3. MATERIALS AND METHODS

Literature pertaining to the flora of Buxa National Park, Buxa Tiger Reserve and Jalpaiguri district was collected from published works and index cards were prepared prior to undertaking explorations. Plants collected by Sikdar from the Jalpaiguri district, Buxa Tiger Park and Buxa Forest Division; Narayanswami from Buxa Forest Division and Singh & al. from Buxa National Park and by earlier workers deposited at CAL were studied and indexed. Intensive surveys have been undertaken periodically in Buxa National Park 2009-2012. The duration of each study tour ranged from 15 to 20 days. Plants in flowers and fruits were collected during explorations. Four duplicate specimens were collected for every species and field numbers were tagged. Field details such as habitat, habit and height of the plant, colour and odour of the flowers and fruits, associated plants and distribution were noted in the field book. Plants in flowering and fruiting and different types of vegetation in the park were photographed. The collected specimens were processed following standard herbarium techniques (Johnston, 1939; Fosberg & Sachet, 1965; Jain & Rao, 1977 and Bridson & Forman, 1998). Specimens were identified using regional floras and also compared with authentic specimens deposited at CAL. Monographs, revisions and more recent literature were referred to for critical identification and name updating. Descriptions were made based on fresh and old herbarium specimens housed at CAL. Illustrations were prepared for selected species. A set of voucher specimens duly labelled are deposited at CAL & CUH. The specimens collected in the explorations were taken into account in description of the species under enumeration.

Sikdar and Narayanswami collections from the Buxa Forest Division/Jalpaiguri district were included (when present!) along with the present collections under ‘specimens examined’.

Bentham and Hooker’s system of classification was adopted and families under dicots were broadly categorised into Polypetale, Gamopetalae and Monochlamydeae. For Monocots, the conventional seven groups were identified. While keying out families, major diagnostic features were included so to define families. For the same reason some of the features cited are not exactly opposite in the leads but can be used practically in arriving at correct families.

Ethnobotanical and other data were collected between 2009 and 2012 by semi-structured interviews with people of these villages (Jain & Mudgal, 1999). The information collected included local name, traditional uses. In case of ethno-medicinal plants data related to
diseases treated, parts used, condition of plant used, method of preparation other uses of
the plant and existing threats to medicinal species were also included.

4. PLAN OF PRESENTATION

The arrangement of the families followed in the present work is based primarily on
Bentham & Hooker’s (1862–1883) system of classification with modifications as per
current concepts following Hutchinson (1926, 1934), Cronquist (1981) and Kubitzki (1990–
2015). Since, all the Indian herbaria hold their collections under Bentham & Hooker’s
classification, it was felt appropriate to present the flora under this classification as this
was even familiar among foresters. In case of Angiosperms and Gymnosperms, the keys
to families were adopted from Prain (1903) with minor modifications. For Pteridophytes,
keys to the families were adopted from the flora of China (Lin & al., 2013). These keys are
given to have a broader perspective of the diversity of the flora of the National Park. The
Linear Angiosperm Phylogeny Group III (LAPG III) sequence of families and the related
numbers are cited against the family names in parenthesis as APG was considered as the
most evolved system of classification (Haston & al., 2009). The genera under a family and
the species under a genus have been arranged in alphabetical order. Bracketed keys have
been provided for the families, genera, species and infra specific-taxa, if more than one
taxa is present. These keys are artificial and are based on exomorphic characters. The
nomenclature of plants has been updated applying the current ICN (McNeill & al., 2012)
and referring to recent taxonomic literature. For each taxon, the correct botanical name,
followed by basionym, if any, has been provided with full citation. For synonyms, full
citation was avoided. The names of authors’ of plant names are abbreviated following
‘Authors of Plant Names’ (Brummitt & Powell, 1992). For the abbreviation of titles of
books and periodicals, Taxonomic Literature (ed. 2) (Stafleu & Cowan, 1976–1988) and its
supplements (Stafleu & Mennega, 1992–2000; Dorr & Nicolson, 2008–2009) and Botanico-
Periodicum-Huntianum (Lawrence & al., 1968) and its supplement (Bridson, 2004) have
been followed. Nomenclatural citation is followed by local vernacular name(s), if any,
followed by the description based primarily on morphological characters. In species
enumeration, accepted name has been given with full citation, followed by the floras
which have adopted this name. This is followed by basionym (if any). Only Flora of
British India, Flora of India and Bengal Plants, have been cited. Some relevant revisionary
works have been were also cited. Other synonyms are cited without giving the details of
publication. The details such as exact localities of collections with forest compartment numbers, habitat, distribution and uses were given. The Specimens studied or collected are given under the “Specimen examined”. Only metric units have been used in the description. Maps and tables connected to distribution/analysis and colour photographs of vegetation/plants are given. The sources of illustrations for most of species are given. References and index to scientific names have been provided.

5. FOREST TYPES

The Buxa National Park can be broadly classified as Northern dry deciduous and moist Tropical Forests. These can be classified further in five sub types, namely: i. Dry mixed forests; ii. Evergreen forests; iii. Riverine Forests; iv. Sal forests and v. Semi-evergreen forests (Champion & Seth, 1968) (Map 6).

i. Dry Mixed Forests

This type of forests occurs mainly in the Jainti range (NRVK 6, Jainti 1, Jainti 2, Jainti 3); Rajabhatkhawa range (SRVK 3, SRVK 6) and Gadadhar range (Panbari 6 partly, Panbari 9 partly). In this type, the upper storey is generally composed of *Crateva religiosa*, *Dillenia pentagyna*, *Dysoxylum gotadhora*, *Holarrhena pubescens*, *Stereospermum colais*, *Sterculia villosa* etc. and the middle storey is composed of *Careya arborea*, *Litsea salicifolia*, *Machilus glaucescens*, *Mallotus philippensis*, *Oroxylum indicum*, *Wrightia arborea* etc. Grass is generally absent but may become abundant on burning and then the forest tends towards Savannah land. The undergrowth/ground vegetation consists of *Alternanthera sessilis*, *Carex cruciata*, *Commelina benghalensis*, *Commelina paludosa*, *Eleusine indica*, *Nelsonia canescens*, *Sida acuta*, *Sida rhombifolia* etc. The common climbers/lianas are *Aristolochia tagala*, *Celastrus paniculatus*, *Cyphostemma auriculata*, *Dioscorea oppositifolia*, *Gouania leptostachya*, *Hiptage benghalensis*, *Pegia nitida*, *Porona paniculata and Vallaris solanacea*. Pteridophytes such as *Adiantum philippense*, *Athyrium falcatum*, *Lygodium flexuosum* grow as under growth.

ii. Evergreen Forests

This type is found close to streams which rises in the plains and it occupies very small area in comparison with other types which occurs in Gadadhar range (Panbari 1, 2, 6, 7, 8, 9 compartments); Jainti range (Jainti 4, 5, 6, 8, 9 compartments). The most typical trees are *Actinodaphne obovata*, *Aesculus assamicus*, *Archidendron clypearia*, *Artocarpus chaplasha*, *Castanopsis indica*, *Chiscocheton cunningianus*, *Chukrasia tabularis*, *Cryptocarya amygdalina*, *
Map 6: Vegetation types of Buxa National Park

- **Dry Mixed Forests**
- **Evergreen Forests**
- **Riverine Forest**
- **Sal Forests**
- **Wet Mixed Forests**

*Nos. refer to compartment number*
Dillenia indica, Dysoxylum gotadhora, Ehretia acuminata, Eurya acuminata, Elaeocarpus varunua, Eugenia formosa, Horsfieldia kingii, Litsea cubeba, Meliosma pinnata, Phoebe lanceolata, Polyalthia simiarum, Sloanea sterculiacea, Vatica lanceifolia etc. The ground vegetation is covered with herbs and shrubs like Alocasia fornicata, Begonia roxburghii, Casearia vareca, Centella asiatica, Coffea bengalensis, Costus speciosus, Cyanotis cristata, Elatostema punctatum, Elatostemma repens, Eryngium foetidum, Leptanurus sylvestris, Micromelum pubescens, Phlogacanthus thrysiflorus etc. The common climbers and lianas are Sabia limoniacea, Sabia paniculata, Tournefortia hookeri, Uncaria macrophylla, Uncaria sessilifructus, Ziziphus apetala etc. The forest also supports some terrestrial orchids namely, Goodyera procera, Phaius tancarvillea, Zeuxine clandestine and Zeuxine nervosa.

iii. Riverine Forests

This type of forests occurs along the bank of the rivers Bala and Jainti in Jainti 2B, 3B, 6B, 7 compartments of Jainti range); NRVK 5A, 7, 12, 14 compartments of East Damanpur Range; SRVK 3, 6, 11 compartments (Rajabhatkhawa range). The ground that bears this type of forest ranges from unstable banks of the Bala and Jainti rivers. The principle constituents being various degrees of admixture with Acacia catechu, Albizia lucidior, Albizia procera, Bombax ceiba, Cassia fistula, Lagerstroemia parviflora, Sapium insigne, Sterculia villosa, Streblus asper, Trewia nudiflora etc. Trewia nudiflora, Bischofia javanica with a few Dillenia indica and Gmelina arborea appear to do well in this type where ever the water table is not low. Bauhinia purpurea is the commonest in the neighbourhood of river beds where permanent water table is fairly deep. The undergrowth includes Buddleja asiatica, Clerodendrum infortunatum, Hyptis suaveolens, Lantana camara, Ziziphus oenoplia and Mussaenda roxburghii. The common climbers and lianas found are Celastrus paniculatus, Chonemorpha fragrans, Clematis gouriana, Cryptolepis buchananii, Millettia extensa, Millettia pachycarpa, Mukia maderaspatana, Paederia cruddasiana, Reissantia arborea, Tournefortia hookeri, Wattakaka volubilis etc. The epiphytic orchids are rare and represented by Acampe papillosa. The parasite, Scurrula parasitica and the scrambler, Dregea volubilis also appear here.

iv. Sal Forests

This type of forests occurs in Tashigaon-1 & 2, Jainti 6 (Jainti range), ‘Sal’ (Shorea robusta) is the most important and predominant species in the well-drained areas and occurs both in the plains as well as in foothills of the park. Other than the Shorea robusta important components are Teminalia belerica, Dillenia pentagyna, Sterculia villosa, Careya arborea and
Plate 2: a. Dry Mixed Forests; b. Evergreen Forests; c. Riverine Forests; d. Sal Forests; e. & f. Wet Mixed Forests; g. Bhutia pond; h. Sivlingi (a sacred site)
Schima wallichii, Amoora wallichii, Terminalia tomentosa, Machilus villosa, Phoebe lanceolata are also found. The middle storey consists of Aphanamixis polystachya, Macaranga denticulata, Bauhinia purpurea etc. The common climbers and lianas found are Caesalpinia cucullata, Gymnema inodorum, Marsdenia tinctoria, Strophanthus wallichii and Stixis suaveolens. The ground vegetation is dominated by Clerodendrum viscosum, Coffea benghalensis, Eranthemum nervosum, Phlogacanthus thyrsiformis, Leea indica etc.

v. Wet Mixed Forests Plate 2e, f

This type of forests occurs in Jainti range (Tashigaon-1, Tashigaon-2, NRVK 5A, NRVK 13, NRVK 14, NRVK 6), East Damanpur Range (Checko 2), Gadadhar range (Panbari) of the park. The species like Bischofia javanica, Machilus villosa, Syzygium formosum, Syzygium fruticosum, replace Shorea robusta. The top canopy consists of Phoebe lanceolata, Dysoxylum getadhora, Duabanga grandiflora, Cinnamomum bejolghata, Wrightia arborea etc. The middle storey is composed of Meliosma pinnata, Turpinia pomifera, Aesculus assamica etc. The top storey is composed of Schima wallichii in association with Bauhinia purpurea, Toona ciliata, Duabanga grandiflora, Tetrameles nudiflora, Magnolia doltsopa, Gmelina arborea, Chukrasia tabularis. Lower storey is composed of Litsea salicifolia, Mallotus philippensis, Morinda angustifolia etc. The ground is covered with Leea compactiflora, Phrynium pubinerve, Phaius tancarvillea and Schumannianthus dichotomus. Common climbers and lianas are Hodgsonia heterocita and Hiptage benghalensis. In epiphytic orchids, Dendrobium aphyllum, D. fimbriatum are common. The other epiphytes include Hoya lanceolata, H. parasitica.

6. FAUNAL DIVERSITY Plate 3a-1

The Buxa National Park harbours a wide range of animal diversity. There are 68 species of mammals, 41 species of reptiles and more than 359 species of birds, and rich amphibian and fish fauna. It will be worth noting that there are 20 species of mammals which are endangered and are included in Schedule I of Wildlife protection Act (1972), 7 species of birds, 10 species of reptiles, are also included within the endangered lists. The main carnivores of Buxa National Park are Tiger (Panthera tigris), Leopard (Panthera pardus), Clouded Leopard (Neofelis nebulosa), Wild dog (Cuon alpinus), Jungle Cat (Felis chaus), Leopard Cat (Prionailurus bengalensis), Fishing Cat (Prionailurus viverrina), Hog badger (Arctonyx collaris), Mongoose (Herpestes edwardsii), etc. Marbled Cat (Pardofelis marmorata) and Golden Cat (Catopuma temminckii) were reported earlier but in recent years they have not been sighted. Among the herbivores, the common are Elephant
Plate 3: a. Elephas maximus; b. Axis axis; c. Pavo cristatus; d. Macaca mulatta; e. Vanellus indicus; f. Microhierax caerulescens; g. Sturnus contra; h. Acridotheres tristis; i. Halcyon smyrnensis; J. Gracula religiosa; k. Pycnonotus cafer; l. Streptopelia orientalis
(Elephus maximus), Gaur (Bos gaurus), Sambar (Cervus unicolor), Chital (Axis axis), Barking deer (Muntiacus muntjak), Wild pig (Sus scrofa) and Wild Buffalo (Bubalus bubalis) was reported in Buxa but in recent years it has not been sighted. The great Indian one horned Rhinoceros (Rhinoceros unicornis) was reported in Panbari blocks of Buxa National Park up to 1968 which might have migrated from Assam from the other side of Sankosh River. However, regular occurrence of rhino was reported till the 1950s in these areas. Many other animals like porcupines (Hystrix indica), Rhesus macaque (Macaca mulatta), Civet Cat (Viverricula indica), Malayan Giant Squirrel (Ratufa bicolor), Common Pangolin (Manis crassicaudata) and Chinese Pangolin (Manis pentadactyla) are also frequently seen in these forests. For birds, it is a very important area, as there are 23 raptors species, 5 Hornbill species and numerous water birds are recorded. The rich biodiversity is comparable to Amazonian forest biodiversity (Allen & al, 1996). Among reptiles tortoise, lizards and various kinds of snakes are recorded. Among snakes, King Cobra, Russel’s viper, Black Krait, Banded Krait and Burmese Python (Python molurus bivittatus) are found in this park.

7. TAXONOMIC ACCOUNT OF VASCULAR PLANTS

7.1 ARTIFICIAL KEY TO GROUPS AND FAMILIES

(Angiosperms, Gymnosperms and Pteridophytes, Prain 1903)

1a. Plants bearing antheridia or archegonia or both on minute prothalii in one stage of existence and small sporangia with minute spores in an alternating sporophytic stage .............. Pteridophytes (Group C)

1b. Plants bearing flowers with stamens or pistil (open or enclosed) or both; pistil bearing ovules develop into embryonic seeds .......... 2. (Phanerogames)

2a. Pistil with a stigma; ovules contained in an ovary composed of a carpel or with two or more cohering carpels; perianth usually present; wood, when present, consists of true vessels .......... Angiosperm (Group A)

2b. Pistil without a stigma; ovules in a ovary composed of an open carpel; perianth almost always absent; wood usually with no true vessels (except in Gnetaceae) ...................... Gymnosperm (Group B)

Group A: Angiosperms

A. Stems with a central pith surrounded by one or more concentric rings of woody vascular tissues enclosed in a separable bark; leaves usually articulated on the stem and usually with branched or reticulated veins; embryo with 2 cotyledons ...................... 1. Dicotyledones

B. Stems without central pith, the woody substance in isolated bundles embedded in cellular tissue encased in a firmly adhering outer rind; leaves usually sheathing at the base and not articulated on the stem;
their veins usually parallel and unbranched, running from base
to apex and connected by straight cross-veinlets; embryo with
only 1 cotyledon ................................................................. 2. Monocotyledones

1. Dicotyledons

Key to subgroups (Dicotyledons)

1a. Flowers lack distinct sepals and petals; sepals and petals
present as perianth, in whorls or rarely lack perianth;
usually unisexual or rarely bisexual.................................. 1c. Monochlamydeae

1b. Flowers with distinct sepals and petals in two different whorls;
usually bisexual rarely unisexual.................................................. 2

2

2a. Petals free................................................................. 1a. Polypetalae

2b. Petals united ............................................................... 1b. Gamopetalae

1a. Key to families (Dicotyledons): Polypetalae

1a. Ovary superior; receptacles usually flat bearing floral
parts successively; stamens arising direct
from the receptacle or from disk crowning the pedicels .................. 2

1b. Ovary semi-inferior or inferior; receptacles usually encircled by
cupular calyx on which floral parts appear successively; stamens
arising from calyx or from the disk lining the calyx tube .................. 41

2a. Sepals imbricated; if valvate then leaves opposite, sepals free,
stamens many, and fruitlets separate (Clematis) ............................. 3

2b. Sepals valvate; if imbricate or sub-imbricate then petals invariably valvate ....... 34

3a. Sepals free; if united below then leaves even-pinnate or odd
pinnate (Turpinia) ................................................................. 4

3b. Sepals united at least at the base ........................................... 21

4a. Stamens 10 or fewer ......................................................... 5

4b. Stamens more than 10 ....................................................... 13

5a. Plants dioecious; flowers 3-merous................................. Menispermaceae

5b. Plants monoecious; flowers 4-5-merous ............................. 6

6a. Petals 4; stamens 6 (4+2) .................................................... Brassicaceae

6b. Petals usually 5, sometimes 4; perfect stamens as many
or twice as many as petals and sepals .......................................... 7

7a. Flowers isomerous; ovary 1-celled ........................................ 8

7b. Flowers isomerous or not; ovary 2-or more-celled ...................... 9

8a. Herbs; leaves linear, opposite and clustered above; sepals
united; petals entirely free; seeds not hairy but ornamented........ Caryophyllaceae

8b. Shrubs; leaves scaly, alternate; sepals free; petals slightly
connate below; seeds with tufts of hair at one end .............. Tamaricaceae

9a. Herbs; seeds pendulous, arillate partly .................................. 10

9b. Shrubs or trees; seeds erect, fully arillate or not ..................... 11
10a. Inflorescences axillary or subterminal racemes or pseudo-umbellate, or not pedunculate, fascicled or solitary; flowers zygomorphic, resupinate to through 180°; stamens 5 ...................... Balsaminaceae

10b. Inflorescences umbellate, cymose, or racemose, or flowers solitary; flowers actinomorphic, heterostylos; stamens 10 .......................... Oxalidaceae

11a. Flowers unisexual; seeds arillate ................................................................... Sapindaceae

11b. Flowers bisexual; seed exarillate........................................................................... 12

12a. Flowers actinomorphic; fruit a berry..................................................................... Staphyllaceae

12b. Flowers zygomorphic; fruit a capsule................................................................. Hippocastanaceae

13a. Sepals 3 or fewer, deciduous ............................................................................. 14

13b. Sepals 4 or more, deciduous or persistent .............................................................. 15

14a. Trees or shrubs; sepals petaloid, petals in 2-many whorls; carpels many; fruits usually aggregate .................................................. Magnoliaceae

14b. Herbs; sepals distinct from petals; petals 2-3-whorls; ovary 1-celled; placenta parietal; fruits capsules ........................................... Papaveraceae

15a. Sepals persistent ........................................................................................................ 16

15b. Sepals deciduous ....................................................................................................... 17

16a. Plants without short branches; flowers usually bisexual; sepals not connate into a calyx tube; disk absent; ovary on a gynophore, superior................................................................. Capparaceae

16b. Plants often with short branches; flowers usually unisexual; sepals connate into a calyx tube; disk present; ovary not on a gynophore, semi-inferior ................................................ Flacourtiaceae

17a. Carpels free; placenta basal .................................................................................... Ranunculaceae

17b. Carpels coherent; placenta parietal ........................................................................ 18

18a. Herbs; leaves opposite, gland dotted; fruits capsules ........................................ Hypericaceae

18b. Trees or shrubs; leaves alternate, not gland dotted; fruits capsules or not............ 19

19a. Stamens free; gynoecium of 2-7 carpels; placenta marginal/submarginal; fruits leathery; seeds arillate or not, wingless..................... Dilleniaceae

19b. Stamens free or not; gynoecium of 5 carpels; placenta axile; fruits baccate or capsules; seeds exarillate, winged or wingless......................... 20

20a. Inflorescences solitary or fascicled ................................................................. Theaceae

20b. Inflorescences cymose or paniculate ................................................................. Actinidiaceae

21a. Trees; leaves simple, eglandular; stamens indefinite, variously connate; connective prominent; fruits winged .......... Dipterocarpaceae

21b. Shrubs or lianas; leaves simple or compound; stamens (12 or fewer), indefinite in Rutaceae (then leaves gland dotted); connective not prominent; fruits winged or not ........................................ 22

22a. Leaves glandular ..................................................................................................... Rutaceae

22b. Leaves eglandular .................................................................................................. 23

23a. Leaves opposite; disk obscure; filaments basally connate, declinate; ovary 3-celled; fruits winged .................................................. Malpighiaceae

23b. Leaves alternate; disk enlarged; filaments not declinate; ovary 1-celled; fruits not winged ................................................... 24
24a. Stamens opposite to petals ................................................................. 25
24b. Stamens alternate with the petals ....................................................... 26
25a. Climbing shrubs; leaves simple or pedately compound with
tendrils; stipules often caducous; ovules 2 per locule ......................... Vitaceae
25b. Erect shrubs; leaves pinnately compound, devoid of tendrils;
stipules sheathing along rachis margins with conspicuous wings;
ovule 1 per locule ................................................................. 26 Leeaceae
26a. Leaves exstipulate; petals imbricate ................................................ Sabiaceae
26b. Leaves usually stipulate; petals valvate............................................. 27
27a. Flowers bisexual and polygamdioecious; ovules erect or ascending... 28
27b. Flowers unisexual; ovules pendulous ............................................... 30
28a. Leaves simple or compound; ovary usually 1-locular,
rarely 2-5-locular ................................................................................. Anacardiaceae
28b. Leaves simple; ovary 3-5-locular ....................................................... 29
29a. Scandent shrubs; fruits not in 3s; globose capsules; seeds
dependoporous, arillate and not winged ........................................... Celastraceae
29b. Lianas; fruits usually in 3s; flattened capsules;
seeds non-endospermous, exarillate, winged .............................. Hippocreateaceae
30a. Leaves compound ................................................................................. 31
30b. Leaves simple .......................................................................................... 32
31a. Inflorescences racemes, cymes or thyrses; petals 3-5; stamens
equal or twice the number of petals, free; fruit a drupe ............... Simaroubaceae
31b. Inflorescences axillary thyrses, rarely racemose or spicate;
petals 3-6; stamens 4-12, united in a tube; fruit a capsule or drupe ....... Meliaceae
32a. Inflorescences axillary cymose, racemose, or subumbellate;
drupe 3-5 of 1-seeded pyrenes ...................................................... Aquifoliaceae
32b. Inflorescences usually spicate and pendulous; fruit 1-celled, 1-seeded 33
33a. Erect shrubs, monoecious; inflorescences panicles/umbels/spikes;
flowers bisexual; sepals cupular; disk present .............................. Opiliaceae
33b. Climbing shrubs, dioecious; inflorescences recemose; flowers
unisexual; sepals tubular; disk present or not ................................... Icacinaceae
34a. Sepals free; ripe carpels free or conjoined ........................................ Annonaceae
34b. Sepals united below (excl. Grewia & Trumfetta); fruit not as above......... 35
35a. Stamens united ...................................................................................... 36
35b. Stamens free ........................................................................................ 38
36a. Flowers usually unisexual, rarely bisexual or polygamous;
stamens in a column or cup, round the style; mouth of tube
usually with 5 sterile prolongations; androgynophore usually
present; ovules 2 or more per locule ........................................ Sterculiaceae
36b. Flowers usually bisexual; stamens indefinite in a column,
round the style with only short free filaments towards apex or
dividing upwards into phalanges; androgynophore usually absent;
ovules 1 to many per locule.............................................................. 37
37a. Epicalyx present; stamens numerous, monadelphous; fruit a loculicidal capsule or a schizocarp, separating into individual mericarps; seeds without endocarpic hairs.............................. Malvaceae
37b. Epicalyx absent; stamens 5-many, monadelphous to pentadelphous, rarely free; fruit a capsule, seeds with endocarpic hairs..............................Bombacaceae
38a. Stamens definite .......................................................................................................................39
38b. Stamens indefinite ...................................................................................................................40
39a. Dioecious usually, unarmed; leaves compound; petals not hooded; stamens usually twice as many as petals or equal to petals; alternate to petals ............................................................... Burseraceae
39b. Monoecious, armed; leaves simple; petals usually hooded; stamens equal to petals; opposite to petals .................................................... Rhamnaceae
40a. Inflorescences solitary flower, racemes, fascicled; stamens 20-many, free; ovary 2-5-celled; 2-20 ovules per cell; stigma simple; seeds arillate or not ..................................................................................................... Elaeocarpaceae
40b. Inflorescences terminal cymes or panicles; or 1-3 per axil; stamens 10-many, free or connate at base; ovary 2-10-celled; ovules 1-many per cell; stigma capitate; seeds exarillate ............................................................................................................. Tiliaceae
41a. Trees; ovary syncarpous, l-locular, placentation parietal ......................... Datiscaceae
41b. Trees, shrubs or climbers; apocarpous or syncarpous with several locules .............. 42
42a. Ovules arising from the inner angles or from base of carpels or loculi or if arising from apex of loculus then with ovules many .........................43
42b. Ovules suspended from apices of carpels/locules; ovules always few .............. 52
43a. Leaves stipulate; flowers zygomorphic with definite diadelphous stamens, or actinomorphic with indefinite free stamens; carpel solitary, excentric, style terminal; ovules many or few arising from margins....Fabaceae (s.l.)
43b. Leaves exstipulate; flowers actinomorphic; carpels several; if solitary (some Rosaceae), then, style not terminal and odd sepal remote from axis .............................................................................................................................. 44
44a. Flowers unisexual; ovary inferior ....................................................................................... 45
44b. Flowers bisexual; ovary inferior or not .............................................................................. 46
45a. Weak herbs or shrubs or climb through tendrils; flowers actinomorphic; stamens usually three; styles united or only free at apex; fruits not winged........................................................................... Cucurbitaceae
45b. Erect herbs or shrubs; flowers zygomorphic; stamens numerous, free or conjoined; styles free or only united at base; fruits winged ........ Begoniaceae
46a. Stipulate; carpels free or if united, with styles distinct ................................. Rosaceae
46b. Exstipulate; carpels and styles united throughout .................................................. 47
47a. Calyx lobes imbricate ................................................................................................. 48
47b. Calyx lobes valvate ........................................................................................................ 50
48a. Shrubs; petals valvate, white, mauve to purple; stamens definite; fruit a capsule or drupe; seeds numerous ............................................. Melastomataceae
48b. Trees; petals imbricate, white to pinkish; stamens indefinite; fruit a berry or drupe or capsules; seeds 2-many ........................................................... 49
49a. Stamens joined and to the petals or staminodes at their base in one or more rings ......................................................... Lecythidaceae
49b. Stamens usually numerous, in 1 to several whorls; filaments distinct or connate into 5 bundles ...................................................... Myrtaceae
50a. Herbs; ovary adnate or semi-adnate to calyx-tube ........................................ Onagraceae
50b. Herbs, shrubs or trees; ovary free from calyx-tube .............................................................. 51
51a. Inflorescences solitary flower/fascicles/terminal racemes/spikes/panicles; seeds winged ................................................................................... Lythraceae
51b. Inflorescences terminal corymbose cymes; seeds tailed at both ends ........................................................................ Sonneratiaceae
52a. Flowers bisexual; ovules solitary in each locule ............................................................... 53
52b. Flowers unisexual; ovules solitary in each locule in female flowers, or when bisexual, ovules more than 1 in each locule ................................. 54
53a. Herbs; leaves compound/ simple and deeply lobed, alternate, stipulate; inflorescences umbels, subtended by involucre of free or united bracts; styles 2; schizocarp of 2-mericarps ...................................... Apiaceae
53b. Trees or shrubs; leaves simple, opposite, exstipulate; inflorescences axillary cymes or fascicles, subtended by petaloid bracts; style simple; fruits drupes .................................................................................. Alangiaceae
54a. Trees; leaves opposite, eglandular; ovary 2-6-locular; fruits berries; seeds arillate ........................................................................ Rhizophoraceae
54b. Trees or lianas; leaves opposite or alternate, usually glandular; ovary 1-locular; fruits drupaceous, winged or not; seeds exarillate ...... Combretaceae

1b. Key to families (Dicotyledons): Gamopetalae

1a. Ovary inferior; stamens equal and alternate to corolla lobes
   (rarely fewer than corolla lobes) ................................................................. 2
1b. Ovary superior; stamens equal and alternate to corolla lobes;
   alternately ovary half inferior then stamens opposite to corolla lobes .......... 5
2a. Stamens free from corolla; flowers actinomorphic, rarely zygomorphic;
   ovary 2-many loculed; ovules many in axile placentation ................. Campanulaceae
2b. Stamens attached to corolla; flowers actinomorphic; ovary 1-many loculed; ovules 1-many in each locule; ovules in axile placentation or not .......... 3
3a. Calyx reduced to pappus or obsolete; anthers syngenesious;
   ovary 1-locular and 1-ovuled; seeds without albumen ....................... Asteraceae
3b. Calyx toothed, lobed or partite; anthers free; ovary 2-many-locular,
   each locule 1-many-ovuled; seeds usually with copious albumen .......... 4
4a. Stipules interpetiolar, prominent; inflorescences usually cymose,
   capitate, fasciculate or solitary; flowers bisexual
   (rarely polygamous); disk present; ovary 2-(5)-locular .................. Rubiaceae
4b. Stipules absent or very inconspicuous, lateral; inflorescences usually in corymb or in short spikes, rarely paniculate; flowers bisexual; disk absent; ovary (1)2-8-locular ........................................ Caprifoliaceae

5a. Ovary 1-locular; placentation free-central ......................................................... 6
5b. Ovary 2-many locular, rarely 1-locular; placentation axile or less often parietal.... 7

6a. Herbs; leaves eglandular; flowers mono/di-morphic; inflorescences axillary, solitary flower/heads/umbels/racemes/spikes; flowers bisexual; corolla eglandular; fruits capsules ......................... Primulaceae

6b. Trees or shrubs; leaves often gland-dotted or with pellucid reticulations; flowers bisexual or unisexual, monomorphic; corolla glandular; fruits drupes or berries ................................................... Myrsinaceae

7a. Stamens free from corolla; fruits capsules ......................................................... Ericaceae
7b. Stamens attached to the corolla; fruits capsules or not ........................................ 8

8a. Stamens as many as or twice as many as corolla lobes, inserted at base of corolla; ovary inferior or half inferior, 3-5-locular ...................... Styracaceae
8b. Stamens either equal or fewer than the corolla lobes; ovary superior or inferior, usually 2-(3), (5)-locular ............................................. 9

9a. Corolla actinomorphic, rarely slightly oblique .................................................. 10
9b. Corolla zygomorphic or at least oblique ............................................................ 17

10a. Leaves opposite ........................................................................................................ 11
10b. Leaves alternate ........................................................................................................ 14

11a. Stamens 2 (4) ........................................................................................................... Oleaceae
11b. Stamens 4 or more, alternate with corolla lobes ................................................ 12

12a. Carpels and styles united; stamens 4 (5) ............................................................. Buddlejaceae
12b. Carpels free, styles united; stamens always 5 ...................................................... 13

13a. Pollen granular, not aggregated; filaments usually adnate to corolla; stigma capitulate/conical/lampshade-shaped; fruits berries/drupes/follicles; seeds few or many, variously shaped, comatose or not........ Apocynaceae
13b. Pollen aggregated in masses (pollinia); filaments usually connate; stigma head fleshy; fruits follicles; seeds numerous, strongly compressed, comatose ........................................... Asclepiadaceae

14a. Ovules in each carpel numerous ........................................................................ 15
14b. Ovules in each carpel 2, less often 1, rarely 4 .................................................... 16

15a. Herbs, usually aquatic; stems glabrous or pubescent, occasionally glandular, bristly, or thorny; corolla-lobes imbricate or (rarely) contorted; stamens usually 5, epipetalous, often alternating with scaly appendages; anthers dehisce longitudinally; ovary 1(2)-locular; placentation parietal; style 2-fid or styles 2; fruits capsules .......... Hydrophyllaceae
15b. Herbs, shrubs, small trees, or climbers; stems prickly, hairs simple, branched, or stellate, sometimes glandular; corolla-lobes plicate, (rarely) imbricate; anthers dehisce by apical pores; ovary 2-5-locular; placentation axile; style 1; fruits berries/capsules .............................. Solanaceae
16a. Trees, shrubs or herbs, usually scabrous or hispid; inflorescences usually scorpioid cymes, or panicles; corolla-lobes imbricate or contorted, without petaloid bands; fruits 1-4-seeded drupes or nutlets; nutlets often ornamented; seeds vertical or oblique .................................................. Boraginaceae

16b. Twiners or climbers, glabrous or hairy; inflorescences cymes/ (rarely) solitary flower; corolla lobes plicate or rarely imbricate, with petaloid bands; fruits capsules/berries; seeds usually trigonous .......................................................... Convolvulaceae

17a. Carpels 1-ovuled, or rarely 2-ovuled; fruits always 1-seeded, indehiscent ............. 18

17b. Carpels 2-or more-ovuled, usually ovules many, but if only 2 then the ovules superposed, or if ovules 2 collateral the fruit a 2-valved capsule ........................................................................................................ 19

18a. Herbs (aromatic or not)/shrubs/ or trees; Inflorescences racemose/ cymose; calyx more cupular, never bilipped; fruit a drupe or indehiscent capsule, sometimes breaking up into nutlets; seeds non-endospermous .......................................................... Verbenaceae

18b. Aromatic herbs/shrubs; inflorescences verticillasters, subtended by leaves or bracts, sometimes flower solitary; calyx tubular, often bilipped; fruits 4, dry nutlets; seeds with or without endosperm .................................................................................................................. Lamiaceae

19a. Ovary inferior, 1-locular, placentation parietal............................................... Gesneriaceae

19b. Ovary superior, 2-locular, placentation usually axile........................................ 20

20a. Bracts prominent; fruit open from the apex by 2 loculicidal valves; seeds usually on retinacula .............................................. Acanthaceae

20b. Bracts prominent or not; fruit dehiscent but not opening elastic valves or rarely indehiscent; seeds not on retinacula ..................................................... 21

21a. Trees; leaves compound, leave scars of the rachis on the stem when they fall off; flowers large, zygomorphic; fruit capsular or indehiscent; seeds with a broad membranous marginal wing/s........ Bignoniaceae

21b. Herbs; leaves simple, petiolar scars absent; flowers small, zygomorphic or actinomorphic; fruit a septicidal capsule or rarely a drupe or berry; seeds without wings ....................... Scrophulariaceae

1c. Key to families (Dicotyledons): Monochlamydeae

1a. Flowers bisexual, rarely unisexual (excl.: some genera in Chenopodiaceae, Loranthaceae, Elagnaceae and Lauraceae)................................. 2

1b. Flowers unisexual, rarely bisexual (excl.: some genera in Piperaceae).............. 9

2a. Ovary inferior............................................................................................................. 3

2b. Ovary superior.......................................................................................................... 4

3a. Scandent herbs or shrubs; leaves alternate; stamens twice as many as perianth lobes; disk absent; gynostegium present; ovary partially 6 (5-4)-loculed; ovules many in each locule; fruits capsules............ Aristolochiaceae
3b. Epiphytic shrubs, parasitic or not; leaves opposite; stamens as many as perianth lobes; disk present; gynostegium absent; ovary 1-loculed; ovule solitary; fruits drupes/berries. .................................. Loranthaceae

4a. Seeds without albumen .............................................................................................................. 5
4b. Seeds usually with copious albumen ...................................................................................... 6

5a. Trees or shrubs, scaly or stellate tomentose; inflorescences solitary flower/ clusters/racemes; perianth-tube constricted above the ovary; fruits usually nut, covered by thickened fleshy perianth base; seeds basal .......................................................... Elaeagnaceae

5b. Shrubs or trees, usually glabrous; inflorescences panicles/racemes/umbels; perianth-tube not constricted above the ovary; fruits berries naked or rarely enclosed in perianth tube/drupe, never enveloped by perianth base; seeds pendulous. .................................. Lauraceae

6a. Leaves stipulate, stipules connate in a tube around the nodes.............. Polygonaceae
6b. Leaves exstipulate or if stipules present, then minute or reduced to tubercles........ 7

7a. Flowers usually bisexual; perianth tubular below, valvate to plicate lobed above, fruit 1-seeded achene surrounded by persistent base of perianth tube. .............................................................. Nyctaginaceae
7b. Flowers bisexual/unisexual; perianth-lobes united only at the base, always imbricate; fruits capsules, or berries or achenes. .......................................................... 8

8a. Inflorescences in spikes; perianth scarious, dry; flowers usually bracteate and bracteolate; ovules suspended on long basal funicles; fruits/utricles/circum sessile capsules/rarely berries. ........... Amaranthaceae
8b. Inflorescences in clusters, often ball like and branched; perianth membranous; flowers usually ebracteate and bracteolate; ovule basal or lateral; fruits achenes. .................................................. Chenopodiaceae

9a. Leaves exstipulate; perianth sepaloid. ............................................................. Myristicaceae
9b. Leaves stipulate or if stipules absent (Piperaceae) the flowers bisexual; perianth absent. ............................................................................................................. 10

10a. Ovary 1-locular; 1-ovuled ................................................................................................. 11
10b. Ovary 0 or to many locular; each locule 2-ovuled ................................................................ 15

11a. Seeds with copious albumen, embryo minute ................................................................. 12
11b. Seeds with little or no albumen and large embryo present. ............................................. 13

12a. Herbs; leaves alternate, rarely opposite (excl.: some Pepromia sp.); flowers usually unisexual, rarely bisexual; stamens 1–10; filaments usually free; anthers 2-locular, perianth distinct or absent. ....... Piperaceae
12b. Shrubs; leaves opposite; flowers spuriously bisexual, male and female connate on a bract; stamens 1 or 3, confluent; anthers 1-or 2-loculed. .............................................................. Chloranthaceae

13a. Fruits samaras or drupes .............................................................................. Ulmaceae
13b. Fruits achenes ............................................................................................................................. 14

14a. Trees/shrubs/lianas with milky or watery latex, sometimes spiny, devoid of stinging hairs; leaves venation pinnate but often palmately 3–15-veined at base, surfaces glabrous or hairy, cystoliths absent;
flowers minute, in heads, racemes or catkinate spikes/syconiums;
filaments not reflexed; ovule 1, basal ................................................. Moraceae

14b. Herbs/shrubs/rarely trees, very rarely climbing, stems often fibrous,
sometimes succulent, sometimes armed with stinging hairs;
leaves palmately 3-veined at base or pinnately veined, surface with
punctate or linear cystoliths; flowers minute, usually in clusters or
heads, sometimes aggregated into cymes or panicles, usually
unisexual, filaments usually reflexed; ovule 1, pendulous ....................... Urticaceae

15a. Monoecious or dioecious; leaves simple/pinnately or rarely palmately
compound; inflorescences variable, but male inflorescences never
catkins; fruits capsules/baccate/ drupes, pericarp leathery;
1-many seeded, usually arillate .............................................................. Euphorbiaceae

15b. Monoecious; leaves simple; male flowers in spikes or
catkins; female flowers in spikes or in fascicles;
fruits 1-seeded nut, pericarp hard, exarillate ............................................. Fagaceae

B. Key to families (Monocotyledons)

1a. Perianth 2-seriate, usually segments of both series calycine ....................... 2
1b. Perianth 2-seriate, usually the segments of both series coralline .................. 6
2a. Inflorescences heads or cymes; flowers usually bisexual; perianth in
2-whorls ................................................................................................. Juncaceae
2b. Inflorescences racemes/spikes/spadix; flowers unisexual or bisexual;
perianth absent or reduced ........................................................................ 3
3a. Inflorescences of many-flowered or few-flowered spadices or spikes or
racemes .................................................................................................. 4
3b. Inflorescences of heads or spikelets composed of solitary flowers
in axil of glumaceous bracts ..................................................................... 5
4a. Herbs/shrubs/scrambling shrubs or climbers with corms or tuber or
aerial root; raphids present; flowers bisexual or unisexual....................... Araceae
4b. Marsh or emergent aquatic rhizomatous herbs, aromatic; raphides
absent; flowers bisexual; stamens 3 + 3, filaments flattened,
anthers horseshoe-shaped .................................................................... Acoraceae
5a. Sedges; stems solid; leaves with closed sheaths;
florets not subtended by lemma and palea ............................................. Cyperaceae
5b. Grasses; stems usually hollow except at the nodes; leaves with open
sheaths; florets usually subtended by lemma and palea............................ Poaceae
6a. Seeds many, minute, without albumen .................................................. 7
6b. Seeds conspicuous, with copious albumen ............................................. 8
7a. Aquatic herbs or shrubs; flowers actinomorphic, usually unisexual,
outer perianth segments calycine, inner coralline, often
cleistogamous .................................................................................... Hydrocharitaceae
7b. Epiphytic or terrestrial herbs or shrubs; flowers zygomorphic,
bisexual, outer and inner perianth segments coralline, not
cleistogamous ................................................................................... Orchidaceae
8a. Ovary superior ............................................................................................................. 9
8b. Ovary inferior or half-superior .................................................................................... 12
9a. Outer perianth-segments calycine, inner series corolline; embryo
    marginal or only partially enclosed within the albumen..................... Commelinaceae
9b. Perianth segments of both series isomerous, outer and inner
    perianth segments ................................................................. 10
10a. Aquatic; inflorescences racemose or spicate, terminating
    a 1-leafed scape; embryo cylindric and lying
    within a central canal in the albumen ........................................ Pontederiaceae
10b. Terrestrial; inflorescences various, axillary or terminal,
    but never on a 1-leafed scape; embryo completely
    enclosed within the albumen .................................................. 11
11a. Shrubs or vines; stems erect or climbing,
    usually prickly, sometimes unarmed; leaves opposite or alternate,
    prominently 3-veined, reticulate between veins, usually bearing tendrils;
    flowers usually unisexual; anthers 1-loculed; fruits baccate .......... Smilacaceae
11b. Herbs; leaves basal and/or cauline, alternate, opposite, or whorled,
    parallel/(rarely) reticulate veined; anthers 2-loculed; fruits
    capsules/or berries ................................................................. Liliaceae
12a. Flowers irregular; outer series of perianth-segments calycine;
    perfect stamens 1 with 5 reduced to staminodes, or 5 with a single
    staminode; seeds arillate .................................................................. 13
12b. Flowers regular or nearly irregular ........................................................................ 15
13a. Outer perianth series of 3, free, equal or sub-equal segments,
    inner perianth 3, united into tube below; anther 1-celled, laterally
    adnate to petaloid filaments ...................................................... Marantaceae
13b. Both series of perianth united, tubular or spathaceous; anthers 2-celled.......... 14
14a. Leaves spirally arranged; leaf sheath tubular, closed; staminodes 5,
    united into a labellum equaling or much longer than corolla;
    placentation axile .............................................................................. Costaceae
14b. Leaves distichous; leaf sheath open; staminodes 6, in 2 whorls,
    lateral 2 staminodes of outer whorl petaloid, or forming small
    teeth at base of labellum, or adnate to labellum, or absent, median
    staminode of outer whorl always reduced; placentation parietal,
    basal, or axile ............................................................................... Zingiberaceae
15a. Climbing herbs or shrubs; stamens not hooded; ovary 3-locular;
    placentation axile ........................................................................ Dioscoreaceae
15b. Erect herbs or shrubs; leaves cauline or terminal; stamens hooded;
    ovary 1-2-locular, placentation parietal, many-ovuled.................. 16
16a. Evergreen herbs, shrubs or dwarf trees; inflorescences racemose
    or paniculate; ovules 1 each locule; berries 3-seeded .................. Dracaneaceae
16b. Perennial rhizomatous herbs; inflorescences spikate, on a
    leafless scape; ovules 2 in each locule; berries 1-many seeded...... Convallariaceae
7.2 ANGIOSPERMS

POLYPETALAE

RANUNCULACEAE [114]

CLEMATIS L.

32 species in India and 1 species in BNP.


Climbers; stems and branches angled, furrowed, sparsely hairy when young, glabrescent when old, slightly swollen at nodes. Leaves 7-foliolate or sometime bi-ternate; leaflets ovate, 4–9.5 × 1.8–3 cm, acute to acuminate at apex, entire or toothed along margins, rounded or sub-cordate at base, sub-coriaceous, shiny above, glabrous; midvein slightly impressed above, raised beneath, glabrous; 3–5-nerved at base, obscure toward margins; petiolules 1–2.4 cm long. Inflorescences axillary or terminal panicles; peduncles c. 1.5 cm long. Flowers 1–1.2 cm across. Sepals 4, white, petaloid, oblong-obovate, c. 6 × 2.5 mm, densely pubescent both sides. Petals absent. Stamens many, free; filaments 3–4 mm long, glabrous; connectives scarcely produced above anthers; anthers oblong, c. 1 mm long. Ovary linear-oblong, c. 1 mm long; style c. 2.5 cm long; stigma clavate. Achenes ovoid-oblong, 3–4 mm long, densely hairy with 4–6 cm long feathery style.

Fl. & Fr.: October-February.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan and Sri Lanka.

Habitat: Grows along Jainti river bank.


Notes: Apparently similar to Narvelia spp. in morphology but can be distinguished by absence of modification of terminal leaflet into tendril.
DILLENIACEAE [124]

DILLENIA L.

7 species in India and 2 in BNP.

Key to species

1a. Evergreen trees; flowers 15–20 cm across, white, solitary; carpels 14–20; fruits 6–10 cm across; seeds reniform, hairy.......................... 1. D. indica

1b. Deciduous trees; flowers 2.5–3 cm across, yellow, in fascicles; carpels 5–6; fruits up to 3.5 cm across; seeds ovoid, glabrous........ 2. D. pentagyna


Local name: “Chalta” (Bengali).


Evergreen trees, 10–12 m tall; branches spreading. Leaves alternate below, crowded towards end of branches, oblong-lanceolate or elliptic, 15–30 × 5–12 cm, acute to acuminate at apex, sharply serrate-dentate along margins, attenuate at base, coriaceous, shining, glabrous above, strigose beneath; midvein impressed above, raised beneath, glabrous above, strigose lower side; lateral veins 30–45, prominent beneath; petioles 2.5–5.6 cm long. Flower solitary, terminal, fragrant, 15–20 cm across; pedicels 3.5–6 cm long, pubescent; bracts lanceolate, c. 5 mm long. Sepals 5, elliptic-ovate, 4–6 × 3–4 cm, persistent, fleshy, enlarged in fruits. Petals white, 5, obovate, 7–8 × 5–6 cm, obtuse at apex. Stamens many, arranged in whorls; outer stamens shorter than inner ones; filaments 5–10 mm long. Carpels 14–20; style oblongate to linear lanceolate, 1.5–2.2 cm long. Fruits included in enlarged thick sepals, subglobose, 6–10 cm across, greenish yellow, 5-seeded, embedded in pulp; seeds reniform c. 6 × 4 mm, reddish turned to black on maturity, exarillate.

Fl.: May-July; fr.: September–February.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal.

Uses: The fleshy pericarp is edible and local people use it in preparing chutney; children eat it mixing with common salt and chillies. Elephants eat the fruits, this is also cultivated in West Bengal in many households.


Notes: Flowers appear with leaves.


Local name: “Karkotta” (Bengali).

Illustration: Roxb., Pl. Coromandel 1: t. 20. 1795.

Deciduous trees, 15–20 m tall; branches straggling, young parts shining, silky. Leaves alternate below, whorled above, oblong-obovate or oblong-lanceolate, 30–45 × 10–15 cm, obtuse at apex, dentate along margins, cuneate at base, coriaceous, pale-green, glabrous except on nerves; midvein impressed above raised beneath, clothed with white hairs; lateral veins 25–50 pairs, prominent beneath, white hairy pubescent, forking towards margins; petioles 2–5 cm long, sheathing. Flowers 2.5–3 cm across, fragrant, fascicled on leafless branches; pedicels 2.5–5 cm long, reddish, pubescent; bracts orbicular-obovate, 1–2 × 1 mm. Sepals 5, green with reddish patches outside, orbicular or oblong-ovate 8–12 × 4–5 mm, fleshy, coriaceous, obtuse at apex, ciliate along margins, slightly hooded. Petals bright yellow, 5, oblong-lanceolate or obovate 15–20 × 10–12 mm, obtuse at apex, wavy along margins. Stamens in 2 distinct whorls; outer ones many, straight in bud, 2.5–4 mm long; inner ones 8–10, with reflexed apex in bud, 6–9 mm long. Carpels 5(-6), oblong-lanceolate, 3.5–4 × 1.4 mm, unilocular, arranged on narrow conical receptacle; styles c. 4 mm long. Fruits globose, c. 1.5 cm, indehiscent, yellow or orange-red, pendulous with accrescent fleshy sepals, 1(-2)-seeded; seeds ovoid, c. 5 × 3.5 mm, black, glabrous, exarillate.

Fl.: April–May; fr.: May–July.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Uttar Pradesh and West Bengal. WORLD: Celebes and Lesser Sunda Islands, China, Java, Myanmar, Thailand and Vietnam.
Specimens examined: Buxa National Park, Gadadhar Range, Panbari 7, 29th March 2012, Gopal Krishna 50628; Buxa, Santrabari 800’, 23.05.1949, Narayanswami & party 2935.

Notes: Dillenia pentagyna turns completely leafless when flowers appear where as in D. indica leaves remain even during flowering. D. pentagyna is not as common as D. indica in the Park.

MAGNOLIACEAE [17]
MAGNOLIA L.
12 species in India and 1 species in BNP.


Other synonyms: Michelia excelsa (Wall.) Blume; Michelia calcuttensis P. Parm.; Magnolia excelsa Wall.; Michelia manipurensis Watt ex Brandis.

Plate 4f

Local name: “Rani-champa” (Bengali).


Trees, 16–25 m tall; bark dark grey, corky, lenticellate; branchlets densely ferruginous tomentose; buds greyish-brown, sericeous. Leaves simple, alternate, ovate-lanceolate to elliptic, 15–29 × 5–9 cm, acute to acuminate at apex, entire along margins, cuneate to slightly rounded at base, thinly coriaceous, glabrous and shining above, glaucous and minutely pubescent beneath; lateral nerves 7–10 pairs, arched; tertiary nerves closely reticulate; petioles 2–3 cm long, glabrous; stipules oblong-acuminate, 4–5 cm long, silky outside; stipular scars 5–7 mm long. Flowers axillary, sometimes spuriously terminal, faintly scented, white, 10–13 cm across when fully open; buds lanceolate, apiculate, c. 3.5 cm long, silky outside; bracts 2, spathaceous, oblong-ovate, 4–6 × 2–3 cm; pedicels 4–8 mm long. Perianth lobes 12, obovate to spathulate, 5–6 × 2–3.5 cm, white, outer ones larger, gradually narrower towards centre. Stamens 50–80, yellowish; filaments short; anthers c. 1 cm long with a connective. Ovary stipitate; stalk 5–8 mm long; style recurved. Fruiting receptacles elongate, up to 15 cm long; ripened carpels woody, obliquely obovoid, c. 1.5 × 0.6 cm, loosely placed, slightly compressed, shortly beaked, ventrally dehiscent, lenticellate; seeds 1–2, compressed.

Fl. & Fr.: March–October.

Distrib.: INDIA: Arunachal Pradesh, Manipur, Meghalaya, Sikkim and West Bengal.

Uses: Wood is used as timber.

Notes: The species was included in Flora West Bengal, based on a collection from Darjeeling. The present collection is from Jalpaiguri district. This species is endemic to North East India and West Bengal.

ANNONACEAE [21]
Key to genera

1a. Inner whorl of petals reduced or absent; fruit syncarpous and with many seeds, embedded in pulp .......................................................... 1. Annona

1b. Inner whorl of petals present; fruit apocarpous and carpels devoid forming free, often stipitate monocarps with single seed and of pulp................. 2

2a. Flowers ebracteate; inner petals not basally clawed ....................... 4. Polyalthia

2a. Flowers bracteate; inner petals basally clawed or stipitate ...................... 3

3b. Petals greenish yellow; inner petals smaller than outer petals; carpels sessile ................................................................. 2. Goniothalamus

3a. Petals dark pink; inner petals larger than the outer petals; carpels stalked.. 3. Miliusa

1. ANNONA L.

5 species in India and 1 species in BNP.


Local name: “Nona” (Bengali).

Illustration: Curtis’s, Bot. Mag. 56: t. 2911. 1829.

Trees, 10-15 m high; branchlets sub-terete, bark light brown, lenticellate, glabrous. Leaves alternate, oblong-lanceolate, 13-19 x 4.5-5.5 cm, acuminate at apex, entire along margins, cuneate or rounded at base; sub-coriaceous, shiny, glabrous; midvein slightly impressed or flattened above, raised beneath; secondary veins, 17-20 pairs, prominent beneath, reddish; petioles c. 1.5 cm long, glabrous. Flowers extra axillary or terminal cyme; bracts pubescent. Sepals green, 3, broadly ovate, 1.5-3 x 2-3 mm, shortly acuminate, pubescent outside. Petals cream-white, 6 in 2 whorls; outer whorl narrow oblong, 1.5-2 x 0.4-0.5 cm, reddish at the base towards inner side; inner whorl minute, reduced, c. 2 mm long. Stamens many; filaments c. 1 mm long; anthers c. 1 mm long; connectives ovoid. Ovary of
many carpels, ovule 1 per carpel, basal; style oblong, clavate; stigma muriculate. Fruits syncarpous, subglobose, c. 3.5 × 3 cm, pentagonal, reticulate, yellowish brown to reddish brown, many seeded; seeds black, shining.

**Fl.:** May-July; **fr.:** September-January.

**Distrib.:** **INDIA:** Andhra Pradesh, Assam, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal. **WORLD:** Native of Central America and West Indies.

**Specimen examined:** Buxa National Park, Jainti Range, NRVK 6a compt., 04th December, 2011, Gopal Krishna 52324.

**Note:** Cultivated and often naturalized.

2. **GONIOOTHALAMUS** (Blume) Hook.f. & Thomson

10 species in India and 1 species in BNP.


**Illustrations:** Wall., Pl. Asiat. Rar. 3: t. 266. 1832; Fl. India 1: f. 37. 1993. **Fig. 1**

Shrubs, 3-4 m high; stems terete, glabrous; bark dark brown. Leaves alternate, linear-oblong, 22-30 × 5.4-9 cm, abruptly acuminate at apex, entire along margins, rounded-cuneate at base, coriaceous, shiny, glabrous above, puberulous beneath; midvein impressed above, raised beneath, glabrous; lateral veins 17-20 pairs, inconspicuous above, prominent beneath; petioles 8-12 mm long, hispid, stout. Flower axillary, solitary; pedicels c. 7 mm long, glabrous; bracts 2-6, triangular ovate, c. 4 × 3 mm, pubescent outside, glabrous inside. Sepals 3, free, ovate, 5-8 × 4-6 mm, acute at apex, puberulous. Petals greenish yellow, 6, in 2 whorls; outer whorl linear-lanceolate, 12-20 × 3-5 mm, pubescent; inner whorl ovate, 10-14 × 4-5 mm, shortly acuminate apex, clawed at base. Stamens many; filaments c. 1.2 mm long; anthers c. 0.3 mm long. Carpels linear, c. 4 mm long, golden yellow, strigose; style slightly recurved; stigma funnel-shaped. Fruits apocarpous, ovoid, 2-2.5 × 1 cm, orange red when ripe, 1-seeded.

**Fl.:** April-June; **fr.:** September-December.

**Distrib.:** **INDIA:** Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal. **WORLD:** Bangladesh, Bhutan and Myanmar.

Fig. 1. Goniothalamus sesquipedalis (Wall.) Hook.f. & Thomson: a. Flowering branch; b. Flower (petal removed); c. Outer petal; d. Inner petals; e. Stamen; f. & g. Gynoecium
3. MILIUSA Lesch. ex A. DC.
14 species in India and 2 species in BNP.

Key to species

1a. Leaves rounded or acute at base; flowers unisexual or bisexual; fruitlets 1 (2)-seeded ......................................................... 1. M. globosa

1b. Leaves rounded or sub-cordate at base; flowers bisexual; fruitlets 2-seeded .......................................................... 2. M. indica


Other synonyms: Miliusa roxburghiana (Wall.) Hook.f. & Thomson; Uvaria dioica Roxb.


Trees, to 5 m high; stems terete; branches drooping; bark dull brown, glabrous. Leaves simple, alternate, ovate or oblance-obovate or oblance-elliptic, 4–14 × 2–5 cm, acuminate at apex, entire along margins, rounded or slightly oblique at base, coriaceous, glabrous on both surfaces except midvein; midvein slightly impressed above, raised beneath, pubescent; secondary veins 8–10 pairs, inconspicuous above, puberulous, looping towards margin; petioles c. 1 mm long, hispid. Inflorescences axillary, 1 or 2 flowered. Flower pedicels 0.8–2.6 cm long, hispid; bracts linear-lanceolate, c. 2 mm long, hispid; bracteoles narrowly ovate, c. 2 mm long, hispid. Sepals 3, free, pinkish-green; lobes subequal, lanceolate, 3–4 × 1 mm, hispid. Petals crimson, 6 in 2 whorls, free above, connate below; outer petals similar to sepals, lanceolate, 3–4 × 1 mm; inner petals lobes, ovate-elliptic, c. 1 × 0.5 cm, leathery, pubescent outside, glabrous inner side, base shallowly saccate and shortly clawed. Stamens many, arranged on a globose torus, free; filaments flattened, c. 1 mm long; anthers oblong, c. 1 mm long, 1-celled. Carpels obovoid or subglobose, 7–8 mm across, borne on stalk; stalk 1.5–2 cm long; style short; stigma sub-clavate. Fruits apocarpous, ovoid-subglobose, 10–18 mm across, 1-seeded; seed ovoid, c. 4 × 3 mm.

Fl.: December-May; fr.: August-September.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Bangladesh and Bhutan.
Fig. 2. *Miliusa globosa* (A. DC.) Panigrahi & S.C. Mishra: a. Flowering branch; b. Flower; c. Flower (petal removed); d. Sepal; e. Stamen
**Specimen examined:** Buxa National Park, Gadadhar Range, Panbari 1 compt., 9th March, 2011, Gopal Krishna 50523.


Shrubs or small trees, 2-7 m tall; young parts fusco-pubescent. Leaves oblong-elliptic or oblong-lanceolate, rounded or subcordate at base, obtuse or acute at apex, 4-9 × 1.5-3 cm, glabrous above, except the pubescent sunken midrib, pubescent with straight hairs beneath; petioles 1-2 mm long, swollen at base, pubescent. Flowers bisexual, axillary, solitary; pedicels 3-6 mm long; bracts 2, at the lower half of the pedicel. Sepals 3, ovate, c. 1.5 × 1 mm, acute, reflexed, pubescent outside. Petals 6 (3+3); outer petals like the sepals, broadly ovate; inner ones ovate, subacute, united up to the middle from saccate base, 1.2-1.6 × 0.7 cm. Stamens many, c. 1 mm long, with connectives rounded-apiculate at top. Carpels many, linear-oblong, c. 2 mm long, densely pilose, 1 or 2-ovuled; style short; stigma subclavate. Ripe carpels many, subsessile, ovoid or obovoid, silky pubescent; seeds 2, yellow, smooth.

Fl. June-July; fr. October-November

**Distrib.:** INDIA: Karnataka, Kerala, Tamil Nadu and West Bengal.

**Specimen examined:** Buxa National Park, Jainti range, 11th March, 2011, Gopal Krishna 50536.

4. **POLYALTHIA** Blume

14 species in India and 1 species in BNP.


*Guatteria simiarum* Buch.-Ham. ex Hook.f. & Thomson, Fl. Ind. 1: 142. 1855; Prain, Bengal Pl. 1: 204. 1903.

**Fig. 3; Plate 5a**


Trees, 20-25 m tall; branches sub-terete, puberulent when young, glabrous and sparsely lenticellate with age; bark dark gray. Leaves simple, alternate, crowded toward apex, ovate-elliptic or ovate-oblong, 12-17 × 5-8.5 cm, acute at apex, entire along margins, slightly oblique at base, coriaceous, glabrous; midvein impressed above, raised beneath,
Fig. 3. *Polyalthia simiarum* (Buch.-Ham. ex Hook.f. & Thomson) Hook.f. & Thomson:
a. Fructing branch
puberulous; secondary veins 15–16 pairs, slightly impressed or flattened above, prominent beneath; petioles 0.8–0.9 cm long, robust; axillary buds very small or sometimes inconspicuous. Inflorescences in fascicles of 3 or 5 in the axil of fallen leaves. Flowers bisexual. Sepals 3, free, obtusely triangular c. 2 × 2.5 mm, reflexed, pubescent outside. Petals 6, in 2 whorls; outer whorls linear-lanceolate, c. 3 × 0.3–0.4 cm, coriaceous, puberulous outside, glabrous inside; inner whorls linear-lanceolate, slightly longer than outer petals. Stamens oblong; connectives apically broadly truncate to convex, c. 1 mm long. Carpels oblong, c. 1 mm; style oblong, capitate, puberulent. Fruits apocarpous, fruitlets ellipsoid, 2.5–3 cm long, yellow-orange, 1-seeded; seed transversely striate; fruting pedicels 3–4 cm long.

