile or subsessile, 4 - 5 mm long; calyx lobes 4, linear, oblong or lanceolate, nearly as long as tube of corolla, dentate along the margin. Corolla funnel-shaped; stamens arising from the throat of the corolla tube. Capsules 2 - 2.5×3 - 3.5 mm, subglobose.

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2. Dalzell, N. A. (1850). *Journ. Bot.* 2 : 135.
3. Dalzell, N. A. & Gibson, A. (1861). *Bombay Fl.*, p. 116.
4. Gamble, J. S. (1921). *Fl. Pres. Madras*, p. 605.
5. Hooker, J. D. (1880). *Fl. Brit. India* 3 : 74.
6. Lewis, W. H. (1966). *Ann. Miss. Bot. Gard.* 53 : 37.

The material for this sheet was supplied by D. B. Deb and Ratna Dutta, Botanical Survey of India, Howrah.

STATUS : Rare. About 160 years ago its original collection was recorded to have been made from Sylhet mountains, which are geographically nothing but the Khasi Hills in the present state of Meghalaya, adjacent to the Sylhet plains in Bangla Desh. The species has been since then collected from these hills at different times up to 1960, but has been found to be rare and sparse.

DISTRIBUTION : India : Endemic to Meghalaya.

HABITAT AND ECOLOGY : In swampy hilly soils upto 1824 m alt., growing on muddy banks or on boulders along streams. Plants often remain submerged.

CONSERVATION MEASURES TAKEN : Meghalaya encompasses the Balphakram Wildlife Sanctuary, Nokrek Biosphere Reserve and some Sacred Groves, the areas of which are protected from anthropogenic activities.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plants and cultivate in botanical gardens and to perpetuate natural survival of populations of this species in its habitats.

BIOLOGY AND POTENTIAL VALUE : A plant of botanical interest.

CULTIVATION : Not yet known.

DESCRIPTION : Undershrubs or erect large herbs, 30 - 45 cm in height. Leaves subsessile, 7 - 14 × 0.5 - 1.4 cm, linear-lanceolate or lanceolate, acuminate, tapering to the base, coriaceous, black when dry; stipules free, ovate-lanceolate or lanceolate, toothed. Inflorescence terminal peduncled subcorymbose cymes with slender erect peduncles and pedicels. Flowers 7 - 8 mm long, white. Calyx 4 - lobed, 0.8 - 1 × 0.3 - 0.8 mm, ovate acute. Corolla much longer than calyx lobes; stamens exserted; filaments 1 - 1.5 mm long, adnate at the throat of corolla tube. Ovary 2-loculed; ovules 4 - 10 in each locule on subglobose placenta with a basal stalk; style short, included; stigma bilobed, linear, papillose. Capsules subsessile or shortly stalked, 2.5 - 3 × 2.5 - 3 mm, globose, didymous, turgid, crown hemispheric, dehiscence loculicidal. Seeds 8 - 10 in each locule, 0.3 - 0.5 × 0.5 mm, subglobose or elliptic, slightly convex on one face and with longitudinal ridges; testa black, loosely pitted.

REFERENCES :

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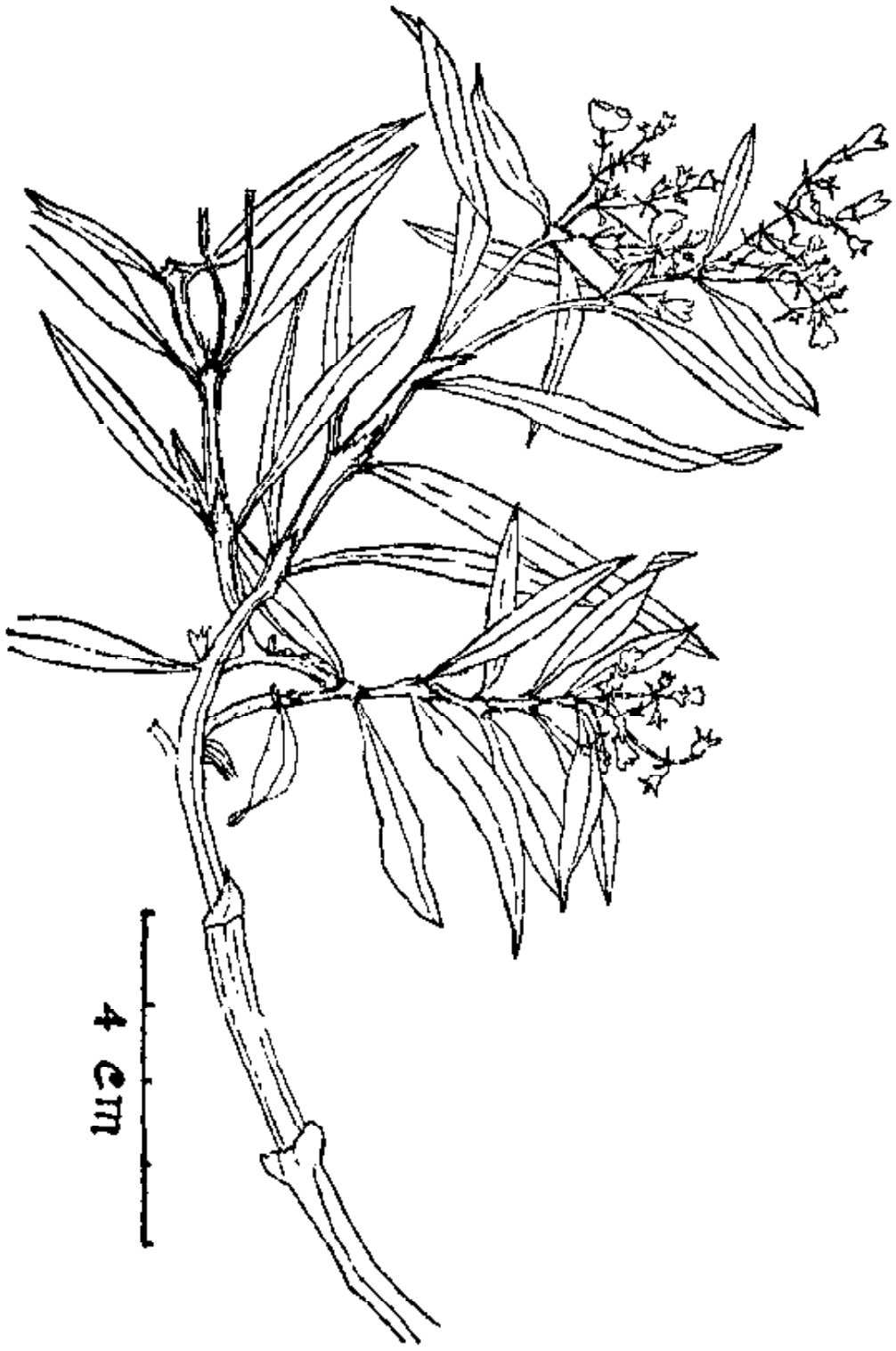
The material for this sheet was supplied by D. B. Deb and Ratna Dutta, Botanical Survey of India, Howrah.



Neanotis oxyphylla (G. Don) Lewis

STATUS : Vulnerable. After the original discovery in 1893 from Karnataka, Bababudan hills, Santaveria and Kulhatti, the species has been collected only once from the type locality in Kulhatti in 1964. Its habitats are threatened and are under cultivation of plantation crops.

DISTRIBUTION : India : Karnataka. Endemic.

HABITAT AND ECOLOGY : The species grows amidst boulders and rocky crevices in shady localities at 1500 m in alt., in the forested hills.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should made to relocate the plants in its type locality and introduce in botanic gardens. Bababudan hills in Karnataka harbour many endemics and deserve consideration as a Biosphere Reserve.

BIOLOGY AND POTENTIAL VALUE : Flowers and Fruits : September. A plant of distritional and academic interest.

CULTIVATION : Not in cultivation.

DESCRIPTION : Annual, erect or procumbent herbs, 3 - 5 cm long, gregarious. Leaves petioled, 4 - 6 × 3 - 4 mm, ovate or elliptic-lanceolate, acute at apex, obtuse to cuneate at base; stipules very small, truncate. Flowers pedicelled, axillary, solitary. Calyx lanceolate, acute, pubescent. Corolla tubular, 7 - 10 mm long. Stamens inserted. Ovary 2-loculed ; style slender, stigma bilobed. Capsules shortly stalked, 1 1.8 × 0.8 - 1.5 mm, oblong pubescent, dehiscing longitudinally. Seeds 3 - 9 in each locule, 0.4 - 0.6 × 0.3 - 0.4 mm, subglobose.

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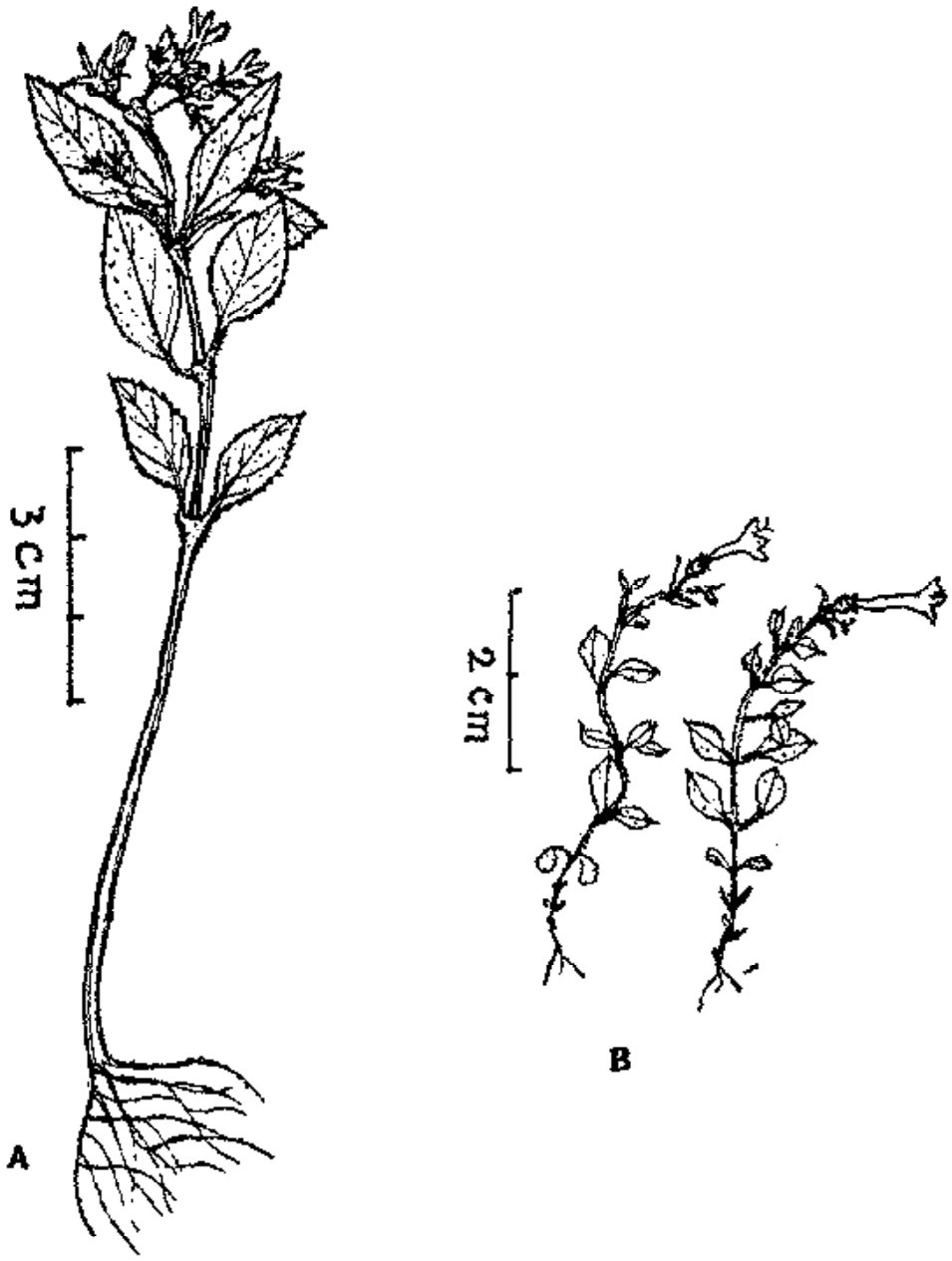

A. *Neanotis carnosa* (Dalz.) Lewis B. *Neanotis prainiana* (Talbot) Lewis

STATUS : Vulnerable. Fragmented populations of this extremely rare species are found in widely separated discrete localities, which are threatened by various anthropogenic factors. The species is depleted in many of the earlier recorded localities. Degradation of natural forest cover for agricultural purposes and exploitation of the species at individual level are the causes for its rarity and also the principal threats to its survival. Studies indicate that the populations of this species are being reduced to critically low levels. This species is of particular phytogeographical significance as it represents a monotypic endemic genus with a narrow restricted distribution.

DISTRIBUTION : Endemic to central and southern W. Ghats of Peninsular India (1). It is known by very old collections from Yellapur N. Kanara, in Karnataka, and Indigaltur, (Travancore), Quilon from Kerala. No recent collections from the aforementioned localities are known. The species was located at Thunbermuzhi forest, Trichur District in Kerala and at Kanapathiankadu, Kanyakumari District in Tamil Nadu during the plant surveys of 1979-80.

HABITAT AND ECOLOGY : Found growing in evergreen forest areas, particularly along the banks of rivers or streams in the hills. It has been recorded between 600 and 2000 m altitudes.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Monitoring of all existing populations is urgently called for. These populations along with their natural habitat must be accorded protection. Threats to its survival must be removed Plant sanctuaries or nature reserves must be set up locally for as many of the remaining populations as possible. Attempts to raise seedlings through artificial regeneration methods must be made particularly in arboreta or plant conservatories. The seedlings must be transferred to ecologically suitable sites in its distribution range.

