

THE INDIAN PLANT RED DATA BOOK-I



BOTANICAL SURVEY OF INDIA

**DEPARTMENT OF ENVIRONMENT
GOVERNMENT OF INDIA**

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**THE INDIAN
PLANT
RED DATA
BOOK-I**

**Comprising Red Data Sheets
on 125 selected plants of
India**

1984

Compiled by

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and

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Botanical Survey of India

with the help of
several experts.

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(POSSCEF), Botanical Survey of India.

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Jacket : *Aconitum heterophyllum* Wall. ex Royle

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PREFACE

Red Data Book is the name commonly given now to publications dealing with endangered biological species.

It is widely realised that due to some natural and unnatural factors the biological resources of this earth are under varying degrees of threat or pressure. In some regions of the world, particularly in the tropical regions, many species of plants and animals are faced even with extinction ; many have already become extinct in recent times.

Whereas extinction of species is a phenomenon which is perhaps inevitable in the process of evolution, it is the rate at which species become extinct or become endangered at a particular time or period which causes concern.

Consciousness about threat to biological species has become more intense during the last few decades ; mainly due to the extinction or rarity of the germplasm and biological diversity available for improvement of plants and animals.

Loss of biological diversity has great economic and environmental impact and much literature has been generated on this subject.

Before any conservation measures can be taken, it is necessary that proper assessment is made of the species which are threatened and the causes of threat. Many nations of the world have prepared Red Data Books for their biological resources. Some Red Data Books include both plants and animals, whereas generally the plants are dealt separately from animals.

The IUCN have started publishing the Red Data Books on a global basis, but the very enormous size of the problem makes this work of limited scope for assessment of endangered species on local basis.

In India the interest in assessment of threatened plants started about 15 years ago and a list of about 100 species was prepared by the BSI and the Forest Research Institute in early seventies.

In 1980, the National Man and Biosphere Committee asked us to prepare an illustrated account of the threatened plants in India and a small State-of-Art Report dealing with 134 species was brought out.

A few Seminars were organised by the BSI between 1977-82 at Calcutta, Dehra Dun, Shillong, Delhi, Coimbatore and Port Blair to create wider interest in floristics and particularly threatened plants. A Project on the Study, Survey and Conservation of Endangered Species of Flora (POSSCEF) supported by the U.S. Fish and Wildlife Service has been functioning in the BSI since 1980.

The literature related with conservation of plant resources started emanating from different parts of the country and to accommodate them, the BSI started a special Conservation Supplement in its Bulletin and the POSSCEF started a Plant Conservation Bulletin to publish data on the subject.

About 15% of an estimated 15,000 flowering plants of India are threatened to lesser or greater degree. Efforts have been made during last five years to evaluate the status of several hundred species by analyses of data in literature and herbaria and in many cases actual field work.

The present volume includes Red Data Sheets for 125 species of flowering plants. Our knowledge about the actual distribution and ecology for many of these is still not complete.

Whereas efforts on collecting more information on the threatened species of the country continues, it was considered useful to bring the available data in a reasonably presentable form to make it widely available.

The species have been included as material is available. It means that this volume is not exhaustive for all Annonaceae or Apiaceae. More species of these families may be dealt in future volumes.

Despite shortcomings, it should serve the following purpose :

1. To provide a lead to other workers to prepare Red Data Sheets for more species.
2. To indicate the gaps in knowledge about these plants, and enable field, herbarium and other research on them ; suggestions for improvements will be welcome.
3. Enable biologists and conservationists to consider and actually implement some measures of their conservation either in nature (*in situ*) or in Botanic Gardens, Conservatories (*ex situ*), etc.

The data sheets have been prepared by several scientists of the BSI and they have freely drawn on the information in literature and herbaria. As the material has been compiled by several persons the presentation sometimes varies in language or in details. The data on occurrence or threat is mainly in qualitative terms.

No doubt methods for quantification of threat have been suggested by several workers ; and a short review to some of these methods is available in the work of Perring and Farrell (British Red Data Books. 1. Vascular Plants. 1977).

In the present work, the format of the IUCN Red Data Book has generally been adopted.

The families of flowering plants are arranged alphabetically. Under each family, the genera and species are arranged alphabetically. For each species the following information is provided :

The correct *botanical name*, followed sometimes with its prevalent synonym.

This *status* indicates the degree of threat as now understood.

Distribution : The names of Indian States are given followed by name of the districts or localities, and regions outside India.

Habitat & Ecology : The preference of plants of a particular habitat or altitude is indicated.

Conservation Measures Taken : Conservation measures have been taken only in few cases which can be inclusion of the species in Threatened Plant List or in the Appendices of CITES.

Conservation Measures Proposed : Suggestions on *in situ* or *ex situ* conservation are given.

Cultivation : Only a few rare species are in large-scale cultivation. Also there is little data on species growing in gardens, particularly gardens outside India.

Description : General characters of habit or of flowers are indicated. It is hoped that in future volumes, the descriptions will be made elaborate.

References : A few references about the plants are mentioned.

The last entry for each species indicates the scientist(s) who had supplied the data.

Some species are illustrated with line drawings and a map showing their distribution in India; for some, an indication is given to the serial number of Reference, where illustration is available.

This volume is provided with an index to botanical names. To facilitate location of plant names in different volumes, the 2nd volume will have a consolidated index to plant names in volumes 1 and 2; the 3rd volume will have index to volumes 1 to 3, and so on. Readers will have to see only the last volume for locating any species.

S. K. JAIN
A. R. K. SASTRY

May, 1984.

ANNONACEAE

Alphonsea zeylanica Hook. f. & Thoms.

Status : Endangered; due to habitat destruction.

Distribution : Tamil Nadu, Tirunelveli Dist., Courtallam and Shivagiri hills.

Habitat and Ecology : In evergreen forests at 600-900 m. Known from type locality only.

Conservation Measures Taken : None so far; included in threatened plants lists.

Conservation Measures Proposed : To be relocated in the area and protected. Also to be introduced in Botanical gardens.

Biology and Potential Value : Rare tree of botanical interest. Also for timber.

Cultivation : Nil.

Description : Trees 10-15 m. Leaves coriaceous, alternate, lanceolate or elliptic-lanceolate. Flowers yellow-green, leaf-opposed or in extra-axillary fascicles.

For illustration—see (2).

References :

1. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., *Fl. Brit. India*, 1 : 89.
2. Beddome, R. H., *l.c.* t. 90. 1868-74.
3. Gamble, J. S. (1957) : *Flora Pres. Madras*, 16 (repr. ed.).
4. Nair, N. C. and Henry, A. N. (1983) : *Flora of Tamil Nadu, India—1. Analysis 1-3.*
5. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. *Materials for a catalogue of threatened plants of India*, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Cyathocalyx martabanicus Hook. f. & Thoms.

Status : Rare. Recorded from one locality in Garo Hills of Meghalaya.

Distribution : Assam, Meghalaya and Mizoram; BURMA, MARTABAN.

Habitat and Ecology : It grows in subtropical mixed forests.

Conservation Measures Taken : None so far; included in threatened plants lists.

Conservation Measures Proposed : An attempt is to be made to relocate this species in other areas in wild and to conserve it in some protected areas.

Biology and Potential Value : Not known.

Cultivation : Nil.

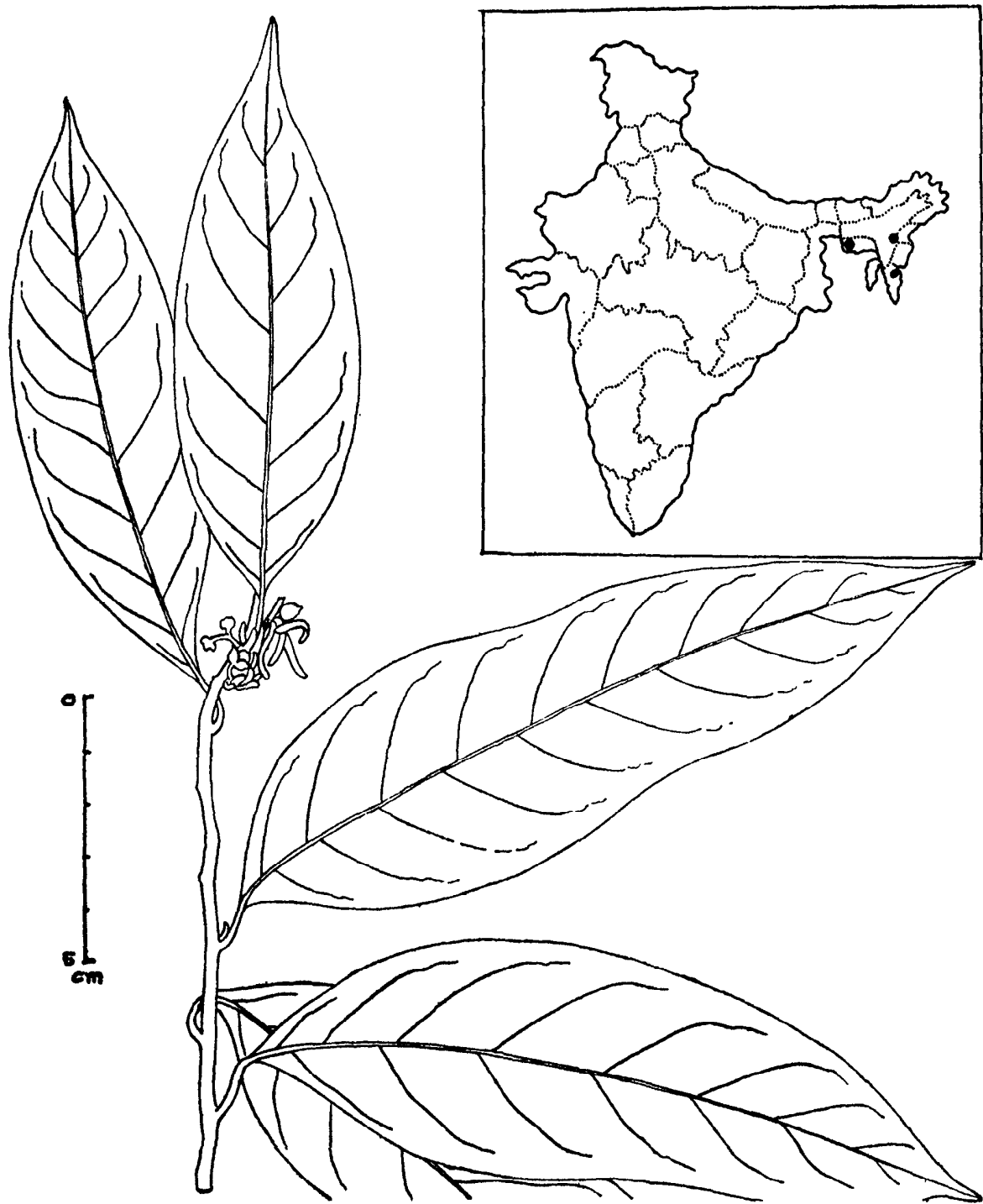
Description : A tall evergreen tree with a narrow crown, about 45 m in height, young branches puberulous. Leaves ovate or oblong, acuminate; petiole short. Flowers leaf-opposed.

Flowering : April-May.

Rereferences :

1. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 53. London.
2. Kanjilal, et al (1934) : Flora of Assam, 1(1) : 40.
3. Mukherjee, S. K. (1963) : Enumeration of Indian Flowering Plants in Bull., Bot. Surv. India 5(1) : 40.

(Data supplied by S. K. Katakı & A. S. Chauhan).



Cyathocalyx martabanicus Hook. f. & Thoms.

ANNONACEAE

Desmos viridiflorus (Bedd.) Safford
(*Unona viridiflora* Bedd.)

Status : Rare; due to habitat destruction.

Distribution : Tamil Nadu, Coimbatore Dist., Sholaiyar, Anamalai hills; Tirunelveli Dist., Udumbanpara. Endemic.

Habitat and Ecology : On the banks of rivers around 1000 m. Known from a few localities only.

Conservation Measures Taken : None so far; included in threatened plants lists.

Conservation Measures Proposed : Anamalai hills—proposed as a protected area (Sanctuary).

Biology and Potential Value : Botanical value of rare and endemic species.

Cultivation : Nil.

Description : Gigantic climbers; young branches golden pubescent. Leaves ovate-lanceolate. Flowers pale-green; bracts cordate.

For illustration—see (1).

References :

1. Beddome, R. H., Ic. t. 158. 1868-74.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 10 (repr. ed.), Calcutta.
3. Henry, A. N., Vivekanathan, K. and Nair, N. C. (1978). Rare and threatened flowering plants of South India. in Journ. Bombay Nat. Hist. Soc. 75 : 685.
4. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 60.

(Data supplied by E. Vajravelu).

ANNONACEAE

Fissistigma polyanthum (Hook. f. & Thoms.) Merr.
(*Melodorum polyanthum* Hook. f. & Thoms.)

Status : Threatened.

Distribution : Assam, Meghalaya; BANGLADESH.

Habitat and Ecology : It grows within forest areas mainly near water sources.

Conservation Measures Taken : None so far.

Conservation Measures Proposed : It is fast depleted in wild due to habitat destruction; an attempt is to be made to conserve this in some protected areas.

Biology and Potential Value : Ripe fruits edible.

Cultivation : Nil.

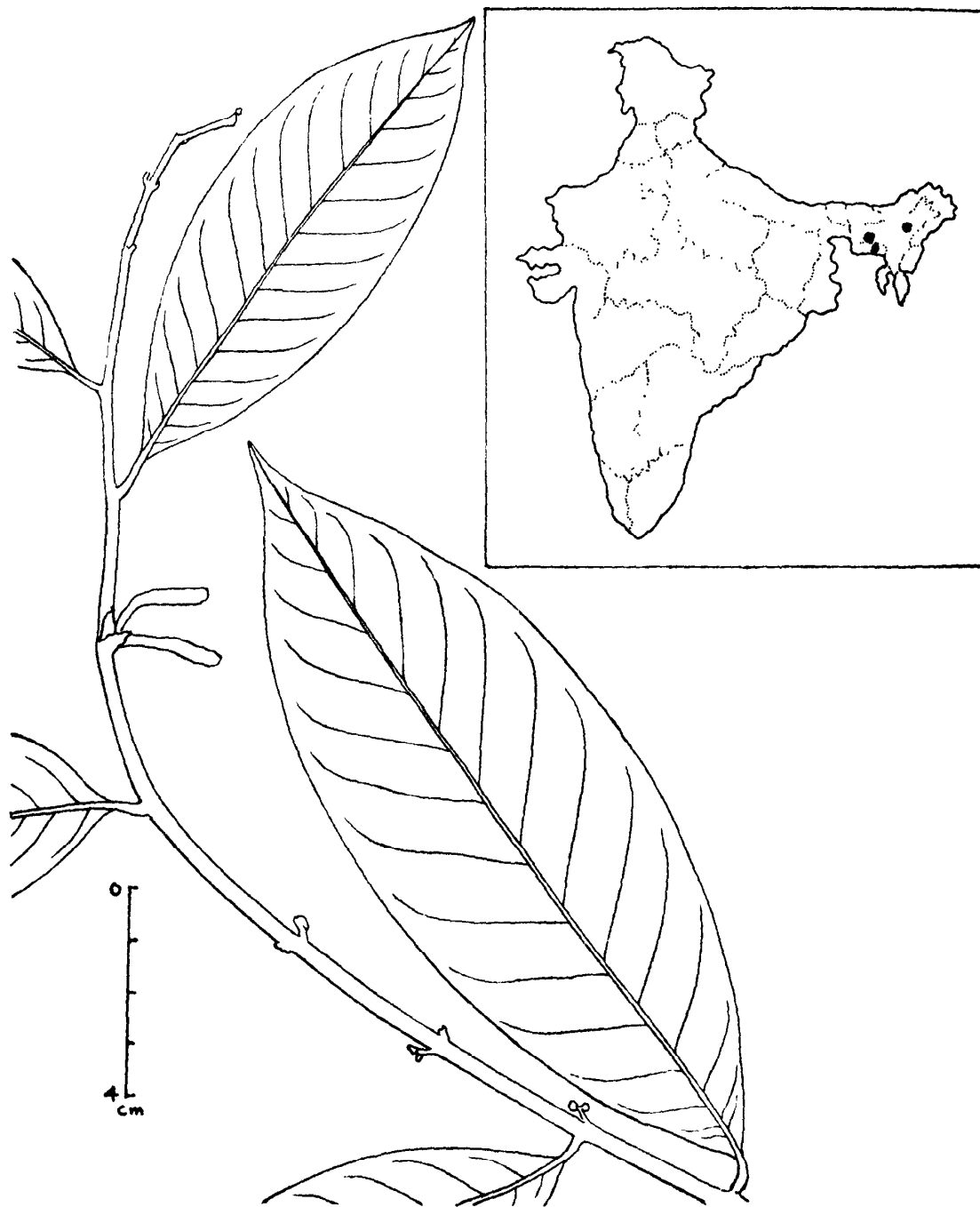
Description : A large woody climber. Leaves narrow, oblong or lanceolate, acute at both ends. Flowers small in leaf-opposed cymes, fragrant, pale-orange.

Flowering : December-February.

References :

1. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 81.
2. Kanjilal, et al (1934) : Flora of Assam, 1(1) : 49.
3. Mukherjee, S. K. (1963) : Enumeration of Indian Flowering Plants, in Bull. Bot. Surv. India, 5(1) : 45.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Fissistigma polyanthum (Hook. f. & Th.) Merr.

ANNONACEAE

Goniothalamus simonsii Hook. f.

Status : Rare.

Distribution : Meghalaya. Endemic.

Habitat and Ecology : It grows in forest areas.

Conservation Measures Taken : None so far.

Conservation Measures Proposed : An attempt is to be made to relocate this species in wild and to conserve it in protected areas.

Biology and Potential Value : Botanical interest.

Cultivation : Nil.

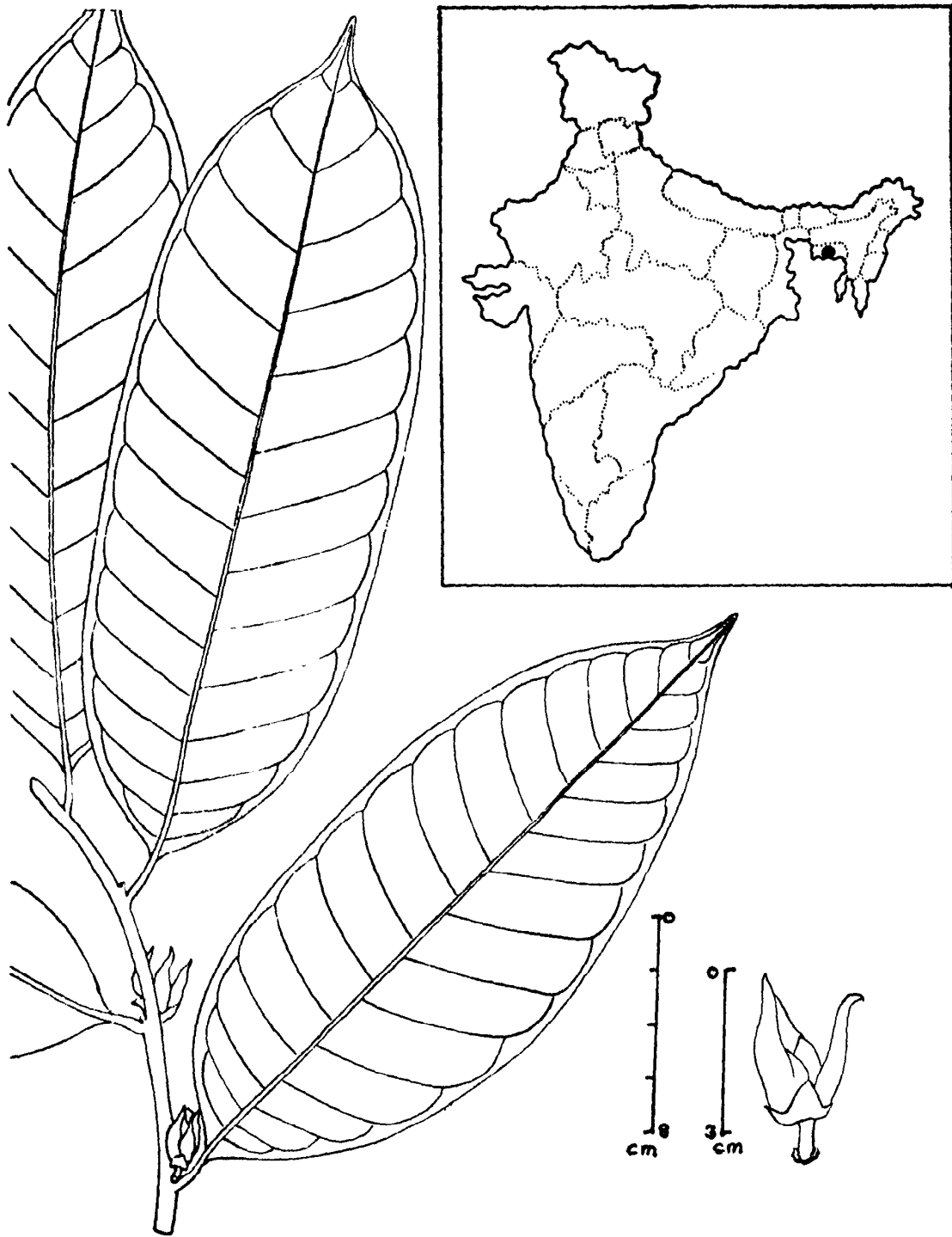
Description : A large shrub or small tree; young parts brown tomentose. Leaves obovate-oblong, caudate acuminate, glabrous above, brown pubescent beneath. Flowers axillary, solitary with a pair of bracts at the base of pedicel, cream-coloured.

Flowering : May-June.

References :

1. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 74-75.
2. Kanjilal, U. N., et al (1934) : Flora of Assam, 1(1) : 37.
3. Mukherjee, S. K. (1963) : Enumeration of Indian Flowering Plants, in Bull. Bot. Surv. India, 5(1) : 44.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Goniothalamus simonsii Hook. f.

ANNONACEAE

Goniothalamus thwaitesii Hook. f. & Thoms.

Status : Rare.

Distribution : Tamil Nadu, Tirunelveli Dist., Shivagiri hills; Kerala, Travancore hills; SRI LANKA.

Habitat and Ecology : In moist forests at 600-1200m.

Conservation Measures Taken : None so far; included in threatened plants lists.

Conservation Measures Proposed : To be relocated and protected.

Biology and Potential Value : Botanical interest.

Cultivation : Nil.

Description : Small trees, 5-7m. Leaves coriaceous, oblong; margin recurved. Flowers green, axillary.

For illustration—see (1).

References :

1. Beddome, R. H., Ic. t. 58, 1868-74.
2. Gamble, J. S. (1957): Fl. Pres. Madras, 1 : 13 (repr. ed.).
3. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 72.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Goniothalamus wynaadensis Bedd.

Status : Endangered.

Distribution : Tamil Nadu, Nilagiri hills; Devala and Cherambady hills, Wynaad. Endemic.

Habitat and Ecology : In evergreen forests at 800-1100m. Not located after Type; may be due to habitat destruction.

Conservation Measures Taken : None so far; included in threatened plants lists.

Conservation Measures Proposed : To be relocated and protected. Its habitat under consideration for Biosphere Reserve.

Biology and Potential Value : Botanical value.

Cultivation : Nil.

Description : Erect shrubs, around 5 m. Leaves obovate-oblong or oblong-lanceolate, glabrous. Flowers solitary, axillary or on trunks.

For illustration—see (1).

References :

1. Beddome, R. H., Ic. t. 61. 1868-74.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 13 (repr. ed.).
3. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 74.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Milium nilagirica Bedd.

Status : Endangered.

Distribution : Tamil Nadu, Nilagiri hills; Wynaad, Coimbatore Dist., Anamalai hills. Endemic.

Habitat and Ecology : In evergreen forests at 1500 m. Known only from type locality and from Anamalai hills.

Conservation Measures Taken : None so far for the wild plants ; included in threatened plants list of India.

Conservation Measures Proposed : Nilagiri hills and Anamalai Sanctuary under consideration for Biosphere Reserve.

Biology and Potential Value : Endemic and rare shrubs of botanical interest.

Cultivation : Nil.

Description : Glabrous shrubs, 3-5 m; branches rugose-tuberculate. Leaves linear-lanceolate or elliptic. Flowers minute, axillary.

For illustration—see (1).

References :

1. Beddome, R. H., Ic. t. 88. 1868-74.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 15 (repr. ed.).
3. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 87.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Orophea thomsoni Bedd.

Status : Endangered.

Distribution : Tamil Nadu, Coimbatore Dist., Anamalai hills; Tirunelveli hills. Endemic.

Habitat and Ecology : In evergreen forests at 800 m. ; subjected to habitat destruction and indiscriminate cuttings.

Conservation Measures Taken : None so far; included in threatened plants lists.

Conservation Measures Proposed : Anamalai Sanctuary under consideration for Biosphere Reserve; to be located and protected.

Biology and Potential Value : Endemic species known from type locality and Tirunelveli hills only. Botanical interest.

Cultivation : Nil.

Description : Shrubs or small trees, 5-7 m. Leaves ovate-oblong or ovate-elliptic. Flowers axillary in sessile clusters.

For illustration—see (1).

References :

1. Beddome, R. H. (1846), in Trans. Linn. Soc. London, 20 : 5; Ic. t. 67. 1868-74.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 17 (repr. ed.).
3. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 9. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Orophea uniflora Hook. f. & Thoms.

Status : Very rare.

Distribution : Tamil Nadu, Courtalam, Tirunelveli hills; Karnataka, Coorg; Kerala, Wynaad to Travancore. Endemic.

Habitat and Ecology : In evergreen forests at 800 m; subjected to habitat destruction.

Conservation Measures Taken : None so far.

Conservation Measures Proposed : To be located and introduced in Gardens; to be protected in wild.

Biology and Potential Value : Very rare species of botanical interest.

Cultivation : Nil

Description : Shrubs or small trees 3-4 m. Leaves coriaceous, elliptic-oblong or lanceolate. Flowers solitary.

For illustration—see (1).

References :

1. Beddome, R. H., Ic. t. 69. 1868-74.
2. Gamble, J. S. (1957); Fl. Pres. Madras, 1 : 17, (repr. ed.).
3. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 90.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 9. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Phaeanthus malabaricus Bedd.

Status : Threatened.

Distribution : Kerala, Wynaad and Tambracherry Ghat. Endemic.

Habitat and Ecology : In evergreen forests at around 900 m. Rare due to habitat destruction. Not located after Type collection.

Conservation Measures Taken : None so far for wild plants; included in threatened plants lists of India.

Conservation Measures Proposed : To be searched and introduced in Botanical Garden and protected in wild.

Biology and Potential Value : Botanical value.

Cultivation : Nil.

Description : Shrubs or small trees 3-5 m. Young parts pubescent. Leaves oblong-lanceolate. Flowers red, solitary, axillary or extra-axillary.

For illustration—see (1).

References :

1. Beddome, R. H., Ic. t. 76. 1868-74.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 12 (repr. ed.).
3. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D., Fl. Brit. India, 1 : 72.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 9. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Polyalthia rufescens Hook. f. & Thoms.

Status : Rare.

Distribution : Tamil Nadu, Tirunelveli hills; Kerala, Cochin and Travancore.

Habitat and Ecology : In evergreen forests. Rare due to habitat destruction and clearing of forests.

Conservation Measures Taken : None so far; the species is included in threatened plants lists of India.

Conservation Measures Proposed : Consideration for Biosphere reserve—Tirunelveli hills.

Biology and Potential Value : Rare species of botanical interest, timber value.

Cultivation : None so far.

Description : Trees 7-10 m, young branches densely tomentose. Leaves narrow oblong, base obliquely cordate. Flowers brown tomentose, solitary, leaf opposed.

References :

1. Gamble, J. S. (1957) : Fl. Pres. Madras, 12. (repr. ed.).
2. Henry, A. N., Vivekanathan, K. and Nair, N. C. (1978) : Rare and threatened flowering plants of South India, in Journ. Bombay, Nat. Hist. Soc., 75 : 685.
3. Hooker, J. D. and Thomson, T. (1872), in Hooker, Fl. Brit. India, 1 : 66.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 9. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ANNONACEAE

Trivalvaria dubia (Kurz) Sinclair

Status : Rare.

Distribution : India-Assam, Andaman Islands; BANGLADESH.

Habitat and Ecology : Once common in the forest areas.

Conservation Measures Taken : None so far.

Conservation Measures Proposed : As the species could not be collected again in the recent years, an attempt should be made to relocate it in the wild and to conserve.

Biology and Potential Value : Nil.

Cultivation : Nil.

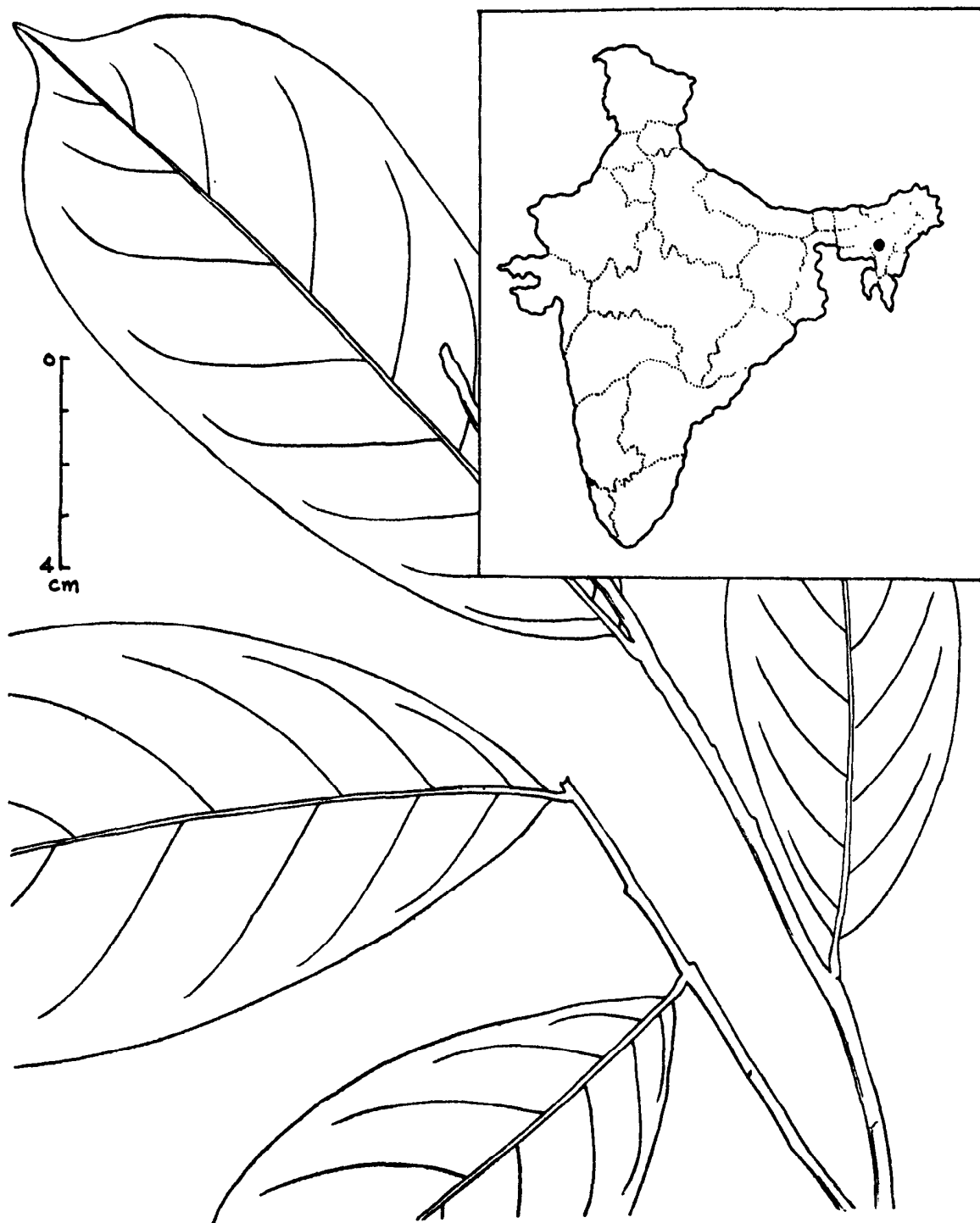
Description : A shrub, 2-3 m in height, young shoots pubescent, brownish-yellow. Leaves oblong-obovate, acuminate, shortly petioled.

Flowering : May-August.

Reference :

1. Mukerjee, S. K. (1963) : Enumeration of the Indian Flowering Plants in Bull. Bot. Surv. India, 5(1) : 43.

(Data supplied by S. K. Katak and A. S. Chauhan).