Fl.: April-August; fr.: July-March.

Distrib.: INDIA: Assam, Odisha, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, China, Laos, Myanmar, Thailand and Vietnam.


MENISPERMACEAE [112]

Key to Genera

1a. Erect shrubs or small trees; leaves elliptic or oblanceolate, narrowly rounded or cuneate at base prominently 3-veined at base …… 2. Cocculus

1b. Climbers; leaves ovate or deltoid, broadly rounded, sagittate, truncate or cordate at base not 3-veined at base ………………………………………………… 2

2a. Climbers with milky juice; leaves deeply cordate or hastate at base, basal lobes usually acute ………………………………………………… 3. Parabaena

2b. Climbers with watery juice; leaves not or only shallowly cordate and then basal lobes always rounded ………………………………………………… 3

3a. Stamens connate into a column; anthers borne on margin of peltate disk; carpel solitary………………………………………………………… 1. Cissampelos

3b. Stamens with filaments free or if connate but anthers free; carpels 3 ……………………………………………………………………… 4. Pericampylus
1. CISSAMPELOS L.

1 species in India and BNP.


Other synonyms: *Cissampelos pareira* L. var. *hirsuta* (Buch.-Ham. ex DC.) Forman; *C. hirsuta* Buch.-Ham. ex DC.

Local name: “Ekleja” (Bengali).


Climbing shrubs; stems slender, densely to sparsely pubescent to glabrous. Leaves peltate, ovate to orbicular, c. 7 x 5.5 cm, obtuse or retuse, mucronate at apex, entire along margins, rounded, truncate or cordate at base, sparsely pubescent or puberulous above, tomentose to pubescent below, palmately 5–7-nerved; petioles 2–8 cm long, densely to sparsely pubescent. Male inflorescences axillary, subcorymbose, cymes 2–4 cm long, or a few in fascicles. Male flower green to yellowish; pedicels 1.2 mm long. Sepals 4, obovate, 1.2–1.5 mm long, pilose outside. Petals 4, connate into a cupliform corolla, c. 0.5 mm long, puberulous outside. Stamens connate in a peltate synandrium, c. 1 mm long. Female inflorescences thyrsoid, c. 16 cm long. Female flower: bracts suborbicular, c. 1.8 mm long, puberulous, accrescent; pedicels 1–1.5 mm long. Sepal 1, broadly obovate, 1.2–1.5 mm long. Petal 1, broadly cuneate-ovate, 0.7–0.75 mm long. Staminode absent. Ovary c. 0.5 mm long, pilose; style glabrous; stigma divaricately 3-lobed. Drupes in 2 rows of prominent transverse ridges; seeds horse-shoe-shaped.

Fr.: July-October; fr.: March-May.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, Nepal, Pakistan and Malaysia.


2. COCCULUS DC.

5 species in India and 1 species in BNP.


Fig. 4; Plate 5b, c1, c2

Fig. 4. Cocculus laurifolius DC.: a. Flowering branch; b. Flower bud; c. Flower (petal removed) d. Sepal; e. Outer petal; f. Inner petal; g. Stamens.
Trees, 5–6 m high; branches terete, striate, glabrous. Leaves alternate, simple, elliptic, 7–16.5 × 2.3–5.6 cm, mucro-acute at apex, entire along margins, cuneate at base, coriaceous, green, shiny above, turned light brown when dry, glabrous; veins strongly 3-nerved at base, impressed above, raised beneath, glabrous. Inflorescences axillary panicle. Flower pedicels c. 1 mm long, glabrous; bracts, ovate, c. 0.5 × 0.25 mm. Male flowers: Sepals green, 6, free, in two whorls; outer whorl, lanceolate, c. 0.25 × 0.2 mm, glabrous; inner whorl orbicular, c. 1 × 1 mm, glabrous. Petals white, 6, free, bifid above, jointed at base, conate at the base of filaments. Stamens 6; filaments c. 0.25 mm long; anthers, c. 0.25 mm long, tetradynomous. Carpel absent. Female flowers: Sepals and petals as in male flower. Stamens absent. Ovary elliptic-ovoid, c. 1 mm across; style reflexed. Drupes globose, 4–5 mm across, green turned blackish when mature.

Fl.: April-May; fr.: September-December.

Distrib.: INDIA: Himachal Pradesh, Karnataka, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal (present collection). WORLD: China, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal and Thailand.


Notes: The present collection new record for West Bengal.

Uses: The fruits of the species having taste of piper, the seeds of said species is being used by local people.

3. PARABAENA Miers

1 species in India and BNP.


Climbers with milky juice; branches striate, pubescent. Leaves ovate or oblong-ovate, 11–24 × 6–15 cm, acute to acuminate at apex, entire or distantly dentate along margins, sagittate or hastate at base, thinly coriaceous, usually glabrous above, densely pubescent to subglabrous beneath; basal nerves 3–5; lateral nerves 3–5 pairs above; petioles 4–12 cm long, pubescent. Inflorescences axillary or slightly supra-axillary, dichotomously branched cymes, occasionally thyrsoid, 3–10 cm long, pubescent; flowers few to many, often solitary or paired. Male flowers: pedicels 1–2 mm long. Sepals greenish-yellow,
elliptic-ovate, 1.5-2 cm long, pubescent to glabrescent outside. Petals narrowly obovate, 1-15 mm long. Staminal column c. 1 mm long; anthers 6, free, with transverse slits. Female flowers: Sepals and petals as in male flowers. Staminodes 6, oblong. Carpels 3, erect; style recurved. Drupes ovoid, rostrate, c. 7 x 5 mm, orange, glabrous. Fl.: April-July; fr.: August-September

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Meghalaya, Sikkim, Tripura, Odisha and West Bengal. WORLD: Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand and Vietnam

Specimen examined: Buxa National Park, Jainti range, Jainti 5, 6th April, 2012, Gopal Krishna 56043.

4. PERICAMPYLUS Miers (nom. cons.)

1 species in India and BNP.


Other synonyms: Cocculus incanus Colebr.; Pericampylus incanus (Colebr.) Miers.


Twiner; stems and branches corrugulate, tomentose. Leaves alternate, sub-peltate, broadly ovate, 4-10 x 3.5-11.1 cm, mucronate at apex, crenate along margins, subtruncate or sub-cordate at base, subcoriaceous, whitish-green, upper surfaces sparsely pubescent, lower surface densely pubescent; palmately 5-6 nerved, flattened above, slightly raised beneath, tomentose; petioles 3-6 cm long, corrugulate, tomentose. Inflorescences axillary, paniculate cymes. Male flowers: pedicels c. 1.5 mm long, tomentose; bracts linear, c. 1.5 mm long, tomentose. Sepals green, 9, in 3 whorls; outer whorl narrowly obovate, c. 1 x 0.5 mm, pubescent outside, glabrous inside; middle whorl oblanceolate, c. 1.75 x 0.5 mm, pubescent outside, glabrous inside, inner whorl obovate, c. 1.5 x 1 mm, sparsely pubescent outside. Petals white, 6, obovate, c. 1 x 0.5 mm, glabrous. Stamens 6, monadelphous; filaments c. 1 mm long; anthers globose, c. 1 x 1 mm, 4-celled. Female flowers: Sepals and petals as in male flowers. Staminodes linear, c. 0.75 mm. Ovary c. 0.5 mm long; style 3-fid, recurved. Drupes red or purple, compressed globose, blackish, 5-7 mm across.

Fl.: April-May; fr.: June-August.


Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

PAPAVERACEAE [109]

ARGEMONE L.

3 species in India and 1 in BNP.


Local name: “Bara Shial-kanta” (Bengali).

Illustrations: Edward’s, Bot. Mag. 7: t. 243. 1794.

Herbs, 20-80 cm high; stems terete, smooth, with scattered prickles and yellow latex, glabrous. Leaves simple, rosette at base, alternate above, elliptic-ovate, pinnatifid, 3-10 x 2.5-6.5 cm, semi-amplexicaul at base, spinulose-dentate along margins, pale green, shining, glaucous and prickly on nerves, white-pruinose on veins; midvein impressed above, variegated with glaucous bands; petioles short in basal rosette leaves, sessile above. Flower solitary, axillary or terminal bisexual, 4-5 cm across, sessile or shortly pedicellate; pedicels 2-3 mm long. Sepals 3, oblong-elliptic, c. 10 x 7 mm, prickly outside, glabrous inside, caducous. Petals bright yellow, 6 in 2 whorls, obovate, 2-2.5 x 1.2-1.5 cm, obtuse at apex, chartaceous, nerves prominent. Stamens many; filaments 7-12 mm long, pale green; anthers yellow, c. 1 mm long. Ovary elliptic to oblong, 8-10 mm long, softly spinous; style short; stigma crimson, 3-6-lobed. Capsules oblong, 3-4 x 2 cm, cylindrical, glaucous, green, prickly, 3-6 valved, open by valves at top, many seeded; seeds globose, 1.5-1.8 mm across, brownish-black, pitted.

Fl.: February–March; fr.: March–May.

Habitat: Grows more as a weed in degraded area of park.

Distrib.: INDIA: Throughout. WORLD: Native of Tropical America.

Uses: Seeds produce oil, to be used in treating skin diseases; also used as an adulterant in mustard seeds.

**BRASSICACEAE** (Cruciferae, *nom. alt.*) [273]

**RORIPPA** Scop.

7 species in India and 2 in BNP.

Key to species

1a. Flowers bracteate, white ........................................... 1. *R. benghalensis*

1b. Flowers ebracteate, pale yellow ............................................... 2. *R. indica*


Local name: “Bil-rai” (Bengali).

Herbs, 30-50 cm high; stems branched; branches terete, glabrescent. Leaves alternate, crowded at nodes, simple to deeply lyrate-pinnate, 1.5-4.5 × 0.5-1.7 cm, acute at apex, dentate at margins, attenuate at base, chartaceous, setose above, glabrous beneath; midvein impressed above, faintly raised beneath, hispid; lateral veins 6-8 pairs. Inflorescences racemes, many flowered. Flowers bisexual; pedicels 1-1.5 mm long; bracts lyrate, 1.5-2 × 1 mm. Sepals 4, free; linear-oblong, c. 2 × 0.6 mm, obtuse at apex, chartaceous, nerves conspicuous or sometimes obscure. Petals white, 4, free, linear-obovate, c. 2 × 0.6 mm, obtuse at apex, chartaceous. Stamens 6, tetradynamous; filaments 0.5-0.75 cm long; anthers oblong, 0.5-0.6 mm long. Ovary oblong, c. 1.25 × 0.5 mm, glabrous; style not distinct; stigma bilobed. Siliqua cylindric, 12-17 × 1-1.5 mm, glabrous, many seeded; fruiting pedicels 2-4 mm long, puberulent; seeds reddish brown, subglobose or broadly ovoid, biseriate, mucilaginous when wet.

**Fl. & Fr.**: March–July.

**Habitat**: Grows in moist and shady places.

**Distrib.**: INDIA: Assam, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.
Specimen examined: Buxa National Park, Jainti Range, Jainti 7-8, 12th March, 2011, Gopal Krishna 50552.


Annuals herbs, glabrous, rarely sparsely pubescent; stems terete, unbranched or branched distally. Basal leaves margins pinnatifid, dessile. Cauline leaves petiolate; petioles c. 4 cm, lyrate-pinnatifid or undivided, obovate, oblong, or lanceolate, 3.5–12 × 0.15–0.4 cm, acute at apex, entire or irregularly crenate, or serrate, along margins, auriculate at base or not. Inflorescences racemose. Flower pedicels 0.3–1 cm long. Sepals oblong-ovate, 2–3 × 0.8–1.5 mm. Petals pale yellow, obovate or spatulate, 3–4 × 1–1.5 mm. Stamens many; filaments 1.5–3 mm long; anthers oblong, 0.5–0.8 mm. Ovary with elongated style 1–1.5 mm long; many ovules per ovary. Silique often curved-ascending, linear, 12–25 × 1–1.5 mm; seeds biseriate, reddish brown, ovate or ovate-orbicular, 0.5–0.9 mm, foveolate.

Fl. & Fr.: Throughout the year.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, South America, Thailand and Vietnam.


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**CAPPARACEAE [271]**

Key to genera

1a. Herbs; fruit a cylindrical capsule ................................................................. 2. *Cleome*

1b. Trees, shrubs or climbers; fruit usually a globose berry or a capsule.................. 2

2a. Sepals 6; petals absent; stamens borne on short gynandrophone..................... 4. *Stixis*

2b. Sepals 4; petals present; stamens borne from the base of gynophore............... 3

3a. Shrubs, prickled; leaves simple ................................................................. 1. *Capparis*

3b. Trees, not prickled; leaves palmately 3-foliolate ..................................... 3. *Crataeva*
1. CAPPARIS L.
29 species in India and 1 in BNP.


Shrubs, 1-2 m high; stems and branches terete, tomentose or glabrescent on maturity, prickled; prickle recurved; bark dark green, shining. Leaves simple, alternate, ovate-lanceolate 6.5-11 × 2.3-3.7 cm, acuminate at apex, entire along margins, sub-coriaceous, green, shining above, turned pale when dry; midvein impressed above, raised beneath, faintly reddish, glabrous; lateral veins 5-7 pairs, prominent beneath, glabrous; petioles 4-6 mm long. Flowers in fascicles, axillary, fragrant, bisexual; pedicels 3-10 mm long, tomentose. Sepals 4, free; lobes sub-equal, green, ovate, deflexed, 5.5-9 × 4-6 mm, acute at apex, ciliate along margins, sub-coriaceous, hairy inside, glabrous outside. Petals 4, free, cream-white with greenish tinge, sub-equal, ovate-oblong, obovate, 7-15 × 6-10 mm, obtuse at apex, ciliate along margins, tomentose. Stamens many; filaments from the base of gynophores, 1.8-2.2 cm long; anthers linear-oblong, c. 2 mm long, bluish. Gynophore filiform 2-2.2 cm long, glabrous. Ovary pear shaped, c. 2 × 1.5 mm; style subulate, c. 1.1 mm long; stigma knob shaped. Berries globose, 1-1.2 cm across, green, scarlet-red when ripe, pointed at apex, shiny, 3-4 seeded; seeds c. 3 × 4 mm.

Fl.: February-May; fr.: April-June.

Habitat: Grows in dry and shady places, its population observed in Jainti and Gadadhar ranges.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Karnataka, Kerala, Maharashtra, Manipur, Nagaland and West Bengal. WORLD: Myanmar, Sri Lanka, Thailand and westward extending to tropical Africa.


Notes: It was included in Flora West Bengal based on a collection from Darjeeling district the present collection is from Jalpaiguri district.

2. CLEOME L.
15 species in India and 1 in BNP.

Plate 5: a. Polyalthus simiarum  (Buch.-Ham. ex Hook.f. & Thomson) Hook.f. & Thomson; b - c2. Cocculus laurifolius DC.: b. Habit; c1. Flowering branch; c2. Fruiting branch; d - f. Capparis tenera Dalz.: d. Habit; e. Flower (close up); f. Fruit (close up); g. Cleome rutidosperma DC.
Other synonym: Cleome ciliata Schumach. & Thonn.


Herbs, 30–50 cm high; erect or partially procumbent; stems angled, striate, sparsely pubescent. Leaves alternate, trifoliate; petioles 2–3 cm long, angled, sparsely pubescent; leaflets, ovate-rhombic obovate, 1.5–2.6 × 0.9–1.4 cm, acute at apex, ciliate along margins, cuneate at base, chartaceous, glabrous except lateral veins beneath; midvein impressed above, raised beneath; lateral veins 6–8 pairs, slightly impressed above, prominent beneath, sparsely pubescent; petiolules sessile or sub-sessile, c. 0.3 mm long, slightly hairy. Flowers in axillary racemes, pedicellate; pedicels 2–2.5 cm long, accrescent in fruits. Androgynophore 1.5–2 cm long. Sepals 4, green, free, linear-lanceolate, 3.5–4.5 × 1–1.1 mm, acute at apex, slightly thickened, fleshy, glandular pubescent. Petals 4, purple, oblanceolate-elliptic, 6–8 × 2.5–3 cm, acute at apex, attenuate-clawed at base, veins obscure. Stamens 6; filaments c. 1.1 cm long, glabrous; anthers linear c. 2 mm long, dorsifixed. Ovary linear, 4–6 mm long, glandular pubescent; stigma sessile. Capsules linear-cylindric, 4–6 cm long, tapering at both ends, ribbed, pubescent, many seeded; seeds reniform–sub-orbicular, 1.6–2 × 1.3–1.5 mm, with prominent concentric ridges.

Fl. & Fr.: May–November.


Notes: In Flora West Bengal stamens were quoted 10–12, which might be incorrect.

3. CRATEVA L.

4 species in India 1 in BNP.


Plate 6a, b, c

Local name: “Tikta-shak” (Bengali).

Illustration: Blanco, M., Fl. Filip. t. 176. 1875.

Deciduous trees, to 10 m high; bark ash-grey; branchlets sub-terete, lenticellate, glabrous. Leaves alternate, 3-foliolate; leaflets ovate, rhombic ovate or ovate-elliptic, 5.8–11.5 × 2.3–
5.8 cm, acuminated at apex, entire along margins, cuneate at base, chartaceous, shining, turned pale when dry, glabrous; midvein slightly impressed above, raised beneath, glabrous; lateral veins 7-11 pairs, prominent beneath, glabrous; petioles 3.5-10 cm long, terete, glabrous. Flowers bisexual, 4-5 cm across, towards end of leafy twig; pedicels 3-4 cm long; bracts caducous. Sepals green, 4, adhering below the lobed disk, linear-lanceolate, c. 5 × 1-1.2 mm, acute and upcurved at apex, sub-coriaceous, glabrous, 3-nerved, open even in bud. Petals 4, yellowish-white, ovate-elliptic, 1.1-1.5 × 0.6-1 cm, acute at apex, entire along margins, cuneate-clawed at base, chartaceous, pinnately veined; claw c. 3 mm long attached to the lobed disk. Stamens many; filament 2-3 cm long, maroon-green, adnate below at base of gynophore; anthers oblong-ovate, c. 3 mm long, maroon-green. Gynophore c. 1.5 cm long, glabrous; ovary c. 2.5 × 1.3 cm; stigma sessile. Berries 3-5 cm across, lenticellate, hard, many seeded embedded in yellow pulp; epicarp c. 5 mm thick, unpleasant smell; seeds globose c. 5 mm across.

Fl.: March-April; fr.: October-November.

Habitat: Grows along rivers Bala and Jainti. Also found in mid of dense forest in East Damanpur range.


Notes: Trees appear leafless in fruiting.

4. STIXIS Lour.

2 species in India and 1 species in BNP.


Plate 6d, e

Local name: “Kasouli Lahara” (Bengali).


Lianas; branchlets terete, lenticellate, puberulous, glabrous later. Leaves alternate, oblong-ovate or oblong-lanceolate or obovate, 17-26 × 5.8-8.5 cm, shortly acuminate at apex, undulate along margins, cuneate at base, coriaceous, green shining, turned pale
when dry, glabrous; midvein slightly impressed or flattened above, raised beneath, glabrous; lateral veins 8-10 pairs, flattened, slightly obscure above, raised, prominent beneath, glabrous; petioles 1.8-2.9 cm long, stout, glabrous. Inflorescences axillary or terminal racemes; rachis 5-7 cm long, tomentose. Flowers c. 1 cm across; pedicels 3-4 mm long, tomentose; bracts lanceolate, c. 3 x 1 mm, acute at apex, tomentose both side. Sepals 8, arranged in 2 whorls, free above, connate below; lobes ovate, c. 4 x 3 mm, acute at apex, tomentose. Petals absent. Stamens many; filaments creamish white or yellow, subequal, terete, cuneate at tips, 5-7 mm long, pubrulous; anthers ovoid c. 1 x 0.4 mm, bilobed, faintly yellow. Gynophore 2-3 mm, long, golden-yellow tomentose. Ovary globose, c. 1.5 x 1 mm, glabrous; styles 2, linear c. 1 mm long, glabrous; stigma capitate, 3-4-lobed. Drupes ellipsoid or obovoid, 1.5-2 cm across, lenticelate, shortly stalked, 1-seeded; seed ovoid, 1.6-1.8 x 1-1.2 cm, embedded in pulp; pulp aromatic, yellow, sweet.

Fl. & Fr.: October-February.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal and South East Asia.


Uses: Fruits edible.

Notes: Its placement in Capparaceae is doubted by Mabberly (Plant Book, 2008) for the fact placentation is axile and not parietal. West Bengal was excluded under distribution data in Fl. India. l.c.

FLACOURTIACEAE

Key to genera

1a. Flowers bisexual; petals absent; stamens 8, fruit a capsule, ellipsoid; seeds arillate ............................................................... 1. Casearia

1b. Flowers unisexual; petals present; stamens many; fruit a berry, globose; seeds exarillate .................................................. 2. Gynocardia

1. CASEARIA Jacq.

12 species in India and 1 in BNP.

Fig. 5. Casearia vareca Roxb.: a. Fruiting branch
Other synonym: *Guidonia vareca* (Roxb.) Baill. ex Kurz.  

*Fig. 5; Plate 6f*

Trees, 7-10 m tall; branches spreading; branchlets, terete, corrugated, pubescent. Leaves alternate, spiral, simple, oblong or oblong-ovate, 7-16 × 2.3-4.8 cm, acuminate at apex, serrate along margins, cuneate at base, coriaceous, glabrous except nerves; midvein flattened above, raised beneath, pubescent; lateral veins 12-14 pairs, prominent beneath, obscure above, pubescent; petioles c. 0.8 cm long. Inflorescences in axillary fascicles. Flowers bisexual; pedicels 2-3 mm long; bracts oblong-ovate, c. 1.5 × 1 mm, acute at apex, chartaceous. Sepals 4-lobed; lobes ovate or suborbicular, c. 2 × 1.5 mm, thick. Petals absent. Stamens 8; filaments united into a tube, c. 1 mm long; anthers ovoid, c. 0.5 mm long. Staminodes shorter than stamens. Ovary ovoid-oblong, 1-2 mm long; style short; stigma capitate. Capsules orange, subglobose to broad ellipsoid, in clusters usually with remnant styar bases, c. 1.5 cm long, shining, 3-valved; seeds ovate c. 4 × 2 mm, embedded in scarlet aril.

**Fl.**: May-September; **fr.**: August-April.

**Distrib. INDIA**: Arunachal Pradesh, Assam, Meghalaya, Nagaland and West Bengal.

**WORLD**: Bangladesh, Bhutan and Myanmar.

**Specimens examined**: Buxa National Park, East Damanpur range, Check-2, 13th Feb., 2010, S.K. Srivastava & Gopal Krishna 47070; Rajabhatkhawa Depot. Road, 14.05.1949, V. Narayanswami & party 2400.

**Note**: The genera cited above under Flacourtiaceae have gone to two different families, *Casearia* in Salicaceae [201] and the other, *Gynocardia*, in Achariaceae [204].

### 2. GYNOCARDIA Roxb.

1 species in India and 1 species in BNP.


**Plate 7a, b**

**Illustration**: Roxb., Pl. Coromandel 3: t. 299. 1819.

Dioecious trees, 10-15 m tall; branches scrambling, appear as lianas; bark light yellow gray; branchlets sub-terete, lenticellate, glabrous. Leaves alternate, simple, oblong, oblong-ovate, 13-23 × 5-7 cm, acuminate or cuspidate at apex, entire along margins, rounded at base, coriaceous, shining, turned pale when dry, glabrous; midvein raised both sides, glabrous; lateral veins 6-7 pairs, prominent beneath, arcuate, glabrous; petioles c. 1.4 cm long, stout, glabrous. Flowers unisexual. Male flower solitary or in many flowered axillary fascicles on tubercles on stem and older branches, pale yellow,
fragrant; pedicels 2–2.5 cm long, angled, slightly tapering toward base; bracteoles ovate, c. 1 × 0.5 mm, pubescent. Sepals pale-green, cupular below, shallowly 5-lobed above; cup c. 7 × 5 mm, thick, leathery; lobes shallowly obtuse. Petals green-white, 5, connate at base; lobes oblong or suborbicular c. 15 × 7 mm, fleshy, glabrous, each with a scale inside at base; scales oblong, c. 6 × 4 mm, obtuse, densely ciliate along margins. Stamens many; filaments broaden towards base, c. 1 mm long, hairy; anthers linear-oblong, c. 2 mm long, basifixed. Pistillode absent. Female flowers few on tubercles on stems and older branches. Sepals and petals similar as in males flower but larger than male flowers. Staminodes 10–15, villous. Ovary globose 5–7 mm across; styles 5, short; stigmas hastate. Berries globose, 8–12 cm across; pericarp thick, hard, rugose, greyish, glabrous, many seeded; seeds variable, usually ovoid or ellipsoid, 2.5–3 × 1.8–2.2 cm, irregularly compressed without aril.

Fl.: March–May; fr.: November–December.

**Distrib.:** **INDIA:** Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal. **WORLD:** Bangladesh, Bhutan and Myanmar.

**Specimens examined:** Buxa to Bhutan Road, 2800’, 16.05.1949 Narayanswami & party 2513; Jalpaiguri, Way to Tabgaon, 18. 05. 1949, Narayanswami & party 2695; East Damanpur Range, SRVK 12 compartment, 30th March, 2012 Gopal Krishna 50665.

**Uses:** Seeds are used in fish poison.

**Note:** Male plants are more common than female plants in the Park.

**CARYOPHYLLACEAE [296]**

Key to genera

1a. Stipules absent ................................................................. 3. _Stellaria_

1b. Stipules present ............................................................................................................................. 2

2a. Leaves petiolate; sepals herbaceous; stamens 2; styles 2–3 fid;

   capsules 3-valved ............................................................. 1. _Drymaria_

2b. Leaves sessile; sepals scarious; stamens 3–5; styles 3–5 fid;

   capsules 6-valved ........................................................................................................ 2. _Polycarpon_

1. **Drymaria** Willd. & Schult.

   2 species in India and 1 species in BNP.

Other synonym: *Drymeria cordata* Edgew. & Hook.f.

**Illustration:** Fl. India. 2: f. 108. 1993.

Herbs, 30-40 cm high; stems branched, terete, puberulent. Leaves simple, opposite, deltoid-ovate to subreniform, 4–13 × 3–10 mm, acute or broadly acute at apex, crenate along margins, truncate or cuneate at base, chartaceous, green, slightly punctate beneath; palmately 3-nerved at base, lateral nerve branched from above, faintly appear like 5-nerved, conspicuous beneath; petioles 1–2 mm long, puberulent; stipules interpetiolar, variable, linear-lanceolate, 1–3 mm long. Inflorescences terminal racemes. Flowers bisexual; pedicels filiform, 1–1.5 mm long, glandular pubescent; bracts oblong-ovate, 1–1.25 × 0.75 mm; bracteole broadly ovate, c. 1.5 × 1 mm. Sepals pale-green, 5, elliptic-lanceolate, c. 2.75 × 0.5–0.8 mm, punctate, gland dotted above, 3-nerved. Petals 5, bifid, nearly up to middle or more, white, lobes oblong, obtuse at apex, glabrous. Stamens 2; filaments c. 1.5 mm long, glabrous; anthers ovoid c. 0.5 mm. Ovary c. 1 × 0.6 mm, glabrous; style 2–3-fid, short, 0.3–0.4 mm; stigma bifid. Capsules lanceolate, 0.3–0.4 mm long, 3-valved, many seeded; seeds finely tuberculate.

**Fl. & Fr.**: January-December.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Karnataka, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Australia, Bangladesh, Bhutan, China, China, Malaysia, Nepal, Sri Lanka, Taiwan and Tropical Africa.


**Notes:** The flowers have sticky nature due to presence of glands on its pedicel and calyx.

### 2. POLYCARPON L.

2 species in India and 1 species in BNP.


Other synonyms: *Hepalosia loeflingiae* Wight & Arn.; *Polycarpon loeflingiae* (Wall. ex Wight & Arn.) Benth. ex Edgew. & Hook.f.

**Illustration:** Fl. India. 2. f. 114. 1993.
Herbs, to 10 cm high; stems terete, appressed hairy. Leaves simple, opposite, whorled at node, elliptic ovate or ovate-elliptic, 3-9 × 1.5-3 mm, acute at apex, entire along margins, attenuate at base, sub-coriaceous, appressed hairy both sides; midvein conspicuous, hairy; lateral veins inconspicuous both sides, covered with hairs; petioles 2-3 mm long; stipule broadly ovate, c. 2.5 × 1 mm, lacerate along margins. Inflorescences terminal or axillary cymes. Flowers pedicellate, 3-3.5 × 2 mm; pedicels short, 0.5-1 mm long; bracts very similar to stipules. Sepals white, 5, free up to base, ovate-elliptic or elliptic, subequal, 3-3.5 × 1 mm, middle portion thickened, hard, margin hyaline, delicate, hispid outside, glabrous inside. Petals 5, free, ovate, 1.5-2 × 1 mm, lobed at apex. Stamens 3-5; filament c. 1 mm long; anthers ovoid. Ovary c. 1 × 0.75 mm, glabrous; style 3-5 fid, short; stigma 3-fid. Capsules ovoid, c. 1.5 mm across, 6-valved.


**Distrib.**: INDIA: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Tropical Asia and Tropical Africa.


### 3. STELLARIA Ség.

17 species in India and 1 species in BNP.


**Illustration:** Wight, Icon. Pl. Ind. Orient. 3: t. 947. 1846.

Herbs, 10-15 cm high; stems terete, weak, white pubescent. Leaves simple, opposite, ovate, broadly ovate, 5-12 × 5-10 mm, broadly acute at apex, crenate along margins, shallowly cordate or truncate at base, chartaceous, appressed hairy; midvein obscure above, faintly raised beneath, glabrous; lateral veins 5-6 pairs, faintly raised beneath, inconspicuous above, glabrous; petioles 5-20 mm long, echinate, purplish; stipules absent. Inflorescences terminal cymes. Flowers pedicels 1.5-2 mm long, hairy. Sepals 4, free, ovate, 3-4 × 1-2 mm, pubescent. Petals, white, 4, free, deeply bifid; lobes ovate-obovate, 2-3 × 1-1.5 mm, glabrous. Stamens 8; filaments filiform, c. 1 mm long, hyaline; anthers ovoid c. 1 mm long. Ovary globose, c. 0.75 mm across, 1-loculed; style 3-fid,
filiform, c. 0.5 mm long; stigma simple. Capsules ovoid, 4–7 × 1 mm, many seeded; seed ovoid to compressed globose, c. 1 mm across.

Fl. & Fr.: Throughout the year.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Afghanistan, America, Bhutan, Europe, Nepal, Russia and Turkey.


Notes: All CAL collections show flowers with 5 petals, whereas collections from the Park were found to have only 4 petals.

HYPERICACEAE [214]

HYPERICUM L.

25 species in India and 1 in BNP.


Illustration: Fl. India. 3. f. 25. 1993.

Tufted herbs, 5–21 cm high; stems erect, decumbent or prostrate, rooting at basal nodes, dichotomously branched; branches angled, glabrous. Leaves opposite decussate, simple, broadly elliptic or oblong-ovate, 5–10 × 2–6 mm, acute at apex, with prominent red gland dots at tip, faintly visible on maturity, entire along margins, cordate-amplexicaul at base, chartaceous, green, glabrous; 5–7 nerved at base faintly impressed above, obscure, sessile. Inflorescences solitary to many flowered, in dichasial or monochasial cymes. Flower pedicels 5–7 mm long; bracts linear-lanceolate, 2–2.5 mm long. Sepals green, 5, imbricate; outer 2, ovate, 3.5–5 × 1–2.5 mm; inner 3, oblong to oblanceolate, 3–5 × 1–2 mm, acute or rounded with a red gland at apex, entire with pellucid glands along margins, 2–3-veined, persistent. Petals pale to bright yellow, 5, elliptic to obovate c. 5 × 2.5 mm, obtuse at apex, entire along margins. Stamens many free or distinctly connate in 3-8 bundles; filaments 2.5–3 mm long; anthers yellow, obvoid, c. 0.5 mm long. Ovary ovoid to subglobose, 2–3 mm long; styles 3-fid, free above connate below, c. 1.2 mm long. Capsules cylindric to globose, 4–4.5 mm long, many seeded; seeds oblong, c. 0.5 mm.

Fl.: March-October; fr.: April-November.
Habitat: Often seen growing in grasslands of the park.

Distrib. INDIA: Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Madhya Pradesh, Maharashtra, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia, Japan, Laos, Myanmar, Malaysia, Nepal, North Korea, Philippines, South East Australia, South Korea, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: Buxa National Park, Gadadhar Range, Panbari 8, 8th March, 2011, Gopal Krishna 50513.

Notes: In Flora China the taxon was placed under Clusiaceae, the much variability, with eight nodal variants without being named were recognised based on nature of habit, inflorescence and size and shape of bracts and sepals.

THEACEAE [334]

Key to genera

1a. Shrubs (dioecious); flowers unisexual; anthers basifixed; fruit
   a berry; seeds without wings ................................................................. 1. Eurya

1b. Trees; flowers bisexual; anthers versatile; fruit a capsule; seeds winged ..... 2. Schima

1. EURYA Thunb.

8 species in India 1 species in BNP.


Other synonyms: Diospyros serrata Buch.-Ham. ex D. Don; Eurya membranacea Gardner; E. wallichiana Steud.; E. phyllanthoides Blume; E. japonica Thunb. var. phyllanthoides (Blume) Dyer; E. wrayi King.


Dioecious shrubs, 2–4 m high; stems branched. Bark dark brown; branchlets terete, glabrous. Leaves alternate, elliptic-lanceolate or obleng-elliptic, 1.7–10.5 × 0.9–2.9 cm, caudate-acuminate at apex, crenate along margins, cuneate, at base, thinly leathery, dark green, shining above, pale beneath, glabrous except veins; midvein impressed above, glabrous, raised beneath, hispid lateral veins 13–20 pairs, prominently raised beneath, sparsely hairy to glabrous beneath; petioles 1–2 mm long, puberulent or glabrous. Inflorescences axillary, 2–5-flowers in almost every leaf axil; flowers unisexual. Male
flowers c. 4 × 2.5 mm; pedicels 2–4 mm, long; bracts ovate, 1–1.3 × 0.5 mm; bracteoles broadly ovate to sub-orbicular, 1–1.2 × 1 mm, pubescent outside, glabrous inside. Sepals green, 5 (2+3), free; outer 2, suborbicular, c. 1.5 × 1.5 mm, hairy outside, glabrous inside, sub-coriaceous; inner 3, ovate, c. 2 × 2 mm, hairy outside, glabrous inside, sub-coriaceous. Petals cream-white, 5, connate below, lobed above; lobes obovate or ovate to oblanceolate, 4.5–5 × 2–3 mm, caducous. Stamens 15–20; filaments unequal, 1–3 mm long, glabrous; anthers yellow, c. 1 mm long. Pistillode absent. Female flowers: pedicels, sepals and petals are similar as in male flowers. Staminodes c. 3.5 mm long. Ovary sub-globose, 2–3 × 1 mm, glabrous, 3–5-loculed; styles 1.5–2 mm long; stigma 3–4, feathery. Berries bluish black, globose to subglobose, c. 5 mm across, glabrous, many seeded; seeds trigonal but not angled, dark brown, c. 1 mm long.

Fl.: October–December; fr.: Jumary–August.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Malaysia, Myanmar and Sri Lanka.

Specimen examined: Buxa National Park, East Damanpur Range & Rajabhatkhawa range, Checko 2, 27th Nov., 2011, Gopal Krishna 47141; On the way to Chunabhati near Buxa Fort, 2500′, 24.05.1949, V. Narayanswami & party 2972.

Notes: Both male and female plants look similar but male plants are fewer in comparison to female plants in the Park.

2. SCHIMA Reinw. ex Blume

1 species in India and 1 in BNP.


Other synonyms: Gordonia wallichii DC.; G. chilaunea Buch.-Ham. ex D. Don. Plate 7f, g

Local name: “Chilaune” (Nepali).

Trees, 25–30 m tall; bark brown, rough; branchlets sub-terete, lenticellate, glabrous. Leaves sub-opposite, crowded towards end of branchlets, elliptic to broadly elliptic, 8–21 × 3.2–6.8 cm, broadly acute or acuminated at apex, entire-wavy along margins, attenuate at base, coriaceous, green, shining, upper surface glabrous except midvein, appressed hairy beneath; secondary veins 10–14 pairs, reddish, prominent beneath, pubescent; petioles 1–2 cm long, lamina decurrent faintly on to petioles. Inflorescences axillary, solitary.
Flowers 3–5 cm across, fragrant, pedicellate; pedicels 1.5–2 cm long, terete, lenticellate. Sepals 5, sub-orbicular, 3–4 × 3 mm, obtuse at apex, coriaceous, glabrous outside, hairy inside. Petals white, 5, broadly obovate, 1–1.5 × 1 cm, obtuse at apex, minutely pubescent at the base outside, glabrous inside. Stamens many, adnate to the base of petals; filaments yellow, terete, 5–10 mm long; anthers ovoid, yellow, versatile. Ovary globose, 2–3 mm, tomentose; style 5–6 mm long; stigmas capitate, 5-lobed. Capsules, subglobose, c. 2 × 1.8 cm across, 5-loculed, grey, lenticellate, pericarp woody; seeds 2–6 per locule, c. 7 × 4 mm, surrounded by 2–3 mm wing.

Fl. & Fr.: February–December.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar and Nepal.


Notes: Its occurrence in the Park is quite frequent and the timber is used as firewood.

ACTINIDIACEAE [340]

SAURAUJA Willd. [“Saurauja”], (nom. cons.)

8 species in India and 1 species in BNP.


Local name: “Daliup” (Bengali).

Trees, 5–7 m high; young stems and branches covered with scurfy hairs and appressed scales, lenticellate; branchlets terete, glabrescent. Leaves alternate or sub-opposite, crowded towards end of branchlets, elliptic-oblong or elliptic, 11.5–26 × 4.3–7.2 cm, shortly acuminate at apex, distantly serrate along margins, rounded-cuneate at base, coriaceous, shining, young leaves rusty tomentose with scales on midvein beneath, mature leaves glabrous on both surfaces; midvein flattened or slightly raised above, prominently raised beneath; lateral veins 14–17 pairs, prominent beneath; petioles 3–6.7 cm long, rusty tomentose with scattered scales, glabrescent. Inflorescences axillary cymes; leaves fall off in older branches after flowering, peduncles and pedicels rusty tomentose; pedicels 5–7 mm long, tomentose; bracts minute, deltoid, acute. Sepals pale green, 5,
ovate toovate-rounded, 2–3 × 2–3 mm, acute at apex, hairy along margins, glabrous thick. Corolla campanulate, light pink, 5-lobed; lobes suborbicular, 4–5 × 3–4 mm, obtuse at apex, glabrous. Stamens many, in whorls; outer whorl filaments c. 0.2 mm long; innermost whorl filaments c. 1.5 mm long; anthers oblong, c. 1.2 mm long, dehiscing by pores. Ovary conical, c. 2 × 2 mm, glabrous; styles 5-fid, 1–2 mm long, connate at base, free above, persistent in young fruits. Berries subglobose, c. 5 mm across, fleshy, whitish; seeds many, minute, brown.

Fl.: March–May; fr.: September–February.


Notes: The species occurs frequently in the park and gall formation on branches is common.

DIPTEROCARPACEAE [256]

Key to genera

1a. Leaves plicately folded in buds; stipules amplexicaul, stipular scar encircling the twigs; inflorescence axillary racemes; calyx in fruit with a distinct urceolate tube; ovary semi-inferior .................... 1. Dipterocarpus

1b. Leaves not plicately in bud; stipules not amplexicaul; inflorescence in panicles; calyx in fruit without a tube, lobed above; ovary superior .................. 2

2a. Petioles straight; sepals free; stamens more than 15; filaments pandurate; three outer calyx lobes expanded into wings .................. 2. Shorea

2b. Petioles short and curved; sepals united at base; stamens 15; filaments flattened; two calyx-lobes expanded into wings .................. 3. Vatica

1. DIPTEROCARPUS C.F. Gaertn.

10 species in India and 1 in BNP.

Dipterocarpus retusus Blume, Cat. Gew. Buitenzorg 77. 1823.

Other synonym: Dipterocarpus macrocarpus Vesque.

Local name: “Hollong” (Nepali).

Trees, 30–35 m tall; bark gray or brown. Leaves alternate, usually plicately folded in buds, simple, elliptic to elliptic-ovate, 40–50 × 25 cm, abruptly acuminate at apex, entire and ciliate along margins, broadly cuneate at base, coriaceous, green, shining, glabrous above except nerves, stellate hairy beneath; midvein flattened above, raised beneath, stellate pubescent; lateral veins 25–28 pairs, prominent both sides, stellate pubescent beneath; petioles 7–8.5 cm long, pilose; petioles hairy stipules green or red, lanceolate, 14–18 cm long, sub-coriaceous, pilose outside, glabrous inside, amplexicaul. Inflorescences axillary racemes, 8–10 cm long, 2–5-flowered; flowers large, scented, star shaped. Sepals 5 (2 + 3), urceolate tubular in fruits; lobes valvate, 3 shorter deltoid, c. 2 mm long, two enlarged lobes strap-shaped, 20–25 × 3–5 mm, coriaceous, tomentose. Petals creamish-pink, 5, falcate-ovate-lanceolate, 5–6 cm long, tip and margins recurved, subcoriaceous, faintly longitudinally nerved, glabrous inside, stellate-puberulous outside. Stamens 30, longer than style at anthesis; filaments filiform, dilated at base, c. 5 mm long; anthers linear-oblong, 5–8 mm long; connective c. 4 mm long, subulate. Ovary c. 6 × 4 mm, semi-inferior, silky pubescent; styles c. 1.5 cm long, longitudinally ribbed, silky hairy. Nuts ovoid, hard indehiscent, c. 5 × 4.2 cm, densely yellowish tomentose, 3 smaller lobes of fruiting calyx, orbicular ovate or ovate-elliptic, c. 2 × 1.5 cm, obtuse, subrevolute.

Fl.: June–November; fr.: August–March.

**Distrib.**: INDIA: Arunachal Pradesh, Assam, Nagaland and West Bengal. WORLD: China, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam.

**Specimen examined**: Buxa National Park, East Damanpur Range, Checko 2, 8th April, 2012, Gopal Krishna 5608.

**Uses**: It is valued for superior quality timber.

**Notes**: This species has been excluded in Flora West Bengal.

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2. **SHOREA** Roxb. ex C.F. Gaertn.

4 species in India and 1 in BNP.


**Illustration**: Roxb., Pl. Coromandel 3: t. 212. 1819.

Trees, 25–30 m tall, tardily deciduous; bark gray to dark reddish brown, usually breaking in flakes. Leaves alternate, simple, ovate-oblong, 9.5–15 × 5–9.3 cm, broadly acuminate at apex, entire wavy along margins, rounded or shallowly cordate at base, sub-coriaceous,
pale green, shining above, glabrous; midvein flattened or slightly raised above, prominently raised beneath; lateral veins 12-15 pairs, prominent beneath; petioles 1-1.5 cm long, glabrous, stout; stipules falcate, 7-12 mm long, pubescent. Inflorescences axillary or terminal, lax panicles; rachis 12-35 cm long, pale velvety tomentose. Flowers 1-1.5 mm, across; pedicels c. 2 mm long, stout, angled, silky tomentose. Sepals 5, triangular ovate, 2-2.5 × 3 mm, acute at apex, coriaceous, silky tomentose outside, glabrous inside, imbricate. Petals light yellow, 5, narrowly obovate-lanceolate, c. 10 × 4 mm, twisted, appressed sericeous outside, glabrous inside, 12-13-nerved, nerves conspicuous. Stamens more than 15; filaments pandurate, 1.5-2 mm long; anthers oblong c. 1 × 0.5 mm, hairy at apex; connective slightly extended, c. 0.5 mm. Ovary oblong, c. 1.5 × 1 mm, pubescent; style subulate, 2-3 mm long; stigma denticulate, 3-lobed. Nuts ovoid, 1-1.2 cm long, beaked; wings linear-oblong or spathulate, subequal, 3 rather larger, 5-10 cm long, prominently nerved.

Fl.: February-May; fr.: May-July.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Jharkhand, Himachal Pradesh, Madhya Pradesh, Odisha, Tripura and West Bengal. WORLD: Bhutan, China and Nepal.


Uses: Wood is used as timber.

3. Vatica L.

2 species in India and 1 in BNP.

Vatica lanceifolia (Roxb.) Blume, Mus. Bot. 2: 31. 1856 (as “lanceaefolia”); Dyer in Hook.f., Fl. Brit. India 1: 302. 1874. Vateria lanceaefolia Roxb., Fl. Ind. 2: 601. 1824. Fig. 6; Plate 8e, f

Trees, 7-10 m high, bark ash whitish. Leaves alternate, oblong-lanceolate, 10-14 × 3.6-8.6, obtuse to acuminate at apex, entire along margins, cuneate rounded at base, subcoriaceous, dark green, glabrous; midvein raised both sides, glabrous; lateral veins 8-10 pairs, prominent beneath, glabrous; petioles 8-12 mm long, stout, curved at base, glabrous. Inflorescences axillary panicles, 6-7 cm long; rachis pubescent. Flower buds 5-11 mm long, fragrant, pedicellate; pedicels 3-5 mm long, tomentose. Sepals 5, free above, connate below, triangular, 1.5-2 × 1 mm, acute at apex, tomentose outside, glabrous inside, valvate, accrescent. Petals 5, imbricated in buds, linear-falcate, 1.5-2 cm long, tomentose outside. Stamens 15, short and thick, inserted onto the receptacle; filament dilated; anthers ovoid-oblong c. 1 mm, appendages of connective elongated. Ovary
Fig. 6. Vatica lanceifolia (Roxb.) Blume: a. Flowering branch; b. Flower bud; c. A flower (petal removed); d. Stamen; e. Gynoecium
Plate 8: a - b. Saurauia roxburghii Wall.: a. Flowering branches; b. Flowers (close up);
puberlous, 3-loculed, each locule with 2 ovules; style c. 0.5 mm long; stigma clavate, three-toothed. Fruits ovoid or globose, apiculate, indistinctly 3-furrowed, finely tomentose later glabrous; fruiting calyx lobes broadly cordate at base, 2-outer ones overlapping with either the right or left edge, longitudinally 5-nerved.

**Distrib.:** **INDIA:** Arunachal Pradesh, Assam, Nagaland, Meghalaya, Manipur and West Bengal. **WORLD:** Bhutan, China and Myanmar.

**Specimen examined:** Buxa National Park, Gadadhar range, 9th April, 2012, Gopal Krishna 56083.

**Notes:** There are 3–4 individuals in the Park (in the Gadadhar range) and the species was designated under IUCN’s Critically Endangered status. In Flora West Bengal it was stated that its distribution is in Jalpaiguri district but there are no representative collections in CAL from West Bengal.

**MALVACEAE [250]**

**Key to genera**

1a. Fruit a capsule .............................................................................................................................. 2
1b. Fruit a schizocarp of 5–many mericarps ................................................................................3

2a. Flower yellow with dark purple at centre, epicalyx persistent; capsule ovoid, angled and acute attip; seeds reniform concentric rings on surfaces, minutely stellate hairy......................................................... 1. *Abelmoschus*

2b. Flower uniformaly white; epicalyx caducous (only in the refered species); capsule globose; seeds tetragonous, tuberculate .......... 2. *Hibiscus*

3a. Pedicel accrescent in fruit; epicalyx absent; petals uniformly yellow; style branches as many as carpels; fruit not spinous ......................... 3. *Sida*

3b. Pedicel not accrescent in fruit; epicalyx present; petals light pink with dark tinge in centre; style branches twice as many as carpels; fruit spinous ........ 4. *Urena*

1. **ABELMOSCHUS** Medik.

6 species in India and 1 in BNP.


Other synonym: *Hibiscus abelmoschus* L. 

**Local name:** “*Muk-dana*” (Bengali).

**Illustrations:** Fl. India 3: f. 86. 1993.
Shrubs, to 1.5-2 m high; stems terete, hollow, hirsute. Leaves alternate, palmately 5-7-lobed; lobes ovate-lanceolate, 8.5-13.5 × 2.5-5.3 cm, acute or acuminate at apex, serrate-dentate along margins, subcoriaceous, green, hispid above, stellately hairy beneath; 5-7-nerved, slightly raised both sides, hispid; petioles 14.5-24 cm long, terete, hollow, hirsute; stipules filiform, 5-10 mm long, hairy. Flower solitary, axillary; pedicels 2.5-3 cm long, hirsute. Epicalyx 6-10, linear-lanceolate, 1.8-2.3 × 0.5-0.6 cm, acute, chartaceous, hirsute outside, glabrous inside. Sepals green with reddish tinge, 5, spathulate, 1.5-3 cm long, stellate tomentose outside, sericeous inside, usually caducous. Petals yellow with dark purple at centre, 5, obovate, c. 10 cm long, obtuse at apex, hairy at base. Staminal column included, c. 2.5 cm, antheriferous. Ovary 5-locular; style simple, distally 5-branched; stigmas discoid. Capsules ovoid, 4-5.5 × 2-2.8 cm, hirsute, many seeded; seeds brown-black, reniform, c. 4 × 3 mm, concentric rings on surface, minutely stellate hairy.

Fl.: July-October; fr.: October-December.

Distrib.: INDIA: Throughout. WORLD: Bangladesh, Cambodia, China, Fiji Islands, Indonesia, Laos, Malaysia, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti Range, NRVK 6a, 6th Dec., 2011, Gopal Krishna 52349.

Notes: On scrubbing, seeds emit musk like pleasant scent. This is cultivated in West Bengal for perfume industry.

2. HIBISCUS L. (nom. cons.)

23 species in India and 1 in BNP.


Other synonym: Hibiscus solandra L'Hér., (nom. illeg.).


Undershubs, to 1 m high; stems and branches terete, hispid. Leaves alternate, simple, lower leaves broadly ovate-orbicular, upper leaves deeply 3-lobed, lobes ovate or ovate-lanceolate, 1.5-6 × 1.5-6 cm, acuminate at apex, serrate along margins, rounded or subcordate at base, sub-coriaceous, green, stellate hairy mixed with simple hairs both surfaces; 5-7-nerved at base, prominent beneath, pubescent; petioles filiform, 1.5-6 cm long, pubescent; stipules linear, c. 5 mm long, hairy. Flower solitary axillary; pedicel c. 2 cm long, hairy, accrescent in fruits; bracts lanceolate, c. 3 mm long, hairy. Epicalyx 6-8, c.
1 mm in bud, cauducous before anthesis. Sepals green, 6, connate below; lanceolate, c. 7 × 1.5 mm, acute at apex, hairy outside, glabrous inside, vein prominent. Petals white, 6, lobed above, slightly connate below oblong-ovate, c. 11 × 3 mm, acute at apex, hispid along margin and midvein. Stamens forming a column; column c. 6 mm long. Capsules oblong-ovoid, 1–1.5 cm long, hispid outside; seeds tetragonal, c. 1.5 × 1 mm, tuberculate.

Fl. & Fr.: July–January.


3. SIDA L.

12 species in India and 1 in BNP.

Key to species

1a. Leaf tip acute; stipules in pairs dissimilar .................................................. 1. S. acuta
1b. Leaf tip obtuse; stipules in pairs similar .................................................. 2. S. rhombifolia


Other synonyms: Sida lanceolata Retz.; S. carpinifolia auct. non. L.f. 1785.


Herbs, 0.5–1 m high; branches terete, slender, minutely stellate-pubescent, becoming glabrescent later. Leaves alternate, oblong-lanceolate to linear-lanceolate, 2–7 × 0.5–2 cm, acute or subacute at apex, coarsely serrate along margins, obtuse or rounded at base, chartaceous, sparsely stellate-hairy, becoming glabrescent; midvein flattened above, raised beneath, sparsely pubescent or glabrous; 3-nerved at base; petioles 4–7 mm long, stellate-pubescent; stipules 2, dissimilar, linear to lanceolate, 0.4–1 cm long. Flowers axillary, solitary or 2–3 together in a cluster, c. 1.5 cm across; pedicels 0.5–0.7 cm long, accrescent to 1.5 cm long in fruits, stellate-pubescent. Epicalyx absent. Sepals 5, triangular-ovate, c. 3.5 mm long, acute at apex. Petals yellow, 5, obliquely obovate, 4–6 × 4–5 mm, truncate to emarginate at apex, ciliate at base, as long as calyx. Staminal column to 3 mm long. Ovary c. 1 mm across, 5 or 6-loculed; style 5 or 6, c. 5 cm long. Schizocarp globose, c. 5 mm across, wrinkled, glabrous; mericarps 5 or 6, tetrahedral, toothed on
dorsal margins, c. 3 mm long, reticulated, 2-awned; awns liner, glabrous, c. 1/3 the length of mericarps; seeds trigonous, c. 1.5 mm long, smooth, dark brown.

Fl. & Fr.: September-May.

Distrib.: INDIA: Throughout. WORLD: Pantropical.

Habitat: Along roadsides, in wastelands, both shady and open places.


Undershubs, to 80 cm high; stems and branches terete, stellate hairy intermixed with simple hairs. Leaves alternate, oblong-lanceolate, 1.5–3.5 × 0.8–1.9 cm, acute at apex, apically serrate-crenate along marginsentire towards base, cuneate at base, subcoriaceous, glabrous above, except margin, stellate hairy beneath; midvein impressed above, slightly raised beneath, stellate hairy; lateral veins 4–6 pairs, stellate hairy, impressed above, slightly raised beneath, 3-nerved at base; petioles 3–4 mm long, stellate pubescent; stipules similar, filiform, c. 4 mm long, hairy. Flowers axillary, solitary or 2–5 flowers in a cluster; pedicels filiform, 0.5–1.3 cm long, stellate pubescent. Epicalyx absent. Sepals 5, triangular ovate, c. 3 × 4 mm, stellate pubescent above, glabrous below. Petals yellow, 5, free, obtraingular, 0.8–2 × 8–1 cm, oblique emarginate at apex, cuneate at base, glabrous. Staminal column shorter than petals, 4–5 mm long, hairy. Ovary conical, pubescent, 8–10-loculed; style 8–10 branched. Mericarp ovate, c. 2.5 × 2 mm, with two awn; awn c. 1.5 mm long, hairy; seeds reniform black, c. 2 × 1.5 mm.

Fl. & Fr.: August–February.

Distrib.: INDIA: Throughout. WORLD: Pantropical.


4. URENA L.

1 species in India and BNP.


Plate 9d
Illustration: Curtis’s, Bot. Mag. 58: t. 3043. 1831.

Undershubs, to 1 m high; stems and branches terete, stellate hairy; whole plant stellate hairy, intermixed pubescent. Leaves alternate, simple, ovate-orbicular, 1.8–5.3 × 1.5–5.2 cm, unlobed or shallowly 5–6-lobed, acute at apex, crenate or serrate along margins, cuneate or sub-cordate or truncate at base, dark green above, pale beneath, sub-coriaceous, stellate hairy intermixed pubescent both sides, more densely beneath; midvein impressed above, raised beneath, pubescent, 3–5-nerved at base, pinnately 2–3 nerved above; petioles 1–1.5 cm long, pubescent. Flowers axillary, solitary or 2–3-flowered, c. 1.5 × 0.6 cm; pedicels 1–5 mm long, pubescent. Epicalyx 5, free above, connate below, enclosing calyx, linear-lanceolate, 4–5 × 1 mm, hispid. Sepals 5, lanceolate, c. 5 × 1 mm, equal, ciliate along margins, vein prominent, hairy above, glabrous below. Petals pink, 5, obovate, 4–7 × 3–4 mm, obtuse at apex, glabrous. Stamens many, forming a column below; column 4–5 mm long. Ovary ovoid or sub-orbicular, c. 1 × 2 mm, hairy, 5-loculed; style 10, fused; stigma capitate, papillose. Schizocarps 5–8 mm across, spiny; spine retrose, c. 2 mm long, 4–5 hyaline hooks at tip of spine; seeds 2–3 mm across.

Fl. & Fr.: August-December.

Distrib.: INDIA: Throughout. WORLD: Pantropical.


BOMBACACEAE [250]

BOMBAX L. (nom. cons.)

3 species in India and 1 species in BNP.


Other synonyms: Bombax malabaricum DC.; Salmalia malabarica (DC.) Schott; Gossampinus malabaricus (DC.) Merr.

Local name: “Simul” (Bengali).


Deciduous trees, 30–40 m tall; bark greyish, aculeate when young with sharp, conical woody prickles; branches in whorls, spreading horizontally, pricked, old prickles blunt. Leaves digitate, 5–7-foliolate; leaflets lanceolate to elliptic, 9–20 × 4–6.5 cm, caudate or
acuminate at apex, entire along margins, tapering at base, glossy above, puberulous to glabrous beneath; petioles 12-25 cm long; petiolules 2-2.5 cm long. Flower solitary or in clusters towards tips of leafless branchlets, 10-12 cm long; pedicels 1-2 cm long, thick, glabrous or puberulous. Sepals campanulate, irregularly 2-5 lobed; lobes 3-4 × 3 cm, coriaceous, glabrous to sparsely puberulous outside, silky inside, falling off with corolla and stamens. Petals bright red or white, obovate to elliptic-obovate, 5-8.5 × 3.5-5 cm, rarely oblong, recurved, fleshy, tomentellous outside, imbricate. Stamens 65-80, in 6 bundles in 2 series, the central bundle 3-5 cm; outer bundle stamens 4.5-5 cm long; staminal tube short; filaments flat, angular; anthers involute, reniform, bilocular on longer filaments of central bundle, the rest unilocular. Ovary conical, minutely puberulous or glabrous; styles c. 6 cm long; stigmas 5-fid, lobes spreading. Capsules oblong to ovoid or ellipsoid cuneate at both ends, 10-15 cm long, velvety, 5-valved, valves silky inside; seeds many pyriform, smooth, dark brown, embedded in creamy white silky fibers.

Fl.: February-March; fr.: April-May.

Distrib.: INDIA: Throughout.


Notes: Grows along the Jainti river bank.

STERCULIACEAE [250]

Key to genera
1a. Flowers unisexual; petals absent; fruit apocarpous with separate follicles ................................................................. 4. Sterculia
1b. Flowers bisexual; petals present; fruit usually syncarpous, sometimes dividing into separate mericarps ................................................................. 2

2a. Flowers actinomorphic; staminodes clavate; seeds winged .......... 3. Pterospermum
2b. Flowers zygomorphic; staminodes not clavate; seeds not winged .............................................................................. 3

3a. Stamens 15, alternating with 5 emarginate staminodes; capsules erect, 5-winged; many seeds per locule ....................................................... 1. Abroma
3b. Stamens 5, alternating with 5 staminodes; capsules pendulous, spiny, not winged; 1-seed per locule ....................................................... 2. Byttneria
1. **ABROMA** L.f.

1 species in India and BNP.


**Local name:** “Ulat-kambal” (Bengali).

**Illustration:** Edwards, Bot. Reg. 6: t. 518. 1820.

Shrubs 2–4 m high; branches densely stellate velutinous when young. Leaves ovate to suborbicular, unlobed or shallowly 3–5-lobed, 10–20 × 5–15 cm, acute or acuminate at apex, distantly serrulate along margins, cordate at base, glabrescent above except veins, stellate pubescent or tomentose beneath; midvein 5–7 nerved at base, raised both sides, pubescent; prominent; petioles terete, 4.5–6.3 cm long; stipules linear, 4–6 mm long, deciduous. Inflorescences few flowered, in leaf-opposed, subterminal cymes. Flowers bisexual, c. 6 cm across, pendulous; pedicels 1–2.8 cm long, terete, pubescent; bracts linear-lanceolate, 9–12 mm long, acute. Sepals green with purple tinge, 5, lanceolate, c. 2 x 0.7 cm, acute at apex, pubescent, persistent in fruits. Petals purplish brown, cochleate, narrowly elliptic, c. 2.8 x 1.8 cm, sub-acute at apex, pilose on margins and base clawed; claw spoon shaped, c. 6 mm, pilose. Stamens 15; filaments connate into tube enclosing pistil; anthers in 5 groups of 3 on outer part of filament tube alternating with staminodes; staminodes 5, c. 2 x 1 mm, hairy, emarginate at apex. Ovary oblong, 2.5–3 x 2 mm, 5-loculed, villous; styles 5, 1–2 mm long, triangular tongue shaped. Capsules erect, obconic, 3.5–5 x 3.5–5 cm, 5-winged, pubescent, truncate at apex, septicidally 5-valved, valves villous at the edge, more a cup or star shaped when dehisced; wings broadest at apex, many seeds per locule; seeds black obovate, c. 3 x 2 mm.

**Fl.:** June–September; **fr.:** June–February.

**Distrib.:** INDIA: North East India, Uttar Pradesh and West Bengal. WORLD: Australia, Bhutan, China, Indonesia, Malaysia, Nepal, Pacific islands, Philippines, Thailand and Vietnam.