BIOLOGY AND POTENTIAL VALUE : This evergreen tree comes to flower between March and June. The species is locally used in medicine ; powdered bark and its decoction are used for curing cutaneous diseases (leprosy, ulcers, etc.), alleviating rheumatic pain through external application and sometimes as a purgative also. Locally known as "Jalamdasa", it is very much exploited by the local people for its purported medicinal value. Detailed pharmacognostic studies must be undertaken to investigate its true drug potential.

CULTIVATION : Not taken up anywhere as yet.

DESCRIPTION : A tree. Leaves 10 - 16×3.5 - 5.2 cm, oblong-elliptic to elliptic lanceolate, apex obtuse to subacute, rarely short acuminate, base decurrent, membranous, glabrous, shining above, secondary veins 10 - 12 pairs; petioles up to 1.2 cm long, rounded or sometimes flattened. Stipules interpetiolar, *ca* 5 mm long, deltoid, acute, connate, forming a sheath, persistent. Flowers in terminal globose heads, heads 3 - 4.5 cm across; peduncles stout, solitary, 1.2 - 2.5 cm long, with 2 stipular sheathing bracts at base and 4 small

bracts below the middle, bracts linear, 4 - 6 mm long; calyx tube 2 mm long; lobes 3 - 4 mm long, oblong, subclavate at apex, hairy. Corolla yellow; tube 6 - 8 mm long, glabrous; lobes 2.5 mm long, oblong, obtuse, hairy. Stamens inserted at the throat of the corolla; anthers apiculate, reaching up to the middle of the corolla lobes. Ovary 2-locular; style exserted, about 5 mm beyond the corolla lobes; stigma fusiform. Fruits connate into a fleshy globose mass; seeds arillate, irregularly flattened, imbricate; testa black, crustaceous.

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The material for this sheet was supplied by M. Ahmedullah, Botanical Survey of India, Calcutta.

Ochreinauclea missionis (Wall. ex G. Don) Ridsd.

STATUS : Vulnerable. The species has not been collected after the original gathering, though the locality has been explored intensively in recent years by the Botanical Survey of India. The species has been collected from Tiruchirapalli.

DISTRIBUTION : Peninsular India. Tamil Nadu: Nilgiri, Sispara; Tiruchirapalli. Endemic.

HABITAT AND ECOLOGY : In the evergreen forests.

CONSERVATION MEASURES TAKEN : The Nilgiri area has now been accorded the status of a Biosphere Reserve and any surviving plants are likely to be protected.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plants from the type locality and adjoining hill ranges and to cultivate them in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Flowers : February. Fruits: March-April. A plant of botanical and distributional interest; other details are not known.

CULTIVATION : Not known in cultivation.

DESCRIPTION : Erect shrubs, much branched, possibly up to 1.5 m high; stem stout, terete, glabrous. Leaves petiolate, opposite, decussate, 10.5 - 15.8 × 1.8 - 4.0 cm, narrowly obovate or oblanceolate, acuminate at apex, cuneate or attenuate at base, membranous, glabrous; lateral nerves 7 - 9-paired, alternate, slender, more prominent beneath; petioles 0.8 - 2.0 cm long, slender, glabrous; stipules persistent, interpetiolar, 8 - 12 × 3 - 4 mm, narrowly triangular, scariose, glabrous. Inflorescence terminal or axillary pedunculate trichotomously branched corymbose cymes, 5 - 7 cm across, glabrous; penducle 4.5 - 5.5 cm, slender, glabrous; cyme branches slender; bracts 5 - 7 × 3 - 4 mm, membranous, glabrous. Flowers 15 - 30, pedicellate, 4-merous; pedicel 5 - 12 mm, slender, glabrous. Hypanthium *ca* 1.0 × 1.0 mm, obovate, glabrous; calyx tube 0.7 - 1.0 × 1.0 mm, obovate, glabrous; teeth 4, 0.4 - 0.5 × 0.2 - 0.3 mm, narrowly triangular, acute at apex, glabrous; corolla tube 14 - 15 mm long, 1.2 - 1.5 mm across, glabrous outside, pubescent within; lobes 4, 7.0 - 7.5 × 2.5 mm, oblong, mucronulate at apex, glabrous; stamens 4 at the throat of corolla; filaments 1.0 - 1.5 mm, puberulous; anthers *ca* 7 mm, dorsifixed, narrow, acute at apex, sagittate at base, dehiscing longitudinally; ovary *ca* 1.0 × 1.0 mm, 2-loculed with 1 ovule in each locule attached at the middle of the axile placenta; disk *ca* 0.8 × 1.0 mm, annular; style 20 - 31 mm, slender, rarely puberulous above; stigma 2 - 2 mm, clavate, puberulous.

REFERENCES :

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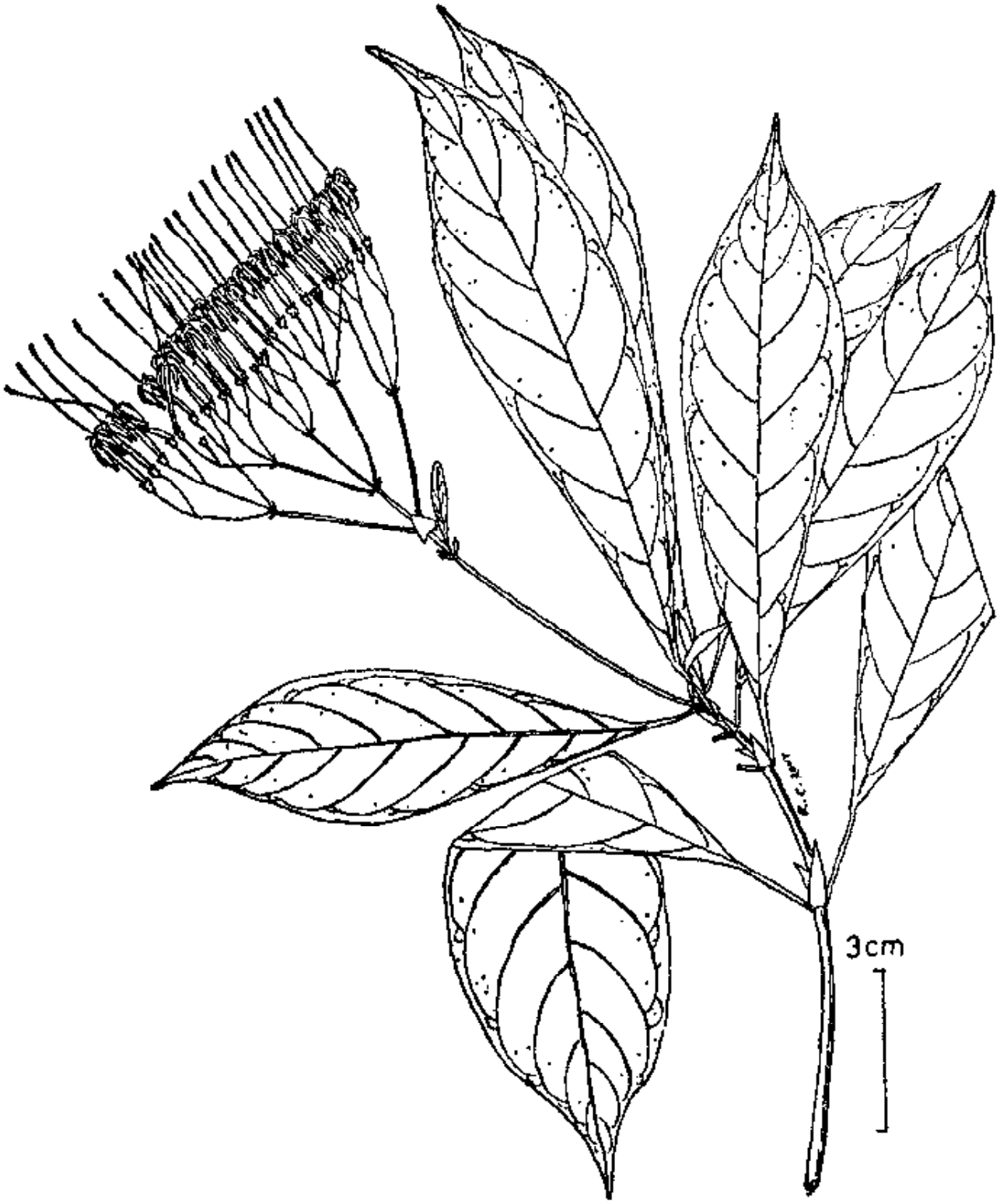
The material for this sheet was supplied by D. B. Deb and R. C. Rout, Botanical Survey of India, Howrah.



Pavetta hohenackeri **Brem.**

STATUS : Indeterminate or Possibly Extinct. Known only from the type specimen collected in 1847.

DISTRIBUTION : Southern Western Ghats. Kerala: Trivandrum Dist., Adimali; Palghat & Attraimalai hills. Endemic.

HABITAT AND ECOLOGY : In the evergreen forests of Agasthyamalai slopes.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plant from the original habitat and cultivate in botanic gardens.

BIOLOGY AND POTENTIAL VALUE : Flowers and Fruits : Winter. A plant of botanical and distributional interest not studied thoroughly.

CULTIVATION : Not cultivated.

DESCRIPTION : Shrubs, branched; stems stout, angled, glabrous. Leaves petiolate, opposite, decussate, 11.0 - 25.5 × 1.8 - 4.5 cm, oblanceolate, acuminate or caudate at apex, attenuate at base, membranous, glabrous; lateral nerves 9 - 14 pairs, alternate or subopposite, slender, more prominent beneath; petioles 1 - 4 cm long, glabrous; stipules interpetiolar, persistent, 6 - 7 × 3 - 5 mm, triangular-subulate, subcoriaceous, glabrous. Inflorescence terminal, sessile trichotomously branched corymbose cymes, 10 - 12 cm across, glabrous; bracts 5 - 6 × 4 - 5 mm, triangular, cuspidate, membranous, glabrous. Flowers 30 - 40, pedicellate, 4-merous; pedicel 3 - 8 mm, glabrous. Hypanthium *ca* 1.2 × 1.2 mm, obovate, glabrous; calyx tube *ca* 1.2 × 1.7 mm, obovate, glabrous; teeth 4, 1.0 - 1.1 × 0.4 - 0.6 mm, narrowly triangular, acute at apex, glabrous; corolla tube 23 - 25 mm long, 1.2 - 2.0 mm across, glabrous outside, pilose within; lobes 4, 8 - 9 × 3 mm, oblong, mucronulate at apex, glabrous; stamens 4 at the throat of corolla; filaments 1.5 mm, glabrous; anthers 6 - 7 mm, dorsifixed, narrow, acute at apex, sagittate at base, dehiscing longitudinally; ovary 1.0 × 1.0 mm, 2-loculed with 1 pendulous ovule in each locule; disk 0.8 × 0.8 mm, annular; style 50 - 55 mm, stout, puberulous above, glabrous below ; stigma 2-lobed, lobes 0.2 - 0.3 mm, obovate, acute at apex, puberulous.

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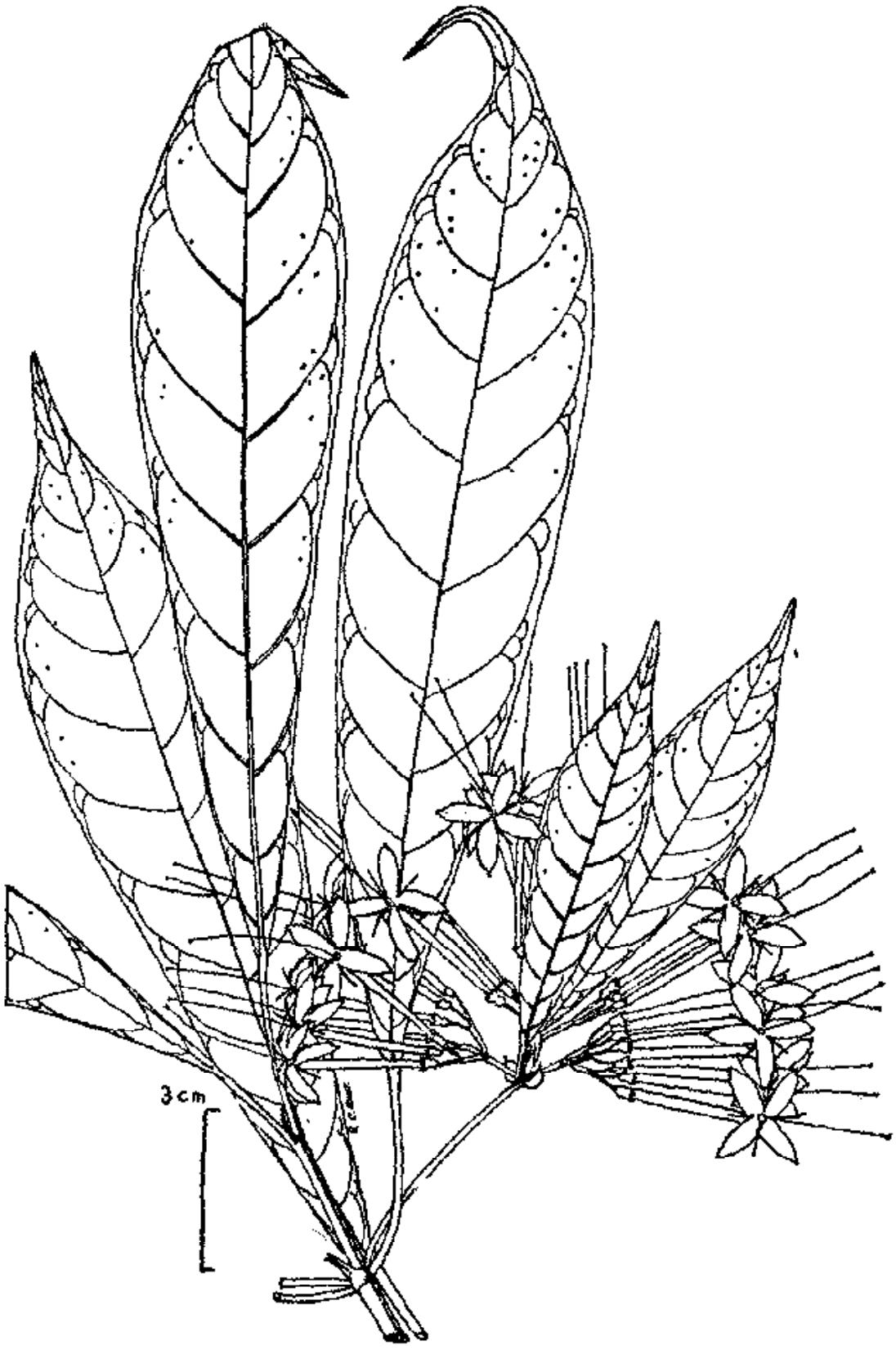
The material for this sheet was supplied by D. B. Deb and R. C. Rout, Botanical Survey of India, Howrah.