Trivalvaria dubia (Kurz) Sincl.

APIACEAE

Chaerophyllum cachemiricum C. B. Clarke

Status : Endangered.

Distribution : Kashmir, Himachal Pradesh. Endemic.

Habitat and Ecology : Known to occur in temperate parts of the Himalayas in the altitudinal range of 2000-2500 m. Known only from Types.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Prosoped : Attempts should be made to search the known localities and the other likely areas to relocate the species.

Biology and Potential Value : Botanical interest.

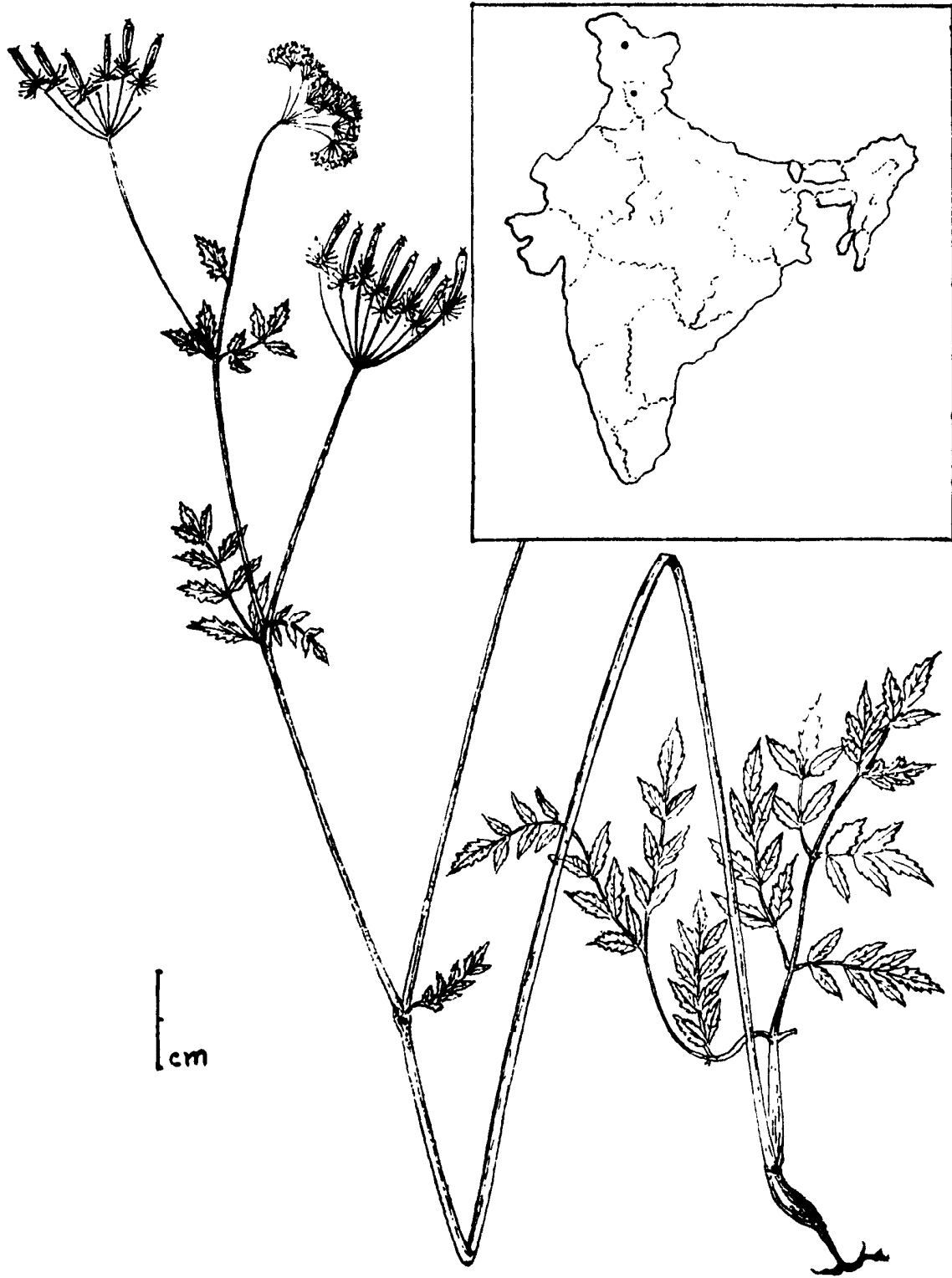
Cultivation : Nil.

Description : Herbs upto about 1.0 m. high, hairy. Rays 5-8, bracteoles 1-4. Pedicels 12, the central alone fruiting.

Reference :

1. Mukherjee, P. K. (1983) : Distribution and collections of Rare Umbellifers in India, in Jain, S. K. & Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 203. Botanical Survey of India, Howrah.

(Data supplied by P. K. Hajra).



Chaerophyllum cachemiricum C. B. Clarke

APIACEAE

Ferula thomsonii C.B. Clarke

Status : Endangered. Last collected in 1848.

Distribution : Jammu and Kashmir (Banahal). Endemic.

Habitat and Ecology : 1500-2000 m.

Conservation Measures Taken : Included in the list of threatened plants.

Conservation Measures Proposed : Monitoring to search the known locality and the other likely areas.

Biology and Potential Value : Botanical interest.

Cultivation : Nil.

Description : Herbs about 1.0 m. high, glabrous. Leaves cut into remote lanceolate subacute leaflets. Umbels compound; flowers yellow; fruits compressed, narrowed at both ends; vittae 3-2 in the dorsal furrows, minute.

Reference :

1. Clarke, C. B. (1879), in Hoeker, J. D., Fl. Brit. India, 2 : 708.

(Data supplied by P. K. Hajra).

APIACEAE

Heracleum jacquemontii C.B.Clarke

Status : Endangered.

Distribution : Jammu and Kashmir.

Habitat and Ecology : Known from Type only.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Attempts should be made to search the known locality and the other likely areas to relocate the species.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Herbs upto about 30 cm high with lax white hairs. Leaves pinnate or 3-partite segments ovate. Rays 7. Bracteoles 4-8, linear. Fruits minutely pubescent. Vittae nearly as long as the carpel.

References :

1. Clarke, C. B. (1879), in Hooker, J. D. Fl. Brit. India, 2 : 712.
2. Mukherjee, P. K. (1983) : Distribution and collections of Rare Umbellifers in India, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 203. Botanical Survey of India, Howrah.

(Data supplied by P. K. Hajra).

APIACEAE

Heracleum thomsoni C.B.Clarke

Status : Rare.

Distribution : Jammu and Kashmir (Ladak); Himachal Pradesh (Lahul); PAKISTAN, AFGHANISTAN.

Habitat and Ecology : In the subalpine and alpine meadows of the Himalayas at alt. 3000-3500 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Parts of its natural habitats in India should be protected from grazing.

Biology and Potential Value : Botanical interest.

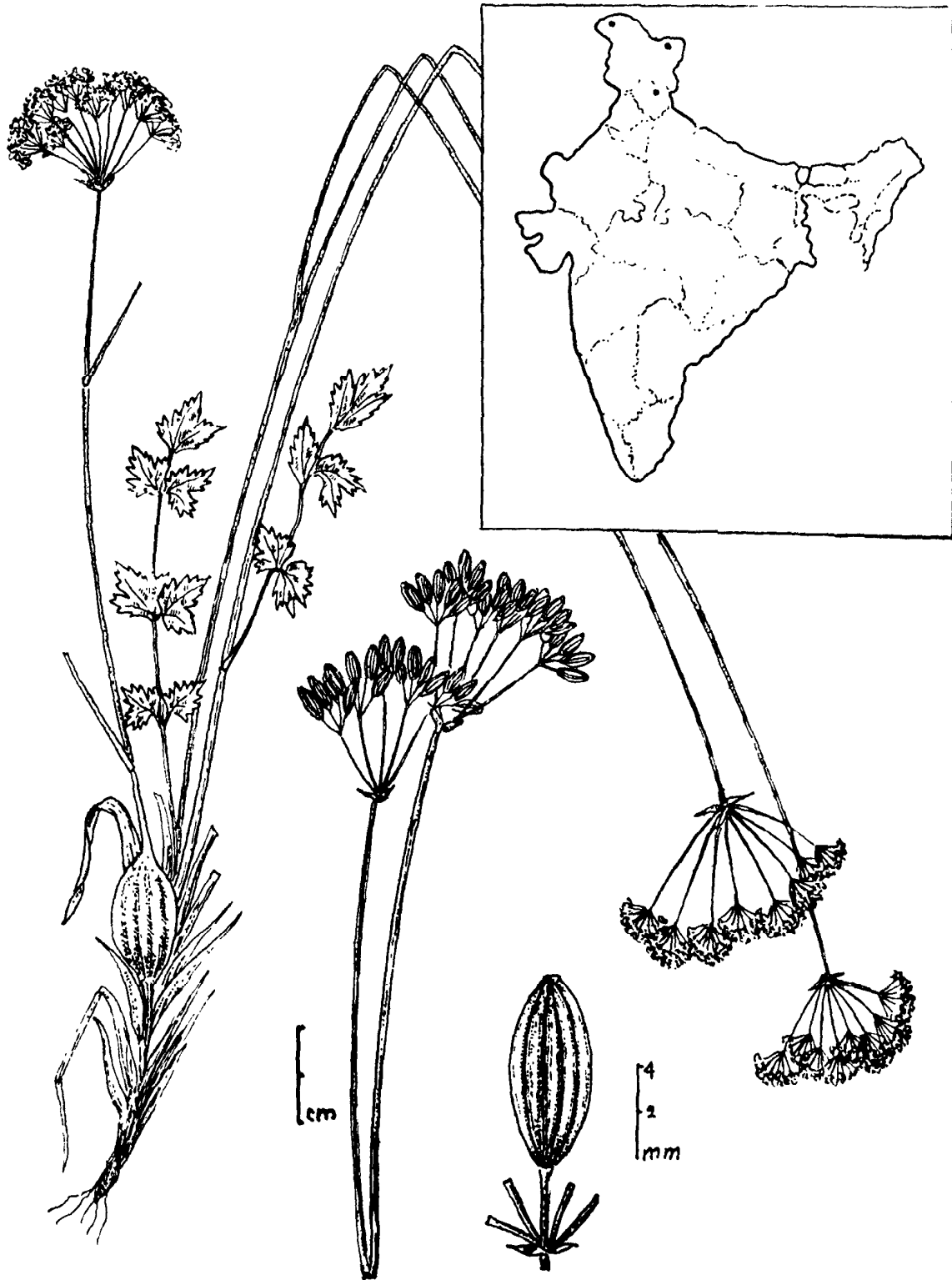
Cultivation : Not known.

Description : Herbs, 20-50 cm high. Stems with persistent leaf-bases. Leaves pinnate to bipinnate. Rays 3-12, pubescent. Flowers white or yellowish-white.

Reference :

1. Hiroc. M. (1979) : Umbelliferae of world, 1737.

(Data supplied by P. K. Hajra).



Heracleum thomsoni C. B. Clarke
(After J. D. Hooker)

APIACEAE

Ligusticum marginatum C. B. Clarke

Status : Rare.

Distribution : Uttar Pradesh (Kumaun), Himachal Pradesh (Simla), Jammu & Kashmir.

Habitat and Ecology : Temperature and subalpine Himalayas at the alt. of 2000—3000 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Intensive search in the known localities and the other likely areas to relocate the species, and protection in the natural habitat.

Biology and Potential Value : Botanical interest.

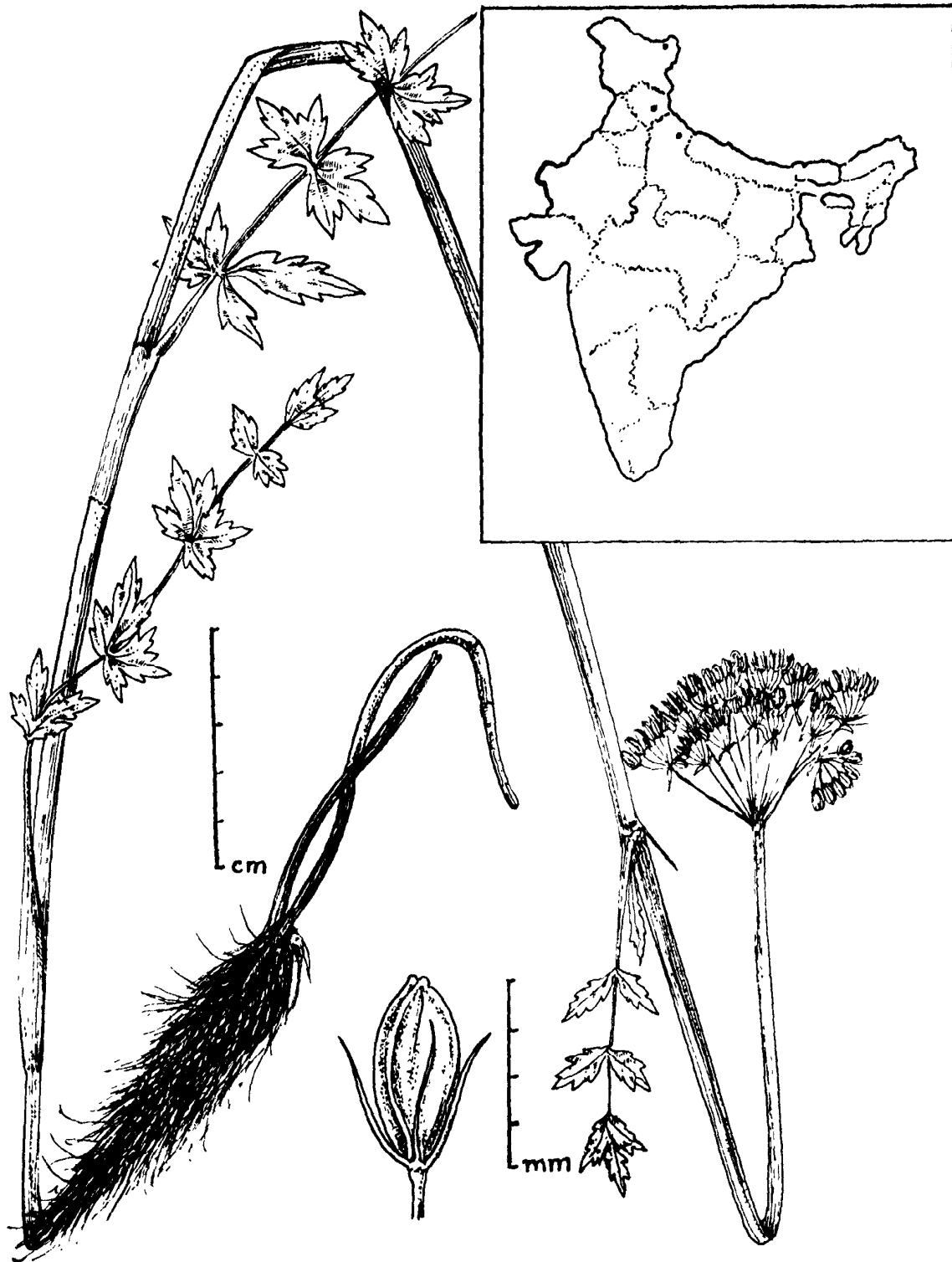
Cultivation : Not known.

Description : Herbs upto ca 1.0 m high, glabrous, stem base fibrous. Lower leaves pinnate. Rays 12-20. Fruits dorsally compressed, ovate to orbicular.

Reference :

1. Clarke, C. B. (1879), in Hooker, J. D. Fl. Brit. Ind. 2 : 698.

(Data supplied by P. K. Hajra).



Ligusticum marginatum C. B. Clarke

APIACEAE

Peucedanum dehradunensis Babu

Status : Endangered. Only ca 150 plants are presently seen in an area of 20×30 sqm.

Distribution : Uttar Pradesh (Dehra Dun).

Habitat and Ecology : In open places in association with species of *Murraya*, *Cocculus*, *Ageratum*, *Jasminum*, etc.

Conservation Measures Taken : (i) Included in the list of threatened plants (ii) It has been suggested to fence the area for protection from adverse biotic factors.

Conservation Measures Proposed : Multiplication and introduction in the similar type of habitats.

Biology and Potential Value : Flowers : March—May. Botanical interest.

Cultivation : This plant has recently been introduced in the experimental garden of the Botanical Survey of India, Northern Circle.

Description : Perennial herbs with tuberous roots. Leaves biternately compound. Inflorescence a terminal compound umbel. Petals white. Fruits ellipsoid.

Reference :

1. Babu, C. R. (1977) : *Herbaceous Flora of Dehra Dun*. 216.

(Data supplied by P. K. Hajra).

APIACEAE

Peucedanum thomsoni C. B. Clarke

Status : Endangered. Known from Type only.

Distribution : Jammu & Kashmir (Kishtwar & Banahal). Endemic.

Habitat and Ecology : It grows in the alt. range of 1500-3000 m.

Conservation Measures Taken : Included in the list of threatened plants.

Conservation Measures Proposed : Intensive search in its known localities and other likely areas.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Herbs 1.0-1.5 m. high, usually glabrous. Leaves 3-4 pinnate. Lower leaves broadly ovate, umbels large, irregular, rays unequal.

Reference :

1. Clarke, C. B. (1879) : in Hooker, J. D. Fl. Brit. Ind. 2 : 711.

(Data supplied by P. K. Hajra).

ARECACEAE (PALMAE)

Corypha taliera Roxb.

Status : Possibly extinct in the wild. This giant monocarpic palm was discovered by Roxburgh (1919) from Bengal. Now it is not seen in the wild. A few trees are in cultivation in the Indian Botanic Garden, Howrah.

Distribution : Bengal. Endemic.

Habitat and Ecology : Not known.

Conservation Measures Taken : This rare palm exists only in cultivation. Efforts were made to propagate the plant from seeds.

Conservation Measures Proposed : Propagation of the plants from seeds.

Biology and Potential Value : A palm of immense scientific interest.

Cultivation : A few trees exist in the Indian Botanic Garden, Howrah.

Description : Tall robust palm with a crown of very large costa-palmate leaves. Petiole heavy, highly dentate along the margins. Inflorescence supra-foliar, massive, pyramidal, about 6 m long with 17-20 horizontal primary flower branches. Flowers bisexual, in adnate cincinni, falsely pedicillate, fruit 1-seeded, dark-green when mature. Endosperm of the seed white, homogeneous.

References :

1. Beccari, O. (1933) : Asiatic Palms, Coryphae. Ann. bot. Gard. Calcutta 13 : 10-32.
2. Benthall, A. P. (1946) : Trees of Calcutta. Calcutta.
3. Roxburgh, W. (1819) : Plants of the coast of Coromandel, 3 : 51-52. t. 255. 256.

(Data supplied by S. K. Basu).

ARECACEAE (PALMAE)

Corypha umbraculifera L.

Status : Rare. This giant monocarpic palm was first described from the west coast of India. Its present population in the wild is unknown due to lack of recent collections.

Distribution : INDIA (Malabar Coast) : SRI LANKA.

Habitat and Ecology : In the moist low regions of Kumpta and Manavar Taluk of North Kanara.

Conservation Measures Taken : None.

Conservation Measures Proposed : Protection of its habitat for natural regeneration of this rare palm.

Biology and Potential Value : A palm of great scientific value. Talipot palm is the national floral emblem of Sri Lanka. Its large fan-like leaves are used for making various fancy articles. The soft central part of the trunk yields a kind of edible sago. Fibres obtained from the trunk are used for rope making. The hard white kernel is used for making buttons and beads. Powdered paste of the seed has toxic effect on fish.

Description : Tall robust palm with large umbrella-like crown of large leaves. Leaf blade orbicular, not deeply divided. Inflorescence suprafoliar, massive. Flowers 3-6 in adnate cincinni. Fruits sessile to sub-sessile, globose with persistent perianth, 3.5 cm in diameter. Seed terete in cross section, endosperm homogeneous, white.

References :

1. Beccari, O. and Hooker, J. D. (1892) : Fl. Brit. Ind. 6 : 428.
2. Hodge, W. (1961) : Nature's biggest bouquet, in Principles, 5 : 125-134.
3. Trimen, H. (1898) : Handbook to the Flora of Ceylon. 4 : 328.

(Data supplied by S. K. Basu).

ARECACEAE (PALMAE)

Hyphaene dichotoma (White) Furtado (The Indian Doum Palm, Branched Palm)

Status : Vulnerable. The curious looking branching palm is close to palmyra palm. Its related species are mostly African. Due to over-exploitation for fire wood, its population along the west coast of India has gone down. Now reported as threatened.

Distribution : Endemic. Along the coastal areas in Diu, Daman & Goa, Saurashtra in Gujarat.

Habitat and Ecology : Along the coastal areas.

Conservation Measures Taken : A few trees are in cultivation in some botanic gardens and parks.

Conservation Measures Proposed : Protection of trees from over-exploitation.

Biology and Potential Value : A palm of scientific interest. Young leaves are sometimes used as fodder, mature leaves as thatch, stem and branches as fire wood.

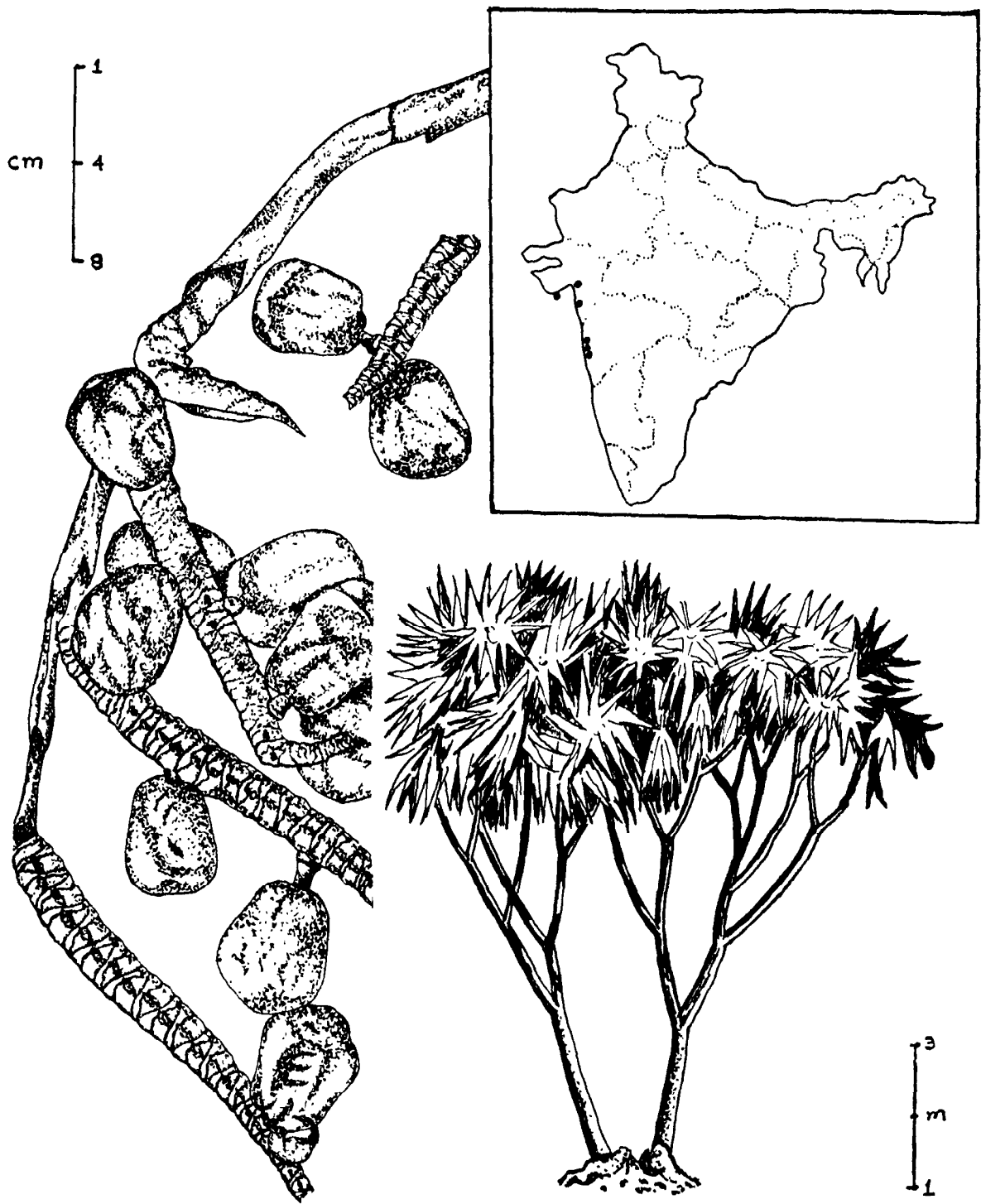
Cultivation : Cultivated in the Indian Botanic Garden, Howrah.

Description : Dioecious palm, dichotomously branched. Each branch has a crown of leaves. Leaves costa-palmate. Inflorescence among the leaves. Fruit obovate, 6.5 cm. × 2.6 cm., distinctly stalked, clothed with fine brown hairs, spongy fibrous mesocarp sweet to taste. Endocarp hard, stony.

References :

1. Furtado, C. (1970) : Some *Hyphaene* species from the botanic Garden, Calcutta, in Gard. Bull. Singapore. 25 : 201.
2. Jain, S. K. & Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
3. Rolla, S. R. (1963) : *Hyphaene indica* Becc. along the west coast of India in J. Bombay nat. Hist. Soc. 60 : 761-763.
4. Rao, T. A. & Korlahalli B. C. (1969) : A note on the inflorescence of *Hyphaene indica* Becc. in J. Bombay nat. Hist. Soc. 66 : 235-236. figs. 1-10.
5. Sahni, K. C. (1980) : Glimpses of Plants Research, Vikas Pub.

(Data supplied by S. K. Basu).



Hyphaene dichotoma (White) Furtado

ARECACEAE (PLAMAE)

Livistona jenkinsiana Griff.

Status : Endangered. Only species of the genus : localised in some selected valleys of north eastern India. It is now scarce in Sikkim.

Distribution : India. Teesta Valley of Sikkim, foot-hills of Gubro Purbat, Assam, Naga Hills of Nagaland, Khasia and Jaintia hills of Meghalaya and mountain valleys of Lohit and Tirap Districts of Arunachal Pradesh. Endemic.

Habitat and Ecology : Grows in the moist evergreen forest's upto 1000 m alt. In Arunachal Pradesh it grows in association with wild *Musa* sp.

Conservation Measures Taken : None.

Conservation Measures Proposed : Needs protection from over-exploitation. This beautiful fan-leaved palm may be introduced into the botanical gardens.

Biology and Potential Value : Only species of the genus endemic to India. The tribal people of Arunachal Pradesh extensively use the leaves of this palm for thatching.

Cultivation : A few full grown trees are present in the Lloyd Botanic Garden, Darjeeling. It can be easily propagated by seeds. Cannot be grown in dry warm regions.

Description : Stem solitary, columnar, dull grey in colour. Leaves costapalmate ; leaf blade slightly bluish on lower surface, orbicular ; segments bilobed at apices. Flower bisexual, sessile, borne on short tubercle. Fruit globose, 3 cm in diameter, slightly attenuate at base, 1-seeded with bluish outer coating. Seed with a broad elongated raphae ; endosperm horny.

References :

1. Anderson, T. (1871) : Palms of Sikkim, in J. Linn. Soc., 11 : 13.
2. Beccari, O. and Hooker, J. D. (1892) : Fl. Brit. Ind. 6 : 435.
3. Griffith, W. (1845) : Palms of British East India, in Calcutta J. nat. Hist. 5 : 334-336.
4. Rolla, R. S. & Joseph, J. (1962) : *Livistona jenkinsiana* Griff. in Principles, 6 : 103-106.

(Data supplied by S. K. Basu).

ARECACEAE (PALMAE)

Phoenix rupicola T Anders.

Status : Rare. A very handsome looking Date Palm restricted to the foothills of eastern Himalayas.

Distribution : INDIA—Teesta Valley in Sikkim, Mishmi hills of Arunachal Pradesh and Khasia and Jaintia hills of Meghalaya. Endemic.

Habitat and Ecology : Grows in isolated strands on the rock cliffs below 450 m.

Conservation Measures Taken : None; but some areas of its distribution in Mishmee hills (Lohit District) fall in the proposed Namdapha Biosphere Reserve.

Conservation Measures Proposed : Reintroduction into the depleted habitats and cultivation in the botanical gardens.

Biology and Potential Value : A dioecious palm, very ornamental in appearance. Unlike other date palms its basal leaflets are not stiffly spinous. Upper leaflets glossy green, soft and arranged in one plain on the midrib. Ripe fruits contain thin but sweet pulp. Core of the stem is edible; often eaten by the tribals of north-eastern India.

Cultivation : Not common in cultivation. A few trees are seen at the Indian Botanic Garden, Howrah. Can be easily propagated through seeds.

Description : A dioecious palm of medium height. Leaves are arching from the stem. Leaflets are induplicate folded, linear. Fruits oblong, 20 mm × 9 mm, deep crimson when ripe. Embryo dorsal.

References :

1. Anderson, T. (1871) : Palms of Sikkim, in J. Linn. Sec. 11 : 13.
2. Beccari, O. and Hooker, J. D. (1992) : Fl. Brit. India, 6 : 425.
3. Mahabale, T. S. and Parthasarathy, M. V. (1963) : The genus *Phoenix* Linn. in India, in J. Bombay nat. Hist. Soc., 60 : 371.

(Data supplied by S. K. Basu).

ARECACEAE (PALMAE)

Rhopaloblaste augusta (Kurz) H. E. Moore

Status : Vulnerable. Sulphiz Kurz (1875) discovered this arecoid palm from Nicobar Islands and stated as frequent in the Nicobarese vegetation. This palm has now been reported as threatened in its natural habitat.

Distribution : INDIA—Northern group of Nicobar Islands. Endemic.

Habitat and Ecology : Grows in the moist slopes in association with other evergreen trees.

Conservation Measures Taken : None for the wild populations. The species is included in the threatened plant lists of India.

Conservation Measures Proposed : Reintroduction in the depleted habitats and cultivation in the botanical gardens.

Biology and Potential Value : An elegant palm very ornamental in appearance. Suitable for cultivation.

Cultivation : A few trees are in cultivation in the Indian Botanic Garden, Howrah. Can be easily propagated by seeds. Unsuitable for cultivation in the drier regions of India.

Description : Stem solitary, annulate. Leaves regularly pinnate; leaflets linear, pendulous from the midrib; leafsheaths aggregated to form a loose shaft at the top of the stem. Inflorescence decompound. Flowers unisexual in protandrous triads on the rachillae. Fruit ellipsoid to broadly ovoid, 1-2 seeded (rarely 3-seeded), 2 cm × 1 cm, deep pink when ripe. Seed ovoid, or plano-convex; endosperm deeply ruminant; embryo basal.

References :

1. Kurz, S. (1875); Description of new plants from Nicobar Islands, in Journ. Bot. Lond., 13 : 331. pl. 170, figs. 1-10.
2. Beccari, O. and Hooker, J. D. (1892) : Fl. Brit. Ind. 6 : 414.
3. Balakrishnan, N. P. (1979) : Recent botanical studies in Andaman and Nicobar Islands, in Bull. Bot. Surv. India, 19 : 132-138.

(Data supplied by S. K. Basu).

ARECACEAE (PALMAE)

Trachycarpus takil Becc.

Status : Rare. A distinct species closely related to a Sino-Japanese species *Trachycarpus fortunei*. The only published photo of this palm is of a plant in the O. Beccari's Garden in Florence, Italy (Kew Bulletin, p. 291, 1912).

Distribution : INDIA—Uttar Pradesh (Kumaun). Endemic.

Habitat and Ecology : Grows on mount Takil in Kumaon at 2000-2500 m. It grows in cool narrow valleys of north-west Himalaya. According to Duthie (1883), it was frequent at the height of 2500 m in moist forests of *Quercus*.

Conservation Measures Taken : None known for the wild populations.

Conservation Measures Proposed : Consideration should be given to protect its habitat.

Biology and Potential Value : A palm of great scientific interest. One of the few palms that thrives in frost and snow. Collection of materials from the wild for introduction into the botanical gardens and for study is, therefore, necessary. Its local uses are unknown.

Cultivation : Reported to be cultivated in Chaubattia Garden (near Musorie) in Uttar Pradesh.

Description : Stem solitary, slightly inclined, not erect, closely adpressed with leaf-sheath fibers and triangular leaf-base appendages. Leaves palmate ; petiole margins crenulate. Inflorescences decomound. Male flowers glomerulate with yellow, fleshy bract at base. Fruit reniform.

Reference :

1. Beccari, O. (1933) : Asiatic Palms, Coryphae, in Ann. Bot. Gard., Calcutta, 13 : 281.

(Data supplied by S. K. Basu).