**Uses:** Plant is said to be medicinal particularly for gyneic disorders.
2. **BYTNTERIA** Loefl. (*nom. cons.*)

4 species in India and 1 in BNP.


Other synonym: *Buettneria aspera* Colebr. ex Wall. Plate 10a, b

**Illustration:** Fl. India 3: 411. f. 114. 1993.

Lianas; branchlets grooved, stellate pubescent. Leaves suborbicular to broadly ovate, 10-20 cm in across, abruptly acuminate at apex, entire or obscurely repand along margins, cordate at base, chartaceous or subcoriaceous, glabrescent and shining above, puberulous on nerves beneath; 5-7-nerved at base, 3-4 pairs above, joining very close to margin prominent beneath, minutely stellate-pubescent; petioles 2.5-6 cm long, grooved, puberulous; stipules 8-12 mm long, linear-lanceolate, early caducous. Inflorescences axillary umbellate cymes; peduncles 1.5-2.7 cm long, minutely stellate pubescent. Flowers bisexual, minute, c. 1 mm across, densely tomentose; pedicels slender, 0.5-1 mm long, densely tomentose; bracts and bracteoles subulate. Sepals 5, lanceolate to deltoid c. 3 × 1 mm, hairy outside. Petal lobes lanceolate, 2-2.5 mm long, yellow-green outside; claw concave, purplish, c. 1.5 mm. Stamininal cup with 5 staminodal lobes alternating with 5 fertile stamens. Anther lobes reniform, divergent; staminodes ovate. Ovary c. 1 mm across; styles about as long as ovary, 5-fid at tip. Capsules globose to ovoid globose, 2-4 cm across, woody, covered with stout sharp, distant, curved prickles, puberulent, 1-seed per locule; seed elliptic-oblong to triangular, c. 12 × 7 mm.

Fl.: April-June; fr.: September-March.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China and Nepal.

**Specimen examined:** Buxa National Park, East Damanpur Range, SRVK 5, 8th April, 2012, Gopal Krishna 56078.

**Notes:** This was excluded in Fl. West Bengal, but it was included in Fl. Bhutan based on a collection from Darjeeling. The present collection is from Jalpaiguri district.

3. **PTEROSPERMUM** Schreb. (*nom. cons.*)

11 species in India and 1 in BNP.


Trees, 10–15 m high; bark light grey smooth; branchlets sub-terete, appressed hairy, floccose. Leaves simple, whorled, broadly ovate, 25–39 × 14–30 cm, acute at apex, palmately lobed to coarsely toothed along margins, peltate at base, leathery, sparsely hairy or glabrous above, densely yellowish and grey stellate velutinous, beneath; 7–12 nerved at base, impressed above, raised beneath, white tomentose with stellate hairs; petioles 7–16 cm long, terete, tomentose floccose. Inflorescences axillary, solitary or 2–3-flowered cymes. Flowers bisexual, c. 15 cm long, fragrant; pedicels 1–3 cm long. Sepals 5, free above, connate below, linear, 8–11 × 0.6–0.9 cm, fleshy, rusty tomentose outside, silky inside. Petals white, 5, linear-oblong, 7–9.5 cm long. Stamens 15, in 5 groups of 3 alternating with staminodes; filaments connate into tube, free at top. Staminodes clavate, 6–8.5 cm long, hairy. Ovary oblong, 1–3 cm long, 5-locular; styles 5, c. 6.5 cm long; stigma clavate. Capsules oblong, 10–20 × 3–6 cm, covered with brown tubercles, many seeded; seeds obliquely ovoid, 1–2 × 1.5 cm, winged; wings 4–7 × 1–1.4 cm.

Fl.: March–November; fr.: July–December.

Distrib.: INDIA: Throughout. WORLD: Bangladesh, Bhutan, China, Laos, Malaysia, Myanmar, Nepal and Thailand.

Specimen examined: Buxa National Park, Rajabhatkhawa Range, SRVK 6, 6th Dec., 2011, Gopal Krishna 52356.

4. STERCULIA L.

15 species in India and 2 in BNP.

Key to species

1a. Leaves not lobed, elliptic to oblanceolate; inflorescences racemes; flowers green, pinkish inside, remain leafy in flowering;
capsules shallowly sulcate and distinctly beaked ......................... 1. S. hamiltonii

1b. Leaves lobed, broadly ovate or suborbicular; inflorescences in panicles; flowers yellow, completely deciduous in flower;
capsules deeply sulcate and shortly beaked ......................... 2. S. villosa


Other synonyms: Sterculia coccinea Roxb; Sterculia indica Merr. Plate 10d, e

Shrubs to medium size trees, 5-6 m high; bark brick red; stems terete, glabrous. Leaves simple, whorled, elliptic to oblanceolate, 9.5-25 × 4-11.5 cm, obtuse or acuminate at apex, entire along margins, rounded or truncate at base, subcoriaceous, sparsely stellate when young, glabrous on maturity; midvein raised both sides, glabrous; lateral veins 8-10 pairs, prominent beneath, glabrous; petioles 1.5-3.9 cm long, pubescent; stipules lanceolate 5-7 mm long. Inflorescences axillary racemes, 6-12 cm long; rachis pubescent. Flowers unisexual; pedicels 5-8 mm long, filiform, pubescent. Male flowers: Sepals 5, green pinkish inside, 5, free above, spreading, linear-lanceolate, 12-15 mm long, incurved and connived at tip, hairy; tube c. 3 mm. Petals absent. Stamens c. 5 mm long, glabrous, curved staminal column. Female flowers: Sepal as in male flowers. Petals absent. Gynandrophiore c. 2 mm long. Ovary c. 2 mm long hairy; style c. 2 mm long, curved; stigma 5-lobed. Follicles 2-5, each oblong-elliptic, 2.5-3.8 × 1-1.2 cm, capsules deeply sulcate and shortly beaked, spreading; seeds black, shining, ovoid, c. 1.5 cm across.

Fl.: April-January; fr.: May-March.

Distrib.: INDIA: Assam, Meghalaya, Nagaland, Sikkim and West Bengal. WORLD: Bhutan, Nepal and Myanmar.

Specimen examined: Buxa National Park, Jainti range, S.K. Srivastava & Gopal Krishna 46163; East Damanpur range, SRVK 11-12, Gopal Krishna 50641.


Other synonyms: Sterculia armata Mast.; S. ornata Wall. ex Kurz. Plate 10f, g

Local name: “Udal” (Bengali).


Trees, 15-20 m tall; bark white; branchlets terete, villous. Leaves crowded at the end of branchlets, broadly ovate to suborbicular, 15-50 × 15-50 cm, 5-7-lobed, entire along margin, cordate at base, acuminate at apex, coriaceous, sparsely stellate-hairy above, stellate rusty tomentose beneath; midvein flattened above, raised beneath, stellate tomentose; lateral veins petioles 14-25 cm long, terete, puberulous; stipules caducous. Inflorescences panicle, pendulous, 40-45 cm long, rusty stellate tomentose, male and female flowers intermixed. Male flowers: c. 3.5 × 2 mm; pedicels c. 2 mm long, villous. Sepals campanulate, yellow, 5, villous outside, floccose inside, ovate, 4-4.5 × 2.5-3 mm; tube c. 2 × 2 mm. Petals absent. Stamens 10, in a bundle forming a column; staminal column c. 2 mm long, curved. Pistilode absent. Female flowers c. 1 × 1 cm; pedicels c. 1
cm long, villous. Sepals campanulate 5, villous outside, pinkish, floccose inside, ovate 4-4.5 × 2.5-3 mm; tube c. 2 × 2 mm. Petals absent. Staminode absent. Gyandrophore 2-3 mm long, hairy; style c. 2 mm long, recurved; stigma 5-lobed. Follicles oblong, 4-5 spreading, 1.8-3.8 × 0.8-1.6 cm, rusty villous outside, deeply sulcate and shortly beaked, 3-5-seeded; seeds black, oblong.

Fl.: December-April; fr.: March-September.

Distrib.: INDIA: Throughout. WORLD: Nepal, Bhutan, Bangladesh and Myanmar.


Notes: Sterculia villosa is easily noticeable in the field by turning completely leafless in flower and fruit.

TILIACEAE [250]

Key to genera

1a. Fruit a capsule .......................................................... 2

1b. Fruit a drupe .............................................................. 3

2a. Androgynophore absent; flowers usually solitary or 2; sepals purple-red; petals eglandular; fruit elongated, a smooth capsule ........... 1. Corchorus

2b. Androgynophore present; flowers in clusters; sepals green; petals glandular; fruit globose, a spiny capsule ............................................... 4. Triumfetta

3a. Inflorescences simple cymes, usually axillary; sepals are smaller than petals; petals eglandular; stigma swollen, lobed ......................... 2. Grewia

3b. Inflorescences compound cymes, terminal; sepals are larger than petals; petals with hairy glands at base adaxially; stigma subulate, not lobed ................................................................. 4. Microcos

1. CORCHORUS L.

8 species in India and 1 in BNP.


Other synonyms: Corchorus acutangulus Lam.; C. fuscus Roxb. Plate 11a

Herbs, to 30–40 cm high; stems and branches terete, glabrescent, more or less wrinkled. Leaves alternate, ovate or lanceolate, 1.3–3.2 × 0.8–1.5 cm, acute at apex, serrate along margins, cuneate or rounded at base, subcoriaceous, puberulous both sides; 3–5-nerved at base, prominent beneath; petioles filiform, 3–7 mm long, pilose; stipules filiform, c. 3 mm long, sparsely hairy. Inflorescences 1–3-flowered cymes, borne in leaf opposed peduncles; peduncles c. 1 mm long. Flowers c. 1 mm across; pedicels c. 2 mm long; bracts linear, 4–6 mm long, hairy. Sepals purple-red 5, linear-oblong, c. 5 mm long, boat-shaped distally, apex awned, purple dotted inside, green outside, glabrous. Petals yellow, 5, obovate, 3–5 mm long, hairy at base, glabrous above. Stamens many; filament c. 1.2 mm long; anthers 2-celled. Ovary oblong, c. 1 mm long; style simple, c. 5 mm long; stigma cupular. Capsules elongate, 1–1.5 cm long, angled, margins winged, smooth, truncate with 2-fid beak at top, 3-loculed, many seeded; seeds dark brown triangular ovate to rectangular, 1-1.2 mm.

Fl. & Fr.: August-February.


2. GREWIA L.

31 species in India and 1 in BNP.


Plate 11b

Shrubs, 2–3 m high; stems terete, glabrous; branches terete, stellate pubescent. Leaves alternate, obovate-elliptic, 1.8–11.5 × 1–4.6 cm, acute at apex, serrate along margins, cuneate at base, coriaceous, dark green, glossy, glabrous except veins; midvein impressed above, raised beneath, pubescent; lateral veins 5–7 pairs, prominent beneath, 3-nerved at base, pubescent; petioles 5–6 mm long, stellate pubescent; stipules linear-lanceolate, c. 4 mm long, pubescent. Inflorescences axillary, umbellate cymes; peduncles 1–2 cm long, stellate hairy. Flowers c. 1 cm across; pedicels c. 7 mm long; bracts lanceolate, c. 2 × 0.5 mm. Sepals 5, linear-lanceolate, c. 8 × 2 mm, scabrid outside, glabrous inside. Petals 5, oblong-elliptic, c. 3 × 1.1 mm, glabrous outside, tomentose inside towards base, glandular
at base. Receptacle c. 2 mm long, grooved, pubescent above, glabrous below. Stamens many; filaments filiform, 3-4 mm long; anthers c. 1 mm long. Ovary c. 2.5 × 1.5 mm, hairy; style linear, c. 6 mm long; stigma 5-lobed; lobes lacinate. Drupes dark green, globose when unlobed, c. 5.5 mm across, 2-lobed.

Fl.: April-March; fr.: December-February.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Australia, Bhutan, Malaysia, Myanmar, Nepal, Pakistan and Tropical Africa.


### 3. MICROGOS L.

1 species in India and BNP.


Other synonyms: *Grewia nervosa* (Lour.) Panigrahi; *Fallopia nervosa* Lour.; *Grewia microcos* L. (nom. illeg.).

**Local name:** “Asar” (Bengali).

**Illustration:** Rheede, Hortus Malab. 1: t. 56. 1678.

Shrubs, 1-2 m tall; branches terete, sub glabrous. Leaves distichous, elliptic-lanceolate, 6-16 × 2.3-6.5 cm, acuminate at apex, crenulate or obscurely sinuate along margins, rounded to subcordate at base, subcoriaceous, glossy, glabrous except nerves beneath; 6-7 nerves at base, sparsely pubescent prominent beneath, veinlets prominent beneath; petioles 3-9 mm long, stout, pubescent; stipules subulate, 6-11 mm long. Inflorescences terminal panicles, 7-12 cm long; rachis stellate pubescent. Flowers c. 1 cm across. Sepals 5, oblong-spathulate, 5-7 mm long, pubescent. Petals yellow, 5, oblong, smaller than sepals, 3-4 mm long, entire or emarginate, ciliate along margins with hairy glands at base adaxially; glands c. 1/3 as long as petals. Stamens many; filaments 3-4 mm long, hairy at base. Ovary globose, c. 1 mm across, glabrous, 2-5-loculed; stigma 2-fid, minute. Drupes globose or obovoid, c. 1 cm across, green when young, turned black when ripe.

Fl.: June-August; fr.: June-March.
**Distrib.: INDIA:** Andaman & Nicobar Islands, Assam, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu, Tripura and West Bengal. **WORLD:** Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jainti Range, Jainti 4, 11th Oct., 2010, S.K. Srivastava & Gopal Krishna 46305.

**Notes:** The material was never collected in flower in the Park and the description of the flowers is based on Fl. China. Since, flowers occurs during rainy season and park is closed for all explorations, the author missed its collection in flower.

### 4. TRIUMFETTA L.

8 species in India and 1 in BNP.


**Illustration:** Wight, Icon. Pl. Ind. Orient. 2(1): t. 320. 1846.

Undershubs, to 50 cm high; branches terete, grey brown tomentose. Leaves alternate, rhomboid-ovate, 5-7.3 × 3.2-6 cm, deeply 3-lobed, acute or acuminate at apex, serrate-dentate along margins, rounded at base, chartaceous, glabrescent above, glabrescent or stellate hairy beneath; 5-7-nerved at base, prominent beneath, pubescent; petioles filiform, 2.5-5.5 cm long, stellate hairy; stipules lanceolate, 3-4 mm long, pubescent. Inflorescences terminal cymes; peduncles c. 5 mm long. Flower buds cylindrical; pedicels 1-2 mm long, pubescent; bracts lanceolate, c. 2 mm long, stellate hairy. Sepals green, 5, oblong or linear-lanceolate, 4.5-5 × 1 mm, glabrous. Petals yellow, 5, obovate, 3.5–4.5 × 1.5–2 mm, glabrous except base, base glandular hairy. Stamens 10, borne on androgynophore; filaments unequal, 2–3.5 mm long, glabrous; anthers 2-celled. Ovary subglobose, hairy; style subulate; stigma 2–3-lobed. Capsules globose, 3.5–4 mm across, with many spiny hooks; spine uncinate, 1.5–2 mm.

**Fl. & Fr.:** August–December.

**Distrib.: INDIA:** Throughout. **WORLD:** Throughout tropics.

ELAEOCARPACEAE [177]

Key to genera

1b. Flowers in racemes; petal margin lacinate; disk lobed; fruit
   a drupe; seeds exarillate................................................................. 1. Elaeocarpus

1a. Flowers axillary, solitary or in fascicles; petal margin entire or
dentate; disk unlobed with many pits; fruit a capsule;
   seeds arillate ..................................................................................... 2. Sloanea

1. ELAEOCARPUS L.

29 species in India and 3 in BNP.

Key to species

1a. Disk 10-lobed................................................................. 3. E. varunua

1b. Disk 5-lobed...................................................................................... 2

2a. Leaves obovoid-lanceolate, clustered at end of branches;
   flowers bud oblong-ovoid; anthers awned at apex....................... 1. E. rugosus

2b. Leaves elliptic to ovate, distributed all through the branches;
   flowers bud ovoid; anthers with bristles at apex......................... 2. E. tectorius


Other synonym: E. aristatus Roxb. Fig. 7; Plate 11c, d


Trees, to 10–15 m high; branchlets sub-terete, rust-brown puberulent with conspicuous
leaf and infructescence scars. Leaves alternate, clustered at the end of apex, simple,
elliptic-oblung to ovate or oblong, 13.5–16.5 × 5–7.4 cm, acuminate at apex, entire to wavy
along margins, rounded at base, coriaceous, shining and glabrous above, sparsely
pubescent beneath; midvein impressed above, raised beneath, appressed hairy; lateral
veins 9–12 pairs, prominent beneath, silky tomentose, glands in the axil of lateral veins at
the base and towards margins beneath; petioles 4.5–5.4 cm long, terete, glabrescent.
Inflorescences axillary racemes in axils of fallen and existing leaves; rachis 6–12 cm long,
gray-white silky pilose; bracts narrowly triangular, c. 3 × 1 mm, acute, adpressed hairy.
Flowers c. 0.7 × 1 cm, pedicellate; pedicels 5–8 mm long, grey-white tomentose. Sepals 5,
lanceolate, c. 7 × 1.5 mm, acute at apex, grey silky tomentose both sides. Petals cream-
white, 5, oblong, 6–7 × 1.5–2 mm, laciniate at apex, silky tomentose below apex both sides.
Fig. 7. Elaeocarpus rugosus Roxb. ex G. Don: a. Flowering branch; b. Petal; c. Stamen; d. Gynoecium with disk glands
Stamens 20–25; filaments 5–8 mm long, hairy; anthers oblong, c. 4 mm long, awned; awn c. 0.5 mm long. Disk 5 lobed, sparsely pubescent. Ovary c. 1.5 × 1.75 mm, sericeous, 2-loculed; style subulate, c. 6 mm long, villous. Drupes oblong-ovoid, 1.5–2 cm long, rounded at ends, 3-grooved, rugose, hirsute, 1-seeded.

Fl.: February-April; fr.: September-October.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Malaysia and Thailand.


Notes: Roxburgh has treated *E. aristatus* as a distinct species from *E. rugosus*. He has drawn the illustration (Icon nos. 2285; 2286) for both and gave a diagnosis based on presence/absence of petioles in leaves, the origin of racemes, number of stamens and nature of nuts. In the present collections the author has noticed intermediately nature in the specimens collected by him and hence, treated *E. aristatus* as synonym under *E. rugosus*. This is in contrast to treatment given in Fl. India. The species had included in Flora Bhutan based on a collection from Darjeeling. There are 7–10 individuals in the Park (in the Gadadhar range) and the species was designated under IUCN’s Vulnerable (VU) status. In Flora West Bengal it was stated that its distribution is in Darjeeling district and present collections is from Jalpaiguri district.


Local name: “Jalpai” (Bengali).


Trees, 15–18 m tall; branchlets sub-terete, pubescent, lenticellate. Leaves simple, alternate, whorled, ovate-oblong, elliptic, 10–16.4 × 5.3–7.8 cm, shortly acuminate or broadly acute at apex, crenate along margins, cuneate-rounded at base, coriaceous, shining above, glabrous; midvein raised both sides, more prominent beneath, pubescent; lateral veins 8–11 pairs, prominent beneath; petioles 1.7–4.3 cm, rusty pubescent. Inflorescences axillary racemes, 6–12.5 cm long; rachis angled, rusty tomentose. Flower buds ovoid, c. 3 × 2.1
mm, tomentose; pedicels 3-5 mm long, grey tomentose. Sepals, 5, lanceolate, c. 3 × 1.5
mm, acute at apex, thick, silky tomentose outside, glabrous inside. Petals white, 5, sub-
orbicular, c. 3 × 3 mm, lacinate at apex. Stamens 35-45; filaments 0.3-0.4 mm long,
pubescent; anthers oblong 1-2 mm long, puberulous, shortly bristled at apex in some of
the anthers. Disk 5-lobed. Ovary c. 1 mm across, 3-loculed; style short c. 0.5 mm long;
stigma simple. Drupes ovoid 2-2.5 × 1.5 cm, 3-grooved, rugose, 1-seeded.

Fl.: April-June; fr.: August-October.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh,
Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Meghalaya, Sikkim,
Nagaland, Odisha, Tamil Nadu, Tripura and West Bengal. WORLD: Bangladesh, Bhutan,
China, Indonesia (Sumatra), Malaysia, Myanmar, Nepal and Sri Lanka.

Specimens examined: Buxa National Park, East Damanpur Range, SRVK 12-5
compartment, 8th April, 2012, Gopal Krishna 56069; Jalpaiguri, Buxa-Santrabari, 1000',
23.05.1949, Narayanswami & party 2927.

Notes: The drawing prepared for this species in Flora of India has leaves narrowly ovate-
lanceolate, but drawing in Flora of West Bengal has leaves more of broadly ovate-acute.
The material collected from the Park has more similarity with the later illustration. The
drawing in Fl. India is in all likelihood that of *E. varunua* (Fl. India 3: 558. f. 155. 1993).
This species is known from Darjeeling district and present collection is from Jalpaiguri
district.


Plate 11f

Trees, 7-10 m high; branchlets sub-terete, appressed hairy, with persistent leaf scars.
Leaves alternate, spirally arranged, simple, oblong, oblong-ovate or elliptic-oblong, 13.8-
16.5 × 5.3-7.3 cm, acute at apex, crenate-serrate along margins, rounded at base,
subcoriaceous, glabrous above, sparsely appressed hairy beneath; midvein raised both
sides, glabrous above, appressed hairy beneath; lateral veins 9-11 pairs, prominent
beneath, hairy. Inflorescences axillary raceme, 8-12 cm long, 10-15 flowered; rachis
angled, gray-white tomentose. Flowers 1-1.6 cm across; pedicels 5-8 mm long,
tomentose, stout. Sepals 5, lanceolate c. 7 × 1.5 mm, acute at apex, thickened, silky
tomentose outside, glabrous inside, sericeous along thickened median line toward inner
side. Petals white, 5, lobes oblong 8-10 × 3-3.5 mm, lacinate, sericeous both sides.
Stamens 25-30; filaments 1-1.2 mm long, hairy; anthers oblong c. 3 mm long, hairy,
awned; awned c. 0.75 mm long. Disk 10-lobed, glabrous. Ovary ovoid-oblong, c. 1.5 mm across, densely hairy; style c. 6.5 mm long, subulate; stigma simple. Drupes oblong-ovoid, 1.5–1.8 × 1 cm, finely rugose, 2-seeded.

Fl.: February–April; fr.: July–October.

Habitat: Grows in in semi-evergreen and evergreen forests.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal. WORLD: Bangladesh, Malaysia, Myanmar, Nepal and Vietnam.


Uses: Wood is used for making tea boxes. This species is known from Darjeeling district and present collection is from Jalpaiguri district.

2. SLOANEIA L.

4 species in India and 2 in BNP.

Key to species

1a. Leaves glabrous except nerves beneath; fruits densely covered with bristles, bristles c. 2 mm long.................................................................1. S. dasycarpa

1b. Leaves tomentose beneath; fruits densely spiny, spines 2–2.5 cm long.................................................................2. S. sterculiacea


Trees, to 7–10 m high; branches corrugated, lenticelled, glabrous. Leaves whorled, rhombic-elliptic, 8–17 × 4–8.5 cm, abruptly acuminate at apex, serrate-dentate along margins, rounded or sub-cordate at base, sub-coriaceous, shining, glabrous, except veins tower lower side; midvein slightly raised both side, hairy; lateral veins 8–10 pairs, prominent beneath, hairy. Inflorescences axillary, solitary. Flowers bisexual, 1.5–2 cm across; pedicels 3–4.8 cm long, tomentose. Sepals 4 lobed; lobes oblong-ovate or ovate, equal, 4–7 × 5–7 mm, acute at apex, tomentose both sides, more densely outer side. Petals light yellow, 4, free up to base; lobes broadly obovate, 6–8 × 7–8 mm, denticulate at apex, nerves prominent, hairy. Stamens many; filaments unequal, 2–4 mm long, hairy; anthers

-awned; awned c. 0.75 mm long. Disk 10-lobed, glabrous. Ovary ovoid-oblong, c. 1.5 mm across, densely hairy; style c. 6.5 mm long, subulate; stigma simple. Drupes oblong-ovoid, 1.5–1.8 × 1 cm, finely rugose, 2-seeded.

Fl.: February–April; fr.: July–October.

Habitat: Grows in in semi-evergreen and evergreen forests.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal. WORLD: Bangladesh, Malaysia, Myanmar, Nepal and Vietnam.


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oblong, 2–3 mm long, hairy, slightly beaked. Disk flattened, pitted. Ovary ovate 4–5 × 3–4 mm, tomentose; style subulate 6–7 mm long, tomentose; stigma simple. Capsules globose-ovoid, 2.5–3 cm long, densely covered with plumose bristles, 3–4 or 5 valved, 1-seed per valve; seeds arillate.

Fl.: July–November; fr.: January–March.

Distrib.: INDIA: Assam, Meghalaya, Nagaland, Sikkim and West Bengal. WORLD: Bhutan, China, Myanmar and Nepal and Vietnam.

Notes: In Fl. India the distribution West Bengal (Darjeeling) has been added, however, this species is excluded from West Bengal. Since, the collections of this species shows Flora of Bhutan (Darjeeling) and locality wrote as Lacheng. Lacheng is a very famous place which is situated in Sikkim; hence, this species has been excluded from Flora of West Begal.


Trees, to 15–20 m high, canopy wide; branches sub-terete, glabrous. Leaves alternate, simple, elliptic-oblong, broadly obovate, 12.5–22.3 × 7.4–11.8 cm, abruptly acuminate at apex, serrate-dentate along margins, cuneate-rounded or sub-cordate at base, coriaceous, shiny, glabrous above, stellate tomentose beneath; midvein flattened above, raised beneath, tomentose; lateral veins 7–9 pairs, prominent beneath, tomentose; petioles 1.8–3 cm long, geniculate at apex, tomentose. Inflorescences axillary, solitary, or in few-flowered fascicles. Flowers bisexual, 2–3 cm; pedicels 2–4 cm long. Sepals 4, free; lobes ovate or oblong, 6–9 × 4–5 mm, sub-equal, tomentose. Petals creamy-white, 4, free; lobes oblong or suborbicular 6–9 × 5–6 mm toothed at apex, pubescent. Stamens many; filaments 2–4 mm long, tomentose; anthers 2–3 mm long, linear or oblong, shortly awned. Disk flattened, pitted. Ovary globose or ovoid, c. 3 × 2–2.5 mm, densely tomentose, 4-loculed; styles 5–6 mm long, subulate, hairy at base, sometimes twisted at apex. Capsules dark maroon, globose to ovoid 4.5–7 cm across, pendulous, 4–5-valved; valves covered with dense, pointed stiff spines; spines 1–1.8 cm long, 2–4 seeded.

Fl.: October–November; fr.: January–April.

Distrib.: INDIA: Assam, Sikkim, Uttarakhand and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar and Nepal.
Plate 11: a. Corchorus aestuans L.; b. Grewia serrulata DC.; c - d. Elaeocarpus rugosus Roxb. ex G. Don: c. Flowering branch; d. Flowers (close up); e. Elaeocarpus tectorius (Lour.) Poir.; f. Elaeocarpus varunua Buch.-Ham. ex Mast.; inset: flowers; g - h. Sloanea sterculia var. assamica (Benth.) Coode: g. Flowering branches; h. Fruiting branches

Notes: In Fl. India, in distribution West Bengal has been excluded, however, this taxon has been added in Fl. West Bengal.

MALPIGHIACEAE [191]

HIPTAGE Gaertn.

9 species in India and 1 in BNP.


Other synonym: Hiptage madablota Gaertn. Plate 12a, b


Scandant shrubs; branchlets terete, lenticellate, puberulent or glabrous. Leaves opposite, simple, ovate-oblong or oblong-elliptic, 9.4-14.8 × 4.2-5.2 cm, acuminate at apex, entire along margins, cuneate at base, coriaceous, green, shining above, glabrous; midvein impressed above, faintly raised beneath; lateral veins 6–7 pairs, impressed above, prominent beneath, glabrous; petioles 5–6 mm long, softly silky tomentose. Inflorescences axillary racemes, 5–10 cm long; rachis 2–3 cm long, silky tomentose. Flowers bisexual, fragrant; pedicels 0.8–1.8 cm long, articulated; bracts linear-lanceolate, c. 1.5 mm long, tomentose; bracteoles 2, linear-lanceolate, 1.5–2 mm long, tomentose. Sepals 5, free above, connate below oblong, subequal, 4–5 × 2–3 mm, obtuse at apex, ciliate along margins, membranous, tomentose both sides, glanduladnate to pedicel. Petals cream-white, 5, suborbicular or obovate, c. 4 × 5 mm, obtuse at apex, laciniate along margins, sericeous above, glabrous inside. Stamens 10; filaments declinate, length variable, 6–10 mm long, glabrous, connate at base; anthers oblong, 1–1.5 mm long. Ovary villous; style c. 1.4 cm long, glabrous; stigma subcapitate. Samara: middle wing oblanceolate, 3–4.3 × 0.7–0.8 cm, puberulous; lateral wings oblanceolate, 2–2.5 × 0.3–0.5 cm, puberulous; seed solitary, subglobose, c. 1 cm across.

Fl.: February-April; fr.: April-May.


BALSAMINACEAE [323]

IMPATIENS Riv. ex L.

241 species in India and 1 in BNP.


![Plate 12c, d](image)

Herbs, 30-50 cm high; stems succulent, corrugated, slightly angled, pubescent; more or less swollen at nodes. Leaves opposite, elliptic-lanceolate or ovate, 6-14.5 × 12.2-4.2 cm, acuminate at apex, crenate along margin, attenuate at base, chartaceous, shining, sticky, hispid both sides; midvein impressed above, raised beneath, glabrescent; lateral veins 10-20 pairs, prominent beneath; petioles 1.3-5.4 cm long, pubescent near base of lamina. Inflorescences axillary, solitary or in 6-8-flowered fascicles. Flowers reddish-purple to bluish-purple, yellowish in throat and with a whitish lower sepal; pedicels filiform, 1-1.6 cm long, pubescent; bracts linear-lanceolate, 2-2.5 mm long, hairy. Lower sepal saccate, 1-1.7 cm, abruptly constricted into a incurved spur; spur 5-8 mm. Dorsal petal cucullate, 8-10 × 5-6 mm, with a pronounced keel-like crest above; lateral united petals 18-23 mm; upper lateral petal suborbicular, 6-8 × 5-9 mm; lower lateral petal asymmetrically oval, 10-14 × 6-10 mm. Stamens 5; filaments 2.5-6 mm long, fused together; anthers c. 2.5 mm long. Ovary ellipsoid, c. 3 × 1.5 mm, glabrous; stigma sessile, 5 toothed. Capsules linear-fusiform, c. 9 × 1.5 mm, glabrous.

**Fl. & Fr.**: November-April.

**Distrib.**: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland and West Bengal. WORLD: Bhutan and Bangladesh.

**Habitat**: Grows in moist and shady places.


OXALIDACEAE [175]

Key to genera

1a. Leaves fascicled at top of stem, leaflets 6-15 pairs; flowers yellow, white in centre; sepals eglandular at tip; petals not recurved ................. 1. Biophytum

1b. Leaves basal or cauline along stem, digitately 3-foliolate; flowers pink, green in centre; sepals glandular at tip; petals recurved....................... 2. Oxalis
1. **BIOPHYTUM** DC.

12 species in India and 1 in BNP.

**Plate 12e**  
**Illustration:** Fl. India 4: f. 56. 1997.

Herbs, 18–25 cm high; stems unbranched, terete. Leaves crowded at apex, compound; rachis filiform, 3.5–8.5 cm long, terete, pubescent; leaflets 6–15 pairs, terminal leaflets obovate, larger, 11–12 × 7 mm; basal leaflets ovate, smaller 2–3 × 3 mm; middle leaflets oblong, ovate, c. 9 × 5 mm, mucro-acute at apex, entire along margins, truncate or rounded at base, chartaceous, glabrous; midvein faintly raised beneath; lateral veins 15–18 pairs, inconspicuous, sessile. Inflorescences umbel, 4–6-flowered; peduncle 4–12.5 cm long, filiform, appressed strigose. Flower pedicels filiform, 4–5 mm long; bracts oblong-ovate, c. 2 × 1 mm, acute at apex, ciliate along margins; midvein raised both side. Sepals green, 5, ovate-lanceolate, c. 3.5 × 0.5–1 mm, acute at apex. Petals yellow, elliptic, 6–8 × 2–3 mm. Stamens 5; filaments flattened, 1.8–2 mm long, hairy; anthers 0.2–0.3 mm long. Ovary c. 2 × 1 mm, hairy along margins; styles 5, 0.5 mm long, hairy; stigmas flattened. Capsules ovoid to oblong, 2–3 × 2 mm, glandular hairy.  
**Fl. & Fr.:** October-December.  
**Distrib.:** INDIA: Throughout. WORLD: Tropical S.E. Asia.  
**Specimen examined:** Buxa National Park, Jainti Range, Tashigaon 1, 4th Oct., 2009, S.K. Srivastava & Gopal Krishna 46106.  
**Notes:** Occurs more frequently in shady and moist places.

2. **OXALIS** L.

10 species in India and 1 in BNP.

**Other synonyms:** *Oxalis martiana* Zucc.; *Oxalis debilis* Kunth var. *corymbosa* (DC.) Lourtieg.  
**Plate 12f**

Creeping herbs with brownish bulbous root stock. stemless, Leaves basal; leaflets obcordate, 1.5–2.5 × 2–3.5 cm, notched at apex, entire along margins, cuneate at base, chartaceous, hairy both side; petioles terete, 4–6 cm long, pubescent. Inflorescences
subumbellate corymbs, 2–12-flowered; peduncles 5–15 cm long, pubescent. Flowers pedicellate; pedicels 1–1.6 cm long, sparsely villous; bracts narrowly ovate, c. 2 × 1 mm, villous. Sepals green, 5, elliptic-ovate, 4–4.5 × 2–2.5 cm, acute, pubescent at apex with two elliptic glands. Petals pink with dark pink streak, 5-lobed above, obovate, c. 10 × 5 mm, obtuse at apex, recurved; tube 0.3–0.6 mm long, hairy within. Stamens 10, in 2 whorls; outer whorl shorter; filaments 1.5–4.5 mm long, free above, jointed below enclosing ovary, hairy; anthers ovoid, c. 6 × 4 mm, dorsifixed. Ovary oblong, c. 2 × 1.1 mm, hairy; style 5, 1–1.5 mm long hairy; stigma capitate.

Fl. & Fr.: September-January.

Distrib.: INDIA: Assam, Bihar, Delhi, Jammu & Kashmir, Kerala, Manipur, Meghalaya, Mizoram, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Tropical S. America.


Habitat: Grows in moist and shady places.

Notes: Capsules not seen; it was not described in any Indian Floras.

**RUTACEAE [241]**

Key to genera

1a. Scrambling shrubs; flowers unisexual; fruits dehiscent ................. 5. *Zanthoxylum*

1b. Shrubs; flowers bisexual; fruits indehiscent ........................................... 2

2a. Leaves compound; stamens 8–10 .............................................................. 3

2b. Leaves simple to 1-foliolate; stamens 20–50; seeds many...................... 1. *Citrus*

3a. Stamens 8; style short, not articulate, persistent; fruits

1-seeded berry......................................................................................... 2. *Glycosmis*

3b. Stamens 10; style articulate, deciduous ........................................... 4

4a. Flowers in terminal compound cymes; petals imbricate;

ovary not on gynophores ............................................................... 3. *Micromelum*

4b. Flower solitary axillary or in axillary cymes or terminal corymbs;

petals valvate; ovary on a gynophores .............................................. 4. *Murraya*
1. CITRUS L.

10 species in India and 1 in BNP


Other synonym: _Citrus aurantium_ L. var. _medica_ Wight & Arn. Plate 12g, h

Illustration: Curtis’s, Bot. Mag. 110: t. 6745. 1884.

Shrubs, to 2–3 m high; older shoots sub-terete, armed, lenticellate; young shoots glabrous; leaves with a spine c. 4 cm long in the axils, simple or rarely 1-foliolate, whorled, elliptic or elliptic-ovate, 7.5–10 × 3–5 cm, obtuse at apex, crenate-serrulate along margins, obtuse or rounded at base, coriaceous, pale green when dry, glabrous; midvein flattened or slightly impressed above, faintly raised beneath; lateral veins obscurely 8–10 pairs; petioles c. 1 cm long, without wing or slightly marginate. Inflorescences axillary, 7–10-flowered racemes; flowers in bud pink-purple, white in bloom, bisexual or sometimes male by ± complete abortion of pistil, 3–4 cm across, fragrant; pedicel 5–10 mm long. Sepals greenish purple, shallowly cupular below, 5-lobed above; lobes broadly triangular ovate, c. 4 × 9 mm; cup 5–6 mm long. Petals white, 5, elliptic-lanceolate or elliptic-oblong, 2–4 × 1 cm, acute at apex, glandular pubescent. Stamens 20–50, inserted outside the Disk; filaments 1.5 cm long, connate, in few bundles at base and free apically, pubescent; anthers yellow, linear-oblong, c. 5 mm long. Ovary oblong, c. 8 × 4 mm; style cylindric, stout, c. 15 mm long, deciduous; stigma capitate. Fruits globose, ovoid-oblong, 10–20 × 6–14 cm; rind leathery, many seeded; seeds ovate, c. 10 × 5 mm.

Fl.: March-May; fr.: October–November.

Habitat: Grows along Jainti river bank.

Distrib.: Native to NE India and possibly Myanmar.


Notes: This species is cultivated in West Bengal, but it grows wild in the Park.

2. GLYCOSMIS Correa (nom. cons.)

7 species in India and 2 in BNP.

Key to species

1a. Leaflets ovate or ovate-elliptic; flowers in compact cymes;

berries purplish-black when ripe, outer rind smooth or pitted

glandular ................................................................. 1. _G. cynocarpa_ var. _cymosa_
1b. Leaflets elliptic; flowers in panicles; berries creamy-white or salmon-reddish when ripe, outer rind mamillate .................................2. G. pentaphylla


Other synonym: *Glycosmis cymosa* (Kurz) V. Naray. Plate 13a, b

Shrubs or small trees, 3–10 m high. Leaves alternate or subopposite, imparipinnate leaflets 5 or 3 or 6 or sometime 1-foliolate, ovate or elliptic-ovate, 12–15 × 4.3–5.5 cm, acuminate to caudate at apex, entire wavy along margins, attenuate at base, chartaceous, green shining, turn pale when dry, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 5–6 pairs, inconspicuous above, glabrous; petiolules 10–12 mm long, lamina faintly decurrent on to petiolules, glabrous. Inflorescences axillary, condensed cymes; peduncle 0.5–3 cm long. Flowers subsessile; pedicel c. 2 mm long, pubescent. Sepals 4 or 5-lobed; lobes shallowly lobed above, cupular below; cup c. 1 mm long, puberulous, ciliate or glabrous. Petals greenish-white, 4 or 5, oblong-obovate, 3–4.25 × 1-1.5 mm, obtuse or rounded at apex, glandular, glabrous. Stamens 8 or 10; filaments linear, dilated below, subulate 3–5 mm long, glabrous; anthers oblong or ovoid, c. 1 mm long, often gland tipped. Disk annular, broader than the ovary. Ovary broadly oblong or subglobose, c. 1 mm, glandular, glabrous; style short, c. 1 mm long, articulated, persistent, glabrous; stigma truncate or subcapitate, persistent in fruits. Berries obovoid or ellipsoid, c. 15 × 10 mm, purplish-black when ripe, outer rind smooth or pitted glandular, 1-seeded.


Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Philippines and Taiwan.

Specimen examined: Buxa National Park, Jainti range, NRVK 6, 5th March, 2011, Gopal Krishna 47272.


Illustrations: Curtis’s, Bot. Mag. 46: t. 2074. 1819; Roxb., Pl. Coromandel 1: t. 85. 1795.

Shrubs, to 3–4 m high; branches terete, glabrous. Leaves imparipinnate, 5-foliolate; leaflets broadly elliptic, 1.8–12.2 × 0.7–4.3 cm, acute or obtuse at apex, crenate, dentate or serrate along margins, cuneate or slightly oblique at base, coriaceous, green, shining,
glabrous; midvein flat above, faintly raised beneath; secondary veins 7–8 pairs, not clearly visible, sessile or subsessile; petiolules 1–2 mm long, glabrous. Inflorescences axillary panicles, 10–15 cm long. Flowers bisexual, c. 2 × 2 mm, globose in buds; pedicels short, c. 1 mm long or sub-sessile. Sepals pale-green, 5, triangular ovate, c. 1 × 1.5 mm, imbricate, puberulent. Petals white, 5, imbricate, elliptic-obovate, c. 3 × 2 mm, glabrous, obtuse at apex, pellucid gland dotted. Stamens 10, free, inserted outside disk; filaments flattened, c. 1.75 mm long, pubescent; anthers c. 0.5 mm long, basifixed. Disk annular c. 0.5 cm, obscurely lobed. Ovary ovoid-cylindric, 1.5–2.5 mm high, glandular; style c. 1 mm, articulated, persistent; stigma thick, 5-lobed. Berries creamy-white or salmon-red when ripe, subglobose, 2–5 mm across, outer rind mamillate, 1-seeded; seed greenish, planoconvex.

Fl. & Fr.: Almost throughout the year.

Distrib.: INDIA: Throughout. WORLD: Nepal, Myanmar, Bangladesh, China, Thailand, Philippines, Sumatra, Java and Sri Lanka.

Notes: Most frequently occurred species in the Park


3. MICROMELUM Blume (nom. cons.)

1 species in India and BNP.


Other synonyms: Micromelum pubescens Blume var. integerrima (Roxb. ex DC.) Oliv.; M. pubescens Blume.

Plate 13c, d

Shrubs to 5 m high. Leaves alternate, compound; leaflets 7–15, alternate except terminal pair which is opposite, ovate-lanceolate, 7–19 × 2–6 cm, acuminate at apex, entire wavy-along margins, oblique at base, sub-coriaceous, green, shiny above, pale-green beneath, glabrous; midvein impressed above, faintly raised beneath; secondary veins 10–11 pairs, pubescent, gland dotted. Inflorescences in compound cymes, c. 10 cm long; rachis pubescent. Flowers bisexual; pedicels c. 0.2 cm long. Sepals 5-lobed, cupular below; lobes triangular c. 0.5 mm long, acute at apex, glandular pubescent. Petals 5, valvate, elliptic or linear oblong, c. 0.5 × 0.5 cm, obtuse at apex, glabrescent. Stamens 10, around the disk; filaments dimorphic, alternately shorter and longer arranged, 3–4 mm long. Disk annular,
c. 1.5 mm across, glabrous. Ovary subglobose or ellipsoid, c. 2 × 1 mm, hairy; style
cylindric, c. 1 mm long; stigmas capitate. Berries, green, orange red when ripe, ellipsoid,
c. 1.2 × 0.7 cm, 2-3 seeded; seeds reniform, compressed.
Fl. & Fr.: December-June.
Distrib.: INDIA: Andaman Islands, Andhra Pradesh, Bihar, Arunachal Pradesh, Assam,
Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.
WORLD: Bangladesh, Bhutan, China, Myanmar and Nepal.
Specimens examined: Buxa National Park, Jainti Range, East Damanpur Range, Cheko 2,
47245; Rajabhatkhawa Range, NRVK 5, 27th Nov. 2012, Gopal Krishna 50592.
Notes: This is one of the most common shrubs in the Park.

4. MURRAYA J. Koenig (nom. & orth. cons.)
2 species in India and BNP.

Key to species

1a. Leaves 3-7-foliolate; leaflets ovate, stigmas bilobed; glands are not
prominent on petals; berries ovoid-elliposid, reddish when ripe ..... 1. M. paniculata
1b. Leaves 13-23-foliolate; glands are prominent on petals; stigmas
capitate; berries subglobose; purplish to black when ripe ................. 2. M. koenigii

Brit. India 1: 503. 1875; Prain, Bengal Pl. 1: 302. 1903; K. Narayanan & M.P. Nayar in Hajra
Other synonym: Chalcas koenigii (L.) Kurz.
Plate 13e
Local name: “Karipata” (Bengali).
Illustration: Roxb., Pl. Coromandel 2: t. 112. 1798.

Shrubs, to 2-3 m high; bark gray; branches terete, tomentose. Leaves alternate, scented,
rachis 17-24 cm long, tomentose; leaflets alternate, imparipinnate, 13-23-foliolate, ovate-
lanceolate, 2.5-5 × 1-1.5 cm, acuminate at apex, entire or obscurely crenulate, oblique at
base, subcoriaceous, green shining, gland dotted above, glabrous except veins,
puberulous beneath, margins ciliate; midvein slightly raised beneath, impressed above,
pubescent; lateral veins impressed, 5-7-nerved; petiolules c. 2 mm long, tomentose.
Inflorescences terminal corymbs, c. 15 cm long; rachis tomentose. Flowers bisexual,
fragrant; pedicels 2–8 mm long, articulated at base, pubescent. Sepals 5 connate below, free above, linear-oblong c. 1 mm long, puberulent. Petals greenish-white, 5, linear, 6–8 × 1–1.5 mm, obtuse at apex, gland dotted outside, glabrous. Stamens 10; filaments inserted on disk, subequal, c. 5–7 mm long; anthers c. 1 mm long, dorsifixed. Disk annular, slightly conical c. 0.5 × 0.2 mm, obscurely 5-lobed. Ovary oblong-ovoid, c. 1 mm long; style slender c. 1 mm long; stigma capitate glandular. Berries ovoid-ellipsoid, purplish to black when ripe, c. 9 × 10 mm, 1-2 seeded; seeds ovoid-oblong.

Fl.: March-April; fr.: May-July.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Cambodia, China, Laos, Myanmar, Sri Lanka and Vietnam.


Other synonym: Murraya exotica L. (as 'Murraea').


Shrubs, 3–4 m high; branches terete, glabrous. Leaves imparipinnate, 3–7-foliolate; leaflets ovate, elliptic or broadly ovate or broadly elliptic, 2.5–7.5 × 1.2–3.1 cm, acuminate or obtuse at apex, crenate or entire along margins, cuneate or slightly oblique at base, coriaceous, glabrous, green, shining above; midvein faintly raised beneath; secondary veins obscurely 8–10 nerved; petiolules 0.3–0.4 cm long, glabrous, swollen at base. Inflorescences axillary or terminal panicles, c. 9 cm long. Flower bisexual; pedicels c. 1.5 cm long, pubescent. Sepals 5-lobed, free above, connate below; lobes ovate, c. 1 mm long, acute at apex, glandular, hairy. Petals white, 5-lobed, free; lobes oblong-elliptic or obovate, c. 1.4 × 0.5 cm, acute at apex, glabrous. Stamens 5; filaments 1.2–2 cm long; anthers oblong, opening slit at apex. Disk annular, c. 1 × 1.5 mm long, glabrous. Ovary ovoid-ellipsoid, c. 2 × 3 mm, glabrous; styles cylindric, c. 4–8 mm long, glabrous; stigma capitate. Berries ovoid-ellipsoid, c. 1 × 0.6 cm, gland dotted, reddish when ripe, 1-2 seeded; seeds c. 1 cm long.

Fl.: February-April; fr.: June-July.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh,
Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. **WORLD:** Australia, Bhutan, Madagascar, Mauritius, Malaysia, Myanmar, Nepal, New Caledonia, Philippines, Sri Lanka, Taiwan and Thailand.

**Specimen examined:** Buxa National Park, Jainti Range, Jainti 3-4, 4th March, 2011, Gopal Krishna 47235.

5. **ZANTHOXYLUM L.**

12 species in India and 1 in BNP.


Other synonym: *Z. hamiltonianum* Wall. ex Hook.f. **Plate 13g, h**

**Illustration:** Curtis’s, Bot. Mag. 52: t. 2558. 1825.

Scrambling shrubs; stems sub-terete, with recurved stout prickles; bark blackish. Leaves imparipinnate; leaflets 7-9, opposite, ovate or ovate-elliptic, 5-13 × 2.5-5.5 cm, broadly acuminate at apex, crenate along margins, slightly oblique or rounded at base; sub-coriaceous, dark green, glabrous; midvein depressed or flattened above, raised beneath, spinose or not, glabrous; secondary veins 9-11 pairs, prominent beneath, glabrous; petiolules 2-4 mm long. Inflorescences axillary or terminal cymes, c. 9 cm long; peduncles puberulous. Flowers unisexual. Male flowers 4-5 mm; pedicels 1-1.5 mm long, pubescent. Sepals 4, free above, connate below, minute, triangular ovate, c. 1 × 1 mm. Petals white, 4, ovate-elliptic, c. 2.5 × 1.2 mm, obtuse at apex. Stamens 4; filaments short, c. 0.5 mm long; anthers c. 1.5 mm long. Disk flat, c. 0.5 mm. Pistilodes 4, linear, c. 1 mm long. Ovary rudimentary. Female flowers 2-3 mm long; pedicels, sepals, petals and disk similar to male flowers. Ovary 2-2.5 mm long; style sub-lateral; stigma capitate. Follicles pale green, gland dotted, oblong-ovoid, c. 5 mm across, lemon scented, minutely beaked, 1-seeded; seed c. 2.5 mm across, dark brown.

Fl.: February-May; fr.: August-October.

**Distrib.:** **INDIA:** Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal. **WORLD:** Australia, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, New Guinea, Philippines, SW Pacific islands, Thailand and Vietnam.

Uses: Oil yielding.

Notes: Stems with recurved prickles.

SIMAROUBACEAE [242]

Key to genera

1a. Shrubs; leaves paripinnate, leaflets caudate at apex; inflorescences in cymes; filaments glabrous at base; drupes without persistent calyx ....... 1. Brucea

1b. Trees; leaves imparipinnate, leaflets acute to shortly acuminate at apex; inflorescences in umbels; filaments hairy at base; drupes with persistent calyx .............................................................. 2. Picrasma

1. BRUCEA J. F. Mill. (nom. cons.)

2 species in India and 1 species in BNP.


Shrubs, to 1 m high; stems terete, hollow, densely white lenticellate. Leaves paripinnate; rachis c. 32 cm long, pulvinate at base, yellow pubescent; leaflets 5-15, ovate-oblong or oblong-lanceolate, 5-14 × 2.6-4.8 cm, shortly acuminate at apex, entire along margins, cuneate or rounded at base, chartaceous, pale green, yellow tomentose when young, on maturity puberulent or glabrescent; midvein impressed above raised beneath, pubescent; secondary veins 6-9 pairs, pubescent; petiolules 5-10 mm long, pubescent. Inflorescences in cymes; rachis c. 22 cm long, yellow tomentose. Flowers unisexual, 1-1.5 mm across; pedicel 1-1.5 mm long; bracts linear c. 1 mm long, hispid; bracteoles linear c. 0.6-0.8 mm, hispid. Male flowers: Sepals green, 4, imbricate in bud, triangular-ovate or oblong-ovate, c. 1 × 0.5 mm, acute at apex, thick, hispid. Petals pale green, 4, oblong-ovate, 1 × 0.5-0.6 mm, incurved at apex, shortly hairy. Stamens 4, inserted below disk; filaments c. 0.5 mm long, subulate; anthers ovoid, 0.3-0.4 mm across. Disk flat and globose. Pistilodes absent. Female flowers: Sepals, petals, disk same as in male flowers. Staminodes absent. Disk shallow. Ovary 0.5-0.7 × 0.3-0.4 mm; style linear. Drupes green to greenish-orange,
epicarp shiny, ovoid, 1–1.2 × 0.6 cm, hard, more or less rugose when dried; seed cream white, ovate, c. 0.8 × 0.5 cm.

Fl. & Fr.: November-May.

Habitat: Grows along forest roads in Jainti range.

Distrib.: INDIA: Arunachal Pradesh, Assam, Nagaland, Manipur, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti Range, Jainti 6-7, 4th Dec., 2011, Gopal Krishna 52321.

Use: Though plant is known to be medicinal, it is not used here.

Note: The species was included in Fl. West Bengal based on a collection from Darjeeling and present collection is from Jalpaiguri district.

2. PICRASMA Blume

2 species in India and 1 species in BNP.


Other synonyms: Picrasma andamanica Kurz ex A.W. Benn; P. nepalensis Benn. Plate 14c, d


Trees, dioecious, 15–20 m tall; canopy large; bark dark brown, more or less smooth. Branchlets terete, glabrous. Leaves whorled, imparipinnate, 5–7-foliolate, 12–16 × 9–13 cm; rachis 4.5–9 cm long, terete, glabrous, pulvinate at base; leaflets elliptic, oblong-ovate or obovate, 3.5–8 × 1.5–3.8 cm, caudate at apex, entire wavy along margins, acute at base, sub-coriaceous, shining, pale green, smooth glabrous; midvein impressed above, raised beneath, glabrous; lateral veins obscurely 5–7 pairs, glabrous; petiolules c. 2 mm long, glabrous. Inflorescences axillary, umbels; peduncle 2–2.8 cm long, pubescent. Flowers unisexual. Male flowers: pedicels 2–3 mm long, hispid. Sepals shallowly 4-lobed, connate below; lobes broadly ovate or sub-orbicular, c. 0.5 × 1 mm, acute, hispid outside. Petals white, 4, valvate in bud, ovate, 2–2.5 × 1–1.5 mm, slightly incurved, cuspidate at apex, midvein conspicuous. Disk 4-lobed, densely white hairy. Stamens 4; filaments subulate, c. 1.5 mm long, hairy at base; anthers ovoid c. 1 × 0.6 mm. Female flowers: Sepals and disk as in male flowers. Petals ovate, larger than male flower and accrescent. Ovary globose, c. 1.5 mm across; style c. 2 mm long. Drupes ovoid-subglobose, c. 10 × 8 mm, turned black when ripe; petals persistent.

Fl. & Fr.: Throughout the year.
**Distrib.:** INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Odisha, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Bhutan and Nepal.

**Specimen examined:** Buxa National Park, Gadadhar Range, Panbari 3-6, 31st March, 2012, Gopal Krishna 56014.

### BURSERACEAE [238]

#### GARUGA Roxb.

2 species in India and 1 species in BNP.


**Illustration:** Fl. Males. 5: f. 6. 1955-1958.

Deciduous trees, 15-20 m tall; bark whitish, shining. Branchlets terete, pubescent when young. Leaves paripinnate, 15-45 cm long; stipules linear to spathulate, 0.5-1 cm long, deciduous; leaflets elliptic or oblong-lanceolate, 5-14 × 2-5.5 cm, acuminate at apex, serrate along margins, obliquely rounded or cuneate at base, subcoriaceous, glabrescent both sides; midvein impressed above, raised beneath, pubescent; lateral veins 5-10 pairs, prominent beneath. Inflorescences paniculate cymes, 7-20 cm long; peduncles 2-6 cm long, tomentose. Flowers ovoid in buds, 6-8 mm long, pubescent; pedicels c. 5 mm long, tomentose. Sepals 5, free above, cupular below, valvate; cup c. 3 × 3 mm, tomentose outside, glabrous inside; lobes deltoid, c. 1 × 1 mm, acute at apex, tomentose outside, densely hairy outside. Petals light yellow, 5; triangular ovate, c. 2.2 × 1.3 mm, acute at apex, tomentose both sides. Stamens 10, 2-seriate, attached to calyx tube at margins; filaments flattened, 2.5-3 mm long, hairy at base; anthers oblong, 1.4-1.8 mm, glandular pubescent. Disk 10-lobed. Ovary globose, c. 0.5 × 1 mm, glabrous, 4-5-loculed; style c. 2 mm long, hairy at base; stigma 5-lobed, greenish. Drupes subglobose, black, 1-1.5 cm, 1-seeded; seed with a membranous covering.

**Fl. & Fr.:** January–December.

**Distrib.:** INDIA: Assam, Eastern Himalayas, Sikkim and Western Ghats. WORLD: Bangladesh, Bhutan and China.

**Specimen examined:** Buxa National Park, Rajabhatkhawa Range, NRVK 5, Near Watch Tower, 29th March, 2012, Gopal Krishna 50611.

**Notes:** Usually at the time of flowering the trees becomes leafless, and very difficult to differentiate from *G. pinnata.*
MELIACEAE [243]

Key to genera

1a. Fruit a capsule; seeds winged ................................................................. 2
1b. Fruit a drupe or berry; seeds arillate, not winged ............................ 3

2a. Filaments distinct; disk shortly columnar or cylindric ...................... 6. Toona
2b. Filaments connate into a staminal tube; disk cup-shaped,
    shallowly cup-shaped, or absent ............................................................ 3. Chukrasia

3a. Staminal tube cylindric; style elongate .............................................. 4
3b. Staminal tube subglobose, globose, urceolate, campanulate, or
    ovoid; style short or absent ................................................................. 1. Aphanamixis

4a. Disk tubular, as long or longer than ovary ..................................... 4. Dysoxylum
4b. Disk annular, shallowly cup-shaped, or absent ................................. 5

5a. Leaves pinnate; leaflet blades with margin entire .......................... 2. Chisocheton
5b. Leaves bipinnate; leaflet blades with margin dentate, crenate,
    or rarely entire .................................................................................... 5. Melia

1. APHANAMIXIS Blume
   1 species in India and BNP.
   Other synonyms: Amoora rohituka (Roxb.) Wight & Arn.; Andersonia ruhituka Roxb.

Illustration: Bedd., Fl. Sylv. S. India 1: t. 132. 1869 [as Amoora rohituka (Roxb.) Wight & Arn.].

Trees, 10–15 m tall; branchlets spreading, subterete, appressed hairy. Leaves alternate, crowded at end of branchlets; rachis 35–40 cm long, pubescent; leaflets imparipinnate, 11–13, oblong-obovate or ob lanceolate, 7.5–16 × 3.5–5.2 cm, abruptly acuminate at apex, entire along margins, obliquely cuneate at base, subcoriaceous, shining, dark brown above when dry, glabrous, yellowish brown, beneath when dry, glabrescent; midvein raised both sides, glabrescent; secondary veins 11–13 pairs, prominent beneath, glabrescent; petiolules 5–10 mm long, puberulent. Male spikes 35–40 cm long; rachis appressed hairy. Female inflorescences shorter than male inflorescences, 10–24 cm long; rachis appressed hairy. Male flowers: c. 3 mm across, sessile. Sepals 5-lobed, lobes free above, connate below; lobes suborbicular, 1–1.5 × 1–1.5 mm, margin ciliate or not. Petals
white, 3, broadly elliptic to orbicular, c. 5 × 4 mm, glabrous or puberulous outside, hairy inside. Stamens joined together forming a staminal column, c. 5 mm long; anthers 6, oblong c. 0.5 mm long. Disk absent. Pistillode with rudimentary ovules. Female flowers: c. 6 mm across, sessile. Sepals and petals as in male flowers. Staminodes narrower. Disk absent. Ovary subglobose, 3-loculed; stigma 3-lobed. Capsules globose, 2.5–4 cm across, 3-valved, smooth, yellow or purplish, fleshy, 3-seeded; seeds ellipsoid, c. 2 × 1.5 cm, brown, covered with orange-red arils.

Fl.: May-September; fr.: October-April.

**Habitat:** Grows in mixed evergreen and deciduous forests.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Bihar, Daman & Diu, Goa, Kerala, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, Myanmar, Nepal, Pakistan and Sri Lanka.

**Specimens examined:** Buxa National Park, Rajabhatkhawa range, SRVK 6, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 47013 & 47014; Jainti Range, near Bhutia Pond, 11th Feb., 2010, S.K. Srivastava & Gopal Krishna 47048.

## 2. CHISOCHETON Blume

2 species in India and 1 species in BNP.


Other synonyms: Chisocheton paniculatus (Roxb.) Hiern; Guarea paniculata Roxb.  **Plate 14h**

**Illustration:** Wight, Icon. Pl. Ind. Orient. 1. t. 146. 1839 [as Guarea paniculata Roxb.]

Trees, 10–15 m tall; young parts rusty-pubescent. Leaves to 1 m long; leaflets 7–24(-30), oblong-ovate or lanceolate, unequally acute at base, entire along margins, acuminate at apex, glabrescent above, thinly pubescent along nerves beneath; secondary nerves 7–15 on each side, arcuating, ending parallel to margins; petiolules usually 6–12 mm long. Panicles to 1 m long, drooping with elongated lax branches. Flowers bracteate, c. 2 cm long, pale yellow, faintly scented; pedicels 3–5 mm long. Calyx cup-shaped, subtruncate, small. Petals ligulate, puberulous, imbricate. Staminal tube to c. 18 × 3 mm, with 6–8 obscure 2-fid pubescent appendages; anthers 8, sessile, linear, locellate, included. Disk annular. Ovary 4-locular; locules 1–2-ovuled; style slender, pubescent below, slightly
exceeding staminal tube; stigma disciform or capitate. Capsules 4–9 cm across, dark orange or red; seeds black, shining; aril white or yellow.

**Fl.**: June–July, **fr.**: October–December.

**Distrib. INDIA**: Arunachal Pradesh, Assam, Meghalaya, Tripura and West Bengal. **WORLD**: Bangladesh, Bhutan and Myanmar.

**Specimen examined**: Buxa National Park, Gadadhra range, Panbari 6-8, 4th Dec., 2011, Gopal Krishna 52312.

### 3. CHUKRASIA A. Juss.

1 species in India and BNP.


Other synonym: **Chukrasia velutina** M. Roem.