Pavetta oblanceolata Brem.

STATUS : Possibly Extinct. After the original collection by R. Wight in 1848, it was collected probably from the type locality by C. E. C. Fischer in 1910. Since then it has not been collected, though the locality has been very recently explored by the Botanical Survey of India.

DISTRIBUTION : Tamil Nadu: Nilgiri Hills, Coonoor. Endemic.

HABITAT AND ECOLOGY : In the sholas of the valleys of the Nilgiri hills at about 1200 m in altitude.

CONSERVATION MEASURES TAKEN : The Nilgiri-Wynaad region has been declared as Biosphere Reserve and any surviving plants are rendered protection.

CONSERVATION MEASURES PROPOSED : Efforts should be made to collect the plants from the type locality and cultivate in botanic gardens, particularly at Yercaud and Coonoor.

BIOLOGY AND POTENTIAL VALUE : Flowers: January. Fruits : February-March. A plant of academic interest; its biology is not yet studied thoroughly.

CULTIVATION : Not taken up any where.

DESCRIPTION : Shrubs, branched; stem stout, terete, glabrous; bark brown when old. Leaves petiolate, opposite, decussate, 8.5 - 16.0×2.0 - 5.5 cm, elliptic-lanceolate or elliptic-oblong, acute at both ends, coriaceous, glabrous above, puberulous beneath, with nerves pubescent; midrib channelled above; lateral nerves 11 - 13 pairs, alternate; petioles 0.7 - 1.5 cm, glabrous; stipules persistent, interpetiolar, 6 - 7×6 mm, broadly triangular, cuspidate, coriaceous, glabrous, scariose at margin. Inflorescence terminal shortly pendunculate trichotomously branched corymbose cymes, 9 - 9.5 cm across, puberulous; bracts *ca* 5×7 mm, broadly triangular, membranous, glabrous. Flowers 70 - 80, pedicellate, 4-merous; pedicel 2 - 6 mm puberulous. Hypanthium *ca* 1.0×1.0 mm, obovate, puberulous; calyx tube *ca* 1.0×1.5 mm, obovate, puberulous outside, glabrous within; teeth 4, 1.5 - 1.8 ×0.7 mm, lanceolate, puberulous on both sides; corolla tube 12 - 13 mm long, *ca* 1.0 mm across, glabrous outside, pubescent within ; lobes 4, 6.0 - 6.5×1.8 mm, oblong, acute at apex, glabrous; stamens 4 at the throat of corolla; filaments *ca* 0.8 mm, glabrous; anthers 4.5 - 5.5 mm, dorsifixed, narrow, acute at apex, 2-lobed, sagittate at base; ovary 1.0×1.0 mm, 2-loculed, with 1 pendulous ovule in each; disk 0.5×1.0 mm, annular; style 30 - 31 mm, slender, glabrous within, puberulous above; stigma 1.5 mm, clavate, puberulous.

REFERENCES :

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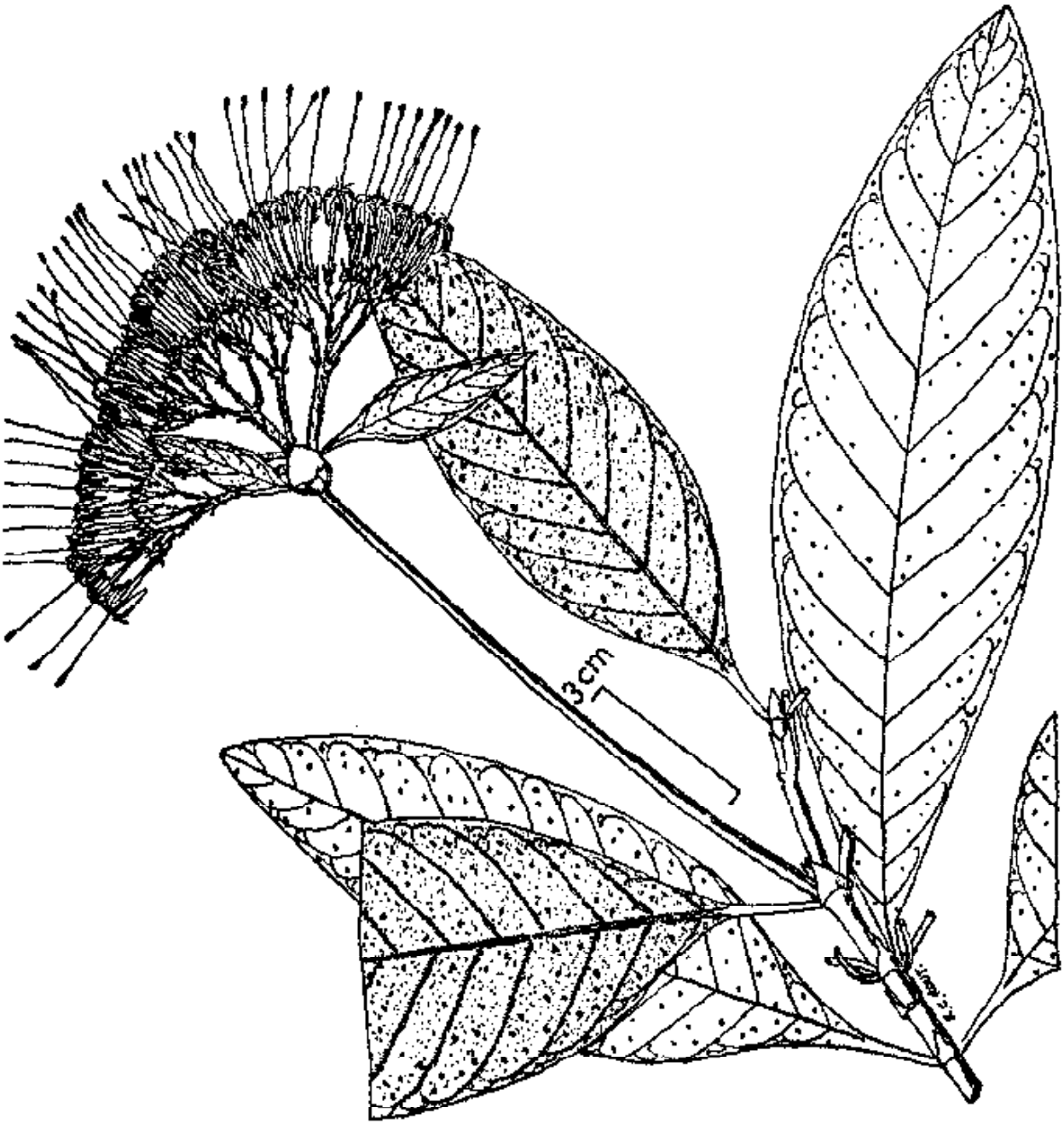

Pavetta wightii Hook. f.

STATUS : Indeterminate. There is no report of its occurrence after the type collections, though the South Andaman Island, excepting Jarawa reserve, is well explored by the Botanical Survey of India.

DISTRIBUTION : South Andaman Island; endemic.

HABITAT AND ECOLOGY : This species is recorded to occur in the scrub-jungles along the fringes of evergreen forests. The ecology of the species is not known.

CONSERVATION MEASURES TAKEN : Mt. Harriet in the South Andaman is declared a National Park, which is likely to cover some of its meagre surviving specimens.

CONSERVATION MEASURES PROPOSED : The area of jurisdiction of the Mt. Harriet National Park requires extention into the adjoinings. The biotic interference and commercial exploitation of forests adversely affect conservation measures in South Andaman, and should be stopped forthwith to save many a threatened and endemic plant species of the island.

BIOLOGY AND POTENTIAL VALUE : Not known. Johanssen (1) considered this taxon as a subspecies of *Prismatomeris fragrans* Geddes.

CULTIVATION : Not cultivated. This species may be introduced in gardens as a shrubby ornamental species.

DESCRIPTION : A large shrub or small tree. Leaves 9.17×7.5 cm, elliptic, obovate, shortly acuminate, cuneate at base, rather coriaceous, glabrous; lateral nerves 7 - 8 pairs. Flowers flesh-coloured, 1.0-2.0 cm across in terminal or axillary cymes, pedicellate; calyx tube 0.2×0.1 cm, truncate or denticulate; corolla tube 2.0 cm long; stamens included. Fruits unknown.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and J. L. Ellis, BSI, Port Blair.

STATUS : Rare. The species is sparsely distributed. The rarity of the species is due to isolation and loss of habitats.

DISTRIBUTION : South Andaman Island & Great Nicobar Island.

HABITAT AND ECOLOGY : This species occurs in inland forest edges of evergreen forests.

CONSERVATION MEASURES TAKEN : The protected areas in the islands (National Parks, Wildlife Sanctuaries and Biosphere Reserves) give partial safeguard against biotic interference.

CONSERVATION MEASURES PROPOSED : Since the islands are small in size and many in number, it is necessary to establish a large number of well planned protected areas to conserve the rich plant diversity, island endemics and rare species.

BIOLOGY AND POTENTIAL VALUE : This is a small shrub with a dense foliage of glossy green, useful as an ornamental species.

CULTIVATION : Not cultivated. It is necessary to cultivate this endemic species in the experimental garden and arboretum of BSI at Port Blair.

DESCRIPTION : An evergreen small shrub, glabrous. Leaves 15×5 cm long, obovate to oblong-lanceolate, tapering at base, brown on drying, thinly coriaceous, often subfalcate, lateral nerves 8 - 10 pairs, remote. Flowers greenish-white, in dense rusty-pubescent cymes at the ends of branchlets, shortly pedicellate forming a shortly peduncled or almost sessile clusters; calyx almost truncate or lobes short, broad, glabrous; corolla exserted, villous at throat, lobes about 0.2 cm long, tube as long. Berries 4 cm long, ellipsoid, smooth or 8 - 9-angled, with persistent crown of calyx limb; pyrenes 5-ribbed.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and J. L. Ellis, BSI, Port Blair.

STATUS : Indeterminate; known only from the type collections. Though the South Andaman Island is well explored, this species could not be located so far.

DISTRIBUTION : South Andaman Island; endemic.

HABITAT AND ECOLOGY : This species is reported from the inland forests. The ecology of the species is not known.

CONSERVATION MEASURES TAKEN : Though Mt. Harriet is declared as National Park, there is no record of the species in this protected area. The Jarawa reserve in South Andaman Island is much less disturbed and hence the species is likely to occur in that area.

CONSERVATION MEASURES PROPOSED : It is necessary to locate this species in the adjoining areas. Special efforts be made for *in situ* and *ex situ* conservation of the species.

BIOLOGY AND POTENTIAL VALUE : Not known.

CULTIVATION : Nil.

DESCRIPTION : Shrub, 1 - 2 m high, branches brownish-green, smooth. Leaves 10 - 15 × 4 - 6 cm, dark green above, pale below, nerves slender; petiole 0.7 - 1 .25 cm long. Fruiting cymes racemose, 12 - 17 cm long. Fruits 1.25 cm broad, somewhat contracted at the base, obscurely didymous, calyx limb cupular, 5-toothed, with a central obtuse projecting enlarged disk. Seeds hemispheric, ventral face flat, albumen not deeply ruminate.

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The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and Ramesh Kumar, B. S. I., Port Blair.

STATUS : Rare. The species is known to be surviving only in a few pockets that are widely scattered in a narrow range. Recent plant surveys indicate that this species has become depleted in its type locality. Depredation of its natural habitats is the apparent cause of its rarity.

DISTRIBUTION : At present it is restricted to the Southern W. Ghats (Kerala and Tamil Nadu) in Peninsular India. There is a doubtful report from Perak in Burma (Swingle, 1967. Rev. Ed.), but no specimens from that area are traceable. It was also reported from Sri Lanka, out its present-day distribution in that island is suspect or even ruled out and the species does not figure in a recent revision of the Ceylonese Rutaceae (Stone, 1985). As such, the species is believed to be confined to the Southern W. Ghats where it has been recorded from Cannanore, Palghat and Tirunelveli districts.

HABITAT AND ECOLOGY : The species occurs as an undergrowth in evergreen forests in the hills and has been recorded up to 750 m altitude.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Monitoring of all its surviving populations and studies on biology should be taken up for ecological data, upon which *in situ* or *ex situ* measures can accordingly be decided for its conservation. Propagation of this arborescent species by artificial regeneration methods should be attempted for raising stocks so as to facilitate its rehabilitation in its natural habitats.

BIOLOGY AND POTENTIAL VALUE : Data on the biology of this species is wanting. Flowering specimens of the plant have been collected between March and June. Its uses, if any, are not yet known. Its allied species *G. pentaphylla*, an aromatic shrub occurring almost throughout India, has some medicinal properties attributed to it. Phamacognostical studies should be undertaken to find out if *G. macrocarpa* has any potential of similar utility.

CULTIVATION : Not known to have been taken up anywhere.

DESCRIPTION : Erect unarmed shrubs; branchlets almost glabrous. Leaves 3 - 5-foliolate; leaflets, alternate, 12 × 14 cm, oblong or elliptic-lanceolate, obtusely acuminate at apex, cuneate at base, margin entire, glabrous. Flowers small, usually in terminal short panicles. Sepals 4, broad, imbricate. Petals 4, imbricate. Stamens, free; filaments flat; anthers small with apical or dorsal gland. Ovary 4-loculed; style short, persistent; stigma capitate; ovule 1 in each locule, pendulous. Berries 1.2 - 2.2 cm in diameter, subglobose, constricted at base, smooth.