ARECACEAE (PALMAE)

Wallichia disticha T Anders.

Status : Rare. This attractive monocarpic Caryotoid palm was discovered by Anderson (1871) from Teesta Valley of Sikkim. Its population in Sikkim has been depleted and is now rarely seen along the river Teesta.

Distribution : INDIA—Sikkim, Arunachal Pradesh. Also occurs in Bhutan, Bangladesh and Burma.

Habitat and Ecology : Grows along moist slopes of the valley along Teesta and in Tirap District of Arunachal Pradesh.

Conservation Measures Taken : None known for the wild populations.

Conservation Measures Proposed : If the habitat remains undisturbed, this monocarpic palm can regenerate from self-sown seeds. Seeds of this species have to be collected from the wild for ex situ conservation in the Botanical Gardens. Seedlings may also be transplanted in its depleted habitats.

Biology and Potential Value : Only arborescent species of the genus. Very spectacular by the presence of distichously arranged leaves on the stem. Can be grown in the gardens as ornamental plant. Mature tree yields good amount of edible starch from the core. Lepchas of Sikkim frequently fell trees for extraction of starch from the core of this palm.

Cultivation : Infrequent in cultivation.

Description : Stem solitary, arborescent. Leaves long; leaflets linear, fascicled, projected in different angles from the midrib. Staminate and pistillate inflorescences separate. Fruit oblong, 2.5 cm × 1.5 cm, 2-seeded, reddish brown when ripe.

References :

1. Anderson, T. (1871) : Palms of Sikkim, in J. Linn. Soc., 11 : 6.
2. Beccari, O. and Hooker, J. D. (1892) : Fl. Brit. Ind. 6 : 419.
3. Moore, H. E. (1960) : The sub-family Caryotoideae, in Principes, 4 : 116.

(Data supplied by S. K. Basu).

ASCLEPIADACEAE

Caralluma edulis (Edgew.) Benth. & Hook.

Status: Rare. Known from a solitary locality in India. The species is becoming scarce due to over-exploitation for its edible young shoots.

Distribution: INDIA—W. Rajasthan (Jaisalmer); PAKISTAN.

Habitat and Ecology: On sandy soil in the Rajasthan desert.

Conservation Measures Taken: The species is included in the threatened plants list of India. Parts of its habitat in Rajasthan are included in the Desert National Park.

Conservation Measures Proposed: It is suggested that the species may be brought under cultivation in botanic gardens.

Biology and Potential Value: Flowering in February-September. Young shoots are edible and are sold commercially in local markets.

Cultivation: None so far.

Description: Succulent herbs. Leaves ovate-lanceolate, caducous. Flowers axillary, campanulate with purplish lines inside.

References :

1. Bhandari, M. M. (1978): Fl. Indian Desert, 220.
2. Kothari, M. J. and Hajra, P. K. (1983), in Jain, S. K. & Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 46. B.S.I., Howrah.

(Data supplied by M. J. Kothari).

ASTERACEAE

Catamixis baccharoides Thoms.

Status : Rare.

Distribution : INDIA—Uttar Pradesh (Garhwal and Siwalik hills); NEPAL.

Habitat and Ecology : On steep hill slopes and in rock crevices at 550 m-700 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection of plants in natural habitat.

Biology and Potential Value : Botanical interest, monotypic genus endemic to Himalaya.

Cultivation : Nil.

Description : Undershrub, much branched, leaves obovate or oblong, obtusely serrate, coriaceous. Heads in dichotomously branched corymbs, yellowish.

References :

1. Jain, S. K. and Sastry A. R. K. (1980) : Threatened plants of India—A State-of-the Art Report. Botanical Survey of India, Howrah.
2. Hajra, P. K. (1983) : Threatened plants of Western Himalaya, in Jain, S. K. & Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 53. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ASTERACEAE

Cremanthodium plantagineum Max. forma *ellissii* (Hook. f.)

R. Good

(*Werneria ellissii* Hook. f.)

Status : Rare.

Distribution : INDIA—Jammu and Kashmir (Ladak), Himachal Pradesh (Chamba).

Habitat and Ecology : Alpine Himalaya.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Some of its habitats in its distribution range need to be protected.

Biology and Potential Value : Ornamental.

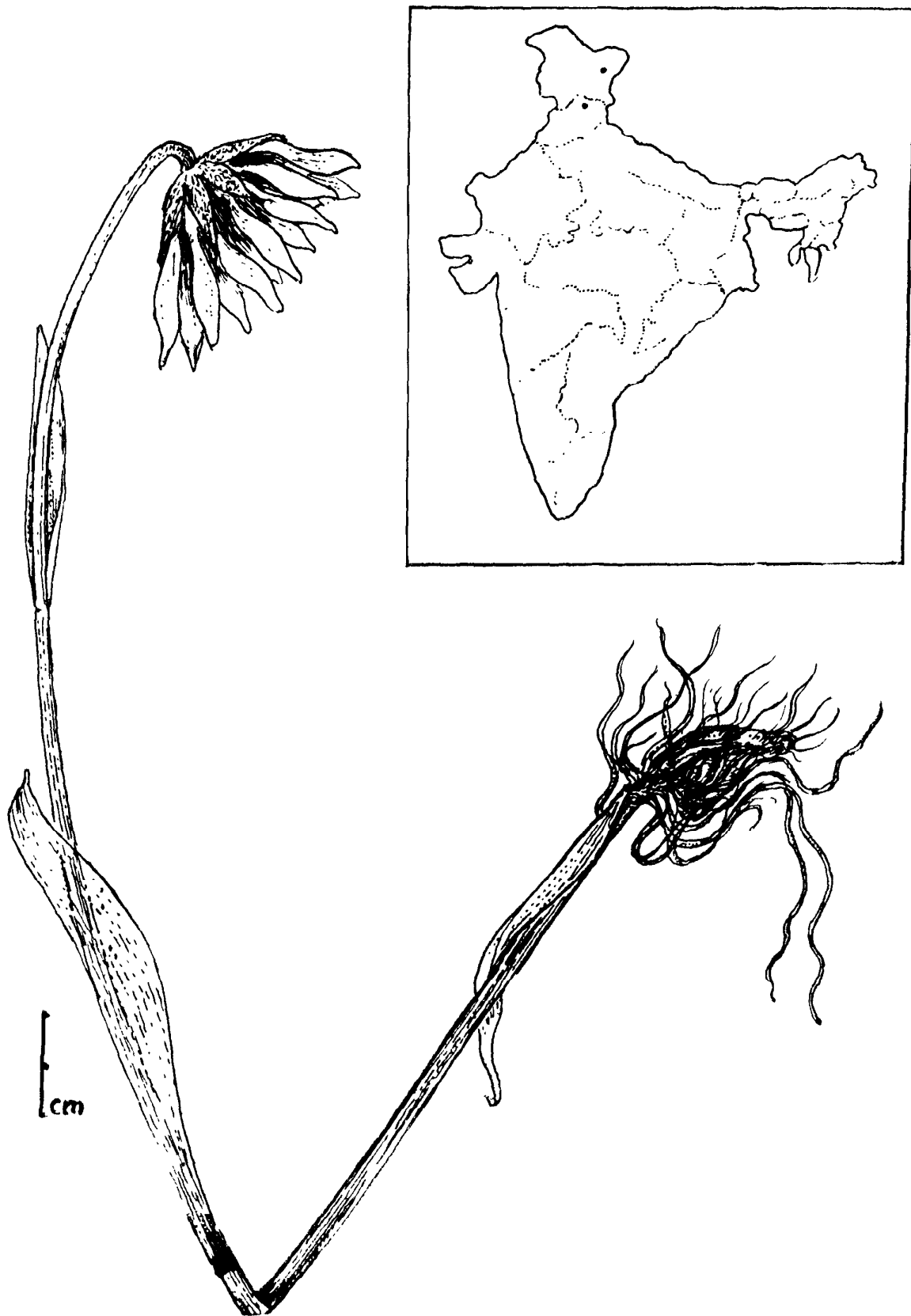
Cultivation : Nil.

Description : Herbs with tuberous roots. Leaves elliptic. Scape tomentose. Heads ca 5.0 cm across. Involucres woolly. Ligules ca 2.5 cm long.

Reference :

1. Stewart, R. R. (1972) : Annotated catalogue of vascular plants of West Pakistan, 738.

(Data supplied by P. K. Hajra).



Cremanthodium plantagineum Max. forma *ellisii* (Hook. f.) R. Good

BALANOPHORACEAE

Balanophora involucrata Hook. f.

Status : Endangered. Known from a few collections only. The species is now getting scarce due to felling of forests.

Distribution : INDIA—Himalayas from Jammu and Kashmir to Sikkim ; WEST CHINA.

Habitat and Ecology : In temperate forests; on the roots of various shrubs and trees in the alt. range of 2,000-3,000 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection in the natural habitat.

Biology and Potential Value : A root parasite of botanical interest.

Cultivation : Nil.

Description : Erect, fleshy, parasitic herbs, 10-14 cm high, yellowish or red. Root-stock warty. Peduncle sheathed halfway up by an involucre. Heads monoecious or dioecious, ovoid, red or yellow.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, p. 16. New Delhi.
2. Rau, M. A. & Rao, T. A. (1960), in Bull. Bot. Surv. India, 2(1 & 2):44.

(Data supplied by P. K. Hajra).

BALSAMINACEAE

Impatiens jaeschkei Hook. f.

Status : Vulnerable; particularly due to alteration and shrinkage of its habitats.

Distribution : INDIA—Uttar Pradesh (Kumaun). Endemic.

Habitat and Ecology : In cool, shady moist forest floors at the alt. of 2700-3000 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Suggested for protection in its natural habitats and location of the species in other likely areas in the region.

Biology and Potential Value : Of ornamental and botanical value.

Cultivation : None on record.

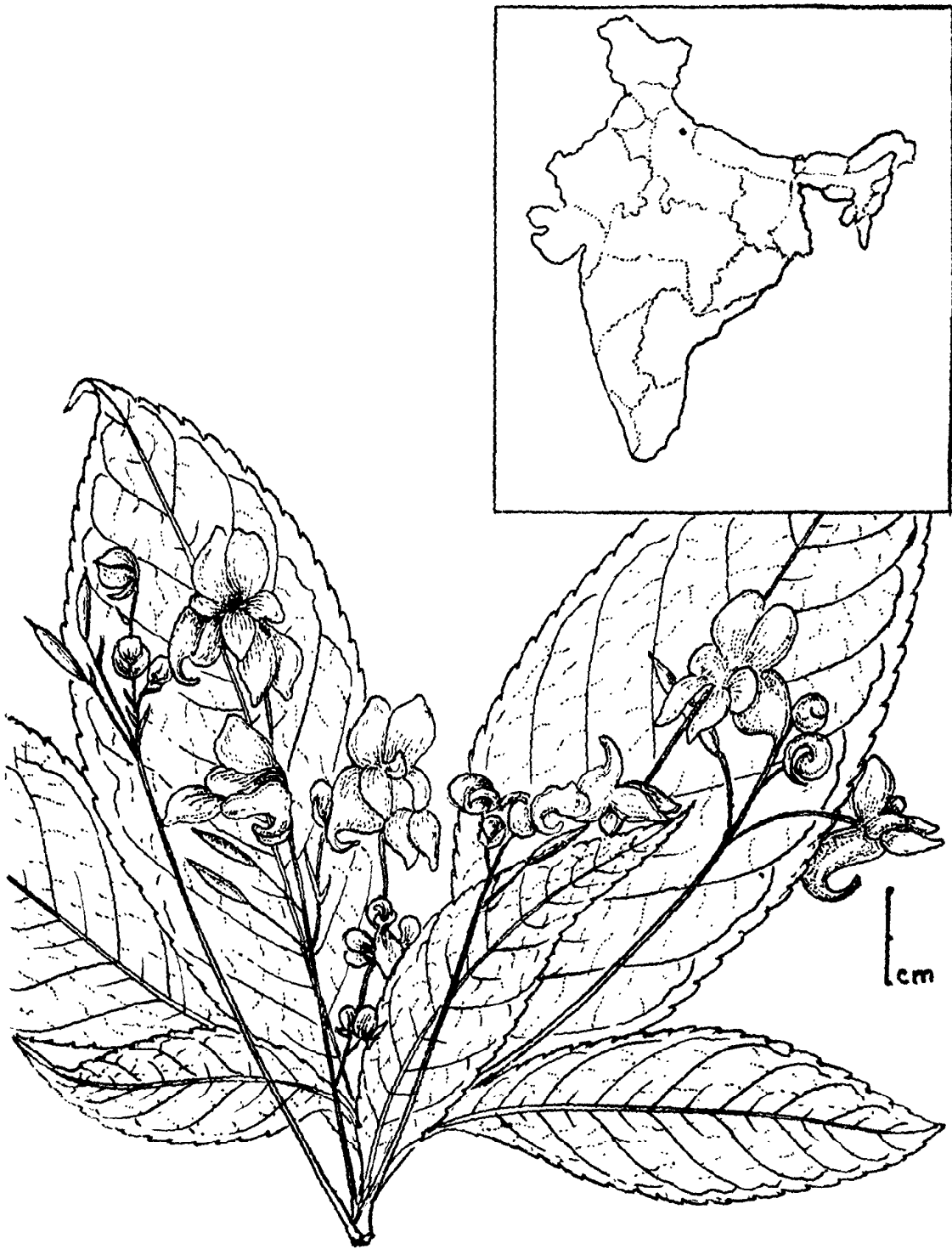
Description : Glabrous annual herbs. Leaves 10-20 cm long, oblong-acuminate. Peduncle 5-10 cm long. Bracts lanceolate. Flowers pinkish ca 2.5 cm across. Vexillum orbicular, bifid.

For illustration—See 2.

References :

1. Hajra, P. K. (1983) : Plants of north-western Himalayas with restricted distribution, in Jain, S. K. & Rao, R. R. (ed.) An Assessment of Threatened Plants of India, p. 3. B.S.I., Howrah.
2. Hooker, J. D. (1910) : Icon. Pl. (4th Ser.) 10. t. 2902.

(Data supplied by P. K. Hajra).



Impatiens jaeschkei Hook. f.
(After J. D. Hooker)

BALSAMINACEAE

Impatiens langeana Hook. f.

Status : Endangered.

Distribution : INDIA—Uttar Pradesh (Kumaun). Endemic.

Habitat and Ecology : Not known.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : (i) Suggested for protection of its natural habitats and location of the species in other likely areas. (ii) Monitoring of known populations.

Biology and Potential Value : Ornamental and of botanical interest.

Cultivation : None on record.

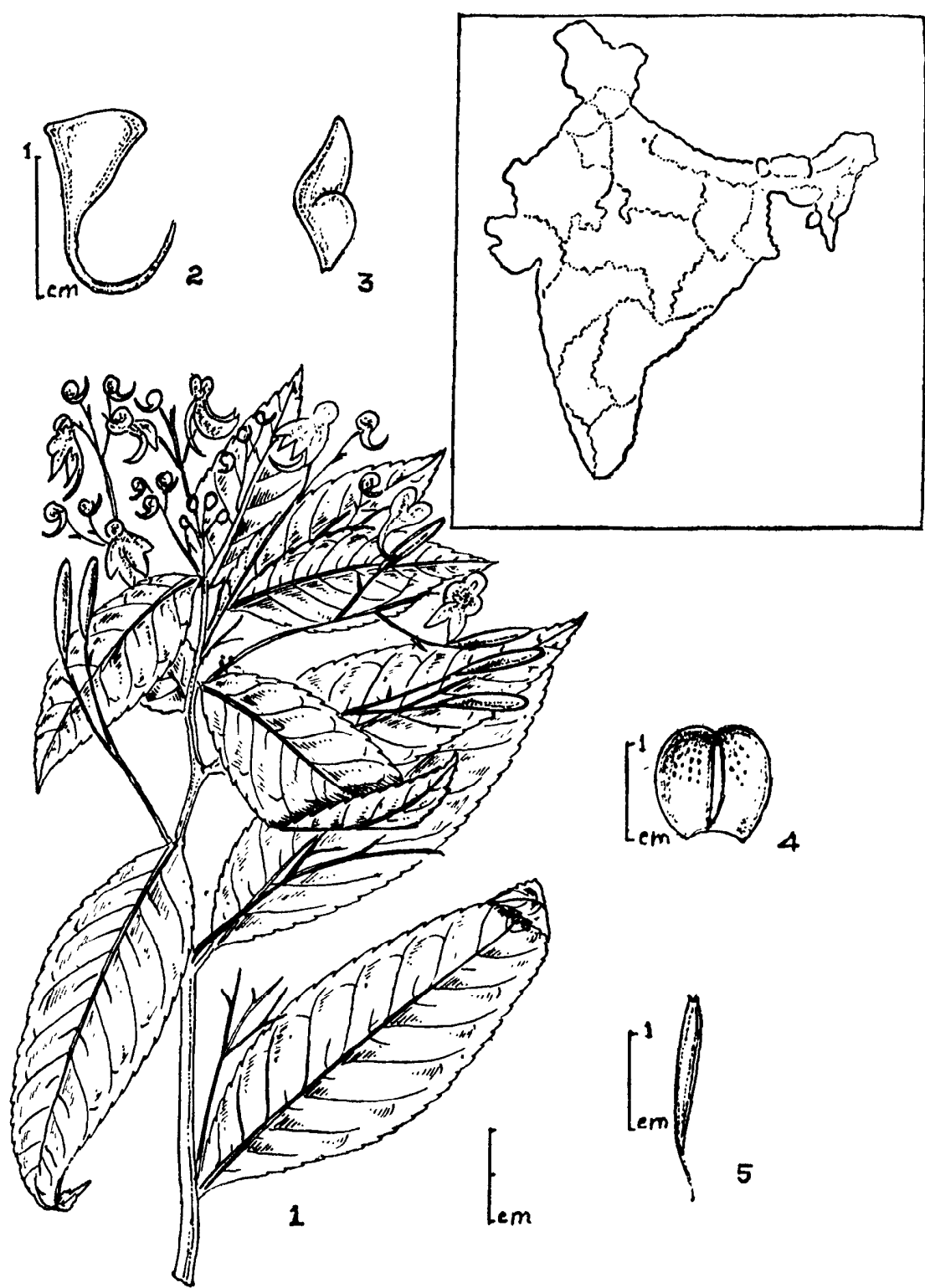
Description : Robust herbs. Leaves 5-15 cm long, upper almost sessile, elliptic to ovate-oblong, acute, serrulate to crenulate. Inflorescence pubescent. Peduncle 2-3 cm long, 6-8-flowered, Flowers ca 1.5 cm across. Vexillum orbicular. Capsule linear.

For illustration—See 2.

References :

1. Hajra, P. K. (1983) : Plants of north-western Himalayas with restricted distribution, in Jain, S. K. and Rao, R. R. (ed.) An Assessment of Threatened Plants of India, p. 3. B.S.I., Howrah.
2. Hooker, J. D. (1910) : Ic. Pl. (4th Ser.) 10. t. 2907.

(Data supplied by P. K. Hajra).



Impatiens langeana Hook. f.
(After J. D. Hooker)

BALSAMINACEAE

Impatiens podocarpa Hook.f.

Status : Endangered.

Distribution : INDIA—Uttar Pradesh (Garhwal). Endemic.

Habitat and Ecology : In cool, shady forests at about 2500 m altitude.

Conservation Measures Taken : Not known for the wild populations. The species is included in the list of threatened plants of India.

Conservation Measures Proposed : To search the known locality and other likely areas and protection in the natural habitat.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

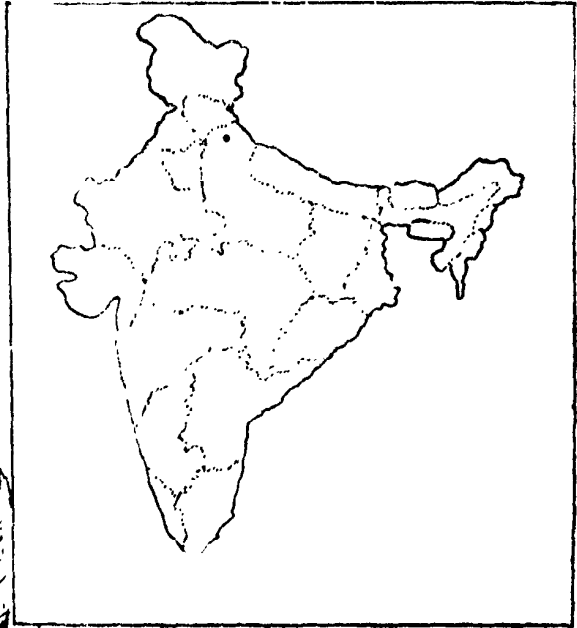
Description : Glabrous, branched herb, branches ca 30 cm long. Leaves 10-12 cm long, alternate, ovate to ovate-lanceolate. Petiolar glands absent. Raceme 6-8-flowered. Capsule clavate.

For illustration—See (2).

References :

1. Hajra, P. K. (1983) : Plants of north-western Himalayas with restricted distribution in Jain, S. K. & Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 3. B.S.I., Howrah.
2. Hooker, J. D. (1911) : Icon. Pl. (4th Ser.), 10. t. 2963.

(Data supplied by P. K. Hajra).



Impatiens podocarpa Hook. f.
(After J. D. Hooker)

BALSAMINACEAE

Impatiens polysciadia Hook.f.

Status : Endangered.

Distribution : INDIA—Uttar Pradesh (Kumaun). Endemic.

Habitat and Ecology : Not known (the specimen raised from seed received from the Royal Botanic Gardens, Calcutta and raised in that of Dahlem).

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : To search the known locality and other likely areas and protection in the natural habitat.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Tall, erect, glabrous herbs. Leaves alternate, sessile or subsessile ovate to oblong, acuminate. Flowers pinkish or rose coloured, ca 1.0 cm across.

For illustration—See (2).

References :

1. Hajra, P. K. (1983) : Plants of north-western Himalayas with restricted distribution in Jain, S. K. & Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 3. B.S.I., Howrah.
2. Hooker, J. D. (1910) : Icon. Pl. (4th ser.), 10. t. 2906.

(Data supplied by P. K. Hajra).

BALSAMINACEAE

Impatiens reidii Hook.f.

Status : Endangered, Known from Type only.

Distribution : INDIA—Uttar Pradesh (Kumaun). Endemic.

Habitat and Ecology : 1,800-2,800 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : To search in the known locality and other likely areas and protection in the natural habitat.

Biology and Potential Value : Of ornamental and botanical interest.

Cultivation : Not known.

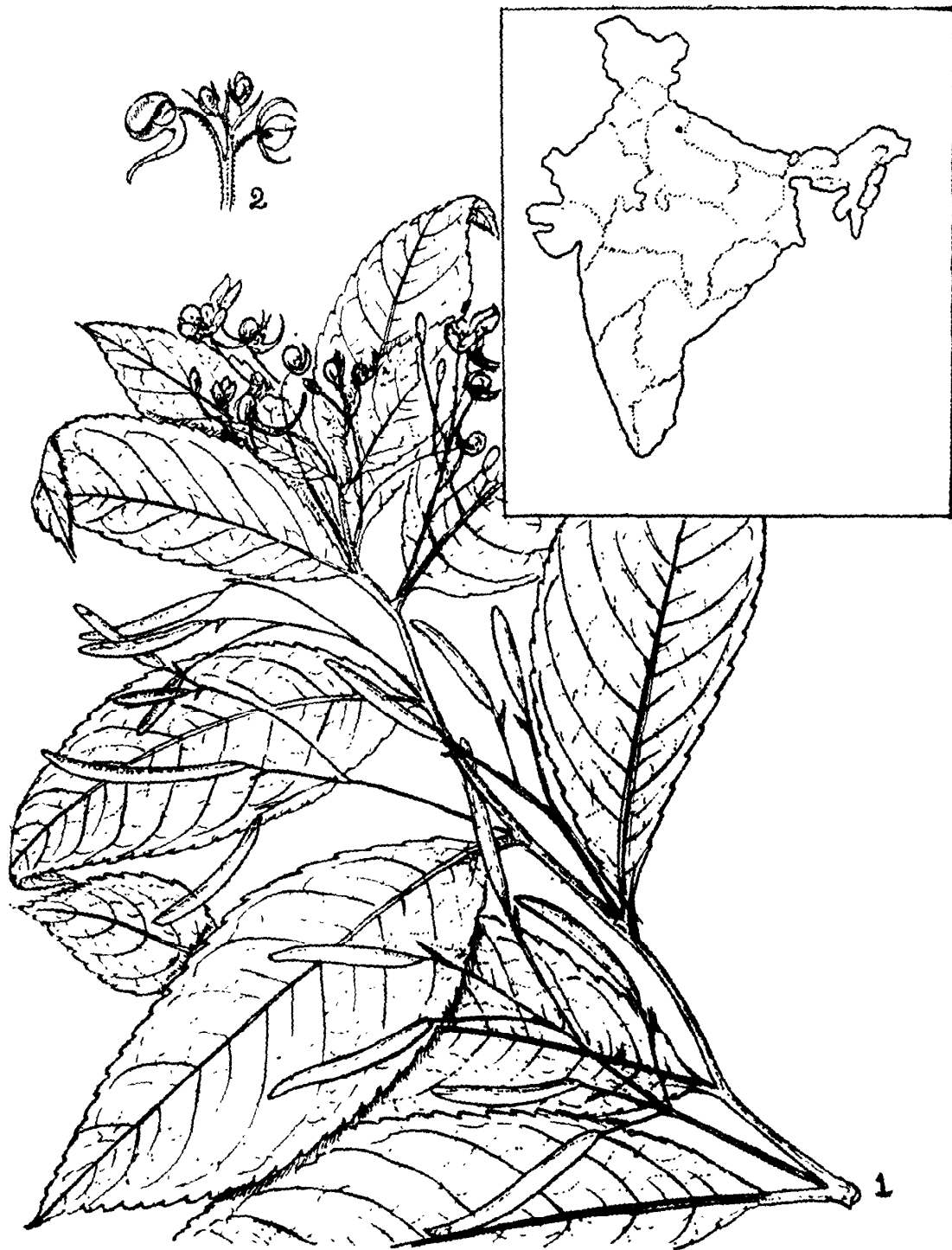
Description : Glabrous herbs. Leaves alternate, elliptic to obovate, acuminate. Peduncle 3-5 cm long, 3-4-flowered. Flowers white. Sepals 2, oblique, ovate, acute to acuminate. Vexillum sub-bilobate. Capsule linear, 3-4 cm long, acuminate.

For illustration—See (2).

References :

1. Hajra, P. K. (1983) : Plants of north-western Himalayas with restricted distribution in Jain, S. K. & Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 3. B.S.I., Howrah.
2. Hooker, J. D. (1910) : Icon. Pl. (4th Ser.), 10. t. 2901.

(Data supplied by P. K. Hajra).



Impatiens reidii Hook. f.
(After J. D. Hooker)

BALSAMINACEAE

Impatiens stoliczkai Hook.f.

Status : Endangered.

Distribution : INDIA --Himachal Pradesh (Kinnaur). Endemic.

Habitat and Ecology : Not known.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : To search the known locality and other likely areas and protection in the natural habitat.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

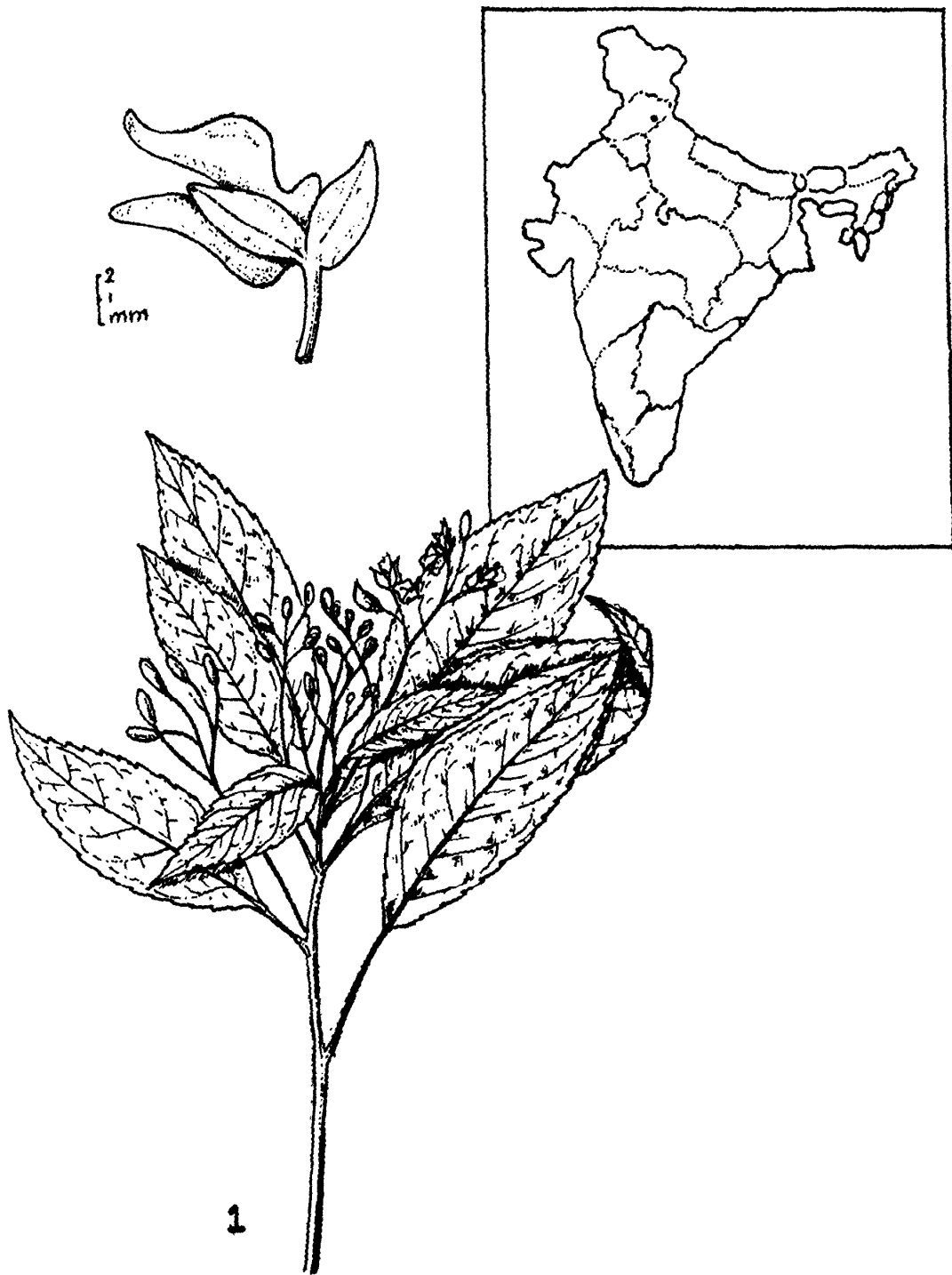
Description : Slender herbs. Leaves 6-10 cm long, ovate to ovate-lanceolate, serrulate to crenate-serrulate. Flowers minute, about 1.0 cm across. Sepals 2, linear-oblong. Vexillum orbicular.

For illustration--See (2).

References :

1. Hajra, P. K. (1983) : Plants of north-western Himalayas with restricted distribution in Jain, S. K. & Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 3. B.S.I., Howrah.
2. Hooker, J. D. (1910) : Icon. Pl. (4th Ser.), 10. t. 2904.

(Data supplied by P. K. Hajra).



Impatiens stoliczkai Hook. f.

BERBERIDACEAE

Berberis kashmiriana Ahrendt

Status : Rare.

Distribution : Jammu & Kashmir. Endemic.

Habitat and Ecology : Amidst Juniper scrub, along mountain slopes.

Conservation Measures Taken : Included in the catalogue of threatened plants of India.

Conservation Measures Proposed : i) An effort be made to determine the extent to which this species occurs.

ii) The feasibility of protecting a few habitats be investigated.

Biology and Potential Value : Medicinal importance.

Cultivation : Not known.

Description : Spiny shrub 1.0—1.5 m high. Leaves narrowly obovate, margins 15-25 spinose-serrate. Racemes 8-10-flowered. Berries oblong-ellipsoid.

References :

1. Ahrendt, L. W. A. (1961) : *Berberis & Mahonia—A taxonomic revision*, in *Journ. Linn. Soc. Bot.* 57. 107.
2. Hajra, P. K. (1983) : *Threatened Plants of Western Himalaya in Jain, S. K. & Sastry, A. R. K. Materials for a catalogue of threatened plants of India.* p. 50. B. S. I., Howrah.

(Data supplied by P. K. Hajra).

BERBERIDACEAE

Berberis lambertii Parker

Status : Vulnerable. This species is so far known only from Almora district.