**Illustration**: Bedd., Fl. Sylv. S. India 1: t. 9. 1869.

Trees to 25 m tall; bark of old branches exfoliating. Young branches reddish brown, glabrous, with pale lenticels. Leaves usually 30–50 cm; petiole cylindric, 4.5–7 cm; leaflets 10–16; petiolules 4–8 mm; leaflet blades ovate to oblong-lanceolate, 7–12 × 3–5 cm, papery, both surfaces glabrous or abaxially pubescent, secondary veins 10–15 on each side of midvein and abaxially prominent, base oblique, margin entire, apex acute to acuminate. Thyrses lax, c. 1/2 as long as leaves, branches glabrous or subglabrous; peduncle short; bracts linear, caduceus. Flowers 1.2–1.5 cm, fragrant; pedicel short. Calyx c. 2 mm, puberulent. Petals cream-colored to ± lavender, linear-oblong to spatulate, 12–15 × 5–6 mm. Staminal tube cylindric, glabrous, apex truncate; anthers 10, oblong, inserted near apex of tube. Ovary on a short disk, elongate, covered with trichomes; style cylindric, short, thick, covered with trichomes; stigma as high as anthers, capitate, apically 3-lobed. Capsules yellowish gray to brown, subglobose to oblong, c. 4.5 × 3.5–4 cm, usually 3-valved, woody, surface coarse and verrucose, many seeded; seeds flat, oblong, c. 3 × 0.5 mm, broadly winged.

**Fl.**: April–May; **fr.**: July–January

**Distrib.**: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal. **WORLD**: Bhutan, China, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Thailand and Vietnam.
Specimen examined: Buxa National Park, East Damanpur Range, NRVK11, Gopal Krishna 52391.

4. **Dysoxylum** Blume

16 species in India and 1 species in BNP.


Plate 15a, b

Trees, 15–20 m tall; branchlets greyish-white, sub-terete, appressed hairy, lenticellate. Leaves alternate, imparipinnate, 30–60 cm long; rachis subterete, appressed hairy; 6–8, opposite or subopposite, oblong-ovate, 11–21 × 4.9–8.2 cm, acuminate at apex, entire along margins, oblique-cuneate at base, subcoriaceous, pale beneath, glabrous, gland dotted beneath; midvein raised both sides, puberulous beneath; secondary veins 9–12 pairs, prominent beneath, glabrous; petiolules 5–8 mm long, puberulous. Inflorescences thyrsoid, 20–30 cm long. Flowers unisexual, 0.75–1.3 cm across; pedicels 3–5 mm long. Sepals 4-lobed, shallowly lobed above, cupular below; lobes triangular; cup c. 1 mm long. Petals yellow, 4; lobes oblong, 6–8 × 2–4 mm, both surfaces puberulent. Stamens forming a staminal tube; staminal tube cylindric, c. 4 mm long, angled; anthers 8, oblong, c. 1 mm long, included. Disk tubular as long or longer than ovary, glabrous inside, 8-toothed. Ovary hairy; style 4-angled; stigma capitate. Capsules globose, 2.5–3 cm across, pale yellow or orange; seeds shining, dark purple with aril.

Fl. & Fr.: March–January.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Daman & Diu, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bhutan and Sri Lanka.


5. **Melia** L.

2 species in India and BNP.


Trees, 6–10 m high; bark dark brown, wrinkled, scurfy-tomentose when young, turned glabrous when matured; branchlets terete, puberulous. Leaves alternate, whorled, crowded towards end of branchlets, bipinnate, rarely 3-pinnate; rachis 18–26 cm long, terete; pinnae 5–9, usually opposite; leaflets 3–7 opposite or subopposite, ovate-lanceolate or elliptic-lanceolate, 2.3–5.1 × 0.9–2.7 cm, acuminate at apex, serrate along margins, oblique at base, sub-coriaceous, shining, glabrous when mature, pubescent when young; midvein raised both sides; secondary veins 10–12 pairs, obscure above, prominent beneath; petiolules 3–7 mm long. Inflorescences axillary thyrsic, c. half of leaf length; rachis lepidote pubescent. Flowers unisexual; pedicels slender, to 7 mm long. Sepals shallowly 5-lobed, cupular below; cup c. 1 × 1.5 mm, pubescent outside; lobes triangular ovate, 0.3 × 0.5 mm, acute. Petals white, 5, free up to base; lobes linear-oblong or oblanceolate, c. 2 × 1 mm, acute or obtuse at base, pubescent outside when young. Staminal tube purple, 2–3 mm long, cylindric 20–30-toothed; anthers at mouth of tube, apiculate. Ovary c. 2 mm across, glabrous; style clavate at apex; stigma 10-lobed. Drupes ovoid-ellipsoid, 1.5–2 × 0.8–1.1 cm, fleshy, yellow when ripe, 1-seeded; seed ellipsoid, c. 1 × 0.7 cm, 5–7 ribbed.

Fl. & Fr.: May-December.

Distrib. INDIA: Almost throughout.


6. TOONA (Endl.) M. Roem.

7 species in India and 1 species in BNP.


Other synonym: Cedrela toona Roxb. ex Rottler & Willd.


Trees, to 25 m tall, densely foliaceous with a spreading crowns, deciduous; branchlets terete, tomentose; bark thin, rough, rusty brown. Leaves whorled, compound, c. 30 × 15 cm; leaflets 6–9 pairs, subopposite, oblong-lanceolate, 8–9 × 2–3 cm, acuminate at apex, entire or undulate along margins, obliquely cuneate at base, thinly coriaceous, green, shining, glabrous; midvein faintly raised both sides; secondary veins 14–17 pairs, conspicuous, looping towards margins; petiolules 5–7 mm long. Inflorescences panicles as long as or longer than leaves, usually c. 25 cm long; peduncles 3 cm long. Flowers c. 8
mm across, bisexual; pedicels 3–5 mm long, pubescent; bracts c. 1 mm long, pubescent. Sepals 5-lobed, lobes free above, connate below; lobes triangular ovate, c. 1 x 0.5 mm, acute at apex, ciliate. Petals 5, white, oblong-ovoid, c. 4 x 2 mm, obtuse at apex, ciliate along margins. Stamens 5; filaments c. 2 mm long, subulate, hairy at base; anthers oblong, c. 0.75 mm long, versatile. Disk 5-lobed, thick, villous. Ovary c. 2 mm long, pubescent or sparsely hairy; style short, c. 1 mm long; stigma globose or discoid. Capsules oblong, c. 3 x 1.5 cm, lenticelled or not, blackish when dry; seeds c. 1.5 cm long, winged at both ends.

**Fl. & Fr.**: December-May.


**Specimen examined**: Buxa National Park, Jainti range, Tashigaon near Bhutia Pond, 15th Feb., 2010, S.K. Srivastava & Gopal Krishna 47114.

**OPILIACEAE [278]**

**LEPIONURUS** Blume

1 species in India and BNP.


Other synonym: *Lepionurus oblongifolius* Mast.

**Illustration**: Griff., Icon. Pl. Asiat. 4: t. 536. 1854 [as *Lepionurus oblongifolius* Mast.].

**Plate 15e, f**

Shrubs, to 1–2 m high; stems branched, terete, more or less striate, bark green, shining, glabrous, hollow. Leaves alternate, simple, distichously arranged, narrowly ovate or lanceolate, 10–17.8 x 3.7–5 cm, acuminate at apex, entire along margins, cuneate at base, chartaceous, green, shining, glabrous; midvein faintly raise above, raised beneath, glabrous; lateral veins 5–7 pairs, inconspicuous above, prominent beneath, glabrous; petioles sub-sessile or sessile. Inflorescences axillary, in clustered racemes, drooping; rachis 2–4 cm long. Flowers c. 0.5 mm across, monochlamydeous, enclosed by bracts; bracts green, broadly ovate, c. 3 x 2 mm, acute at apex, ciliate along margins, chartaceous, glabrous, veins conspicuous, caducous; bracteoles absent; pedicels 2–3 mm, glabrous. Perianth 4, patent, ovate, c. 0.4 x 0.3 mm, acute at apex, thick, glabrous. Stamens 4, opposite to perianth lobe, inserted below the margins of disk; filaments inconspicuous; anthers ovate c. 0.5 mm long. Disk fleshy, lining the base of perianth-tube. Ovary enclosed by disk, ovule-1, pendulous; style subulate, 0.3–0.5 mm; stigma simple. Drupes
orange-red, ellipsoid, c. 1.7 x 1 cm, upon thickened disk; fruiting pedicels 2–5 cm long, glabrous.

**Fl. & Fr.**: Throughout the year.

**Distrib.**: **INDIA**: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal. **WORLD**: Borneo, China, Java, Malay Peninsula, Myanmar, Nepal, Sumatra, Thailand and Vietnam.

**Specimen examined**: Buxa National Park, East Damanpur Range, NRVK 12, 30th March, 2012, Gopal Krishna 50647.

**Notes**: It was included in Fl. West Bengal based on a collection from Darjeeling district. The present collection is made in the vicinity of a drainage course in the Park (Jalpaiguri district.).

**ICACINACEAE [347]**

**NATSIATUM** Buch.-Ham.

1 species in India and BNP.

**Natsiatum herpeticum** Buch.-Ham. ex Arn., Edinburgh New Philos. J. 16: 314. 1834; Mast. in Hook.f., Fl. Brit. India 1: 595. 1875; Prain, Bengal Pl. 1: 326. 1903; R. Mathur in N.P. Singh & al., Fl. India 5: 30. 2000. Plate 15g, h1, h2

Dioecious, climbing shrubs; stems and branches terete, twisted, strigose. Leaves alternate, simple, orbicular to ovate, 9–11.5 x 6.5–10.5 cm, acute to acuminate at apex, crenate-dentate along margins, cordate at base, coriaceous, green, strigose both sides; veins 7–8, slightly raised both sides, strigose; petioles 4.5–11 cm long, strigose. Male inflorescences in raceme, 5–18 cm long. Male flowers: pedicels 2–3 mm long, strigose; bracts linear, c. 2 mm long, hairy. Sepal 5, narrowly ovate, 1–2 mm, hairy outside, glabrous inside. Petals cream-white, 5, ovate, c. 2 x 1 mm, glabrous outside, hairy inside. Disk circular c. 1 mm across. Stamens 5, alternating with petals; filaments c. 3 mm long, glabrous; anthers c. 1 mm long. Female inflorescences racemes, pendulous, 5–10 cm long. Female flowers: pedicels 2–3 mm long, hispid; bracts linear, c. 2 mm long. Sepals as in male flowers. Petals cream-white, 5, lanceolate, c. 3 x 1 mm, hairy inside. Stamens absent. Staminodes 5, subulate. Ovary c. 1.5 x 1 mm, villose; style 2-fid; stigma capitate. Drupes dark green initially, turn black green when ripe, obliquely ovoid, c. 8 x 6 mm, 1-seeded.

**Fl. & Fr.**: December–February.
Plate 1.5: a - b. Dysoxylum binectariferum (Roxb.) Hook. f. ex Bedd.: a. Fruiting branch; b. Dehisced capsule; c. Melia azedarach L.; d. Toona ciliata M. Roem.: inset: fruit; e - f. Lepianurus sylvestris Blume: e. Flowering branch; f. Inflorescence; g - h2. Natsiatum herpeticum Buch.-Ham. ex Arn.: g. Fruiting branch; h1. Female spikes; h2. Fruits


Notes: Female plants are very common but male plants are rare in the Park.

AQUIFOLIACEAE [389]

ILEX L.

26 species in India and 1 species in BNP.


Other synonyms: Ilex sulcata Wall. ex Hook.f.; I. godajam Wall. ex Hook.f. var. sulcata (Wall. ex Hook.f.) Kurz.


Dioecious trees, 5-8 m high; branchlets sub-terete, pubescent. Leaves alternate, oblong-ovate, 3.8-7.6 × 2.3-4.1 cm, acuminate at apex, entire along margins, cuneate at base, chartaceous, pale green, shining, glabrous; midvein depressed above, puberulent, slightly raised or flattened beneath, pubescent; lateral veins inconspicuous; petioles 1-1.5 cm long, pubescent. Inflorescences many-flowered pseudoumbels, flowers inconspicuous; peduncles 3-10 mm long, pubescent. Male flowers: pedicels 1-4 mm long, pubescent. Sepals 4, oblong-obovate, 1-1.5 × 1 mm, obtuse at apex, ciliate along margins, pubescent outside, glabrous inside. Petals cream-white 4, broadly obovate, 1.5-1.7 × 1.25 mm, obtuse, glabrous. Stamens 4; filaments flattened, subulate, c. 0.75 mm long; anthers ovate, c. 1 × 0.75 mm. Pistillode rudimentary, globose 3-5-lobed apically. Female flowers c. 2 mm; pedicels 2-3 mm, hairy. Sepal 4, suborbicular, c. 1 × 1 mm, obtuse at apex, ciliate along margins, pubescent. Petals as in male flowers. Sterile anthers sagittate. Ovary 1-1.5 × 1-1.2 mm, 1-2-ovuled, placentation apical; stigma sessile, capitate. Fruits ellipsoid to globose, c. 3.5 mm across with persistent stigma.

Fl. & Fr.: April-September.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya and West Bengal. WORLD: Bangladesh, China and Myanmar.

Notes: Female plants common in the Park.

HIPPOCRATEACEAE [172]

REISSANTIA Halle

3 species in India and 1 in BNP.


Illustration: Roxb., Pl. Coromandel 3: 3, t. 205. 1819 [as Hippocratea arborea Roxb.].

Straggling shrubs sometimes appear as a lianas; branchlets terete, glabrous, smooth, coiled and robust, may or may not hollow. Leaves opposite, simple, ovate-oblong or ovate-elliptic, 9.6–15.5 × 5.5–8.5 cm, shortly acuminate at apex, crenate to serrulate along margins, base rounded or subacute, membranous to subcoriaceous, shining, pale green when dry, glabrous; midvein faintly raised both sides; lateral veins 6–8 pairs, prominent beneath, glabrous; petioles 1.2–2.3 cm long, stout, glabrous; stipules linear 2–3 mm long, caduceus. Inflorescences axillary, dichotomous cymes; peduncles 1.3–2.5 cm long, filiform, glabrous. Flowers bisexual, c. 0.75 mm across; pedicels 1 mm long, stout, glabrous; bracts triangular ovate, c. 1 × 0.75 mm, acute, glabrous. Sepals green, connate below, 5-lobed above; lobes orbicular c. 1 × 1 mm, glabrous. Petals green white, 5, imbricate or valvate, ovate c. 0.5 × 0.5 mm. Stamens 3; anthers sub-orbicular c. 0.2 mm, sessile. Disk conspicuous. Ovary partially embedded in the disk, tricarpellary, trilocular, apocarpus; stigma truncate. Capsules usually of 3 flattened carpels connate below, obtuse or acute at both ends, green, yellowish when dry, compressed, obovate-oblong, 8–10 × 3.2–4 cm, thickly coriaceous, striate, glabrous, each one 2-seeded; seeds yellowish, 6–6.3 × 2 cm, including wings; wings ovate, 4 cm long, smooth, corky.

Fl. & Fr.: April–December.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Meghalaya, Tripura, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Myanmar and Nepal.

Fig. 8. Reissantia arborea (Roxb.) Haro : a. A vegetative branch; b. Capsule
Notes: The species was included in Fl. Bhutan in which the author cited a collection from Darjeeling too. The collections, from Bala and Jainti river banks, in present exploration constitute alone representations in CAL from West Bengal.

**CELASTRACEAE [172]**

**CELASTRUS L.**

7 species in India and 1 species in BNP.


Local name: “Mal-Kangni” (Bengali).


Scandent shrubs, monoecious and rarely dioecious; branches terete, brown, densely lenticellate, glabrous. Leaves alternate, simple, oblong-ovate, ovate-oblong or elliptic, 4–11.5 × 1.9–5.6 cm, abruptly acuminate to shortly acuminate at apex, crenulate along margins, cuneate to slightly rounded at base, coriaceous, shining above, glabrescent beneath; midvein impressed above, raised beneath, puberulent; lateral veins 5–6 pairs, prominent beneath, puberulent; petioles 5–8 mm long, glabrous. Inflorescences terminal panicles, 7–15 cm long; rachis pubescent. Flowers unisexual and rarely bisexual. Male flowers: pedicel filiform, 5–6 mm long, puberulent; bracts triangular ovate, c. 1 × 1 mm, pubescent. Sepals 5, sub-orbicular, c. 0.5 × 1 mm, ciliate along margins. Petals 5, pale green, recurved, oblong to obovate, c. 3 mm long. Stamens 5; filaments c. 2.5 mm long; anthers ovoid c. 0.5 mm. Disk cupular, obscurely 5-lobed. Ovary sterile, columnar. Female flowers: Sepals, petals and disk are as in male flowers. Ovary globose, c. 5 × 5 mm, free from disk glabrous; style columnar, 1–2 mm long; stigma 3-lobed. Capsules yellow to orange, subglobose, c. 10 × 8 mm, 1–6-seeded; seeds ellipsoid, 3–5 × 2–4 mm, smooth, completely covered with aril.

Fl. & Fr.: April–December.

Distrib.: INDIA: Andaman Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Australia, China, Malaysia, Myanmar, New Caledonia, Thailand and Vietnam.

Use: Oil obtained from seeds is used medicinally.

RHAMNACEAE [151]

Key to genera

1a. Flowers unisexual ................................................................. 2. Rhamnus
1b. Flowers bisexual ................................................................. 2

2a. Plants with tendrils; disk lobed between stamens; fruits 3-winged............ 1. Gouania
2b. Plants without tendrils; disk not lobed between stamens;
   fruits not winged ................................................................. 3

3a. Plants without stipular prickles; leaves not as above;
   fruit a samara ........................................................................ 3. Ventilago
3b. Plants with stipular prickles; leaves oblique and 3–5-nerved at base;
   fruit a drupe ........................................................................ 4. Ziziphus

1. GOUANIA Jacq.

4 species in India and 1 species in BNP.


Other synonym: G. tillifolia Lam.


Climbing shrubs; branchlets sub-terete, glabrous with few tendrils; tendrils axillary or supra axillary. Leaves alternate, simple, ovate or ovate-orbicular, 5–10 × 3–6 cm, shortly acuminate at apex, crenate along margins, cordate at base, coriaceous, dark green above, slightly pale beneath, chartaceous, glabrous except nerves toward lower side; midvein impressed above, raised beneath, hairy; lateral veins 5–6 pairs, flattened or slightly prominent beneath, leptodromous; petioles 1.3–2 cm long. Flowers in axillary racemes or terminal panicles, to 30 cm long. Flowers bisexual; pedicels c. 1 mm long, glabrous or sparsely hairy. Sepals 5-lobed, lobes free above, connate below, triangular c. 1.2 × 1.2 mm, acute at apex, thickened, hairy outside, glabrous inside. Petals white, 5, free, spatulate, c. 1.1 × 1 mm. Stamens 5; filaments c. 0.8 mm, slightly thickened at base; anthers ovoid c. 0.3 mm long. Disk lobes pentagonal. Ovary urceolate, enclosed by disk, 3-loculed; style 3-cleft up to middle, stigmas recurved, papillate. Capsules sessile, winged, 3-seeded,
crowned by persistent calyx; seeds ovate, c. 4 × 3.5 mm, brown, glabrous, black shiny, flattened, margin winged.

Fl. & Fr.: August–December.


Uses: The plant contains an alkaloid. Leaves used in sores, young leaves eaten as vegetable. Bark and root used for washing hairs.

Notes: Plant is common in Jainti range of the Park.

2. RHAMNUS L.

11 species in India and 1 species in BNP.


Scrambling or sub-erect shrubs, 1–2 m high; branches subterete, more or less striate, puberulent. Leaves alternate, elliptic-ovate or oblong-ovate, 8–12.5 × 4.1–5.5 cm, acuminate at apex, serrate-dentate along margins, cuneate or slightly obliquely attenuate at base, sub-coriaceous, dark green, shining, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 5–6 pairs, flattened above, raised beneath, glabrous; petioles 1.2–1.6 cm long, flattened, glabrous. Inflorescence axillary fascicles or in simple or branched racemes; bracts foliaceous, ovate or ovate-oblong, 1.5–4.3 × 0.8–2.2 cm. Flowers 1.2–1.6 mm across; pedicels 1–1.5 mm, pubescent. Male flowers: Sepals 5, triangular-ovate, 1–1.2 × 0.6–0.8 mm, acute at apex, leathery, pubescent outside, glabrous inside. Petals greenish-white, 5, cucullate ovate-oblong, c. 1 × 0.8 mm, spatulate, alternate to sepals, enclosing the stamens. Stamens 5; filaments short, inconspicuous; anthers oblong-ovate, 0.4–0.8 mm, dorsifixed. Disk annular, glabrous. Pistilode present. Female flowers: Sepals and petals as in male flowers except petals are caducous. Staminode present. Ovary trigonous, c. 0.3 × 0.4 mm; style 3-fid, c. 0.6 mm long; stigma
curved. Drupes sub-globose, green, broadly obovate, 0.4–0.5 × 0.6–0.7 mm, 2–3-lobed with persistent calyx cup, 2-or 3-seeded.

Fl. & Fr.: July–February.

Habitat: Grows along drainage in dry places.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Odisha and West Bengal. WORLD: Bhutan, China, Malaysia, Myanmar, Nepal and Thailand.

Specimen examined: Buxa National Park, Rajabhatkhawa Range, 29th Nov. 2011, Gopal Krishna 47161.

Uses: Pounded fruits with vinegar are prescribed for the treatment of herpes.

3. VENTILAGO Gaertn.

4 species in India and 1 species in BNP.


Other synonyms: Ventilago calyculata Tul.; Ventilago madraspatana Gaertn. var. calyculata King.


Scandant shrubs; branchlets greenish, ridged, hispid; bark dark grey, smooth when young. Leaves alternate, simple, ovate-elliptic, 2–6.2 × 1–3 cm, acuminate at apex, crenate-serrate along margins towards apex, entire toward base, oblique at base, subcoriaceous, young leaves reddish green, mature leaves dark green, puberulous both sides; midvein slightly impressed above, raised beneath, pilose; lateral veins 7–9 pairs, prominent beneath, arcuate, pilose; petioles 5–8 mm long, pilose. Inflorescence terminal or axillary panicles, c. 6.5-18 cm long; rachis tomentose. Flowers bisexual, pungent; pedicels 2–3 mm long, tomentose. Sepals 5, free above, cupular below; lobes triangular ovate, 1–1.5 × 1 mm, acute, pubescent outside, glabrous inside. Petals 5, ovate, 1–2 × 1 mm, spathulate, enclosing the stamens. Stamens 5, adnate to the base of petals; filaments, 1–2 mm. Disk thick, fleshy, 5-lobed, densely ferruginous. Ovary globose, densely pilose, nearly immersed in disk; styles deeply 2-fid. Drupes yellow-green, puberulent, surrounded by persistent calyx tube at base; wing with one median line, 2-fid at apex.

Fl. & Fr.: September–June.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Bihar, Gujarat, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Nepal, Thailand and Vietnam.

4. ZIZYPHUS Mill.

17 species in India and 2 species in BNP.

Key to species

1a. Climbing shrubs; leaves ovate-lanceolate; stipular spines in same direction; petals absent; disk 5-lobed; ovary hairy..............................1. Z. apetala

1b. Trees or shrubs; leaves elliptic-orbicular; stipular spines in opposite direction; petals present; disk 10-lobed; ovary glabrous....................2. Z. mauritiana


Scandant shrubs; stems terete, rusty tomentose, lenticellate, striate, on maturity glabrescent; spines recurved, c. 2.5 mm, pubescent at base. Leaves alternate, simple, ovate-lanceolate, 4.5-9.5 × 2-4.5 cm, acuminate at apex, serrate along margins, slightly oblique at base, sub-coriaceous, dark green, shining; midvein impressed above, raised beneath; basally 3-nerved, prominent beneath, pubescent or almost glabrescent on maturity; petioles c. 3 mm long, rusty pubescent. Inflorescences axillary, dichotomous cymes, 1.5-2.5 cm long; peduncle c. 1 cm long, rusty tomentose. Flowers c. 2 mm across; pedicels c. 4 mm long. Sepals pale green, 5, free above, connate below, triangular ovate c. 1 × 1 mm, acute at apex, pubescent outside, glabrous inside. Petals absent. Stamens 5; filaments subulate, c. 3 mm long, glabrous; anthers globose. Disk 5-lobed. Ovary covered with hairs; style bifid; stigma simple. Drupes green, globose, 1-1.1 cm across, slightly apiculate at apex; seed compressed.

Fl. & Fr.: March-May.

Distrib.: INDIA: Assam and West Bengal. Endemic


Notes: This species is confined to Assam and West Bengal, but its population is abundant in the Park. In Fl. West Bengal Z. apetala (disk 10-lobed) was keyed out based on number of disk lobes from Z. rugosa (disk 5-lobed), but Z. apetala exhibits only 5-disk lobes. The
leaf shape and number of stipular spines are more applicable in the diagnosis of these species.


Other synonyms: Ziziphus jujuba (L.) Gaertn.; Rhamnus jujuba L. Plate 16g1, g2

Local name: “Kul” (Bengali).


Shrubs or medium size trees, 1-3 m high; bark dark grey or nearly black, with deep vertical cracks, reddish and fibrous inside; younger parts rusty tomentose; spines solitary or in pairs, straight or one of them recurved; nodes slightly enlarged around the leaf scars. Leaves alternate, variable, broadly elliptic or oblong-ovate, 1.8-4.5 × 1.4-3 cm, obtuse at apex, finely serrulate or entire along margins, cuneate at base, leathery, green, shining above, pale beneath, pubescent or glabrous above, tomentose to densely brown or yellow white silky tomentose beneath; midvein faintly impressed above, raised beneath, tomentose; basally 3-nerved, prominent; stipules spinescent. Inflorescences short axillary cymes or 10-13-flowered fascicles; peduncles 1-8 mm long, tomentose. Flowers 3-4 mm across; pedicels 2-4 mm in flowers, accrescent 3-7 mm in fruits, tomentose. Sepals 5, spreading, triangular-ovate, c. 1.5 × 1.5 mm, acute at apex, tomentose outside, glabrous inside, keeled within. Petals 5, alternate to sepals, oblong-spathulate, 1-1.5 mm long, clawed at base. Stamens 5, equal to petals; filaments c. 1 mm long, subulate; anthers oblong c. 0.2 mm long. Disk fleshy, 10-lobed, concave at middle. Ovary globose, c. 1.5 × 1.5 mm, glabrous; style short, c. 1 mm long, 2-cleft, united to the middle; stigmatic lobes curved. Drupes oblong or globose, 1-1.2 cm in across, green, shining when unripe, turned yellow when ripe; 1-2-seeded; seeds compressed, 6-7 × 5-6 mm.

Fl. & Fr.: August–December.

Habitat: Grows near Bala and Jainti river.


Uses: Fruits are edible. Local people collect them for vegetable and pickles.
VITACEAE [140]

Key to genera

1a. Leaves simple; tendril twice bifid.................................................................1. Cissus
1b. Leaves pedately or digitately 3-7 foliolate; tendril simple or bifid.....................2
2a. Flowers bisexual; berries 1-seeded.................................................................2. Cyphostemma
2b. Flowers unisexual; berries 1-4 seeded.........................................................3. Tetrastigma

1. CISSUS L.

18 species in India and 1 species in BNP.

Other synonyms: Cissus javana DC.; Vitis inaequalis Wall. ex Wight & Arn.; V. discolor (Blume) Dalzell.

Illustration: Curtis’s, Bot. Mag. 80: t. 4763. 1854.

Climbing herbs; stems angled, reddish, glabrous; tendrils leaf opposed, twice bi-fid. Leaves alternate, simple, ovate-lanceolate, 5–13 × 1.9–4.5 cm, acuminate at apex, serrate dentate along margins, truncate or sub-cordate at base, green, blotched with white deep red, shining above, glabrous; petioles 1–1.5 cm long, more or less angled, glabrous. Inflorescences leaf opposed umbellate cymes. Flowers bisexual, 1–1.5 mm across; pedicels 1.5–2 mm long. Sepals 4, shallowly 4-lobed above, cupular below; cup c. 1 × 1 mm. Petals reddish, 4, free, ovate-oblong, 1–1.1 × 0.6–0.7 mm, acute at apex, glabrous. Disk 4-lobed, c. 1 mm across. Ovary c. 0.7 × 0.7 mm, enclosed by disk; style elongated, c. 0.5 mm; stigma discoid. Berries reddish-purple, obovoid-globose, c. 5 mm across, red when ripe, often with stylar remains, 1-2-seeded.

Fl.: June–October; fr.: November–December.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Sikkim, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal and Philippines.


Notes: This species is known from Darjeeling district of West Bengal. Present collection is from Jalpaiguri district.
3. **CYPHOSTEMMA** (Planch.) Alston

2 species in India and 1 species in BNP.


Other synonyms: *Cayratia auriculata* (Roxb.) Gamble; *Vitis auriculata* (Roxb.) Wall.; *Vitis erythroclada* Kurz.

**Illustration**: Wight, Icon. Pl. Ind. Orient. 1: t. 145. 1846 [as *Vitis auriculata* (Roxb.) Wall.].

Climbing shrubs; stems succulent, sub-terete, hispid, hairy. Leaves digitately 5-foliolate; petioles 9.5-11 cm long; stipules falcate, c. 1 x 0.5 cm; terminal leaflets rhomboidal-elliptic, 13.5-15 x 6.5-7 cm, acuminate at apex, serrate along margins, slightly oblique at base, thinly coriaceous, green, rough; midvein faintly raised both sides, pubescent; secondary veins 7-9 pairs, puberulous; petiolules c. 2 cm long; lateral leaflets ovate, 8-11 x 4.5-5 cm, lamina divided in to two unequal part, acuminate at apex, serrate along margins, oblique at base; midvein as in terminal leaflets; secondary veins 7-9 pairs; petiolules 1-1.5 cm long. Inflorescence axillary or terminal branched cymes, 18-20 cm long; peduncles 7-9 cm long. Flowers c. 3 mm across; pedicels 2-3 cm long. Sepals 4-lobed, shallowly 4-lobed above, cupular below, pubescent. Petals 4-lobed, free; lobes c. 2.5 x 1.5 mm, hooded. Stamens 4; filaments c. 2 mm long; anthers globose. Disks of 4 glands. Ovary pyramidal, c. 1.5 mm across, hairy; style c. 1 mm long. Fruits berries globose, c. 1.5 cm across, red, glabrous, 1-seeded; seed oblong-obovoid to subglobose, c. 8 x 5 mm.

**Fl. & Fr.**: July-December.

**Distrib.**: INDIA: Andhra Pradesh, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and West Bengal. WORLD: Bangladesh and Myanmar.

**Specimen examined**: Buxa National Park, Gadadhar Range, Panbari 8-9, 1st Dec., 2011, Gopal Krishna 47195.

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3. **TETRASTIGMA** (Miq.) Planch.

16 species in India and 5 species in BNP.

**Key to species**

1a. Leaves digitately foliolate................................................................. 2

1b. Leaves pedately foliolate................................................................. 3
Plate 16: a. Reissantia arborea (Roxb.) Hara; inset: capsule; b. Celastrus paniculatus Willd.; inset: flowers; c. Rhamnus napalensis (Wall.) M.A. Lowson; d. Ventilago denticulata Willd.; e-f. Ziziphus apetala Hook.f.; e. Flowering branches; f. Flowers; g1-g2. Ziziphus mauritiana Lam.; g1. Flowering branch; g2. Fruiting branch; h. Tetrastigma bracteolatum (Wall.) Planch.; inset: flower (close up)
2a. Leaves 3-foliolate; petals with dorsal spur ..................................... 1. T. bracteolatum
2b. Leaves 5-foliolate; petals without dorsal spur ..................................... 4. T. planicaule
3a. Style distinct; stigma 4-rayed ......................................................... 2. T. dubium
3b. Style indistinct or absent; stigma 4-lobed ........................................ 4
4a. Seeds obovoid, 6-7 × 4-5 mm .......................................................... 3. T. leucostaphylum
4b. Seeds pyriform, c. 5 × 3 mm .......................................................... 5. T. serrulatum


Climbing herbs; stems angled, sparsely pubescent to subglabrous; tendrils simple, leaf opposed. Leaves 3-foliolate; petioles 3.5-5 cm long, pubescent; leaflets elliptic-lanceolate, 7-15 × 2.2-5 cm, abruptly acuminate at apex, distantly serrate along margins, cuneate at base, slightly oblique at base in lateral leaflets, chartaceous, green, shining, glabrous; midvein flattened both sides, conspicuous; lateral veins obscurely 5-6 pairs, glabrous; petiolules 5-8 mm long. Inflorescences lax cymes; peduncles c. 3 cm long, puberulous. Flower unisexual, green; pedicels 1-2 mm long, pubescent; bracts oblong-ovate c. 4 × 3 mm, acute at apex, nerves prominent. Male flowers: Sepals distinctly 4-toothed, pubescent. Petals white, 4, free, ovate-oblong, 2-2.5 × 1 mm, hooded at apex, pubescent outside, glabrous inside. Stamens 4; filaments c. 0.5 mm long, glabrous, attached at the base of disk; anthers oblong, c. 0.75 mm long. Disk 4-lobed, glabrous. Female flowers: Sepals and petals as in male flowers. Stamens absent. Ovary conical, c. 0.5 mm long, glabrous; stigma sessile, 4-lobed. Berries globose, 6-9 mm across, 1-2-seeded; seeds obovoid, c. 6 × 5 mm.

Fl. & Fr.: September-February.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan and Nepal.

Specimen examined: Buxa National Park, Rajabhatkhawa Range, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 46395.


Other synonym: V. oxyphylla Wall. ex Prain.
Climbing shrubs; branches terete, striate, glabrous; tendrilssimple, leaf opposed. Leaves alternate, digitately 3-foliolate or pedately 5-foliolate; petioles 5-12 cm long, glabrous; terminal leaflets elliptic-lanceolate or lanceolate, 6–13.6 × 1–5 cm, acuminate at apex, dentate-serrate along margins, rounded at base, chartaceous, green, turned reddish green when dry, glabrous; midvein slightly raised both sides; lateral veins 8–11 pairs, obscure; petiolules 1–2.1 cm long, glabrous; lateral leaflets obliquely ovate-lanceolate, 4.2–11.5 × 1.3–4.6 cm, apex and margins as in terminal leaflets, oblique at base, texture as in terminal leaflets; midvein as in terminal leaflets; lateral veins 6–8 pairs, obscure; petiolules 3–5 mm long. Inflorescences compact, corymbose cymes, 2.5–4 cm long, nearly glabrous to pubescent; peduncles c. 1 cm long. Flowers c. 2 mm long, pale yellow; pedicels 2–3 mm long. Male flowers: Sepals 4-lobed; lobes triangular, acute. Petals greenish-white, ovate c. 1.8 × 1.5 mm, with a dorsal spur. Stamens c. 1 mm long; filaments flat. Disk cupular with undulate margin, thick, covering base of ovary. Female flowers: Sepals and petals as in male flowers. Staminode absent. Ovary c. 1 mm long; style columnar; stigma 4-rayed. Berries ovoid, c. 1 cm across; seeds oblong-ellipsoid, c. 1 × 3.5 mm.

Fl. & Fr.: February–May.

**Distrib. INDIA:** Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, Tripura and West Bengal. **WORLD:** Bangladesh, China, Myanmar and Nepal.


Other synonyms: *Vitis lanceolaria* Wall. ex Wight & Arn.; *V. serratifolia* Wight & Arn.; *V. muricata* Wight & Arn.; *Tetrastigma lanceolarium* Planch.; *T. muricatum* Gamble. Fig. 9

Climbing shrubs; branches flat, striate, glabrous; tendrils leaf opposed stout, simple. Leaves pedately 5-foliolate; petioles 8–11 cm long, glabrous, striate, glabrous; terminal leaflets oblong-ovate or oblong-lanceolate, 10.5–15.3 × 4.3–5.9 cm, acuminate at apex, serrate-dentate along margins, rounded at base, coriaceous, glossy, green, glabrous; midvein flattened above, raised beneath; lateral veins 6–8 pairs, inconspicuous, glabrous; petiolules 2–3 cm long, glabrous; lateral leaflets obliquely oblong-lanceolate, 10–14.5 × 4.3–6 cm, acuminate at apex, serrate-dentate along margins, oblique at base; petiolules
Fig. 9. Tetrastigma leucostaphylum (Dennst.) Alston: a. Flowering branch; b. Female flower; c. Petal; d. Staminode; e. Gynoecium with staminodes (petals removed)
0.5–2 cm long. Inflorescences subcorymbose cymes; peduncles 1.5–2 cm long. Flowers unisexual, 1.5–2 mm long, pubescent; pedicels 2–3 mm long, pubescent. Male flowers: Sepals cupular, inconspicuous, sometimes minutely 4-lobed, ciliate-pubescent along margins. Petals 4, green, oblong-ovate, c. 1.5 × 0.75 mm, hooded and sometimes slightly dorsally spurred at apex. Stamens 4; filaments c. 1.5 mm long; anthers oblong, c. 0.5 mm long. Disk restricted to base of ovary, undulate along margins. Ovary pyramidal, c. 1 mm across; stigma sessile, 4-lobed. Berries globose, c. 1 cm across, 2-4-seeded; seeds obovoid, 6–7 × 4–5 mm, planoconvex, transversely striate on sides.

Fl. & Fr.: December–September.

Distrib.: INDIA: Andhra Pradesh, Assam, Karnataka, Kerala, Meghalaya, Odisha, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan and Nepal.

Specimen examined: Buxa National Park, Rajabhatkhawa, 8th March, 2011, Gopal Krishna 50504.


Other synonym: V. neurosa Kurz.

Illustration: Curtis’s, Bot. Mag. t. 5685. 1868 [as Vitis planicaulis Hook.f.].

Climbing shrubs; branchlets flattened, striate, puberulous; tendrils simple. Leaves pedately 5-foliolate or rarely digitately 3-foliolate; petioles 6.5–9 cm long, more or less warted, glabrous; terminal leaflets elliptic to oblong or rhombic-ovate, 9.5–10 × 5–5.4 cm, abruptly acuminate at apex, distantly crenate-serrate along margins, cuneate at base, subcoriaceous, green, shining; midvein flattened, conspicuous; lateral nerves 5–6 pairs inconspicuous; petiolules 2–2.3 cm long, glabrous; lateral leaflets oblong to obliquely-ovate, 5.2–10 × 2.8–5.5 cm, oblique at base, otherwise as in terminal leaflets; petiolules 1–2 cm long, glabrous. Inflorescences corymbose cymes; peduncles 1–3 cm, long. Flowers unisexual, 2–2.5 mm long, minutely pubescent; pedicels 2–3 mm long, pubescent. Male flowers: Sepals 4, truncate. Petals green, 4, oblong-ovate, c. 2 × 1 mm long, hooded, pubescent outside. Stamens 4; filaments 1–2 mm long; anthers c. 1 mm long. Disk 4-lobed. Carpel absent. Female flowers: Sepals, petals and disk same as in male flowers. Stamens absent. Ovary c. 1 mm across, glabrous; stigma 4-lobed. Berries c. 2 cm across, 1-2-seeded; seeds oblong-obovoid, c. 10 × 5 mm, transversely ribbed.

Fl. & Fr.: November–May.


Other synonym: Tetrastigma indicum M. Maulik. Plate 17b

Climbing shrubs; branches striate, glabrous; tendrils leaf-opposed, slender, branched near apex. Leaves alternate, pedately 5-foliolate; petioles 2-6 cm long, striate; terminal leaflets obovate or elliptic, 4.3-8.4 × 1.8-3.4 cm; lateral leaflets obliquely ovoid, 1.2-4.6 × 0.6-2.8 cm, mucro-acute or broadly acuminate at apex, crenate-serrate along margins, attenuate at base, sub-coriaceous, green, glabrous; midvein raised both sides; lateral veins 8-9 pairs, prominent beneath, glabrous, reddish; petiolules 3-9 mm long. Inflorescences umbellate cymes, 3-4-chotomous; peduncles 1-3.5 cm long. Flowers unisexual, c. 2 mm long; pedicels c. 2 mm long; bracts ovate c. 1.5 × 1 mm. Male flowers: Sepals cupular, truncate, glabrous. Petals white, 4, free, elliptic, 2-2.5 × 1 mm, hooded, glabrous. Stamens 4; filaments c. 1.5 mm long; anthers oblong, c. 0.5 mm long. Disk shallowly lobed. Carpel absent. Female flowers: Sepals and petals as in male flowers. Stamens absent. Ovary saucer shaped, c. 1.5 mm long, glabrous; style obscure; stigma 4-lobed. Berries globose, c. 6 mm across, shortly apiculate, 1-3-seeded; seeds pyriform, c. 5 × 3 mm.

Fl. & Fr.: February–November.

Distrib.: INDIA: Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, China, Nepal and Thailand.


Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.
LEEACEAE [140]

LEE A. Royen ex L. (nom. cons.)

11 species in India and 3 species in BNP.

Key to species

1a. Leaflets and inflorescences scaly, conspicuously pearl glandular.............1. L. aequata

1b. Leaflets and inflorescences not scaly and glandular.................................2

2a. Inflorescences coryms; bracts ovate, persistent; berries orange-yellow, black when ripe.................................2. L. compactiflora

2b. Inflorescences cymes; bracts triangular, early caducous; berries depressed globose, purple-black..................................................3. L. indica


Other synonyms: *Leea hirta* Roxb. ex Hornem; *L. kurzii* C.B. Clarke.

**Illustration:** Rumph., Herb. Amb. 4: t. 45. 1743.

Plate 17c

Shrubs, to 2 m high; stems and branches angled, succulent, hispid, pearl glandular. Leaves bipinnate, sometimes tripinnate; leaflets 3–7, elliptic-lanceolate or rhombic ovate, 2.5–21.5 × 1–10 cm, acuminate at apex, coarsely serrate along margins, rounded at base, scabrous, pearl glandular on both surfaces, hairy beneath especially on veins; midvein impressed above, raised beneath, pubescent; secondary veins 10–15 pairs, prominent beneath; petiolules 2–7 mm long, terete, pubescent. Inflorescences leaf opposed corymbose cymes; peduncles 1–3.5 cm long, densely ferruginous pubescent. Flowers bisexual, green; pedicels 1–6 mm long, pubescent; buds ovate, 3–4 mm, apex rounded. Sepals 5-lobed, lobes free above, cupulate below; lobes triangular, densely pearl glandular. Petals elliptic, 3–3.5 mm, glabrous. Staminodial tube 1.7–2.5 mm, with lower part 1.5–2.3 mm, upper 0.4–0.6 mm, lobes 0.3–0.4 mm. Stamens 5; filaments 2–3 mm long; anthers elliptic, 1.5–2 × 0.8–1 mm. Ovary globose, 0.5–0.7 mm across; style 0.5–0.8 mm; stigma slightly capitulate. Berries reddish when dry turned into black and hard, oblate to globose, 4–7 mm across, glabrous, 4–6-seeded.

**Fl. & Fr.:** June–January.

**Distrib.:** INDIA: Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand and Vietnam.


Other synonyms: *Leea trifoliata* M.A. Lawson; *L. bracteata* C.B. Clarke. Plate 17d

Straggling shrubs, sometimes with creeping rootstocks, 2–5 m high; stems terete, glabrous densely ferruginous pubescent when young. Leaves bi or tripinnate; basal pair of leaflets sometimes reduced in size; petioles 5–8 cm long; stipules represented by a narrow wing extending to the entire length of petioles, persistent; rachis 12–20 cm long. Leaflets 7–15, elliptic to elliptic-lanceolate, 2.7–11.5 × 1.7–5.7 cm, acuminate to caudate at apex, serrate along margins, obtuse to cuneate at base, subcoriaceous, glabrous above pubescent on the nerves beneath; petiolules 0.4–2.2 cm long, pubescent; midvein faintly raised above, prominently raised beneath; lateral veins 8–15 pairs, prominent beneath. Inflorescences leaf-opposed, corymbs; peduncles 1–4 cm long, pubescent. Flowers greenish white; bracts broadly ovate-lanceolate, 6–12 mm long, persistent. Sepals c. 3 mm long, glabrous to pubescent. Petals elliptic, 3.2–3.5 mm, densely pubescent. Staminal tube 2–2.5 mm long, upper free part 1.5–2 mm long; lobes shallowly retuse or cleft. Stamens 5; filaments 1.6–1.8 mm; anthers elliptic, 1.2–1.5 × 0.6–0.8 mm. Ovary globose, 4–6-loculed; style 2–3 mm; stigma capitate. Berries 7–10 mm across, orange-yellow, black when ripe; 4–6-seeded.

Fl. & Fr.: May–December.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, China, Laos, Myanmar and Vietnam.


Notes: This species is reported from Darjeeling and Howrah districts and present collection is from Jalpaiguri district.


Other synonyms: *Leea sambucina* Willd.; *L. umbraculifera* C.B. Clarke.
Illustrations: Wight, Ill. Ind. Bot. 1: t. 58. 1840; Wight, Icon. Pl. Ind. Orient., 1: t. 78. 1846

Undershubs, to 1 m high; stems and branches angled, glabrous, rigid. Leaves 2-3-pinnate; petioles purple, 10-20 cm long; stipules obovate-oblong, c. 6 x 3 mm long; rachis 15-40 cm long, stout, glabrous; leaflets oblong, ovate-lanceolate or elliptic-lanceolate, 5.5-13 x 1.6-3.2 cm, acute or acuminate to caudate at apex, coarsely serrate to dentate at margins, rounded to cuneate at base, subcoriaceous, glabrous; midvein raised both sides, glabrous; lateral veins 7-13 pairs, prominent beneath; petiolules 5-25 mm long. Inflorescences lax, sometimes dense, glabrous to pubescent cymes; peduncles 5-10 cm long. Flowers 5-merous, greenish white; pedicels 2-3 mm long; bracts narrowly triangular to linear, c. 4 mm long, early caducous. Sepals 2-4 mm long, lobed up to middle, glabrous to pubescent. Petals 5-lobed above; tube 2.5-3.5 mm long; lobes 3-4 mm long. Staminodial tube 2.5-3.5 mm. Ovary globose; style 5-7 mm long; stigma expanded slightly. Berries depressed globose, 6-7 mm across, purple-black; seeds 4-6 mm, grooved.

Fl. & Fr.: June–March.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.


SAPINDACEAE [240]

LEPISANTHES Blume

5 species in India and 1 species in BNP.


Other synonyms: Sapindus attenuates Wall. ex Hiern; S. danura Voigt; S. bifoliatius Hiern; Otophora paucijuga Hiern; S. rubra Kurz; Aphania rubra Radlk.; Aphania danura Radlk.; Aphania nicobarica Radlk.

Illustration: Icon. Select. Pl. 3: t. 38 1837.

Shrubs, 5-7 m high, often climbing; bark greyish brown or dark brown; branchlets terete, striate, lenticellate, glabrous. Leaves compound, often crowded at the ends of branchlets, paripinnate; rachis 19-26 cm long, terete, striate, glabrous; leaflets elliptic-oblong, ovate
or lanceolate, opposite, 5.3-21 × 2.6-5.6 cm, acute or shortly acuminate at apex, entire along margins, rounded at base, subcoriaceous, shining, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 10-11 pairs, obscure; petiolules 5-8 mm long, swollen at base. Inflorescences axillary and terminal panicles; rachis 20-30 cm long, terete, glabrous. Flowers unisexual. Male flowers: Sepals 5, free above, connate at base, outer 3 smaller, innermost 2 larger; outer sepals ovate c. 1.2 × 0.6 mm, coriaceous, sparingly ciliate; innermost sepals orbicular 2.5 × 2 mm, obtuse, ciliate. Petals crimoson, 5, with scales at base, orbicular c. 2.5 × 2 mm, obtuse, slightly folded. Stamens 8; filaments c. 1 mm long, subulate; anthers oblong-ovate, 1.5-1.6 mm long, bent inwards. Disk 4-lobed, glabrous. Pistilode conspicuous, c. 0.5 mm. Female flower: Sepal and petals as in male flowers. Ovary 2-3-celled; style short, stout; stigma shallowly 2-lobed. Berries ellipsoidal, 8-14 × 7-10 mm, orange red, purple to blackish on ripening, glabrous, 1-seeded; seed ellipsoid.

Fl. & Fr.: November-June.


Note: It is very common in the Park.

HIPPOCASTANACEAE [240]

AESCULUS L.

2 species in India and 1 in BNP.


Other synonym: A. *punduana* Wall. ex Hiern.

Local name: “Satpate” (Nepali).

Trees, to 10 m high. Leaves opposite, digitately compound, exstipulate; petioles terete, hollow, glabrous, c. 28.5 cm long; leaflets 7-8, elliptic to elliptic-obovate, 12-30 × 4-9.8 cm, abruptly acuminate at apex, serrulate along margins, cuneate at base, sub-coriaceous,
green, shining, glabrous; midvein flattened or faintly raised above, raised beneath; lateral veins 20-24 pairs, prominent beneath; tertiary veins prominent beneath; petiolules c. 5 mm long. Inflorescences thyrsse, usually erect, sometimes terminal portion bending, main axis in racemes and branches with terminal cymes; rachis c. 60 cm long, pubescent. Flower buds cylindrical; flowers bisexual, zygomorphic, 2-3 cm across. Sepals green, tubular below; tube 5-7 mm, glabrous, insignificantly lobed above; lobes rounded. Petals cream white, with a yellow or orange spot, 4 + 2, unequal, pubescent outside; 4 larger petals spathulate, 1.6-2 cm long; 2 smaller petals linear, c. 2 mm long. Stamens 7-8, prominently exserted, recurved; filament c. 3 cm long; anthers oblong. Disk conspicuous. Ovary linear, puberulous, 3-loculed; style slender, c. 7 mm long; stigma linear. Capsules brown, ovoid-ellipsoid, 8-9 × 4-5 cm, obliquely and bluntly beaked at apex, scurfy brown, 1-seeded; seed large, c. 3 cm across.

Fl. & Fr.: February-June.

Habit: Grows along streams in the Park.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal. WORLD: Afghanistan and Myanmar.


Notes: The wood is used for making vases, plates, cups and toys.

STAPHYLLACEAE [230]

TURPINIA Raf. (nom. cons.)

4 species in India and 1 in BNP.


Local name: “Thali” (Bengali).

Illustration: Roxb., Pl. Coromandel 3: t. 279. 1819 [as Dalrympelea pomifera Roxb.].

Trees, 15-20 m tall; branchlets subterete, glabrous. Leaves opposite, imparipinnate, 5-7; leaflets obovate or oblong elliptic, 5.5-14.5 × 3.2-6.8 cm, acuminate at apex, serrulate along margin, cuneate or slightly oblique at base, coriaceous, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 5-6 pairs, glabrous; petiolules 0.5-2.2 cm long, glabrous. Inflorescences panicles, 12-22 cm long, branched; branches puberulous, green or tinged with red. Flowers c. 3 × 3 mm, bracteate; bracts c. 1 mm long,
margin ciliate; pedicels c. 2.5 mm long, puberulent. Sepals pale-green, 5-lobed above; lobes ovate or obovate, 2-2.75 × 1.25-2 mm, margin ciliated, thick. Petals cream, 5-lobed, free; lobes oblong, c. 3 × 1.5 mm, chartaceous. Stamens 5; filament ribbon shaped, attached to disk, c. 2 mm long; anthers oblong, c. 0.5 mm long, dorsifixed, tetrathecouous. Carpels 5; stigma capitellate. Berries globose, 2-2.5 cm across, 3 grooved at apex, rugose.

Fl. & Fr.: January–August.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, Malaysia, Nepal and Vietnam.

Specimens examined: Buxa National Park, Jainti range, NRVK 4-14, 10th Feb, 2010, S.K. Srivastava & Gopal Krishna 47006; Gadadhar range, Panbari, 8th March 2011, Gopal Krishna 50506; East Damanpur range, SRVK 12, 30th March, 2012, Gopal Krishna 50639.

Use: The fruit is sour and eaten by elephants.

SABIACEAE [115]

Key to genera

1a. Trees; leaves compound; flowers zygomorphic; stamens 2, fertile; staminodes 3; fruit a drupe ................................................................. 1. Meliosma

1b. Scandant shrubs; leaves simple; flowers actinomorphic; stamens 5, fertile; staminodes absent, subequal; fruit a schizocarp ...................... 2. Sabia

1. MELIOSMA Blume

5 species in India and 1 species in BNP.


Trees, to 10 m tall; branchlets pubescent to glabrous. Leaves compound, alternate or subopposite, 30-35 cm long; rachis terete, puberulent; leaflets 11-13, elliptic to obovate, 6.5-15.5 × 3-4.5 cm, distal leaflet smaller and proximal leaflet larger, acuminate at apex, serrate along margins or sometime spinose, rounded or cuneate at base, thinly coriaceous, glabrous or sometimes pubescent beneath; midvein impressed above, faintly raised beneath; lateral veins 9-12 pairs, faintly raised beneath; petiolules 3-5 mm long. Inflorescences terminal panicles, erect, profusely branched, 10-55 cm long; rachis yellow brown tomentose. Mature buds c. 2 mm across enclosed by bracts; bracts lanceolate, c. 5
mm long, acute, brown tomentose. Sepals 5 (3 + 2); 3 broadly ovate, 1-1.5 mm; 2 outer ones narrower, rusty tomentose. Petals 5, in 2 whorls; outer petals 3, suborbicular, c. 0.6 mm, usually glabrous; inner petals 2, c. 0.6 mm, deeply bifid. Staminodes 3, c. 1 mm long. Disk shallowly cup-shaped, 5-dentate. Ovary c. 0.6 mm long, densely pubescent. Drupes subglobose to obovoid, 4-10 mm across; stone prominently reticulate, median keel distinct.

Fl. & Fr.: April-September.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan and Myanmar.

Specimen examined: Buxa National Park, Rajabhatkhawa range, Near 23rd Mile Watch Tower, 8th April, 2012, Gopal Krishna 56079.

Note: This is only taxon with compound leaves in the genus Meliosma.

2. SABIA Colebr.

6 species in India and 2 species in BNP.

Key to species

1a. Inflorescences simple cymes, glabrous; flowers not scented; petals light yellow and not spreading .............................................. 1. S. limoniacea

1b. Inflorescences paniculate cymes, pubescent; flowers scented; petals more greenish and spreading ........................................ 2. S. paniculata


Other synonym: Sabia malabarica Bedd.

Illustration: Fl. Males. 10: P. 686, f. 2. 1984-1989. Plate 18c, d

Scandant shrubs; branchlets terete, striate, glabrous. Leaves simple, usually lanceolate to oblong-ovate, rarely elliptic, 7.2-12.2 × 2.5-4.9 cm, mircro-acute to obtuse at apex, entire along margins, cuneate-rounded at base, leathery, green, shining, glabrous; midvein flattened above, conspicuous above, raised beneath; secondary veins 5-6 pairs, prominent beneath; petioles 8-10 mm long. Inflorescences axillary paniculate cymes, 6-15 cm long; rachis glabrous. Flowers bisexual, 1-1.5 mm across; pedicles 1.5-2 mm long, glabrous. Sepals 5, broadly ovate or elliptic, 0.5-1 × 0.5-1 mm, broadly acute or obtuse at apex, ciliate along margins, slightly thickened, glabrous, nerves obscure, gland dotted at base.
Petals pale yellow, 5, obovate-sub-orbicular, c. 1.5 × 1 mm, obtuse at apex, glabrous. Stamens 5; filament flattened, c. 0.75 mm long, glabrous; anthers globose, c. 0.15 mm, introrse. Disk cup-shaped, shallowly 5-lobed. Ovary c. 0.5 × 0.5 mm, glabrous, 2-loculed; style short, 0.2-0.5 mm; stigma simple. Fruits drupaceous, with 2 drupelets; drupelet red or black, subglobose to obovoid, 10-15 × 10-13 mm compressed, 1 or (2)-seeded.

Fl. & Fr.: September-April.

Distrib.: INDIA: Assam, Kerala, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, Borneo, China, Laos, Malay Peninsula, Myanmar, Sumatra, Thailand and Vietnam.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, Gopal Krishna 47233.


Plate 18e

Climbing shrubs; stems terete, striate, puberulent or glabrous, zig-zag. Leaves alternate, simple, oblong-ovate or narrowly ovate, 10-19.5 × 4.5-8.8 cm, mucro-acute at apex, entire along margins, rounded at base, coriaceous, green, shining, glabrous except nerves; midvein impressed above, glabrous, raised beneath, puberulent; secondary veins 6-9 pairs, obscure above, not prominent beneath. Inflorescences axillary or terminal panicles, c. 12 cm long; rachis pubescent. Flowers fragrant; pedicels 2-8 mm long, pubescent. Sepals 5, ovate, c. 0.75 × 0.5 mm, acute at apex, ciliate along margins. Petals 5, ovate-oblong, c. 2 × 1 mm, acute at apex, glabrous, nerves conspicuous. Stamens 1.5-2.5 mm. Disk shallowly cup-shaped, shortly 5-lobed. Style cylindrical or narrowly conical, 0.75-1.25 mm. Fruit with 2 drupelets; drupelet subglobose, c. 8 mm across, compressed.

Fl. & Fr.: June-August.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Sikkim, Nagaland, Uttar Pradesh and West Bengal. WORLD: Myanmar and Nepal.


Note: Common in the Park.
Plate 18: Turpinia pomifera (Roxb.) DC.: a. Fruiting branch; b1. Inflorescences; b2. Fruits; c - d. Sabia limoniacea Wall. ex Hook.f. & Thomson: c. Flowering branch; d. Fruits; e. Sabia paniculata Edgew. ex Hook.f. & Thomson; inset: Flower; f - g2. Pegia nitida Colebr.: f. Flowering branch; g1. Inflorescence; g2. Fruiting branch
ANACARDIACEAE [239]

PEGIA Colebr.

1 species in India and BNP.


Other synonyms: Tapirira hirsuta (Roxb.) Hook.f; Robergia hirsuta Roxb. Plate 18f, g1, g2

Local name: “Lahra-amp” (Bengali).

Scandant shrubs, 5–10 m high; stems and branches terete, scabrous, villose. Leaves alternate, imparipinnate; rachis 10–20 cm long, villose; leaflets 11–15, elliptic or ovate-lanceolate, 2–5.2 × 0.8–2.4 cm, shortly acuminate at apex, serrate along margins towards apex and entire toward base, obliquely subcordate at base, subcoriaceous, puberulous both sides; midvein slightly raised both sides, hirsute; lateral veins 5–6 pairs, impressed above, prominent beneath, hirsute; petiolules 3–5 mm long, tomentose. Inflorescences axillary or terminal, panicles, 10–20 cm long; rachis terete, villose. Flowers polygamous, c. 1 mm across; pedicels 1–3 mm long, puberulent; bracts lanceolate, c. 1 mm long. Sepals 5, ovate, c. 1 × 0.4 mm, persistent. Petals white, 5-lobed; lobes ovate, c. 1 × 0.6 mm, acute at apex. Stamens 10, inserted at the base of disk; filaments c. 2 mm long; anthers oblong, c. 2 mm long. Disk 5-lobed. Ovary subglobose, c. 1.5 mm. Drupes obliquely oblong, c. 6 × 4 mm, rugose; seeds oblong compressed, hairy.

Fl. & Fr.: February-May.

Habitat: Grows along with drainage in exposed forests.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Bhutan, China, Myanmar, Nepal and Thailand.


Uses: The plants occur frequent in the Park. Leaves are eaten as vegetable.

FABACEAE: CAESALPINIOIDEAE [144]

Key to genera

1a. Lianas or trees; leaves simple................................................................. 2
1b. Herbs, shrubs, trees or lianas; leaves pinnate ...................................... 4

2a. Lianas with tendril; with nectariferous disk.................................... 4. Phanera
2b. Shrubs or trees, without tendril and nectariferous disk.................. 3

3a. Calyx splitting to mouth of hypanthium at anthesis ..................... 1. Bauhinia
3b. Calyx splitting only in the upper part at anthesis ................................................. 5. Piliostigma

4a. Leaves bipinnate; sepals unequal and asymmetric; petals light green, often dominated by sepals (in the referred species); stamens 10, varying in length ................................................................. 2. Caesalpinia

4b. Leaves unipinnate; sepals equal and symmetric; petals yellow, prominent; stamens 4–10, dimorphic, two of them raise side ways and their incurved anthers look like arms of tongs ......................................................... 5

5a. Petioles and rachis of leaves without glands; stamens 10, filaments of 3 abaxial, antisepalous stamens sigmoidally curved, usually longer than anthers; pods indehiscent, cylindric ............................................................... 3. Cassia

5b. Petioles and rachis of leaves with or without glands; stamens 10 or 5 fertile; filaments straight; pods dehiscent, compressed................................. 6. Senna

1. BAUHINIA L.

18 species in India and 1 in BNP.


Other synonyms: Bauhinia coromandeliana DC.; Bauhinia triandra Roxb. Plate 19a

Local name: “Kanchan” (Bengali).