Tanaka (1937) opined that *G. macrocarpa* Wight is in all probability conspecific with *G. citrifolia* (Willd.) Lindl. Some earlier workers preferred to treat it under the *G. pentaphylla* complex. However, Subramanyam & Henry (1972) resurrected this species resting its distinctiveness primarily on the surmise that the large cherry-sized fruits sets its apart too clearly from the other species which otherwise have pea-sized fruits.

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The material for this sheet was supplied by M. Ahmedullah and Narayanan Nair, Botanical Survey of India, Howrah.

STATUS :. Vulnerable. Very few fragmented populations of this narrow endemic species are surviving in specific niches in some isolated locatities in the Nilgiris. This extremely rare species is so far known only by a few gatherings made sporadically from a single hill range. The last known collection was made by Vivekananthan from Avalanche in the year 1972. Specific causes for its rarity are not clearly known, though the gradual contraction and loss of natural habitats brought about by various anthropogenic activities appears to be the prime causative factor. As such, the species could well be in imminent danger of extinction if conservation measures are not taken promptly to safeguard its survival.

DISTRIBUTION : Endemic to the Nilgiri hills (Tamil Nadu) in Peninsular India (1). This narrow endemic species has been recorded from a few localities like Avalanche, Bangitappal, Kundha, Lakkadi, Mudimund and Sispara, all in the Nilgiris. It was collected from some of these localities viz. Avalanche, Lakkadi, Carrott Shola-Mudimund, Sispara during the plant surveys of 1970-72. Though reported (3) from "Travancore", a part of the present-day Kerala State, no substantiating specimens are traceable.

HABITAT AND ECOLOGY : This is a montane species found in evergreen forest patches or Sholas in the Nilgiri hills, between 1800 and 2275 m altitudes.

CONSERVATION MEASURES TAKEN : Specific measures for this particular plant have not been taken as yet. However, many of its known localities are encompassed within the limits of the recently established Nilgiri Biosphere Reserve and, as such, its natural habitat has been accorded a legal protection.

CONSERVATION MEASURES PROPOSED : Monitoring of all extant populations is urgently warranted for assessment of this rare species. Specific threat factors should be identified and remedial measures must be taken. Further surveys must be conducted in an attempt to locate unrecorded populations. If the surveys yield some more populations located within the buffer zone or outer core area of the Nilgiri Biosphere Reserve the localities must further be cordoned off from anthropogenic impacts. Artificial regeneration methods must be employed to stock the area with the plants of the species. Attempts to raise seedlings in botanical conservatories, particularly through application of tissue culture techniques, might also help in this direction.

BIOLOGY AND POTENTIAL VALUE : Flowering specimens have been mostly collected in the period between June and April. Its potential in any sphere of utility is not yet known. However, the species is of academic and phytogeographical interest being the only species of the genus *Melicope* in India.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Large shrubs. Leaves opposite, 1-foliolate, pellucid-punctate; leaflets 9.0 - 12.5 × 4.5 - 7.5 cm, elliptic or obovate, apex acute or subobtuse, base acute or cuneate, margin entire; petiole 1.2 - 5.3 cm long. Cymes 3 - 5 flowered, axillary; peduncles 6 - 8 cm long. Flower 4-merous. Sepals ovate with a distinct midvein. Petals ovate-oblong, acute.

Stamens 8, inserted at the base of a disc, the ones opposite the corolla lobes shorter; anthers oblong. Carpels 4, distinct; styles united; stigma 4-lobed, capitate; ovary 4-loculed; ovules 2 in each locule. Fruit with 4-cocci, coriaceous, dehiscing on the inner face; seeds oblong, black, shining.

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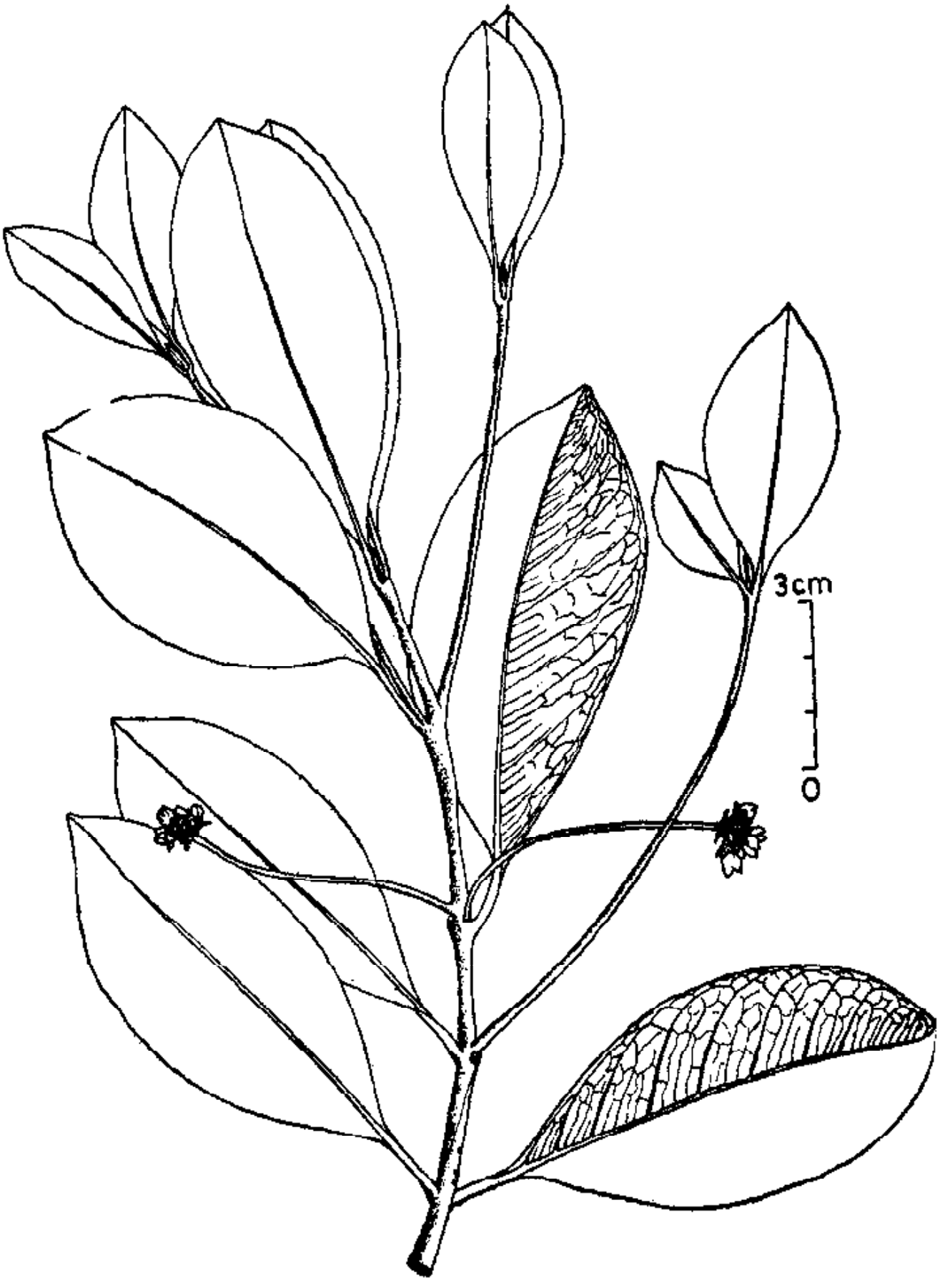
The material for this sheet was supplied by M. Ahmedullah and Narayanan Nair, Botanical Survey of India, Howrah.



Melicope indica Wight

STATUS : Vulnerable. The plant is known by very few old gatherings and from only one recent report. At present the species is extremely rare and under threat due to various anthropogenic causes.

DISTRIBUTION : Endemic to the Western Peninsular India (1). Earlier the species was only known from some old collections of Stocks, Lawson and others from "Malabar, Concan". Fischer collected it from "N. Coimbatore" in 1906. No latter-day collections from the area are known. The exact locality of this W. Ghats endemic was unknown until 1976 when it was collected (5) only once at Banagare in Upper Bisle Ghat and Bababudan Hills (Karnataka), where the fragmented populations are extremely rare.

HABITAT AND ECOLOGY : The species has been recorded as growing in moist deciduous forests or evergreen forest patches (sholas) in the W. Ghats, where it is known to ascend up to 1250 m altitude.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED: Field surveys for status evaluation of the species is urgently called for; monitoring of all surviving populations through demographic, genetic and resource allocation approaches; assessment of threat factors and attempts to cultivate it in arboreta or plant sanctuaries with conditions conducive for its proper growth.

BIOLOGY AND POTENTIAL VALUE : The species is known to flower during April-May, fruiting subsequently. It is a member of an essentially Indo-Malaysian genus of laticiferous trees. The hard and close-grained wood of its congener, *I. perottettiana*, another endemic tree of W. Ghats, is locally used for making door panels. *I. lanceolata*, an Indo-Ceylonese species, is suitable for making posts and rafters.

CULTIVATION : Not known to have been taken up anywhere.

DESCRIPTION : Small trees. Young branches ferruginous-tomentose, older ones terete with leaves clustered at apex. Leaves 5 - 9 (-12) × 2 - 4 (-6) cm, obovate, obtuse at apex, cuneate at base, glabrous, not waxy but dark brownish when dry; secondary nerves 8 - 10 pairs on either side of the midvein, prominent, splitting into 2 parts near the margin; tertiary nerves not close together, descending, passing into transverse reticulation, barely conspicuous. Inflorescence 4 - 5 -flowered, on thick dwarf shoots. Flowers subsessile, pedicellate. Calyx biseriate; lobes 4, 0.2 cm long, ovate, acuminate, glabrous inside. Corolla exserted; lobes 4, rounded, apex truncate, glabrous. Stamens 8, uniseriate; anthers with apex and base pilose; filaments broader at base, gradually narrowing near apex. Ovary 0.1 cm broad, ovate, usually villous, 4-locular; style elongate, 0.2 cm long after anthesis. Berry fleshy.

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The material for this data sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Indeterminate. Its herbarium representation is limited to four specimens (CAL, K) only. The last known collection was made in the year 1923.

DISTRIBUTION : Endemic to Peninsular India (1). The species has an apparently disjunct distribution in E. Ghats and south-western area in Kerala. Ramaswamy collected it from Velligonda hills (Nellore Dt. of Andhra Pradesh) in Southern E. Ghats, while Fischer collected it from Kambakam hills (Chengalpattu Dt. of Tamil Nadu) in the southern extremity of the E. Ghats. The type collection was made by Wight himself from the coastal district of Quilon (specific locality not known) in Kerala.

HABITAT AND ECOLOGY : The species was recorded from deciduous forest tracts in the hills (E. Ghats) at about 600 m altitude. Its collection from Quilon does not indicate the habitat conditions.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Further intensive search in the Velligonda and Kambakam hills of the E. Ghats might yield unlocated populations in some specific niches, and provide data for assessment of the populations. Attempt must first be made to protect its natural habitats. This must be followed by stocking the habitats by artificial regeneration through direct sowing, transplanting or stump planting. Transferring some seedlings to arboreta and plant sanctuaries for *ex situ* conservation is also recommended.

BIOLOGY AND POTENTIAL VALUE : The plant is known to flower in July and August, and fruiting in the month of April. Nothing is known of its biology as yet. Other species of the genus, viz., *I. perrottettiana* and *I. lanceolata* are known to have some timber value.

DESCRIPTION : Trees, young branches ferruginous-pubescent, later terete. Leaves broadly obovate to orbicular, base and apex rounded to obtuse, serrate, 4 - 11 × 3 - 6 cm, glabrous, upper surface shining, waxy below; midvein prominent, inconspicuous towards the apex; secondary nerves 11-15 on either side of the midvein, barely prominent below; tertiary nerves not close together, parallel with a tendency to reticulation, sometimes inconspicuous; petiole 0.3 - 0.6 cm long; stipule deltoid-acute, 0.1 cm long, early deciduous. Inflorescence *ca* 5-flowered, on short thickened dwarf shoots, usually in axils of fallen leaves towards the apex, sessile. Flowers pedicellate; pedicels 0.1 cm long, accrescent to 0.2 cm. Calyx 0.25 - 0.30 cm long; sepals 4, glabrous within. Corolla *ca* 0.1 cm long; lobes 4, rounded with truncate apex, base of the tube and apex of the lobes sparsely pilose outside. Stamens 8, *ca* 0.1 cm long, sparsely pilose. Ovary 0.1 cm long, 4-loculed. Fruit oblong-ovate, 0.7 - 1.0 cm long.

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The material for this data sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Possibly Extinct. The species is so far known only by the type gatherings made by Bourdillon during the last decade of the previous century, probably in 1894 or 1895. Indiscriminate and steady destruction of its natural habitats, compounded by selective felling of Madhuca trees in the past (6) for their purported all-round value, accounts for the present-day state of scarcity in the Western Ghats region. The injudicious exploitation of this particular species over a long period might well have been the principal cause of its depletion. Bourdillon recorded its rarity way back in 1908 itself, which indicates that the populations might already have been reduced to critically low levels by then. Every since, the species is not known to have been collected again inspite of several plant surveys in the area made quite frequently, particularly during the last three or four decades. As such, the probability that this species has already become extinct is rather high.

DISTRIBUTION : Endemic to a narrow range in the Southern Western Ghats of Peninsular India (1). The only known collections were made from Ariankavu and Shendurni Valley in Quilon District of Kerala. Bourdillon recorded it as being very localised in distribution.

HABITAT AND ECOLOGY : This species was recorded from the evergreen tropical rain forest region in the hills at about 300 m altitude.

CONSERVATION MEASURES TAKEN : None as yet. The species is listed as a threatened plant in some recent publications (8, 1).

CONSERVATION MEASURES PROPOSED : The first priority is to clearly find out if this species still exists in the wild, albeit all indications are to the contrary. Since there still remains the possibility that immature trees or seedlings may have escaped detection it is imperative that intensive surveys be conducted to evaluate or confirm its status. If located, its natural habitat must be fenced off in order to thwart any further biotic interference in the area. Concerted efforts must then be made to stock the area through natural and artificial regeneration. Attempts must be made to raise seedlings in arboreta or botanical conservatories for subsequent transfer of the species to other pristine sites in the region having conducive and optimum growth conditions.