Distribution : Uttar Pradesh (Kumaon). Endemic.

Habitat and Ecology : Temperate Himalayas upto ca 2,700 m.

Conservation Measures Taken : Included in Threatened Plants list of India.

Conservation Measures Proposed : i) Intensive exploration work to find out some more localities of its possible occurrence.

ii) The feasibility of protecting its habitat to be investigated.

Biology and Potential Value : Medicinal importance.

Cultivation : Not known.

Description : Shrub ca 1.0 m high, stem pale yellow, glabrous. Leaves oblanceolate, sessile, entire, mucronate. Inflorescence 1-7-flowered. Berries red, oblong-ovoid.

References :

1. Ahrendt, L. W. A. (1961) : *Berberis & Mahonia—A taxonomic revision*, in Journ. Linn. Soc. Bot. 57 : 135.
2. Hajra, P. K. (1983) : Threatened Plants of Western Himalaya in Jain, S. K. & Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 50. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

BERBERIDACEAE

Berberis petiolaris Wall. ex G. Don
var. garhwalana Ahrendt

Status : Rare.

Distribution : Uttar Pradesh (Garhwal, Kumaun). Endemic.

Habitat and Ecology : Temperate Himalaya 2,400-2,500 m.

Conservation Measures Taken : Included in threatened plants lists.

Conservation Measures Proposed : To search the known localities and other likely areas for more data on its biology, and protecting a few of its habitats.

Biology and Potential Value : Roots medicinal.

Cultivation : Not known.

Description : Shrubs. Leaves obovate, spinose. Inflorescence many flowered. Berries ellipsoid or oblong.

References :

1. Ahrendt, L. W. A. (1961) : *Berberis & Mahonia—A taxonomic revision*, in *J. Linn. Soc. Bot.* 57 : 94.
2. Hajra, P. K. (1983) : *Threatened Plants of Western Himalaya*, in Jain, S. K. & Sastry, A. R. K. *Materials for a catalogue of threatened plants of India*, p. 50. B.S.I., Howrah.
3. Hajra, P. K. (1983) : *Plants of North-Western Himalayas with restricted distribution—A census*, in Jain, S. K. & Rao, R. R. (ed.). *An Assessment of Threatened Plants of India*, 2.(B.S.I., Howrah.

(Data supplied by P. K. Hajra).

BERBERIDACEAE

Berberis royleana Ahrendt

Status : Rare.

Distribution : Jammu & Kashmir (Kashmir). Endemic.

Habitat and Ecology : Subtropical to temperate region, upto ca 2,500 m.

Conservation Measures Taken : Included in the list of Threatened Plants of India

Conservation Measures Proposed : Protecting a few of its habitats.

Biology and Potential Value : Medicinal.

Cultivation : Not known.

Description : Stems sulcate. Leaves broadly oblong-obovate ; margin entire ; apex rounded. Inflorescence 1-8-flowered, fascicled or sub-fascicled.

Reference :

1. Ahrendt, L. W. A. (1961) : *Berberis & Mahonia*—A taxonomic revision, in *Journ. Linn. Soc. Bot.* 57 : 227.

(Data supplied by P. K. Hajra).

BERBERIDACEAE

Podophyllum hexandrum Royle

Status : Rare. Known from a few populations only, each usually of 10-15 individuals. Earlier recorded from Himalayas. The area of occurrence has shrunk due to habitat destruction and over-grazing and as the fruits are edible, very often they are collected by the local people resulting in its rarity in its original habitat.

Distribution : Jammu and Kashmir to Arunachal Pradesh; AFGHANISTAN, SOUTH TIBET, WEST CHINA.

Habitat and Ecology : Restricted to rock crevices only on open hill slopes. Sometimes grows in association with *Aconitum heterophyllum*, *Geranium* sp., *Corydalis* sp. etc.

Conservation Measures Taken : i) Export banned.
ii) Included in the list of threatened plants of India;
iii) The creation of Nanda Devi National Park has provided protection of threatened plants.

Conservation Measures Proposed : i) The area—Baltal to Amarnath in Kashmir should be preserved and biotic interference stopped ;
ii) The feasibility of protecting a few more habitats should be investigated.

Biology and Potential Value : Flowering in May-June. Dried rhizomes are used in medicine. The total annual demand of the drug in India is approximately 40 quintols and are being sold in the market @ Rs. 4/- per kg.

Cultivation : Few plants in cultivation in some botanic gardens in India.

Description : Erect herb with creeping rootstock. Leaves two, deeply divided. Flowers pink. Fruits scarlet.

For illustration—see (2).

References :

1. Chatterjee, R. (1963) : Indian *Podophyllum*. *Econ. Bot.* : 342-354.
2. Jain, S. K. & Sastry, A. R. K. (1980) : Threatened Plants of India—A State-of-the-Art Report p. 34. New Delhi.

(Data supplied by P. K. Hajra).

BOMBACACEAE

Bombax insigne Wall.

Status : Rare. Due to damage to habitat and indiscriminate cuttings.

Distribution : Tamil Nadu, Coimbatore Dist., Anamalai hills.

Habitat and Ecology : Rocky slopes, in deciduous forests.

Conservation Measures Taken : None so far.

Conservation Measures Proposed : To be searched intensively and protected in wild ; to be introduced in Gardens.

Biology and Potential Value : Soft wood tree useful for many purposes ; seed fibres used for stuffing pillows, cushions etc. Flowers red and showy.

Cultivation : Nil.

Description : Trees, 15-20 m ; branches prickly. Leaflets 7-9. obovate, glaucous beneath. Flowers red.

References :

1. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 71 (repr. ed.).
2. Hooker, J. D. (1874) : Flora Brit. India, 1 : 349.

(Data supplied by E. Vajravelu).

BORAGINACEAE

Arnebia benthamii (Wall. ex G. Don) I. M. Johnston

Status : Rare, over-exploited for medicinal value, it is known to occur in small scattered populations.

Distribution : INDIA—Jammu & Kashmir, Himachal Pradesh ; Uttar Pradesh (Garhwal & Kumaun) ; PAKISTAN, NEPAL.

Habitat and Ecology : Subalpine to alpine Himalayas in association with species of *Lychnis*, *Rhododendron*, *Pedicularis*, *Nomocharis*, *Aconitum*, etc. in open places at the alt. 3000-4000 m.

Conservation Measures Taken : Some habitats of this species are now protected in the Nanda Devi and Valley of Flowers National Parks.

Conservation Measures Proposed : i) Large scale cultivation is suggested.
ii) Monitoring to find out its actual status.

Biology and Potential Value : The root is medicinal.

Cultivation : Not known.

Description : Hispid herbs upto 1.0 m high. Spike about 35 cm long, very dense, solitary. Flowers purplish white, minute.

For illustration—see (1).

Reference :

1. Rau, M. A. (1963) : Illustrations of West Himalayan Flowering Plants. Calcutta.

(Data supplied by P. K. Hajra).

CELASTRACEAE

Euonymus fortunei (Turcz.) Hand.-Mazz.

Status : Rare, only one individual of this species is known from one locality in Arunachal Pradesh.

Distribution : INDIA—Aka hills of Arunachal Pradesh.

Habitat and Ecology : It grows in mixed temperate forest along hill slopes.

Conservation Measures Taken : None.

Conservation Measures Proposed : Priority should be given to locate this species in wild and to protect its habitat.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

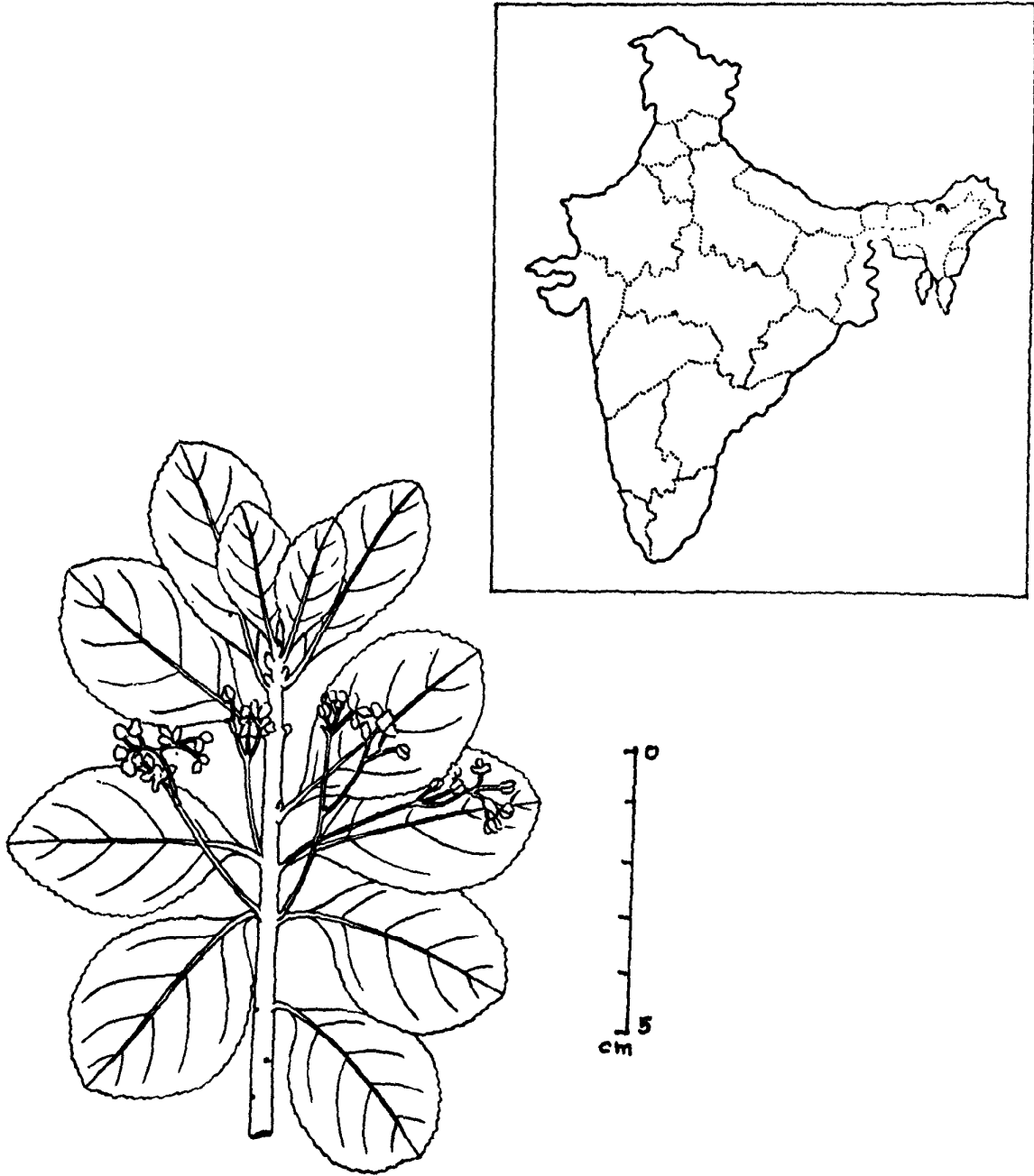
Description : A shrub. Leaves opposite, shortly petioled, elliptic-oblong, acute, margin serrate. Flowers many in dichotomous cymes.

Flowering : April—May.

Reference :

1. Hooker, J. D. (1872) : Fl. Brit. India, 1 : 606.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Euonymus fortunei (Turcz.) Hand.-Mazz.

CELASTRACEAE

Glyptopetalum griffithii Prain

Status : Rare, only one specimen of this species was recorded from Arunachal Pradesh.

Distribution : INDIA—Pasighat in Arunachal Pradesh.

Habitat and Ecology : In evergreen forest.

Conservation Measures Taken : None.

Conservation Measures Proposed : None on record. The habitat of this species in Arunachal Pradesh is under development for a township resulting in the clearance of forest areas. An attempt should be made to protect its habitat and also to locate this species in other likely areas.

Biology and Potential Value : No information.

Cultivation : Not known.

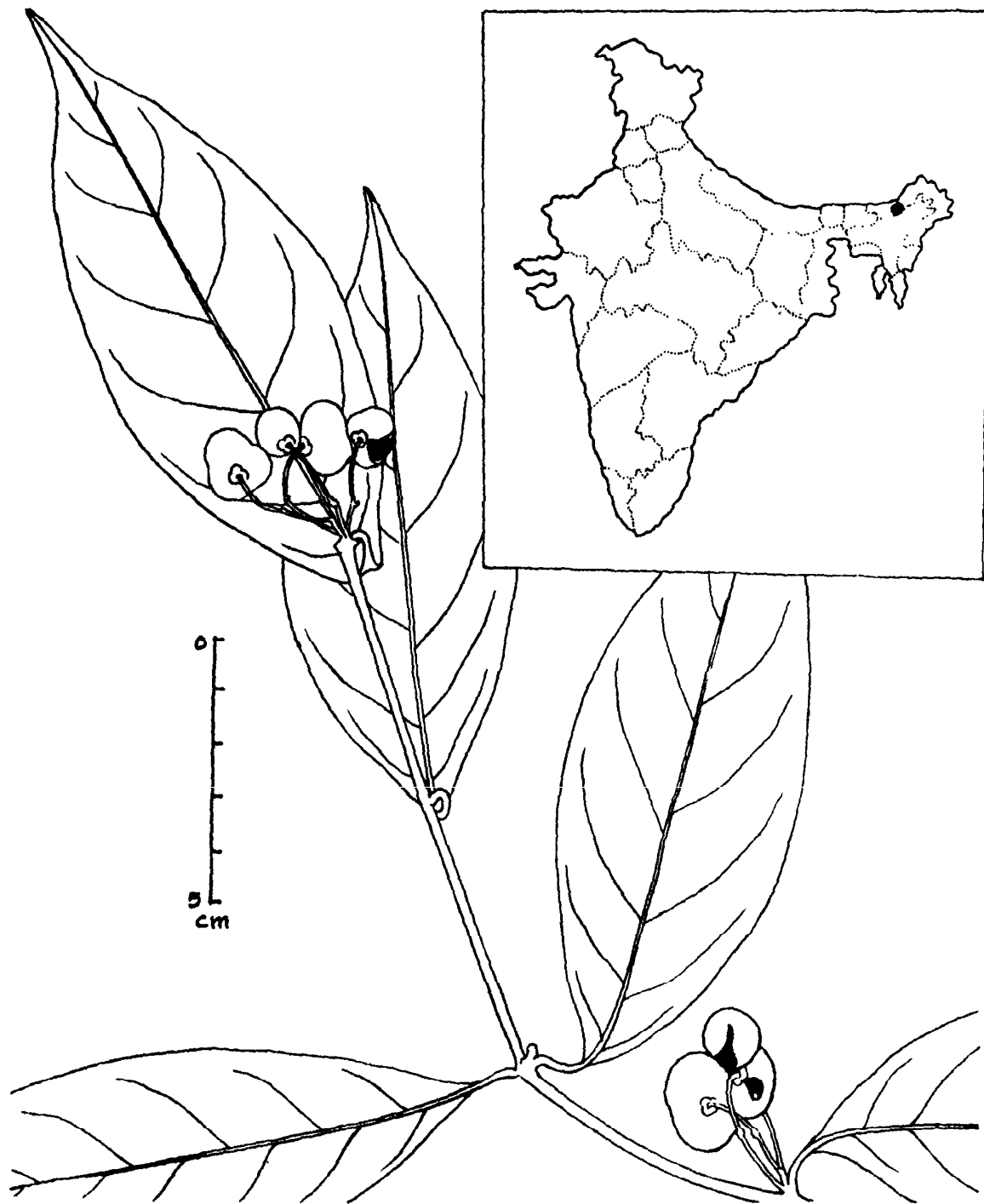
Description : A shrub about 3 m in height, branches glabrous, often grooved when young. Leaves opposite, shortly petioled, acuminate, entire. Cymes 3-4-flowered.

Fruiting : December.

Reference :

1. Prain, D. (1891), in Journ. Asiat. Soc. Bengal. 60(11) : 206.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Glyptopetalum griffithii Prain

CIRCAEASTERACEAE

Circaeaster agrestis Maxim.

Status : Rare. This species is becoming rare due to destruction of its habitats. It occurs in small, disjunct populations in the Himalayas.

Distribution : INDIA—Uttar Pradesh (Garhwal, Kumaun); NEPAL, BHUTAN, S. E. TIBET, CHINA.

Habitat and Ecology : On moss covered rocks in shady moist places in the subalpine forests of Himalayas.

Conservation Measures Taken : Parts of its distribution range are now protected in the Nanda Devi and Valley of Flowers National Parks.

Conservation Measures Proposed : Attempts to raise more plants from seeds in experimental gardens.

Biology and Potential Value : Flowers in September and October; of botanical interest.

Cultivation : In the experimental garden of Botanical Survey of India, Northern Circle, Dehra Dun, the cultivation of this plant was very successful.

Description : Herbs, 2-5 cm high. Leaves spatulate with characteristic dichotomous venation forming a crown at the apex. Flowers minute. Perianth 2-3, hyaline. Stamens 1-2. Carpels 1-3.

Reference :

1. Bhattacharyya, U. C. (1964), in Bull. Bot. Surv. India, 6(2-4):297-298.

(Data supplied by P. K. Hajra).

CLUSIACEAE (GUTTIFERAE)

Calophyllum austroindicum Kosterm. ex Stevens
(*C. trapezifolium* auct. non Thw.)

Status: Rare. Could not be collected during recent botanical tours; rare due to destruction of habitat.

Distribution: INDIA—Tamil Nadu, Coimbatore Dist. Anamalai hills; Kerala, Palghat Dist. Endemic.

Habitat and Ecology: In evergreen forests.

Conservation Measures Taken: None for the wild plants, included in the threatened plants list.

Conservation Measures Proposed: Can be conserved in Anamalai Sanctuary.

Biology and Potential Value: Timber value; botanical importance.

Cultivation: Nil.

Description: Trees, 10-25 m; twigs flat. Leaves elliptic or trapegiform to obovate. Flowers in axillary inflorescence.

References :

1. Stevens (1980), in J. Arnold Arbor. 61.250
2. Anderson, T. (1874), in Hooker, J. D. Fl. Brit. India, 1 : 275.
3. Gamble, J. S. (1957) : Fl. Pres. Madras, 55 (repr. ed.).
4. Vajravelu, E. (1983) : Rare, threatened and endemic plants of South India—1, Plant Conserv. Bull., 4 : 15.
5. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. & Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 10. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

CLUSIACEAE (GUTTIFERAE)

Garcinia talbotii Raizada ex Sant.
(*G. ovalifolia* Hook. f. var. *macrantha*)
(*G. macrantha* Talbot)

Status : Rare, due to destruction of habitat.

Distribution : INDIA—Karnataka (South Kanara), Tamil Nadu (Coimbatore).

Habitat and Ecology : In evergreen forests.

Conservation Measures Taken : None for the wild species; it is included in the threatened plants lists of India.

Conservation Measures Proposed : To be searched intensively and protected in wild; to be introduced in botanical gardens.

Biology and Potential Value : A rare species of botanical interest.

Cultivation : None on record.

Description : Trees 5-7 m; branchlets angular. Leaves broadly oblong. Flowers 5-merous, congested in short racemes on old parts of the stem.

References :

1. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 52 (repr. ed.).
2. Maheshwari, J. K. (1965), in Bull. Bot. Surv. India, 6 : 113.
3. Vajravelu, E. (1983) : Rare, threatened and endemic flowering plants of South India—1, in Plant Conserv. Bull., 4 : 17, B.S.I., Howrah.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. & Sastry, A. R. K. Materials for catalogue of threatened plants of India, p. 10. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

CLUSIACEAE (GUTTIFERAE)

Poeciloneuron pauciflorum Bedd.

Status : Endangered, not collected since its first collection by Beddome even during recent botanical explorations in this region.

Distribution : Kerala, Travancore—Western ghats, Tamil Nadu, Tirunelveli hills. Endemic.

Habitat and Ecology : Evergreen forests at 600-1400 m.

Conservation Measures Taken : None for the wild populations. The species is included in the threatened plants list of India.

Conservation Measures Proposed : Needs intensive search in the region to locate it and to take protective measures.

Biology and Potential Value : Rare tree of timber value, botanical interest due to its endemism.

Cultivation : Not known.

Description : Evergreen trees 15-20 m. Leaves linear, oblong, thick. Flowers axillary, solitary, yellow. Sepals 4. Stamens numerous.

For illustration—See (1).

References :

1. Beddome, R. H. (1871) : Fl. Sylv. t. 93.
2. Hooker, J. D. (1874) : Fl. Brit. India, 1 : 270.
3. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 56 (repr. ed.).
4. Vajravelu, E. (1983) : Rare, threatened and endemic flowering plants of South India—1, in Plant Conserv. Bull., 4 : 12, Botanical Survey of India, Howrah.
5. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. & Sastry, A.R.K., Materials for a catalogue of threatened plants of India, p. 10. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

DILLENIACEAE

Dillenia retusa Thunb.

Status : Endangered, due to damage to habitat.

Distribution : Tamil Nadu, Coimbatore Dist., Bolampatty, Anamalai hills; Karnataka ; SRI LANKA.

Habitat and Ecology : In evergreen forests on hills.

Conservation Measures Taken : None for the wild plants.

Conservation Measures Proposed : Protected status to Anamalai hills.

Biology and Potential Value : Ornamental tree with white flowers ; worth introducing in botanical gardens and parks.

Cultivation : None.

Description : Trees, 10-20 m. Leaves obovate-oblong. Flower white, in racemes. Fruits enclosed by sepals.

For illustration—See (1).

References :

1. Thunberg (1791), in Trans. Linn. Soc., London, 1 : 200. t. 19.
2. Hooker, J. D. and Thomson, T. (1872), in Hooker, J. D. : Fl. Brit. India, 1 : 37.
3. Gamble, J. S. (1957) : Fl. Pres. Madras, 1 : 5 (repr. ed.).
4. Majumdar, N. C. (1979) : Fl. Ind. Fasc., 2 : 8, B.S.I., Howrah.

(Data supplied by E. Vajravelu).

DIPTEROCARPACEAE

Hopea shingkeng (Dunn) Bor
(*Vatica shingkeng* Dunn)

Status : Rare.

Distribution : INDIA—(Arunachal Pradesh, Nagaland.)

Habitat and Ecology : It grows within forest.

Conservation Measures Taken : None.

Conservation Measures Proposed : This species can be protected only in its natural habitat. An attempt should be made to locate this species in other areas in wild.

Biology and Potential Value : Timber value.

Cultivation : Not known.

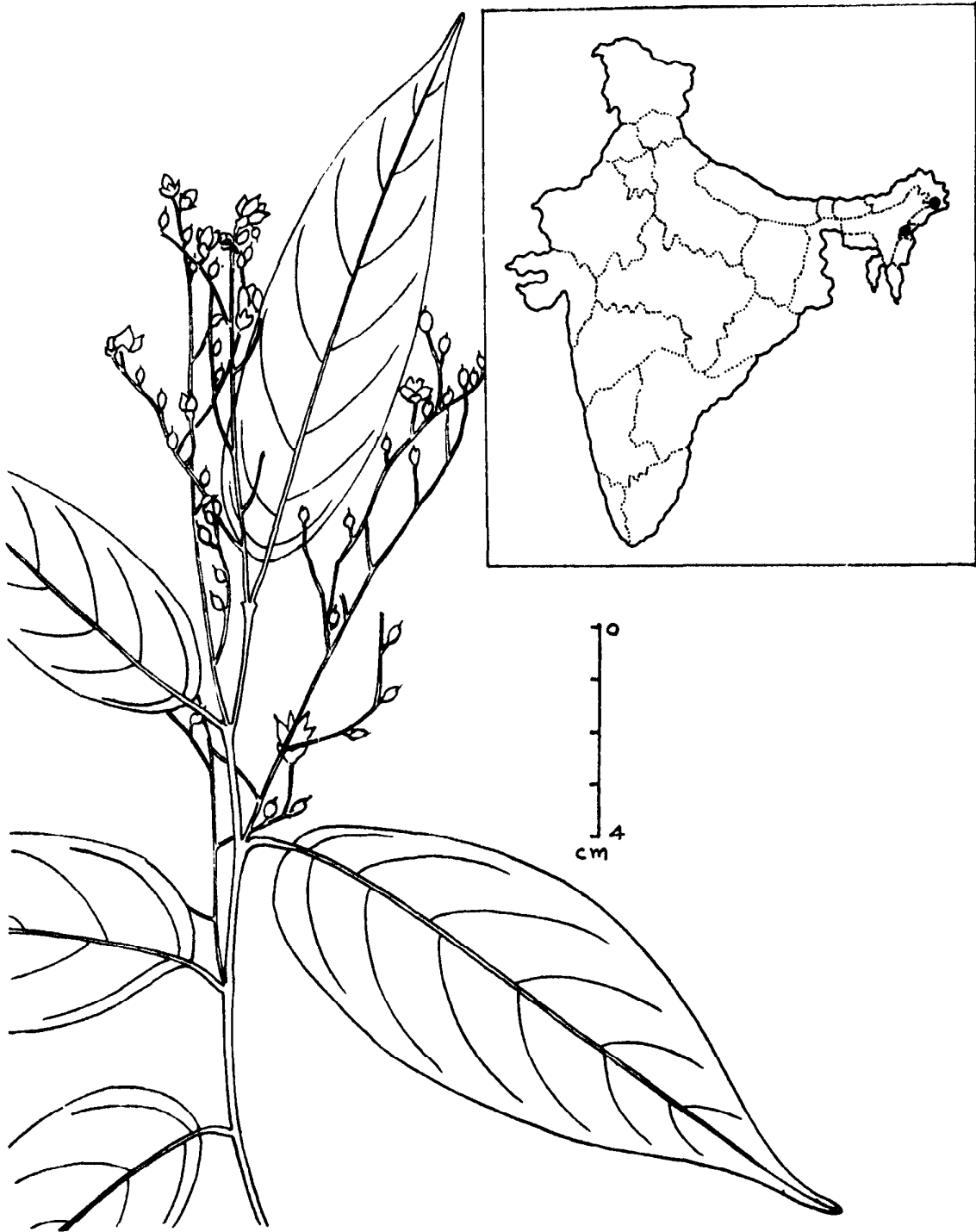
Description : A tall tree. Leaves alternate, lanceolate, acuminate with six pairs of lateral nerves. Flowers shortly pedicellate, in lax paniced racemes.

Flowering : September.

References :

1. Bor, N. L. (1941), in Indian Forest Rec. Bot., 2 : 227.
2. Dunn, S. T. (1920), in Kew Bull., 108.

(Data supplied by S. K. Katak and A. S. Chauhan).



Hopea shingkeng (Dunn) Bor

DIPTEROCARPACEAE

Hopea erosa (Bedd.) van Slooten
(*Balanocarpus erosa* Bedd.)

Status : Endangered, due to damage to habitat.

Distribution : Tamil Nadu, Tirunelveli Dist. Courtallam; Kerala, Cannanore Dist., on way to Kannath, Chanthanathode. Endemic.

Habitat and Ecology : In evergreen forests at 600-900 m.

Conservation Measures Taken : None for the wild populations; the species is included in threatened plants list of India.

Conservation Measures Proposed : Protection of its habitat; introduction in botanical gardens.

Biology and Potential Value : Timber value ; botanical interest due to its endemism.

Cultivation : Not known.

Description : Trees 15-20 m. Leaves entire, unequally cordate at base. Flowers in racemes. Petals bilobed. Fruits ovoid.

For illustration—See (1).

References :

1. Beddome, R. H., For Man. Bot. 237, 1873 : Fl. Sylv. t. 329, 1974.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 60. (repr. ed.).
3. Vajravelu, E. (1983) : Rare, threatened and endemic flowering plants of South India—1, in Plant Conserv. Bull. 4 : 17. B.S.I., Howrah.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. & Sastry, A.R.K., Materials for a catalogue of threatened plants of India, p. 10. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

DIPTEROCARPACEAE

Hopea jacobii Fisher

Status : Endangered; due to damage to habitat.

Distribution : Karnataka, Coorg. Endemic.

Habitat and Ecology : In evergreen forests.

Conservation Measures Taken : None for the plants in the wild. The species is listed in the threatened plants list of India.

Conservation Measures Proposed : The species is to be located in its type locality and other likely areas for protection in the wild and for introduction in Botanical gardens.

Biology and Potential Value : Botanical interest, not collected after Type collection; endemism.

Cultivation : Not known.

Description : Small trees; twigs dark brown, black on drying. Leaves alternate, ovate entire. Flowers minute, in panicles.

References :

1. Gamble, J. S. (1957) : Fl. Pres. Madras. 1292. (repr. ed).
2. Raghavan, R. S. and Singh, N. P. (1983). Endemic and threatened plants of western India, in Plant Conserv. Bull. 3 : 13. B.S.I., Howrah.
3. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 11. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

ERICACEAE

Rhododendron concinnoides Hutch. & Kingdon Ward

Status : Endangered. Known from Type collection only.

Distribution : Arunachal Pradesh. Endemic.

Habitat and Ecology : In temperate forests.

Conservation Measures Taken : None for the wild populations; it is included in the list of threatened plants of India.

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; to introduce in Botanic gardens at high altitudes.

Biology and Potential Value : Flowers in April-May. Ornamental.

Cultivation : Not known.

Description : Shrub, 3.0-3.5 m high. Leaves elliptic or obovate-elliptic, densely covered with brown scales beneath. Flowers in clusters of three, pinkish or purplish with dark spots.

References :

1. Hutchinson, J. and Kingdon Ward, F. (1931), in Notes Roy. Bot. Gard. Edinb. 16 : 180.
2. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India. 64. B.S.I., Howrah.
3. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India—A preliminary Survey, in Jain, S. K. and Rao, R. R. (ed.) An Assessment of Threatened Plants of India, p. 225. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron elliotii Watt ex Brandis

Status : Vulnerable, due to large scale clearing of forests.

Distribution : Manipur, Nagaland. Endemic.

Habitat and Ecology : In temperate and sub-alpine forests at ca 3,000 m.

Conservation Measures Taken : None for the wild plants; included in the list of threatened plants of India.

Conservation Measures Proposed : Its habitat needs conservation; introduction in Botanic Gardens; monitoring of the species in its known localities.

Biology and Potential Value : Flowers in May-June. Ornamental.

Cultivation : Not known.

Description : Small tree, ca 4 m high or straggling shrub. Leaves elliptic-oblong, glossy-green above, pale-green beneath. Inflorescence 6-10-flowered. Flowers scarlet or crimson with darker flecks. Ovary densely rufous-stellate-tomentose.

References :

1. Brandis, D. (1906) : Indian Trees, 410.
2. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, 64. B.S.I., Howrah.
3. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, 225. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron falconeri Hook. f. subsp. *eximium* (Nuttall)
Chamberlain

Status : Rare, known from few collections only.

Distribution : Arunachal Pradesh. Endemic.

Habitat and Ecology : Temperate Himalaya, in mixed forests.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection in natural habitat ; monitoring of the species, ex situ conservation in Botanic gardens and conservatories.

Biology and Potential Value : Flowers in May. Ornamental.

Cultivation : Not known.

Description : Tree upto 15 m high. Leaves broadly elliptic to obovate. Corolla pale pink with darker lips.

References :

1. Chamberlain D. F. (1979), in Notes, Roy. Bot. Gard. Edinb. 37. 330.
2. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India—A preliminary study, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India p. 225. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron johnstoneanum Watt ex Hutch.

Status : Rare.

Distribution : Manipur, Mizoram. Endemic.

Habitat and Ecology : At the edge of the forests on hill slopes in alt. 1700-3000 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection of natural habitat; ex situ conservation and multiplication in Botanic gardens and conservatories.

Biology and Potential Value : Flowers in April-May. Ornamental.

Cultivation : Not known.

Description : Shrubs 2-4 m high. Leaves elliptic to obovate-elliptic. Inflorescence 3-4-flowered. Flowers fragrant, pale yellow or white or sometimes white-tinged with pink, spotted with red.

References :

1. Hutchinson, J. (1919), in Notes Roy. Bot. Gard. Edinb. 12 : 72.
2. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, 64. B.S.I., Howrah.
3. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India.—A preliminary study, in Jain, S. K. and Rao, R. R. (ed.) An Assessment of Threatened Plants of India, p. 226. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron macabeanum Watt ex Balf. f.

Status : Rare. This species has become rare due to damage to habitat.

Distribution : Manipur, Nagaland. Endemic.

Habitat and Ecology : On hill tops, 2500-3000 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection of natural habitat; ex situ conservation and multiplication in conservatories and Botanic gardens.

Biology and Potential Value : Ornamental.

Cultivation : Not known.