Trees, 10-12 m tall; branchlets subterete, glabrous. Leaves alternate, simple, broadly elliptic, 9.5-17 × 6.2-12.4 cm, deeply bi-lobed at apex, lobes sub-acute to obtuse, entire along margins, sub-cordate or truncate at base, coriaceous, pale green, shining above, glabrous above, appressed hairy beneath; palmately 9-11-nerved, slightly impressed above, glabrous, raised beneath, puberulent; petioles 3.2–4.5 cm long; stipules ovate, 1–2 mm long, pubescent. Inflorescences axillary or terminal, racemes, 10-12-flowered. Flower buds clavate, 1–3 cm long, twisted at apex, tomentose; pedicels thick, 0.4–1.7 cm long; bracts ovate, c. 2 × 1 mm, tomentose, acute at apex; pedicels thick, 1.5–4.5 cm long, puberulent along margins; bracteoles similar to bracts. Flowers bisexual, 6–10 cm across. Sepals green, 5-lobed above, connate at base, lanceolate, c. 15 × 4 mm, puberulous both sides. Petals light pink or mauve, or white with pink or pinkish purple tinge, 5, free, obovate-ob lanceolate, 4.8–5.5 × 1.5–1.6 cm, acute at apex. Stamens 3, fertile; filaments 3–4.5 cm long, pubescent or glabrous, slightly curved; anthers oblong, 4–5 mm long. Staminodes 5–7 mm long.
Gynophore 10-15 mm long; ovary elongated, 10-15 × 2-2.5 mm, greenish; style 8-13 mm long; stigma 2-2.5 mm across, oblique, greenish. Pods narrowly oblong, c. 32 × 2.5 cm, acuminate at apex, up to 10-seeded, brown, dehiscent; seeds suborbicular to pyriform, c. 2 cm across, plano-convex.

Fl. & Fr.: September–April.

Distrib.: INDIA: Throughout. WORLD: Bhutan, China, Nepal and SE Asia.


Note: Common in Rajabhatkhawa and Jainti range of the Park.

2. CAESALPINIA L.

14 species in India and 1 in BNP.


Illustration: Ralph, Icon. Carp. t. 22, f. 1. 1849 [as Mezoneuron cucullatum (Roxb.) Wight & Arn.].

Plate 19b, c

Scandant shrubs; stems and branches terete, glabrous; bark dark green or blackish, with recurved prickles. Leaves opposite, 15-20 cm long; leaflets paripinnate, 6–7 pair, broadly ovate to obovate, 2.8–7.4 × 1.3–3 cm, acuminate at apex, entire along margins, cuneate at base, subleathery, dark green, shining above, glabrous; midvein faintly raised beneath; lateral veins 5–6 pairs; petiolules 1.5–2 mm long; stipules absent. Inflorescences axillary, racemes, rarely branches, 25–30 cm long. Flower pedicels 5–8 mm long. Sepals 5, unequal, lowest one cucullate, upper triangular-oblong, c. 5 × 3 mm. Petals yellow 5, upper one fan-shaped, bilobed, 6–8 × 10–12 mm, other petals oblong or broadly elliptic, 5–8 × 4–6 mm, clawed; claw c. 0.5 mm long. Stamens 10, exserted; filaments of various length, 2–2.5 cm long, glabrous; anthers oblong, pink, dehiscing longitudinally. Ovary compressed; style slender; stigma small, truncate. Pods oblong-lanceolate, 7.5–8.5 × 1.8–2.3 cm, membranous, indehiscent, winged with persistent calyx; wings c. 5 mm broad, 1-seeded; seed brown, c. 9 × 6 mm.

Fl. & Fr.: March–December.

Habitat: Grows in dry open forests.
Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.


Note: This species in vegetative or in flowering very much similar of C. nuga, but by its pink colored anthers it can be easily distinguished.

3. CASSIA L.

8 species in India and 1 species in BNP.


Other synonym: Cassia rhombifolia Roxb.

Local names: “Amaltas”, “Banarthi”, “Sundali” (Bengali).

Illustration: M. Blanco, Fl. Filip. t. 120. 1875.

Deciduous trees, to 12 m tall. Leaves paripinnate, 30-40 cm long, leaflets 6-8; leaflets broadly ovate or ovate-oblong, 5-20 × 3.5-5 cm, acute at apex, entire along margins, broadly cuneate at base, shiny, leathery, both surfaces puberulent when young, glabrous when mature. Inflorescences racemes, axillary, 20-40(-60) cm long, lax, pendent, many flowered. Flowers 3.5-4 cm across; pedicels 3-5 cm, slender. Sepals narrowly ovate, 1-1.5 cm, reflexed at anthesis. Petals golden yellow, broadly ovate, subequal, 2.5-3.5 cm, shortly clawed. Stamens 10, 3 long with curved filaments 3-4 cm, anthers c. 5 mm, exceeding petals, 4 short with straight filaments, 6-10 mm, reduced stamens with minute anthers. Ovary stalked, strigulose; stigma small. Pods pendulous, terete, blackish brown, sausage-shaped, indehiscent, 30-60 × 2-2.5 cm in across; seeds many, separated by papery septa, glossy brown, elliptic, flattened.

Fl.: March-April; fr.: August-October.

Distrib.: INDIA: Throughout. WORLD: Cultivated throughout the tropics.

Specimen examined: Buxa National Park, Jainti range, Tashigaon, 10th April, 2012, Gopal Krishna 56069.

Note: Often cultivated.
4. **PHANERA** Lour.

11 species 1 species in BNP.


Other synonyms: *Bauhinia anguina* Roxb.; *B. scandens* L. var. *anguina* (Roxb.) Ohashi; *Bauhinia piperifolia* Roxb.; *Bauhinia anguina* Roxb. var. *horsfieldii* (Miq.) Watt ex Prain; *B. horsfieldii* (Miq.) Macbr.; *Lasiobema scandens* (L.) de Wit; *L. scandens* (L.) de Wit var. *horsfieldii* (Miq.) de Wit; *Bauhinia scandens* L. var. *horsfieldii* (Miq.) K. & S.S. Larsen.


Lianas; stems alternately elevated and depressed glabrous; tendrils present. Leaves alternate, simple, bilobed, 3–16 × 3–13 cm; lobes together ovate and rounded at base, distinctly shallowed at apex; with prominently tapering apices chartaceous, shining, glabrous above, glabrescent to glabrous beneath, 5–9-nerved; petioles 4.8–7 cm long, glabrescent to glabrous; stipules ovate, c. 3.5 mm long, mucronate. Inflorescences simple or compound racemes, terminal or axillary, 4.5–25 × 1.5–20 cm; primary axis and its branches puberulous. Flower buds c. 2 mm across, globose, puberulous to glabrous. Hypanthium c. 1 mm long. Pedicels 2–6 mm long, puberulous; bracts and bracteoles setaceous. Flowers bisexual, c. 5 mm across. Sepals cup shaped with 5 minute deltoid lobes in upper part, later splitting irregularly. Petals white, later turning pale yellow, obovate, 3–4 × 2–2.5 mm, obtuse at apex, nerves visible, glabrous inside, puberulous outside on median zone; claw c. 1 mm long. Fertile stamens 3; filaments 4–5 mm long, glabrous; anthers ellipsoid 1.5–2 mm long. Staminodes 2, c. 1 mm long. Gynophore c. 1 mm long, laterally oriented. Ovary c. 2 mm long, glabrous; style c. 1 mm long, glabrous; stigma scarcely differentiated from style. Pods oblong to elliptic, 2.2–5 × 1.7–2.5 cm, flattened, glabrous, 1–2-seeded, indehiscent; seeds nearly ovate, c. 6 mm across.

**Fl. & Fr.:** October–January.

**Distrib.:** INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Odisha, Pondicherry, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

**Specimens examined:** Buxa National Park, Gadadhar range, Panbari 8-9, 10th April, 2012, *Gopal Krishna* 56086; Panbari 1-2, 1st Dec., 2011, *Gopal Krishna* 47190.
Uses: The stems are carried by the mendicants to keep off serpents. The bark yields cordage fibre.

Notes: Older stems form ladder like structures hence known by “Monkey ladder”. The plants rarely flower and specimens housed at CAL are sterile; the description is based on literature.

5. PILIOSTIGMA Hochst.

2 species in India and 1 species in BNP.


Illustration: M. Blanco, Fl. Filip. t. 118. 1875.

Trees, to 10-15 m high; branches sub-terete, glabrous. Leaves alternate, simple, suborbicular, 3.2-9.0 × 5.5-11.1 cm, bifid at apex, entire along margins, cordate at base, lobes obtuse-truncate, coriaceous; palmately 7-13-nerved at base, slightly raised both sides; petioles 1.6-2.4 cm long, puberulous, shallowly grooved; stipules narrowly ovate, c. 2 mm long. Inflorescences axillary or terminal racemes, male and female flowers on separate racemes, 4-6 cm long. Male flowers: Flowers c. 1 cm across, flower buds narrowly obovoid, 7-9 × 3-4 mm, obtuse at apex, puberulent; pedicels filiform 7-10 mm long; bracts narrowly ovate, c. 1.5 × 1 mm, puberulent; bracteoles linear-lanceolate, c. 1 mm long, puberulent. Sepals 5-lobed above, tubular below; lobes triangular ovate, c. 2 × 2 mm, puberulent; tube c. 10 × 4 mm, puberulent. Petals pinkish-white, 5-lobed, oblanceolate, 11-16 × 3-4 mm, obtuse at apex, puberulent. Stamens 10, perfect, in 2 whorls; filaments 3-6 mm long; outer whorl longer than inner whorl; anthers oblong, 2-2.5 mm long. Ovary rudimentary, densely pubescent. Female flowers: sepals and petals as in male flowers. Staminodes 10, 0.5-1 mm long, outer whorl longer than inner. Gynophore 1.5-2 mm long; ovary c. 9 × 1.5 mm, densely pubescent; style 1.5-2 mm long, densely pubescent; stigma capitate, 2-2.5 mm across, pubescent. Pods narrowly oblong, 15-30 × 1.2-2.5 cm, beaked at apex, nerves conspicuous when dry, reddish brown, indehiscent or with a tendency to dehisce tardily, 20-30-seeded; seeds dark brown, oblong to suborbicular, 5-6 mm across.

Fl. & Fr.: October-March.
Distrib.: INDIA: Throughout. WORLD: Bhutan, Cambodia, Indonesia, Laos, Myanmar, Philippines, Nepal, Thailand and Vietnam


Note: Commonly cultivated in tropics.

6. SENNA P. Miller

43 species in India and 5 in BNP.

Key to species

1a. Rachis of leaves eglandular ................................................................. 2
1b. Rachis of leaves glandular ................................................................. 3

2a. Shrubs; petals not spreading; stamens 10, 7 of them only perfect;
pods tetragonal, winged ................................................................................... 1. S. alata

2b. Trees; petals spreading; stamens 10, all perfect; pods strap shaped, without wing .............................................................. 4. S. siamea

3a. Plants hirsute throughout ............................................................... 2. S. hirsuta
3b. Plants not hirsute ............................................................................ 4

4a. Leaflets more than 3-pairs; sessile glands at the base of rachis;
pod green with purplish tinge, strap shaped ........................................ 3. S. occidentalis

4b. Leaflets 3-pairs; stalked glands on rachis between the first pair of
leaflets; pod green, acicular .......................................................... 5. S. tora


Local name: “Dadmardan” (Bengali).


Shrubs, to 1.5–3 m high; branches terete, pubescent. Leaves compound, 30–60 cm; stipules persistent, triangular, 6–10 mm; rachis with narrow wings; petiolar glands absent; leaflets subsessile, 6–12(–20) pairs, oblong or obovate-oblong, 6–15 × 3.5–7.5 cm, obtusely rounded and cuspidate at apex, entire along margins, obliquely truncate at base, thinly leathery. Inflorescences axillary spikes, some times branched, many flowered, 10–50 cm long; bracts orange yellow, broadly orbicular, 2–3 × 1–2 cm, enveloping unopened flowers in spike, falling off when flowers bloom. Flowers c. 2.5 cm across. Sepals orange-
yellow, 5-lobed; lobes oblong, unequal. Petals not spreading bright yellow, ovate-
orbicular, 16-24 × 10-15 mm, tinged with conspicuous veins, claw. Stamens 10, fertile
stamens 7, opening with apical pores, lower 2 with stout filaments c. 4 mm and larger
anthers, 4, with filaments c. 2 mm and smaller anthers, reduced stamens 3 or 4. Ovary
puberulent, sessile; ovules many. Pods winged, tetragonal, 10-20 × 1.5-2 cm, glabrous,
with a broad, membranous wing down middle of each valve; wings 4-8 mm wide,
chartaceous.
Fl. & Fr.: August-April.
Distrib.: INDIA: Throughout. WORLD: Native to tropical America; widely introduced in
the tropics elsewhere.
Specimen examined: Buxa National Park, Jainti range, Jainti 6, 07th April, 2012, Gopal
Krishna 56097.

2. Senna hirsuta (L.) H. S. Irwin & Barneby, Phytologia 44(7): 499. 1979; V. Singh,
Other synonym: C. tomentosa Wall. ex Arn. Plate 19f

Undershubs, to 1-2 m high; all parts hirsute with densely spreading hairs; stems and
branches angled, ribbed, hirsute. Leaf alternate; rachis 10-12 cm long, gland at the base of
rachis; glands solitary, oblong-conical, 2-3 × 1 mm; leaflets paripinnate, 4-5 pairs, elliptic
to oblong-lanceolate, 2.7-6 × 1.5-2.4 cm, shortly acuminate at apex, entire along margins,
obliquely cuneate at base; subcoriaceous, hirsute both sides; midvein flattened above,
faintly raised beneath, hirsute; lateral veins 4-6 pairs, hirsute. Inflorescences axillary
racemes, but appears as terminal racemes. Sepals pale green, 2-lobed, free; lobes boat
shaped, broadly ovate, c. 5 × 4 mm, densely hirsute. Petals orange-yellow, 5, subequal,
oblong-obovate, 1.4-1.8 × 1 cm, obtuse at apex; clawed at base, glabrous. Stamens 10, (7
fertile + 3 sterile); filaments unequal, 1-2 mm long; anthers variable 5-6 mm long. Ovary
falcate, c. 4 mm long, sericeous; style short; stigma small. Pods linear, 3.5-11.5 × 0.3-0.4
cm, densely hairy, many seeded; seeds flat, obovoid, 3-4 mm across.
Fl. & Fr.: October-December.
Distrib.: INDIA: Throughout. WORLD: A native of Tropical America, now a weed
throughout tropics.

Subshrubs or shrubs, erect, 0.8-1.5 m tall, glabrous, branched; branches ribbed. Leaves compound, c. 20 cm long; stipules lanceolate, 1-2 cm, membranous, caducous; rachis with a large, brown, ovoid gland near base; petiolule 1-2 mm, with a rotten smell when squeezed; leaflets 3-5(or 6) pairs, ovate to ovate-oblong, 4-10 × 2-3.5 cm, membranous, base rounded, apex acuminate. Inflorescences corymbose racemes, few flowered, axillary or terminal, c. 5 cm; bracts linear-lanceolate, caducous. Flowers c. 2 cm across. Sepals unequal, outer ones suborbicular, c. 6 mm across, inner ones ovate, 8-9 mm long. Petals yellow, purplish veined, 2 outer slightly larger, shortly clawed. Fertile stamens 7; anthers opening by apical pores, reduced stamens 3, without anthers or with disfunctional anthers. Ovary tomentose; style glabrous. Pods brown, with pale thick margins, strap-shaped, falcate, flattened, 10-13 × c. 1 cm, with septa between seeds; seeds 30-40, flat, orbicular, 3-4 mm across.

Fl. & Fr.: August-March

Distrib.: INDIA: Almost throughout. WORLD: A native of South America, now a pantropical weed.


Illustration: Monogr. Ind. Cassiinae: 2001 [as Senna siamea (Lam.) H. S. Irwin & Barneby].

Trees, 10-15 tall; bark gray, nearly rough; young branchlets ribbed, sparsely puberulent. Leaves compound, alternate, 16-20 cm long; leaflets paripinnate, oblong-elliptic, 2.1-4.2 × 1.1-1.6 cm, obtuse to mucro-acute at apex, entire along margins, cuneate to rounded at base, leathery, dark green, shining, glabrous above, puberulous beneath; midvein flattened above, faintly raised beneath; lateral veins puberulous beneath; petiolules short,
c. 2 mm long. Inflorescences racemes in axils of apical leaves, often several forming a large terminal panicles; peduncles 5–7 cm long. Flowers pedicellate; pedicel c. 2.2 cm long. Sepals 5, imbricated, unequal, suborbicular, outer smaller, inner larger, c. 9 mm, outside hairy. Petals yellow, 5-lobed; lobes broadly obovate, 1.2–1.5 cm, shortly clawed at base, obtuse at apex. Fertile stamens 10, unequal; 2 filaments c. 10 mm long; anthers 6–7 mm long; 5 filaments 2–3 mm long; anthers 5–6 mm long. Ovary sessile, densely white pubescent. Pods flattened, dark brown, c. 22 × 1.4 cm long, constricted, pubescent, 10–30-seeded; seeds ovoid, c. 2 × 5 mm.

**Fl. & Fr.**: November-April

**Distrib.**: INDIA: Almost throughout. WORLD: Malaysia, Myanmar, Sri Lanka, Thailand, Indonesia, Taiwan, Philippines

**Specimen examined**: Buxa National Park, East Damanpur range, 27th Nov., 2011, Gopal Krishna 50587.

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**Local name**: “Penevar” (Bengali).

**Illustration**: M. Blanco, Fl. Filip. t. 122. 1875.

Annual, erect, herbs, suffrutescent, 20–100 cm high; branches subterete, glabrous, more or less striate. Leaves pinnate, 4–8 cm long; stipules linear, 10–15 mm, caducous; stalked glands on rachis between the first pair of leaflets; leaflets 3-pairs, obovate or obovate-oblong, 8–15 × 4–9 mm, acute or obtuse at apex, entire ciliate along margins, rounded at base, thinly coriaceous, sparsely pubescent above, densely pubescent beneath; midvein faintly raised beneath, hispid; lateral veins 5–6 pairs, faintly raised beneath, pubescent; petiolules 1.5–2 mm. Inflorescences axillary racemes, short, 1 or 2(or 3)-flowered; peduncles 6–10 mm long; bracts linear, acute. Flowers pedicellate; pedicels 1–1.5 cm long. Sepals ovate or ovate-oblong, 5–8 mm, membranous, outside pubescent. Petals yellow, unequal, obovate, lower 2 slightly longer, 12–15 × 5–7 mm, shortly clawed. Fertile stamens 7, subequal; filaments 1.5–2 mm; anthers c. 4 mm, 3 larger, 4 smaller; staminodes absent. Ovary sessile, densely white pubescent; style glabrous. Pods terete, subtetragonal, slender, 10–12 × 0.3–0.5 cm, acuminate at both ends, imperfectly septate between seeds, 20–30 seeded; seeds rhomboid, c. 5 × 3 mm, glossy, with an areole.

**Fl. & Fr.**: September–April.
**Distrib.:** INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Pondicherry, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

**WORLD:** A native of South America, now a pantropical weed.

**Specimen examined:** Buxa National Park, Jainti range, 7th April, 2012, Gopal Krishna 56057.

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**FABACEAE: MIMOSOIDEAE [144]**

Key to genera

1a. Herbs, shrubs, trees or lianas, armed ................................................................. 2

1b. Shrubs or trees, unarmed .......................................................................................... 3

2a. Leaf rachis eglandular; stamens 4 or 8, exserted, pinkish; pods usually in clusters star-shaped, bristly ......................................................... 4. *Mimosa*

2b. Leaf rachis glandular at base; stamens many, not colored; pods distributed on axis or at the tips, not bristly ........................................1. *Acacia*

3a. Flower small in globose heads, in fascicles or forming axillary or terminal panicles; pods oblong, compressed; seeds ovoid, funicle not prominent ................................................................. 2. *Albizia*

3b. Inflorescences in axillary and terminal panicles, subumbellate heads; pods coiled; seeds ellipsoid, hanging from prominent funicles ................................................................. 3. *Archidendron*

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1. **ACACIA** Mill. (*nom. cons.*)

93 species in India and 3 in BNP.

Key to species

1a. Trees; flowers in simple spikes; pods green, rostrate................. 2. *A. catechu*

1b. Climbing shrubs; flowers in paniculate heads; pods not green, not rostrate .......... 2

2a. Leaf gland not cup shaped; midvein of leaflets starting centrally or sub-centrally................................................................................. 1. *A. caesia*

2b. Leaf gland cup shaped; midvein starting marginally....................3. *A. pennata*

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Other synonyms: *Acacia intsia* (L.) Willd. var. *oxyphylla* Grah. ex Benth.; *Acacia oxyphylla* Grah. ex Benth.

Climbing shrubs; branches subterete, angled, more or less grooved, tomentose with recurved prickles on internodes. Leaves alternate, bipinnate; rachis 13–18 cm long, angled, grooved, tomentose, with glands; glands 1.3–2 cm above from the base; gland subsessile, elliptic-oblong, 2–2.5 mm; prickles recurved throughout or some time only toward base; stipules filiform c. 3 mm long; pinnae 6–8 pairs, 4.8–8.5 cm long, 14–21 pairs of leaflets in each pinnae; leaflets oblong, 5–13 × 2–3.5 mm, apiculate at apex, entire along margins, truncate or rounded at base, subcoriaceous, glabrous; midvein starting from center of leaf base, closed and parallel to upper margin; lateral veins inconspicuous. Heads c. 1.2 cm across, 1–4, arranged in panicles; peduncles 1–1.5 cm long, tomentose. Sepals campanulate, 5-lobed above; lobes ovate, 0.3–0.5 mm, acute at apex; tube 1 mm long. Petals 5, 2–3 mm; lobes ovate-elliptic, 0.5–1 mm. Ovary falcate, 0.8–1 mm, puberulent to velutinous; stipe c. 1.5 mm. Pods strap-shaped, 10–17.6 × 1.1–2.4 cm, dehiscent, not bristly, sutures straight or slightly sinuous, base attenuate stalk like; 8–12-seeds.

Fl.: September-October; fr.: November-December.

Distrib.: INDIA: North & North East India and West Bengal. WORLD: Burma, China and Thailand.

Specimen examined: Buxa National Park, Jainti range, 4th Dec., 2011, Gopal Krishna 52342.


Other synonyms: *Acacia wallichiana* DC; *Mimosa catechuoides* Roxb.

Local name: "Khayer" (Bengali).


Erect trees, to 6–10 m high; bark dark brown; branchlets terete, pubescent. Leaves alternate, bipinnate, often with or without a pair of hooked spines below stipules; rachis 15–20 cm long, terete, pubescent, glands at base or above the main rachis and at base of several pinnae; glands sessile, round or elliptic-oblong, 0.5–4 × 0.5–1.5 mm; pinnae 10–30 pairs, 1.8–4 cm long; leaflets 20–50 pairs, linear, 2–6 × 1–1.5 mm, acute at apex, ciliate long margins, truncate at base; midvein conspicuous above; lateral veins inconspicuous. Inflorescences axillary simple spikes; spike cylindric, usually erect, 2.5–10 cm long. Flowers subsessile. Sepals campanulate 5-lobed above, hairy; lobes deltoid, c. 0.3 × 0.3
mm, acute; tube c. 0.7 mm long. Petals yellowish or white, lanceolate or oblanceolate, c. 5 mm long, sparsely pubescent; lobes deltoid, c. 0.3 × 0.3 mm, acute at apex; tube c. 3 mm long. Stamens many exserted; staminal tube c. 4 mm long; anthers ovoid, c. 0.2 mm. Ovary falcate, c. 0.75 × 0.2 mm, glabrous, stipitate; stipe c. 0.5 mm. Pods brown, oblong, strap-shaped, 5–10.6 × 0.7–1.8 cm, dehiscent, not bristly, stalk 3–9 mm long, apex rostrate, 3–10-seeded; seeds suborbicular, c. 5 mm across.

Fl.: April–August, fr.: September.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, China, Indonesia, Java, Myanmar Nepal, Pakistan, Ryukyu, Sri Lanka, Taiwan and Thailand.


Uses: Bark contains tannin and used commercially.


Other synonym: Acacia pennata var. arrophula (D. Don) Baker. Plate 22c


Scandant shrubs; bark grey; stems and branches more or less angled, glabrous, with recurved prickles. Leaves alternate, bipinnate; rachis subterete, 15–18 cm long, pubescent, glands sessile, oblong-cup shaped, at the base and apex, c. 5 × 1.5 mm; pinnae 15–20 pairs, 3–8 cm long; leaflets 30–50 pairs, linear-oblong or oblong 0.4–0.6 × 0.5 mm, acute at apex, entire along margins, truncate at base, assymetric. Flowers in head on large terminal leafy panicles; heads globose, c. 1 cm across. Sepals subcampanulate, 5-lobed above; lobes minute; tube 2–2.5 mm long. Petals oblong, 2.5–3 mm long. Stamens many; filaments 4–5 mm long. Ovary falcate, c. 1 mm long, puberulent, stipitate. Pod oblong, strap shaped, leathery, c. 16.5 × 2.9 cm, copper colored, 10–11-seeded, not bristly; seeds brown, suborbicular, 0.5–0.6 × 0.9–1.1 cm.

Fl.: March–October; fr.: July–April.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 11th Feb., 2010, S.K. Srivastava & Gopal Krishna 47035.

**Uses:** Pods are eaten by elephants; bark for tanning and bark and pounded seeds are used as fish poison.

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2. **ALBIZIA** Durazz.

20 species in India and 3 in BNP.

**Key to species**

1a. Midvein of leaflets eccentrically close to upper margin;
   flowers heads solitary or in fascicles .................................................. 1. *A. lebbeck*

1b. Midvein of leaflets medial or eccentrically close to lower margin;
   flowers heads in axillary or terminal panicles ....................................... 2

2a. Main vein medial; stamens yellow or cream; staminal tube
   shorter than corolla tube .............................................................. 2. *A. lucidior*

2b. Main vein of leaflets slightly eccentrically close to lower margin;
   stamens white; staminal tube longer than corolla tube ....................... 3. *A. procera*

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**Other synonyms:** *Mimosa speciosa* Jacq.; *Acacia lebbeck* (L.) Willd.; *Acacia speciosa* (Jacq.) Willd.; *Mimosa sirissa* Roxb.; *Acacia sirissa* Buch.-Ham. ex Prain.

**Illustration:** Bedd., Fl. Sylv. S. India 1: t. 53. 1869-1874 [as Albizia lebbeck (L.) Benth.].

Trees, to 15 m tall; bark rough; branchlets terete, lenticellate, minutely pubescent. Leaves bipinnate; rachis c. 25 cm long, pubescent; pinnae 2-4 pairs, disk like glands near base of leaves and at base of pinnae; leaflets 4-8 pairs, obliquely oblong or oblong-ovate, 2.3-3 x 1.1-1.4 cm, obtuse at apex, entire along margins, obliquely cuneate at base, chartaceous, shining, glabrous above, pubescent beneath; midvein of eccentrically close to upper margin, prominent beneath, pubescent; lateral veins 8-10 pairs, palmately 5-7 nerved at base, prominent beneath, pubescent; petiolules c. 1 mm long, densely hairy. Inflorescences axillary, solitary heads or in fascicles, 30-40-flowered; peduncles, 7-10 cm long, glabrous. Flowers dimorphic, fragrant; pedicels 3-4 mm long, puberulent. Sepals campanulate below, shallowly lobed above c. 3 x 2.5 mm, tomentose; lobes triangular ovate c. 0.5 x 0.4 mm, acute; tube c. 2.6 mm long. Petals green-yellow, funnelshaped, 7-8 mm; lobes deltoid-ovate. Stamens many, white or light pale-green, staminal tube shorter
than corolla tube, c. 2 mm long; filaments 2–3 cm long. Ovary glabrous, sessile. Pods coriaceous, straw-colored, strap-shaped, hanging from jointed pedicels, 12–30 × 3–4.5 cm, 4–12-seeded; seeds suborbicular, c. 9 × 7 mm.

Fl. & Fr.: April–May.

Distrib.: INDIA: Throughout. WORLD: Tropical and subtropical Asia and Africa—often cultivated throughout tropics.

Specimen examined: Buxa National Park, Jaiti range, NRVK 6a, 7th April, 2012, Gopal Krishna 56058.


Other synonyms: Albizia leebeck Gamble; Mimosa lucida Roxb.

Illustration: L. Pierre, Fl. Cochin. 4: t. 397, f. B (1880-1907 [as Albizia lucida (Roxb.) Benth.]).

Trees, 10–15 m tall; branchlets angular, glabrous. Leaves bipinnate; rachis 7–11 cm long, with a cup shaped gland at base and apex; pinnae 1–3 pairs; leaflets ovate-elliptic to obliquely-obovate, 5–9.5 × 1.2–3 cm, abruptly acuminate at apex, sub-entire along margins, cuneate at base, subcoriaceous, shining; midvein flattened above, raised beneath; lateral veins 8–10 pairs, prominent beneath; petiolules 1–1.5 mm long. Inflorescences heads arranged in terminal or axillary panicles. Sepals campanulate, 1.5–3 mm. Petals funnel-shaped, 6–7 mm; lobes lanceolate, c. 4 mm. Stamens yellow-cream, many; tube 3–4 mm long. Ovary glabrous. Pods green, strap shaped, hanging from jointed pedicels, 7.5–25 × 2.5–4.5 cm, 7–8-seeded; seeds suborbicular, c. 1 cm across, glabrous, shining.

Fl. & Fr.: April–December.

Distrib.: INDIA: Bihar, Himachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, Myanmar, China, Nepal, Singapore and Thailand.


Illustration: Roxb., Pl. Coromandel 2: t. 121. 1798 [as *Mimosa procera* Roxb.].

Trees, to 20 m tall; branchlets terete, pubescent or subglabrous. Leaves bipinnate; rachis 4-10 cm long, gland c. 1 cm above base rachis; glands oblong, c. 3 × 1.5-2 mm; pinnae 3-5 pairs; leaflets ovate to sub-rhombic, 2.1-3.6 × 1.1-1.7 cm, acute to acuminate at apex, entire along margins, obliquely cuneate at base, subcoriaceous, shining, glabrous; midvein flattened above, conspicuous, faintly raised beneath; lateral veins 8-10 pairs, conspicuous beneath; petiolules 1-2 mm long. Flowers in heads, 10-20-flowered, arranged in axillary or terminal panicles. Flowers sessile. Sepals 2-3 mm, glabrous. Petals yellow-white, c. 6 mm; lobes lanceolate, c. 2.5 mm long, apex pubescent. Stamens white, many; staminal tube longer than corolla tube. Ovary glabrous, subsessile. Pods flat, 10.5-16.5 × 1.3-2.1 cm, caudate at apex, glabrous, 10-12-seeded; seeds light brown, obvoid-elliptic or oblong-elliptic, c. 1.2 × 0.6 cm.

**Fl.:** May-September; **fr.:** September-February.

**Distrib.:** **INDIA:** Andaman Islands, Arunachal Pradesh, Bihar, Delhi, Gujarat, Jammu, Meghalaya, Nagaland, Rajasthan, Uttar Pradesh and West Bengal. **WORLD:** Tropical Asia (except Malay Peninsula)/NE Australia—also cultivated.

**Specimen examined:** Buxa National Park, Jainti range, Bhutia Pond, 13th Oct., 2009, S.K. Srivastava & Gopal Krishna 46354.

3. **ARCHIDENDRON** F. Muell.

9 species in India and 1 in BNP.


Other synonyms: *Pithecellobium angulatum* Benth.; *Mimosa heterophylla* Roxb.; *Pithecellobium angulatum var. heterophylla* (Roxb.) Prain (nom. nud.).

**Local name:** “Belatiamli” (Bengali).

**Illustration:** Bedd., Fl. Sylv. S. India 1: t. 189. 1869-1874.

Shrubby trees, 6-7 m high; branchlets angled, rusty tomentose, unarmed. Leaves alternate, compound; rachis 9-15 cm long, angulate, brown pubescent, glands at leaf rachis and base of petioles; glands flat, slightly stalked; leaflets paripinnate, 3-7 pairs, proximal are smaller than distal leaflets, opposite, oblique, rhombic-trapezoid; proximal 1.2-2 × 0.8-1.2 cm; distal 4-11 × 1.8-3.5 cm, acuminate at apex, entire, undulate along margins, obliquely cuneate at base, thinly coriaceous, turned dark brown when dry, glabrous above, yellow tomentose beneath; midvein raised both sides; secondary veins
10–12 pairs, pubescent; petiolules c. 2 mm long. Inflorescences corymbs arranged in terminal or axillary panicles, several flowered. Flowers obovoid in buds, pedicellate; pedicels c. 2.5 mm long, brown pubescent. Sepals campanulate below, 5-toothed above; cup c. 2 × 1 mm; teeth triangular, c. 0.5 × 0.5 mm, acute, brown villous. Petals cream-white, 4–5 mm; lobes lanceolate. Ovary stipitate, hairy. Pods twisted, 1–1.5 cm wide, margin constricted between seeds, 4–10-seeded; seeds black, ellipsoidal or broadly ellipsoidal, c. 1 cm across.

Fl. & Fr.: March–August.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya, N. India, Peninsular India, Sikkim and West Bengal. WORLD: Sri Lanka and SE Asia.

Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 5, near 23rd mile watch tower, 60 m, Gopal Krishna 50658.

Uses: The bark contains the tannin.

Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

4. MIMOSA L.

10 species in India and 2 in BNP.

**Key to species**

1a. Pinnae 3–10 pairs; stamens 8 ...................................................... 1. *M. diplopticha*
1b. Pinnae 1 or 2 pairs; stamens 4 ...................................................... 2. *M. pudica*


Other synonym: *Mimosa invisa* C. Mart. Plate 22e

**Illustration:** Fl. Brasil. 15(2): t. 97. 1876.

Perennial herbs, prostrate; stems angled, pubescent, with recurved prickles along angles. Leaves bipinnate; stipules filiform, 1.5–2 mm long; rachis 8.5–12.5 cm long, angled, recurved prickle along angles; pinnate 3–7 pairs, 3–4.8 cm long; leaflets 11–30 pairs, linear-oblong, 4–7 × 1 mm, acute at apex, entire and ciliate along margins, truncate at base, subcoriaceous, both surfaces white villous; midvein conspicuous and in the middle of leaflets; lateral veins inconspicuous; petiolules sessile. Inflorescences heads, 1 or 2, axillary, c. 1 cm across; peduncles 5–10 mm, hairy. Flowers sessile. Sepals inconspicuous, c. 0.4 mm. Petals narrowly funnel-shaped, c. 2.5 mm, 4-lobed, puberulous outside.
Stamens 8; filaments pale pink. Ovary c. 1 mm long. Pods in clusters, slightly curved, oblong, $1.5-2.8 \times 0.4-0.5$ cm, with prickly bristles, 2-5-segments, each segment with 1-seeded; seed yellow-brown, c. 3.5 mm across.

Fl. & Fr.: February-April

Distrib.: INDIA: Kerala and West Bengal (present collection). WORLD: Native to tropical America; introduced throughout the tropics.

Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 11th, Feb., 2010, S.K. Sricastava & Gopal Krishna 47031.

Note: This species is found growing in fodder plantations.


Annual or perennial shrubby herbs, 1 m high; stems terete, densely hispid and usually with fewer spines. Leaves bipinnate; stipules lanceolate, 9-14 mm long, bristly ciliate; pinnae and leaflets sensitive; pinnae usually 2 pairs, 3-8 cm long; petioles 3-6 cm long; leaflets 15-21 pairs, linear-lanceolate, $6-15 \times 1.5-3$ mm, acute at apex, margin ciliate with bristles, rounded cuneate at base, subcoriaceous, glabrous above, slightly hispid beneath; midvein and lateral veins inconspicuous both side; petiolules sessile. Inflorescences heads axillary solitary or 2, globose, c. 1 cm across; peduncles 2.5-3 cm long, terete, hispid; bracteoles narrowly triangular, 1.8-2.2 mm. Flowers many, small, sessile. Sepals minute. Petals campanulate below, 4-lobed above; tube c. 0.75 mm long; lobes oblong, c. 0.75 x 0.2-0.3 mm, slightly hooded, pubescent outside. Stamens 4, pink, exserted; filaments cylindric, 6-7 mm long; anthers ovoid, c. 0.1 mm. Ovary c. 0.5 x 0.3 mm, glabrous, more or less rugose, shortly stipitate; style pink, filiform, c. 9 mm long; stigma small. Pods oblong, 1-2 x 0.5 cm, 4-12 in numbers, arranged like star, flat, consisting of 3-5 segments, each segments with 1-seed; seed light brown, ovoid, c. 3.5 mm across.

Fl. & Fr.: March-November.

Distrib.: INDIA: Almost throughout. WORLD: Native to tropical America; naturalized in tropical regions of the world.

Specimens examined: Buxa National Park, 21 mile road, 13.05.1949, Narayanswami & party 2351; Rajabhatkhawa, 23.04.1959, Das 65; 05.09.1981, Safui & party 10347; Rajabhatkhawa range, SRVK 6, S.K. Sricastava & Gopal Krishna 46156.
FABACEAE: PAPILIONOIDEAE [144]

Key to genera

1a. Anthers dimorphic with alternately basifixed and dorsifixed anthers........................................4. Crotalaria
1b. Anthers uniform, not alternately basifixed and dorsifixed .........................................................2

2a. Leaflets with stipels; pods breaking up into 1-seeded segments when ripe ........................................6. Desmodium

2b. Leaflets with or without stipels; pods not breaking up into separate segments when mature; seeds 1 to several .................................................................3

3a. Plant with medifixed hairs .........................................................................................................4
3b. Plant without medifixed hairs ...................................................................................................6

4a. Pod sub-globose, 1-seeded ...........................................................................................................8. Indigofera
     (in referred species)

4b. Pod not sub-globose ......................................................................................................................5

5a. Shrubs with woody bases; pods linear 5-16-seeded ................................................................12. Tephrosia
5b. Lianas; pods 1 to several seeded; leaves imparipinnate; rachis not bristle; Inflorescence a pseudo-raceme .................................................................9. Millettia

6a. Pods indehiscent .........................................................................................................................5. Dalbergia
6b. Pods dehiscent ............................................................................................................................7

7a. Leaves paripinnate; rachis of leaflets ending in a bristle; inflorescence fasciculate ......................1. Abrus

7b. Leaves pinnately or digitately 3-foliolate, sometimes 1-foliolate; rachis of leaves not ending in a tendril or bristle .......................................................................................8

8a. Pods jointed ................................................................................................................................6. Desmodium
8b. Pods not jointed .............................................................................................................................9

9a. Leaflets and sepals generally with sessile colored glands; bracteoles absent ................................10
9b. Leaflets and sepals without glands; bracteoles often present ....................................................11

10a. Leaflets, calyx and pods usually without glands; pods oblong 3-6-seeded .....................................3. Cajanus
10b. Leaflets, calyx and pods usually with sessile glands; pods elliptic-ovate 1 or 2-seeded..................7. Flemingia

11a. Style flattened, thickened or twisted, mostly bearded ................................................................13. Vigna
11b. Style generally terete and unbearded .......................................................................................12
12a. Petals generally unequal in length; flowers in extensive panicles and legume samaroid ................................................................. 13

12b. Petals subequal in length .............................................................................................................................. 10. Pueraria

13a. Trees; flowers yellow to scarlet ............................................................................................................... 2. Butea

13b. Lianas; flowers creamy-white or pink .................................................................................................... 11. Spatholobus

1. ABRUS Adans.

3 species in India and 1 in BNP.


Other synonym: *Glycine abrus* L.

Local name: “Kunch”, “Chun-hati” (Bengali).

Illustration: Fl. Filip. t. 156. 1875.

Climbing shrubs; stems and branches slender, sparsely strigose. Leaves alternate, paripinnate; rachis 9–11.5 cm long, terete ending in a bristle; leaflets 8–13 pairs, opposite; suboblong or oblong-obovate, 1–3 × 0.4–0.8 cm, mucro-acute at apex, entire along margins, rounded at base, membranous, sparsely white strigose beneath, glabrous above; midvein faintly raised beneath, flattened above; lateral veins inconspicuous; petiolule short; stipels absent. Inflorescences racemes, axillary, 3–8 cm long; peduncles 5–12 cm, accrescent. Sepals campanulate, 5-lobed above, upper 2 lobes subconnate appears as 4-lobed white strigose; cup c. 4 × 2.5 mm. Petals white-purple; standard obovate c. 6 × 6 mm; wings oblong, c. 8 × 2.5 mm, spatulate; keel curved and sharply pointed, c. 10 × 4 mm. Stamens 9; filaments connate into a sheath, variable in length; tube c. 4 mm long; vexillar filament absent. Ovary linear, c. 2 mm long, densely hairy; style short; stigma capitate. Pods linear-oblong, 2–3.5 × 0.5–1.5 cm, leathery, compressed, dehiscent, 2–6-seeds; seeds black in lower part, red in upper part, subglobose, 6–7 × 5–6 mm, glabrous, shining.

Fl.: March–June; fr.: September–October.

Distrib.: INDIA: throughout. WORLD: Pantropical.

2. **BUTEA** Roxb. (*nom. cons.*)

2 species in India and 1 in BNP.


Other synonym: *Butea frondosa* Roxb. ex Willd.

**Local name:** “Palas” (Bengali).

**Illustration:** Roxb., Pl. Coromandel 1: t. 21. 1795.

Trees, to 15–20 m high, branchlets terete, glabrous. Leaves alternate, 3-foliolate, c. 27 × 27 cm, variable; petioles terete, c. 15 cm long, tomentose or subglabrous; terminal leaflets rhombic-ovate, c. 20.5 × 16.5 cm; lateral leaflets asymmetrically ovate, c. 18 × 10.5 cm, retuse at apex, entire along margins, acute at base, coriaceous, shining, turned pale when dry, appressed hairy above, hispid beneath; midvein impressed above, raised beneath, pubescent; lateral veins 7–9 pairs, raised both side, prominent beneath; petiolules, 0.6–6 cm long, terete, glabrous. Flowers in dense racemes forming terminal panicles, 20–40 cm long, appearing while almost leafless. Sepals campanulate, 5-lobed above, densely brown pubescent; lobes broadly ovate, c. 5 × 5 mm, acute at apex; cup 5–7 mm. Petals orange red, velvety tomentose outside; standard ovate, 4–5 × 2 cm, reflexed; wings lanceolate, 4–4.5 × 1 cm, curved; keel 4–5 × 1.5 cm, strongly upcurved and almost beaked. Stamens diadelphous; staminal tube 5–5.5 cm long, curved; anthers oblong, c. 1 mm long. Ovary linear-oblong; style curved, enclosed by staminal tube, densely tomentose below, sparsely above; stigma simple. Pods oblong, compressed, samaroids, 9–15 × 3–4 cm, densely brownish pubescent, borne on basal stalks; stalk c. 2.5 cm long.

**Fl. & Fr.:** February–April.


**Specimen examined:** Buxa National Park, Jainti range, NRVK 6, 11th Feb., 2010, S.K. Srivastava & Gopal Krishna 47047.

3. **CAJANUS** DC.

16 species in India and 1 in BNP.


Other synonym: *Atylosia scarabaeoides* (L.) Benth.

**Local names:** “Ban-arhaf”, “Banur-kalai” (Bengali).

Twining herbs; stems and branches slender, striate, pubescent. Leaves alternate, 3-foliolate; petioles 2-13 mm long, tomentose; leaflets elliptic-oblong or obovate, 1-2.5 × 0.4-0.8 cm, obtuse at apex, entire along margins, cuneate at base, sub-coriaceous, densely pubescent both sides; midvein obscure above, faintly raised beneath; lateral veins 3-nerved at base, 2-3 pairs above; petiolules 1-2 mm long, tomentose; stipels absent. Inflorescences axillary raceme, usually less than 2 cm, 1-5-flowered; peduncle 2-5 mm long, brown to dull brown villous. Flower pedicels c. 1 mm long; bracts densely grey silky tomentose. Sepals campanulate, 5-toothed above; teeth narrowly lanceolate, 2-3 mm long, acute at apex, densely hairy; tube 2-3 mm long, densely hairy. Petals yellow; standard obovate, c. 8 × 7 mm, emarginate auricle and claw at base; wings oblong, blade c. 7 × 2 mm, slightly curved, base auriculate; keel truncate, c. 7 × 3 mm, curved at apex. Stamens 10, connate in a bundle forming a staminal tube; tube 4-5 mm long; filaments c. 2 mm long; anthers c. 0.1 mm. Ovary c. 4 mm long, densely white silky hairy; style c. 3 mm long; stigma capitate. Pods oblong, 15-20 × 5-6 mm, densely villous, transversely constricted between seeds, 3-6-seeded, shortly beaked at apex; seeds oblong, c. 1.5 × 2 mm.

Fl. & Fr.: August-April.

Habitat: Grows in sandy soil in Bala river.

Distrib: INDIA: Throughout. WORLD: Australia, Coastal West Africa, Jamaica, Mauritius, Madagascar, Pacific Islands, South and South East Asia and Zanzibar.

Specimen examined: Buxa National Park, Jainti range, NRVK 7, Bala river, 4th Dec., 2011, Gopal Krishna 52330.

4. CROTALARIA L. (nom. cons.)

97 species in India and 3 in BNP.

Key to species

1a. Stems winged; leaves simple.................................................................1. C. alata

1b. Stems not winged; leaves 3-foliolate.....................................................2

2a. Racemes usually leaf-opposed, rarely terminal; pods
  compressed, 3-6-seeded.................................................................2. C. cytisoides

2b. Racemes always terminal; pods inflated, 20-or more seeded...............3. C. pallida

Other synonyms: *Crotalaria sagitticaulis* Wall.; *Crotalaria bialata* Schrank.

Shrubs to 80-100 cm high; stems terete, winged both sides, appressed hairy. Leaves alternate, simple, lanceolate, 0.8-3.2 × 0.3-0.9 cm, mucro-acute at apex, entire along margin, cuneate at base, scabrous, whitish hispid both sides; midvein inconspicuous above, faintly raised beneath, hirsute; lateral veins 4-5 pairs, inconspicuous; petioles short, 1-2 mm long, hispid. Inflorescences raceme, 5-flowered. Flower pedicels 4-5 mm long, appressed hairy; bracts ovate, 2.5-3 × 1.5-2 mm, sericeous. Sepals 5-lobed, lobes free above, connate below; lobes linear, 8-9 mm long, sericeous. Petals yellow; standard broadly elliptic, c. 12 × 10 mm; wings oblong, c. 10 × 4 mm; keel c. 10 × 4 mm. Stamens 10, connate in a bundle below, free above; tube 2-5 mm long; anthers dimorphic, c. 1 mm long. Ovary ovate, c. 1.5 × 1 mm; style tubular, c. 4 mm long, hairy near stigma; stigma slightly oblique. Pod oblong, 2.5-3.5 × 0.7-1 cm, glabrous, beaked, beak 5-6 mm long, many seeded; seeds reniform, c. 2 × 2 mm, glabrous.

**Fl. & Fr.:** September-March

**Distrib.:** INDIA: Andhra Pradesh, Arunachal Pradesh, Bihar, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Africa, Australia, Bangladesh, Bhutan, Cambodia, Caribbean, China, Hainan, Indonesia, Java, Laos, Malaysia, Myanmar, Nepal, Peninsular Malaysia, Singapore, Sri Lanka, Sumatra, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, near 26 mile watch tower, 29th Nov., 2011, Gopal Krishna 47151.


Other synonyms: *Crotalaria psoralioides* D. Don.; *Priotropis cytisoides* (Roxb. ex DC.) Wight & Arn.

Shrubs, to 1-3 m high; stems terete, densely appressed sericeous or glabrous. Leaves compound, alternate, 3-foliolate; petioles terete, 1.5-3.2 cm long, pulvinate at base; lateral leaflets, elliptic, 1.8-5 × 0.8-1.9 cm; terminal leaflets, elliptic, acute or acuminate at apex, entire along margins, cuneate or attenuate at base, subcoriaceous, glabrous above, puberulous beneath; midvein impressed above, raised beneath, glabrous; lateral veins faintly visible; petiolules c. 1 mm long or subsessile; stipules minute subulate. Inflorescence racemes, usually leaf-opposed or sometimes terminal, 10-30-flowered.
Flowers pedicellate; pedicels filiform, c. 7 mm long. Sepals broadly campanulate, c. 4 × 6 mm, divided to middle into triangular teeth, upper pair shorter. Petals yellow; standard suborbicular, c. 10 mm across; claw c. 3 mm; wings oblong-elliptic, c. 13 × 4 mm, lower part of keel c. 12 × 6 mm. Stamens 10, connate in a bundle; staminal tube c. 7 mm long; anthers dimorphic. Gynophore short. Ovary falcate, c. 8 mm long, glabrous; style 10-12 mm long; stigma capitate. Pods oblong-elliptic, 2.3-3.2 × 1-1.3 cm, flattened, finely pubescent, rostrate; beak 5-9 mm long, slight bent at apex, 3-6-seeded; seeds reniform, c. 4 × 3 mm, brown.

Fl. & Fr.: August-March

Distrib.: INDIA: Arunachal Pradesh, Assam, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal and Thailand.


Note: Common in the Park.


Other synonyms: Crotalaria striata DC. (excl syn. C. labumoides Klotz.); Crotalaria mucronata Desv.


Plate 20d1, d2

Shrubs, to 1 m high; profusely branched from base; branches terete, lenticellate, appressed hairy. Leaves alternate, 3-foliolate, glandular punctate, appressed hairy beneath; leaflets obovate, oblong-elliptic; lateral leaflets 2.8-4.6 × 1.7-2.5 cm; terminal leaflets 3-5.5 × 1.8-3 cm, mucro-retuse at apex, entire along margins, cuneate at base, coriaceous, green, shining, pale green, puberulous; midvein impressed above, glabrous, raised beneath, appressed hairy; lateral veins 6-8 pairs, inconspicuous; petiolules 2-3 mm long, hispid; petioles 3-4.6 cm long, terete, appressed hairy. Inflorescences terminal racemes, 15-17 cm long. Flower pedicels 2-3 mm long. Sepals green, subcampanulate, 5-toothed above; teeth lanceolate to narrowly triangular, 4-4.5 × 1.5 mm, sub-equal; tube c. 3 × 3 mm, densely hairy outside, glabrous inside. Petals yellow; standard orbicular to elliptic, c. 8 × 6 mm, base with 2 appendages; wings oblong, c. 8 × 4 mm, acute at apex, marginally pilose on basal part, nerves conspicuous, glabrous; keel 10-12 mm long rather shallowly rounded, marginally pilose at base, beak narrow and projecting. Stamens 10; tube c. 6 mm long; filaments c. 5 mm long; anthers oblong-ovate, 0.5-2.5 mm. Gynophore
short. Ovary elongated, c. 3 mm long, hairy, slightly curved; style c. 3 mm long, hairy one side; stigma capitae. Pods inflated, 3.2–4.1 cm, appressed hairy to glabrescent, many seeded; seeds reniform, 2.25 × 1.5–1.75 mm.

Fl. & Fr.: September-March


5. DALBERGIA L.f. (nom. cons.)

34 species in India and 3 in BNP.

Key to species

1a. Stamens 9, occasionally 10, in one bundle; pod thin papery, 1-4-seeded .................................................................................................................................................. 1. D. pinnata

1b. Stamens 10, in 2 bundles; pod suberose, 1-2-seeded ............................................................. 2

2a. Bracts and bracteoles oblong, persistent and conspicuous; pod abruptly narrowed to a stipe .............................................................................. 2. D. stipulacea

2b. Bracts and bracteoles absent or inconspicuous, deciduous; pod coriaceous gradually narrowed to a stipe, 1-2-seeded ....................... 3. D. volubilis


Other synonym: Dalbergia tamarindifolia Roxb.


Scandent shrubs; branches terete, lenticellate, puberulent. Leaves alternate, 12-15 × 3-4 cm; rachis puberulent; leaflets imparipinnate, 29-41, linear-oblong to oblong-ovate, 10-21 × 4.5–6 mm, obtuse at apex, entire along margins, obliquely cuneate at base, subcoriaceous, appressed hairy both sides; midvein impressed above, slightly raised beneath; lateral veins obscure; petiolules sessile or subsessile; stipeles lanceolate, c. 0.5 mm long, acute, pubescent, deciduous. Inflorescences in panicles, 2-3 cm long; rachis brown pubescent. Flowers c. 6 mm across; pedicels c. 5 mm long, pubescent; bracts triangular ovate, c. 1 × 1 mm, acute or obtuse at apex, tomentose. Sepals campanulate, 5-lobed above; lobes ovate, c. 0.75 × 1 mm, acute at apex; tube c. 3 mm long, tomentose. Petals cream-white; standard reflexed, ovate c. 3 × 2 mm; wing and keel oblong 3 × 1 mm.
Stamens 9 or 10; filaments united into sheath tube c. 3 mm long; anthers globose c. 0.2 × 0.2 mm. Ovary elliptic-oblong, c. 1.5 cm long, glabrous. Pods oblong, 3-6.1 × 1-1.1 cm, flattened, papery, stipitate, narrowly beaked at apex, 1-4-seeded; seeds oblong, c. 13 × 4-5 mm.

Fl.: Jan–March; fr.: March—July.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Karnataka, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia (Java), Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam.


Lianas, 10–15 m high; stems and branches terete, glabrous. Bark brown. Leaves alternate, 10–15 cm long; leaflets imparipinnate, 17–21, oblong to oblong-elliptic, 1–3.5 × 0.7–1.5 cm, obtuse at apex, entire along margins, cuneate at base, subcoriaceous, glabrous above, appressed pubescent beneath; midvein flattened above, faintly raised beneath; lateral veins obscurely 5–7 pairs; petiolules 2–2.5 cm long; stipules oblong-lanceolate, c. 10 × 2–3 mm, early caducous. Inflorescences in panicles, 8–12 cm long; bracts obovate, 4–5 × 1 mm; bracteoles obovate c. 3 × 2 mm. Flowers pedicellate. Sepals campanulate, 5-lobed above, puberulent; lobes ovate, shorter than tube except lowest c. as long as tube. Petals pale blue, 5-lobed; standard obovate, c. 6 × 5 mm, strongly recurved; claws c. 2 mm long; wings and keel falcate, 4–6 × 3 mm. Stamens 10 (5 + 5), diadelphous. Ovary glabrous except for pubescent long stipe, 1 (or 2)-ovuled; style slender; stigmas mall. Pods oblong-elliptic, 6.5–9.3 × 2–2.1 cm, suberose, abruptly narrowed to a stipe; 1-(2)-seeded; seed brownish black reniform, c. 1.3 × 0.9 cm.

Fl.: April-May; fr.: August-January.

Distrib.: INDIA: Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal and Vietnam.


Other synonym: *Amerimon volubile* (Roxb.) Kuntze.

**Illustration:** Roxb., *Pl. Coromandel* 2: 48, t. 191. 1805.

Stragglers; bark blackish green; stems terete, strigate, glabrous. Leaves opposite, 17–20 cm long, imparipinnate; leaflets alternate, oblong or oblong-ovate, 1.3–4.8 × 1–3 cm, acute, obtuse or emarginated at apex, entire along margins, cuneate at base, leathery, dark green, glabrous; mid-vein flattened above, raised beneath; secondary veins 14–16 pairs, more or less conspicuous beneath; petiolules 2–5 mm long, glabrous. Inflorescences in panicles, terminal, 20–30 cm long; rachis angled, strigate, tomentose. Flowers pedicellate, 1–2 cm. Sepals green, campanulate, 5-lobed above; lobes narrowly ovate, c. 1 × 1 mm, acute, hairy outside, glabrous inside. Petals purplish, 5; standard suborbicular, c. 4 × 6 mm; wings and keel elliptic, c. 4.5 × 3 mm, nerves prominent; claws c. 2 mm long. Stamens 10, diadelphous; staminal tube c. 3 mm long; anthers globose, c. 0.1 × 0.1 mm. Ovary linear-oblong, c. 4 × 0.6 mm, tomentose; style linear. Pods oblong-elliptic, 5–8 × 1.5–2 cm, 1–2-seeded; seeds reniform, c. 7 × 5 mm, compressed.

**Fl. & Fr.: January-March.**

**Distrib.:** INDIA: Andaman & Nicobar Islands, Assam, Bihar, Gujarat, Meghalaya, Mizoram, Peninsular India, Rajasthan, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bangladesh, China, Myanmar and Sri Lanka.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, Bala river, 8th March, 2011, *Gopal Krishna* 50505.

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6. **DESMODIUM** Desv. (*nom. cons.*)

47 species in India and 7 in BNP.

Key to species

1a. Petioles terete; leaves 1-foliolate; leaflets unevenly parted by midvein ................................................................. 2. *D. gangeticum*

1b. Petioles not terete; leaves 3-foliolate; leflets evenly parted by midvein ........................................................................................................ 2

2a. Stems triangular; inflorescences axillary umbels or corymbs .......... 6. *D. triangulare*

2b. Stems not triangular; inflorescences racemes or panicles............... 3

3a. Leaflets lanceolate; petioles narrowly winged; flowers with a disk;

petals green-white or yellow-white ........................................ 1. *D. caudatum*
3b. Leaflets not lanceolate; petioles not narrowly winged; flowers without disk, not yellow or green white ........................................ 4

4a. Creeping herbs; leaflets broadly obovate, retuse at apex; flower solitary or 2 or 3 in leaf axils............................................... 7. D. triflorum

4b. Erect herbs; leaflets not obovate, not retuse at apex; flowers in racemes and spike and usually more than 3 ....................................... 5

5a. Inflorescences condensed spikes; flowers pink............................ 3. D. heterocarpon

5b. Inflorescences not in condensed spikes; flowers not pink .................. 6

6a. Flowers bluish; pods linear, not deeply indented; 6-7-segmented .... 4. D. laxiflorum

6b. Flowers purplish; pods deeply indented along lower side; pods 2-segmented ................................................................. 5. D. podocarpum


Other synonyms: H. laburnifolium Poir.; Desmodium laburnifolium (Poir.) DC.

Shrubs, to 1-2 m high, much branched; stems and branches terete, glabrous. Leaves alternate, 3-foliolate; petiole 1.4-4 cm long, often very narrowly winged; terminal leaflet oblong-lanceolate or oblong, 5-13.4 x 1.5-4.6 cm; lateral lanceolate or oblong, 4-10.3 x 1.4-2.8 cm, acuminate or acute at apex, entire undulate along margins, cuneate at base, subleathery, glaucous above, glabrescent beneath; midvein impressed above, raised beneath; lateral veins 6-8 pairs, prominent beneath; petiolules c. 2 mm long; stipels filiform c. 3 mm long. Inflorescence racemes, terminal or axillary, 10-22 cm long; rachis densely pubescent, intermixed with minute uncinate and appressed or spreading longer hairs. Flower pedicels 3-5 mm long, filiform; bracts subulate, c. 5 mm long; bracteoles 1.5-2 mm long, Sepals campanulate, 5-lobed above, densely hairy outside; lobes unequal, 2-4 mm long; tube c. 2 x 2 mm. Petals green-white or yellow-white; standard elliptic, 5-6 mm, shortly clawed; wings narrowly oblong, c. 5 mm long, clawed; keel oblong, c. 5 mm long, clawed. Stamens 10; filaments connate in a tube below, free above; tube c. 5 mm long. Ovary falcate, c. 3.5 mm long, densely appressed pilose on both sides; style c. 1.5 mm long; stigma simple. Pods linear, flat, 2.5-7 x 0.4-0.5 cm, 4-6-segments; segments narrowly ellipsoidal, 9-12 x 3 mm, with dense, short, brown, uncinate hairs.

Fl.: July-September; fr.: September-November.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh and West
Bengal. **WORLD:** Bhutan, China, Indonesia, Japan, Java, Korea, Lesser Sunda Island, Malaysia, Myanmar, Nepal, Peninsular Malaysia, Ryukyu Islands, Sri Lanka, Sumatra, Taiwan and Vietnam.

**Specimen examined:** Buxa National Park, Jainti range, Tashigaon 2, *S.K. Srivastava & Gopal Krishna* 46315.


**Local name:** ‘*Salpan’, ‘Salpani*’ (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 1: t. 271. 1846.

Shrubs, to 1–2 m high; stems angled, appressed hairy. Leaves alternate, 1-foliolate, oblong-ovate, 4–14 × 1.7–4.5 cm, acute at apex, entire along margins, rounded or truncate at base, coriaceous, glabrous above, appressed hairy beneath; midvein slightly impressed above, pubescent, hairs uncinate, raised beneath, appressed hairy; lateral veins 10–12 pairs, prominent beneath; petioles terete, 1–2 cm long; stipules narrowly triangular-ovate or linear-lanceolate, 2–12 × 0.5–2 mm, densely pubescent, uncinate; petiolules c. 1.5 mm long; stipules filiform, 3–4 mm long. Flower pedicels 3–5 mm long, filiform; bracts linear-lanceolate, c. 8 mm long. Sepals campanulate, 5-lobed above; lobes triangular, c. 1 × 0.5 mm, hispid outside, glabrous inside. Petals white or purplish; standard obovate, 3–4 mm broad; wings oblong, base auriculate, shortly clawed; keel narrowly obovate. Ovary linear, c. 2 mm long, hairy; style slightly curved, 1–1.5 mm long; stigma capitate. Pods linear, 0.7–2.2 × 0.15–0.2 cm, hairy; hairs slightly curved at tip with persistent calyx; calyx teeth 4–8-lobes, each segment tetragonous.

**Fl. & Fr.:** August-May

**Distrib.:** INDIA: Throughout. **WORLD:** Bhutan, Cambodia, China, Hainan, Indonesia, Iran, Java, Java, Kalimantan, Laos, Lesser, Sunda Island, Malaysia, Moluccas, Myanmar, Nepal, Pakistan, Peninsular Malaysia, Philippines, Ryukyu Islands, Sri Lanka, Sumatra, Taiwan, Thailand and Vietnam.