BIOLOGY AND POTENTIAL VALUE : The tree is known to flower during September-November, setting fruit by March next year. The tree is reported to yield a high grade quality timber. Its other Indian congeners viz. *M. longifolia* (The South Indian Mahua or Mahua Butter tree), *M. neriifolia* etc. find wide ranging utility. The *Madhuca* species in general yield good quality timber, oil, medicine, food and fodder (2). It is rather unfortunate that *M. bourdillonii* has become depleted before its full potential could be assessed.

CULTIVATION : Not known.

DESCRIPTION : Evergreen trees, up to 20 m tall, young branches clothed with brownish woolly pubescence. Leaves conferted at the ends of young branches, 20 - 32 × 6 - 10.5 cm, spatulate-obovate, acuminate at apex, broadly cuneate or rounde at base, membranous, glabrous, woolly hairs along the midrib beneath; midrib grooved above, prominent

and rounded below; lateral veins 20 - 27 pairs; petioles stout, 7 - 10 cm long, flattened above, rounded below, brownish woolly pubescent. Flowers in axillary clusters at the ends of branches; pedicels 2 - 2.5 cm long, angular, thickened towards the apex, cinnamomously tomentose. Sepals 0.7 - 1.0 × 0.6 cm, ovate, tomentose except the basal portion within. Corolla 11-or 12-lobed, 1.2 - 1.4 cm long; *lobes* 6.5 - 7.5 × *ca* 2 mm, lanceolate to oblong, obtuse, sometimes irregularly scarious. Stamens 24, in two distinct whorls, 5.5 - 6 mm long, glabrous; filaments filiform, 2.5 - 3 mm long, geniculate at apex; anthers 3.5 - 4 mm long, ovoid-sagittate, connective acutely prolonged up to 1 mm. Ovary *ca* 1 × 3 mm, broadly ovoid, 11- or 12- loculed, glabrous; style up to 2 cm long, filiform, glabrous. Fruits 3 - 4 cm long, ovoid, single-seeded, glabrous.

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The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Insufficiently Known. The species is so far known only by its type gathering made by Robert Wight. This interesting tree species could not be recollected during the recent plant explorations conducted by the Botanical Survey of India along the Western Ghats and Eastern Ghats. At present it is suspected to be extremely rare.

DISTRIBUTION : Endemic to Peninsular India. The only known collection is from an unknown locality (Deccan Peninsula). Many of the Indian members of the genus are mostly found in the Western Ghats of Peninsular region.

HABITAT AND ECOLOGY : No specific data is available. But species of *Madhuca* are generally found growing in evergreen to deciduous forests, particularly in the lower ranges of hilly regions.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Extensive surveys particularly along the W. Ghats and E. Ghats regions are recommended to locate populations of this little-known species. When located, the populations along with their natural habitats must be preserved. Plant sanctuaries must be set up whenever some sustainable populations of this species are found. Preservation of the species in arboreta or plant conservatories is recommended. Attempts must be made on priority basis to raise populations through artificial means like tissue culture.

BIOLOGY AND POTENTIAL VALUE : No information on its biology is available in existing records. Other Indian species of *Madhuca* (Mahua trees) are popular for various uses. (1). The wood of *M. longifolia* is useful as constructional timber. The petals of Mahua are edible, while their seeds yield a fatty oil, popularly known as Mahua Butter. The plants are also useful in local medicine. The potential of *M. diplostemon* for similar utility needs to be studied.

CULTIVATION : Not known to have been taken up.

DESCRIPTION : Trees ; young branches angular, glabrous, terminal cone upto 3 mm long, ferruginously puberulous; stipules 1×0.5 mm, lanceolate, puberulous outside, glabrous within, caducous. Leaves subconfelted at the ends of branchlets, $7.5 - 13.5 \times 4.5 - 7.5$ cm, obovate or suborbicular-obovate, rounded, apex obtuse or indistinctly obtuse-acuminate, base rounded, abruptly narrowed and decurrent along the upper sides of petiole, coriaceous, glabrous; midrib crested above, prominently rounded below; lateral veins 13 - 19 pairs, ascending, curved; petioles 7 - 12 mm long, flat above, rounded below. Flowers 4 - 7 in axillary clusters (known in bud only); pedicels 1 - 3 mm long, ferruginously sericeous. Sepals *ca* 2.5×2 mm, ovate-orbicular, obtusely acuminate, ferruginously sericeous without, glabrous within, inner sepals with membranous glabrous fimbriate margins. Corolla *ca* 1.5 mm long, 7-or 8-lobed ; lobes *ca* 1×1 mm, oblong, rounded, glabrous. Stamens 17, *ca* 1 mm long; filaments *ca* 0.3 mm long, subulate, glabrous; anthers *ca* 0.7 mm long, sagittate ; connective acutely prolonged, glabrous. Gynoecium *ca* 1 mm long, stetile, conoid, glabrous. Fruits not known.

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3. Royen, P. van (1960). Revision of the Sapotaceae of the Malaysian area in a wider sense. xx. *Madhuca* Gmelin. *Blumea* 10 (1) : 78-79.

The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Possibly Extinct. The species is known by only one other collection besides its type collected more than a hundred years ago. It could not be located again during this century even though its known area of occurrence and other contiguous areas have been well explored, particularly in recent years. The type locality was formerly covered by rich natural vegetation, but due to pressures on the land for urbanisation and developmental activities, large portions of these forest tracts were brought under the axe, insomuch that only some bleak patches of secondary vegetation are now found in the area. Selective felling of these trees at individual level must have certainly hastened their depletion.

DISTRIBUTION : Endemic to Western Peninsular India. It was recorded only from a single locality, Mangalore, in South Kanara District of Karnataka. The type collection was made by Hohenacker. The only other known collection was made by an unknown collector from the same locality.

HABITAT AND ECOLOGY : Specific habitat conditions were not recorded by the collectors. However, the area was formerly covered by lush evergreen type of vegetation particularly in the lower hills of the W. Ghats up to 300 m altitude.

CONSERVATION MEASURES TAKEN : None on record.

CONSTRVATION MEASURES PROPOSED : Though the natural vegetation in its type locality has been degraded, it might be prudent to look for it in similar habitats along the adjoining forest tracts of the Western Ghats. Extensive surveys are warranted to confirm its status. If located, its habitat must be immediately accorded due protection, and a thorough assessment made and necessary conservation measures must be employed.

BIOLOGY AND POTENTIAL VALUE : A fruiting specimen was collected in the month of September. No further data on its biology is available. Species of *Madhuca* in general are of manifold uses; while some yield good quality timber, others are useful as food, medicine, fodder etc. (2). It is possible that *M. insignis* had potentiality in similar spheres of utility.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Trees, young branches glabrous, cinnamon-sericeous at the extreme ends; stipules *ca* 1.5×0.5 cm, lanceolate-subulate, sericeous without, glabrous within, soon caducous. Leaves 9 - 13×4 - 6 cm, obovate-rounded or retuse at apex, cuneate at base, decurrent, subcoriaceous, glabrous, midrib shallowly grooved and crested above, prominent below, lateral veins 11 15 pairs, ascending, curved, sometimes straight but curved at apex; petioles 8 -12 mm long, grooved above, rounded below, thickened and sometimes rugulose in the basal part , glabrous. Flowers not known; pedicels 2 - 2.8 cm long, glabrous, with persistent sepals; sepals 6 - 8×4 - 6 mm, ovate-lanceolate, cinnamon-sericeous without, glabrous within, inner sepals crested and with glabrous membranous, fimbriate margin. Fruits 2.7 - 3×0.8 - 1.2 cm, fusiform-ovoid, sometimes slightly oblique with persistent style at apex upto 1.7 cm, 1-seeded; pericarp thin, glabrous; seeds fusiform, ovoid, truncate at ends, brown.

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The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Vulnerable. The species is known only by a few sporadic gatherings made from far-flung isolated localities and is possibly surviving by very few fragmented populations scattered in a narrow range. The species is obviously on the decline; the apapparent cause of its rarity being the loss of natural habitats. Being subject to the pressures of rapidly spreading urbanisation the few remaining populations of this species are on the verge of depletion. As such, this extremely rare species could be irrevocably lost by the turn of this century, unless steps are taken to ensure its survival.

DISTRIBUTION : Endemic to the Southern E. Ghats in Peninsular India. Its type collection was made by Lushington from the Nallamalai hills in Kurnool District of Andhra Pradesh. Subsequently after a lapse of about seventy years Ellis collected it from Chelama in July 1963, and from the adjacent locality Rollapenta in 1972, in the Nallamalais. It was also located further south at Srivilliputhur Reserve Forest in Ramanathapuram District of Tamil Nadu in July 1965.

HABITAT AND ECOLOGY : The species is found growing in moist deciduous forest tracts in the hills at lower elevations.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Monitoring of all extant populations for evaluation; assessment of specific threat factors must be made, and its habitats should be accorded protection. The Nallamalai hills harbour many interesting plants including some rare endemics of germplasm potential (1, 4, 5, 6) and, as such, a 'Plant Sanctuary' should be established in the area to conserve its genetic diversity. Further botanical forays in some relatively underexplored areas of the Eastern Ghats might yield some hitherto unrecorded populations of the species.

BIOLOGY AND POTENTIAL VALUE : Flowering and fruiting specimens have been collected between June and August. The plant is not known to have any specific uses at present. However, some related congeners like *E. candollei, E. hookeriana, E. quinquelocularis* and *E. wallichii* yield durable useful timber. The roots of *E. quinquelocularis* are of some medicinal value. The bark of *E. hookeriana* and *E. spectabilis* yield strong fibre. The potential of *E. lushingtonii* for similar uses needs study.

CULTIVATION : Not taken up anywhere yet.

DESCRIPTION : Deciduous trees, *ca* 5 m tall; branchlets pubescent. Leaves *ca* 5×cm, orbicular, acute at apex, base cordate, irregularly short dentate, stellate hairy above, white-tomentose below, membranous ; petioles *ca* 5 cm long. Racemes *ca* 8 cm long, axillary, 2-3-flowered, flower buds oblong, constricted at middle. Flowers 2 cm long; bracteoles 0.5 cm long, multifid, caducous; calyx 5-partite, 2 cm long, pubescent within, tomentose outside; petals 5, yellow, obovate, clawed at base, tomentose; staminal column with numerous anthers; ovary sessile; style simple; stigma 5-fid. Capsules *ca* 4 cm long, ovoid, woody; seeds numerous, winged apically on one side.

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4. Nayar, M. P., Ahmedullah, M. & Raju, D. C. S. (1984). Endemic and Rare Plants of Eastern Ghats. *Indian Journ. Forestry* 7(1) : 34-42.
5. Nayar, M. P., Ahmedullah, M. & Raju, D. C. S. (1986). The dwindling flora of Andhra Pradesh.—A call for conservation. *Indian Journ. For.* 9 : 283-286. 1987.
6. Raju, D. C. S., Ahmedullah, M. & Nayar M. P. (1986). Genetic Potential in Eastern Ghats of India. *Journ. Econ. Tax. Bot.* 9 : 133-138, 1987.

The material for this sheet was supplied by M. Ahmedullah, Botanical Survey of India, Howrah.

STATUS : Endangered. At present only one population comprising about 20 trees is reportedly found surviving at one discrete locality (1). Apparently it has become depleted in all the localities it was recorded earlier. Loss of natural habitats is the apparent cause of its rarity and decline. This narrow endemic species is in imminent danger of extinction if conservation measures are not taken immediately to ensure its survival in the wild.

DISTRIBUTION : Endemic to the Southern E. Ghats in Andhra Pradesh and Tamil Nadu states of Peninsular India. Earlier records of its distribution are very few. The earliest known collections are from the "Corommandel Coast". Gamble collected it from "Nigadi hills" (Nagari hills) in Cuddapah District of Andhra Pradesh in July 1884. Subsequently Barber collected it in 1917 from Dharmapurj in Tamil Nadu. No latter-day collections are known from the aforementioned localities. After a lapse of over sixty years Mohanan and Venugopal located it in 1978 at Kullukurichi in the Kalrayans of South Arcot District of Tamil Nadu.

HABITAT AND ECOLOGY : The species is found growing in deciduous forest on the exposed and moist eastern slopes of the hills (at Kalrayans) between 300 and 600 m altitudes.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Its sole surviving population at Kalrayans in South Arcot should be accorded full protection by declaring the specific locality and its vicinity as a 'Plant Sanctuary'. Efforts to raise seedlings in arboreta or botanical gardens should be made for *ex situ* conservation and to transfer the species to suitable pristine sites in the region. Efforts to raise stocks artificially through application of tissue culture techniques should also be made.

BIOLOGY AND POTENTIAL VALUE : The tree sheds off its leaves completely by January and has a very characteristic appearance. It sprouts new foliage by April and flowers almost simultaneously, fruiting from June onwards; the fruits remaining persistent on the tree up to February. The potential uses of this tree species are not yet known, but it might possibly have some timber value as is the case with most species of its allied genus *Sterculia*.

CULTIVATION : Not taken up anywhere.

DESCRIPTION : Deciduous trees, *ca* 20 m tall. Leaves 6.5 - 13.8 × 5.5 - 11.5 cm, ovate to sub-orbicular, base cordate, acute or acuminate at apex, margin entire, coriaceous, upper surface glabrescent, lower surface densely pilose throughout when young, ultimately glabrescent except for the basal portion; petiole *ca* 10 cm long. Panicles *ca* 15 cm long, axillary or terminal, dense, rusty-tomentose when young; peduncle *ca* 5 cm long; pedicel upto 4 mm long. Male flowers: 1.5 cm across. Sepals 5, scarlet, oblong-spathulate, stellate-tomentose. Gynandrophore *ca* 6.5 mm, basally attenuate, apically globose with staminal cluster. Stamens 10, sessile; anthers parallel. Bisexual flowers: Sepals 5. Gynandrophore upto 4 mm long. Stamens *ca* 10, adnate to the base of the ovary. Ovary

5-loculed, ovoid, woolly; ovules 2 in each locule on axile placenta; style 2 mm long, attenuate. Follicles 8 - 10×4 - 5 cm, oblong, membranous, inflated at base, prominently nerved, densely pilose within, 1 - 2 seeded, apically winged; wing flattened, clothed with rusty brown pubescence; seeds globose, brownish, shining, mottled.