Description : Tree upto 15 m high. Leaves broadly ovate to broadly elliptic, apex rounded to retuse, upper surface glabrous when mature, lower surface with dense indumentum. Inflorescence 15-25-flowered. Corolla lemon-yellow with a purple blotch.

References :

1. Balfour, I. B. (1920) in Notes, Roy. Bot. Gard. Edinb. 12 : 128.
2. Sastry, A. R. K. and Hajra, P. K. (1983). Rare and endemic species of *Rhododendron* in India—A preliminary study, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 227. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron nuttallii Booth

Status : Rare.

Distribution : Arunachal Pradesh ; CHINA.

Habitat and Ecology : Terrestrial or epiphytic, in open forests at 1200-3650 m alt.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection in the natural habitat, cultivation in Botanic Gardens.

Biology and Potential Value : Flowers in April-May. Ornamental.

Cultivation : Few plants were introduced into cultivation in Experimental Garden at Shillong, but did not thrive.

Description : Shrub or small tree, 2-10 m high. Leaves oblong-elliptic or oblong-obovate, upper surface rugose, lepidote, lower surface densely scaly. Inflorescence 2-5-flowered. Flowers white with a yellow blotch.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art-Report. 35. New Delhi.
2. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India—A Preliminary study, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, 228. B.S.I., Howrah.
3. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983) : in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, 64. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron santapau Sastry, Katak, Cox & Hutchison

Status : Endangered, due to felling of large trees in its habitat forests. Known from Type collection only.

Distribution : Arunachal Pradesh (Subansiri). Endemic.

Habitat and Ecology : Epiphytic, in mixed temperate forests, 1540-2300 m.

Conservation Measures Taken : Included in the lists of threatened plants of India.

Conservation Measures Proposed : Conservation of natural habitat ; cultivation in Botanical Gardens and intensive search in the known localities and other likely areas.

Biology and Potential Value : Flowers white (July), botanical interest.

Cultivation : The plants collected in 1965 from Subansiri, survived only for two years in the experimental garden at Shillong. Presently none in cultivation.

Description : Shrub upto around 1.5 m high, spreading. Inflorescence two-flowered. Flowers white. Ovary densely scaly. Capsule oblong, sparsely scaly.

For illustration—see (1 & 2).

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art-Report. p. 36. New Delhi.
2. Sastry, A. R. K., et al. (1969) : in Journ. Bombay nat. Hist. Soc. 65(3) : 744-747.
3. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India, in Jain, S. K. and Rao, R. R. (ed.) An Assessment of Threatened Plants of India, 229. B.S.I., Howrah.
4. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983) : in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, 64. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron subansiriense Chamberlain

Status : Endangered. Known from Type only.

Distribution : Arunachal Pradesh. Endemic.

Habitat and Ecology : Mossy rain forest, 2600-2800 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Conservation of natural habitat; cultivation in Botanical Gardens and multiplication through seeds and other means. Intensive search in the Type locality and other likely areas.

Biology and Potential Value : Ornamental.

Cultivation : Not known.

Description : Shrub or tree upto 14 m. Leaves oblong, upper surface glabrous, lower surface hairy along the veins. Inflorescence dense, upto 15-flowered.

References :

1. Chamberlain, D. F. (1978), in Notes Roy. Bot. Gard. Edinb. 36 : 124.
2. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 65. B.S.I., Howrah.
3. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India—A preliminary study, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, 230. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron triflorum Hook. f. var. *bauhiniflorum*
(Watt ex Hutch.) Cullen

Status : Rare.

Distribution : Manipur. Endemic.

Habitat and Ecology : On hill slopes, at alt. of 2450-2750 m.

Conservation Measures Taken : None for the wild plants; included in the list of threatened plants of India.

Conservation Measures Proposed : Protection of natural habitat; ex situ conservation and multiplication.

Biology and Potential Value : Flowers in May-June. Ornamental.

Cultivation : Not known.

Description : Shrubs 2-3 m high. Leaves oblong-lanceolate or ovate-lanceolate. Flowers in clusters of 2-3, brown-yellow or almost green or without brown or green spots.

References :

1. Cullen, J. (1978), in Notes Roy. Bot. Gard. Edinb. 36 : 109.
2. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India—A preliminary study, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, 230. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ERICACEAE

Rhododendron wattii Cowan

Status : Endangered. Known from the type locality.

Distribution : Manipur. Endemic.

Habitat and Ecology : Reported to occur in the forests at alt. 2700 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Protection of its natural habitat; ex situ conservation and monitoring of the species in its known localities.

Biology and Potential Value : Ornamental.

Cultivation : Not known.

Description : Shrub or small tree, 3-7 m high. Leaves obovate to oblong, glabrous above, white felted indumentum beneath. Inflorescence 15-flowered, dense. Corolla pink with darker flecks and purplish basal patches.

For illustration—see (1).

References :

1. Cowan, J. M. (1936), in Notes Roy. Bot. Gard. Edinb. 19 : 163. t. 253.
2. Sastry, A. R. K. and Hajra, P. K. (1983) : Rare and endemic species of *Rhododendron* in India—A preliminary study, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, 231. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

FABACEAE

Derris kanjilalii Sahni et Naithani

Status : Endangered. Known from the Type only.

Distribution : Uttar Pradesh (Pilibhit).

Habitat and Ecology : Not known as this species was described from old herbarium specimens.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Monitoring of its known locality and the other likely areas should be undertaken.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Scandent shrubs. Leaves 18-21 cm long, leaflets 9, ovate-oblong. Flowers 1.0 cm across. Pods oblong, winged on both the sutures.

References :

1. Sahni, K. C. and Naithani, B. D. (1976), in Indian For. 102 : 402.
2. Thothathri, K. (1982) : Fasc. Fl. Ind. 8 : 21. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

FABACEAE

Derris macrocarpa Thoth.

Status : Endangered. So far known from two localities only.

Distribution : Uttar Pradesh (Bahraich Dist.). Endemic.

Habitat and Ecology : Not known. This species was described from old herbarium specimens.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Monitoring to search the known locality and the other likely areas.

Biology and Potential Value : Botanical interest.

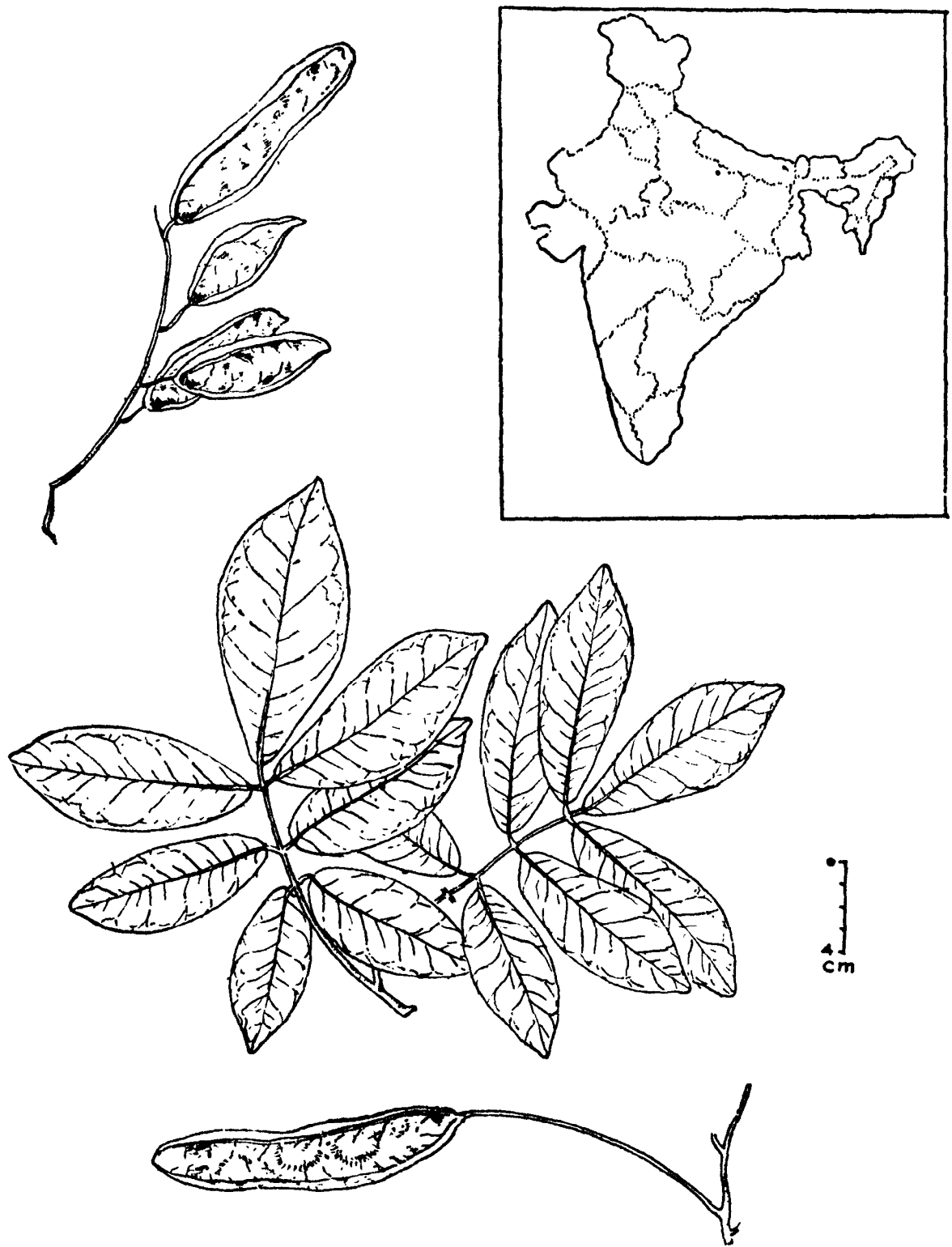
Cultivation : Not known.

Description : Climbing shrubs. Leaves 19.5-21.5 cm long; leaflets 7-9, obovate. Flowers not known. Pods flat, glabrous, winged on both the sutures. Seeds 1-3.

References :

1. Hajra, P. K. (1983) : Plants of N. W. Himalayas with restricted distribution—A census, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India, p. 4. B.S.I., Howrah.
2. Thothathri, K. (1982) : Fasc. Fl. Ind. 8 : 22. B.S.I., Howrah.

(Data supplied by P. K. Hajra).



Derris macrocarpa Thoth.
(After K. Thothathri)

FLACOURTIACEAE

Hydnocarpus macrocarpa (Bedd.) Warb.
(*Asteriastigma macrocarpa* Bedd.)

Status : Rare, due to damage to trees and habitat.

Distribution : Tamil Nadu, Kanya Kumari Dist., Muthukuzhivayal, Kerala, Travancore hills. Endemic.

Habitat and Ecology : In evergreen forests at 450-900 m.

Conservation Measures Taken : None.

Conservation Measures Proposed : Muthukuzhivayal-Travancore hills deserve consideration for Biosphere Reserve.

Biology and Potential Value : Timber value and botanical interest.

Cultivation : Not known.

Description : Evergreen trees 10-15 m. Leaves alternate, oblong, flowers white in axillary fascicles or on old stem. Petals scaly within. Fruits woody, globose, dark brown, 12-15 cm across.

For illustration—see (1).

References :

1. Beddome, R. H. (1869-74) : Ic. t. 242. Madras.
2. Gamble, J. S. (1957) : The Fl. Pres. Madras, 38 (repr. ed.).

(Data supplied by E. Vajravelu).

HYPERICACEAE

Hypericum humifusum L.

Status : Rare, located in very few localities and becoming rare due to destruction of habitat.

Distribution : Tamil Nadu, Nilagiris, Porthimund and Snowdown.

Habitat and Ecology : On rocky grassy slopes.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : To be protected in wild ; the Nilagiri hills being considered as a Biosphere Reserve.

Biology and Potential Value : Flowering ; April-July. Can be introduced in Botanical gardens as an ornamental plant for its showy yellow flowers.

Cultivation : None known.

Description : Perennial, glabrous herbs with red stems. Leaves short petioled, penninerved. Flowers yellow.

References :

1. Dyer, T. (1874), in Hooker, J. D. Fl. Brit. India, 1 : 255.
2. Gamble, J. S. (1957). The flora of the Presidency of Madras, 51. (repr. ed.), Calcutta.
3. Vajravelu, E. (1983). Rare, threatened and endemic flowering plants of south India-1 in Plant Conservation Bull. 4 : 17. B.S.I., Howrah.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A.R.K. Materials for a Catalogue of threatened plants of India, p. 10. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

HYPERICACEAE

Hypericum japonicum Thumb. var *major* Fyson

Status : Endangered ; due to damage to habitat. Not collected again from type or any other locality.

Distribution : Tamil Nadu, Nilagiri hills, Western downs. Endemic.

Habitat and Ecology : On grassy hill slopes.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : To be searched intensively and protected ; to be introduced in Botanical Gardens.

Biology and Potential Value : Botanical and ornamental value Flowers yellow.

Cultivation : Nil.

Description : Trailing weak stemmed, less branched herbs. Leaves ovate, clasping the stems at base. Flowers yellow. Capsules red.

References :

1. Fyson, P. F. (1932) : Flora of South Indian Hill Stations 1 : 49. Madras.
2. Vajravelu, E. (1983) : Rare, threatened and endemic flowering plants of south India-1. Plant Conservation Bull. 4 : 17. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

IRIDACEAE

Iris duthiei Foster

Status : Endangered. Known from one locality in Uttar Pradesh. No specimens in BSD and DD.

Distribution : Uttar Pradesh (Kumaon). Endemic.

Habitat and Ecology : In subalpine mountain slopes.

Conservation Measures Taken : None for the wild populations ; included in threatened plants list of India.

Conservation Measures Proposed : Intensive search in its type locality, conservation of habitat and ex situ conservation.

Biology and Potential Value : An ornamental plant.

Cultivation : None so far.

Description : Herbs. Leaves linear. Flowers solitary, reddish-lilac with darker veins, very attractive.

References :

1. Hooker, J. D. (1892) : Fl. Brit. India 6 : 275.
2. Hajra, P. K. (1983) : Rare, threatened and endemic plants of the Western Himalayas-Monocotyledons. Pl. Conserv. Bull. 4 : 8.
3. Hajra, P. K. (1983) in Jain S. K. and Sastry, A.R.K.. Materials for a Catalogue of threatened plants of India, 57. B.S.I., Howrah.

(Data supplied by M. J. Kothari).

LAMIACEAE

Eremostachys superba Royle ex Benth.

Status : Endangered. Presently known only from a small population of ca 100 plants in an area of about 20 sq. m. in India.

Distribution : Uttar Pradesh (Dehra Dun Siwaliks), Himachal Pradesh (Kangra) ; PAKISTAN.

Habitat and Ecology : North-western slopes of the Siwalik hills in forest clearings of Terminalia, Mallotus, Ougenia, Dalbergia, Erythrina, etc., associated with *Astrella* sp. (a common bryophyte), *Cheilanthes farinosa*, *Lastraea cochleata*, and species of *Ajuga*, *Geranium*, *Justicia*, *Phoenix*, *Inula*, *Murraya* and grasses like *Chrysopogon* and *Arundinella*.

Conservation Measures Taken : Included in the list of threatened plants of India. Suggestion has been made to the local forest Department for protective measures of its habitat.

Conservation Measures Proposed : As the plant is extremely localized and near the road side immediate action should be taken to protect the area by giving proper fencing. Intensive exploration to find out some more localities of its possible occurrence.

Biology and Potential Value : Flowering in March-April. Flowers are attractive and are of ornamental and horticultural interest.

Cultivation : A few plants are grown in the experimental garden of Botanical Survey of India, and in some private gardens, at Dehra Dun.

Description : Herbs, ca 1 m high, hairy. Radical leaves pinnatisect, cauline leaves pinnatifid. Inflorescence ca 30 cm long. Flowers in whorls, deep yellow.

References :

1. Babu, C. R. (1977) : Herbaceous Flora of Dehra Dun, 40.
2. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, 23. New Delhi.

(Data supplied by P. K. Hajra).

MAGNOLIACEAE

Magnolia griffithii Hook. f. & Thoms.

Status : Rare, due to clearance of forest areas for timber and other purposes.

Distribution : Assam. Endemic.

Habitat and Ecology : In evergreen forests.

Conservation Measures Taken : None for the wild plants ; the species is included in the list of threatened plants of India.

Conservation Measures Proposed : An attempt should be made to conserve it through ex situ and in situ methods.

Biology and Potential Value : Botanical interest. Several other species of *Magnolia* are prized in horticulture. Flowers in April-May.

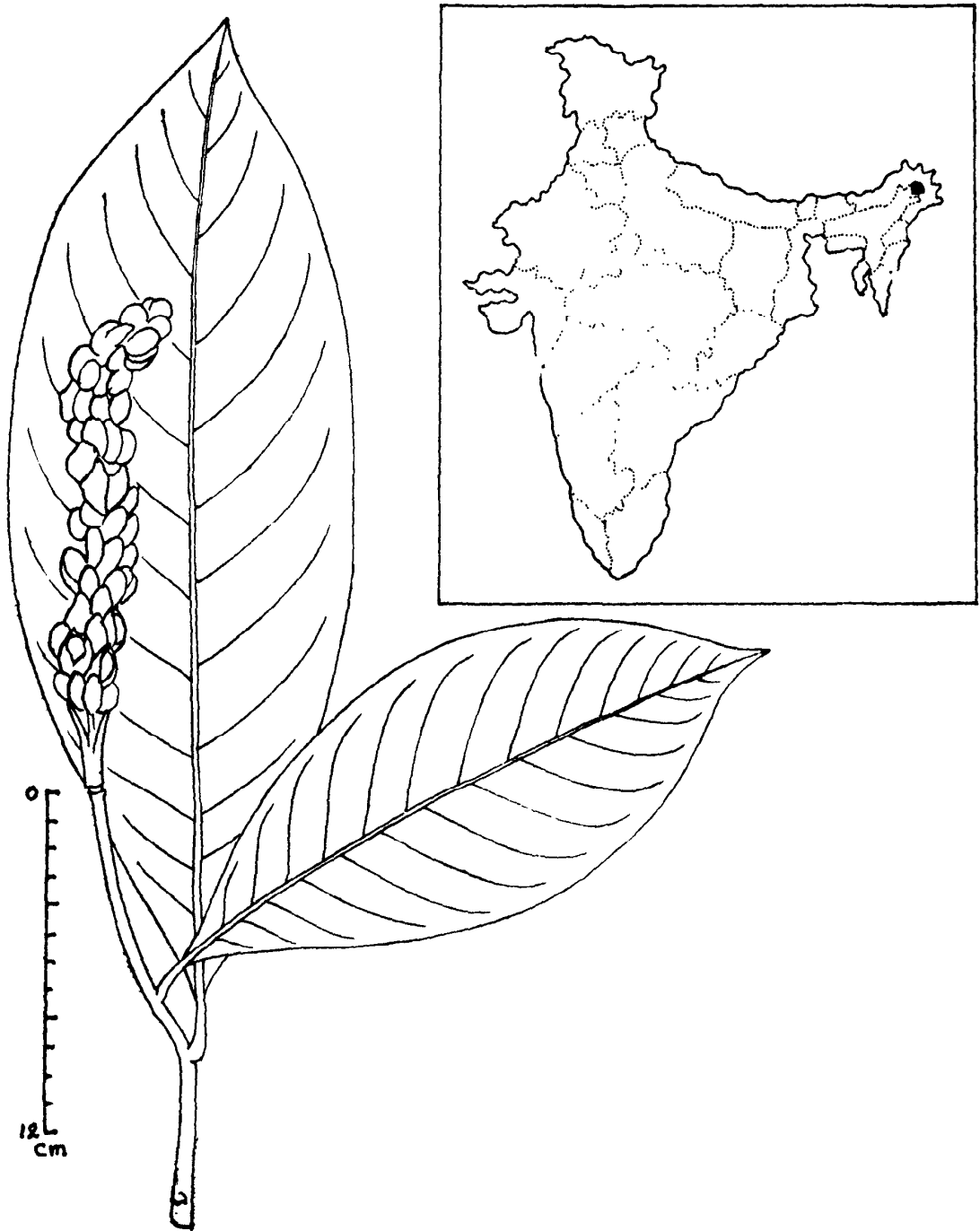
Cultivation : Not known.

Description : A large evergreen tree ; young branches and buds silky tomentose, finally glabrate. Leaves oblong, coriaceous, glabrous above. Flowers large, white, showy.

References :

1. Hooker, J. D. (1872) : Fl. Brit. India 1 : 41.
2. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, 25. New Delhi.
3. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, p. 62. B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).



Magnolia griffithii Hook. f. & Thoms.

MAGNOLIACEAE

Magnolia gustavi King

Status : Rare. There are no specimens in ASSAM Herbarium.

Distribution : Assam. Endemic.

Habitat and Ecology : In evergreen forests.

Conservation Measures Taken : None for the species in the wild ; it is included in the list of threatened plants of India.

Conservation Measures Proposed : To locate this species in wild, to conserve its habitat and to introduce into botanic gardens.

Biology and Potential Value : Botanical interest. Several other species are well known in horticulture. Flowers—April-May.

Cultivation : Not known.

Description : An evergreen tree with spreading branches. Flowers terminal, white.

References :

1. Jain, S. K. and Sastry A. R. K. (1980) : Threatened plants of India—A State-of-Art Report, 25. New Delhi.
2. Kanjilal, U. N., et al (1934) : Flora of Assam, 1(1) : 15.
3. King, G. (1891) : The Magnoliaceae of British India, in Ann. Roy. Bot. Gard. Calcutta 3 : 210.
4. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 62. B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

MAGNOLIACEAE

Michelia mannii King

Status : Rare, due to clearing of forests.

Distribution : North-East India, so far recorded only from Makum forest, North Lakhimpur, Assam ; also reported from BANGLADESH.

Habitat and Ecology : It grows in evergreen forests.

Conservation Measures Taken : None for the species in the wild.

Conservation Measures Proposed : An attempt should be made to locate this species in wild to protect its habitat and to introduce in some protected areas and botanic gardens.

Biology and Potential Value : Botanical interest. Flowering-November-December.

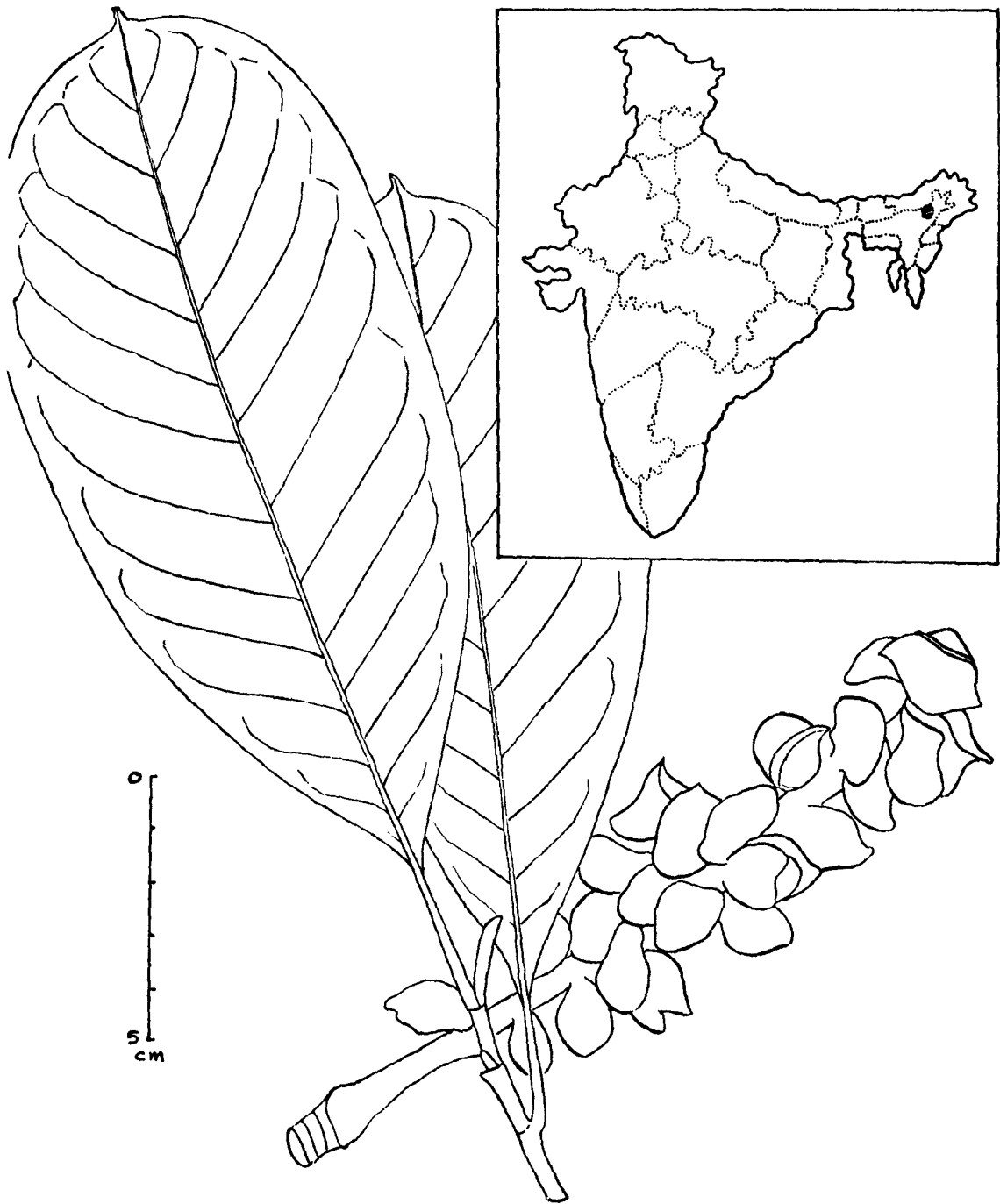
Cultivation : Not known.

Description : A tall tree. Leaves large with prominent nerves. Flowers axillary, large.

References :

1. Kanjilal, U. N., et al. (1934). Flora of Assam 1 (1) : 25.
2. King, G. (1891). The Magnoliaceae of British India in Ann. Roy. Bot. Gard. Calcutta, 218.

(Data supplied by S. K. Katak and A. S. Chauhan)



Michelia manni King

MAGNOLIACEAE

Michelia velutina DC.

Status : Vulnerable ; due to the destruction of the habitat.

Distribution : Meghalaya ; NEPAL, BHUTAN to S. E. TIBET, N. BURMA, W. YUNNAN.

Habitat and Ecology : In mixed sub-tropical to temperate forests, in the altitudes of 1500-1800 m.

Conservation Measures Taken : None for the wild plants ; the species is listed in the threatened plants list of India.

Conservation Measures Proposed : Recently, it was located in the Poriong forest in Meghalaya. An attempt should be made to protect this in this wild habitat. It is a fast growing species.

Biology and Potential Value : Botanical and horticultural interest. Flowering in August-September. The species of *Michelia* are valued in horticulture for their delicately fragrant flowers.

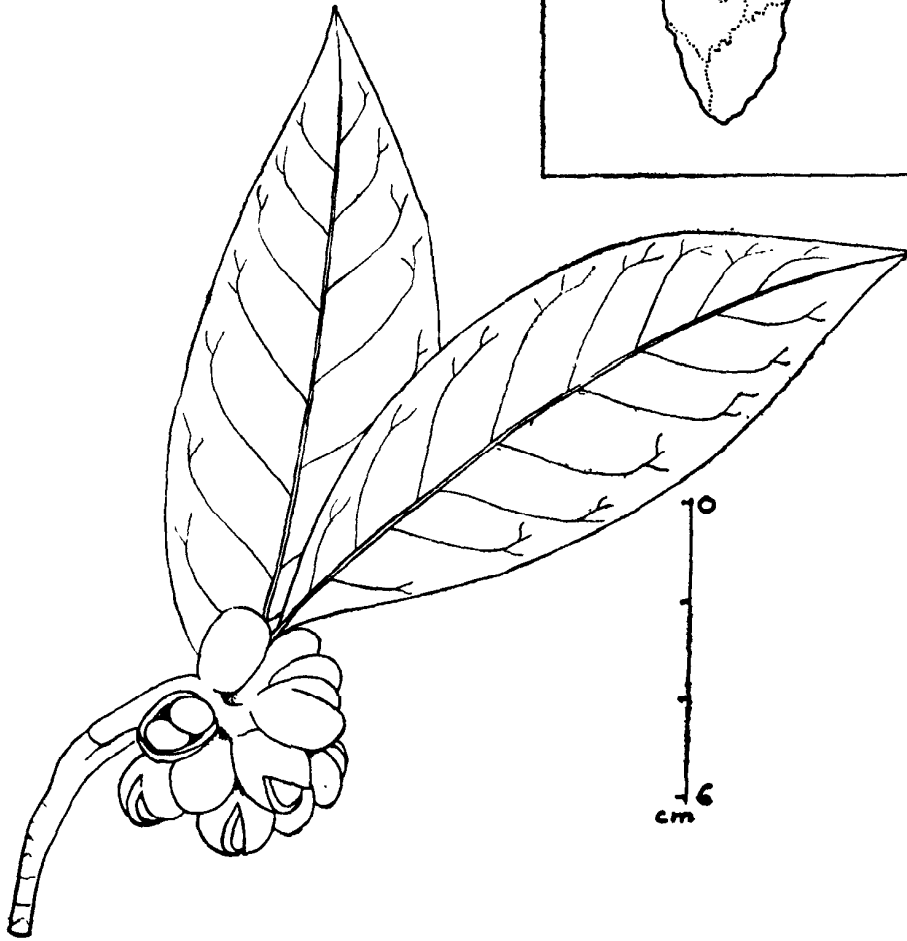
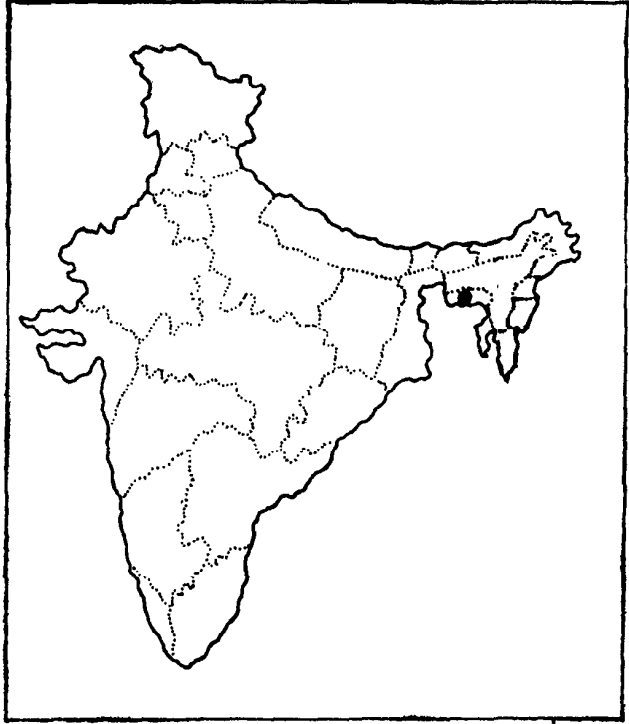
Cultivation : Not known.

Description : A small tree. Leaves oblong or lanceolate, glabrous above and tomentose beneath, deciduous. Flowers white, attractive.

References :

1. Hooker, J. D. (1872) : Fl. Brit. India, 1 : 43.
2. Hara, H. and Williams, L. H. J. (1979) : An enumeration of the Flowering plants of Nepal, 2 : 25.

(Data supplied by S. K. Katak and A. S. Chauhan).



Michelia velutina DC.

MAGNOLIACEAE

Talauma rabaniana Hook. f.

Status : Rare ; destruction of the habitat for some development projects and natural rarity.

Distribution : Assam, Meghalaya. Endemic.

Habitat and Ecology : It grows in evergreen and subtropical forests.

Conservation Measures Taken : None for the wild plants ; it is included in the threatened plants list of India.

Conservation Measures Proposed : A detailed survey is needed to locate the species in wild and to conserve this in some protected areas.

Biology and Potential Value : Botanical interest. Flowering in April-May.