Shrubs, to 50-80 cm high; stems angular, appressed hairy. Leaves alternate, 3-foliolate, 2.5-6.4 x 2.5-7 cm; petioles 0.5-1.8 cm long, angular, appressed hairy; stipules narrowly triangular, 5-6 mm long; lateral leaflets, oblong-elliptic, 0.8-3.4 x 0.4-1.7 cm; terminal leaflets 2.1-5.2 x 1.2-2.7 cm, obtuse at apex, entire along margin, rounded-cuneate at base, coriaceous, green, glabrous above, appressed hairy beneath; midvein impressed above, glabrous, raised beneath, appressed hairy; lateral veins 6-9 pairs, prominent beneath, appressed hairy, looping toward margin; petiolules 1-10 mm long, hairy; stipels linear, 3-5 mm long, puberulous. Inflorescence dense raceme, 5.5-8.0 cm long. Flower pedicels 2-2.5 mm long; bracts ovate, c. 3 x 15 mm, acute at apex, hispid along margin, striate. Sepals campanulate, 5-lobed above; lobes ovate, 1-1.5 x 1 mm; tube c. 1 mm. Petals purplish pink; standard sub-orbicular, 4-6 mm broad; wings oblong-obovate, 3.5-5 x 1.5-2.5 mm; keel oblong-obovate, 3.5-0.5 x 1.5-2.5 mm. Ovary linear, 2-2.5 mm long, hairy; style slightly curved, 1-1.5 mm long; stigma capitate. Pods 3-7 squarish segments; each segment 3-4 x 3 mm, sparsely pubescent, hispid along margin.

Fl. & Fr.: September-December.

Distrib.: INDIA: Throughout. WORLD: Australia, Bangladesh, Bhutan, Burma, China, Japan, Malaysia, Nepal, Pacific Islands, Ryukyu, Sri Lanka, Taiwan, Thailand and Vietnam.


Shrubs, to 1-1.25 m high; stems and branches terete, appressed hairy. Leaves alternate, 3-foliolate, 7-14 x 6-10.5 cm; petioles 4.5-6.5 cm long, triangular, appressed hairy; stipules ovate, c. 7 x 2 mm; leaflets ovate to broadly ovate, 3-11.5 x 1.8-7.5 cm, mucro-acute at apex, entire along margins, rounded at base, coriaceous, glabrous above, hairy beneath; midvein raised both sides, pubescent; lateral veins 6-8 pairs, prominent beneath, pubescent; petiolules 2-3 mm long; stipales subulate, 4-5 mm long. Inflorescences in lax panicles. Flowers c. 5 x 3 mm; pedicels 4-6 mm long, filiform, uncinate; bracts narrowly lanceolate, 3.5-4 mm long. Sepals campanulate, 5-lobed above; lobes triangular-ovate, c. 2
× 1-2 mm; tube c. 1.5 × 1.5 mm, hairy outside, glabrous inside. Petals white; standard obovate c. 5 × 4 mm; wings oblong, c. 4 × 1 mm. Stamens 10, filaments enclosed in a bundle; tube c. 7 mm long. Ovary linear, c. 3.25 × 0.4 mm, hairy; style c. 2 mm long, glandular pubescent; stigma capitate. Pods linear, 0.8-3 cm long, hairy outside, hairs uncinate, 6-7-segmented.

Fl.: May-September; fr.: November-December.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, Myanmar, China, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Thailand, Vietnam and Taiwan.


Other synonym: Desmodium hardwickianum Voigt.

Shrubs to 1-1.5 m high; stems compressed, subterete, puberulent. Leaves alternate, 3-foliolate; petioles 2.5-4 cm long; stipules lanceolate, c. 5 × 2 mm, striate, ciliate along margin; leaflets elliptic-ovate or ovate-lanceolate, 6-13.5 × 2.4-4.3 cm, mucro-acute at apex, undulate along margin, obliquely cuneate at base, coriaceous, glabrous above, sparsely pubescent beneath; midvein raised both side, pubescent; lateral veins 4-5 pairs, prominent beneath, sparsely pubescent; petiolules 3-4 mm long, pubescent; stipels linear, 2-3 mm long, hairy. Inflorescence raceme, axillary or terminal, 15-25 cm long; rachis sparsely pubescent. Flowers c. 5 × 4 mm; pedicel 0.5-1.1 cm long, pubescent. Sepals campanulate, shallowly 5-lobed, c. 1.5 × 2 mm, puberulent. Petals pink-white; standard suborbicular, c. 4 × 3.5 mm; wings c. 4 mm long. Stamens 10; tube 3-3.5 mm long. Ovary c. 2 × 0.5 mm, glandular pubescent; style c. 2 mm long, subulate, glandular pubescent; stigma capitate. Pods deeply indented along lower side; suture into 2-3-meric segments, 10-20 × 4-5 mm; segments ciliate, uncinate; fruiting pedicel c. 10 mm long, puberulent with persistent calyx and filaments tube.

Fl. & Fr.: September-November.

Distrib.: INDIA: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Punjab, Sikkim, Uttar Pradesh and West Bengal.

WORLD: Bhutan, China, Japan, Myanmar, Nepal, Pakistan, Philippines and Sri Lanka.

Specimen examined: Buxa National Park, Jainti range, Jainti 6, 12th Oct., 2009, Gopal Krishna 46314.
Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

Other synonyms: Dendrolobium triangulare (Retz.) Schindl.; Desmodium cephalotes (Roxb.) Wall. ex Wight & Arn.; Hedysarum cephalotes Roxb.; Desmodium cephalotes (Roxb.) Wall. ex Wight & Arn.

Shrubs, to 1 m high; stems triangular, clothed with white cottony hairs. Leaves alternate, 3-foliolate; petioles 1.8-2.5 cm long, triangular, cottony hairy; stipules ovate, c. 3.5 × 1-1.5 mm, hairy; terminal leaflets elliptic-ovate, 6.7-9.8 × 3.3-4.9 cm; lateral leaflets elliptic-ovate, 4.1-7 × 1.4-3.1 cm, micro-acute at apex, entire, undulate along margins, rounded-cuneate at base, coriaceous, green, shining above, white appressed hairy beneath; midvein impressed above, sparsely pubescent, beneath, villous; lateral veins 9-14 pairs, prominent beneath, villous; petiolules 3-4 mm long, villous; stipules 6-7 mm long, villous outside, glabrous inside. Inflorescences axillary umbels; peduncle 4-5 mm long. Flower pedicels 2-3 mm long, sericeous. Sepal 5 lobed above, connate below; lobed narrowly ovate, 1.5-2.2 × 1-1.5 mm; tube 2-2.5 mm long, sericeous outside, glabrous inside. Petals yellowish-white; standard broadly elliptic, c. 6 mm broad; wings oblong, 6-7 × 1.5 mm; keel spatulate, 5-6 × 3 mm. Stamens 10. Ovary densely pubescent; style 7-12 mm long. Pods linear, 0.5-0.9 cm long, sericeous, divided into 1-3 segments; seeds elliptic, 2.5-3.5 × 2-2.5 mm.

Fl. & Fr.: August-March

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, Cambodia, China, East Timor, Hainan, Indonesia, Java, Kalimantan, Laos, Lesser Sunda Island, Malaysia, Moluccas, Myanmar, Nepal, Pakistan, Sri Lanka, Sulawesi, Sumatra, Taiwan, Thailand and Vietnam.


Local name: “Kodalia” (Bengali).
Creeping herbs, rooting at nodes; stems terete, appressed hairy. Leaves alternate, compound, 3-foliolate; petioles 3-5 mm long, terete, hairy; stipules lanceolate or broadly ovate, c. 3 × 1-1.5 mm; leaflets broadly obovate, 3-9 × 3-9 mm, emarginate at apex, entire along margins, cuneate or rounded at base, sub-coriaceous, glabrous above, pubescent beneath or glabrous; midvein impressed above, glabrous, raised beneath, hispid; lateral veins 3-5 pairs, inconspicuous above, prominent beneath; petiolules 0.5-2 mm long, angled, hispid. Flowers c. 2 × 1.25 mm; pedicels 1-1.5 mm long, hispid. Sepals 5-lobed, lobes free above, connate below; lobes linear-lanceolate, c. 2.5 × 0.5 mm, hispid. Petals exserted; standard obovate, c. 1.5 × 1.5 mm; wings obliquely oblong, c. 2 × 0.75 mm. Stamens 10, connate in a tube, tube 0.5-1 mm long; anthers tetrahedric. Ovary sessile ellipsoid, c. 0.5 × 0.5 mm, densely hairy, hairs multicellular; style curved, c. 0.75 mm long; stigma capitate, glandular. Pod 1-4 septate, beaked, ciliate along margin, each septum single seeded; seeds reniform, c. 2 × 1.1 mm, glabrous.

Fl. & Fr.: September-November.


Specimen examined: Buxa National Park, Jainti range, tashigaon 2, S.K. Srivastava & Gopal Krishna 46290.

7. FLEMINGIA Roxb. ex W.T. Aiton (nom. cons.)

17 species in India and 1 in BNP.


Other synonym: Maughania stricta (Roxb.) Kuntze. Plate 21b1, b2


Shrubs, to 1–3 m high; stems and branches triangular, adpressed hairy. Leaves 3-foliolate, 20-30 cm long; petioles 9.5-12 cm long, angled; lateral leaflets oblong or lanceolate to obliquely ovate-lanceolate, 11.5-29 × 4.5-5.6 cm; terminal leaflet, oblong or lanceolate to obliquely ovate-lanceolate, 12.9-28.5 × 4.5-6 cm, acute at apex, entire along margins, cuneate to truncate at base, thinly leathery, green, shining, glabrous and black gland dotted beneath; petiolules 4–5 mm long; stipules lanceolate, c. 11 cm long. Inflorescences terminal or axillary racemes, 5-16 cm long, densely pubescent. Flower pedicels linear, 1–2 mm long, silky tomentose; bracts ovate-lanceolate, 9-13 mm, sparsely hairy, deciduous.
Sepals campanulate, 5-lobed above, black gland dotted and white-silky tomentose outside, glabrous inside; lobes linear-subulate, 5-9 mm long, acute; tube c. 2 mm long. Petals crimson; standard obovate or suborbicular, 7-8 × 6-7 mm; wings oblanceolate, blade, c. 6 × 2 mm; keels obliquely-elliptic, c. 6.5 × 3 mm. Stamens 10 (9+1), connate below and forming a tube; tube c. 7 mm long; anthers c. 0.5 mm long. Ovary silky tomentose; style linear, c. 3 mm long, glabrous. Pods elliptic-ovate, 1-1.3 × 0.8 cm, hairy, black gland dotted, caudate at apex, 1-2-seeded; seeds light brown, ovoid, c. 3 × 2 mm, glabrous.

Fl. & Fr.: February-November.

Habitat: Grows both in moist and dry places and the height they attain vary based on moisture in the Park.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Mizoram, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia, Java, Laos, Myanmar, Philippines, Thailand and Vietnam.


Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

8. INDIGOFERA L.

60 species in India and 1 in BNP.


Other synonym: Indigofera roxburghii Tausch.

Illustration: Obs. Bot 6: 33, t. 2. 1791.

Tufted suffrutilose herbs; stems diffuse, more or less terete, slightly winged, hairs medifixed. Leaves alternate, 1-foliolate, linear-oblong, 4–9 × 1–2.5 mm, mucronate at apex, entire along margins, narrowed at base, subcoriaceous, white appressed hairy both sides; midvein impressed above, slightly raised beneath; lateral veins inconspicuous; petioles c. 1 mm long, hairy; stipules linear-lanceolate, 1.5-2.5 mm long. Inflorescences racemes, 2-3 mm, 1-4-flowered. Flowers 2-2.5 × 1-1.5 mm, pedicellate; pedicels 0.5-0.7 mm long, appressed hairy. Sepals campanulate, 5-lobed above, appressed hairy outside,
glabrous inside; lobes narrowly triangular, 1.75-2 × 0.5-0.6 mm. Petals bright, pinkish-red, caducous; standard broadly ovate, c. 3 mm broad, acute; wings c. 2.5 × 0.2 mm, glabrous; keel c. 2.5 × 0.5 mm, glabrous, lateral spur c. 0.3 mm. Stamens 10 (9+1), diadelphous; tube 1-1.5 mm long, sheath slit above; connective apiculate. Ovary oblong-ovate, c. 1 × 0.7 mm, slivery appressed hairy, slightly curved; style c. 2 mm long. Pods globose, c. 2 × 2 mm, appressed silver hairy, 1-seeded; seed rhombic ovate, c. 1 × 1 mm, pellucid dotted.

Fl.: September-October; fr.: October-February.

Habitat: Grows in dry and sandy area of the park.


9. MILLETTIA Wight. & Arn. (nom. cons.)

13 species in India and 2 in BNP.

Key to species

1a. Leaves 5-9-foliolate; standard pubescent or sericeous dorsally;
pods oblong, strap shaped, tomentose .............................................. 1. M. extensa

1b. Leaves 11-17-foliolate; standard glabrous dorsally; pods ovoid,
glabrous or pubescent when young .............................................. 2. M. pachycarpa


Other synonym: Millettia auriculata Baker ex Brand.

Plate 21d

Lianas; stems and branches subterete, glabrous. Leaves alternate, imparipinnate, c. 42 × 17 cm; petioles c. 10.5 mm long, striate, puberulent; leaflets 5-9, oblong-ovate, 14.5-21 × 8-8.5 cm, shortly acuminate at apex, entire along margins, rounded at base, coriaceous, glabrous above, pubescent beneath; midvein impressed above, raised beneath, pubescent; lateral veins 10-11 pairs, conspicuous above, prominent beneath, pubescent; petiolules 4-5 mm long, stout. Inflorescence raceme, axillary, 12-16 cm long. Flowers borne in small clusters. Sepals 5-lobed, campanulate, c. 4 mm, obscurely toothed above, sericeous. Petals
yellowish-green; standard sub-orbicular, c. 12 × 12 mm, bilobed at apex, base shortly clawed, sericeous; wing and keel obovate, narrowed into a long claw at base. Pod compressed, flattened, c. 19.5 × 2.7 cm, brown tomentose; seeds dark brown, broadly elliptic, c. 15 × 10 mm.

Fl.: July-August; fr.: September-October.


**Local name:** “Bishloti” (Bengali).

Lianas; branchlets yellow brown tomentose to glabrescent, lenticellate. Leaves imparipinnate, 28–33 cm long; leaflets 11–17, elliptic-oblong to oblong-lanceolate, 5.5–10 × 2–2.5 cm, acuminate at apex, entire along margins, cuneate at base, chartaceous, green, shining, glabrous above, yellow brown tomentose beneath; midvein impressed above, raised beneath; lateral nerves 10–12 pairs, prominent beneath, tomentose; petiolules c. 5 mm long. Inflorescences racemose, 8–14 cm long; rachis subterete, rusty tomentose. Flower pedicels 6–8 mm long; bracts, triangular-ovate, c. 2 × 1 mm, tomentose; bracteoles same as bracts. Calyx shallowly 5-lobed above, tubular below, brown tomentose outside; tube 4–5 × 3–3.5 mm; lobes triangular ovate, c. 1 × 1 mm. Petals purplish; standard broadly-elliptic, c. 3 × 2 cm, bilobed at apex; wings oblong, 2.5–2.75 × 0.7–0.8 cm; keel oblong, 2.5–2.75 × 0.7–0.8 cm, glabrous, auricled. Stamens 10, filaments connate at tube; tube c. 12 mm long; anthers oblong-ovate, c. 1 mm long. Ovary falcate, c. 6 × 1.5 mm, silky tomentose; style c. 8 mm long, setose; stigma ovoid, sticky. Pods 6–23 × 3–5 cm, constricted between seeds, without wings, pubescent at first later glabrous; seeds reniform, c. 3 × 2.5 cm.

**Fl. & Fr.:** March–May.

**Habitat:** The plant is growing along the bank of river as well in vicinity of forest in dry places.
**Distrib.:** INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Taiwan, Thailand and Vietnam.

**Specimens examined:** Buxa National Park, South Rajabhatkhawa, Bala River, SRVK 6, 29.03.2012, Gopal Krishna 50633; Rajabhatkhawa depot Road, 15.05.1949, V. Narayanswami & party 2444.

**Uses:** The root bark is used in fish sticking by Bhutia tribe in the Park.

**10. PUERARIA DC.**

13 species in India and 2 in BNP.

Key to species

1a. Plants bearing leaves at flowering time ........................................... 1. P. phaseoloides

1b. Plants leafless at flowering time ......................................................... 2. P. sikkimensis


Other synonyms: *Dolichos phaseoloides* Roxb.; *Neustanthus phaseoloides* (Roxb.) Benth.

Climbing herbs; stems slender, brownish hirsute. Leaflets broadly ovate, rhomboid or ovate-rhomboid, terminal one broader, 4–8.7 x 3–7.4 cm, lateral ones smaller, acute at apex, entire along margins, broadly cuneate at base, subcoriaceous, densely adpressed hirsute beneath, adpressed hirsute above, stipulate; stipules basifixed, ovate-lanceolate, 3–5 mm; stipels linear, 2–3 mm; midvein impressed above, raised beneath; lateral veins 5–7 pairs, impressed above, raised beneath; petiolules short. Inflorescences racemes solitary, 8–15 cm or more; bracts and bracteoles linear-lanceolate, 3–4 mm, hirsute. Flowers with short pedicels, clustered at slightly distant nodes. Calyx c. 6 mm, pilose; lower tooth as long as tube, apex hirsute, others deltoid, shorter than tube. Corolla Bluish or lilac; standard suborbicular, 6–8 x 5–6 mm, obtuse at apex, base with 2 incurved auricles; wings obovate-oblong, c. 5 x 3 mm, obtuse at apex, auricled at base, clawed; keel falcate, c. 6 x 6 mm, apex with short beak, base truncate, clawed. Ovary linear, c. 4 mm long, densely hairy; style c. 1.5 mm long; stigma discoid. Pods subcylindric, 5–8 x 0.4 mm, adpressed hirsute when young, later subglabrous, 15–20-seeded; seeds oblong-elliptic, c. 4 mm across, subtruncate at both ends.

**Fl.:** August–September; **fr.:** October–November.
Distrib.: INDIA: Almost throughout. WORLD: Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam; widely cultivated elsewhere in the tropics.


Scandant shrubs; stems terete, pubescent. Leaves 3-foliolate; leaflets ovate, c. 15 × 12 cm, acute or shortly acuminate at apex, entire along margins, rounded or truncate at base, sub-coriaceous, sparsely pubescent; midvein impressed above, faintly raised beneath; secondary veins 5–6 pairs, prominent beneath. Inflorescences raceme; rachis 11–40 cm long, terete, brownish tomentose. Flower pedicels 4–5 mm long, filiform, tomentose; bracts lanceolate, c. 1.25 × 0.5 mm, hispid outside, glabrous inside; bracteoles ovate, c. 1.5 × 1 mm, hispid outside, glabrous inside. Sepals green purplish, campanulate, 5-lobed above, rusty tomentose outside; teeth oblong-ovate, 4–5 × 1.5–2 mm, acute; tube c. 4 × 5 mm. Petals pale blue with yellow spots; standard sub-orbicular, c. 15 mm broad; wings oblong, c. 3 mm broad; keel upcurved, 4–5 mm broad. Stamens 10, connate in a tube; tube c. 12 mm long; anthers oblong, c. 0.75 mm long, dorsifixed. Ovary falcate, 5–6 mm long, densely hairy; style slightly curved; stigma clavate.

Fl. & Fr.: February-April.

Distrib.: INDIA: Himachal Pradesh, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bhutan and Nepal.


11. SPATHOLOBUS Hassk.

4 species in India and 1 in BNP.


Other synonym: Spatholobus roxburghii Benth. Plate 21h


Lianas deciduous; branchlets terete, subglabrous. Leaves 3-foliolate; petioles 9–13 cm long, puberulent; stipules broadly triangular, c. 4 × 6 mm; terminal leaflet ovate or
Plate 21: a. Desmodium heterocarpon (L.) DC.; b1 - b2. Flemingia stricta Roxb.; b1. Inflorescence; b2. Pods; c. Indigofera linifolia (L.f.) Retz.; d. Millettia extensa (Benth.) Benth. ex Baker; e - f. Millettia pachycarpa Benth.; e. Habit; f. Inflorescence (close up); g. Pueraria sikkimensis Prain; h. Spatholobus parviflorus (Roxb. ex DC.) Kuntze; inset: pod
broadly elliptic, 14–17 × 10.2–12 cm, rounded at both ends or slightly narrowed at base;
lateral leaflets asymmetric, broadly ovate, 11.5–14.5 × 6.5–7.8 cm, acute to acuminate at
apex, entire undulate along margins, leathery, shining above; midvein impressed above,
raised beneath; lateral veins 7–9 pairs; petiolules 5–6 mm, thick and stout, puberulent;
stipels subulate, c. 1.5 mm. Inflorescences terminal panicles, 30–40 cm long; rachis
puberulent. Sepals campanulate, 5-lobed above; lobes lanceolate 6-10 mm, densely
pubescent; tube 3–4 mm, puberulent. Petals creamy-white or pink; standard broadly
ovate 9–11 × 6–8 mm; wings oblong, blade 5–7 × 3 mm; keel oblanceolate 3–5 × 2–3 mm.
Stamens 10. Ovary tomentose. Pods samaroid, falcate-oblong, c. 11 × 2.8 cm, thick,
subwoody, rounded at apex, densely brownish velutinous, stipitate; stipe terete, 1.3–1.7
cm, densely velutinous, 1-seeded; seed brownish red, orbicular or reniform, c. 2.8 × 1.5
cm.
Fl.: August-September; fr.: February-April.
**Distrib.:** INDIA: Throughout. WORLD: Bangladesh, Cambodia, China, Laos, Myanmar,
Sri Lanka, Thailand and Vietnam.
**Specimen examined:** Buxa National Park, Jainti range, Bhutia pond, 7th April, 2012, Gopal
Krishna 56049.

**12. TEPHROSIA** Pers. (*nom. cons.*)

27 species in India and 1 in BNP.

1876; Prain, Bengal Pl. 1: 405. 1903; Sanjappa, Leg. India: 256. 1992.

Other synonym: *Robinia candida* Roxb.

**Local name:** “Bangara” (Bengali).

**Illustration:** Fl. West Bengal 2: f. 14. 2015.

Shrubs, 1–2 m high; stems ridged, greyish white tomentose, trichomes c. 1 mm. Leaves
imparipinnate, 12–20 cm long; rachis angled, grayish white tomentose; leaflets, 17–25,
oblung-lanceolate, 2.5–5.6 × 0.6–1.4 cm, mucro-acute at apex, entire along margins,
cuneate at base, leathery, green shining above, densely sericeous beneath; midvein
impressed above, faintly raised beneath, sericeous; lateral veins 30–50 pairs, conspicuous
above, inconspicuous beneath; petiolules c. 1 mm long sericeous. Inflorescences terminal
or lateral pseudo-racemes, 15–20 cm long. Flowers c. 2 cm; pedicels c. 1 cm, densely white
villus. Sepals campanulate, 5-toothed above; teeth equal, c. 1 mm, rounded at apex; cup
c. 5 × 5 mm. Petals white, rarely yellow or pale pink; standard c. 2 × 2 cm, base abruptly
narrowed to a short claw, wings and keel c. 20 × 8 mm. Stamens 10. Ovary tomentose, with numerous ovules; style shortly bearded on inside near apex. Pods linear, 8–10 × 0.75–0.85 mm, straight, brown tomentose with a mixture of long and short trichomes, apex truncate and with a straight, c. 1 cm beak, 10–15 seeds; seeds olive-green with dark patches, ellipsoid, c. 5 × 3.5 mm, smooth.

Fl.: October–November; fr.: November–December.

Distrib.: INDIA: Assam, Bihar, Gujarat, Karnataka, Manipur, Meghalaya, Rajasthan, Sikkim, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, Malaysia, Myanmar, Nepal, New Zealand, Sri Lanka, West Indies and USA (Hawai Islands).

Specimen examined: Buxa National Park, Jainti range, NRVK6a, 9th Feb., 2010, S.K. Srivastava & Gopal Krishna 46383.

Note: The leaves and bark are used to poison fish.

13. VIGNA Savi (nom. cons.)

24 species in India and 2 in BNP.

Key to species

1a. Flowers blue, purple or white; stipules auriculate at base ...................... 1. V. pilosa
1b. Flowers yellow; stipules rounded at base ........................................ 2. V. sublobata


Other synonym: Dysolobium pilosum (Willd.) Maréchal.

Local names: “Jhikrai”, “Malkonia” (Bengali).

Vines, herbaceous, twining; stems terete, more or less striate, pilose. Leaves 3-foliolate; petiole 2–6.2 cm long, pilose; terminal petiolule 5–9 mm long, densely white villous; leaflets subequal; terminal leaflet narrowly ovate or triangular-ovate, c. 10 × 6.5 cm, acuminate at apex, obtuse at base; lateral leaflets subequal, elliptic-ovate, 7–8 × 4 cm, acuminate apex, oblique-cuneate at base, subcoriaceous, sparsely hairy above with tuberculate base, densely hairy beneath; 3-nerved at base, 3-pairs above, raised both sides, hispid. Inflorescences raceme, axillary, 3–10 cm long, upper part with many flowers. Sepals broadly campanulate, exterior densely pubescent, 5-lobed; upper 2-lobed, connate, middle lower lobe c. 4 mm; tube c. 4 mm. Petals white or purplish; standard broadly ovate, c. 1.4 × 1.6 cm, apex emarginate, slightly reflexed, shortly clawed and with auricle at base; wings obovate, c. 2 × 1.2 cm, apex obtuse, emarginate, base clawed, with
auricles, c. 1 mm; keels falcate, base wider, upper acute, near base with a triangular
dentiform auricle, clawed. Stamens 10, subequal; staminal tube c. 1.8 cm. Ovary falcate, c.
1.3 cm long, densely appressed hairy; style c. 1 cm long. Pods c. 12.5 × 0.6–0.7 cm,
leathery, densely brown villous, apex beaked, dehiscent along 2-sutures, 5–12 seeded;
seeds black, oblong, 5–6 × 3–4 mm; hilum oblong.
Fl.: September–October; fr.: October–November.
Distrib.: INDIA: Assam, Bihar, Karnataka, Kerala, Maharashtra, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, Burma, Cambodia, China, Indonesia, Java, Laos, Malaysia, Myanmar, Nepal, Malaysia, Philippines, Taiwan, Thailand and Vietnam.

Other synonyms: Vigna sublobata (Roxb.) Bairig; Phaseolus sublobatus Roxb.; P. trinervius Wight & Arn.
Local name: “Ghora-mung” (Bengali).
Straggling annual; stems and petioles deflexed hirsute. Leaflets unequally 3-lobed;
leaflets ovate, 4–10 × 2.5–7 cm, shortly acuminate, base rounded or cuneate, entire or
undulate along margins, stipels linear-lanceolate 3–6 mm; petioles 6–14 cm; stipules
medifixed ovate-elliptic, 7–12 × 3–4 mm; flowers 5-15 terminally clustered on racemes 2–9
cm; calyx 2–3 mm; petals 7–12 mm; pods 4–7 × 0.5–0.6 cm, shortly brown pubescent; seeds
10–15, green or blackish, hilum not protuberant ungrooved.
Distrib.: INDIA: Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra,
Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Malaysia and
Sri Lanka [widely cultivated in tropics].
Gopal Krishna 46138.

ROSACEAE [147]

1a. Herbs; leaves 3-foliolate; epicalyx present; fruits red, aggregate,
dehiscent.......................................................................................................................1. Duchesnea
1b. Trees; leaves simple; epicalyx absent; fruits green, drupes, indehiscent…2. Prunus

1. DUCHESNEA Sm.
1 species in India and BNP.


Other synonym: Potentilla indica (Andrews) T. Wolf.


Herbs; rootstocks stout with several prostrate stolons. Leaves in rosettes, 3-foliolate; petioles 1–10 cm long, hispid; leaflets obovate, 0.75–2.9 × 0.75–2.1 cm, obtuse at apex, crenately-serrate along margins, cuneate at base, chartaceous, appressed pubescent both sides; midvein impressed above, faintly raised beneath, pubescent; lateral veins 6–8 pairs, faintly visible both sides; petiolules c. 1 mm long, hispid. Inflorescences axillary, solitary. Flowers 1–2 cm across; pedicels 2.5–5 cm long, hispid. Epicalyx obovate, usually shorter than calyx lobes, villous both sides, bluntly 3–5-toothed at apex. Sepals 5-lobed, lobes free above, cupular below, villous both sides; lobes ovate 3–5 mm, entire; cup c. 4 mm long. Petals yellow, 5-lobed, free; lobes obovate, 3–5 × 3–5 mm, obtuse at apex, slightly clawed at base, nerves faintly visible, chartaceous, glabrous. Stamens 20–30; filaments 0.5–1.5 mm long, subulate, glabrous; anthers ovoid, c. 0.5 mm long. Carpels many, free, inserted on convex receptacle; style adaxial or subterminal, c. 1 mm long, deciduous; stigma entire. Aggregate fruit formed from enlarged receptacle, hemispheric or turbinate, fleshy red, conical or subglobose 0.75–1.5 cm across, shining, dehiscent. Achenes seated on surface of aggregate fruit, compressed ovoid, c. 1 mm across; seeds reniform.

Fl. & Fr.: February-June.

Habitat: Grows in moist and shady places. Fruits edible but tasteless.

Distrib.: INDIA: Himachal Pradesh, Sikkim and West Bengal. WORLD: Afghanistan, Africa, Bhutan, China, Europe, Indonesia, Japan, Korea and Nepal and North America.

2. **PRUNUS L.**

10 species in India and 1 species in BNP.


**Illustration:** Wight, Icon. Pl. Ind. Orient. 1(1): t. 256. 1840 [as *Polydontia ceylanica* Wight].

Trees, 15–20 m tall; branchlets terete, lenticellate, puberulent. Leaves alternate, simple, ovate-oblong or ovate-elliptic, 8.2–15 × 3.2–8.2 cm, shortly acuminate at apex, entire along margins, asymmetrically cuneate at base, coriaceous, dark green, brown above, pale beneath when dry, glabrous above, gland dotted beneath; midvein impressed above, raised beneath, glabrous; lateral veins 6–7 pairs, slightly impressed above, prominent beneath, glabrous; petioles 8–10 mm long, appressed hairy. Inflorescences axillary raceme, 9–14 cm long. Flowers c. 8 × 8 mm; pedicels 4–6 mm long, pubescent. Sepals 5, free above, connate below, subulate; tube c. 3 × 3 mm, appressed hairy outside. Petals white, 5. Stamens many; filaments 4–5 mm long, glabrous; anthers ovoid. Ovary 1-loculed, glabrous; ovules 2, collateral, pendulous; style terminal, elongated. Drupes green, glabrous, often glaucous, usually with a longitudinal groove, depressed globose, c. 1.5 × 2.1 cm, indehiscent.

**Fl.:** May-August; **fr.:** October-April.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. WORLD: Bangladesh, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.


**Notes:** There are 10–15 individuals in the Park (in the East Damanpur, Gadadhar and Rajabhatkhawa range) and the species was designated under IUCN’s Endangered (EN) status. In Flora West Bengal it was stated that its distribution is in Darjeeling district and present collections is from Jalpaiguri district.
RHIZOPHORACEAE [181]

CARALLIA Roxb.

1 species in India and BNP.


Other synonyms: Carallia lucida Roxb.; Carallia integerrima DC.


Trees, to 15 m tall; branchlets subterete, glabrous. Leaves simple, opposite-decussate, obovate-elliptic, 8-15 × 4-8.4 cm, broadly acuminate at apex, entire along margins, attenuate at base, leathery, shining, glossy, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 15-20 pairs, inconspicuous above, faintly visible beneath; stipules lanceolate 1-1.5 cm long; petioles c. 0.5 cm long. Inflorescences cymes, 2 or 3-chotomously branched; peduncles 5-8 mm long, stout, glabrous; bracts triangular ovate, 1-1.5 × 1 mm, acute at apex. Flowers bisexual, sessile or subsessile, c. 0.5 × 0.3 cm. Calyx 6-lobed, campanulate. Petals maroon, 6-lobed; lobes narrowly triangular or lanceolate, c. 3 × 1 mm, inserted on disk, bifid, toothed. Stamens 12; 6 exserted and attached with calyx, 6 attach in disk; filament c. 2 mm long, pubescent; anthers very small, c. 0.1 mm long. Ovary bulbous, c. 2 mm, enclosed by disk; style, c. 2.5 mm long; stigma c. 2 mm long, 6-lobed apically. Fruits globose, c. 7 mm across, indehiscent, 1 seeded; seeds subreniform.

Fl. & Fr.: November-February.


Notes: Germination happens only after fruit fall unlike other Rhizophoraceae members. This species is known from Darjeeling district and present collection is from Jalpaiguri district.

COMBRETACEAE [218]

Key to genera

1a. Shrubs; leaves opposite or in whorls of 3s; petioles eglandular; flowers bisexual; petals present .................................................................1. Combretum
1b. Trees; leaves alternate or subopposite; petioles glandular; flowers
usually bisexual sometimes unisexual petals absent

2. Terminalia

1. COMBRETUM Loefl.
10 species in India and 1 species in BNP.


Shrubs, branches sub-terete, glabrous. Leaves usually in whorls of 3s, simple, oblong-ovate, or elliptic-ovate, 6–9.5 × 2.3–3.5 cm, acuminate at apex, entire along margins, subcordate at base, coriaceous, glabrous except veins, pale green when dry both surfaces, orange-yellow gland dotted beneath; midvein impressed above, slightly raised beneath, hispid; lateral veins 8–10 pairs, impressed above, raised beneath, hispid; petioles short, c. 2 mm long, stout, pubescent. Inflorescences axillary spikes, 9.5–11 cm long; rachis rusty pubescent. Flowers bisexual, c. 5 × 4 mm; pedicels 1–2 mm long, swollen at base, pubescent; bracts linear 1.5–2 mm long, hispid. Sepals 4-lobed above, cupular below; lobes triangular ovate, c. 1.5 × 2 mm, acute at apex, pubescent; tubes campanulate, c. 2 × 3 mm, tomentose outside, villous inside. Petals cream-white, 4, free; lobes obovate, c. 2 × 1 mm, adnate to calyx tube. Stamens 8, exerted; filaments filiform, subequal, 3–3.5 mm long; anthers oblong, c. 0.5 mm long. Disk densely hairy. Ovary inferior, oblong ovate, c. 1.5 × 0.5 mm; style c. 6 mm long; stigma simple. Fruits 2.1–2.9 × 2.1–2.9 cm, 4 winged, yellow-brown, with scattered peltate scales between wings; seeds oblong-ovate, c. 10 × 5 mm.

Fl. & Fr.: March–November.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal and Vietnam.


2. TERMINALIA L. (nom. cons.)
12 species in India and 3 species in BNP.

1a. Fruits not winged, more or less 5-ridged

2. T. bellirica

1b. Fruits winged, not ridged
2a. Flower white or yellowish; sepals pubescent above; fruits (4–) 5-winged.....1. **T. alata**

2b. Flowers pink; sepals subglabrous above; fruits 2-winged..................3. **T. myriocarpa**


Other synonyms: *Pentaptera tomentosa* Roxb.; *Terminalia tomentosa* (Roxb.) Wight & Arn. (nom. illeg.).

**Local names:** “Saj”, “Asan”, “Asna” (Bengali).

Trees, to 40 m tall; branchlets terete. Leaves opposite or subopposite, oblong or oblong-elliptic, 12.5–21 × 6–10 cm, obtuse at apex, crenate along margins, slightly oblique at base, coriaceous, glabrous on both surfaces; midvein impressed above, raised beneath, glabrous; lateral nerves 18–21 pairs, prominent beneath, reddish; petiole c. 0.5 cm long, stout, glabrous. Inflorescences axillary or terminal panicles, simple or branched, 8–17 cm long. Sepals 5-lobed above, cupular below; cup 2–3 mm long, tomentose; lobes triangular 0.7–1 mm. Petals absent. Stamens 8 or 10. Disk densely hairy. Drupes, 4–5 cm long, (4–)5-winged, reddish-brown, glabrous, marked with closed horizontal parallel striations.

**Fl. & Fr.:** June–November.

**Distrib.:** INDIA: Meghalaya, Sikkim and West Bengal. WORLD: Bhutan.

**Specimen examined:** Buxa National Park, Gadadhar Range, Panbari compartment no. 6, 72 m, 1st Dec. 2011, Gopal Krishna 47183.


**Local name:** “Bhaira” (Bengali).

**Illustration:** Roxb., Pl. Coromandel 2: t. 198. 1805.

Trees, 20 m tall; bark gray, longitudinally ridged; branchlets subterete, with conspicuous spirally ascending leaf scars. Leaves clustered towards end of branchlets, obovate to broadly elliptic, 14–19.2 × 10–11 cm, broadly acute at apex, entire along margins, cuneate-oblique at base, coriaceous, pale green, glossy, turned pale when dry, immature leaves pubescent, on maturity glabrous; midvein impressed above, raised beneath, pubescent to glabrous; secondary veins 6–9 pairs, prominent beneath, glabrous; petioles 2–7.5 cm long, glabrous. Inflorescences axillary spikes or panicle, simple, 5–14 cm long; rachis densely ferruginous tomentose. Sepals 5-lobed above, tubular below; tube cupular, 4–5 mm long, tomentose outside, villous inside. Petals absent. Stamens 10, exserted, 4–5 mm. Disk
densely hairy. Ovary enclosed by disk; style c. 1 mm long; stigma simple. Drupe sub-globose to obovoid, 2-2.5 × 1.5-2 cm, more or less 5-ridged, velvety tomentose.

Fl. & Fr.: November-December.


Other synonym: Myrobalanus myriocarpa (van Heurck & Mull.Arg.) Kuntze.

Local names: “Pani-saaj” (Bengali, Nepali).

Trees, 25 m tall; branchlets terete, minutely brownish hirsute when young or rarely densely brownish long stiff hirsute. Leaves opposite, oblong or oblong-elliptic, 14.5-19 × 3.8-7.8 cm, shortly acuminate at apex, crenate along margins, slightly unequal, truncate to subcordate at base, coriaceous, glabrous; midvein flattened or faintly raised above, raised beneath, glabrous; lateral veins 28-30 pairs, prominent beneath, glabrous; petioles 5-8 cm long, two glands near the base of lamina; glands stalked, prominent. Inflorescences axillary or terminal panicles, 9-17 cm long, simple or branched; rachis terete, white tomentose. Flowers bisexual, c. 1.25 cm long; pedicles c. 1 mm long, thick, softly white tomentose; bracts narrowly ovate, 1-1.5 × 0.5 mm, acute at apex, coriaceous, tomentose both sides. Sepals pink, 5-lobed, lobes free above, tubular below; tube cupular, 0.5-0.6 mm long; lobes triangular ovate, c. 0.5 × 0.3 mm, acute at apex, tomentose outside, villous inside. Petals absent. Stamens 10, inserted on to the calyx tube; filaments absent; anthers narrowly ovate, c. 0.5 mm. Disk glabrous or sparsely hairy. Ovary enclosed by disk; style cylindric, c. 1 mm long, glabrous; stigma capitate. Fruit a nut, 0.3-0.4 × 1.3- 1.5 cm, 2-winged, hairy, yellow or yellowish brown.

Fl. & Fr.: October–December.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bangladesh, Bhutan, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Use: The timber is used for furniture, doors, windows etc.
Specimens examined: Buxa National Park, without any precised locality, V. Narayanswami & party 2681; Gadadhar Range, Panbari compartment no. 6, 72 m, 29th Nov. 2011, Gopal Krishna 52305.

Note: This species can be easily identified by pinkish inflorescences in field.

**MYRTACEAE [222]**

**SYZYGIUM** Gaertn. *(nom. cons.)*

50 species in India and 4 in BNP.

Key to species

1a. Leaves often in whorls of 3, sessile; calyx lobes conspicuous, persistent; stamens long, 2-2.5 cm long ...................................................... 2. **S. formosum**

1b. Leaves opposite, petiolate; stamens short, 0.2-1 cm long;
calyx lobes inconspicuous or early caduceus ........................................ 2

2a. Inflorescences terminal; petals distinct .........................3. **S. fruticosum**

2b. Inflorescences axillary or lateral below the leaves; petals coherent, falling as a cap at anthesis................................................................. 3

3a. Fruits greenish, globose, 1-1.5 cm .......................................... 1. **S. cumini**

3b. Fruits red to black, ellipsoid, 1-2 cm........................................ 4. **S. oblatum**


Local name: “Belati-menhdi” (Bengali).


Trees, 6-20 m tall; branchlets grayish white when dry, terete. Petiole 1-2 cm; leaf blade broadly elliptic to narrowly elliptic, 6-12 × 3.5-7 cm, leathery, abaxially slightly pale when dry, adaxially brownish green to blackish brown and slightly glossy when dry, both surfaces with small glands, secondary veins numerous, 1-2 mm apart, and gradually extending into margin, intra-marginal veins c. 1 mm from margin, base broadly cuneate to rarely rounded, apex rounded to obtuse and with a short cusp. Inflorescences axillary on flowering branches or occasionally terminal, paniculate cymes, to 11 cm. Hypanthium obconic or long pyriform, 4-8 mm. Calyx lobes inconspicuous, 0.3-0.7 mm. Petals 4, white or light purple, coherent, ovate and slightly rounded, c. 2.5 mm. Stamens 3-4 mm. Style as long as stamens. Fruit red to black, ellipsoid to pot-shaped, 1-2 cm, 1-seeded; persistent calyx tube 1-1.5 mm.
Fl.: April–May; fr.: June–September.


**Specimen examined:** Buxa National Park, Jainti range, Jainty 6, 31st March, 2012, Gopal Krishna 56018.


**Local name:** “Phul-jamb” (Bengali).

**Illustration:** Wall., Pl. Asiat. Rar. 2: t. 108. 1831 [as *Eugenia formosa* Wall.].

Trees, 10–15 m high; canopy large; bark light brown; branchlets terete with scars of fallen leaves, glabrous. Leaves opposite or in whorls of 3s towards end of branchlets, obovate, elliptic-oblong-oblanceolate, 9–23 × 9.2–14 cm, obtuse at apex, undulate along margins, subcordate at base, thickly leathery, dark green above, immature leaves reddish green, glabrous, gland dotted both sides; midvein impressed above, raised beneath, glabrous; lateral veins 10–13 pairs, prominent beneath; sessile. Inflorescences cymes borne on older branchlets below the leaves, 4–7 flowered; peduncles c. 5 mm long. Flowers 3–8 cm across; pedicel 0.5–1.1 cm long, glabrous; bracts linear, 3–5 mm long, caducous. Hypanthium obconic, 1–1.2 cm long, yellow green with pinkish tinge at tip. Sepals yellowish green, 4-lobed, lobes free above, tubular below; lobes suborbicular, c. 5 × 8 mm, obtuse at apex, glabrous; tube funnel shaped, c. 15 × 10 mm, tapering toward base, glabrous. Petals pinkish-white, 4, free; lobes suborbicular, c. 12 mm long. Stamens many, borne on disk within the calyx tube; filaments white, 2–2.5 cm long, glabrous; anthers oblong c. 2 mm long. Ovary enclosed by calyx tube; style 3–3.5 cm long. Fruits white when ripe, sub-globose, 2–3 cm across, crowned with persistent calyx.

Fl. & Fr.: March–April.

**Distrib.:** INDIA: North East India and West Bengal. WORLD: Bhutan.

**Specimen examined:** Buxa National Park, East Damanpur range, SRVK 11, 30th March, 2012, Gopal Krishna 50666.


Other synonym: *Eugenia fruticosa* (DC.) Roxb.

**Local name:** “Ban-jamb” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2(1): t. 624. 1846 [as *Eugenia fruticosa* (DC.) Roxb.].
Trees, to 12 m tall; branchlets dark brown when dry, compressed glabrous; old branches grayish white. Leaves simple or 3-4-foliolate, narrowly elliptic to elliptic or elliptic-ovobvate, 5.8-9.6 × 3.1-5 cm, acuminate at apex, entire along margins, cuneate to slightly rounded at base, thinly leathery, green, shining, glabrous, reddish brown when dry above, brown and glossy when dry toward beneath, gland dotted both sides; midvein impressed above, raised beneath, glabrous; lateral veins many 2-3 mm apart, and gradually extending into margin, intramarginal veins c. 1 mm from margin; petioles 1.5-2.8 cm long, compressed or slightly grooved. Inflorescences lateral below leaves, paniculate cymes, 4-7 cm. Hypanthium obconic, 2-2.5 mm. Sepals lobes inconspicuous; tube funnel shaped, c. 2 mm long, glabrous. Petals 4, distinct, rounded, 1-1.5 mm wide. Stamens many; filaments c. 1 mm, glabrous. Style as long as stamens. Fruits red when ripe, globose, 6-7 mm across, 1-seeded.

Fl.: April-May; fr.: June-July.

Distrib.: INDIA: Throughout. WORLD: Bangladesh, Myanmar and Thailand.


4. Syzygium oblatum (Roxb.) Wall. ex A.M. Cowan & Cowan, Trees N. Bengal 68. 1929.

Eugenia oblatu Roxb., Fl. Ind. 2: 493. 1832; Duthie in Hook.f., Fl. Brit. India 2: 492. 878; Prain, Bengal Pl. 1: 491. 1903. Plate 24e, f

Local name: “Goolam” (Nepali).

Illustration: Wight, Icon. Pl. Ind. Orient. 2(1): t. 622. 1846 [as Eugenia oblata Roxb.].

Trees, 12-20 m tall; branchlets dark brown when dry, terete, glabrous. Leaves opposite, simple, elliptic to oblong elliptic, 6-15 × 2.4-4.5 cm, acuminate at apex, entire along margins, cuneate at base, leathery, green, shining, numerous small glands above, glands inconspicuous beneath, glabrous, midvein impressed above, raised beneath; lateral veins numerous, 2-3 mm apart and nearly extending horizontally, intramarginal veins less than 1 mm from margin; petiole up to 1 cm long, grooved, glabrous. Inflorescences terminal or a few axillary, paniculate cymes, 4-8 cm long, branched; rachis angled, stout, glabrous; peduncles 8-20 mm long. Flower pedicles 2-3 mm long, glabrous. Hypanthium obconic, 4-5 mm. Sepals 4 or 5 lobed above, tubular below; lobes shortly angular, c. 1 × 2-3 mm; tube funnel shape c. 2.5 × 3 mm, glands dotted above, glabrous, persistent calyx lobes in fruits, c. 1.5 mm. Petals 4, white, coherent, ovate, c. 5 mm. Stamens many longer than petals; filaments 1.5-3.5 mm long gland dotted; anthers oblong c. 0.2 mm long.
Ovary enclosed in calyx tube; style nearly as long as stamens, c. 3.5 mm long; stigma simple. Fruits globose, 1-1.5 cm in across, 1-seeded.

**Fl.:** April-May; **Fr.:** November-January.

**Distrib.: India:** Assam, Meghalaya and West Bengal. **WORLD:** Bangladesh, Cambodia, China, Indonesia, Malaysia, Thailand and Vietnam.


**LECYTHIDACEAE [328]**

**CAREYA** Roxb.

2 species in India and 1 species in BNP.


**Local name:** “**Kumbhi**” (Bengali).

**Illustration:** Roxb., Pl. Coromandel 3: t. 214. 1811.

Trees, to 18 m tall; bark thick, dark brown. Leaves simple, alternate, whorled, broadly obovate to oblong-ovoblate, 15-30 × 10-19 cm, broadly acute or obtuse at apex, crenate along margins, attenuate at base, decurrent onto petioles, coriaceous, green, shining, glabrous, old leaves often red or purple; midvein flattened above, raised beneath, glabrous; lateral veins 14-16 pairs, prominent beneath, glabrous; petioles 5-15 mm long. Inflorescences in racemes, 10-15 cm long, 3-8 flowered. Flowers sessile; bracts elliptic-lanceolate or narrowly ovate, c. 1.7 × 0.8 cm. Sepals green, 4-lobed, lobes free above, tubular below; lobes rounded 8-10 mm long, thick, coriaceous; tube 10-15 mm long, glabrous, persistent. Petals greenish-white with pink red patches at the base, 4-lobed, free above, connate at base; lobes oblong-spathulate, c. 4 × 1.3 cm, obtuse at apex, revolute along margins, caduceus; tube c. 1 cm long. Stamens many, epipetalous, many seriate, outer and inner seriate sterile; filament flattened, 2.5-5 cm long, adanate to base; anthers ovoid, c. 1 mm long. Ovary embedded in calyx cup; style 4-5.5 cm; stigma capitate. Berries green, ovoid-globose, 7-9 cm across, glabrous; seed compressed, ellipsoid, 1.5 × 1 cm.

**Fl. & Fr.:** April-June.

**Distrib.:** INDIA: Almost throughout. **WORLD:** Bhutan.
Fig. 10. Careya arborea Roxb.: a. Leaf; b. Flowering branch; c. Sepal; d. Stamens and staminodes; e. Gynoecium (enclosed by sepals); f. Fruit; g. Seed
Plate 24: a - b. Syzygium cumini (L.) Skeels: a. Flowering branch; b. Flowers (close up);
c - d. Syzygium formosum (Wall.) Masam.: c. Flowering branch; d. Flowers (close up);
e - f. Syzygium oblatum (Roxb.) Wall. ex A.M. Cowan & Cowan: e. Flowering branch;
f. Flower (close up); g - h. Careya arborea Roxb.: g. Flowering branch; h. Fruiting branch
Specimens examined: Buxa National Park, Jainti range, Jainti 6a, Gopal Krishna 56096; Rajabhatkhawa range, 29th March, 2012, Gopal Krishna 50625.

MELASTOMATACEAE [223]

Key to genera

1a. Shrubs, 2-4 m; stamens unequal in length ........................................... 1. Melastoma
1b. Shrubs, 1-2 m; stamens equal in length............................................. 2. Osbeckia

1. MELASTOMA Burm. ex L.
4 species in India and 1 species in BNP.


Illustration: Curtis’s Bot. Mag. 15: t. 529. 1801.

Shrubs, 2–2.5 m high; stems angled, densely appressed hairy, scabrous; swollen at nodes. Leaves opposite, elliptic to elliptic-lanceolate, 2.5–11 × 1–3.9 cm, mucro-acute at apex, entire along margins, cuneate or rounded at base, coriaceous, shining above, turned pale beneath when dry, appressed hairy; palmately 3–5-nerved, impressed above, raised beneath, strigose; petioles 6–10 mm long, strigose. Flowers bisexual, 4–6 cm across; pedicels 7–10 mm long, white appressed hairy. Sepals 5-lobed, cupular below; lobes linear-oblong, c. 5 × 3 mm, acute at apex, strigose; cup c. 8 × 6 mm, strigose outside, glabrous inside. Petals mauve or rose purple, 5, lobes obovate 2.2–2.7 cm long, obtuse, slightly incised, margin ciliate. Stamens 10, free; filaments variable in length, 1–1.4 cm long; anthers yellow, linear-oblong 8–10 mm long, beaked. Ovary c. 5 × 4 mm; style filiform, c. 2 cm long; stigma simple. Capsules sub-globose, 8–10 × 9–10 mm across.

Fl. & Fr.: April–December.

Habitat: Grows in moist and wet places.


2. OSBECKIA L.

29 species in India and 1 species in BNP.


Key to varieties

1a. Calyx tube with hairy scales ..........................................1. O. nepalensis var. nepalensis
1b. Calyx tube glabrous.........................................................2. O. nepalensis var. nutans

1. Osbeckia nepalensis Hook. var. nepalensis.


Shrubs, to 1 m high; stems obscurely quadrangular, appressed hairy, hispid. Leaves simple, opposite, oblong-ovate or elliptic-oblong, 3–8 × 0.7–2.8 cm, acute or obtuse at apex, entire along margins, sub-cordate or round at base; coriaceous, green, shining, appressed hairy; palmately, 5-nerved at base; midvein flattened or impressed above, raised beneath, pubescent; petioles 1–2 mm long. Inflorescences terminal few to many flowered cymes. Flowers bisexual, 2–2.5 cm across; pedicel 3–10 mm long, densely white hairy; bracts lanceolate, c. 10 × 3 mm. Sepals 5-lobed; lobes, ovate-elliptic, 8–10 × 5–6 mm, ciliate, scaly hairy. Corolla, white, 5-lobed, lobes free; lobes broadly obovate, 1.5–2 × 1.5 cm, obtuse ciliate at apex, veins obscure. Stamens 10; filaments almost equal, c. 7 mm long; anthers yellow, oblong c. 7 mm long, beaked. Ovary ellipsoid 5–8 mm long, appressed white hairy; style c. 1.3 cm long; stigma capitate. Capsules ovoid-globose, 8–10 × 6–8 mm long, densely strigose at apex.

Fl. & Fr.: September-November.

Habitat: Grows in mostly degraded land.


Specimen examined: Buxa National Park, East Damanpur range, Checko 2, 55 m, 27th Nov., 2011, Gopal Krishna 50588.


Plate 25b
Plate 25c, d
Undershubs, to 1 m high; stems terete, hispid. Leaves linear-lanceolate, 1.5–4.5 × 0.3–0.9 cm, mucro-acute at apex, entire along margins, rounded or cuneate at base; coriaceous, dull green, turned pale beneath when dry, glabrous except veins; midvein impressed above, raised beneath, hispid; secondary veins palmately 3-nerved, prominent beneath, pubescent; petioles 1–2 mm long, appressed hairy. Inflorescences terminal clusters, 1-4-flowered. Flowers bisexual, 1–3 cm across; pedicels 3–8 mm long, appressed hairy. Sepals 5-lobed; lobes lanceolate, 6–10 × 2–3 mm, acute at apex, ciliate along margins; tube c. 5 mm long, glabrous. Corolla mauve-purple, 5-lobed; lobes obovate, 1.3–1.6 × 1.1–1.2 cm, obtuse at apex, nerves obscure. Stamens 10; filaments c. 7 mm long; anthers falcate, c. 6 mm long, beaked. Ovary globose, 4–5 × 3–4 mm; style glabrous, c. 1.3 cm; stigma capitate. Capsules sub-globose, 4–7 mm long, hairy at apex.

Fl. & Fr.: October-January.

Habitat: Grows on rock surfaces.

Distrib.: INDIA: North East India. WORLD: Bhutan and Nepal.

Specimen examined: West Bengal, Jainti Range, NRVK 5a, 144 m, 6 December 2011, Gopal Krishna 52357.

LYTHRACEAE [219]

Key to genera

1a. Herbs; flowers pink ......................................................... 1. Cuphea

1b. Shrubs or Trees; flowers orange or mauve or purple ................................................. 2

2a. Trees; flowers purple; stamens not exserted ................................................. 2. Lagerostroemia

2b. Shrubs; flower orange; stamens exserted .................................................. 3. Woodfordia

1. CUPHEA P. Browne

3 species in India and 1 species in BNP.


Other synonym: Cuphea balsamona Cham. & Schltdl.

Illustration: Fl. Bras. 13(2): t. 45. 1877 [as Cuphea balsamona Cham. & Schltdl.].

Herbs, 20–30 cm high; stems sub-terete, hispid. Leaves opposite, whorled, simple, ovate-lanceolate, 6–30 × 3–14 mm, acute at apex, entire along margins, cuneate at base, subcoriaceous, appressed hairy above, puberulous beneath; midvein inconspicuous, glabrous; lateral veins 5–6 pairs, inconspicuous both sides, glabrous; petioles 1–2 mm
long, pubescent; stipules linear-lanceolate, c. 1.5 × 0.5 mm. Flowers axillary, solitary or in pairs; pedicels 1-1.5 mm long, pubescent. Sepals green, 6-lobed, lobes free above, tubular below, hairy outside; lobes triangular, c. 0.5 × 1 mm; tube c. 4.5 × 2.5 mm. Petals dark pink or crimson, 6-lobed, free, attached at the base of calyx lobed; lobes oblanceolate, c. 1.5 × 6 mm, obtuse at apex, clawed at base. Stamens 12, borne within calyx tube in two rows, unequal, not exserted. Ovary oblong, c. 3 × 2 mm, glabrous; style c. 0.5 long; stigma capitate. Capsules oblong-obovoid, 3-4 × 2 mm, enclosed by calyx tube, striate, pubescent outside, 4-5 seeded; seeds obovate to orbicular, c. 1.5 × 1-1.5 mm, obtuse at apex, truncate at base, rugose, glabrous, shining, slightly winged.

Fl. & Fr.: August-December.

Distrib.: INDIA: Almost throughout naturalized. WORLD: Native of Brazil.


2. LAGERSTROEMIA L.

10 species in India and 1 species in BNP.


Local name: ”Jarul” (Bengali).

Trees, 15–20 m tall; branchlets terete, pubescent. Leaves opposite, simple, ovate-elliptic or ovate-lanceolate, 4.5–11.5 × 1.8–5 cm, acuminate or acute at apex, undulate along margins, rounded at base, coriaceous, shining above, glabrous; midvein flattened above, raised beneath; lateral veins 7-9 pairs, prominent beneath, puberulous beneath; petioles short or subsessile, swollen at base. Flowers 5–6 cm across; pedicels 1–1.5 cm long, greenish purple, softly tomentose; bracts linear-lanceolate, 5–6 × 1–1.3 cm, acute at apex, sub-coriaceous, tomentose; bracteoles lanceolate, c. 3 × 1 mm, acute at apex, sub-coriaceous, tomentose. Sepals 6-lobed, lobes free above, cupular below; cup c. 1 × 1 cm, tomentose; lobes triangular ovate, 7–8 × 5–6 mm, acute at apex, fleshy, thick, glabrous, tomentose beneath. Petals purple, 6-lobed, free; lobes ovate-orbicular, c. 2 × 2 cm, obtuse at apex, wavy, undulate along margins, attenuate-clawed at base; claw 3–4 mm, chartaceous, nerves distinct, dark purple. Stamens many, adnate to calyx cup; filaments 1–2 cm long, glabrous; anthers c. 1–2 mm long. Ovary globose, c. 4 × 5 mm, glabrous; style tubular, 2–2.3 cm long, stigma discoid. Capsules 1.5–2.2 × 1.2–1.5 cm, many seeded; seeds falcate, c. 1.1 × 0.6 cm, with terminal wing, glabrous.
Plate 25: a. Melastoma malabathricum L.; b. Osbeckia nepalensis Hook. var. nepalensis; c - d. Osbeckia nepalensis Hook. var. nutans (Wall. ex C.B. Clarke) D. Maity; c. Flowering branch; d. Flower (close up); e - f. Lagerstroemia speciosa (L) Pers.; e. Flowers (close up); f. Fruits; g - h. Woodfordia fruticosa (L) Kurz; g. Habit; h. Flowers (close up)
Fl. & Fr.: April–July.

Distrib.: INDIA: Almost throughout.

Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 2nd Dec., 2011, Gopal Krishna 52308; Central Moraghat, 31.05.1975, J.K. Sikdar 430.

Note: The fruits are sold by local people in the market.

3. **WOODFORDIA** Salisb.

1 species in India and BNP.


Illustration: Hook., Par. Lond. t. 42. 1805.

Shrubs, 2–3 m high; branched; stems and branches terete, glabrous. Leaves simple, opposite, lanceolate, 5–9.5 × 1.8–2.1 cm, acute at apex, entire along margins, oblique-subcordate at base, thinly coriaceous, green, black gland dotted above, tomentose beneath; lamina slightly curved; midvein impressed above, raised beneath; lateral veins 14–15 pairs, prominent beneath, glabrescent. Inflorescences axillary paniculate cymes. Flowers bisexual; bracts lanceolate, c. 1 × 0.5 mm, acute at apex; pedicels c. 4 mm long. Sepals greenish orange, 6-lobed above, cupular below; cup c. 2 × 3 cm long; lobes triangular-ovate, c. 1 × 1 mm, margin ciliate, glabrous outside, hairy beneath. Petals orange, 6-lobed, lobed above; tube 5–7 mm long; lobes triangular, c. 2 mm long, glabrous. Stamens 12, exserted; filaments 11–15 mm long, hairy, reddish, adnate to calyx tube; anthers c. 0.5 × 0.25 mm. Ovary c. 8 × 4 mm; style filiform, c. 1.2 cm long; stigma simple. Capsules ellipsoid, c. 8 × 4 mm, many seeded; seeds reddish brown, c. 1.5 mm.

Fl. & Fr.: March–May.

Habitat: This species grows along river side with other shrubby species.

Distrib.: INDIA: Almost throughout. WORLD: Bhutan, China, Indonesia, Laos, Myanmar, Nepal, Pakistan and Thailand.

Specimen examined: Buxa National Park, East Damanpur Range, NRVK 12, 6, 08.03.2011, Gopal Krishna 50508.

**SONNERATIACEAE** [219]

**DUABANGA** Buch.-Ham.

1 species in India and 1 in BNP.


Other synonym: *Duabanga sonneratioides* Buch.-Ham.