REFERENCES :

1. Britto, S. J. & Matthew, K. M. (1983). Sterculiaceae. *In :* Matthew, K. M., *Fl. Tamil Nadu Carnatic* 3 : 145.
2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 76. (*repr. ed.*).
3. Kostermans, A. J. G. H. (1953). The genera *Scaphium* Schott & Endl. and *Hildegardia* Schott & Endl. (Sterculiaceae). *J. Sci. Research Indonesia* 2 (1) : 23.
4. Masters, M. T. (1874). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 361.
5. Roxubrgh, W. (1832) *Fl. Indica*, p. 148. (Carey ed.).
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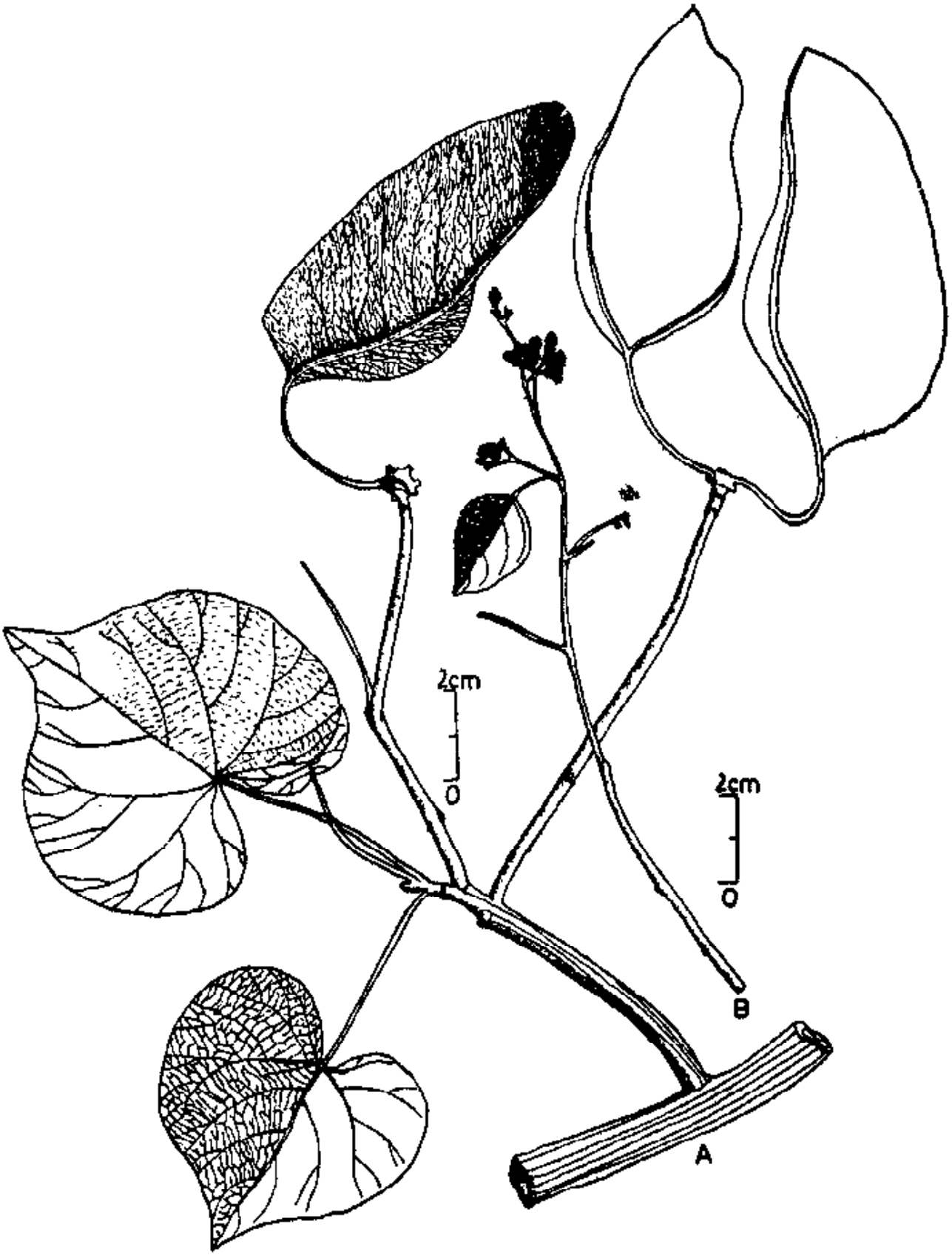
The material for this sheet was supplied by M. Ahmedullah, Botanical Survey of India, Howrah.



Hildegardia populifolia (Roxb.) Schott & Endl.

STATUS : Rare. Though fairly frequent at one time it is depleted now with a few fragmented populations widely scattered in its range. The gradual decimation of natural forest cover in its area of distribution has lead to its rarity. Injudicious felling of trees by the local people for exploiting its wood could have been another major factor.

DISTRIBUTION : Endemic to the W. Ghats in Karnataka, Kerala and Tamil Nadu (1). It is known from Coimbatore and Tiruchirapalli through old records or solitary collections. At present some fragmented populations are found scattered in far-flung localities at the Jog Falls (N. Kanara Dt.), Nadarai Temple Grove, (Quilon Dt.), Trichur and Lower Kodayar (Kanyakumari Dt.).

HABITAT AND ECOLOGY : In evergreen forest patches in the hills at low elevations.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : Monitoring of all its populations in the region for assessment of the existing populations and also for locating some hitherto unrecorded populations, if any, should be conducted on a priority basis. Introduction of the species in arboreta or botanical gardens is necessary. Protection of its remaining natural habitat and stocking the area through natural regeneration and artificial propagation are required.

BIOLOGY AND POTENTIAL VALUE : The tree comes to flower during March-May and sets fruit during December-February. The tree yields a moderately hard and heavy wood which is reportedly used locally for contructing houses. The wood is also suitable for making match boxes and splints. It is well worth as an ornamental and also be grown as an avenue plant.

CULTIVATION : It was reportedly grown in gardens some decades ago, but not found in local gardens at present.

DESCRIPTION : Everygreen tree, *ca* 8 m tall. Leaves deeply lobed on young plants, elliptic-obovate, 7.5 - 10 × 3.5 - 5 cm, cuneate to obliquely subcordate at base, margin toothed towards the apex, palmately 4 - 5-veined, prominently reticulate, rusty tomentose below. Bracteoles laciniate with linear segments. Flowers large, axillary, short pedunculate. Calyx lobes 2.5 - 3.5 cm long, connate at base. Corolla lobes, white, almost equal to sepals. Staminal filaments connate in lower half of the phalanges. Ovary stipitate, 5-loculed, ovules several in each locule; style entire; stigma groved. Capsules 4 × 2.5 cm, ovoid, obtusely 3-angled, woody, with rusty stellate hairs; seeds 4 in each locule, apically winged.

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2. Gamble, J. S. (1957). *Fl. Pres. Madras* 1 : 77. (repr. ed.).
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The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Howrah.

STATUS : Rare. This taxon is represented by a few collections in the Kanjilal Herbarium, Botanical Survey of India, Shillong (ASSAM). It has lastly been collected from the Elephant Falls, Meghalaya in the year 1935. Much of the forests in Meghalaya have been cleared for 'Jhum' cultivation, perhaps rendering this taxon rare.

DISTRIBUTION : So far known from Meghalaya in North-Eastern India, endemic. It is not even reported from the Garo and Jaintia Hills in Meghalaya.

HABITAT AND ECOLOGY : Evergreen forested hills at 1900 m altitude. The area receives high rainfall up to 1200 cm annually.

CONSERVATION MEASURES TAKEN : The forests at Mausmai and Shillong Peak are preserved as 'sacred groves' due to religious belief; however there is no recent report of this plant from this area also.

CONSERVATION MEASURES PROPOSED : The known range of distribution of this taxon has been fairly botanised during recent past, but this could not be collected/located in this natural habitat. Yet further intensive search is required and if found the plants may be collected and introduced into the garden at Woodlands, Shillong and Barapani Arboretum, BSI, for its regeneration.

BIOLOGY AND POTENTIAL VALUE : Flowering and fruiting: July to November. The plant is of botanical and phytogeographical interest. The wood is reportedly heavy, very fine and hard.

CULTIVATION : None.

DESCRIPTION : Medium or small sized tree up to 8 m high; bark grey, crown lax. Leaves alternate, 6 - 12 × 1.5 - 4 cm, elliptic, shortly acuminate, base acute or cuneate, entire; lateral nerves indistinct, 15 - 19 on each half; petiole 4 - 6 mm, long glabrous or sparsely ciliate. Flowers pedicillate, 1 1.5 cm in diam., axillary, fascicled, yellow. Sepals 5, free, orbicular, 3.5 - 4 × 3 - 3.5 mm, glabrous, ciliate at the margins. Petals 5, 8 - 5 mm, connate at base, elliptic, glabrous. Stamens numerous (35 - 37 or more), different in size; filaments longer than anthers; anthers *ca* 1.5 mm long, slightly apiculate, pilose. Ovary 2 - 3-celled, many ovules in each loculus with axile placentation; styles 2 - 3 fid. Fruit globose, berry, crowned by persistent style.

REFERENCES :

1. Haridasan, K. & R. R. Rao (1985). *For. Fl. Meghalaya* 1 : 116.
2. Dyer, W. T. Thisleton (1874). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 284 (as *grandiflora* Hook. f. & Thoms. ex Dyer)
3. Kanjilal U. N. *et al* (1934). *Fl. Assam* 1 : 116.

The material for this sheet was supplied by A. S. Chauhan, Botanical Survey of India, Shillong.

STATUS : Indeterminate. This species is based on the collection of Kurz from Meghalaya made in 1877. Recently this area has been floristically explored by Balakrishnan (2), Haridasan & Rao (3), but this species has not been recorded.

DISTRIBUTION : Endemic to Meghalaya.

HABITAT AND ECOLOGY : Subtropical evergreen forest between 600-900 m altidudes.

CONSERVATION MEASURES TAKEN : Balphakram area is a wildlife sanctuary; Nokrek (Tura range) is a Biosphere Reserve, besides some sacred groves in the region, which may offer protection to the species.

CONSERVATION MEASURES PROPOSED : Exploration of the type locality and its vicinity to collect this species. If located, it must be introduced into botanical gardens for propagation and further studies and also into the existing sanctuaries, Biosphere Reserve and Sacred groves which will provide scope for its conservation in its distribution range.

BIOLOGY AND POTENTIAL VALUE : Fruits in May. Flowers not known. A shrubby species of botanical interest.

DESCRIPTION : Shrubs, stem glabrous, bark brown or brownish grey. Leaves oblanceolate to spathulate, apex abruptly short acuminate, base acute or attenuate, margin serrate, entire towards the base, 15 - 21 × 4 - 7 cm, glabrous, coriaceous, midevin depressed above, raised below ; petioles 4 - 7 mm long, glabrous. Flower not seen. Fruit globoid, 1.6 - 2.5 cm across, furrowed longitudinally, hard, apex with 5 stigmatic heads, base with persistent sepals.

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2. Balakrishnan, N. P. (1981). *Fl. Jowai* 1 : 90 - 94.
3. Haridasan, K. & R. R. Rao (1985). *For. Fl. Meghalaya.* Vol. I.

The material for this sheet was supplied by Tapas Kr. Paul and M. P. Nayar, Botanical Survey of India, Calcutta.

STATUS : Rare. The species is thinly scattered in its range. The tree was fairly frequent about a decade ago but has become rather scarce now. Depletion of natural forests for developmental activities is mainly responsible for its rarity. As this species represents a monotypic endemic genus it is of botanical and phytogeographical interest.

DISTRIBUTION : Endemic to the W. Ghats in Maharashtra and Karnataka (1). In Maharashtra it is restricted to Padgha-Erada range, Khandala, Ambavane and its vicinity. In Karnataka it is known from a few localities in the northern part of the state.

HABITAT AND ECOLOGY : The species grows in moist deciduous to semi-evergreen forests in the hills of northern and central W. Ghats.

CONSERVATION MEASURES TAKEN : None.

CONSERVATION MEASURES PROPOSED : Surveys must be conducted to locate rich pockets of this species. Its natural habitat must be safeguarded. Utilisation through resource management must be based on plantations rather than on trees growing in the wild. Artificial regeneration methods can be gainfully employed towards this end.

BIOLOGY AND POTENTIAL VALUE : The trees flower during May-November. The bark of the tree yields good quality fibre which is useful for cordage. The wood is rather soft and is locally used for making rafters and yokes.

CULTIVATION : None on record.

DESCRIPTION : Deciduous trees, 5 - 9 m tall. Leaves 11 16-(25)×11 16-(25) cm, suborbicular, shallowly 3-lobed, usually cordate at base, glandular dentate, upper surface sparsely stellate hairy towards the base, lower surface stellate-hairy, palmately veined; stipules ovate-acuminate to linear-lanceolate. Flowers in terminal lax panicles, sometimes axillary, solitary; bracts 1×0.7 cm, broadly elliptic, rusty pubescent; pedicels jointed. Sepals 5, free, 3×0.3 cm, oblong in bud, becoming linear-lanceolate at maturity. Petals 5, free, yellow, 2.5×0.7 cm, obovate-spathulate, glandular near base. Stamens numerous, free, on raised torus; torus 0.2 - 0.3 cm long; filaments thread-like, pubescent at base. Ovary 3 - 5-locule6; each locule with 2 ovules; style filiform; stigma not prominent. Fruit 5×3.5 cm, indehiscent, woody, triquetrous, usually winged on the 3 angles, sometimes 2-winged, spinescent; seeds 1 in each locule, pendulous.