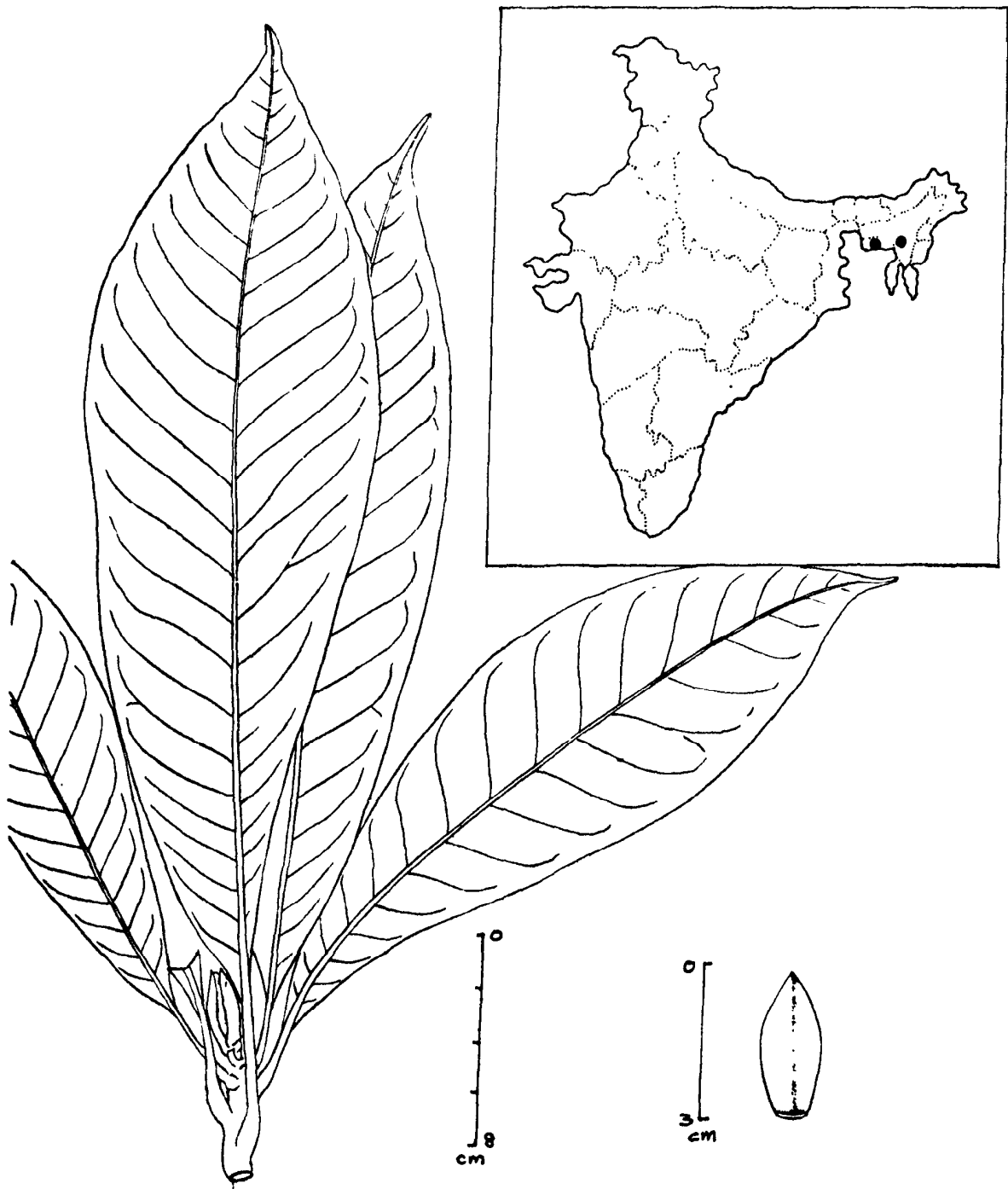
Cultivation : Not known.

Description : A lofty tree. Leaves lanceolate, glabrous, petioles short. Fruits ovoid.

References :

1. Hooker, J. D. (1872) : Fl. Brit. India, 1 : 40.
2. Kanjilal, U. N., et al (1934) : Flora of Assam, 1(1) : 18.

(Data supplied by S. K. Katak and A. S. Chauhan).



Talauma rabaniana Hook. f.

MALVACEAE

Abutilon ramosum Guill. & Perr.

Status : Rare ; due to destruction of habitat.

Distribution : Tamil Nadu, Madurai Dist., Kodaikanal, Nilgiris Mamaram ; Kerala, Cochin, Karnataka, Concan.

Habitat and Ecology : On open forest slopes.

Conservation Measures Taken : None for the wild populations ; it is included in the threatened plants list of India.

Conservation Measures Proposed : Protection of its habitat, ex situ conservation in botanical gardens suggested.

Biology and Potential Value : Shrubs with showy yellow flowers. Can be introduced in gardens as a horticultural plant.

Cultivation : Nil.

Description : Erect shrubs, 1-2 m. Leaves sub-trilobate, cordate ; stipules subulate. Flowers yellow, sepals viscous pubescent.

References :

1. Hooker, J. D. (1874) : Fl. Brit. India, 1 : 328.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 65. (repr. ed.).
3. Vajravelu, E. and Daniel, P. (1983), in Jain S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 11. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

MALVACEAE

Decaschistia rufa Craib

Status : Endangered ; due to destruction of habitat ; could not be collected during recent botanical explorations.

Distribution : Tamil Nadu, Chengalpattu dist., Tiruvallur area, Kambakkam hills. Endemic.

Habitat and Ecology : In open forests.

Conservation Measures Taken : None for the wild populations ; the species is included in the threatened plants list of India.

Conservation Measures Proposed : To be searched intensively and protected in wild ; to be introduced in botanical gardens.

Biology and Potential Value : Botanical interest.

Cultivation : None on record.

Description : Shrubs with reddish hairy stems. Leaves ovate, entire. Flowers axillary, bracteoles 10.

References :

1. Gamble, J. S. (1957) : Fl. Pres. Madras. 68. (repr. ed.).
2. Vajravelu, E. (1983) : Rare, threatened and endemic flowering plants of south India—I, Plant Conserv. Bull. 4 : 18.
3. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India. 11. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

NEPENTHACEAE

Nepenthes khasiana Hook. f

Status : Vulnerable ; due to destruction of its habitat and overcollection.

Distribution : Meghalaya. Endemic.

Habitat and Ecology : It grows in open grassy slopes as well as in shady hill slopes near water sources. Plants growing in sunny, exposed areas are usually dwarfish.

Conservation Measures Taken : Protection measures taken by the Forest Department, Government of Meghalaya by declaring the wild habitats in Jarain and Baghmara as 'protected areas'. Few plants are under cultivation in experimental garden, Botanical Survey at Shillong. The species is included in the threatened plants lists of India.

Biology and Potential Value : Insectivorous plant ; botanical curiosity and endemic importance.

Cultivation : It is under cultivation in experimental gardens at Shillong.

Description : A perennial herb with leaf-apices modified into pitchers.

References :

1. Hooker, J. D. (1886) : Fl. Brit. India, 5 : 69.
2. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
3. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983) in Jain, S. K. and Sastry, A.R.K. Materials for a catalogue of threatened plants of India, 66. B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

NYMPHAEACEAE

Nymphaea tetragona Gregori
(*Nymphaea pygmaea* Ait.)

Status : Vulnerable, due to destruction of habitat; only known from one locality in Meghalaya.

Distribution : Meghalaya. SIBERIA, N. CHINA.

Habitat and Ecology : It grows in shallow ponds in open places together with *Bracenia schreberi* Gmel.

Conservation Measures Taken : None for the wild populations; it is included in the threatened plants list of India.

Conservation Measures Proposed : Should be cultivated in botanical gardens, as the natural habitat is under threat due to paddy cultivation. The locality containing small populations, recently surveyed by the POSSCEF, BSI, Shillong. This area may be declared as a 'protected area'.

Biology and Potential Value : Botanical and horticultural interest.

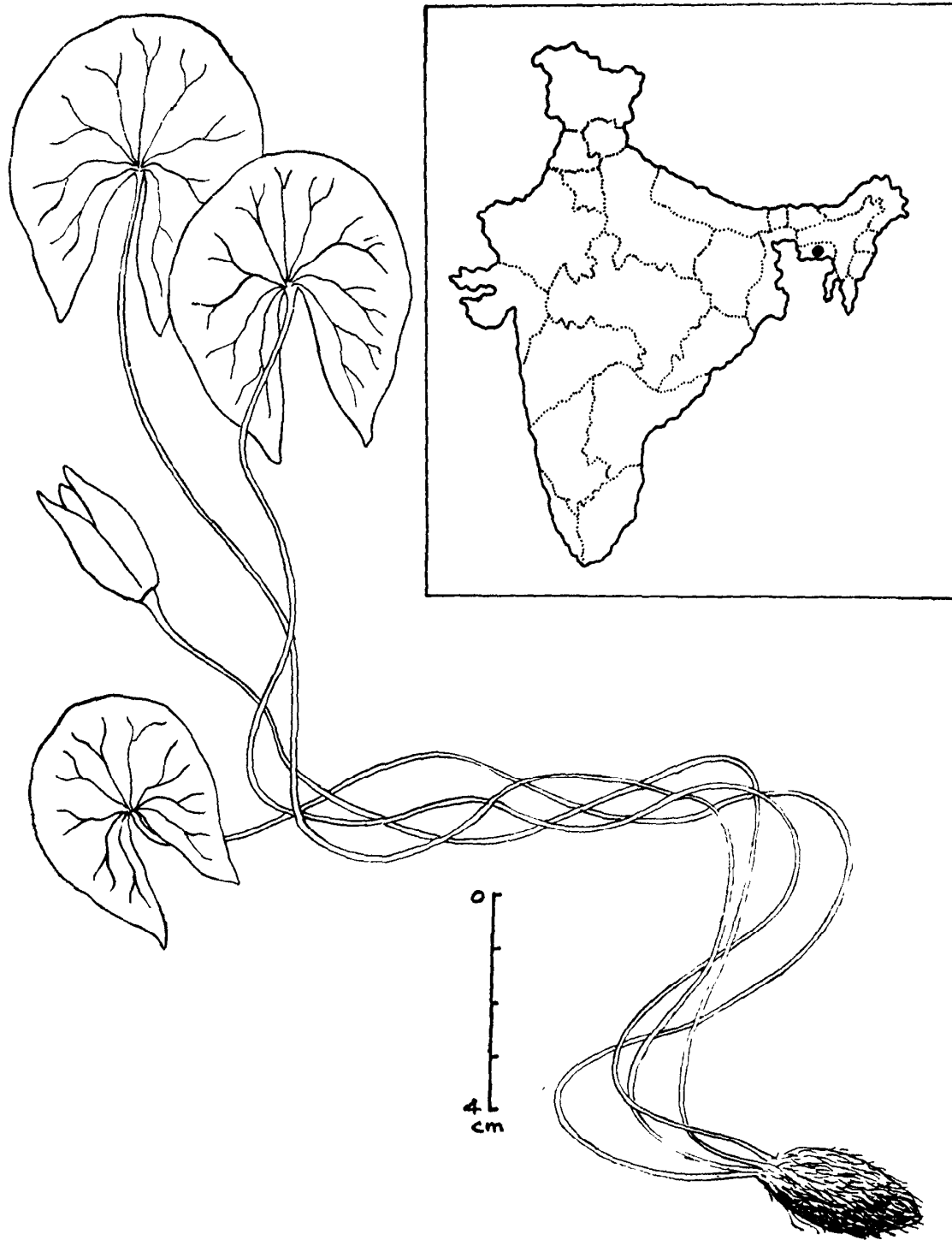
Cultivation : Not known elsewhere; a few plants collected from Nongkhrem have been introduced into the botanic garden (BSI) at Shillong.

Description : A slender aquatic herb. Root-stock thick, tuberous, with soft black hairy-roots. Leaves oblong-orbicular, lobes divergent, acute, about 6 cm in diam. Flowers small, about 5 cm diam., white.

References :

1. Hooker, J. D. (1872) : Fl. Brit. India, 1 : 115.
2. Kanjilal, U. N., et al (1934) : Flora of Assam, 1(1) : 64.
3. Sastry, A. R. K., Katak, S. K. and Chauhan, A. S. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 61. B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).



Nymphaea tetragona Gregori

ORCHIDACEAE

Archineottia microglottis (Duthie) Chen

Status : Rare. This plant has recently been collected after a lapse of about 80 years from Tehri-Garhwal and is known from a few populations only.

Distribution : Uttar Pradesh (Garhwal). Endemic.

Habitat and Ecology : Wooded hill-sides under Rhododendrons and Oaks ; about 2000 m.

Conservation Measures Taken : None for the wild populations; included in the list of threatened plants. All species of Orchidaceae in India are included in App. 2 of CITES, 1973.

Conservation Measures Proposed : Intensive exploration to determine the extent of occurrence; introduction in botanical gardens.

Biology and Potential Value : Flowering in August-September. Botanical interest.

Cultivation : None so far.

Description : Terrestrial, leafless herbs, 20-30 cm high. Flowers pale-green, crowded, about 7 mm across.

For illustration—see (1).

References :

1. Duthie, J. F. (1906), in Ann. Roy. Bot Gard. Cal. 9(2) : 154. t. 120.
2. Hajra, P. K. (1983) : Rare, threatened and endemic plants of the Western Himalayas—Monocotyledons. Plant Conserv. Bull. 4 : 2.
3. Hajra, P. K. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 54. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Aphyllorchis gollani Duthie

Status : Endangered. This species was last collected in 1900. During recent intensive exploration tours in the Tehri-Garhwal region, the plant could not be located in its original habitat. Appears to be endangered due to destruction of habitat.

Distribution : Uttar Pradesh (Tehri-Garhwal). Endemic.

Habitat and Ecology : Between elevations of 2,500-3,300 m.

Conservation Measures Taken : Included in the list of threatened plants of India. All species of Orchidaceae are included in App. 2 of CITES, 1973.

Conservation Measures Proposed : It is necessary to search for the plant intensively in the adjacent areas and to declare its habitats as protected area.

Biology and Potential Value : Flowers in August. It is of considerable importance as the species is saprophytic and known from a few collections only.

Cultivation : None so far; being a saprophyte it would be difficult to grow this species outside its habitat.

Description : Terrestrial leafless herbs with thick fleshy roots. Scapes 40-50 cm high, stout, sheathed. Flowers 8-10, crowded, purplish-green.

For illustration—see (1).

References :

1. Duthie, J. F. (1906); 'Orchids of the North-Western Himalaya' in Ann. Roy. Bot. Gard. Cal. 9(2) : 155.
2. Hajra, P. K. (1983) : Rare, threatened and endemic plants of the Western Himalaya—Monocotyledons, in Plant Conserv. Bull. 4 : 2.
3. Hajra, P. K. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 54. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Aphyllorchis montana Reichb. f.

Status : Rare. A very inconspicuous plant. It is becoming rare in wild, due to destruction of its habitat.

Distribution : Meghalaya, Sikkim.

Habitat and Ecology : It grows in moist, shady forest areas.

Conservation Measures Taken : All species of Orchidaceae are included in App. 2 of CITES, 1973.

Conservation Measures Proposed : As it is difficult to grow, its natural habitats should be protected.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Terrestrial. Stems slender, erect, leafless. Racemes few-flowered; flowers pale-brown.

For illustration—see (2).

References :

1. Hooker, J. D. (1890) : Fl. of Brit. India, 6 : 116.
2. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic Orchids of Sikkim and North-eastern India, t. 3. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).

ORCHIDACEAE

Bulbophyllum ornatissimum (Reichb. f.) J. J. Sm.

Status : Rare, occurs in small patches; fast depleted due to destruction of habitat.

Distribution : Assam, Nagaland, Sikkim.

Habitat and Ecology : It grows in sub-tropical and tropical forests in shady areas.

Conservation Measures Taken : It is included in App. 2 of CITES, 1973.

Conservation Measures Proposed : Plants are to be brought under cultivation for multiplication.

Biology and Potential Value : Ornamental.

Cultivation : Few plants are under cultivation in private gardens.

Description : Epiphytes. Pseudobulbs ovoid. Leaves linear. Scapes lateral, few-flowered in umbels. Flowers purplish with pale-yellow streaks.

References :

1. Hooker, J. D. (1890) : Fl. Brit. India, 5 : 773.
2. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic Orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).

ORCHIDACEAE

Calanthe alpina Lindl.

Status : Rare.

Distribution : Uttar Pradesh (Garhwal, Kumaun), Sikkim ; NEPAL, BHUTAN.

Habitat and Ecology : Temperate to subalpine Himalayas.

Conservation Measures Taken : All species of Orchidaceae are included in the App. 2 of CITES, 1973. The species is listed in the threatened plants list.

Conservation Measures Proposed : i) An effort should be made to determine the extent of its occurrence. ii) Habitat should be preserved.

Biology and Potential Value : Horticultural value.

Cultivation : The species has been in cultivation in some nurseries in Eastern India.

Description : Pseudobulbs sub-cylindric with two or three annular markings. Leaves oblanceolate. Racemes 4 or 5-flowered. Perigone white, tipped with green, lip dull red, without lateral lobes.

References :

1. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and Endemic Orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.
2. King, G. and Pantling, R. (1898) : Orchids of the Sikkim Himalayas. Ann Roy. Bot. Gard. Calcutta 8 : 170 t. 229.
3. Pradhan, U. C. (1979) : Indian Orchids—Guide to Identification and Culture 2 : 257. Calcutta.
4. Seidenfaden, G. and Arora, C. M. (1982) : An enumeration of the Orchids of N. W. Himalaya, in Nordic Journ. Bot., 2 : 11.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Calanthe mannii Hook. f.

Status : Rare. It is known from a few localities having small populations only.

Distribution : Arunachal Pradesh, Meghalaya (Khasi Hills), Uttar Pradesh (Garhwal, Kumaun), Sikkim ; NEPAL, BHUTAN.

Habitat and Ecology : In moist shady places in the subtropical and temperate forests, amidst rock boulders and along streams.

Conservation Measures Taken : Included in the list of threatened plants. All species of Orchidaceae are included in the App. 2 of CITES, 1973.

Conservation Measures Proposed : Intensive exploration to find out some localities for in situ conservation measures. Reintroduction in some undisturbed habitats and botanical gardens.

Biology and Potential Value : The species is of horticultural interest for the orchid growers.

Cultivation : Grown in some private nurseries.

Description : Terrestrial herbs. Pseudobulbs small. Flowers chocolate-brown, spur short, lip with lateral lobes.

For illustrations—see (1, 2, 4).

References :

1. Katakai, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and North-eastern India. t. 9. POSSCEF, B.S.I., Howrah.
2. King, G. and Pantling, R. (1898) : Orchids of Sikkim Himalaya. Ann. Roy. Bot. Gard. Calcutta 8 : 167. t. 225.
3. Duthie, J. F. (1906) : Orchids of the North-west Himalaya. Ann. Roy. Bot. Gard. Calcutta 9, 2 : 120.
4. Pradhan, U. C. (1979) : Indian Orchids : Guide to Identification and Culture 2 : 256. Calcutta.
5. Seidenfaden, G. and Arora, C. M. (1982) : An enumeration of the Orchids of N. W. Himalaya, in Nord. Journ. Bot. 2 : 11.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Calanthe pachystalix Hook. f.

Status : Endangered. This species is known from Type collection and has become endangered due to destruction of habitat.

Distribution : Himachal Pradesh (Simla), Uttar Pradesh (Mussoorie) :
NEPAL, INDO-CHINA ?

Habitat and Ecology : In shady forests at about 2,000 m.

Conservation Measures Taken : Included in the list of threatened plants of India. The family Orchidaceae is included in the App. 2, CITES, 1973.

Conservation Measures Proposed : Monitoring of the known localities.

Biology and Potential Value : Flowers in dense racemes, greenish yellow. The plant is of horticultural value.

Cultivation : Not known.

Description : Terrestrial herb. Stem short, swollen at the base. Leaves linear-lanceolate, many. Inflorescence from the axils of sheath, usually over topping the leaves.

For illustration—see (1).

References :

1. Duthie, J. F. (1906) : Orchids of the North-west Himalaya. Ann. Roy. Bot. Gard. Calcutta, 9. 2 : 121. t. 104. 1906.
2. Hajra, P. K. (1983) : Rare, threatened and endemic plants of the Western Himalayas—Monocotyledons, in Plant Conserv. Bull. 4 : 1-13.
3. Hajra, P. K. (1983), in Jain, S. K. and Sastry, A.R.K. Materials for a catalogue of threatened plants of India, 54. B.S.I., Howrah.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Calanthe plantaginea Lindl.

Status : Rare. It is known from a few, very scattered localities.

Distribution : Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh (Garhwal, Kumaun); NEPAL, BHUTAN.

Habitat and Ecology : In shady places of sub-tropical and temperate forests, near streams amidst rock boulders.

Conservation Measures Taken : Included in the threatened plants list of India. The family Orchidaceae is included in App. 2 of CITES, 1973.

Conservation Measures Proposed : A detailed survey of its range, for conservation of some of its natural habitats.

Biology and Potential Value : Flowers sweet scented, purplish white. Horticultural value.

Cultivation : Grown in some private nurseries.

Description : Terrestrial herb, 10-30 cm high. Leaves 20-30 cm long, oblanceolate or elliptic-lanceolate. Flowers showy; spur very slender; lateral lobes of lip spreading, disk with 3 slender lamellae.

For illustration—see (1 & 2).

References :

1. Duthie, J. F. (1906) : Orchids of the North-west Himalaya. Ann. Roy. Bot. Gard. Calcutta, 9, 2 : 122, t. 105.
2. Pradhan, U. C. (1979) : Indian Orchids—Guide to Identification and Culture, 2 : 261.
3. Seidenfaden, G. and Arora, C. M. (1982) : An enumeration of the Orchids of North-western Himalaya, in Nord. Journ. Bot. 2 : 11.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Cheirostylis griffithii Lindl.

Status : Rare, due to destruction of its habitat.

Distribution : Western Himalaya, Meghalaya, Sikkim; BURMA.

Habitat and Ecology : It grows in extremely moist and shady areas.

Conservation Measures Taken : All species of Orchidaceae are included in App. 2 of CITES, 1973. It is included in the threatened plants list of India.

Conservation Measures Proposed : Protection in its natural habitats and introduction in orchidaria suggested.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Terrestrial. Stems prostrate. Leaves pale-brown, reflexed. Racemes few-flowered. Flowers white.

References :

1. Hooker, J. D. (1890) : Fl. of Brit. India, 6 : 105.
2. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic Orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).

ORCHIDACEAE

Cheirostylis pusilla Lindl.

Status : Rare, due to destruction of its habitat.

Distribution : Meghalaya; THAILAND.

Habitat and Ecology : It grows in very moist shady areas of forests on humus covered soil.

Conservation Measures Taken : All species of Orchidaceae are included in App. 2 of CITES, 1973. The species is included in threatened plants list of India.

Conservation Measures Proposed : It can be protected only in its natural habitat as it is difficult to grow.

Biology and Potential Value : Botanical interest.

Cultivation : Not known.

Description : Terrestrial. Stems prostrate. Leaves small, ovate. Scapes 2-3-flowered. Flowers pink.

References :

1. Hooker, J. D. (1890) : Fl. Brit. India, 6 : 105.
2. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic Orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).

ORCHIDACEAE

Corybas purpureus Joseph et Yog.

Status : Rare, known from one locality only. The area being a tourist spot, is most vulnerable.

Distribution : Meghalaya. Endemic.

Habitat and Ecology : Grows on mossy ground in moist, shady areas near water courses.

Conservation Measures Taken : All species of Orchidaceae are included in App. 2 of CITES, 1973. It is included in threatened plants list of India.

Conservation Measures Proposed : The IUCN Plant Red Data Book has included one species of *Corybas*. *C. himalaicus* (from Sikkim) and *C. purpureus* (from Meghalaya) in India are so far reported only from their Type localities. An effort should be made to protect their habitats.

Biology and Potential Value : Botanical curiosity.

Cultivation : A very small orchid, difficult to cultivate.

Description : Terrestrial. Tuber small with a very small slender stem. Leaf one, sessile, cordate. Flowers solitary, pinkish-white.

References :

1. Joseph, J. & Yoganarasimhan, S. N. (1967) : *Corybas purpureus*—a new species of orchid from United Khasi & Jaintia Hills, Assam. *Ind. For.* 93(12) : 815-817.
2. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic Orchids of Sikkim and North-eastern India. t. 15. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).

ORCHIDACEAE

Cymbidium mackinnoni Duthie

Status : Rare. So far known from Uttar Pradesh. Mackinnon collected it from Mussoorie in 1899. Recently this species has been collected from Kumaon and Garhwal and is known from a few scattered populations.

Distribution : Uttar Pradesh (Garhwal, Kumaon). Endemic.

Habitat and Ecology : Usually epiphytic on oak trees at alt. of 1500-2000 m.

Conservation Measures Taken : i) Included in the threatened plants list.
ii) All species of the family orchidaceae are included in the App. 2 of CITES, 1973.

Conservation Measures Proposed : Habitat conservation; cultivation and multiplication in the National Orchidaria.

Biology and Potential Value : Flowering in February. Ornamental.

Cultivation : This plant is under cultivation in the Orchid House, B.S.I., Northern Circle, Dehradun.

Description : Herbs with spongy roots. Leaves linear, margins entire. Flowers solitary, green with yellow tip. Lip pale-yellow, blotched with purple.

For illustration—see (1).

References :

1. Duthie, J. F. (1906), in Ann. Roy. Bot. Gard. Cal., 9(2) : 134. t. 115.
2. Raizada, M. B., et al (1981) : Orchids of Mussoorie, 38.
3. Hajra, P. K. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 54. B.S.I., Howrah.

(Data supplied by P. K. Hajra and M. J. Kothari).

ORCHIDACEAE

Cymbidium tigrinum Parish ex Hook.

Status : Rare. It is confined to one or two localities in Nagaland, depleted due to the clearance of forest areas. It was earlier collected in the vicinity of Kohima. Recently, it could not be located again even there, as the area had been cleared.

Distribution : Nagaland, Manipur; BURMA, THAILAND.

Habitat and Ecology : An epiphyte on medium sized trees in sunny open forests.

Conservation Measures Taken : All the species of orchidaceae are included in App. 2 of CITES, 1973. It is included in the threatened plants list of India.

Conservation Measures Proposed : As the species is getting depleted in wild, it is proposed to bring a few plants under cultivation.

Biology and Potential Value : Ornamental.

Cultivation : It grows well as an epiphyte on tree trunks of *Quercus* species. Some plants are under cultivation in the Orchidarium of the Forest Deptt., Nagaland. It can be cultivated in pots in the media of charcoal and brick-bats.

Description : Epiphytes. Pseudobulbs ovoid with few leaves. Leaves shortly petioled. Scapes sub-erect, few-flowered. Flowers greenish with red spots.

References :

1. Pradhan, U. C. (1976 & 1979) : Orchids of India—Guide to Identification and Culture. Calcutta.
2. Rao, A. S. (1980) : Orchids of India. New Delhi.
3. Bijay Krishna and Sastry, A. R. K. (1975) : *Cymbidium tigrinum* Par. ex Hook.—A new record from Nagaland, India, in *Bull. Bot. Surv. India*, 14 : 179-180.
4. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic Orchids of Sikkim and North-eastern India, t. 28. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak & A. S. Chauhan).

ORCHIDACEAE

Cypripedium elegans Reichb.f.

Status : Rare. This species is known from a few populations only each of usually 15-20 individuals, and is becoming rare due to destruction of habitat and over-grazing.

Distribution : Uttar Pradesh (Garhwal), Sikkim ; NEPAL ; BHUTAN ; S. E. TIBET.

Habitat and Ecology : On open hill slopes near water sources.

Conservation Measures Taken : It is included in threatened plants list of India and the family Orchidaceae is included in App. 2 of CITES, 1973.

Conservation Measures Proposed : This species has recently been collected from Nanda Devi National Park. The area should be preserved and biotic interference through grazing and tourists, etc., should be controlled.

Biology and Potential Value : Flowering in June. Ornamental ground orchid.

Cultivation : Not on large scale ; a few plants are grown in some botanic gardens.

Description : Herbs, 10 cm high, pubescent. Leaves two. Scape single flowered. Flowers brownish.

For illustration—see (1).

References :

1. Hajra, P. K. (1983) : A contribution to the botany of Nanda Devi National Park, 30. t. 34. B.S.I., Howrah.
2. Katak, S. K. (1984) ; Lady's Slipper Orchids of India. B.S.I., Howrah.
3. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, 19. New Delhi.
- (4. Rao, A. S. (1979) : Orchids of India, 34. New Delhi.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Dactylorhiza hatagirea (D. Don) Soo

Status : Vulnerable. Known from few localities, its populations are declining due to over-exploitation for its medicinal tubers.

Distribution : Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh (Garhwal, Kumaun); PAKISTAN, NEPAL, BHUTAN, S. E. TIBET.

Biology and Potential Value : Palmate tubers are medicinal.

Conservation Measures Taken : Some habitats in its distribution range are now included in the Nanda Devi and Valley of Flowers National Parks. All species of Orchidaceae are included in the App. 2 of CITES, 1973.

Conservation Measures Proposed : The feasibility of protecting a few more habitats and its cultivation should be considered.

Habitat and Ecology : In subalpine and alpine meadows amidst rock boulders.

Cultivation : Not known.

Description : Tuberos herbs, 30-90 cm high. Leaves lanceolate. Spikes cylindric. Flowers purple, lip with dark purple spots ; spur stout.

For illustration—see (2).

References :

1. Hajra, P. K. (1983) : A contribution to the botany of Nanda Devi National Park in Uttar Pradesh, India. POSSCEF, B.S.I., Howrah.
2. Pradhan, U. C. (1976) : Indian Orchids—Guide to Identification and Culture, 1 : 45. Calcutta.
3. Seidenfaden, G. & Arora, C. M. (1982) : An enumeration of the orchids of N. W. Himalaya, in Nordi. Journ. Bot. 2 : 13.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Dendrobium primulinum Lindl.

Status : Rare.

Distribution : Uttar Pradesh (Garhwal and Kumaun), Sikkim, Manipur ; NEPAL (?), BURMA.

Habitat and Ecology : Epiphytic ; grows upto 1,000 m altitude.

Conservation Measures Taken : All the species of Orchidaceae are included in the App. 2 of CITES, 1973.

Conservation Measures Proposed : The feasibility of protecting a few habitats should be considered.

Biology and Potential Value : Flowers attractive, of horticultural interest.

Cultivation : Grown in some private nurseries. Recently collected from Pithoragrah district and introduced in the Orchid House, B.S.I., at Dehra Dun.

Description : Pendulous herb upto 30 cm long. Leaves broadly oblong, coriaceous. Flowers solitary, pinkish-white, 6.5 cm across. Lip strongly ciliate on the margins.

For illustration—see (1).

References :

1. Duthie, J. F. (1906) : Orchids of the North-west Himalaya. Ann. Roy. Bot. Gard. Calcutta, 9, 2 : 97, t. 98.
2. Seidenfaden, G. and Arora, C. M. (1982) : An enumeration of the orchids of N. W. Himalaya, in Nord. Journ. Bot. 2 : 14.

(Data supplied by P. K. Hajra).

ORCHIDACEAE

Diplomeris hirsuta (Lindl.) Lindl.

Status : Vulnerable.

Distribution : Meghalaya, West Bengal—Darjeeling.

Habitat and Ecology : Grows in moist shady areas or on mossy rock surfaces near water sources.

Conservation Measures Taken : It is included in the IUCN Plant Red Data Book. All the species of Orchidaceae are in App. 2 of CITES, 1973.

Conservation Measures Proposed : As its native habitats are much disturbed due to forest clearance for various purposes, the species has become scarce in wild. In Darjeeling, the locality is under the Mahananda Wildlife Sanctuary.

Biology and Potential Value : Ornamental.

Cultivation : It can be cultivated in pots keeping them in moist, shady areas.

Description : Terrestrial. Roots tuberous, 1-2 leaved. Flowers large, white.

References :

1. Hooker, J. D. (1890): Fl. Brit. India, 5.
2. Katak, S. K. (1976) : Indian Orchids—A note on conservation, in Amer. Orch. Soc. Bull. 45(10) : 912-913.
3. Pradhan, U. C. (1976 & 1979) : Indian Orchids—Guide to Identification & Culture, 1 & 2. Calcutta.
4. Rao, A. S. (1979) : Orchids of India. New Delhi.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Paphiopedilum fairieanum (Lindl.) Stein

Status : Vulnerable. Restricted in distribution.

Distribution : Arunachal Pradesh, Sikkim ; BHUTAN.

Habitat and Ecology : Grows in association with *Saxifraga* species on hill slopes in open places or in rock crevices. The original habitats are much disturbed.

Conservation Measures Taken : It is included in Appendix 2 of the CITES.

Conservation Measures Proposed : Multiplication in its natural habitats and in orchidaria.

Biology and Potential Value : Ornamental.

Cultivation : Plants are under cultivation in the National Orchidarium at Shillong (B.S.I.) and also in the Orchidarium of Forest Department, Arunachal Pradesh, Tipi. It can be grown in pots in a mixture of leaf-mould, sand and powdered charcoal in the proportion of 8 : 1 : 1.

Description : Terrestrial. Leaves oblong, green. Scapes much longer than the leaves, 1-flowered. Flowers pale-green with dark purple lines.