**Local name:** “Lampate” (Bengali, Nepali).

**Illustrations:** Hook., Ill. Him. Pl. t. 11. 1855; Griff., Icon. Pl. Asiat. 4: t. 591. 1847-1854.

Trees, 20-30 m tall; branches drooping; branchlets, terete, glabrous. Leaves simple, closely placed, opposite, ovate or oblong-ovate, 8-13.5 × 4-6.5 cm, acute at apex, entire along margins, subcordate to cordate at base, coriaceous, shining above, pale-white beneath, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 8-16 pairs, faintly impressed above, prominent beneath, glabrous; petioles 2-3 mm long, stout, glabrous. Inflorescences in branched cymes usually in the ends of drooping branches, 10-20-flowers. Flower 5-8 cm across, flowersbuds green, ovoid, c. 3 × 4 cm; pedicels 2-3 cm long, stout, glabrous. Sepals green, 5-6, triangular-ovate, 1.6-2 × 1.5-2 cm, acute to obtuse at apex, thick, glabrous. Petals cream-white, 5-6, obovate, 3-4 × 2-2.5 cm, obtuse at apex, clawed at base, chartaceous, glabrous. Stamens many, on the margin of perigynous disk, in two rows, white, spreading much beyond petals; filaments 5-6 cm long, glabrous; anthers oblong, 5-6 mm long, recurved over one end of connective. Disk large, depressed. Ovary 5-8 loculed glabrous; style 6-8 cm long, glabrous; stigma green, capitate, 5-8-lobed. Capsules sub-globose, 4-4.5 cm across, deeply dividing into 6-8 locules, many seeded; seeds minute filiform, 4-6 mm long, 2-tailed.

**Fl. & Fr.:** December-March.

**Distrib.:** INDIA: Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Tripura, Sikkim and West Bengal. WORLD: Cambodia, Laos, Malaysia, Myanmar, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, SRVK 4-5, 10⁰ Feb., 2010, S.K. Srivastava & Gopal Krishna 47012; Buxa to Chunabhati 3000’, 17.05.1949, Narayanswami & party 2645.

**Uses:** Wood is used as timber for tea chest; fruits edible (boiled) and leaves & fruits yield a black dye.

### ONAGRACEAE [220]

**LUDUIGIA L.**

7 species in India and 2 species in BNP.

**Key to species**

1a. Petals 2-3 mm; seeds in lower 3/4 th of capsule, in one row and
embedded in endocarp .................................................... 1. L. hyssopifolia

1b. Petals 5–17 mm; seeds in several rows, not embedded in endocarp ................................................................. 2. L. octovalvis

   **Illustration:** Barua, Rhedea 20: 65, f. 5. 2010.

Herbs, to 23 cm high; branched; stems and branches angled, appressed hairy. Leaves alternate opposite, whorled, simple, ovate-elliptic, 0.6–2.4 × 0.4–0.8 cm, acute at apex, undulate along margins, attenuate at base, sub-coriaceous, glabrous above, appressed hairy beneath; midvein impressed above, faintly raised beneath, appressed hairy; lateral veins 7–10 pairs, inconspicuous above, conspicuous beneath, appressed hairy; petioles 1–4 mm long, hairy. Flowers axillary cymes; pedicels 1–3 mm long. Sepals 4-lobed, lobes free above, tubular below; lobes ovate-lanceolate, c. 4 × 1 mm, hispid outside, glabrous inside. Petals yellow, 4, free, obovate, c. 2 × 1.25 mm, obtuse, glabrous 3–4 nerved. Stamens 8; filaments 1–2 mm long; anthers ovoid, 4-celled. Style subulate, c. 1 mm long; stigma lobed. Capsules c. 10 mm long, puberulent, many seeded; seeds ovoid, 0.1–0.2 × 0.1 mm.

Fl. & Fr.: August–October.

**Distrib.:** INDIA: Throughout. WORLD: Afghanistan, Africa, Japan, New Caledonia, Sri Lanka, Tropical Asia to subtropical China and tropical Australia.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 11th March, 2011, Gopal Krishna 50539.


Other synonyms: Jussiaea octonervis var. sessiliflora Mich.; J. suffruticosa L. Plate 26c

**Illustration:** Rheede, Hortus Malab. 2: t. 50. 1679.

Herbs, 18–27 cm high; branched; stems and branches terete, hispid. Leaves, alternate, whorled, simple, linear-lanceolate, 1.6–4.6 × 0.3–0.7 cm, acute at apex, entire-ciliate along margins, cuneate at base, sub-coriaceous, pale-green, appressed hairy both sides; midvein inconspicuous above, faintly raised beneath; lateral veins 10–12 pairs, inconspicuous above, conspicuous beneath, pubescent; petioles 2–5 mm long, hairy. Inflorescences axillary solitary or in clusters. Flower pedicels 2–3 mm long, hairy. Sepals 4-lobed, free above, tubular below; lobes ovate, c. 6 × 2.5 mm, acute at apex, margins hispid; tube 9–10
mm long, prominently 3 nerved. Petals yellow, 4-lobed, free; lobes obovate, 5-17 × 4-17 mm, reutse at apex, glabrous, nerves faintly visible, more or less clawed at base. Stamens 8; filaments c. 1 mm long, glabrous; anthers ovoid, c. 0.75 mm long. Capsules 1.7-4.5 cm long, terete, hairy outside, many seeded; seeds light brown, oblong-ovate, 0.2-0.3 × 0.2-0.3 mm; fruiting pedicel 5-8 mm long.

Fl. & Fr.: August-February.

Distrib.: INDIA: Almost throughout. WORLD: Australia, Bangladesh, China, Japan, Malaysia, Pacific Islands, SE Africa, Taiwan and Tropical America.


CUCURBITACEAE [167]

Key to genera

1a. Anther cells folded together or sigmoidly curved......................................................... 2

1b. Anther cells straight, or, if curved (Bryonia), not conduplicate
    nor sigmoid ................................................................. 5

2a. Corolla lobes fimbriate at margin................................................................. 3

2b. Corolla lobes entire at margins................................................................. 4

3a. Seeds usually 6, each with 1 abortive seed attached to its side;
    calyx tube 7-10 cm long ......................................................... 2. Hodgsonia

3b. Seeds many; calyx tube less than 7 cm ......................................................... 7. Trichosanthes

4a. Flowers ebracteate; stamens inserted at the mouth
    of the calyx; filaments exserted, recurved; anthers free ......................... 4. Luffa

4b. Flowers with leaf like bract on pedicel; fruit usually muriculate,
    often 3-valved when mature Stamens inserted below the mouth
    of calyx; filaments hardly exserted not recurved; anthers more
    or less coherent ......................................................................... 3. Momordica

3a. Flowers less than 10 mm across ................................................................. 4

3b. Flowers more than 10 mm across ................................................................. 6

4a. Male flowers without pistillode; anther cells conduplicate;
    male and female flowers fasciculate in leaf axil ............................. 1. Diplocyclos

4b. Male flowers with globose or subulate pistillode; anther cells straight,
    curved or conduplicate ........................................................................ 5

5a. Anther cells straight .................................................................................. 5. Mukia

5b. Anther cells incurved or reflexed ................................................................. 6. Solena
1. **DIPLOCYCLOS** (Endl.) T. Post & Kuntze

1 species in India and BNP.


Other synonyms: *Coccinia palmata* M. Roem.; *Diplocyclos palmatus* var. *walkeri* (Chakrav.) Babu.; *Bryonopsis laciniosa* (L.) Naudin var. *walkeri* Chakrav.

Climbers; stems slender, glabrous; tendrils coiled, glabrous. Leaves alternate, broadly ovate, 8–12 × 8–12 cm, membranous, palmately 5-lobed; middle lobe oblong-lanceolate, 8–10 × 2–3.5 cm, acuminate or obtuse at apex; lateral lobes short, lanceolate or oblong-lanceolate, both surfaces subglabrous, sinus rounded; petiole 4–6 cm long, slightly puberulent. Male and female flowers usually fasciculate in same axil. Male flowers: pedicel slender, 5–15 mm long. Sepals tubular, c. 2 × 5–6 mm; lobes subulate, 0.5–1 mm. Petals green-yellow, c. 7 mm across; lobes ovate, c. 2 × 0.5–1 mm. Stamens 3; filaments 1–1.5 mm; anthers ovoid, c. 2 mm; anther cells reflexed. Pistilode absent. Female flowers: Sepals and Petals as in male flowers. Staminodes 3. Ovary smooth. Fruit yellow-green to red, narrowly white striped, globose, indehiscent, 14–18 mm across, smooth, many seeded; seeds brown, ovate, c. 5 × 3 mm.

Fl.: March–August; fr.: September–December.


**Specimen examined:** Buxa National Park, Jainti range, 9th Oct., 2009, S.K. Srivastava & Gopal Krishna 46260.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.

2. **HODGSONIA** Hook.f. & Thomson

2 species in India and 1 species in BNP.


Local name: “Gulu” (Bengali).

Illustration: Hook.f., Ill. Himal. Pl. t. 1, 2, 3. 1855.

Climbing shrubs; stems and branches angled, glabrous. Leaves alternate, suborbicular in outline, 15–17 × 16.5–22 cm, palmately 3–5-lobed; lobes ovate-oblong, 3.5–10.2 × 3.3–6.1
cm, acuminate at apex, entire along margins, truncate at base, cordate at base, leathery, dark green, shining, glabrous; palmately 5-nerved at base, impressed above, raised beneath, glabrous; midvein impressed above, raised beneath; lateral veins 4–6 pairs, prominent beneath; petioles 4–5.6 cm long, robust, striate, glabrous. Male inflorescences racemes; rachis 10–15 cm long, striate, puberulent, stout; bracts triangular ovate, c. 7 × 5 mm, acute, thick, hard, prominent gland dotted, glabrous; pedicels 1–7 cm long, glabrous or puberulent. Sepals tubular below, 5-toothed above; tube 8–10 cm long, minutely brown tomentose, prominent gland dotted outside; lobes triangular-lanceolate, 2–4 mm long. Petals yellow-cream outside, white inside, 5-lobed, lobes free above, connate below; lobes c. 5 cm long, fimbriate at margin, processed unto 10 cm. Female flower solitary; peduncle 3–5 cm long, tomentose; pedicels robust, short. Sepals & Petals as in male flowers. Ovary sub-globose, 2–2.2 cm across; stigma 3-lobed, lobes bifid. Berry reddish brown, compressed globose, 5–10 cm across, shallowly grooved, brown tomentose, many seeded; seeds ellipsoid, 6–7 × 3–4.5 cm.

Fl. & Fr.: June–October; fr.: December–April.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jantti range, Jantti 6a-7, 5th March, 2011, Gopal Krishna 47266; 21st mile road from Rajabhatkhawa, 13.05.1949, Narayanswami & party 2325.

Note: This species was wrongly treated under Hodgsonia macrocarpa (Blume) Cogn. in some floras.

3. LUFFA Mill.

7 species in India and 1 species in BNP.


Other synonyms: Luffa aegyptiaca Mill.; Luffa sylvestris Miq.

Illustration: M. Blanco, Fl. Filip. t. 334. 1875.

Climbing herbs; stems angled, sparsely pubescent; tendril 3-fid, leaf opposed. Leaves alternate, simple, palmately 5-lobed, c. 13 × 14 cm, deeply cordate at base, coriaceous, green, glabrous above, scabrous beneath, 5–7-nerved at base, inconspicuous above, prominent beneath; lobes triangular-ovate to oblong-ovate, 3–7 × 3.4–5 cm, acute at apex,
denticulate or entire along margins; petioles angled, 3–4 cm long, scabrous. Male and Female flowers in same axil. Male flowers: peduncle 8–13 cm long, puberulent; pedicel filiform, 5–15 mm long, hispid. Sepals 5-lobed above, tubular below; lobes oblong-ovate, 2–3 × 1–1.5 mm, rounded at apex; tubes short. Petals yellow, rotate, 5–9 cm across, campanulate; lobes oblong, 2–4 × 2–2.8 cm, inside densely yellow-white villous, base attenuate, apex rounded-obtuse. Stamens 3 or 5, c. 7 mm long, connate at base, free above. Female Flowers: peduncles 2–10 cm. Sepals and petals as in male flowers. Staminodes 3–5. Ovary narrowly cylindric, puberulent; stigmas expanded. Berries ellipsoid, cylindrical, 15–30 × 6–10 cm, smooth, with 10 dark green longitudinal lines, fibrous, many seeded; seeds ellipsoid, 12 × 7 × 2 mm, black, margin winged.

Fl. & Fr.: September–December.

Distrib.: INDIA: Native and cultivated throughout India. WORLD: Egypt and Sudan; cultivated widely.


4. MOMORDICA L.

7 species in India and 1 species in BNP.


Other synonyms: Momordica charantia L. var. muricata (Willd.) Chakrav.; Momordica muricata Willd.


Climbing herbs; stems and branches ribbed, pubescent; tendrils axillary, simple, c. 10 cm long, coiled, puberulent. Leaves alternate, simple, ovate or suborbicular, 1.5–6 × 1.5–6 cm, cordate at base, pedately 5–7-lobed, chartaceous, white pubescent at first, later glabrescent, green, pubescent, palmately 5–7-nerved at base; Petiole slender, 4–6 cm, lobes ovate-oblong, 8–36 × 5–20 mm, obtuse or acute at apex, crenate or irregularly lobed along margins, chartaceous, green, pubescent both sides; midvein prominent beneath, pubescent; lateral nerves 3–4 pairs, inconspicuous, pubescent; sinus semicircular membranous, puberulent on veins; petioles 0.8–3 cm long, striate, pubescent. Plants monoecious. Male flower solitary in axils of leaves; pedicels slender, 1–4.5 cm long, puberulent, with median bract; bracts suborbicular, 5 × 5 mm, entire, both surfaces puberulent. Sepals lobes ovate-lanceolate, 4–6 × 2–3 mm, white pubescent, acute apex. Petals yellow; lobes oblong, c. 15 × 4 mm, obtuse at apex, pubescent. Stamens 3; anthers
free. Female flower solitary, bracteate; pedicel 4–6 cm long, with a bract at base. Ovary 7 mm long, densely verrucose; stigmas 2-lobed. Fruits ellipsoid, 8–10 cm, tuberculate, many seeded; seeds oblong, sub-compressed, c. 12 × 6 × 3 mm, sculptured, embedded in red pulp.

Fl. & Fr.: May–October.

Distrib.: INDIA: Chhattisgarh, Jharkhand, Eastern and Western Ghats, and all over Central and South India. WORLD: Native in tropical and subtropical Africa, naturalized in parts of tropical Asia.

Specimens examined: Buxa National Park, Rajabhatkhawa range, 12th March, 2011, Gopal Krishna 50543; Santrabari, 5th Oct., 2009, S.K. Srivastava & Gopal Krishna 46151; Rajabhatkhawa, 21 mile road, 13.05.1949, Narayanswami & party 2344; Rajabhatkhawa Depot Road, 14.05.1949, Narayanswami & party 2386.

5. MUKIA Arn.

1 species in India and BNP.


Other synonyms: Bryonia scabrella L.f.; Mukia scabrella (L.f.) Arn.; Melothria mederaspatana (L.) Congn.

Plate 26g

Illustration: Wight, R., Icon. Pl. Ind. Orient.2(1): t. 501. 1846 [as Bryonia scabrella L.f.].

Scandent herbs; stems and branches sulcate, densely hispid; tendril simple coiled, robust. Leaves simple, alternate, broadly ovate, 3.5–7 × 3.5–7 cm, obtuse or acuminate at apex, toothed along margins, cordate at base, subcoriaceous, green, scabrous both sides; midvein impressed above, raised beneath, hispid; secondary nerve not distinct. Male flowers fascicled; pedicels short or absent. Sepals tubular below, 5-toothed above; tube campanulate, c. 2 × 1.5 mm; teeth reflexed, subulate, 1–1.5 × 1 mm. Petals yellow 5-lobed, lobes free above, campanulate below; lobes ovate-oblong, c. 2 × 0.5 mm, obtuse at apex. Stamens 3; filaments short, c. 0.5 mm long, slightly pilose; anthers oblong, c. 1 mm, ciliate. Ovary rudimentary globose. Female flower solitary or 3–5-fasciculate. Sepals and Petals as in male flowers. Ovary hispid. Fruits globose, c. 1 cm across, red and glossy at maturity, hispid, many seeded; seeds ovoid, 4–2.5 × 1 mm, surface roughed.

Fl.: April–August; fr.: August–December.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Rajasthan, Tamil Nadu,
Tripura and West Bengal. **WORLD:** Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.


### 6. SOLENA Lour.

3 species in India and 1 species in BNP.

**Solena heterophylla** Lour., *Fl. Cochinch.* 2: 514. 1790.

Other synonyms: *Melothria heterophylla* (Lour.) Cogn.; *Bryonia rheedei* Blume; *Bryonia sagittata* Blume; *Melothria ovata* Cogn. **Plate 26h**

**Illustration:** *Pflanzenr.*, 275: p. 122, f. 28. 1916 [as *Melothria heterophylla* (Lour.) Cogn.].

Perennial herbs; stems angled, pilose; tenderils leaf opposed, simple, coiled, glabrous. Leaves alternate, simple, ovate, sub-orbicular, narrowly lanceolate, sagittate, 8–15.5 × 3.1–8 cm, deeply cordate at base, remotely denticulate along margin, acute at apex, coriaceous, green, pale when dry, scabrid above, glabrous; palmately 5–7 nerved, prominent beneath, echinate above, glabrous beneath; petiole angled, 1–1.5 cm long, hispid. Male flowers axillary, fascicles; pedicel 7–10 mm long, angled, hairy; sepals 5 lobed; lobes subulate, c. 0.6 mm long; tube campanulate, c. 5 × 3 mm, glabrous. Petals 5-lobed; lobes 0.5–0.7 mm long; tube c. 1.5 mm long; stamens 3; filaments flattened, 2.5–3 mm long; anthers sub-orbicular. Female flower solitary, axillary, with few male flowers. Fruits oblong, 4–4.5 × 2–2.5 cm, brown, many seeded; seeds thick, grey, 5–7 × 4–5 mm. **Fl. & Fr.:** March-September.

**Habitat:** Grows along riversides in mixed scrubs.

**Distrib.:** INDIA: Widely distributed all over India. **WORLD:** Indonesia, NE Afghanistan, (Java), Peninsular Malaysia, Myanmar, Nepal, Thailand, Vietnam.


**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.
Plate 26: a - b. Duabanga grandiflora (Roxb. ex DC.) Walp.: a. Flowering branches; b. Flower; c. Ludwigia octovalvis (Jacq.) P.H. Raven; d - e. Hodgsonia heteroclitica (Roxb.) Hook.f. & Thomson: d. Flowering branch; e. Fruit; f. Momordica charantia L.; g. Mukia maderaspatana (L.) M. Roem. (fruits); h. Solena heterophylla Lour.; inset: flowers
7. TRICHOSANTHES L.
22 species in India and 2 species in BNP.

Key to species

1a. Male flower solitary or 2; anthers free................................. 1. T. dioica
1b. Male flowers in racemes; anthers connate............................ 2. T. ovigera

1. Trichosanthes dioica Roxb., Fl. Ind. 3: 701. 1832.
Other synonym: Trichosanthes dioica Roxb. var. sagittifolia Chakrav.

Climbing herbs; stems terete, striate. Leaves simple, ovate-oblong in outline, 3.7-14 × 2.5-10.6 cm, acute to acuminate at apex, cordate at base, distantly toothed or denticulate, coarsely tuberculate on both surfaces; tendrils 2-4-fid. Male flower solitary or 2; peduncles 2-3 cm long. Calyx tube 3-4 cm, lobes subulate, 4-5 mm long. Petals lobes oblong, c. 1.5 cm including fimbriate margins; anthers oblong, 3.5 × 1.5 mm, free. Female Flowers: peduncles 2-4 mm long. Sepals and petals as in male flowers. Ovary oblong, villose. Fruit orange-yellow, 5-12 × 2-6 cm, many seeded; seeds sub-globose, 6-7 × 5-4 mm.

Fl. & Fr.: September-November.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Punjab, Rajasthan, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka.


Other synonym: Trichosanthes ovigera Blume var. sikkimensis Kundu.

Herbs; stems terete, striate, glabrous. Leaves simple, alternate, suborbicular in outline, 3.5-12 × 2.8-9 cm, deeply palmately 3-lobed; lobes lanceolate or triangular ovate, 2-7 × 1-3.8 cm, acuminate at apex, margin denticulate, cordate at base, subchartaceous, scabrous both surfaces; 5-7-nerved at base, prominent beneath; petioles 2.5-6 cm long; tendrils bifid. Male peduncles 2-5 cm long, puberulent, 10-flowered near apex; pedicels c. 10 mm long; bracts linear-acuminate, 5-10 mm, long, pubescent. Sepals campanulate, lobes free above, narrowly tubular below; tube c. 3 cm long; lobes subulate, 3-5 mm long. Petals c. 8 mm across, in bud tube c. 4 mm long, 5-lobed; lobes oblong, fimbriate at apex. Stamens 3, inserted on calyx tube; anthers connate, conduplicate, c. 3 × 1.5 mm. Female flowers:
Sepals and Petals as in male flowers. Staminodes absent. Ovary ellipsoid. Fruit ellipsoid, 8–10 × 2.5–3 cm, many seeded; seeds brownish, 6–7 × 7 × 5 mm, turgid.

Fl. & Fr.: August-May

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura, Uttar Pradesh and West Bengal. WORLD: Australia, Bangladesh, China, Japan, Java, Myanmar and Nepal.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

BEGONIACEAE [170]

BEGONIA L.

55 species in India and 4 species in BNP.

Key to species

1a. Leaves symmetric, not clearly peltate .......................................................... 3. B. ovatifolia
1b. Leaves asymmetric, clearly peltate ................................................................. 2

2a. Capsule turbinate blotched pink, not winged .............................................. 4. B. roxburghii
2b. Capsules not turbinate, distinctly winged .................................................. 3

3a. Stipules deciduous; flowers white; tepals 2 (male) and 2 or 3 (female) .................................................................................................. 2. B. nepalensis
3b. Stipules persistent; flowers pink; tepals 4 (male) and 5 (female) ............. 1. B. hatacoa


Illustration: Curtis’s, Bot. Mag. 79: t. 4689.1853 [as Begonia rubrovenia Hook.].

Herbs, 10-35 cm high; stems terete, pubescent, branching twice or more. Leaves cauline, asymmetric, ovate-lanceolate to elliptic-lanceolate, 9-11.5 × 5.5-8.5 cm, acuminate to caudate at apex, remotely serrulate along margins, oblique, rounded or slightly cordate at base, subchartaceous, brown pubescent above, glabrous or subglabrous beneath; midvein flattened above, faintly raised beneath; lateral veins palmate 5-7-nerved at base; 3-5 pairs above, prominent beneath, pubescent; petioles 6-10.5 cm long, terete, densely brown hirsute; stipules narrowly ovate, 12-15 × 6 mm, acuminate at apex, membranous, persistent. Inflorescences terminal or axillary cymes, glabrous; peduncles 4.5-7 cm long; bracts narrowly elliptic to lanceolate, 5-8 × 1.5-3.5 mm, acuminate apex, membranous,
brown hirsute when young. Male flowers: pedicels 5–10 mm long. Tepals 4, in 2 whorl, outer 2 triangular-ovate, c. 10 × 7 mm, glabrous; inner pink or white, 2 oblong, c. 6 × 4 mm. Stamens many; filaments free, c. 1.5 mm; anthers reniform, c. 0.8 mm. Female flowers: Tepals 5, unequal, largest broadly ovate, c. 7 × 4 mm, glabrous, smallest oblong or lanceolate, 6–7 × 1.5–2 mm. Ovary bilamellate, glabrous; styles 2, fused at base; stigmas 2-cleft, spiraled. Capsules oblong, c. 18 × 10 mm including wings, unequally 3-winged; wing broadly falcate, 1.5–2 cm × 6–9 mm, apex rounded; lateral wings smaller, c. 4 mm.

Fl. & Fr.: August-October.

Distrib.: INDIA: Arunachal Pradesh, Manipur, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, China and Nepal.


Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Rhizomatous herbs, to 75–100 cm high; stems succulent, usually unbranched, terete, glabrous, ziz-zag. Leaves simple, ovate to oblanceolate, 5.5–29 × 1.5–13.5 cm, caudate-acuminate at apex, shallowly toothed along margins, obliquely cordate base, chartaceous, smooth above, more or less punctate beneath, pubescent on veins beneath, otherwise glabrous; midvein flattened above, faintly raised beneath, pubescent; lateral veins palmately 7–9-nerved at base, prominent beneath; petioles up to 5 cm long, terete, glabrous; stipules lanceolate, deciduous. Inflorescences terminal cymes; peduncles repeatedly 2–3 times branched. Male flower: Tepals 2, white, ovate, c. 1 × 1 cm, acute, chartaceous, glabrous, nerves conspicuous. Stamens many, free or monadelphous forming a globose mass, c. 4 mm across; filaments 1–2 mm long, subulate; anthers yellow, clavate, 1–1.2 mm long. Female flowers: Tepals 2 or sometimes 3, ovate, c. 1 × 1 cm, acute, chartaceous, glabrous, nerves conspicuous. Ovary ellipsoid, 1–1.5 cm long; style 2, 0.5–0.7 mm long, glabrous; stigma green, turgid, spirally twisted-tortuous, setose. Capsules ellipsoid, 1.2–1.5 × 0.5 cm, becoming inverted, with a large triangular wing, c. 1.5 cm, somewhat ascending, rounded or acute distally, and 2 smaller wings, 1–1.5 cm.

Fl. & Fr.: October-December.

Distrib.: INDIA: Sikkim and West Bengal. WORLD: Bhutan and Nepal.
**Specimen examined:** Buxa National Park, Jainti range, NRVK 5a, 6th Dec., 2011, Gopal Krishna 52350.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Herbs, to 10-20 cm high; stems terete, glabrous. Leaves cauline, orbicular or broadly ovate, 4-10 × 4.4-8.5 cm, acute or acuminate at apex, crenate-dentate along margins, cordate at base, chartaceous, glabrous; palmately 5-7-nerved at base, prominent beneath; petioles 4-11.5 cm long, terete; stipules deciduous. Male flowers: pedicels c. 10 mm long glabrous; bracts ovate, c. 0.8 × 0.6 mm, acute at apex, chartaceous, glabrous. Tepals pink to white, 4, in 2 whorls, glabrous; outer 2, obovate, c. 5 × 3 mm, obtuse at apex, chartaceous; inner 2, oblong, c. 2.5 × 1.5 mm, obtuse at apex. Stamens c. 20, monadelphous in a short tube; tube 0.1-0.2 mm long; anthers obovoid, c. 1 × 0.6 mm. Female flowers: Tepals 5; outer elliptic; inner oblong, largest one broadly ovate, c. 4 × 5 mm, acute at apex, chartaceous. Ovary oblong, c. 6 × 4 mm; styles 2, fused at base, c. 2 mm long; stigmas lunate. Capsules oblong, 8-12 mm long, 3-winged; largest wing narrowly ovate, c. 11-18 × 6-10 mm, acute.

**Fl. & Fr.:** August-October.

**Distrib.:** INDIA: Meghalaya, Sikkim and West Bengal. WORLD: Bhutan.

**Specimen examined:** Buxa National Park, Jainti range, Tashigaon 1, 5th Oct., 2009, S.K. Srivastava & Gopal Krishna 46171.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Other synonym: **Begonia malabarica** Roxb.

**Illustration:** Rheede, Hortus Malab. 9: t. 86.1689.
prominent beneath; petioles 3–20 cm long; stipules oblong-lanceolate, c. 1 cm long, acuminate at apex. Inflorescences short axillary cymes; bracts ovate-lanceolate, c. 1 cm long. Male flowers: Tepals light pink to white, 4, in opposite decussate. Stamens many; filaments short, 2–2.3 mm long; anthers clavate, 4.3–4.5 mm long. Female flowers: Tepals light pink to white, 4, as in male flowers but larger than male flowers; outer 2, broadly ovate, 2.5–3.2 × 1.8–2 cm; inner 2, obovate or oblong, 1.8–2 × 0.7–1 cm. Ovary obovoid, 4-locular, c. 1 cm across, subglabrous; styles 4, bifid from the base; stigma spiral with 3 turns, yellow. Capsules pedant, 4-angular, 1.2–1.5 cm across, succulent, red spotted with greenish yellow base, each angle distinctly ribbed but without wings; fruiting pedicels 10–17 mm long.

Fl. & Fr.: April–November.

Distrib.: INDIA: Assam, Maharashtra, Manipur and West Bengal. WORLD: Bangladesh, Bhutan, Myanmar and Nepal.

Specimen examined: Buxa National Park, East Damanpur range, SRVK 12, 29th Nov., 2011, Gopal Krishna 47172.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

DATISCACEAE [169]

TETRAMELES R. Br.

2 species in India and 1 in BNP.


Local name: “Maina-kathi” (Bengali).


Deciduous, dioecious trees, to 50 m tall; root buttress; bark white, shining. Leaves broadly ovate-orbicular, 6–15 × 5–14 cm, acute at apex, serrate along margins, cordate at base, incision c. 1 cm, subcoriaceous, pubescent; midvein impressed above, faintly raised beneath; secondary veins palmately 5–7-nerved at base, tomentose; petiole 3.5–6 cm long, tomentose. Male inflorescences terminal, lax panicles, c. 15 cm long; rachis pubescent. Male flowers c. 1.5 × 2 mm; pedicel c. 1 mm long; bracts spathulate, c. 1 mm. Sepals 5 lobed above, connate below; lobes unequal, triangular ovate, 1–1.5 × 1–1.5 mm, acute at apex, entire along margins, 3-nerved. Petals absent. Disk conspicuous. Stamens 5; filaments c. 1 mm long; anthers sub-globose, tetrathecous. Female inflorescences pendulous; rachis
c. 20 cm long. Female flowers: Sepals and petals as in male flowers. Staminode absent. Ovary 1-celled; style c. 0.5 mm long, exserted; stigma obliquely club-shaped, c. 0.75 cm long. Capsules obovoid, 5-6 × 4-4.5 mm, ribbed; seeds c. 1 mm long.

Fl.: March–April; Fr.: May–June.

**Distrib.:** INDIA: Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal. WORLD: Australia, Bangladesh, Bhutan, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Sri Lanka, Thailand and Vietnam.

**Specimens examined:** Buxa National Park, East Damanpur range, SRVK 11-12, 6th April, 2012, Gopal Krishna 56044.

**Notes:** The flowers of this species are very similar to *Biscofia javanica* (Euphorbiaceae); however, in *Tetrameles nudiflora*, bark is white and smooth and flowers appear when trees turn deciduous.

**APIACEAE [413]**

**Key to genera**

1a. Leaves compound ebracteate; calyx teeth prominent, lanceolate; stylodium conic .................................................. 3. *Oenanthe*

1b. Leaves simple; bracteate; calyx obsolete; stylodium obsolete ..................................... 2

2a. Leaves and bracts not spinous-toothed; flowers in distinct umbels .......... 1. *Centella*

2b. Leaves and bracts spinous-toothed; flowers in compact heads .......... 2. *Eryngium*

1. **CENTELLA** L. (*nom. cons.*)

1 species in India and BNP.


**Local names:** “*Thankuni*”, “*Tholkuri*” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 565. 1840-43 [as *Hydrocotyle asiatica*].

Prostrate herbs; stems slender, terete, filiform, puberulous when young, rooting at nodes. Leaves rosette, orbicular to cordate, 1–2.5 × 1.5–5 cm, obtuse at apex, entire or crenate-repand along margins, cordate at base, unlobed or shallowly lobed, chartaceous, glabrous; 3–7-nerved; petioles 1–12 cm long, sparingly pubescent. Inflorescences umbel or 2–6 in the axil of bracts, each having 2–4 flowers; peduncle 3–5 mm long, villous; bracts oblong-ovate, 1.5–2 × 1.1 mm, acute at apex, membranous, puberulous outside, glabrous.
Fl. & Fr.: Almost around the year.

Distrib.: INDIA: Almost throughout. WORLD: Bhutan, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand and Vietnam.

Specimen examined: Buxa National Park, Gadadhar range, 01st April, 2012, Gopal Krishna 52036.

Uses: It is used in the treatment of leprosy, skin diseases and improves the power of concentration, memory and general ability.

2. ERYNGIUM L.

4 species in India and 1 species in BNP.


Local name: “Jangli-dhane” (Bengali).

Illustration: Fl. Bras. 11(1): t. 79, f. II. 1879.

Aromatic herbs; to 12-55 cm high; stems dichotomously branched above, terete, puberulous, grooved. Basal leaves almost all in rosette, oblanceolate or spatulate, 5-28 × 1-3 cm long, obtuse to acute, crenate to finely spinulose-serrate along margins, cuneate to decurrent, sheathing at base, glabrous petiolate, cuneate; upper leaves sessile, opposite, deeply spinose-serrate. Inflorescences capitate or spiciform, heads in dichasia; involucral bracts, foliaceous, 5-9, linear-lanceolate or elliptic, 1-3.5 × 0.2-0.8 cm, longer than the heads, spreading and reflexed with 2-3 spiny teeth, glabrous or puberulous, entire along margins, prominently 3-nerved at base. Flowers sessile, greenish. Sepals 5-lobed, free; lobes ovate-lanceolate, 0.5-1 mm, acute, equal, persistent. Petals greenish-white, erect, clawed, oblanceolate to obovate. Style filiform; stigma capitate. Fruits globose or ovoid, 1-1.6 mm across, dorsally subcompressed, warty with indistinct ribs.

Fl. & Fr.: March–December.
**Distrib.:** INDIA: Arunachal Pradesh, Assam, Kerala, Manipur, Nagaland, Odisha, Tripura, Uttar Pradesh and West Bengal. **WORLD:** Native to Central America; now a widespread weed in tropical and subtropical regions.


**Use:** Used as a substitute of Coriander.

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### 3. OENANTHE L.

4 species in India and 1 species in BNP.


Other synonyms: *Oenanthe stolonifera* (Roxb.) DC.; *Phellandrium stoloniferum* Roxb.

**Local name:** “Pan-turasi” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 571. 1840-43 [as *Phellandrium stoloniferum*].

Stoloniferous herbs, to 60–120 cm; stems often rooting at lower nodes. Leaves up to 30 cm long, bi-pinnate; lobes ovate, 2-5 × 0.75-2.5 cm, acute at apex, serrate along margins, cuneate at base, chartaceous, glabrous; midvein faintly raised beneath, obscure above; lateral veins cladodromous; petiolules up to 5 mm long. Inflorescences umbels, 5-8 cm across; peduncles 3.5-14 cm long; bracteoles narrowly ovate, c. 1 × 4 m, acute, chartaceous. Sepals 4-lobed, free above, connate below; lobes subulate, c. 0.5-1.5 mm long, acute. Petals white or greenish-yellow, obovate, c. 1.2 × 0.6 mm, emarginated at apex, glabrous. Stylopodium conic; styles patent, 1.2-2 mm. Fruits ellipsoid or ovoid, c. 2 × 1 mm; dorsal and intermediate ribs corky-thickened.

**Fl.:** June-July; **fr.:** August-September.

**Distrib.:** INDIA: Assam, Jammu & Kashmir, Manipur, Punjab and West Bengal. **WORLD:** Bhutan, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Russia, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 29.04.1961, *G. Panigrathi* 24057.
ALANGIACEAE [320]

ALANGIUM Lam. (nom. cons.)

3 species in India and 1 species in BNP.


Other synonym: Marlea begoniifolia Roxb.

Illustration: Edward’s, Bot. Reg. 24: t. 61. 1838.

Shrubs, to 3–4 m high; branches terete, spreading often zigzag, appressed hairy. Bark silvery grey. Leaves simple, alternate, distichous, ovate to sub orbicular, 9.6–13.1 × 6–7.7 cm, acuminate to caudate at apex, entire-undulate along margins, obliquely cuneate at base, subcoriaceous, pubescent both sides including nerves; midvein faintly raised above, prominent beneath, pubescent; lateral veins palmately 5–7 nerved at base, 3–4 pairs above, prominent beneath, pubescent; petioles grooved, 1.5–2.4 cm long, pubescent.

Inflorescences axillary cymes; peduncles 1–2 cm long, pubescent. Flower pedicels 2–4 cm long; bracts linear, c. 5 mm long, pubescent. Sepals green, 4–10 toothed above, tubular below; tube c. 2 mm long; teeth triangular, minute, pubescent. Petals white 6–8-lobed, free, appressed hairy throughout outside, glabrous inside; lobes linear, 5–10 mm long. Stamens as many as petals; filaments short, bearded below anther; anthers linear, almost equal to petals. Ovary 1–1.5 mm across, glabrous; style c. 6 mm long, hairy; stigma discoid glabrous. Drupes ovoid, 1–1.4 × 0.5–0.6 cm, obscurely ribbed, black.

Fl. & Fr.: March–September.

Distrib.: INDIA: Arunachal Pradesh, Assam, Nagaland, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, East Africa, South East Asia and Nepal.


GAMOPETALAE

CAPRIFOLIACEAE [406]

VIBURNUM L.

17 species in India and 1 species in BNP.

Viburnum colebrookeanum Wall. ex DC., Prodr. 4: 325. 1830; C.B. Clarke in Hook.f., Fl. Brit. India 3: 5. 1880.

Fig. 11; Plate 28d, e

Shrubs, 3–4 m high; branches subterete, young shoots stellate pubescent, glabrescent on
Fig. 11. *Viburnum colebrookeanum* Wall. ex DC.: a. Flowering branch; b. Flower (opened); c. Stamen; d. A fruit
maturity. Leaves opposite, ovate to oblong-ovate, 7–19 × 2.5–8.5 cm, acute to shortly acuminate at apex, prominently serrate along margins, rounded to cuneate at base, coriaceous, glabrous except on midvein; midvein impressed above, raised beneath; lateral veins 10–12 pairs, prominent beneath, glabrescent; petioles 0.5–1.5 cm long. Inflorescences axillary, umbelliform corymb; peduncles c. 3 cm long, stellate hairy; bracts linear, c. 3 mm long, stellate pubescent. Calyx campanulate, 5-lobed above; tube c. 1.5 mm long, glabrous; lobes ovate, c. 5 mm long, acute at apex. Corolla cream-white, 5-lobed; lobes ovate to oblong-ovate, c. 2 × 1 mm, acute at apex, spreading, glabrous. Stamens 5, alternating with petals; filaments filiform, c. 2.5 mm long, adnate to base of petals; anthers c. 5 mm long, dorsifixed. Ovary inferior, enclosed in calyx tube, 1-3-loculed; style short, c. 0.5 mm long; stigma capitate. Drupes oblong-ellipsoid, 4–5.5 × 2–3 mm, purplish-black, 1-seeded.

Fl. & Fr.: January–April.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Tripura, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Myanmar and Nepal.


Rubiaceae [350]

Key to genera

1a. Ovules solitary in each locule ................................................................. 2
1b. Ovules more than one in each locule .................................................. 7

2a. Inflorescences in solitary flowers, usually when plants turn deciduous; corolla lobes twisted ................................................................. 4. Coffea

2b. Inflorescences heads/cymes, usually when plants are with leaves (excl. Meyna); corolla lobes valvate ............................................................. 3

3a. Flowers in heads ............................................................................ 9. Morinda
3b. Flowers not in heads .................................................................... 4

4a. Herbs; stipules connate with petioles and with bristles; cymes capitate, sessile; fruits dehiscent capsules ......................... 14. Spermacoce

4b. Erect or climbing shrubs or trees; stipules various; cymes pedunculate and branched (axes obvious); fruits drupes/pyrenes/baccate ............................... 5

5a. Climbers; calyx turbinate, 4–5 toothed; style papilose;
fruit flattened or hemispheric pyrenes ............................................................ 12. Paederia

5b. Erect shrubs; style not pappilose; calyx not as above; fruits drupaceous ............... 6

6a. Deciduous armed shrubs; calyx obconic or turbinate, irregularly
toothed; style stout; stigma large; ovule pendulous ................................. 8. Meyna

6b. Evergreen unarmed shrubs; calyx tube short, limb deciduous;
style slender; stigma divided; ovules erect ............................................. 13. Psychotria

7a. Stems and branches with recurved hooks; flowers in globular
head; corolla salver-shaped; stigma simple, exserted ............... 15. Uncaria

7b. Stems and branches without recurved hooks; flower solitary or
in fascicles or in axillary or terminal cymes, racemes or in panicles .............. 8

8a. Trees; inflorescences racemiform or spiciform, pendulous; flowers
with foliar bracts; fruits loculicidal capsules, turn upwards;
seeds winged ............................................................................................... 6. Hymenodictyon

8b. Herbs or shrubs; flower solitary or fascicled, in axillary or
terminal cymes; seeds not winged .................................................. 9

9a. Calyx teeth persistent; capsular fruits tardily dehisce;
seeds usually angular ..................................................................................... 10

9b. Calyx-teeth deciduous; capsule loculicidally dehiscent above
calyx, very rarely indehiscent ........................................................................ 11

10a. Inflorescences in leafless axillary cymes; hypanthium hirsute; calyx
lobes often recurved at tips, at least in fruit; fruits without beaks .......... 5. Hedyotis

10b. Inflorescences leafy, cymose, sometimes fascicled, hypanthium
glabrous; calyx lobes not recurved at tips; fruits with beak ........ 11. Oldenlandia

11a. One of the calyx lobes enlarged; corolla orange, valvate .............. 10. Mussaenda

11b. Calyx lobes similar; corolla white or creamish, imbricated
or contorted ............................................................................................................................. 12

12a. Scandent shrubs; inflorescences on main branches; seeds few;
styly arms two .................................................................................................................... 7. Hyptianthera

12b. Erect shrubs/trees; inflorescences on short branches;
seeds many; stigma fusiform ..................................................................................... 13

13a. Flowers unisexual, dioecious or polygamo-monoecious; ovary 1-celled;
placentas 2-6, parietal .......................................................... 3. Ceriscoides

13b. Flowers bisexual, ovary 2-celled; placentas 2, attached to the
septum of the ovary ........................................................................................... 14

14a. Stipules caducous; calyx smaller, 0.5 to 4 mm;
corolla tube 17-25 mm .......................................................................................... 1. Benkara

14b. Stipules deciduous; calyx bigger, 5-8 mm; corolla tube
less than 7 mm ........................................................................................... 2. Catunaregam
1. **BENKARA** Adans.

   2 species in India and 1 species in BNP.


Other synonyms: *Randia fasciculata* (Roxb.) DC.; *Fagerlindia fasciculata* (Roxb.) Triveng.


**Plate 28 f**

Shrubs, 1–2 m high; branches spreading, subterete, pubescent; bark brownish-black; branches bear straight, hard, supra-axillary spines, without nodal scars; spines 5–10 mm long. Leaves elliptic-lanceolate or ovate-oblong, 2.2–7 × 1.2–2.9 cm, acuminate to caudate at apex, entire along margins, rounded or cuneate at base, vertically inclined, chartaceous, densely pubescent when young, glabrous at maturity; midvein faintly raised both sides; lateral veins 4–5 pairs, prominent beneath; petioles 2–8 mm long, pubescent; stipules interpetiolar or shortly united around stem, caducous, 1.5–5 mm long. Inflorescences in axillary cymes, 3–5-flowered or solitary sometime; peduncles 2–10 mm long, pubescent. Flowers fragrant, subsessile; bracts ovate, c. 3 mm long, hairy. Calyx green, 5-toothed above, tubular below; tube 2–4 mm long; teeth linear, c. 2 mm long, apically free, caudate, pubescent. Corolla white, salver-shaped, 5-lobed above, convolute in bud; tube slender 1.2–1.5 cm long, glabrous outside, hairy inside at throat; lobes patent to reflexed, linear-lanceolate, 4–7 × 2.5–3.5 mm, acute at apex. Stamens 5; filaments short; anthers linear-oblong, 5–7 mm long, spreading on petals, mucronate at tip. Ovary oblong c. 7 mm long; stigma large, fusiform, exserted. Berries dark blue-purple, globose, c. 0.7 cm across, with articulated stalk; stalk c. 0.5 cm long, glabrous.

**Fl. & Fr.**: November-May.

**Distrib.**: INDIA: Assam, Meghalaya and West Bengal. WORLD: Bhutan, Myanmar and Nepal.


2. **CATUNAREGAM** Wolf

   2 species in India and 1 species in BNP.


Other synonyms: *Gardenia longispina* (Link) Sweet; *Randia longispina* (Link) DC.; *Randia
Plate 28: a. Tetrameles nudiflora R. Br.; b. Eryngium foetidum L.; c. Alangium chinense (Lour.) Harms; d - e. Viburnum colebrookeanum Wall. ex DC.; d. Flowering branch; e. Fruiting branch; f. Benkara fasciculata (Roxb.) Ridsdale; inset: Flower; g. Catunaregam longispina (Link) Tirveng; inset: fruit (close up)
Local names: "Menaphal"; "Madan" (Bengali).


Trees, to 3–4 m high; stems covered with grey-yellowish bark; spines 0.6–6.5 cm long, straight. Leaves often clustered and apparently fasciculate on short lateral shoots, elliptic-ovate or obovate, 7–11 × 2.5–4 cm, acuminate at apex, entire along margin, acute to cuneate at base; midvein prominent beneath; secondary veins 8–10 pairs, glabrous. Inflorescences terminal on short shoots or these sometimes reduced giving an appearance of axillary position, 1-flowered, or cymose to fasciculate and 2–6-flowered, sessile to pedunculate; bracts triangular, c. 2 mm long, caducous. Flower c. 1.3 × 0.8 cm, pedicellate; pedicels 4–12 mm long. Calyx tube dilated, 3–5 mm, pubescent outside and on upper portion toward inner side; lobes narrowly oblong to broadly spathulate, 5–9 × 1.5–5.5 mm, erect, acute or acuminate, strigillose, often alternating with denticles. Corolla white-yellow, narrowly campanulate, 5-lobed above; tube c. 5.5 mm, tomentose outside; lobes obovate, 7–9 × 5–7.5 mm, patent, obtuse, apiculate, tomentose outside and inside towards margins. Stamens 5; filaments included; anthers c. 3.2 mm, attached just above base to rim of corolla tube, exserted. Fruits baccate, globose to sub-globose, 2.8–4 × 2.2–3 cm, yellow, calyx very rarely persistent; seeds many, reddish-brown, c. 5 × 3 mm, embedded in pulp.

Fl & Fr.: April-August.


Specimen examined: Buxa National Park, Rajabhatkhawa range, 5th April, 2012, Gopal Krishna 56028.

Notes: The taste of fruits is sour and edible to wild animal like monkeys.

3. CERISCOIDES (Benth. & Hook.f.) Tirveng.

2 species in India and 1 species in BNP.


ovate-elliptic, membranous, to 7-9 × 3.5 cm, acuminate at apex, entire along margins, finely tapered at base; petioles 5-15 mm; stipules triangular, c. 5 mm, caducous; midvein impressed above, raised beneath; lateral veins 5-6, prominent beneath. Flowers unisexual, dioecious or polygamo-monoecious; pistillate ones solitary, staminate ones fasciculate. Male flowers in fascicles, pedicellate; pedicels c. 1 mm. Calyx cupuliform, glabrous, c. 3 × 3 mm, persistent in fruits. Corolla white or greenish white to fading yellow, fragrant, campanulate, 5-(6)-lobed above; tube 8-9 × 3-4 mm; lobes ovate, 2.2-3.6 × 1.8-2.3 mm, acute at apex, tip inflexed. Stamens 5; anthers subsessile, c. 4.3 mm, tip exserted. Ovary abortive; style c. 4.5 mm long, with fusiform head opposite to the lower part of anthers. Female flowers sessile, solitary. Calyx oblong to spatulate; lobes 2.3 mm. Corolla same as male flowers. Stamens shorter c. 3.3 mm, though tips exserted, sterile. Ovary 1-locular with 4–6 parietal placentae; style with head opposite the whole of the anthers. Fruit baccate, ellipsoid or subglobose, c. 2.8 × 2.1 mm; seeds many, c. 2.4 mm.

Fl. & Fr.: April-May.

Distribution: INDIA: Assam, Jharkhand (Parasnath), Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Myanmar & Thailand.

Specimen examined: Buxa National Park, Jainti range, Jainti 7-8, 8th April, 2012, Gopal Krishna 56074.

Notes: The species was described from Calcutta Botanic Garden by Roxburgh. There are few collections in CAL, one from Meghalaya and one from Assam. The species seems rare as it is the first collection from West Bengal.

4. COFFEA L.

8 species in India and 1 species in BNP.


Other synonyms: Psilanthus bengalensis (Roxb. ex Schult.) J.F. Leroy.

Illustration: Curtis’s Bot. Mag. 82: t. 4917. 1856.
acute. Calyx dialated, toothed above, persistent in fruit. Corolla white, salverform; 5-lobes above; lobes twisted in bud; tube 15-20 mm long, sparsely hairy outside along nerves, hairy inside; lobes elliptic, 8-10 × 3-6 mm, acute at apex, entire. Stamens 5, included; anthers c. 1.1 cm long, partly exserted. Ovary c. 1 × 0.75 mm, glabrous; style c. 2 mm long, glabrous; stigma bifid. Drupes red, ellipsoid to ovoid-oblong, c. 1.2 × 1 cm, glabrous, 1-seeded.

Fl. & Fr.: February-June.

Distrib.: INDIA: Assam and West Bengal. WORLD: Bhutan.


5. HEDYOTIS L. (nom. cons.)

75 species in India and 1 species in BNP.


Scandent shrubs; stems obscurely angled, glabrous to sparingly pubescent. Leaves elliptic or lanceolate, 4.2-16 × 2.3-3.9 cm, acuminate to caudate at apex, entire along margins, cuneate to attenuate at base, subcoriaceous, glabrous; midvein impressed above, puberulent, raised beneath; lateral veins 7-9 pairs, inconspicuous; petioles 2-4 mm long; stipules connate, forming a small broad shallow cup, 2-2.5 × 2-3 mm. Inflorescences panicles of umbellate cymes, terminal, 1-5.5 cm long; peduncles 2.5-5 cm long, subtended by bracts; bracts linear-lanceolate, 7-23 × 2-4 mm. Flowers 2-3 × 2-3 mm, pedicellate; pedicels 1-2 mm long, filiform, minutely pubescent. Hypanthium ovoid, 0.7-1.5 mm long, Calyx 4-lobed above, cupular below; lobes narrowly triangular, unequal, 1-1.25 × 1 mm, acute at apex, ciliate, minutely pubescent both sides; cup 1.5-2 mm long, pubescent. Corolla white, 4-lobed above, connate below, sparsely puberulous outside; lobes oblong, 3-4 mm long, beaked, densely hairy inside; tube 1-2 mm long. Stamens 4; filaments c. 1 mm long, minutely appressed-pubescent, exserted. Ovary sub-globose, 2.5-3 mm long; style 1.5-2 mm long, pubescent above; stigma 2-lobed, linear or sub-globose, 1-1.5 mm long, papilose. Capsules globose, c. 3 mm across, many seeded; seeds black, plano-convex with an irregular wing-like margin.

Fl. & Fr.: February-June.
Distrib.: INDIA: Throughout Eastern India. WORLD: Bangladesh, Bhutan, China, Myanmar and Nepal.


6. HYMENODICTYON Wall. (nom. cons.)

3 species in India and 1 species in BNP.


Other synonyms: Cinchona excelsa Roxb.; Hymenodictyon excelsum (Roxb.) Wall.

Illustration: Roxb., Pl. Coromandel 2: t. 106. 1799.

Deciduous trees, to 20-25 m tall; branchlets more or less angled, prominently scarred of fallen leaves and inflorescences; bark dark brown to blackish. Leaves alternate, in whorls, ovate-elliptic, elliptic or broadly elliptic, 12-21 × 7-14 cm, broadly acute or obtuse at apex, attenuate at base, entire along margins, velvety tomentose; midvein faintly raised above, prominently beneath, pubescent; lateral veins 10-11 pairs, raised both sides, pubescent; petioles 12-15 cm long; stipules ovate to triangular or lanceolate, 5-20 mm, densely hairy. Inflorescences terminal or axillary racemiform or spiciform, villous to pruinose, pendulous; peduncles c. 6 cm long; basal bracts 2-4, ovate-elliptic, 5-9 × 3.5-5 cm. Flowers 1-2 mm across, pedicellate; pedicels 1-2 mm long, pubescent; bracts linear c. 2 mm long, pubescent. Calyx 5-lobed above, cupular below; lobes linear, 1-1.5 mm long, pubescent; cup c. 1 mm, pubescent. Corolla greenish white, ventricose above, 5-lobed above; tube 2-2.5 mm long, puberulent outside, glabrous inside; lobes elliptic c. 2 mm long, puberulent outside, glabrous inside. Stamens 5, included; filaments short c. 0.5 mm long, glabrous; anthers oblong-elliptic, c. 2 mm long, slightly beaked at apex. Ovary enclosed in calyx cup; style terete, c. 1.1 cm long, glabrous; stigma globose. Capsules ellipsoid, 1.3-1.7 × 0.7-1.1 cm, many seeded; seeds rhomboic-ovate, c. 10 × 5 mm, including wings, papery.

Fl.: May-July; fr.: May-December.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Cambodia, China, Indonesia (Java), Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimens examined: Buxa National Park, Jainti range, NRVK 11, 4th Dec., 2011, Gopal
7. HYPTIAN TherA Wight & Arn.

1 species in India and BNP.


Illustration: Hook., Icon. Pl. 31: t. 3005. 1915.

Shrubs, 2-3 m high; stems branched; branches flattened becoming angled to subterete, glabrous. Leaves lanceolate or oblong-lanceolate, 6-13.5 × 1.2-3 cm, acuminate at apex, entire along margins, attenuate at base, thinly coriaceous, glabrous; midvein slightly impressed above, prominent beneath; secondary veins 6-8 pairs, reddish, glabrous; stipules interpetiolar, triangular-ovate, c. 6 × 3 mm, acute at apex, chartaceous, glabrous, smooth to weakly keeled, persistent; petioles 5-7 mm long, glabrous. Flowers in axillary clusters, sessile, involucral bracts in 2-whorls; bracts subequal, narrowly ovate, 2-3 mm long, margins ciliate, strigose. Calyx 5-lobed above, cupular below; cup c. 1 × 2 mm; lobes triangular-ovate, c. 0.5 × 0.5 mm, margin ciliated, glabrous outside, hairy inside. Corolla white-cream, sub-campanulate, 5-lobed; lobes sub-equal, glabrous outside, villous inside; tube, 1-2 mm long; broadly ovate, c. 1 × 1 mm, acute. Stamens 5; filaments included; anthers c. 1 mm long, hairy. Ovary enclosed in calyx cup; style included; stigma 2-lobed, c. 1.25 mm long, hairy. Berries green, pyriform to subglobose, 7-9 × 5-6 mm, puberulent to glabrous, calyx persistent; seeds c. 4 × 3 mm.

Fl.: April.-August; fr.: August-February.

Distrib.: INDIA: Assam, Meghalaya, Odisha, Sikkim, Tripura and West Bengal.

WORLD: Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand and Vietnam.


8. MEYNA Roxb. ex Link

3 species in India and 1 in BNP.

Local name: “Moyena” (Bengali).

Deciduous shrubs, to 1–2 m high; branches and branchlets terete, glabrescent; bark dark brown corky, spines axillary or supra axillary; spines c. 3 cm long. Leaves in whorl of 3s, toward end of branchlets, ovate or ovate-oblong, 1.7–9.5 × 0.9–4.7 cm, acute or obtuse at apex, entire along margins, cuneate at base, subcoriaceous, green, glabrous; midvein slightly raised beneath, puberulous; lateral veins 7–9 pairs, inconspicuous above, prominent beneath; petioles 7–13 mm long. Inflorescences 3–4-flowered cymes or solitary. Flowers c. 10 × 7 mm, subsessile, borne on densely squamate foliate pads or spurs on old wood; bracts and bracteoles small scales. Calyx pale-green, cupular below, shallowly 5-lobed above, c. 2 × 3 mm. Corolla pale-green, tube shallowly cylindric or suburceolate, densely hairy within on upper half, 5-lobed above; tube 6–7 mm long; lobes broadly ovate, c. 3 × 2.5–3 mm, acute at apex, reflexed. Stamens 5; filaments inserted at top of tube, short; anthers oblong, c. 1 mm long. Ovary c. 1 × 1 mm, 4–5-locular, ovules solitary, pendulous; style c. 3 mm long; stigma clavate, 4–5-lobed. Fruits baccate, globose, 2–2.5 cm across, immature green, turned yellow when mature.

Fl. & Fr.: March–June.


9. MORINDA L.

8 species in India and 1 species in BNP.


Evergreen shrubs, to 2–3 m high; stems and branches angled, appressed hairy. Leaves oblanceolate, ovate-elliptic, elliptic-obovate, 12.5–22.5 × 4.5–8.8 cm, abruptly acuminate at apex, undulate-crenate along margin, attenuate at base, sub-coriaceous, shining, glabrous above, appressed hairy beneath; midvein raised both side, puberulent; lateral veins 10–14 pairs, prominent beneath; petioles 0.7–1.4 cm long; stipules free or shortly united to petioles, triangular, c. 8 × 4 mm, acute at apex. Inflorescences heads, solitary and leaf-
opposed; peduncle 1.5-4 cm. Flowers sessile, bisexual and distylos, rarely bisexual and monomorphic, or rarely dioecious. Flowers sessile, clavate shape in buds. Calyx green, truncate to sinuate, tubular below, c. 3 x 3 mm, glabrous. Corolla white, salver-form, (4-) 5-lobed above; lobes ovate-lanceolate, c. 8 x 3 mm, acute at apex, patent; tube 1-1.8 cm long, glabrous outside, hairy inside. Stamens 4-6; filaments included; anthers oblong, c. 2.5 mm long. Ovary subglobose; style elongated, c. 1.1 cm long, glabrous; stigma bifid, c. 3 mm long. Fruits nearly a cluster of drupelets, partially fused/separate, bluish white, c. 1 x 1 mm.

Fl.: February-April; fr.: May-December.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Tripura and West Bengal. WORLD: Bhutan, China, Laos, Myanmar, Nepal and Thailand.


10. MUSSAENDA L.

14 species in India and 1 species in BNP.


Plate 29h

Shrubs c. 2 m high, much branched; branches terete, appressed hairy. Leaves ovate-elliptic, 7.5-11.8 x 3.1-4.5 cm, acuminate at apex, undulate along margins, attenuate at base, coriaceous, shining above, green beneath, glabrous above except nerves, hispid beneath; midvein raised both sides, hispid; lateral nerves 6-7 pairs, slightly raised both sides; petioles 6-10 mm long, appressed hairy; stipule linear-lanceolate, c. 5.5 x 2 mm, appressed hairy. Inflorescences axillary cymes; peduncle 1.8-5 cm long, puberulous; basal bracts linear, 5-6 mm long, appressed hairy. Flowers heterostylus, pedicellate; pedicels c. 3 mm long. Calyx 5-lobed; lobes filiform, lanceolate or oblong-elliptic, usually pilose outside; one lobe transformed into a large, petiolate, brilliant-white petaloid structure, similar in size and shape to leaves. Corolla orange, salverform, 5-lobed above, appressed hairy outside, villous within; tubes 9-10 mm long, densely sericeous near throat inside; lobes triangular-ovate, 2-2.25 x 1-2 mm. Stamens 5; filaments c. 3 mm long, glabrous; anthers oblong, c. 5 mm long. Ovary c. 2 x 1 mm, enclosed by calyx tube; style subulate, c. 4.5 mm long; stigma bifid. Berries globose, 6-10 mm across, glabrous, calyx persistent until fruit is ripe.
Fl. & Fr.: May-August.

Habitat: Grows along Bala river bank, its sliver appressed foliar calyx lobe makes very showy in forests.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal. WORLD: Bhutan.

Specimens examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 31st March, 2012, Gopal Krishna 56001; North Rajabhatkhawa, 23.05.1976, J.K. Sikdar 6990; 21 mile from Rajabhatkhawa, 13.05.1949, V. Narayanswami & party 2378.

11. OLDENLANDIA L.

6 species in India and 2 species in BNP.

Key to species

1a. Stems quadrangular to flattened; usually pubescent to scaberulous; margins thickened to wings; 1-5 flowered, pedicellate; anthers and stigmas included ............................................................. 1. O. corymbosa

1b. Stems terete below, hispid; margins never thickened; flowers many, sessile, limited around the node; anthers and stigmas exerted ...... 2. O. verticillata


Other synonym: Hedyotis corymbosa (L.) Lam.

Local name: “Khet-papra” (Bengali).

Illustration: Wight, Icon. Pl. Ind. Orient.3: t. 822. 1846 [as Hedyotis ramosa (Roxb.) Blume].

Annual herbs, 5–15 cm high; stems 4-angled, ribbed; angles thickened to wings. Leaves linear-lanceolate or narrowly elliptic, 0.8–2 × 0.1–0.6 cm, acute at apex, entire along margins revolute on drying, acute to cuneate at base, membranous, glabrous to slightly scabridulous above, lineolate beneath; midvein conspicuous; lateral veins inconspicuous both sides; sessile to subsessile; stipules fused with petiole base, tubular, 2–3 mm long, with 1–5 linear bristles. Inflorescences axillary, pedunculate cymes or 1–2-flowered per axil; peduncles 0.5–1.2 cm long, filiform. Flower pedicels slender, 3–8 mm long, filiform. Hypanthium ellipsoid, c. 1.5 mm long. Calyx 4-lobed above, cupular below; lobes triangular-lanceolate, 0.5–0.8 × 0.3–0.5 mm, acute at apex, finely serrate along margins; cup c. 0.5 × 1 mm. Corolla white, 4-lobed above, glabrous; tube 0.8–2 mm long, ring of hairs inside below sinus; lobes oblong to narrowly triangular, 0.7–1.1 × 0.3–0.6 mm,
pubescent inside. Stamens 4, included with stigma; filaments c. 0.5 mm long; anthers ovoid, c. 0.2 × 0.2 mm. Ovary enclosed in calyx cup; style c. 0.5 mm long; stigma 2-lobed. Capsules globose or ellipsoid, 1.2–2.5 × 1.5–2.5 mm, lineolate outside, truncate or slightly raised at apex, many seeded; seeds triangular, 0.1–0.3 × 0.1–0.2 mm.
Fl.: May–November; fr.: June–December.
Distrib.: INDIA: Andaman & Nicobar Islands, Odisha, Sikkim, Tripura and West Bengal. WORLD: Africa and Malaysia.
Specimen examined: Buxa National Park, Jainti range, 27th Nov., 2011, Gopal Krishna 47150.