REFERENCES :

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2. Beddome, R. H. (1877). *Fl. Sylv.*, t. 110.
3. Graham, J. (1839). *Cat. Pl. Bombay*, p. 21.
4. Hooker, J. D. (1874). *Fl. Brit. India* 1 : 394.

The material for this sheet was supplied by M. Ahmedullah and M. P. Nayar, Botanical Survey of India, Calcutta.

Erinocarpus nimmonii Graham A. Flowering twig. B. Fruits.

STATUS : Endangered; endemic. The habitat loss due to forest felling may be one of the reasons for the depletion of this semi-parastic species.

DISTRIBUTION : Kurz (1877) described this species from South Andaman Island. This species is only known from the type collections.

HABITAT AND ECOLOGY : This interesting semi-parasitic shrub is reported from the evergreen forests.

CONSERVATION MEASURES TAKEN : The Mt. Harriet National Park and the areas were highly affected due to biotic pressures in the past. It is necessary to further extend the Mt. Harriet National Park limits to include ajoining areas. The Jarwa Reserve is not affected biotically and this species might occur in the reserve.

BIOLOGY AND POTENTIAL VALUE : Not studied, except that it grows as a semi-parasite on large tree branches.

CULTIVATION : Not cultivated.

DESCRIPTION : Parasitic shrub, glabrous. Leaves 3.5 - 5 cm long, obovate to ovate-oblong, opposite, entire, slightly wavy, apex rounded, thickly coriaceous. Inflorescence a spike, arising from the forks of the branches and terminal between the 2-uppermost leaves. Flowers minute, sessile; calyx-limb obsolete; perianth segments 3, triangular; stigma obscurely conical, small. Fruit a berry, elongate-ovate, smooth, truncate or crowned by the longer persistent perianth segments.

REFERENCES :

1. Barlow, B. A. (1964). Classification of the Loranthaceae and Viscaceae. *Proc. Linn. Soc.*, N. S. W. 89 : 268-272.
2. Kujit, J. (1981). Inflorescence morphology of Loranthaceae—an evolutionary synthesis. *Blumea* 27 : 1-73.
3. Kurz, S. (1877). *For. Fl. Brit. Burma* 2 : 326.

The material for this sheet was supplied by M. P. Nayar, Botanical Survey of India, Calcutta and H. S. Debnath, BSI, Port Blair.

STATUS : Vulnerable. It is a very rare species and after the type collection (*Helfer* 1240, 1341, K! CAL!) it has been collected only once, in April 1976, after a lapse of more than a hundred years from Mount Harrriet, S. Andamans (*N. G. Nair* 3666 PBL !).

DISTRIBUTION : Andaman Islands; Burma?. Lawson (1) had given its distribution as "Tenasserim and Andaman Isls., Helfer". J. W. Helfer visited Andaman Islands and lost his life in an attack on his party by a band of Andamanese. After his death his Andaman collections got mixed up with his Tenasserim plants and all were labelled "Tenasserim and Andamans". Thus, it is difficult to say whether his collections of *Ampelocissus helferi* were from Andamans or Tenasserim. Kurz (2), reported it from Tenasserim, based probably on Helfer's collections.

HABITAT AND ECOLOGY : In tropical evergreen forests.

CONSERVATION MEASURES TAKEN : The forests in S. Andamans are, by and large, disturbed. However, forests around Mount Harriet, one of the areas from where this plant has been collected, has been declared as a protected area by the Andamans Administration.

CONSERVATION MEASURES PROPOSED : Measures for *in situ* conservation and introduction of the species in the Botanic Garden at Port Blair for *ex situ* conservation are proposed.

BIOLOGY AND POTENTIAL VALUE : It is the only species of the section *Kalocissus* of the genus *Ampelocissus* represented in India.

CULTIVATION : Not known in cultivation.

DESCRIPTION : Scandent shrubs; branches cylindrical, pale tomentose when young. Leaves 5-foliolate, pedate; petiole 6 - 10 cm long; terminal leaflet *ca* 14×6 cm, oblong-lanceolate, attenuate at base, margins serrate, acuminate at apex, coriaceous, glabrous above, nerves pubescent beneath, petiolules *ca* 1 cm long; lateral leaflets 9 - 12×3.5 - 5 cm, oblique at base, margins and apex as in the terminal leaflets, petiolules *ca* 1 cm long. Inflorescences panicles of spikes, cirrhiferrous; peduncles *ca* 10 cm long, tomentose; tenderils simple, *ca* 10 cm long, tomentose. Flowers 5-merous. Fruits *ca* 1 cm across (immature), oblong-ovoid.

REFERENCES :

1. Lawson, M. A. (1875). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 662.
2. Kurz, S. (1877). *For. Fl. Brit. Burma* 1 : 277.

The material for this sheet was supplied by B. V. Shetty, Botanical Survey of India, Coimbatore and Paramjit Singh, Central Soil & Water Conservation Research & Training Institute, Khedbrahma, Gujarat.

STATUS : Endangered. Apart from the type collection (Sikkim Terai, *S. Kurz, s.n.*, K!, CAL!), this species is represented by only one collection [W. Bengal : Silgore (5 miles), Panchkil (2 miles), 1 - 6 - 1875, *C. B. Clarke* 26524 A, CAL!] made more than a hundred years ago.

DISTRIBUTION : Endemic to Sikkim and W. Bengal.

HABITAT AND ECOLOGY : In damp forests.

CONSERVATION MEASURES PROPOSED : A thorough search for the species should be made and measures taken for *in situ* and *ex situ* conservation, if located.

BIOLOGY AND POTENTIAL VALUE : It is an endemic species confined to a very small area.

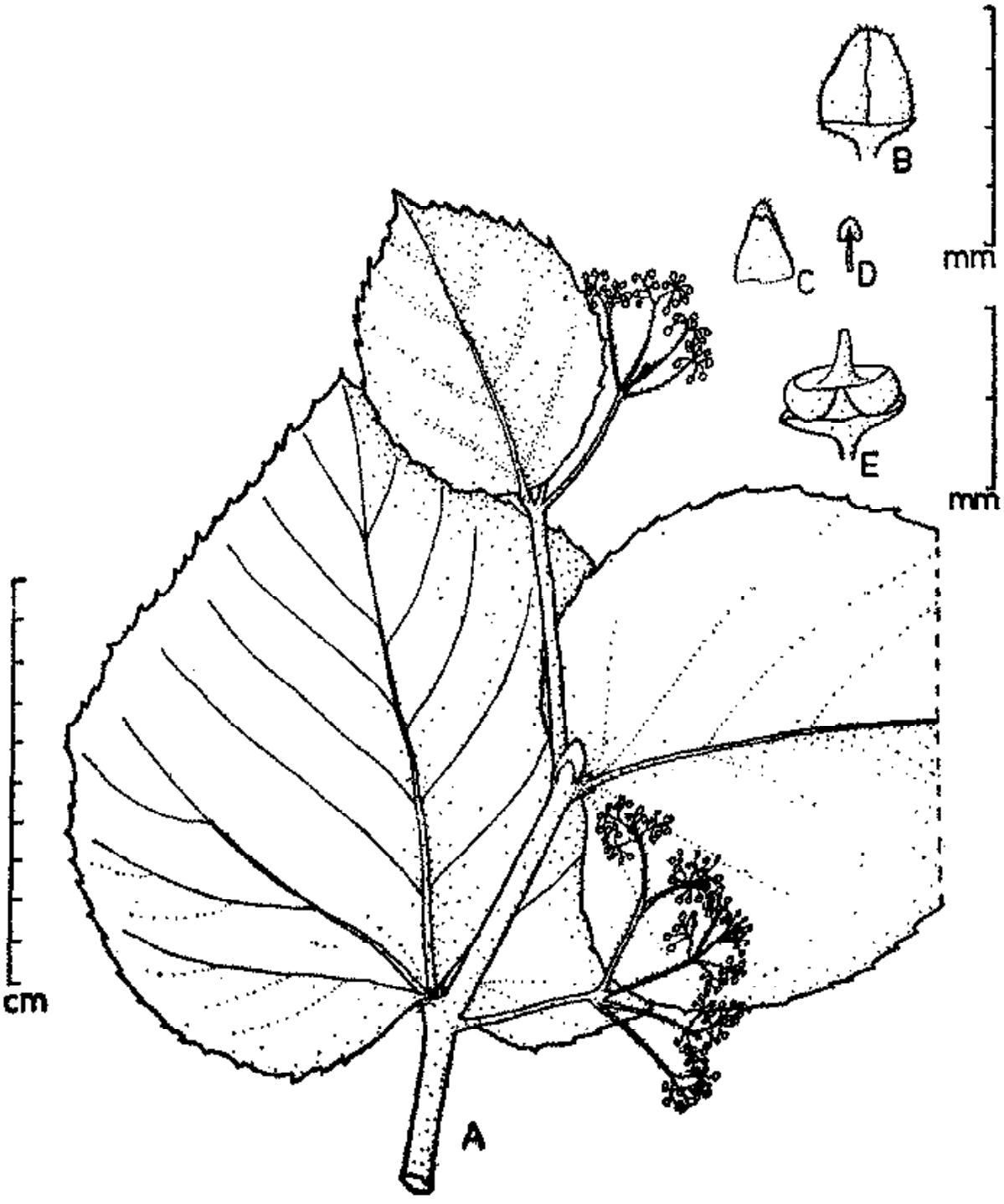
CULTIVATION : Not known in cultivation.

DESCRIPTION : Erect shrubs; branches upright, striate, soft-pubescent. Leaves subsessile to petiolate, 13 - 20 × 13 - 20 cm, broad-ovate, rhomboid or suborbicular, shallowly cordate at base, margins dentate-serrate, acute at apex; petioles usually up to 1 cm long. Inflorescences divariacate cymes, pubescent, *ca* 6 cm long; peduncles *ca* 3 cm long. Flowers 4-merous, *ca* 1.5 mm long; pedicels 2 - 3 mm long. Calyx saucer-shaped, obscurely 4-lobed. Petals *ca* 1.5 × 0.7 mm, oblong-ovate, acute and hooded at apex. Stamens *ca* 1 mm long; anthers globose. Disc 4-notched, covering the ovary. Ovary *ca* 1 mm across; style stout, *ca* 1 mm long; stigma minute.

REFERENCE :

1. Lawson, M. A. (1875). *In :* Hooker, J. D., *Fl. Brit. India* 1 : 649. (as *Vitis spectabilis* Kurz).

The material for this sheet was supplied by B. V. Shetty, Botanical Survey of India, Coimbatore and Paramjit Singh, Central Soil & Water Conservation Research & Training Institute, Khedbrahma, Gujarat.



Cissus spectabilis (Kurz) Planchon

A. Habit. B. Flower. C. Petal. D. Stamen. E. Gynoecium.

STATUS : Vulnerable, due to excessive clearing and opening of forest. This has been collected during 1965 and there is no subsequent collection of this species either from the Niligiris (6) or Palnis (5).

DISTRIBUTION : Hills of Kodaikanal, Madurai, Kotagiri & Nilgiris in Tamil Nadu. Endemic to Tamil Nadu.

HABITAT AND ECOLOGY : In hilly terrain at higher elevation (above 2000 m), in partial shady forest clearings.

CONSERVATION MEASURES TAKEN : The Nilgiri hilly region is protected now since its declaration as the Nilgiri Biosphere Reserve.

CONSERVATION MEASURES PROPOSED : A thorough intensive search be made in the above areas to locate the plants and introduce in the botanical gardens for *ex situ* conservation.

DESCRIPTION : Perennial terrestrial trailing herb. Lateral branch system is characteristic and forked several times. Branches at successive forks conspicuously, alternately unequal, successive larger branches forming almost a straight line : ultimate branches always with accessory branches, 8 - 16 × 3 - 4 cm; costules on the ultimate branches, 5 - 5 mm apart; segments of lamina tapering from base to apex; texture thin but firm, apex acute, margin slightly reflexed when dry, lower surface glabrous and slightly glaucous; veins concolorous to lamina, distinctly prominent on the upper surface and slightly so on the lower surface.

This differs from var. *demota* Holttum in having its accessory branches opposite to the successive forks, not distinctly below the forks as in var. *demota*.

REFERENCES :

1. Beddome, R. H. (1883). *A Handbook to the Ferns of British India, Ceylon and Malay Peninsula with supplement* (repr. ed.).
2. Holttum, R. E. (1957). On the taxonomic subdivision of the Gleicheniaceae with description of new Malaysian species and varieties. *Reinwardtia* 4 : 257-280.
3. Panigrahi, G & Dixit, R. D. (1968). Notes on three species of *Gleichenia* in India. *Bull. Bot. Surv. India* 10 : 337-340.
4. Panigrahi, G. & Dixit, R. D. (1971). Two new varieties of *Gleichenia linearis* (Burm.f.) Underw. from India. *Ibid.* 13(1 & 2) : 162 - 163.
5. Manickam, V. S. (1986). *The Fern Flora of the Palni Hills (South India)*.
6. Sharma, B. D. *et al.* (1975). Studies on the flora of Nilgiris, Tamil Nadu. *Biol. Mem.* 2(122) : 1-186.

The material for this sheet was supplied by P. Bhargavan and N. P. Balakrishnan, Botanical Survey of India, Coimbatore.

STATUS : Vulnerable, due to habitat destruction and narrow endemism.

DISTRIBUTION : According to Holttum (1977) it is only known from type collection (Darjeeling 4000 m.); Clarke (1880) and Beddome (1883), mentioned the locality from Sikkim Himalaya near Darjeeling.

HABITAT AND ECOLOGY : Along streams among rock boulders, at high altitudes.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Specific survey for its collection is required to ascertain its range of distribution. *Ex situ* conservation of its plants in conservatories recommended.

BIOLOGY AND POTENTIAL VALUE : Not known.

DESCRIPTION : Rhizome short-creeping. Fronds 75-100×25 - 30 cm; stipe and rachis hairy; lamina pinnate, pinnae reduced in the basal part into auricles, alternate, middle pinnae 17 - 20×4 - 5 cm, narrowed at the base, herbaceous in texture, margins lobed, 1 - 2 mm from costa. Veins upto 16 pairs, simple to one or two times forked, basal vein joining with more than one excurrent veins to sinus, veins anastamosing to form areoles along costules, hairy on the lower surface. Sori indusiate on basal veins only; indusia hairy.