References :

1. Jain, S. K. & Sastry A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, New Delhi.
2. Katak, S. K. (1976) : Indian Orchids—A note on conservation. American Orch. Soc. Bull. 45(10) : 912-914.
3. Katak, S. K. (1984) : Lady's Slipper Orchids of India. POSSCEF, B.S.I., Howrah.
4. Pradhan, U. C. (1976) : Indian Orchids—Guide to Identification and Culture, Calcutta.
5. Rao, A. S. & Hajra, P. K. (1977) : *Paphiopedilum fairieanum* (Lindl.) Pfitz.—Habitat, description and cultural notes, in Ind. For. 103(1) : 29.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Paphiopedilum hirsutissimum (Lindl.) Stein

Status : Rare. Probably abundant in wild in the past. Large scale exploitation coupled with destruction of habitat made the species rare in wild.

Distribution : Meghalaya, Mizoram, Nagaland; BURMA.

Habitat and Ecology : Grows as epiphyte on low tree trunks or as lithophyte on rocky surface in moist shady places.

Conservation Measures Taken : It is included in App. 2 of the CITES, and threatened plants list of India.

Conservation Measures Proposed : The plants may be taken from wild for introduction in protected forests. Further search be made to locate the species in other areas.

Biology and Potential Value : Ornamental.

Cultivation : At present, this species is under cultivation in the B.S.I., National Orchidarium and gardens at Shillong. It grows well in a mixture of leaf-mould, river sand and powdered charcoal in the proportion of 8 : 1 : 1.

Description : Epiphyte, lithophyte or terrestrial. Leaves linear-oblong, green. Scapes erect, 1-flowered. Flowers-large, greenish with purple lines and black dots.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
2. Katak, S. K. (1976) : Indian Orchids—a note on conservation, in Amer. Orch. Soc. Bull. 45(10) : 912-913.
3. Katak, S. K. (1984) : Lady's Slipper Orchids of India. POSSCEF, B.S.I., Howrah.
4. Pradhan, U. C. (1976) : Indian Orchids—Guide to Identification and Culture, vol. 1. Calcutta.
5. Rao, A. S. (1979) : Orchids of India. New Delhi.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Paphiopedilum insigne (Wall. ex Lindl.) Pfitz.

Status : Rare. It is known only from 2 or 3 localities in Meghalaya and Sikkim. Once common but fast depleted due to exploitation and destruction of its habitat.

Distribution : Meghalaya, Sikkim; NEPAL, BANGLADESH.

Habitat and Ecology : It grows on hilly slopes or in rock crevices in moist shady areas.

Conservation Measures Taken : It is included in Appendix 2 of the CITES.

Conservation Measures Proposed : Cultivation in Orchidaria and Gardens. Few plants to be replanted in original habitats.

Biology and Potential Value : Ornamental.

Cultivation : Plants are under cultivation in the National Orchidarium, B.S.I., at Shillong. It can be grown in pots in the mixture of leaf mould, river sand and powdered charcoal in the proportion of 8 : 1 : 1.

Description : Terrestrial. Leaves linear-ligulate, green. Scapes erect, 1-flowered. Flowers whitish-green with purple blotches on the dorsal sepal.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
2. Katak, S. K. (1976) : Indian Orchids—A note on conservation, in Amer. Orch. Soc. Bull. 45(10) : 912-913.
3. Katak, S. K. (1984) : Lady's Slipper Orchids of India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Paphiopedilum spicerianum (Reichb. f.) Pfitz.

Status : Rare. It is reported to occur in 2 or 3 patches in the Cachar District of Assam. Now, fast depleted due to large scale exploitation.

Distribution : Assam.

Habitat and Ecology : Grows on steep rocky surfaces covered with moss or in rock crevices.

Conservation Measures Taken : It is included in App. 2 of the CITES.

Conservation Measures Proposed : Introduction in the Orchidaria for multiplication. Its habitats should be protected to conserve this species.

Biology and Potential Value : Ornamental.

Cultivation : Very few plants are under cultivation in private and government gardens. This species grows well in humus covered soil preferably in shady places.

Description : Terrestrial. Leaves linear-oblong, green. Scapes 1-flowered. Flowers greenish-white.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
2. Katak, S. K. (1984) : Lady's Slipper Orchids of India. POSSCEF, B.S.I., Howrah.
3. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.
4. Pradhan, U. C. (1976) : Indian Orchids—Guide to Identification and Culture, vol. 1. Calcutta.
5. Rao, A. S. (1979) : Orchids of India. New Delhi.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Paphiopedilum venustum (Wall. ex Sims.) Pfitz.

Status : Rare. Fast depleted due to the destruction of its habitat. It is known only from one or two localities.

Distribution : Meghalaya, Sikkim ; BANGLADESH.

Habitat and Ecology : It grows in very moist, shady areas near water sources.

Conservation Measures Taken : It is included in the App. 2 of CITES.

Conservation Measures Proposed : Cultivation in Orchidaria and Gardens. Few plants need to be replanted in its original habitats.

Biology and Potential Value : Ornamental.

Cultivation : Few plants are under cultivation in the Govt. and Private Gardens. It can be grown in pots in a mixture of leaf mould, river sand and charcoal in the proportion of 8 : 1 : 1.

Description : Terrestrial. Leaves elliptic-oblong, green, mottled with dark green above and purple beneath. Scapes erect, 1-flowered. Flowers whitish-green with dark green veins.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State of-the-Art Report. New Delhi.
2. Katak, S. K. (1976) : Indian Orchids—A note on conservation, in Amer. Orch. Soc. Bull. 45(10) : 912-913.
3. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Paphiopedilum villosum (Lindl.) Stein

Status : Rare. In India, it is known only from 2 or 3 places in Mizoram.

Distribution : Mizoram ; BURMA.

Habitat and Ecology : It grows as epiphyte on moss covered low tree trunks or as terrestrial on humus covered soil.

Conservation Measures Taken : It is included in the App. 2 of the CITES.

Conservation Measures Proposed : Few plants can be replanted in protected areas, multiplication in orchidaria.

Biology and Potential Value : Ornamental.

Cultivation : Some plants are under cultivation in the Govt. and private orchidaria. It is easy to grow in pots of leaf mould, river sand and powdered charcoal in the proportion of 6 : 2 : 2.

Description : Epiphytes or terrestrials. Leaves linear, ligulate, green. Scapes erect, 1-flowered. Flowers greenish-purple.

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
2. Katak, S. K. (1984) : Lady's Slipper Orchids of India. POSSCEF, B.S.I., Howrah.
3. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Pleione lagenaria Lindl.

Status : Endangered or possibly Extinct. No plants known in wild or in cultivation. It was recorded by Thomas Lobb in 1849 from Khasi Hills, where it is said to be restricted to one or two localities of very limited extent and has not been collected since then.

Distribution : Meghalaya—Khasi Hills.

Habitat and Ecology : The other species of *Pleione* grow as epiphytes on trees or rock surface covered with moss in the alt. of 1500-2000 m.

Conservation Measures Taken : All species of Orchidaceae are included in App. 2 of the CITES. It is included in the threatened plants list of India.

Conservation Measures Proposed : Intensive search has to be made in Khasi Hills to locate the species.

Biology and Potential Value : Ornamental (as other species of *Pleione*).

Cultivation : Not known.

Description : Epiphyte. Pseudobulbs bottle-shaped. Flowers rose-coloured ; the basal half of the lip convolute, the distal half open with undulate margin, purple streaked.

References :

1. Hooker, J. D. (1980) : Fl. Brit. India, 5 : 841.
2. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Renanthera imschootiana Rolfe

Status : Rare, due to destruction of its habitat and exploitation of wild populations.

Distribution : Nagaland. Manipur ; BURMA.

Habitat and Ecology : Grows as epiphyte on trees in sunny places.

Conservation Measures Taken : It is included in App. 2 of CITES and in threatened plants list of India ; few plants are under cultivation in the B.S.I. Orchidarium at Shillong.

Conservation Measures Proposed : Few plants may be introduced in some protected areas and more plants be raised under cultivation in botanical gardens.

Biology and Potential Value : Ornamental.

Cultivation : Some plants are under cultivation in the National Orchidarium, B.S.I., Shillong and in some private gardens. It can be grown in pots in a mixture of charcoal and brick pieces.

Description : Epiphytes. Stems erect. Scapes lateral, much longer than the leaves. Flowers medium sized, blood red.

For illustration—see (3).

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
2. Katak, S. K. (1976) : Indian Orchids—A note on conservation, in Amer. Orch. Soc. Bull. 45(10) : 912-913.
3. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and North-eastern India. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

ORCHIDACEAE

Vanda coerulea Griff. ex Lindl. (Blue Vanda)

Status : Vulnerable. This species is much depleted in wild due to large scale exploitation and destruction of its habitat.

Distribuion : N. E. India ; BURMA, THAILAND.

Habitat and Ecology : Grows as epiphyte on tall trees in subtropical forests.

Conservation Measures Taken : It is included in Appendix I of the CITES. Plants are under cultivation in the National Orchidarium, Botanical Survey of India, Shillong.

Conservation Measures Proposed : It is suggested that one or two areas of its habitat in N. E. India, should be protected. In some protected areas the species can be reintroduced for multiplication.

Biology and Potential Value : Ornamental.

Cultivation : Plants are under cultivation in Government and Private gardens. It can easily be grown on trees or in pots in a mixture of charcoal and brick pieces.

Description : Epiphytes. Stems erect. Scapes much longer than the leaves, many-flowered. Flowers light blue, large, attractive.

For illustration—see (1).

References :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report. New Delhi.
2. Katak, S. K. (1976) : Indian Orchids - A note on conservation, in Amer. Orch. Soc. Bull. 45(10) : 912-913.
3. Pradhan, U. C. (1979) : Orchids of India—Guide to Identification and Culture. Calcutta.
4. Rao, A. S. (1979) : Orchids of India. New Delhi.
5. Katak, S. K., Jain, S. K. and Sastry, A. R. K. (1984) : Threatened and endemic orchids of Sikkim and N. E. India, 76. POSSCEF, B.S.I., Howrah.

(Data supplied by S. K. Katak and A. S. Chauhan).

PAPAVERACEAE

Dicranostigma lactuoides Hook. f. & Thoms.
(*Stylophorum lactuoides* Baill.)

Status : Endangered. This plant has been known from the collections of Strachey and Winterbottom and Duthie made during the nineteenth century, and subsequently collected only in 1960 by T. A. Rao from Eastern Kumaon in Pithoragarh district.

Distribution : Uttar Pradesh-Garhwal ; NEPAL.

Habitat and Ecology : Occurs at an altitude of 3200 m.

Conservation Measures Taken : None so far.

Conservation Measures Proposed : It is necessary to search for the plant intensively in the adjacent areas. The feasibility of protecting a few habitats should be considered.

Biology and Potential Value : This plant is of scientific interest as it is the only species in the genus.

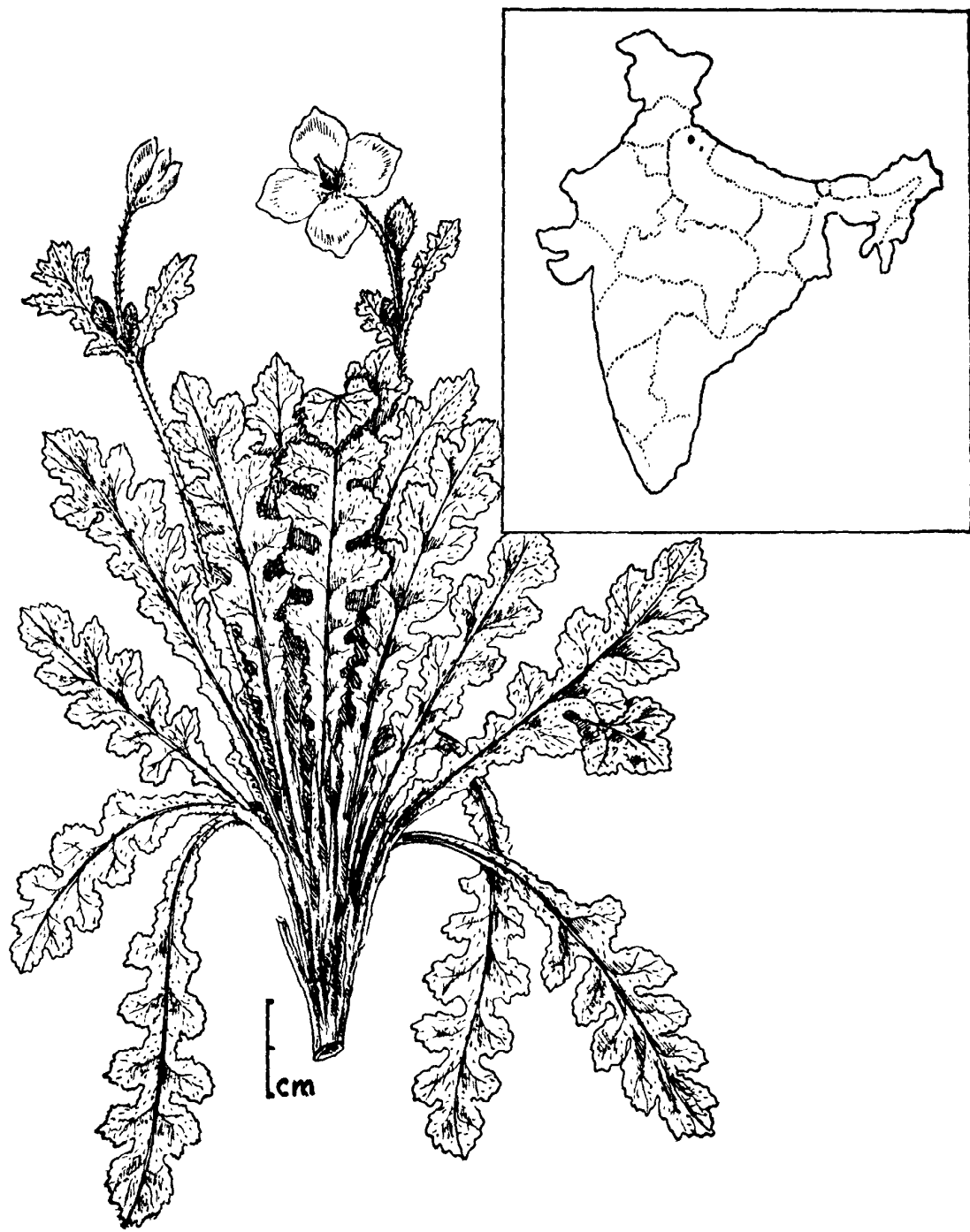
Cultivation : None on record.

Description : Perennial hairy herb. Leaves pinnatifid, many, glaucous beneath. Flowers yellow, ca 5 cm across.

References :

1. Hooker, J. D. and Thomson, T. (1872) : in Hooker, J. D., Fl. Brit. India, 1 : 119.
2. Rau, M. A. and Rao, T. A. (1961) : in Bull. Bot. Surv. India, 3 : 29. t. 1.

(Data supplied by P. K. Hajra).



Dicranostigma lactuoides Hook. f. & Th.

RANUNCULACEAE

Aconitum deinorrhizum Holmes ex Stapf

Status : Rare. This species is known from a few scattered populations, and is becoming rare due to over-exploitation for its medicinal value.

Distribution : INDIA—(Himachal Pradesh-Bashahr, Jammu and Kashmir-Bhadrawah); NEPAL, BHUTAN.

Habitat and Ecology : Along the hill slopes, valleys and around water courses in alpine regions.

Conservation Measures Taken : Export of the species is banned, included in threatened plants list of India.

Conservation Measures Proposed : Proposed for inclusion in App. II, CITES ; Conservation of habitats ; control in trade, and large scale cultivation are suggested.

Biology and Potential Value : Flowering in August-September. An important Indian Aconite of medicinal value. Roots contain poisonous alkaloid.

Cultivation : Few plants are grown in gardens, but not on large scale.

Description : Herbs with tuberous roots. Leaves 10-12, 3-5-lobed. Flowers in racemes, blue. Seeds many, obconic.

For illustration—see (4).

References :

1. Hajra, P. K. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, 49. B.S.I., Howrah.
2. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, 12. New Delhi.
3. Nair, N. C. (1977) : Flora of Bashahr Himalayas, 5.
4. Stapf, O. (1905), in Ann. Roy. Bot. Gard. Calcutta, 158, t. 103.

(Data supplied by P. K. Hajra & M. J. Kothari).

RANUNCULACEAE

Aconitum heterophyllum Wall. ex Royle

Status : Rare, due to over-exploitation for its medicinal value.

Distribution : INDIA—(Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh); NEPAL, PAKISTAN.

Habitat and Ecology : Subalpine and alpine areas of the Himalayas. In open places often associated with *Podophyllum* and other species of *Aconitum*.

Conservation Measures Taken : The export of this species has been banned.

Conservation Measures Proposed : Multiplication through seed germination or tissue culture method; the feasibility of protecting its habitats should be investigated. Consideration for inclusion in the Appendices of CITES.

Biology and Potential Value : The Drug Aconite is derived from the tuberous roots of these plants, and is well known in medicine.

Cultivation : A few plants are grown in some experimental gardens.

Description : Herbs, 30-70 cm high. Leaves amplexicaule at base. Flowers green, variegated, reddish-brown or dull greenish-blue.

For illustration—see (2).

References :

1. Hajra, P. K. (1983) : Plants of North-western Himalayas with restricted distribution—A census, in Jain, S. K. and Rao, R. R. (ed.). An Assessment of Threatened Plants of India. B.S.I., Howrah.
2. Jain, S. K. (1968) : Medicinal Plants, 40, t. 1. New Delhi.
3. Mukerjee, S. K. (1961), in Bull. Bot. Surv. India, 4 : 100.
4. Stapf, O. (1905), in Ann. Roy. Bot. Gard. Calcutta, 10 : 136.

(Data supplied by P. K. Hajra).



Aconitum heterophyllum Wall. ex Royle

RANUNCULACEAE

Aconitum laeve Royle

Status : Rare; with small and scattered populations. It is becoming rare due to destruction of its habitat.

Distribution : INDIA—Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh (Garhwal, Kumaun); NEPAL.

Habitat and Ecology : Subalpine Himalayas in open meadows in association with other species of *Aconitum*, *Festuca* and *Podophyllum*.

Conservation Measures Taken : The export of *Aconitum* species regulated. Proposed for inclusion in the Appendices of CITES.

Conservation Measures Proposed : The feasibility of protecting a few habitats should be considered. Large scale cultivation to prevent collection from wild for trade.

Biology and Potential Value : Aconites are among the most well-known medicinal plants. The roots contain poisonous alkaloid.

Cultivation : A few plants are grown in experimental gardens.

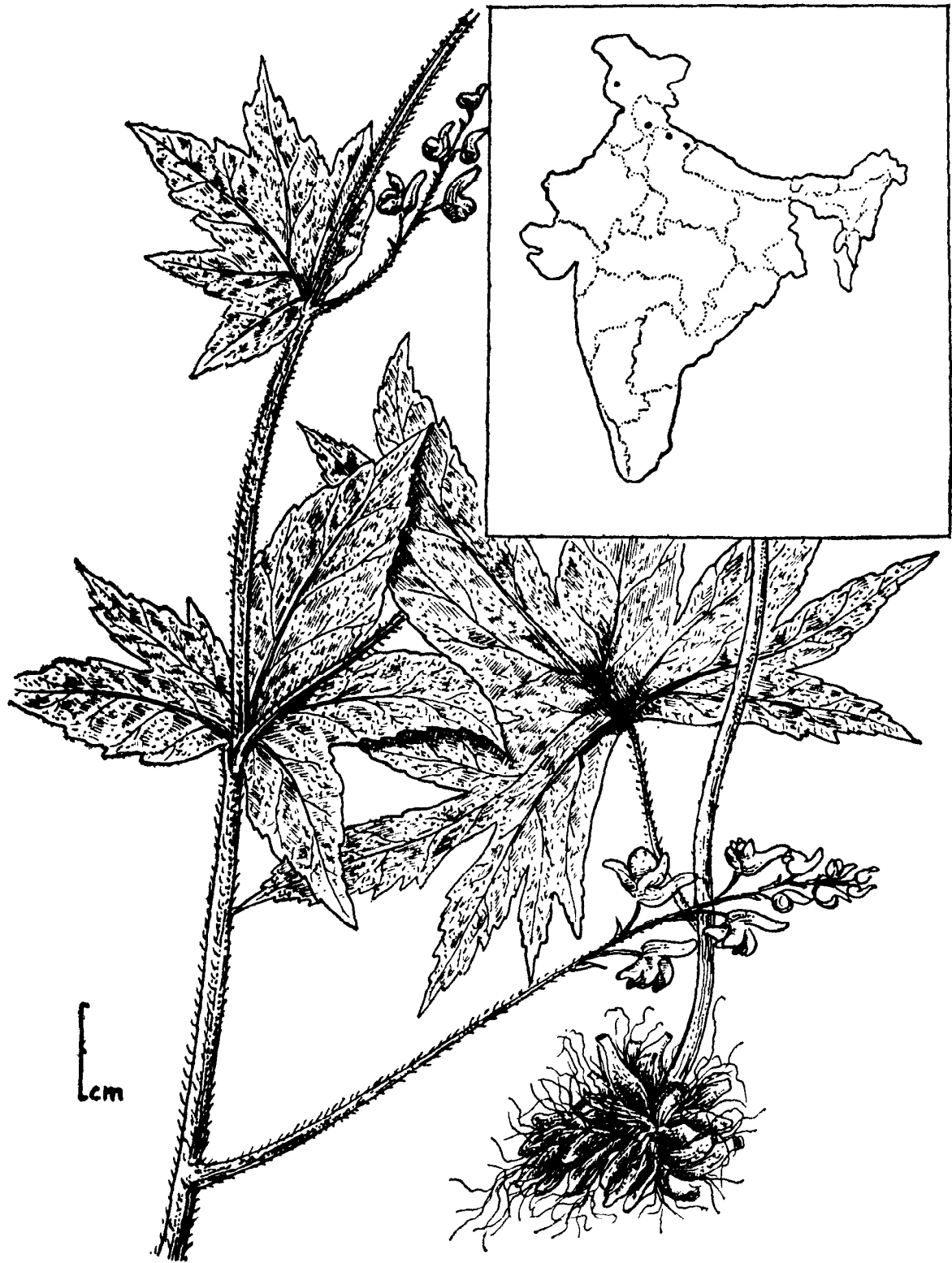
Description : Herbs, 1.0-2.0 m high, glandular pubescent. Leaves orbicular-cordate, deeply 5-9 lobed. Flowers white, pale-yellow and dull red-purple or variegated white and purple. Uppermost sepal with blunt, spur like protuberance.

For illustration—see (1).

References :

1. Coventry, B. O. (1930) : Wild flowers of Kashmir, 3 : 15. London
2. Mukerjee, S. K. (1961), in Bull. Bot. Surv. India, 3 : 101.
3. Royle, J. F. (1834) : Illustrations of the botany and other branches of the natural history of the Himalayan Mountains and of the flora of Cashmere, 45 & 56. London.

(Data supplied by P. K. Hajra).



Aconitum laeve Royle

RANUNCULACEAE

Aconitum nagarum Stapf

Status : Rare.

Distribution : INDIA—Arunachal Pradesh, Nagaland. Reported so far only from one locality in Arunachal Pradesh and in Nagaland. Endemic.

Habitat and Ecology : It grows on hilly forest slopes.

Conservation Measures Taken : Export restrictions for all species of *Aconitum*. Included in threatened plants list.

Conservation Measures Proposed : An attempt should be made to locate this species in wild as this was not recorded after its first collection in Aka Hills (Arunachal Pradesh) by Bor in 1936.

Biology and Potential Value : Botanical interest. Roots poisonous. Hill tribes use on arrows to kill animals. Flowering in June; Fruiting in August.

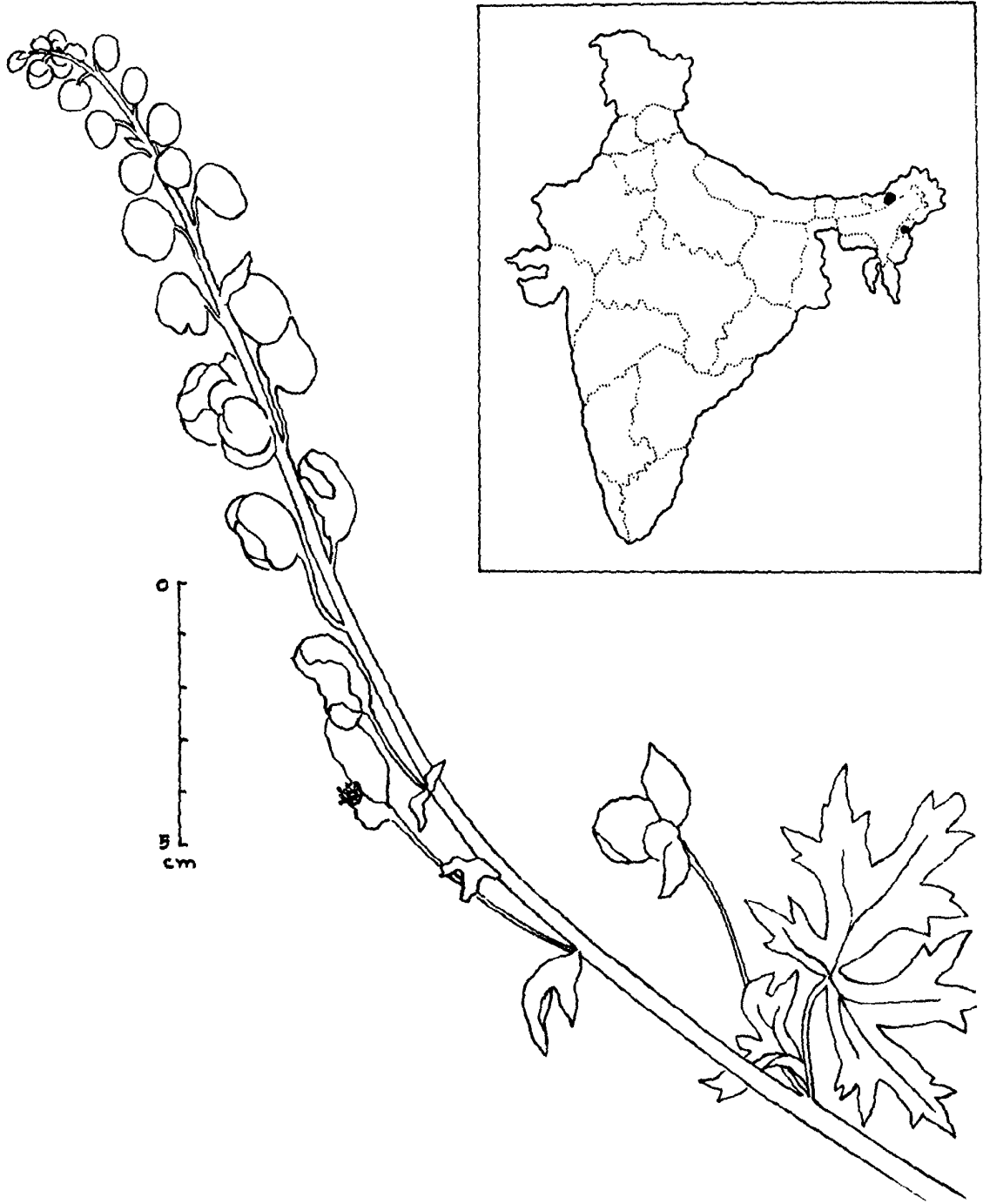
Cultivation : Not known.

Description : A perennial herb. Leaves palmately lobed. Raceme terminal, simple, many-flowered. Flowers medium-sized.

References :

1. Kanjilal, U. N., et al (1934) : Flora of Assam, 1(1).
2. Mukerjee, S. K. (1961) : Enumeration of the Indian Flowering Plants, in Bull. Bot. Surv. India, 3 : 100.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Aconitum nagarum Stapf

RANUNCULACEAE

Clematis bourdillonii Dunn

Status : Rare; perhaps due to loss of its habitat. There are no specimens of this in MH.

Distribution : Kerala, Travancore. Endemic.

Habitat and Ecology : Evergreen forests at 750 m.

Conservation Measures Taken : None for the wild plants. It is listed in the threatened plants list of India.

Conservation Measures Proposed : To be searched intensively in the area; to be introduced into gardens and protected in wild.

Biology and Potential Value : It is known only from the type locality; botanical significance due to endemism.

Cultivation : Not known.

Description : Climbing shrubs. Leaves 3-foliolate, sometimes coarsely toothed. Flowers many in panicles; sepals puberulous, connectives produced considerably beyond the anther.

References :

1. Dunn, S. T. (1914), in Bull. Misc. Inform., Kew, 101.
2. Gamble, J. S. (1957): Fl. Pres. Madras, 2 (repr. ed.).
3. Vajravelu, E. (1983): Rare, threatened and endemic flowering plants of South India—1, in Plant Conserv. Bull., 4 : 15.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

RANUNCULACEAE

Clematis theobromina Dunn

Status : Rare. This species was collected from Nilgiris in 1971 after a lapse of nearly 9 decades.

Distribution : Tamil Nadu, Coonoor, Kora Kundha, Nilgiris. Endemic.

Habitat and Ecology : Evergreen forests at 1800-2400 m.

Conservation Measures Taken : None for the wild plants. It is included in the threatened plants list of India.

Conservation Measures Proposed : Its type locality (Nilgiri Hills) is now under consideration as a Biosphere Reserve.

Biology and Potential Value : Endemicity and its rarity are of conservation significance.

Cultivation : Nil.

Description : Climbing shrubs. Leaves opposite, 3-foliolate. Flowers few, in panicles, sepals 4, petaloid, velvety-brown outside; petals absent. Fruits a head of achenes with long, feathery styles.

References :

1. Dunn, S. T. (1914), in Bull. Misc. Inform., Kew, 181.
2. Gamble, J. S. (1957): Fl. Pres. Madras, 2. (repr. ed.).
3. Vajravelu, E. (1983): Rare, threatened and endemic flowering plants of South India—1. Plant Conserv. Bull., 4 : 15.
4. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

RANUNCULACEAE

Coptis teeta Wall. (*Mishmee teeta*)

Status : Rare; due to over-exploitation and loss of its habitat.

Distribution : INDIA—(Arunachal Pradesh). It is known only from Mishmee Hills, Lohit District of Arunachal Pradesh with restricted distribution.

Habitat and Ecology : It grows in hilly slopes at high altitudes.

Conservation Measures Taken : Only scattered populations are found in wild. The Forest Department of Arunachal Pradesh has started its cultivation to prevent the exploitation from wild. Proposed for inclusion in the Appendix of CITES and is included in the threatened plants list.

Conservation Measures Proposed : Protection of populations in its natural habitats and introduction into some protected areas and conservatories.

Biology and Potential Value : Its rhizomes are of very high medicinal value and is exploited in large quantities.

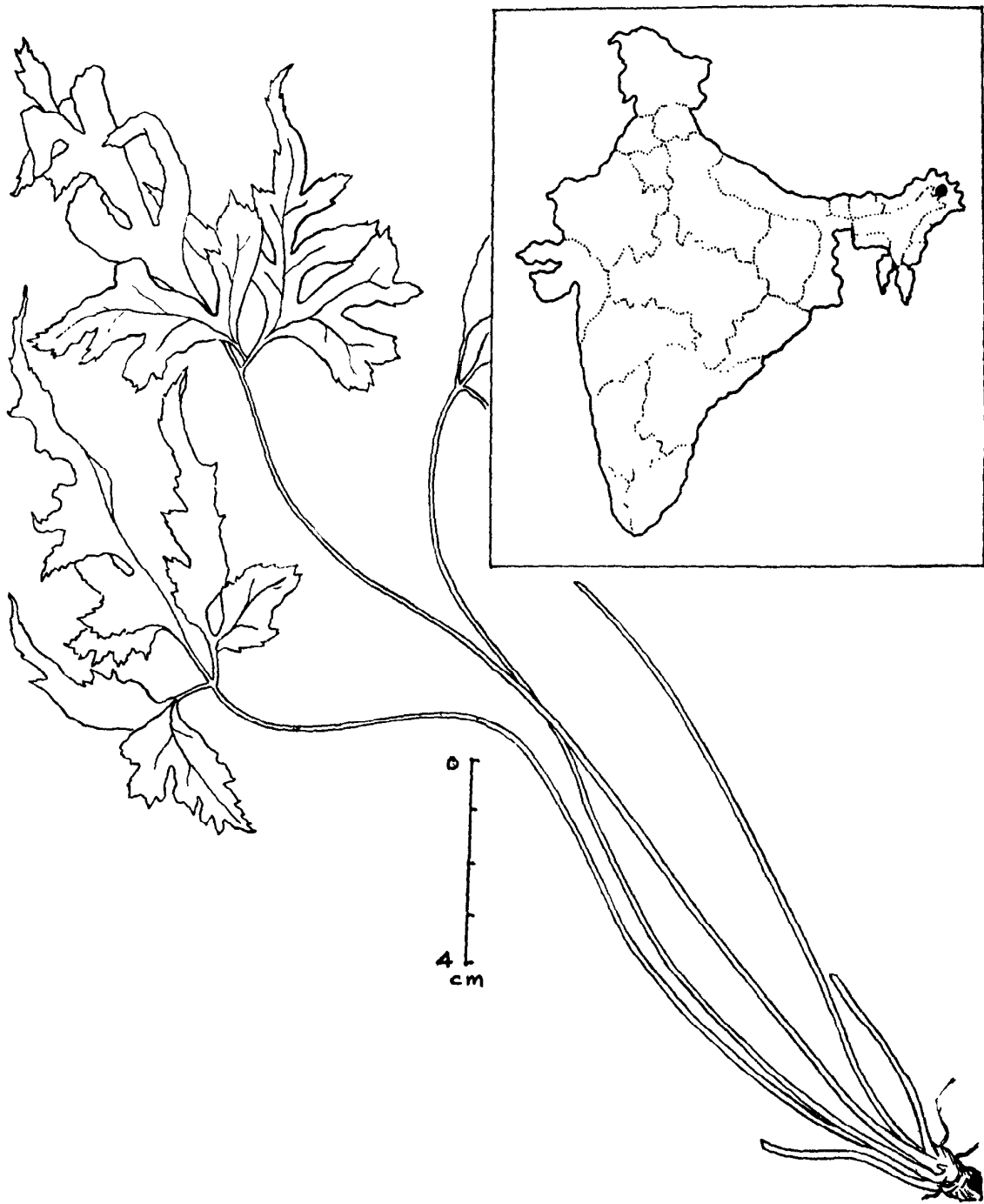
Cultivation : The Forest Department of Arunachal Pradesh has brought this species under cultivation. Two plants are under cultivation in the Experimental Garden, B.S.I., Shillong.

Description : A stemless perennial herb. Leaves lobed with long petiole. Scapes slender, few-flowered. Flowers small, white. Rootstock woody, densely fibrous, bitter.

Reference :

1. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, 19. New Delhi.

(Data supplied by S. K. Katak & A. S. Chauhan).



Coptis teeta Wall.

RANUNCULACEAE

Thalictrum dalzellii Hook.

Status : Endangered. It has been collected by Bhiva from Purandhar, Maharashtra in 1891. Appears to be endangered due to habitat destruction.

Distribution : Karnataka, Mysore, Bababudan hills; Maharashtra, Purandhar. Endemic.

Habitat and Ecology : Evergreen forests in ghats.

Conservation Measures Taken : None known, for the wild populations; it is included in the threatened plants list of India.

Conservation Measures Proposed : To be searched for and the area to be protected; to be introduced in gardens for multiplication and ex situ conservation.

Biology and Potential Value : Rare herb, of botanical interest.

Cultivation : Not known.

Description : Perennial, erect herbs, up to 30 cm. Leaves 3-foliolate (upper most usually 1-foliolate). Leaflets mostly orbicular, cordate. Flowers white in leafy panicles, crowded at the end of braches. Sepals 4, petaloid.

References :

1. Hooker, J. D. (1852) : Ic. Pl. t. 866.
2. Gamble, J. S. (1957) : Fl. Pres. Madras, 3 (repr. ed.).
3. Hooker, J. D. and Thomson, T. (1872) : Fl. Brit. India, 1 : 13.
4. Vajravelu, E. (1983) : Rare, threatened and endemic flowering plants of South India—1, in Plant Conserv. Bull., 4 : 15.
5. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K. Materials for a catalogue of threatened plants of India, p. 8. B.S.I., Howrah.

(Data supplied by E. Vajravelu).

SABIACEAE

Meliosma arnottiana Walp.

Status : Vulnerable. It was recorded from Barapani in Meghalaya. The area is now under water due to construction of a Hydro-electric dam.

Distribution : Meghalaya. Endemic.

Habitat and Ecology : It grows in hilly forest slopes.

Conservation Measures Taken : None.

Conservation Measures Proposed : An attempt should be made to locate this species in wild.

Biology and Potential Value : Not known.

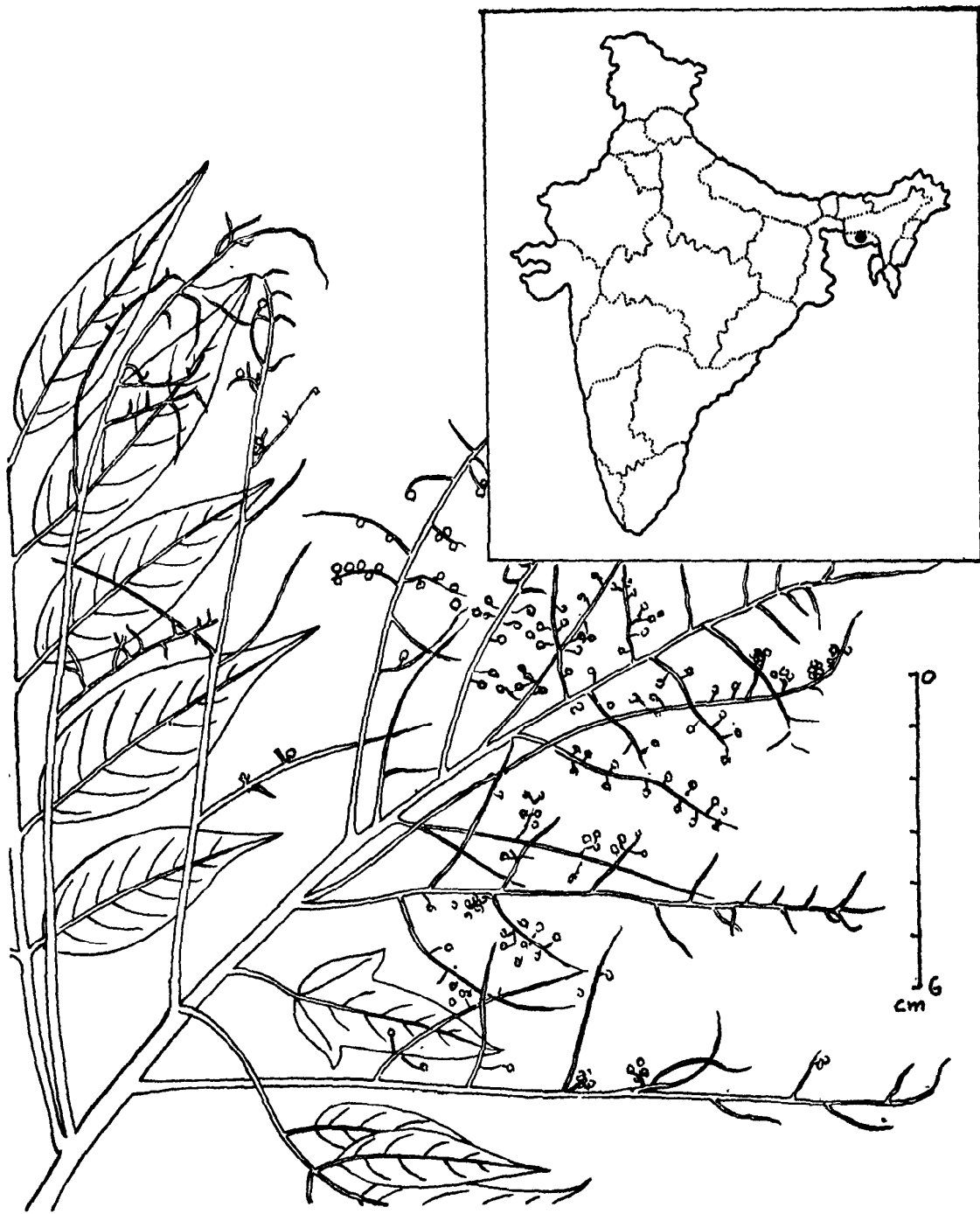
Cultivation : Not known.

Description : A tree about 12 m in height. Leaflets 5-7 pairs, sub-opposite, ovate-lanceolate, acuminate, pubescent beneath. Flowers minute, sessile in long terminal panicles.

References :

1. Hooker, J. D., (1876) : Fl. Brit. India, 2 : 6.
2. Kanjilal, U. N., et al (1936) : Flora of Assam, 1(2) : 329.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Meliosma arnottiana Walp.

SAPINDACEAE

Lepisanthes listeri King ex Radlk.

Status : Rare. It is recorded only from Arunachal Pradesh. There are no recent collections.

Distribution : Arunachal Pradesh. Endemic.

Habitat and Ecology : It grows in tropical and sub-tropical evergreen forests.

Conservation Measures Taken : None.

Conservation Measures Proposed : An attempt should be made to locate this species in other likely areas in wild.

Biology and Potential Value : Not Known. Flowering in May-June.

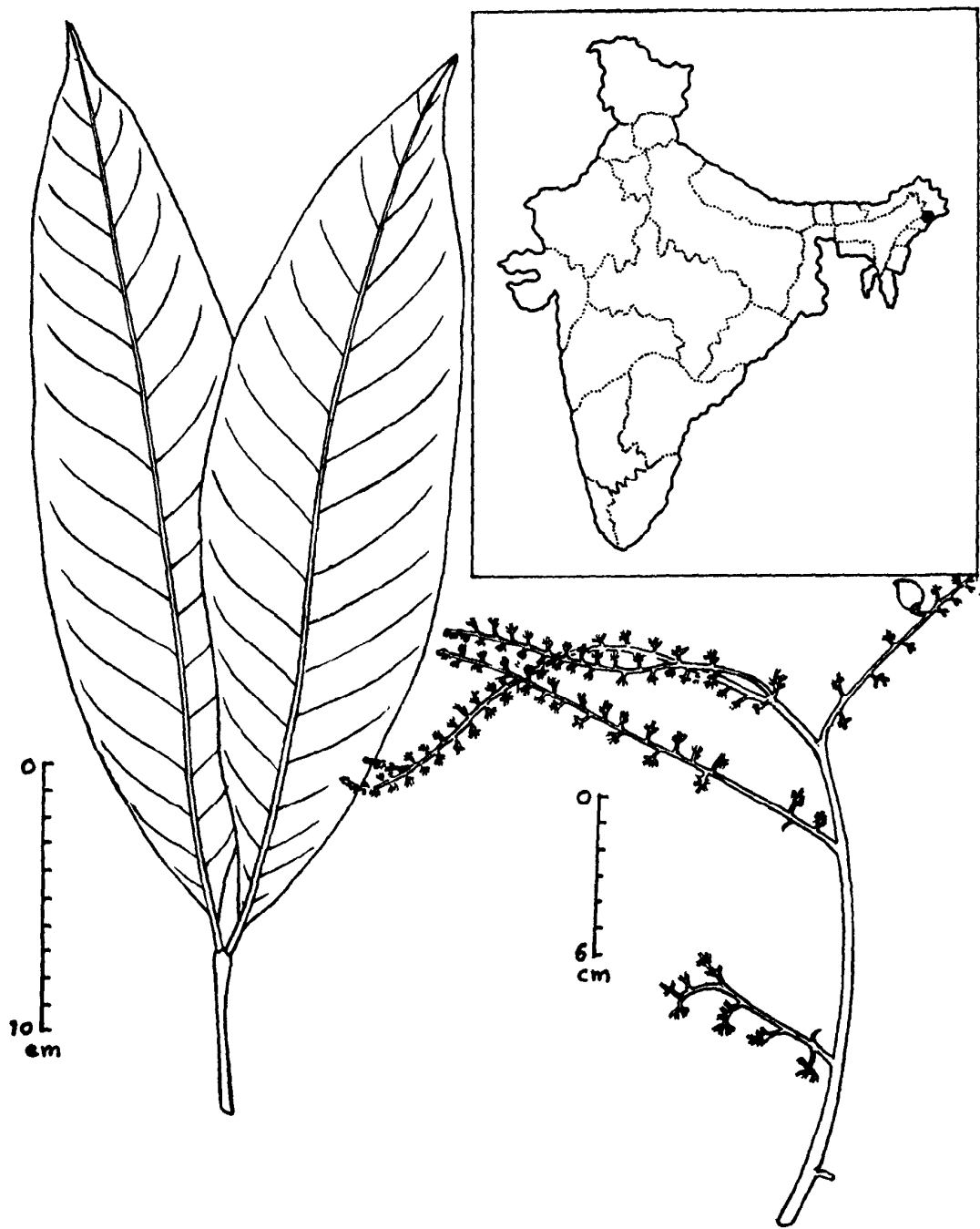
Cultivation : Not known.

Description : A tree, about 13 m in height. Leaflets opposite, oblong-lanceolate, acuminate, shortly petioled. Inflorescence paniced, many-flowered. Flowers small.

References :

1. Kanjilal, U. N. et al (1936) : Flora of Assam 1(2) : 319.
2. Radlkofer, L. (1907) : in Rec. Bot. Surv. India, 3 : 344.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Lepisanthes listeri King ex Radlk.

SCROPHULARIACEAE

Picrorhiza kurrooa Royle ex Benth.

Status : Rare ; due to over exploitation and destruction of habitat.

Distribution : INDIA—Kashmir to Sikkim. Endemic.

Habitat and Ecology : In subalpine and alpine Himalayas.

Conservation Measures Taken : By the creation of Nanda Devi and Valley of Flowers National Parks in the Himalayan region, some of its habitats in its distribution range, are under partial protection.

Conservation Measures Proposed : Large scale cultivation.

Biology and Potential Value : The drug is derived from rhizomes of the plant. The plant is important as it can be used as a substitute for *Gentiana lutea*.

Cultivation : A few plants are grown in experimental gardens.

Description : Herbs, upto 40 cm high. Rhizome woody, 15-25 cm long, clothed with leaf-bases. Leaves spatulate 5-10 cm long. Flowers bluish-white, in cylindrical spikes with long filaments.

For illustration—see (1 & 2).

References :

1. Hajra, P. K. (1983) : A contribution to the botany of Nanda Devi National Park in Uttar Pradesh, 26, t. 2A. POSSCEF, B.S.I., Howrah.
2. Jain, S. K. (1968) : Medical plants, 109, t. 19. New Delhi.

(Data supplied by P. K. Hajra).

SCROPHULARIACEAE

Wulfenia himalaica (Hook. f.) Pennell
(*Falconeria himalaica* Hook. f.)

Status : Endangered. Known from Kumaun only.

Distribution : INDIA—Uttar Pradesh (Kumaun). Endemic.

Habitat and Ecology : In moist situations at an altitude of 3000 m.

Conservation Measures Taken : Included in the list of threatened plants of India.

Conservation Measures Proposed : Intensive search in the known localities and the other likely areas to assess its populations and to protect it in natural sites.

Biology and Potential Value : Botanical interest, restricted occurrence.

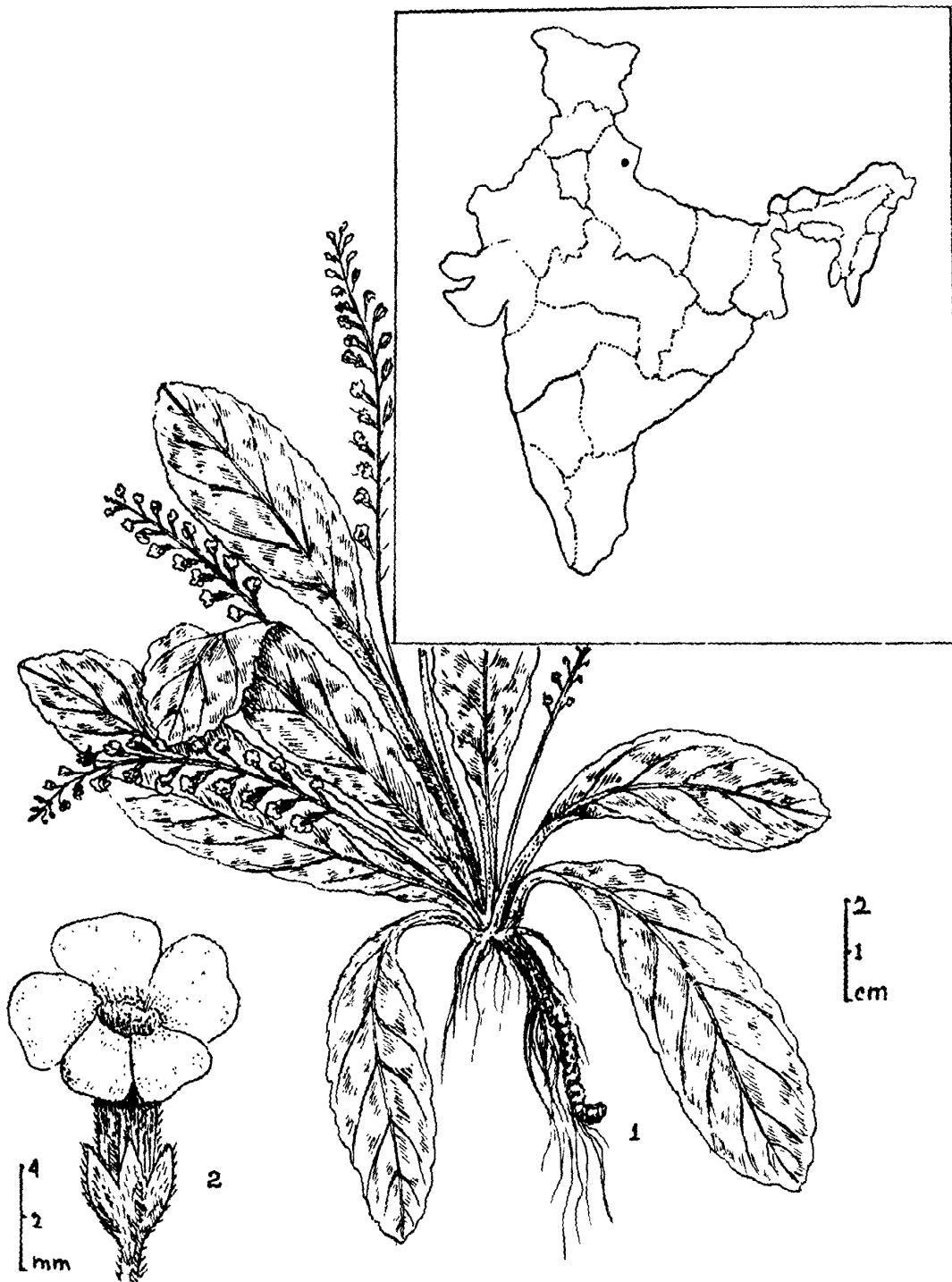
Cultivation : Not known.

Description : Lax hairy herbs. Root stock long, cylindrical, clothed with thick elongated fleshy roots and persistent root scars. Leaves radical, oblong-ovate or spatulate, crenate. Scapes radical 1-7, 5-13 cm long. Flowers deep or pale blue.

Reference :

1. Rao, T. A. (1961) : in Bull. Bot. Surv. India, 3(1) : 75-77, (1962).

(Data supplied by P. K. Hajra)



Wulfenia himalaica (Hook. f.) Pennell

SOLANACEAE

Withania coagulans (Stocks) Dunal

Status : Rare. Known from very scattered populations in Rajasthan in India. The rarity is due to over-exploitation for economic uses. The fruits of the plants are used in coagulating milk.

Distribution : INDIA—Rajasthan ; PAKISTAN, AFGHANISTAN.

Habitat and Ecology : On sand dunes in Rajasthan desert.

Conservation Measures Taken : Included in threatened plants list of India.

Conservation Measures Proposed : Conservation of natural populations and habitat, and introductions in Botanic gardens.

Biology and Potential Value : Flowering in November-March. Fruits used economically for coagulation of milk, hence the plant is locally known as 'Paneer bandh'.

Cultivation : None so far.

Description : Grey-tomentose undershrubs. Leaves elliptic to lanceolate, grey tomentose. Flowers with acrescent calyx.

References :

1. Bhandari, M. M. (1978) : Fl. Indian Desert, 276.
2. Kothari, M. J. and Hajra, P. K. (1983), in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, 47. B.S.I., Howrah.

(Data supplied by M. J. Kothari)

STERCULIACEAE

Sterculia khasiana Debbarman

Status : Vulnerable. The greatest source of danger to this species is the destruction of habitat in Charrapunji area for development of roads and other construction works.

Distribution : INDIA—Assam and Meghalaya. Endemic.

Habitat and Ecology : It grows in evergreen forests in the sub-tropics at 1000 m.

Conservation Measures Taken : None.

Conservation Measures Proposed : This species is only known from its type locality ; it is represented only by a line drawing in the ASSAM Herbarium. An effort should be made to locate this in wild.

Biology and Potential Value : Uses not known ; botanical interest due to restricted distribution. Flowering : May-June.

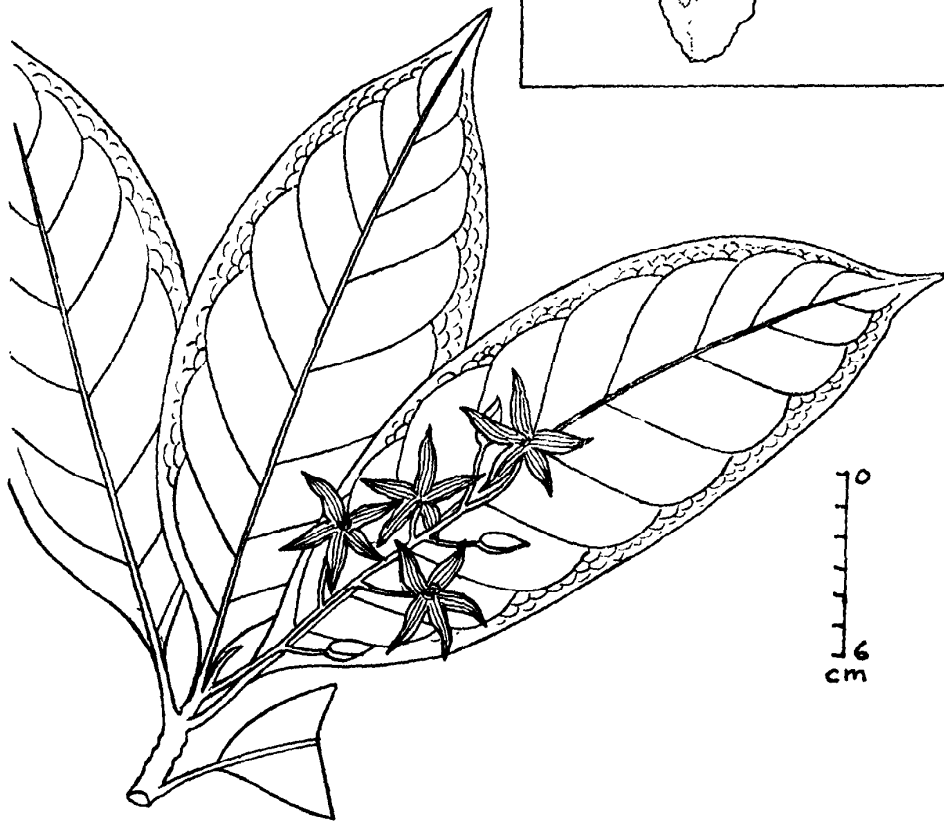
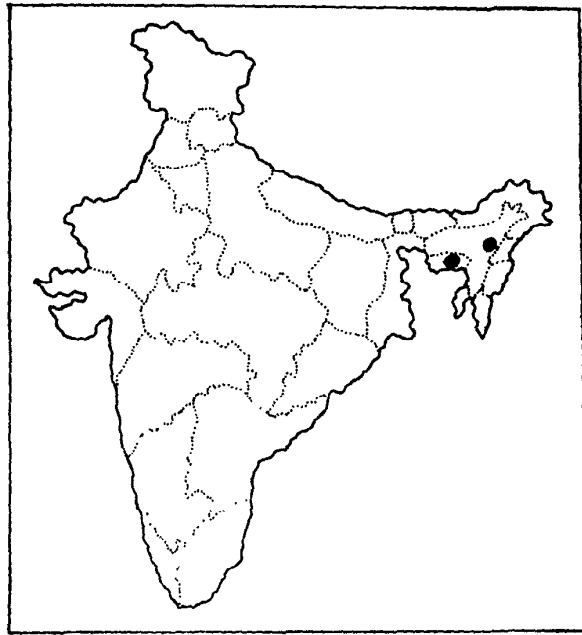
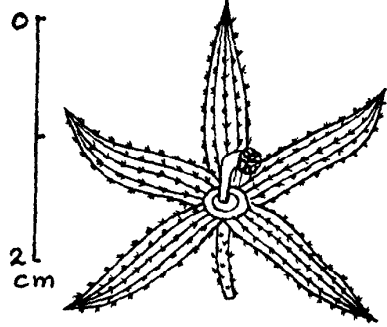
Cultivation : Not known.

Description : A tall tree. Leaves obovate, oblong, acuminate, glabrous. Panicles erect, many-flowered.

Reference :

1. Kanjilal, U. N. et al (1934) : Flora of Assam, 1(1) : 154.

(Data supplied by S. K. Katakai & A. S. Chauhan).



Sterculia khasiana Debbarman

TETRACENTRACEAE

Tetracentron sinense Oliv. var. *himalense* Hara & Kanai

Status : Rare.

Distribution : INDIA—Arunachal Pradesh—Kameng ; NEPAL, BURMA, CHINA.

Habitat and Ecology : It grows in sub-tropical and temperate forests preferably near water courses.

Conservation Measures Taken : None.

Conservation Measures Proposed : A local area is needed to conserve this species in wild. Conservation in suitable botanical gardens should be attempted.

Biology and Potential Value : A vesselless angiosperm of botanical interest. Monotypic with disjunct distribution.

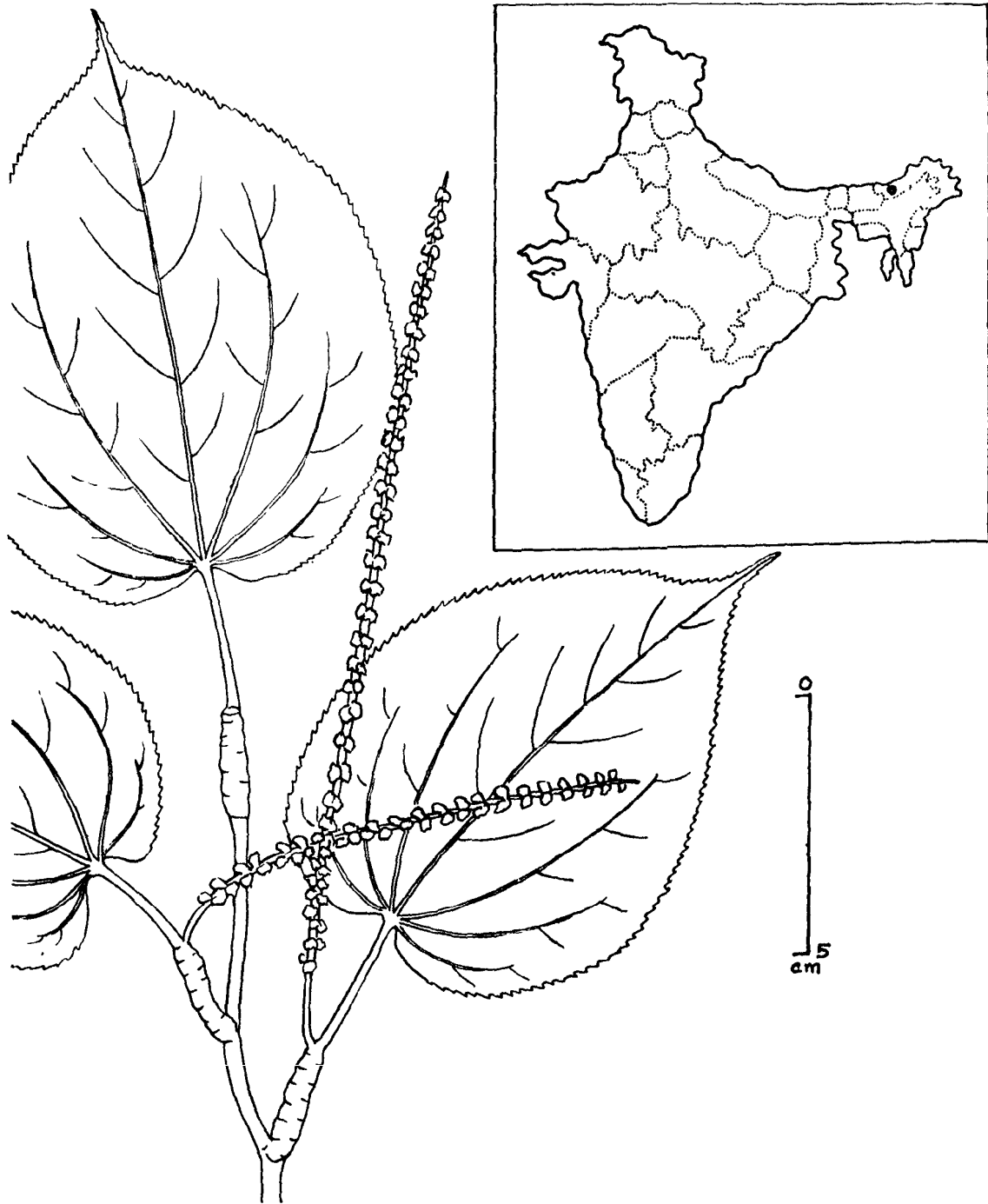
Cultivation : Not Known.

Description : Shrubs or small trees. Leaves petioled, cordate, margin serrate, acuminate. Inflorescence catkin-like slender spikes, many flowered ; flowers small.

References :

1. Hara, H. (1967) : J. Jap. Bot. 42 : 206.
2. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India—A State-of-the-Art Report, 37. New Delhi.
3. Rao, A. S. (1974), Vegetation and Phytogeography of India and Burma in Mani, M. S. (ed.)—Ecology and Biogeography in India, 204-246. Hague.

(Data supplied by S. K. Katakai & A. S. Chauhan)



Tetracentron sinense Oliv. var. *himalense* Hara & Kanai

VALERIANACEAE

Nardostachys grandiflora DC.

Status : Rare, due to indiscriminate collecting.

Distribution : INDIA— Uttar Pradesh (Garhwal, Kumaun); NEPAL, BHUTAN, TIBET, W. CHINA.

Habitat and Ecology : Alpine Himalayas, in rock crevices and meadows.

Conservation Measures Taken : The species included in the list of threatened plants of India. Nanda Devi and Valley of Flowers National Parks include parts in its natural habitats.

Conservation Measures Proposed : Large scale cultivation to check over-exploitation of natural populations. The feasibility of protecting a few more habitats should be investigated.

Biology and Potential Value : The Himalayan Spikenard of Commerce. The dried rhizomes and roots of this plant are aromatic and medicinal. The total requirement of this drug in India is estimated to be about 20 quintals (Jain, 1968).

Cultivation : Some plants grown in experimental gardens. Higher altitudes in the Himalayas are suitable for its cultivation.

Description : Herbs, upto ca 60 cm high. Rhizomes woody, covered with fibres from petioles of withered leaves. Flowers small purplish-white.

References :

1. Jain, S. K. (1968) : Medicinal plants, 101.
2. Jain, S. K. and Sastry, A. R. K. (1980) : Threatened plants of India— A state-of-the-Art Report, 27. New Delhi.

(Data supplied by P. K. Hajra)

VIOLACEAE

Hybanthus travancoricus (Bedd.) Melch.

(*Ionidium travancoricum* Bedd.)

Status : Rare ; due to habitat destruction.

Distribution : Tamil Nadu, Tirunelveli hills ; Kerala, Travancore. Endemic.

Habitat and Ecology : In hill forests at 600-900 m. along streams.

Conservation Measures Taken : Nil.

Conservation Measures Proposed : Protection in wild; to be introduced in Botanical gardens.

Biology and Potential Value : Flowering in August ; botanical interest, restricted distribution.

Cultivation : Nil.

Description : Erect, perennial herbs or shrubs, 1-5 m. tall. Leaves alternate, linear-lanceolate, distantly serrate. Flowers pink, solitary, axillary.

References :

1. Gamble, J. S. (1957) : Fl. Pres. Madras, 35. (repr. ed.).
2. Henry, A. N., Vivekanathan, K. and Nair, N. C. (1978) : Rare and threatened flowering plants of South India, in Journ. Bombay nat. Hist. Soc., 75(3) : 685.
3. Vajravelu, E. and Daniel, P. (1983), in Jain, S. K. and Sastry, A. R. K., Materials for a catalogue of threatened plants of India, 8, B.S.I., Howrah.

(Data supplied by E. Vajravelu)

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