REFERENCES :

1. Beddome, R. H. (1982). *A Handbook to the Ferns of British India, Ceylon and Malaya Peninsula with supplement.*
2. Dixit, R. D. (1984). *A census of the Indian Pteridophytes.* Botanical Survey of India, Calcutta.
3. Holttum, R. E. (1977). The genus *Christella* Lev., sect. *Christella.* Studies in the family Thelypteridaceae-XI. *Kew Bull* 31 : 308.
4. Nayar, B. K. & Kaur, S. (1974). *Companion to R. H. Beddome's Handbook to the Ferns of British India, Ceylon and Malaya Peninsula.*

The material for this sheet was supplied by R. D. Dixit and Bal Krishna, Botanical Survey of India, Allahabad.

STATUS : Vulnerable due to habitat loss.

DISTRIBUTION : Endemic to Kumaun; so far known only from the type specimen.

HABITAT AND ECOLOGY : Terrestrial, among rocks along streams.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Intensive search is required to trace out the species from Kumaun to recommend conservation measures.

BIOLOGY AND POTENTIAL VALUE : No information.

DESCRIPTION : Rhizome creeping; fronds distant, 80 - 100 cm high; stipes upto 32 cm long, clothed with short hairs; pinnae *ca* 30 pairs, basal 5 - 6 pinnae reduced into lobate auricles, margins crenate, middle pinnae 16 - 18 × 2 - 2.5 cm, auriculate, caudate acuminate at apex, both the surfaces clothed with short erect hairs; veins 10 - 11-paired, anastamosing, herbaceous in texture. Sori medial, divergent; indusium small with acicular hairs.

REFERENCES :

1. Chandra, S. (1982). Checklist of ferns endemic to India. *Nov. Hedw.* 36 : 241-247.
2. Holttum, R. E. (1977). The genus *Christella* Lev., sect. *Christella*. Studies in the family Thelypteridaceae-XI. *Kew Bull.* 31(2) : 318.

The material for this sheet was supplied by R. D. Dixit and Bal Krishna, Botanical Survey of India, Allahabad.

STATUS : Rare. Extensive tracts of natural forests in Meghalaya were removed in the past 5 - 6 decades ; it is a case of narrow endemism.

DISTRIBUTION : Meghalaya-Khasi hills; endemic.

HABITAT AND ECOLOGY : Terrestrial, growing in mountainous gorges 1500 m deep in forests along streams.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : The habitats should be protected and the species should be introduced into the conservatory of the BSI at Barapani near Shillong.

BIOLOGY AND POTENTIAL VALUE : No information.

CULTIVATION : Not in cultivation.

DESCRIPTION : Rhizomes suberect; fronds tufted, stipes 30 - 50 cm long, pubescent; lamina lanceolate, 25 - 40 × 10 - 20 cm, leathery in texture; margin lobed, lobes cut down upto 2/3rd or more towards the costa, hairy on the lower surface; veins simple. Fertile fronds larger and slightly contracted in comparision of sterile ones; sori indusiate, larger, confined to basal part, didymochlaenoid, close to midrib: indusium long, hairy; sporangia sessile, without hairs or glands.

REFERENCES :

1. Beddome, R. H. (1892). *A Handbook to the Ferns of British India, Ceylon and Malaya Peninsula with supplement.*
2. Nayar, B. K. & Kaur, S. (1974). *Companion to R. H. Beddome's Handbook to the Ferns of British India, Ceylon and Malaya Peninsula.*

The material for this sheet was supplied by R. D. Dixit and Bal Krishna, Botanical survey of India, Allahabad.

STATUS : Rare, due to habitat loss.

DISTRIBUTION : Sikkim-Simonbong at 1500 m altitude. Endemic.

HABITAT AND ECOLOGY : Along streams as undergrowth of forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Sikkim, the Northeastern hill states and Arunachal Pradesh abound in many rare and endemic tree ferns and other lower groups of vascular plants and harbour in all about 500 species of peteridophytes representing the richest diversity for India. Due to loss of habitats, tree felling and ecological imbalances in this region, many of these species are threatened. A National Pteridophytes Sanctuary should be established and developed for *in situ* conservation of this rich diversity of flora of our country.

BIOLOGY AND POTENTIAL VALUE : No information. It is generally seen that ferns are resistant to diseases of fungi, bacteria and viruses and thus may prove to be of potential value in preparing biological pest control chemicals.

DESCRIPTION : Rhizome short-creeping; fronds distant, 70 - 150 cm high; stipes and rachis pubescent. Lamina lanceolate, pinnae sub-opposite in the basal part, middle pinnae 15 - 17 × 1.5 - 2 cm, pubescent on both the surfaces, margins lobed, lobes deeply cut down near to costa, oblong to acute, herbaceous but firm in texture. Sori near the midrib.

REFERENCES :

1. Clarke, C. B. (1880). A review of the ferns of Northern India. *Trans. Linn. Soc. Lond., Bot.* 1 : 514.
2. Tagawa, M. (1938). *Cyclogramma*, a new fern genus. *Acta Phytotax. Geobot.* 7 : 55.

The material for this sheet was supplied by R. D. Dixit and Bal Krishna, Botanical Survey of India, Allahabad.

STATUS : Rare ; decline of its habitats is a causative factor for its rarity.

DISTRIBUTION : Darjeeling Himalayas and Khasia Hills. Endemic.

HABITAT AND ECOLOGY : Terrestrial along streams in the undergrowth of the forests.

CONSERVATION MEASURES TAKEN : Nil.

CONSERVATION MEASURES PROPOSED : Collection of the species from the wild and introduction in conservatories at Shillong and Barapani and *in situ* conservation of its populations are suggested.

BIOLOGY AND POTENTIAL VALUE : Not known.

DESCRIPTION : Rhizome short, erect; fronds tufted, clefted; stipes 10 - 30 cm long, stramineous, hairy; lamina deltoid-oblong, 30 - 40 × 10 - 16 cm, pinnate; pinnae 10 - 15 pairs, the basal pairs close, largest 8 - 9 × 2 - 2.5 cm, broadly ovate-lanceolate, margins serrate, veins 6 pairs, forked, herbaceous in texture, hairy on both the surfaces. Sori medial on the veins; indusium small, pubescent.

REFERENCES :

1. Beddome, R. H. (1892). *A Handbook to the Ferns of British India, Ceylon and Malaya Peninsula with supplement.*
2. Clarke, C. B. (1880). A review of the ferns of Northern India. *Trans. Linn. Soc. Lond. II. Ser. 2. Bot.* 1 : 514. t. 65. f. 2.
3. Ching, R. C. (1963). A reclassification of the family Thelypteridaceae from the mainland of India. *Acta Phytotax. Sin.* 8 : 306.

The material for this sheet was supplied by R. D. Dixit and Bal Krishna, Botanical Survey of India, Allahabad.

STATUS : Endangered. Known only from the types and a few specimens available at the Kew Herbarium (K).

DISTRIBUTION : Endemic to the Nilgiri and Palni Hills.

HABITAT AND ECOLOGY : None on record. It may be growing along stream sides at 1300 - 2000 m alt. in the forests as undergrowth.

CONSERVATION MEASURES TAKEN : This species has been reported from Nilgiris and Palnis, of which the former areas are now under the recently established Nilgiri Biosphere Reserve which offers protection to the surviving populations and habitats.

CONSERVATION MEASURES PROPOSED : Efforts should be made to relocate this plant and introduce them in botanic gardens. The Southern Western Ghats abound in serveral threatened and endemic plants including pteriodphytes that need to be conserved. A large conservatory to be built by the Botanical Survey of India, exclusively for *ex situ* conservation of such species from this region, should be given due consideration.

BIOLOGY AND POTENTIAL VALUE : A species of botanical interest due to its endemicity. This species is an intermediate between *Pseudocyclosorous ochthodes* and *P. tylodes.*

DESCRIPTION : Caudex unknown. Stipes *ca* 12 cm long, *ca* 6.5 cm long from base of stipe to the first-large pinna. Reduced pinnae 14 pairs, *ca* 4 cm apart ; upper most pair 3 and 3.7 cm long, with entire basal acroscopic lobe, *ca* 6 mm long, 8 mm wide above base, lobed half way to costa ; apical lobe entire, 1.5 cm long, 3 - 5 mm wide ; lower reduced pinnae with subentire narrow blade ; auricle much shorter than the blade. Fronds *ca* 75 cm long ; pinnae more than 25 pairs, at base 2 pairs pinnae intermediate between normal and reduced, their bases slightly narrowed with short entire acroscopic auricle ; the largest pinna *ca* 22×24 cm, base subtruncate to broadly cuneate, apex cuneate-acuminate; edges lobed to 1—1.5 mm from costa ; lobes slightly falcate, apiculate ; costules 5 mm apart, at an angle of 60° to costa ; veins to 12 pairs ; lower surface of rachis, costae and costules glabrous or with a few acicular hairs present distally on costae and sparse short hairs on sinus membrane and edges ; upper surface with sparse hairs of less than 0.5 mm long on costae. Sori inframedial, lower ones slightly divergent and often a little elongate, sometimes asymmetric ; indusia glabrous.

REFERENCES :

1. Beddome, R. H. (1892). *A Handbook to the Ferns of British India, Ceylon and Malay Peninsula with supplement.*
2. Holttum, R. E. & Grimes, J. N. (1979). The genus *Pseudocyclosorus* Ching (Thelypteridaceae). *Kew Bull.* 34 : 511.

The material for this sheet was supplied by P. Bhargavan and N. P. Balakrishnan, Botanical Survey of India, Coimbatore.

Pseudocyclosorus griseus (Baker) Holttum & Grimes THELYPERIDACEAE

(*Neprodium griseum* Baker)

STATUS : Endangered, known only from the type locality at Cochin and Pannaikadu in Palni Hills (Type : *Johnstone* 27 from Cochin, in K).

DISTRIBUTION : Endemic to South India—near Cochin (1) and a recent collection from Pannaikadu, Palni Hills, Madurai Dt., Tamil Nadu (3).

HABITAT AND ECOLOGY : None on record.

CONSERVATION MEASURES TAKEN : None so far.

CONSERVATION MEASURES PROPOSED : If a population is rediscovered from any of the above areas, efforts should be made to protect them in their natural habitat or may be introduced in the botanic gardens.

BIOLOGY AND POTENTIAL VALUE : A species of botanical interest.

CULTIVATION : Not known to be in cultivation.

DESCRIPTION : Terrestrial herbs ; caudex short creeping with close spiral of fronds ; stipes *ca* 8 cm long, *ca* 40 cm long from base of stipe to first large pinna. Reduced pinnae 7-8 pairs, uppermost 6×2 mm, lobed halfway to costa, with an auricle of 2 mm long, the fourth pair *ca* 3 mm long, the rest very small. Fronds *ca* 60 cm long ; pinnae 25 pairs, texture thin ; lower 2—3 pairs of pinnae narrowed near base with a slightly lobed acroscopic auricle ; aerophores slightly swollen. Largest pinna *ca* 11×1.4 cm ; base truncate ; apex acuminate ; edges lobed to 1.0-1.5 mm from costa, lobes slightly falcate ; costules up to 3.5 mm apart, at more than an angle of 60° to costa ; veins up to 10 pairs ; lower surface of rachis and costae covered with copious erect hairs of unequal length, the longest *ca* 1 mm, with similar hairs on costules and a few on veins and many slender erect hairs between veins, with no glands or capitate hairs ; upper surface of rachis and costae with hairs almost 1 mm long ; scattered hairs 0.5 mm long on costules and veins ,short suberect hairs on surface between veins. Sori slightly supyramidal ; indusia bearing many short acicular hairs.

REFERENCES :

1. Beddome, R. H. (1892). *A Handbook to the Ferns of British India, Ceylon and Malay Peninsula with supplement.*
2. Holttum, R. E. & Grimes, J. W. (1979). The genus *Pseudocyclosorus* Ching (Thelypteridaceae). *Kew Bull.* 34 : 523.
3. Manickam, V. S. (1986). *The Fern Flora of the Palni Hills (South India).*

The material for this sheet was supplied by P. Bhargavan and N. P. Balakrishnan, Botanical Survey of India, Coimbatore.

STATUS : Vulnerable, due to habitat destruction and ecological imbalance in its habitats.

DISTRIBUTION : India : North-West-Himalayas ; endemic.

HABITAT AND ECOLOGY : Plants grow along stream sides in dense shady forest floors.

CONSERVATION MEASURES TAKEN : None on record.

CONSERVATION MEASURES PROPOSED : *Ex situ* conservation in conservatories and ferneries of the Botanical Survey of India at Shillong, Barapani and Yercaud. As proposed elsewhere in this volume, serious efforts should be made to establish and develop a 'National Pteridophytes Sanctuary' in the N. E. hilly region, preferably in an area rich in many naturally growing tree ferns, ferns and fern-allies, and to introduce all the Himalayan and N. E. Indian threatened and endemic vascular non-flowering plants for *ex situ* conservation and further research.

BIOLOGY AND POTENTIAL VALUE : Not known.

DESCRIPTION : Rhizome short-creeping ; fronds up to 30 cm long, pinnate, pubsecent on both the surfaces, middle pinnae ovate-oblong, 13—15 × 1.5—2.0 cm, truncate at base, caudate-acuminate at apex, herbaceous in texture, sessile or shortly petiolate, lower most pair shorter than the above, obtuse to acute at apex, veins free, rarely anastomosing Sori medial.

REFERENCES :

1. Ching, R. C. (1936). On the genera *Stenogramma* Bl. and *Leptogramma* J. Sm. 7(1) : 100. t. 6.
2. Dixit, R. D. (1984). *A census of the Indian Pteridophytes.* Botanical Survey of India, Calcutta.
3. Iwatsuki, K. (1963). A revision of the genus *Stenogramma* emend. *Acta Phytotax. Geobot.* 19 : 122.

The material for this sheet was supplied by R. D. Dixit and Bal Krishna, Botanical Survey of India, Allahabad.

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