2. Oldenlandia verticillata L., Mant. Pl. 40. 1767.
Other synonyms: Hedyotis hispida Retz.; Hedyotis verticillata (L.) Lam.
Annual or perennial, herbs, 20–45 cm high; stems branches, angled, grooved, hispid. Leaves simple, opposite or whorled at nodes, elliptic or linear-lanceolate, 1–5.9 × 0.2–1.4 cm, mucro-acute at apex, entire along margins, margins revolute on drying, cuneate at base, coriaceous, scabrous both sides; midvein impressed above, faintly raised beneath; lateral veins obscure; petioles sessile to shortly petiolate, 0.5–1 mm long; stipules variable in size, cupular, shortly fused to petiole base, triangular to subtruncate with 5–9 cilia or bristles. Inflorescences axillary, congested cymose, several flowered. Flowers 7–9 mm long; sessile or shortly pedicellate; pedicels c. 1 mm long; bracts linear, 1–2 mm long with 3–4-bristles. Hypanthium obconic, c. 1 mm long. Calyx 4-lobed above, densely hispid; lobes triangular-ovate, 2–2.5 × 1 mm long, ciliolate. Corolla yellowish-white, 4-lobed, funnel form; tube 3–4 mm long, glabrous; lobes lanceolate, 1–2 mm long, spinous at apex. Stamens 4, exserted; filaments 4–4.5 mm long; anthers oblong, 1–1.5 mm long, exserted. Ovary 0.8–1.2 mm long; style c. 9 mm long; stigma 2-lobed, exserted. Capsules globose, 2–3 mm across, subcoriaceous, ribbed, hispid, many seeded; seeds brown, triangular, c. 3 × 3 mm.
Fl. & Fr.: May–September.
Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Myanmar, Malaysia and Nepal.
12. **PAEDERIA** L. (*nom. cons.*)

5 species in India and 1 species in BNP.


Other synonyms: *Paederia cruddasiana* ssp. *microcarpa* (Kurz) Puff; *Paederia foetida* L. var. *microcarpa* Kurz.

Climbing shrubs; stems terete, glabrous. Leaves ovate to ovate-lanceolate, 2.8–10 × 0.8–4.6 cm, acuminate at apex, crenate along margins, truncate or subcordate at base, subcoriaceous, glabrous; midvein impressed above, slightly raised beneath, glabrous; lateral veins 6–7 pairs, faintly raised beneath; petioles 0.7–4.5 cm long, puberulent to subglabrous; stipules triangular ovate, c. 5 × 5 mm, acute at apex, glabrous. Inflorescences terminal or lateral, thyrsoid or lax panicles; peduncles 2.5–6 cm long, terete, glabrous; bracts linear 3–4 mm long. Flowers sessile/sub-sessile; bracts linear-lanceolate, c. 1 mm long. Calyx green, 5-lobed above, tubular below; lobes triangular ovate, c. 1 × 1 mm, acute at apex, pubescent; tube c. 2 mm long. Corolla pink, funnel-form, outside densely puberulent, 5-lobed; lobes ovate, c. 1.5 × 1 mm, whitish; tube 6–16 mm long. Stamens 5; filament short; anthers linear-oblong, c. 3 mm long. Ovary 2-loculed; style filiform, 3–3.5 mm long, scaly; stigma bifid. Drupes pinkish green, ovate-elliptic to ovoid c. 10 × 7 mm, flattened, partially, glabrous, with persistent calyx; seeds ovate-elliptic, c. 9 × 6 mm, flattened, marginally winged.

Fl.: May–October, fr.: November–December.

**Habitat:** Grows along riverside of the forest.

**Distrib.**: **INDIA:** Assam and West Bengal. **WORLD:** Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand and Vietnam.


**Use:** Leaves eaten as vegetable.

**Notes:** This species has long been incorrectly treated by several authors under *Paederia foetida*. This species is known from Darjeeling district and present collection is from Jalpaiguri district.

13. **PSYCHOTRIA** L. (*nom. cons.*)

39 species in India and 2 species in BNP.

**Key to species**

1a. Stipules forked at apex; seeds smooth or with a single groove
1b. Stipules not forked at apex; seeds 4–8-grooved on dorsal surface ........ 2. P. erratica


Shrubs, to 2–3 m high; stems and branches terete, glabrous. Leaves oblong-ovate, ovate-elliptic or lanceolate, 10–15 × 4.1–8.1 cm, broadly acuminate at apex, entire along margins, attenuate at base, coriaceous, shining above, glabrous; midvein impressed above, glabrous, raised beneath, rusty tomentose; secondary veins 16–18 pairs, prominent beneath, brown tomentose; petioles 7–13 mm long, glabrescent; stipules triangular-ovate, 11–13 × 6–8 mm, apex 2-lobed, hairy, caducous. Inflorescences terminal cymes; peduncles 1.8–4.7 cm long, puberulent. Flowers c. 2.5 × 1 mm; sessile; bracts triangular, c. 1 × 0.5–1 mm, ciliate along margins. Calyx 5-toothed above, tubular below; teeth triangular, c. 0.5 × 1 mm, acute at apex, glabrous; tube c. 1.5 × 1 mm, glabrous. Corolla white, 5-lobed above, connate below; tube c. 0.5 mm long, glabrous outside, scaly, hairy inside at the base; lobed ovate, c. 1 × 0.75 mm, tip recurved. Stamens 5; filaments adnate to corolla tube, c. 0.2 mm long; anthers oblong, 0.8–10 mm long. Ovary 2-celled; style c. 0.5 mm long; stigma 2-lobed. Fruits broadly ellipsoid, 5–6 mm across, reddish; calyx teeth deciduous; seeds smooth or with a single groove on dorsal surface.

Fl. & Fr.: June–July.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Nagaland, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, Myanmar (Burma), Malaysia and Nepal.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Shrubs, to 1 m high; branches subterete, glabrous. Leaves opposite, whorled, elliptic, ovate-lanceolate, 3.1–14.5 × 1.4–5.5 cm, acute at apex, entire along margins, attenuate at base, coriaceous, green shining; midvein impressed above, raised beneath, pubescent; lateral veins 7–9 pairs, prominent beneath, puberulous; petioles 5–13 mm long; stipules ovate, 10–15 × 4–6 mm, glabrous above, villous or pubescent at base beneath, caducous.
Inflorescences axillary and terminal cymes; peduncle 1-3.5 cm long, puberulent. Flowers bisexual; pedicels c. 1.5 mm long; bracts linear lanceolate, c. 4 × 1 mm, ciliate along margins; bracteoles linear-lanceolate, c. 2 × 1 mm, ciliate along margins. Calyx 5-lobed above, cupular below; lobes lanceolate, glabrous; tube 0.8-1.2 mm long. Corolla white, 5-lobed above; lobes lanceolate, reflexed. Stamens 5; filaments 0.3-1 mm long; anthers oblong, 0.2-0.7 mm long. Ovary c. 0.5 mm long; style 3-3.5 mm long; stigma 2-lobed. Drupes globose, 6-8 × 4-6 mm; calyx teeth deciduous; seeds grooved on dorsal surface.

Fl. & Fr.: March–December.

Distrib.: INDIA: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan and Nepal.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

14. SPERMACOCE L.

9 species in India and 2 species in BNP

Key to species

1a. Calyx 4-lobed; corolla tube 0.5–10 mm and longer than calyx lobes;
mature fruit 1-5 × 1-3.5 mm................................................................. 1. S. alata

1b. Calyx 2 or 4-lobed; corolla tube lesser than 0.5–1 mm, slightly
longer than calyx lobes; mature fruit 0.6-1.1 × 0.3-1 mm................. 2. S. ocymoides


Other synonyms: Borreria alata (Aubl.) DC.; Spermacoce latifolia Aubl.


Annual or perennial, erect or straggling herbs, c. 90 cm tall; stems 4-angled, angles acute to winged, sparsely to densely pubescent or sometimes hirsute. Leaves sessile to shortly petiolate, stipulate; petioles 1-2 mm long, hirtellous; stipules hispudulous, sheath 1-2 mm long, bearing 5-8 bristles; blade ovate to broadly elliptic, 3-5 × 1.8-2.3 cm, margins scabrid, both surfaces sparsely to densely pilosulous, apex acute, base narrowed to obtuse. Inflorescences axillary, few to many flowered, bracteate cymes; bracts filiform,
0.5-3.5 mm long. Flowers sessile, white tinged with blue. Calyx sparsely to densely pubescent; hypanthium obconic, c. 0.5 mm; lobes 4, oblong to lanceolate. Corolla funnelform; tube 2-4 mm long, ring of hairs inside at the throat; lobes ovate to triangular, c. 1.5 mm long, acute. Stamens 4, exserted; style exserted. Capsules ellipsoid to subglobose, wrinkled, finely ribbed.

**Fl. & Fr.:** August-October.

**Distrib.:** INDIA: Almost throughout. WORLD: Apparently native to the Neotropics but exact origin unknown; Antilles, Central America, North America (Mexico, Florida), widespread in tropical South America; naturalized in Africa, South and South East Asia, Australia, Madagascar, and perhaps North America.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 14th Feb., 2010, S.K. Srivastava & Gopal Krishna 47097.

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*Other synonym:* *Borreria ocymoides* (Burm.f.) DC. Plate 30d

Herbs, 10-35 cm tall; branches decumbent, slender, branched from the base, glabrous or sparsely hairy. Leaves subsessile to shortly petioled, stipulate; petioles c. 2 mm long; stipules pubescent, sheath c. 2 mm long, broad at the top, bearing 6–7 equal filiform bristles; ovate-lanceolate, elliptic-lanceolate, 1–4.5 × 0.2–1.3 cm, glabrous or scabrid above, pubescent on nerves beneath, acute to acuminate at apex, base narrowed. Inflorescences axillary and terminal, many-flowered cymes. Flowers white, c. 3 mm long, bracteolate, shortly pedicelled; pedicels c. 1 mm long. Calyx glabrous; hypanthium ovoid, glabrous; lobes 4, lanceolate, unequal, c. 1.5 mm long. Corolla pubescent above; tube 0.5 mm long; lobes ovate-triangular, obtuse at apex, ring of pubescent hairs inside; stamens attached at sinuses of corolla-lobes. Capsules compressed, wrinkled.

**Fl. & Fr.:** July-October.

**Distrib.:** INDIA: Almost throughout. WORLD: Africa, Malaysia and Sri Lanka.

**Specimen examined:** Buxa National Park, Jainti range, 5th Oct., 2009 S.K. Srivastava & Gopal Krishna 46159.
15. **UNCARIA** Schreb. (*nom. cons.*)

6 species in India and 2 species in BNP.

Key to species

1a. Stems weakly-angled to terete; leaves tomentose beneath; domatia present in leaf axils; flowers pedicellate; corolla white, tube pubescent; fruits fusiform with stalks.........................1. *U. macrophylla*

1b. Stems 4-angled; leaves glabrous beneath; domatia absent in leaf axils; corolla yellow, tube glabrous; fruits ovoid, sessile........2. *U. sessilifructus*


Lianas; stems weakly angled to terete, tomentose to subglabrous, hooked. Leaves ovate or broadly elliptic, 10-16 × 6-12 cm, acute or shortly acuminate at apex, entire along margins, rounded, subcordate or cordate at base; thinly leathery and yellowish brown tomentose both sides; midvein prominent beneath, tomentose; secondary veins 6-9 pairs; petioles 1-2.5 cm long, glabrous to densely tomentulose; stipules ovate, 6-12 × 6-15 mm, caducous, 2-lobed. Inflorescences axillary in heads, tomentulose to glabrescent; peduncle 3-7 cm; bracts triangular, 6-8 mm. Heads solitary, 1.5-2 cm across. Flower pedicels 2-5 mm long. Calyx obconic, deeply lobed above; lobes linear-oblong, 3-4 mm, obtuse to rounded. Corolla white, salverform, outside strigillose to tomentulose; tube 8-10 mm; lobes oblong to ligulate, c. 2 mm, obtuse to rounded. Fruiting heads 8-10 cm across; fruits fusiform, 14-20 × 4-5 mm, densely strigose, with accrescent pedicels.

**Fl.:** July-December.; **fr.:** March-November.

**Distrib.:** **INDIA:** Assam, Meghalaya and West Bengal. **WORLD:** Bangladesh, Bhutan, China, Laos, Myanmar, Thailand and Vietnam.

**Specimens examined:** Jalpaiguri, Buxa road, 26.02.1934, Biswas 1676; Jalpaiguri, Damanpur forest, Rajabhatkhawa, 23.04.1959, C. R. Das 46.

2. **Uncaria sessilifructus** Roxb., Fl. Ind. 2: 520. 1832; Hook.f. in Hook.f., Fl. Brit. India 3: 30. 1880; Prain, Bengal Pl. 1: 553. 1903. **Plate 30e**

Lianas; branchlets angled, puberulent or hirtellous to glabrous. Leaves ovate or ovate-elliptic, 4.5-13 × 1.9-6.3 cm, acute or shortly acuminate at apex, entire along margins, attenuate at base, thinly leathery, green, shining, glabrous except nerves; midvein inconspicuous above, raised beneath, puberulous; secondary veins 4-6 pairs,
inconspicuous above, prominent beneath, puberulous; petioles 7-13 mm long, stout, puberulent; stipules ligulate to lanceolate, 5-6 mm long, 2-lobed, puberulent, deciduous. Inflorescences axillary or in terminal head; heads 2-2.5 cm across; peduncles 2.5-3.5 cm long, appressed hairy; bracts linear-sub-spatulate, 4-5 mm long; bracteoles same as bracts. Flowers, c. 4 × 2 mm; sessile. Calyx obconic, 5-lobed above; lobes oblong to triangular, c. 0.5 mm long; tube 2-2.5 mm long, appressed hairy outside, glabrous inside. Corolla yellow, salverform, 5-lobed above; lobes ovate-lanceolate, c. 1 × 0.75 mm, sericeous outside, glabrous inside. Stamens 5; filaments c. 0.5 mm long; anthers falcate, c. 1 mm long. Ovary 2-locular; style exserted, 3-5 mm long; stigma globose-clavate, c. 1 mm. Fruiting heads 2.5-3.5 cm across, pedunculate; fruits ovoid, 1-1.4 cm, sessile.

Fl. & Fr.: March–December.


Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, 1st Dec., 2011, Gopal Krishna 47187.

ASTERACEAE [400]

Key to genera

1a. Capitula of two kinds, either with only male florets or with only female florets; flowers tubular…………………………………………………………17. Xanthium

1b. Capitula all alike, homogamous or heterogamous, rarely plants subdioecious……………………………………………………………………..2

2a. Leaves opposite or mostly so ………………………………………………….3

2b. Leaves all alternate ……………………………………………………………..11

3a. Capitula discoid; corolla never yellow ………………………………………….4

3b. Capitula radiate, disciform, or discoid; corolla usually yellow………………...7

4a. Scandent annual or short-lived perennials; phyllaries and florets 4 per capitulum …………………………………………………………………………..14. Mikania

4b. Erect annual or perennial herbs; phyllaries and florets not of equal number…………………………………………………………………….5

5a. Anthers truncate at apex; achenes glandular……………………………..2. Adenostemma

5b. Anthers appendaged at apex; achenes eglandular…………………………...6

6a. Phyllaries biseriate; pappus paleaceous; receptacle paleaceous or not; corolla blue……………………………………………………………………3. Ageratum

6b. Phyllaries 4–5-seriate; pappus and receptacle epaleaceous;
corolla white ........................................................................................................ 6. Chromolaena

7a. Pappus usually 20, bristles plumose or fimbriate ................................. 16. Tridax
7b. Pappus absent or awned .............................................................................. 8

8a. Achenes compressed .................................................................................. 9
8b. Achenes all relatively plump, or 3-5-angled in ray florets and
    compressed in disk florets ............................................................................ 10

9a. Leaves trifoliolate, opposite or upper alternate; corolla white;
    pappus awns retrorsely barbed; achenes usually monomorphic,
    rarely dimorphic ............................................................................................ 4. Bidens
9b. Leaves simple, opposite; corolla yellow; pappus 2 strigously
    awned; achenes dimorphic ........................................................................... 15. Synedrella

10a. Capitula many; achenes not enclosed by inner phyllaries ................. 1. Acmella
10b. Capitula solitary; achenes enclosed by inner phyllaries ....................... 8. Enydra

11a. Dioecious/subdioecious; leaves spinous or finely serrulate-spinulose .......... 12
11b. Monoecious; leaves neither spiny nor finely serrulate-spinulose at margin ...... 13

12a. Sub-dioecious; leaf margin entire or with blunt to mucronulate
    teeth, apex of phyllaries straight; corolla yellow .......................................... 13. Ixeris
12b. Dioecious; leaf margin spinous or spinulose; phyllaries bending
    gently backwards; corolla whitish pink ......................................................... 7. Cirsium

13a. Woolly herbs; leaves entire at margins; phyllaries rather dry,
    either with distinct scarious margin or papery, brownish,
    yellowish, or whitish, never herbaceous and green throughout ...... 11. Gnaphalium
13b. Glabrous or sparsely hairy herbs; leaves serrate, dentate
    or vividly sinuate at margins; phyllaries herbaceous, all or at
    least outer ones green throughout, except at very apex ......................... 14

14a. Capitula homogamous; style branches long, slender, subulate,
    without an apical appendage, hairy abaxially and with stigmatic
    papillae over entire adaxial surface ................................................................. 15
14b. Capitula homogamous or heterogamous; style branches not with
    above combination of characters ................................................................. 16

15a. Leaves essentially cauline; capitula distinct, many flowered,
    presented in distinct heads, not subtended by leafy bracts;
    corolla pinkish .............................................................................................. 18. Vernonia
15b. Leaves essentially rosette; capitula 1-4-flowered, multiple
    heads occurring in single heads, subtended by (1-)3 leaf like
bracts; corolla purplish

16a. Phyllaries disciform, dark green/purple, reflexed after achene dispersal; style branches without an apical appendage distal to stigmatic lines, apically rounded or truncate ................................. 5. *Blumea*

16b. Phyllaries green not reflexed after achene dispersal; style branches terminating in a triangular to subulate appendage distal to stigmatic lines................................................................. 17

17a. Phyllaries 2-to several seriate; involucre saucer-shaped to subglobose ......................................................... 12. *Grangea*

17b. Phyllaries uniseriate, but sometimes with an outer series of much shorter bracts (calyculus); involucre cylindric......................... 8. *Crassocephalum*


6 species in India and 1 species in BNP.

Key to species

1a. Achenes glabrous, pappus absent ................................. 1. *A. calva*

1b. Achenes moderately to densely hairy, pappus of 2 or 3 setae .......... 2. *A. paniculata*


Other synonym: *S. acmella* L. var. *calva* (DC.) C.B. Clarke. Plate 30f

Herbs, to 10-15 cm high; stems terete, sparsely hairy. Leaves opposite, broadly ovate, 1.3-5 × 0.8-3.2 cm, acute at apex, crenate-serrate along margins, truncate at base, subcoriaceous, scabrous, shortly hairy above, puberulous beneath; palmately 3-nerved, hairy, conspicuous beneath; petioles 3-16 mm long, decurrent. Head terminal, solitary, ovate, 7-10 mm across, heterogamous, dicoid; peduncles 1-6 cm long, striate, puberulous. Phyllaries in 2 whorls, ovate-lanceolate, 3-3.5 × 1-2.5 mm. Ray florets: Corolla yellow, ligulate, 2-lobed above, tubular below; tube c. 2.5 mm long. Style c. 1.5 mm long; stigma bifid. Disk florets: Corolla yellow, campanulate, 5-lobed above; lobes ovate triangular, c. 3 × 3 mm; tube c. 1.5 mm long. Anthers c. 0.5 mm long. Style c. 1.5 mm long; stigma bifid. Achenes obovate, trigonous, c. 2 × 1 mm, glabrous; pappus absent.

Fl. & Fr.: February-April.

**Distrib.:** INDIA: Almost throughout. WORLD: Bhutan, China, China, Indonesia, Malaysia, Myanmar, Nepal and Sri Lanka.


Other synonym: **Spilanthes acmella** var. paniculata (DC.) C.B. Clarke. Plate 30g

Illustration: Wight, Icon. Pl. Ind. Orient. 3: t. 1109. 1846.

Herbs, to 30-50 cm high; stems ribbed, puberulent, branched. Leaves opposite, ovate or ovate-lanceolate, 1.6-7.6 × 0.7-4.3 cm, mucro acute at apex, distantly serrate along margins, attenuate at base, sub-coriaceous, glabrous except nerves; midvein faintly raised beneath, inconspicuous or flattened above; 3-nerved, inconspicuous above, prominent beneath, pubescent; lateral veins 6-7 pairs above, inconspicuous both side, pubescent. Inflorescences corymbose/panicled heads; peduncle 5-6 cm long, hispid; peduncular bracts narrowly triangular, c. 3 × 1 mm, acute, hairy; phyllaries 6, in 2 whorl, ovate-lanceolate, 3.5-4 × 1-1.25 mm, acute at apex, distantly serrate, short hairy, ciliated along margins; 3-nerved at base. Receptacles convex. Pappus aristate, 1-1.25 mm long. Ray Florets: absent. Disk florets: Corolla yellow, 5-lobed above; lobes ovate, c. 0.2 × 0.2 mm; tube c. 1.5 mm long. Stamens 5; anthers c. 0.5 mm long, truncate at base. Style c. 1.5 mm long; stigma bifid. Achenes oblong-ellipsoid, c. 2 × 1 mm, hispid along margins, apex concave with 2 or 3 setae.

Fl. & Fr.: February-April.

Habitat: Grows in moist and wet places in wet area.

Distrib.: INDIA: Throughout. WORLD: Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal and Sri Lanka.


1 species in India and BNP.


Other synonyms: Adenostemma viscosum J. R. & G. Forst. var. viscosum Char.; Adenostemma viscosum var. lavenia Hook.f.; Adenostemma lavenia var. elatum (D. Don) Hochr.;
**Adenostemma elatum** D. Don; **Adenostemma viscosum** J.R. Forst. & G. Forst. var. *elatum* (D. Don) C.B. Clarke.

**Local name**: ‘Buro-keshubi’ (Bengali).

**Illustration**: Wight, Icon. Pl. Ind. Orient. 3: t. 1087. 1846 [as *Adenostemma latifolium* D.Don].

Herbs, to 40-70 cm high; stems terete, striate, puberulent. Leaves opposite, broadly ovate, c. 16.5 × 9 cm, acute at apex, crenate along margins, attenuate at base, narrowly decurrent on 1-5 cm petiole; chartaceous, glabrous; midvein flattened above, prominent beneath; lateral veins 4-5 pairs; petioles 2.5-3 cm long. Inflorescences terminal, lax paniculate or corymbose heads. Heads 5-6 mm across; peduncles 0.5-3 cm long, glandular pubescent. Phyllaries 1-2-seriate, green, subequal, narrowly ovate or lanceolate; acute at apex, glandular ciliate along margins. Disk florets: Corolla white, 5-lobed above; tube 1.3-1.5 cm long, viscid glandular pubescent outside; lobes triangular c. 0.6 × 0.3 mm, acute. Stamens 5; filaments filiform c. 0.75 mm long; anthers truncate at apex, c. 0.5 mm long. Achenes blackish brown oblanceolate or falcate, 2.8-3 × 0.6-0.7 mm, obtuse at apex, muricate, prominently glandular tubercled; pappus 3 or 4 bristled, 0.5-0.6 mm long.

**Fl. & Fr.**: August-December.

**Distrib.** India: Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh and West Bengal. **WORLD**: Australia, Bangladesh, Bhutan, China, Japan, Korea, Myanmar, Nepal and Philippines.

**Specimen examined**: Buxa National Park, Jainti range, Jainti 8, 12th Oct., 2010, Gopal Krishna 46325.

**Notes**: This is a very variable taxon. Some regard *Adenostemma lavenia* is distinct from *A. tinctorium* and *A. viscosum*.

### 3. AGERATUM L.

2 species in India and 1 species in BNP.


**Local name**: “Uchunti” (Bengali).

**Illustration**: Hook., Exot. Fl. 1: t. 15. 1823.

Erect herbs, to 30-60 cm high; stems and branches reddish or green toward apex, striate, puberulent or spreadingly long hairy. Leaves opposite, whorled, ovate, 1.4-5 × 1-3.5 cm, broadly acute at apex, serrate-dentate along margins, truncate or rounded at base, chartaceous, setose above, hirsute beneath; 3-5-nerved at base, inconspicuous above,
prominent beneath, pubescent; petioles 8–20 cm long, hairy. Inflorescences terminal corymbose heads, discoid; head 5–7 × 7–8 mm, homogamous; peduncles 1–7 mm long, densely hairy; phyllaries biseriate, imbricate or subimbricate, oblanceolate, c. 4 × 1 mm, spinous at apex, distantly serrulate hairy along margins. Disk florets: Corolla blue or mauve, 5-lobed; tube c. 1.5 mm long, puberulent; lobes linear-oblong, c. 0.3 mm long. Stamens 5; anthers appendaged at apex, 0.5 mm long. Style c. 1.3 mm long; stigma bifid. Achenes obovate, 2–2.25 mm long, blackish, 5-angled, puberulous along angles; pappus scales 5 or awned, c. 2 mm long, free above, connate below.

Fl. & Fr.: Almost throughout year.

Distrib.: INDIA: Throughout. WORLD: China, Nepal, and South East Asia [Native to tropical America]; widespread weed throughout Africa.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 6, 29th Nov., 2011, Gopal Krishna 47174.

4. BIDENS L.

10 species in India and 1 species in BNP.


Erect herbs, to 15–25 cm high; stems angled, pubescent. Leaves 3-foliolate rarely 5–7-foliolate; leaflets ovate to ovate-elliptic, 1–3.5 × 0.5–1.6 cm, acute at apex, serrate along margins, cuneate or rounded at base, sub-coriaceous, hirsute above, scabrous beneath; midvein inconspicuous above, raised beneath; lateral veins 5–6 pairs, pubescent. Inflorescences head terminal; head heterogamous; peduncle c. 14 mm long. Phyllaries biseriate, lanceolate to oblanceolate, 4–6 mm long. Ray florets 5–6; Corolla white, 3-lobed above; tube to 1.2 mm; ligule ovate-oblong, truncate. Disk florets: Corolla yellow; tube c. 3 mm long. Stamens 5; anthers saggitate at base. Style hirsute, upwards. Achenes usually dimorphic, compressed: outer achenes red-brown, linear to narrowly cuneate, 3–5 mm long, obscurely 2-grooved, sometimes tuberculate-hispidulous, margin antrorsely hispidulous, apex truncate or somewhat attenuate; inner achenes linear-cuneiform, 4-tonous; awns 2–4, persistent, 1.75–2.25 mm long, retrorsely barbellate.

Fl. & Fr.: March–October.

Distrib.: INDIA: Uttar Pradesh, Meghalaya and elsewhere in warmer parts of the country. WORLD: Tropical and subtropical regions of world.
**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 15.02.2010, Gopal Krishna 47111.

### 5. BLUME A DC. (*nom. cons.*)

29 species in India and 2 species in BNP.

**Key to species**

1a. Perrenial; stems glandular pubescent; leaves lyratly lobed ................. 1. *B. lacera*

1b. Annual or biennial; stems eglandular pubescent; leaves simple not lobed.................................................................................................. 2. *B. lanceolaria*


Other synonyms: *B. subcapitata* DC.; *B. lacera* DC. var. *cinerascens* Hook.f.; *B. lacera* DC. 1881. var. *glandulosa* Hook.f.  

**Plate 31a**

Herbs erect, aromatic, with many stems arising from the woody base; stems branched, up to 100 cm high, densely long villous, glandular. Leaves obovate, oblong or elliptic-oblong, lyrately lobed, acute or obtuse, entire or coarsely dentate, 2–6 × 1–2 cm, glandular and densely hairy on both surfaces, narrowed to a short petiole. Heads in axillary panicles, 5-7 mm across, on 5-15 mm long peduncle. Involucral bracts slightly longer than florets, linear, acute, 2–5 (-7) mm long, glandular hairy; inner bracts with scarious margins. Receptacles 2–3 mm across, alveolate, glabrous. Corolla of bisexual florets, yellow, tubular up to 6 mm long, 5-lobed; lobes triangular, pubescent with unicellular hairs; corolla of female florets 3–4 mm long, 2-3-lobed, glabrous. Achenes brown, oblong, angular, terete, 0.5 mm, sparsely hairy. Pappus white, 4 mm long.

**Fl. & Fr.:** March–June.

**Distrib.:** **INDIA:** Andaman & Nicobar Islands, Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamil nadu, Uttar Pradesh and West Bengal. **WORLD:** Australia, Bhutan, China, Nepal, New Guinea, Sri Lanaka and Tropical Africa.

**Specimen examined:** Buxa National Park, Jainti Range, Tashigaon, Bhutia Pond, 6th March 2011, Gopal Krishna 47294.


Other synonym: *Blumea myriocephala* DC.
Shrubs, to 1–1.5 m high; stems terete, hollow, striate, puberulent with scars of fallen leaves. Leaves alternate, whorled, simple, lanceolate to elliptic-lanceolate, 8–19 × 1.1–3.4 cm, broadly acute at apex, sinuately lobed along margins, attenuate at base, coriaceous, scabrous above, glabrous beneath; midvein raised both sides, puberulous; lateral veins 15–20 pairs, inconspicuous above, prominent beneath; petioles 2–4 cm long. Flower heads heterogamous, campanulate, c. 7 × 6 mm.; phyllaries 2–3-seriate, outer ones shorter, linear-lanceolate, 1.5–4.5 × 0.5–1 mm. Ray Florets: Pappus 5–5.5 mm long, white, shining, puberulous. Corolla 2–3-lobed. Style subulate, c. 5.5 mm long; stigma bifid. Disk florets: Corolla 5-lobed above; tube c. 5 mm long, slightly broaden towards apex, glabrous outside; lobes ovate or triangular ovate, c. 0.3 × 0.2 mm, acute; Stamens 5; anthers oblong, c. 0.5 mm long, tailed. Styles subulate, c. 4 mm long; stigma bifid, c. 0.5 mm long. Achenes oblong, c. 1 × 0.3 mm, hairy; pappus 4–4.5 mm long, white, puberulous.

Fl. & Fr.: January–April.

Distrib.: INDIA: Throughout. WORLD: Bhutan, China, Indonesia, Japan, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti range, Jainti 5–9, 29th March, 2012, Gopal Krishna 50629.

6. CHROMOLAENA DC.

10 species in India and 1 species in BNP.


Other synonyms: Eupatorium conyzoides Vahl; E. repandum Willd.


Plate 31b

Shrubs, to 1 high; stems striate, villous. Leaves opposite, ovate, 3.1–7.4 × 1.8–4.3 cm, acuminate at apex, sinuate dentate along margins, acute at base, chartaceous, green, hispid, scabrous above, gland dotted beneath; 3-nerved at base, hispid; petioles filiform, 5–8 mm long, hispid. Inflorescences terminal in head, corymbose; head oblong-ovate, 8–9 × 3–4 mm, homogamous; peduncles 4–6 mm long, densely hairy. Phyllaries 4–5-seriate, ovate-oblong or ovate, 3–7 × 1–1.25 mm, acute, striate. Ray florets absent. Disk florets: Corolla 5 lobed; lobes linear, 0.3 mm long; tube c. 2.5 mm long. Stamens 5; anthers c. 0.5 mm long. Style 2-partite, c. 2 mm long. Achenes truncate, c. 1 mm long; pappus white, silky in 2 bundle, 3–4 mm long, many, rigid, scabrid.
Fl. & Fr.: April–December.

Distrib.: INDIA: Throughout. WORLD: Mexico and Tropical Asia.


7. CIRSIUM Mill.

7 species in India and 1 species in BNP.


Other synonyms: Breea arvensis (L.) Less.; Cnicus arvensis (L.) Roth. Plate 31c


Subdioecious, erect, branching thistles; stems terete, striate, araneous. Leaves alternate, oblanceolate, 4.5-8 × 1.6–3 cm, pinnately lobed; lobes sub-orbicular, spinescent along margins, decurrent on the stem; midvein impressed above, raised beneath, woolly tomentose; lateral veins obscure. Inflorescences in cymose heads, campanulate, 0.5–3.5 cm; peduncles 1–4 cm long. Phyllaries in many series, lanceolate, 8–18 × 1.5–2.2 mm, sparsely araneous, shortly spine-tipped; receptacle convex, densely bristled. Male and female flowers on separate plants, but few achenes reported to mature sometimes on male plants. Male flowers: Corolla pink to purplish; tube c. 1 cm long. Stamens 5; filaments glabrous; anthers c. 2 mm long, sagittate. Female flowers: Corolla pinkish to purplish, 5-lobed above; lobes linear, c. 3 mm long; tube c. 14 mm long, subulate. Style filiform, c. 15 mm long, glabrous; stigma bifid. Achenes obovoid, 4-angled, c. 1.5 × 0.75 mm, glabrous; pappus multi seriate, 12–15 mm long, feathery.

Fl. & Fr.: February–May.

Distrib.: INDIA: Bihar, Himachal Pradesh, Jammu & Kashmir, Punjab, Uttar Pradesh, and West Bengal. WORLD: Asia, Europe and introduced in North America.


8. CRASSOCEPHALUM Moench

1 species in India and BNP.

Herbs, 30 – 60 cm high; stems corymbosely branched, puberulous, greenish brown. Leaves elliptic or oblanceolate, attenuate at base, mucronately dentate at margins, acute to acuminate at apex, 5 – 15 × 1 – 6 cm, lyrately lobed, puberulous on both surfaces; nerves raised; petioles c. 3 cm long. Heads discoid, cylindrical, arranged in loose, terminal corymb, puberulous, pendulate; peduncle 0.5 – 10 cm long; bracteoles 3 – 5. Phyllaries cylindrical, puberulous; bracts linear-lanceolate, 0.8 1 cm long, acute, scarious, puberulous, faintly ribbed. Florets filiform, c. 10 – 12 mm long, dark orange. Corolla limb c. 3 mm long; tube c. 7 mm long. Achenes oblong, c. 2 mm long, white hairs between ribs, soft, dark brown; pappus hairs 10 – 12 mm, white.

**Fl. & Fr.**: September-March.

**Distrib.**: INDIA: Almost throughout. WORLD: Native of Tropical Africa, spread as a weed in Paleotropical regions.

**Specimen examined**: Buxa National Park, Jainti range, Jainti 7B, 3rd March, 2011, Gopal Krishna 47223.

9. **ELEPHANTOPUS L.**

1 species in India and BNP.


**Local name**: “Samdulun” (Bengali).

**Illustration**: Wight, Icon. Pl. Ind. Orient. 3: t. 1086. 1846.

Erect herbs, to 18–27 cm high; stems dichotomously branched, terete, hirsute. Leaves alternate or radical, obovate-elliptic, c. 9 × 2.8 cm, broadly acute at apex, serrate along margins, attenuate at base, coriaceous, scurfy setose above, densely hispid beneath; midvein impressed above, hispid, raised beneath hispid; lateral veins 11–13 pairs, hispid. Heads densely clustered into compound synflorescences subtended by (1-)3 leaf like bracts, each involucre with 1–4 florets; bracts broadly ovate or oblong-ovate, 0.6–1.6 × 0.4–1.2 cm, acuminate at apex, serrate along margins, hisrute and glandular, with conspicuously raised veins; peduncles 1.5–5.4 cm long, hispid. Phyllaries 2–3-whorled, c. 8, elliptic-lanceolate, 7–9 × 1.5–2 mm, micro-acute at apex, finely serrate along margin. Ray florets absent. Disk florets 4, corolla purplish to pinkish, 5-lobed above; lobes spreading, 0.7 mm long; tube c. 1.2 cm long, slightly broadened above. Stamens 5; filament linear, minutely puberulous. Stigma bifid, hairy. Achenes oblong-obovate, c. 3 × 0.5 mm, 10-ribbed; pappus 5–5.5 mm, shining, rigid, chaffy below, scabrid.
Fl. & Fr.: July–November.

**Distrib.:** INDIA: Throughout. WORLD: Tropical Asia, Australia and America.

**Specimens examined:** Buxa National Park, Jainti range, Tashigaon 1, 4th oct., 2009, S.K. Srivastava & Gopal Krishna 46136; Buxa Division-5, Kodalbasti, 06.12.1995, Chandra & Mondal 1052; Bhutan Ghat 28.05.1949, V. Narayanswami & party 3093; Buxa Camp. 2000', 24.05.1949, V. Narayanswami & party 2957.

10. **ENYDRA** Lour.

1 species in India and BNP.


**Plate 31e**

**Local name:** “*Hingcha*” (Bengali).

Marshy herbs, submerged, rooting at nodes; stems fleshy, hollow, terete, glabrous, younger part hairy. Leaves opposite, linear-oblong, 1.5–4.5 × 0.4–1 cm, acute to obtuse at apex, crenate along margins, subcoriaceous, gland dotted; midvein prominent beneath, faintly raised above; lateral veins inconspicuous. Inflorescences heads solitary axillary or terminal, heterogamous, sessile; surrounded by biseriate leafy involucral bracts; outer 2-bracts ovate-oblong, 1–1.5 × 0.6–0.8 cm, glabrous; inner 2 broadly ovate, c. 5 mm broad, fleshy, glabrous. Receptacle rounded to concave, fleshy. Ray florets: Corolla white with purple tinge, 3-lobed above; tube 2–2.5 mm long. Disk florets campanulate, 2–2.5 mm apically 5-lobed. Anthers linear. Ovary oblong, up to 2.5 mm long; style arms flattened, oblong-obtuse, hispid at the tips. Achenes oblong, 4–5 long, compressed; pappus absent.

Fl. & Fr.: January–April.

**Distrib.:** INDIA: Assam, Jammu & Kashmir, Sikkim, Tripura, Uttar Pradesh and West Bengal. WORLD: Bangladesh, China, Indonesia, Malaysia and Pakistan.

**Specimen examined:** Buxa National Park, Jainti range, Bhutia pond, 300m, 14th Feb., 2010, Gopal Krishna 47082.

**Note:** *Enydra fluctuans* Lour. in error is usually used in most of the floras.

11. **GNAPHALIUM** L.

10 species in India and 1 species in BNP.

Other synonym: *G. luteoalbum* L. ssp. *pallidum* (Lam.) Maheshw. 

Woolly erect herbs, to 15-25 cm high; stems terete, white woolly. Leaves alternate, simple, linear-oblong to oblanceolate, 1-4.5 × 0.4-0.8 cm, mucro-acute at apex, entire along margins, cuneate at base, chartaceous, white woolly; midvein inconspicuous both sides; lateral nerves obscure both sides; sessile. Inflorescences in terminal or axillary corymbs, heterogamous; peduncles 5-6 mm long, terete, woolly. Phyllaries in 2-4 whorls, oblanceolate to elliptic, 2.5-3 × 1 mm. Ray florets, female, many-seriate, c. 2 mm long, filiform, 3-4 toothed. Disk florets: Corolla 5-lobed; lobes triangular ovate, dilated; tube c. 1.5 mm long. Stamens 5. Achene oblong or obovoid, 0.5-0.6 mm long, tuberculate; pappus hairs 1-seriate, white, 1-1.5 mm long, caducous.

**Fl. & Fr.**: Almost round the year.

**Distrib.**: INDIA: Almost throughout. WORLD: Africa, Australia, Bhutan, China, Europe, Indonesia, Mauritius, New Guinea and Philippines.

**Specimens examined**: Buxa National Park, Jainti range, Jainti 9, 5th March, 2011, Gopal Krishna 47250; Bhutia Pond, 321 m, 11th Feb., 2010, S.K. Srivastava & Gopal Krishna 47041; Gaddhar range, Panbari 8, 31st march, 2012, Gopal Krishna 56020; Buxa-Bhutan, 35 mile road, 3000’, 16.05.1949, V. Narayanswami & party 2542; Tobgaon 4000’, 18.05.1949, V. Narayanswami & party 2678.

12. **GRANGEA** Adans.

1 species in India and BNP.


**Local name**: “Namuti” (Bengali).

**Illustration**: Wight, Icon. Pl. Ind. Orient. 3: t. 1097. 1846.

Erect herbs, to 20-50 cm high; stems and branches striate, hispid. Leaves alternate, simple, lyrate 1.5-5 × 0.75-2.5 cm acute at apex, lobed along margins, sub-auriculate at base; lobes ovate or oblong, coriaceous, scabrous both sides; midvein inconspicuous above, raised beneath, hispid; lateral veins inconspicuous. Inflorescences axillary or terminal, solitary head, rarely in pairs, subglobose, c. 6 × 8 mm; peduncles 1-4 cm long, hispid. Phyllaries biseriate, triangular-ovate, c. 3 × 1.25 mm, hispid outside. Ray florets: Corolla 3-lobed above; lobes linear, c. 0.2 mm long; tube c. 0.75 mm long. Style c. 1 mm long; stigma bifid. Disk florets: Corolla campanulate, 5-lobed; lobes triangular-ovate, c.
0.4 × 0.3 mm; tube c. 1 mm long. Stamens 5; anthers obtuse at base. Style c. 1.5 mm long, subulate; stigma bifid. Achens oblong, 1.75–2 × 0.4–0.5 mm, flattened; pappus cupular, cartilaginous with fimbriate margin.

Fl. & Fr. March–November.


13. IXERIS Cass.

3 species in India and 1 species in BNP.


Other synonym: Saussurea affinis Spreng. ex DC. Plate 31h

Herbs, to 30–40 cm high; stems striate, puberulous. Leaves alternate, lowest leaves oblong-lanceolate, c. 13 × 1 cm, entire or with few slender teeth especially below, or deeply pinnatisect; cauline leaves lanceolate to linear, 3–13 × 0.3–1.5 cm, acuminate at apex, entire along margins, sagittate-auriculate at base; sessile. Inflorescences head, axillary or terminal, 2–3 × 1–2 mm; peduncle 2–8 cm long, homogamous. Outer phyllaries 5–6, ovate, c. 0.8 mm, acuminate at apex; inner phyllaries 7–8, linear-lanceolate, 5–6 mm. Disk florets: Corolla yellow, 5-lobed; lobes linear, c. 2 mm long; tube c. 10 mm long. Stamens 5; anthers c. 2 mm long, sagittate; style c. 10.5 mm long, subulate; stigma bifid. Achenes 2–2.5 mm, reddish-brown, beaked c. 1.5 mm long; pappus 3.5 mm, white.

Fl. & Fr.: March–August.


14. MIKANIA Willd. (nom. cons.)

1 species in India and BNP.


Other synonym: M. scandens auct. non. Willd.
Scandent herbs; stems angled, striate, puberulent. Leaves opposite, triangular ovate, 1.8–5.4 × 1–3.1 cm, mucro-acute at apex, crenate-dentate along margins, truncate or cordate at base, chartaceous, scabrous, 3–5-nerved at base, inconspicuous above, raised beneath, glabrous; petioles 0.5–3.5 cm long, angled, puberulent. Inflorescences corymbose panicle, head clustered on subcymose branches, homogamous. Phyllaries 4, lanceolate, c. 3 × 1 mm, acute at apex, ciliate along margins; florets 4 per capitulum. Disk florets: Corolla campanulate, 5-lobed, lobes ovate, c. 0.4 × 0.4 mm; tube c. 1.75 mm long. Anthers exserted, c. 1 mm long, obtuse at base. Style c. 3 mm long with long arm. Achenes tetragonal, oblong, 1–1.5 × 0.3–0.4 mm, glandular sparsely; pappus 1–2-seriate, connate at base, 2–2.5 mm long.

Fl. & Fr.: Year around.

Distrib.: INDIA: Assam, Kerala, Sikkim, Tripura, Uttar Pradesh and West Bengal. WORLD: Africa, America, Anaam, China, Malay Archipelago, Myanmar, Nepal, Philippines and Taiwan.


Note: Overgrowth of this species can be observed throughout the Park.

15. SYNEDRELLA Gaertn. (nom. cons.)

2 species in India and 1 species in BNP.


Illustration: M. Blanco, Fl. Filip. t. 404. 1875.

Annual herbs, to 30–50 m high; stems terete, villous. Leaves cauline, opposite, ovate-lanceolate, 2.5–6.5 × 1–3.2 cm, acuminate at apex, serrate along margins, attenuate at base, sub-coriaceous, green, hispid; midvein impressed above, raised beneath; lateral veins 5–6 pairs, sparsely hispid; petioles 5–10 mm long, hispid. Head solitary, 3–6 mm across, heterogamous; peduncles 5–35 mm long, hirsute. Phyllaries biseriate; outer whorl ovate-lanceolate, c. 9 × 3 mm, hispid along margins, acute at apex, hispid above, glabrous beneath; inner whorl linear-lanceolate, 5–6 × 1–1.5 mm, distantly serrate along margins, spinous-acute at apex. Ray florets: Corolla tube 2–3 mm long; ligules oblong c. 2 × 1 mm. Disk florets: Corolla yellow, 4-lobed above; tube 3–3.5 mm long. Achenes dimorphic, 3–4.5 × 10.5–2 mm; ray achenes oblong-lanceolate, dorsally compressed, blackish with pale,
narrow, thick wing with 5 upwardly pointing sharp appendages on each side; disk achenes narrowly oblong-cylindrical, compressed, without wings; awns 2, 2.5–4.5 mm long, stiff, hispidulous.

Fl. & Fr.: Throughout the year.

Habitat: Grows in open and dry places of the Park.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Kerala, Madhya Pradesh, Tamil Nadu and West Bengal. WORLD: Bhutan, China, Malaysia, Polynesia, Sri Lanka, Tropical America and West Indies.


16. TRIDAX L.

1 species in India and BNP.


Herbs, to 60 cm long; stems procumbent, branched at base, terete, hirsute. Leaves opposite, elliptic ovate or lanceolate, 1.5–2.5 × 0.4–0.8 cm, irregularly serrate along margins, cuneate, pinnatisect; lobes ovate-lanceolate, coriaceous, green, hirsute both sides; prominently 3-nerved at base, obscure above, faintly visible beneath; petioles 2–4 mm long, hirsute. Inflorescences solitary heads; capitula, c. 1.5 cm across; peduncles c. 16 cm long, hirsute; peduncular bracts linear, c. 5 mm long. Phyllaries in 2–3-whorls; outer phyllaries oblong-ovate, c. 5 × 3 mm, broadly acute at apex, distantly serrate along margins, hirsute outside, glabrous inside; inner phyllaries obovate-oblong, c. 6 × 3 mm, broadly acute at apex, distantly serrate along margins. Ray florets: Corolla white, ligular, 2–3-lobed above, tube 2–3.4 mm long. Style branches recurved. Disk florets: Corolla pale yellow, 5-lobed above; lobes ovate, reflexed; tube 5–7 mm long, coarsely hairy toward apex. Stamens 5, c. 3.5 mm long. Style elongated, c. 3.5 mm long; stigma bifid. Achenes obconical, c. 2.25 × 1 mm, silky brown, 15–20 bristles, subequal; pappus 3–5 mm long, aristate, plumose bristles.

Fl. & Fr.: Throughout the year.

Habitat: Grows along Bala river in Jainti range.

Distrib.: INDIA: Widespread throughout the tropical and subtropical parts of India. WORLD: Native to tropical America; now a pantropical weed.
Specimen examined: Buxa National Park, Jainti range, NRVK 7, along with Bala river, 4th Dec., 2011, Gopal Krishna 52337.

17. VERNONIA Schreb.

13 species in India and 1 species in BNP


Perennial herbs, to 1–2 m high, woody at base; stems and branches angled, striate, sparsely glandular pubescentor subglabrous. Leaves alternate, elliptic-oblong or ovate-lanceolate, c. 3 x 0.8 cm, mucro acute at apex, denticulate along margins, rounded at base, subcoriaceous, scabrous, glandular pubescent both sides; midvein slightly impressed above, coarsely hairy, raised beneath, puberulous; lateral veins 5–8 pairs, inconspicuous above, prominent beneath, puberulous; petioles subsessile or 1–2 mm long. Inflorescences heads in terminal or axillary panicles; heads 5–8 mm across; peduncles 8–18 mm long, hirsute; peduncular bracts lanceolate, c. 2 x 0.4 mm, acute at apex, hispid. Phyllaries 5–6 seriate, reddish purple in upper part, triangular ovate or ovate-lanceolate, 1.5–4.5 x 0.5–1.75 mm, acute at apex, fimbriate along margins. Disk florets: Corolla pinkish, 5-lobed above; tube 5–6 mm long; lobes narrow lanceolate. Stamens 5; anthers obtusely auricled at base. Styles subulate, c. 5 mm long; stigma bifid. Achenes oblong-obovate, c. 3 x 1 mm, striate, ribbed, gland dotted; pappus white, 1-seriate, 5–6 mm long, scabrid-barbellate.

Fl. & Fr.: September–February.

Distri.: INDIA: Arunachal Pradesh, Assam, Karnataka Manipur, Meghalaya, Sikkim, and West Bengal. WORLD: Bhutan, Bangladesh, China, Myanmar and Nepal.

Specimen examined: Buxa National Park, Jainti range, Tashigaon 2, Bhutia Pond, 300m, 6th March, 2011, Gopal Krishna 47295.

18. XANTHIIUM L.

3 species in India and 1 species in BNP.


Other synonym: Xanthium strumarium L.

Illustration: Wight, Icon. Pl. Ind. Orient. 3: t. 1104. 1846.

Erect herbs, to 25–30 cm high, monoecious; stems terete, appressed hairy, lenticellate. Leaves alternate, broadly ovate, 1.8–5.2 x 1.6–5.2 cm, acute at apex, serrate along margins,
sometimes lobed, attenuate at base, coriaceous, green, coarsely short hairy both sides; 3-nerved at base, prominent beneath, hispid; petioles 1–4 cm long, hispid. Inflorescences terminal or axillary head; peduncle upto 10 mm long, hispid. Male capitula: phyllaries 1-seriate, linear, c. 2 × 0.3 mm, hairy along margins. Corolla campanulate, 5-lobed above; lobes triangular, c. 0.4 × 0.3 mm; tube c. 2 × 1 mm. Stamens 5. Female capitula: phyllaries 1-seriate, lanceolate, c. 4 mm long. Achenes black, fusiform, enclosed in obovoid to ellipsoid, 10–18 × 6–12 mm, hard, densely puberulent, 2-chambered burs; pappus absent.

Fl.: July-August; fr.: September-October.

Habitat: Grows along Bala river in Jainti range.

Distrib.: INDIA: Throughout. WORLD: Bhutan, Sri Lanka and Malay Peninsula.

Specimen examined: Buxa National Park, Jainti range, Bala river, Gopal Krishna 56089.

CAMPANULACEAE [391]

LOBELIA L.

22 species in India and 1 species in BNP.


Other synonym: Lobelia affinis Wall. ex G. Don.


Annual, prostrate herbs; stems terete, puberulent; rooting at nodes. Leaves alternate, simple, ovate, 1.4–2.3 × 0.9–1.7 cm, acute at apex, crenate-dentate along margins, shallowly cordate or broadly cuneate or rounded at base, chartaceous, pale green, glabrous; midvein impressed above, faintly raised beneath, glabrous; lateral veins 4–5 pairs, glabrous; petioles 5–6 mm long. Inflorescences solitary flower, axillary. Flowers bisexual, zygomorphic; pedicels filiform 1.4–1.5 cm long, hispid. Sepals green, 5-lobed, lobes free above, connate below; lobes linear, c. 4 mm long, puberulous; cup c. 2 × 3 mm, puberulous. Corolla bluish-purple, 2-lipped; upper lip 2-partite, divided unto base, lobes obovate-oblong, 6–7 mm long, glabrous; lower lip 3-lobed, lobes broadly elliptic, hairy along midvein. Stamens 5, filaments fused forming a column; column 4–5 mm long, beared at base; anthers fused, hairy at apex. Ovary c. 3 × 2 mm, enclosed in calyx cup; style c. 3 mm long, glabrous; stigma globose, hairy. Capsules ellipsoid, obovoid or oblong, c. 5 × 3 mm, many seeded; seeds trigonous, minute.

Fl. & Fr.: Throughout the year.


ERICACEAE [344]

AGAPETES G. Don

34 species in India and 1 species in BNP.

Agapetes bhutanica N.P. Balakr. & Sud. Chowdhury, Reinwardtia 7: 287 1966.; D. Banik & Sanjappa in Sanjappa & Sastry, Fasc. Fl. India 25: 262. 2014. Fig. 12; Plate 32b, c

Illustrations: Fasc. Fl. India 25: 263. f. 73. 2014.

Epiphytic shrubs; branches terete, lenticellate, glabrous. Leaves crowded at the end of branchlets, oblanceolate, 8–16.5 × 1.6–2.9 cm, acute at apex, undulate along margins, cuneate at base, leathery, brown above on drying, pale greenish-yellow beneath, glabrous, yellow gland dotted beneath; midvein impressed above, raised beneath; lateral veins many, impressed both sides; petioles 2–3 mm long, glabrous; stipules triangular-ovate, c. 3 × 1.25 mm, glabrous. Inflorescences in fascicles, in the axil of fallen leaves, 7–8-flowered. Flowers buds oblong-lanceolate, pedicellate; pedicels 8–10 mm long, subulate, glandular pubescent. Calyx pale green with pinkish tinge at the base, connate below, 5-lobed above; lobes triangular-ovate, c. 2 × 1 mm, acute at apex, glandular pubescent outside, glabrous inside. Corolla subcylindric, pale pink with intermittent red lines, 5-lobed above; lobes lanceolate, c. 8 × 5 mm, incurved, sparsely glandular-pubescent outside, Stamen 10, exserted; filaments linear, c. 2.5 mm long, puberulous; anthers orange-yellow, c. 2 cm long, spurred at middle. Ovary enclosed in calyx tube; style filiform, c. 2.9 cm long, glabrous, longer than stamens, exserted; stigma discoid-capitate. Fruits not known.

Fl.: March–May.

Distrib.: INDIA: West Bengal. WORLD: Bhutan.

Specimens examined: Buxa National Park, Jainti range, Tashigaon 2, Bhutia Pond, 7th April 2012, Gopal Krishna 56047; Darjeeling, Near Sevoke bridge, 800m, 12.5.2001, D. Banik 27886.
Fig. 12. Agapetes bhutanica N.P. Balakr. & Sud. Chowdhury: a. Flowering branch; b. Flower; c. L. S. of Corolla; d. Calyx with pedicel; e. Stamen; f. Gynoecium
Notes: This species is endemic to Southern Bhutan and adjacent West Bengal. This species was earlier known from Darjeeling and collection is from Jalpaiguri district.

**PRIMULACEAE [333]**

**ANDROSACE L.**

1 species in India and BNP.


Other synonyms: *Androsace saxifragifolia* Bunge; *Primula umbellata* (Lour.) Benth. Plate 32d


Herbs, to 10–15 cm high. Leaves basal, suborbicular 0.9–2.2 × 0.9–2.1 cm, obtuse at apex, crenate along margins, cordate at base, subcoriaceous, appressed hairy both sides; veins inconspicuous; petioles 10–12 mm long, appressed hairy. Inflorescences umbel; scapes 3–4-per rosette, filiform, pubescent, 2–6.5 cm long. Flowers pedicellate, pedicels 1–2.5 cm long, filiform, pubescent; bracts ovate-lanceolate, c. 3 × 1–2 mm, hairy, acute at apex. Calyx green, 5-lobed, free above, connate below; lobes sub-equal, ovate to lanceolate, 2–3 × 1–2 mm, acute at apex, ciliated along margins, 5–7-nerved. Corolla white, 5, free above; lobes oblong-ovate, 2.5–3 × 1.5–2 mm, obtuse at apex; tube c. 2 mm long. Stamens 5, subsessile; filaments included. Ovary subglobose, glabrous, 5-loculed; style short. Capsules globose, 3–4 mm across, many seeded; seeds dark brown, minute, sub-globose, 0.4–0.5 mm across.

Fl. & Fr.: January–February.

Distrib.: INDIA: Bihar, Jharkhand, Punjab, Kashmir and West Bengal. WORLD: China, Japan, Korea, Myanmar, New Guinea, Pakistan, Philippines, Russia, and Vietnam.


**MYRSINACEAE [333]**

Key to genera

1a. Inflorescences clustered in umbels; pendulous; petals pink; anthers forming a cone enveloping the ovary and style, gland dotted; ovary and fruit superior; ebracteate absent; stigma not lobed; fruits 1-seeded, globose or elongated and curved................................. 1. *Ardisia*

1b. Inflorescences recemose, spreading in long peduncle, erect; petals white;
anthers free and not enveloping the ovary and style eglandular; 
ovary and fruit semi-inferior to inferior; stigma 3-5-lobed; 
bracteate; fruits many seeded, angular .................. 2. Maesa

1. ARDISIA Sw. (nom. cons.)
45 species in India and 1 species in BNP.

Ardisia solanacea Roxb., Pl. Coromandel 1: 29, t. 7. 1795.

Other synonyms: Ardisia humilis Vahl; Ardisia solanacea Roxb.; Ardisia elliptica Bedd.

Illustrations: Roxb., Pl. Coromandel 1: 29, t. 7. 1795; Wight, Icon. Pl. Ind. Orient. 4: t. 1212.
1848 [as Ardisia humilis Vahl].

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1848 [as Ardisia humilis Vahl].

1. ARDISIA Sw. (nom. cons.)
45 species in India and 1 species in BNP.

Ardisia solanacea Roxb., Pl. Coromandel 1: 29, t. 7. 1795.
2. MAESA Forsskål
25 species in India and 2 species in BNP

Key to species

1a. Branches not lenticellate; leaves elliptic, elliptic-lanceolate to ovate-lanceolate, entire to broadly dentate at margin, both surfaces glabrous; inflorescences racemes and branching at base; rachis glabrous to glabrescent.......................... 1. M. indica

1b. Branches densely lenticellate; leaves broadly elliptic to oblong-orbicular, coarsely and sharply serrate-dentate along margins, densely tomentose on both surfaces; inflorescences panicles; rachis densely brownish tomentose....................... 2. M. macrophylla


Local name: "Ramjani" (Bengali).

Illustrations: Curtis’s, Bot Mag. t. 2052; Wight, Icon. Pl. Ind. Orient. 4: t.1206. 1848.

Shrubs, 1–3 m high; branches angular to obtusely ridged, pellucid punctate-lineate, striate, glabrous. Leaves simple, alternate, oblong-ovate or oblong-lanceolate, 3.5–12.5 × 1.8–2.8 cm, acute to acuminate at apex, serrate-dentate or denticulate along margins, teeth not callose, obtuse or sub-rounded at base, subcoriaceous, glabrous; midvein faintly raised above, prominent beneath; lateral veins 6–7 pairs, prominent beneath; petioles 8–12 mm long. Inflorescences axillary or sub-terminal, racemes, some time branched, 3–4.5 cm long, glabrescent or glandular granulose. Flowers globose in bud, c. 2 mm across; pedicels 1–2 mm long; bracts triangular ovate, c. 0.5 × 0.3 mm, acute, coriaceous; bracteoles broadly ovate, c. 0.5 × 0.3 mm. Sepals green, 5-lobed above, connate below; lobes broadly ovate, obtuse to rounded at apex, entire and sparsely ciliate along margins, pellucid dotted. Petals white campanulate, 5-lobed above; lobes broadly ovate, as long as tube, margins subundulate, apex acute. Stamens 5, inserted at middle of corolla tube, included; filaments as long as or longer than anthers; anthers rounded. Ovary ovoid-globose, c. 1 mm across, semi inferior; style c. 1 mm long; stigma 3–5-lobed. Berries globose or subglobose, c. 3 mm across, smooth or faintly longitudinally striate; persistent calyx lobes closed at fruit apex, many seeded; seeds black, sub-trapezoid, 0.5–1 mm long, rugose.
Fl. & Fr.: April–November.

Distrib.: INDIA: Throughout. WORLD: Africa, Bhutan, China, Malaysia and Sri Lanka.


Notes: Two population have been recognized in the Park, one corresponds to typical var. indica and other var. angustifolia Hook.f. & Thomson. The var. indica is more common in the Park in comparison to var. angustifolia Hook.f. & Thomson. It is interesting to see that both distinct varieties occurred in the Park.


Other synonym: Maesa tomentosa D. Don.

Shrubs, 2–3 m high; stems densely lenticellate, glabrous. Leaves alternate, simple, broadly elliptic, ovate or obovate, 7–11.6 × 5–9 cm, obtuse or slightly retuse at apex, serrate-dentate along margins, subcordate or truncate at base, coriaceous, yellowish green, puberulous above, glabrous or puberulous beneath; midvein impressed above, raised beneath, pilose; lateral veins 7–9 pairs, raised beneath, slightly reddish, puberulous; petioles 1–2.5 cm long, pilose. Inflorescences axillary panicles, 9–17 cm long; bracts lanceolate, c. 1 × 0.5 mm, ciliate along margins; bracteoles ovate, c. 0.5 × 0.5 mm, ciliate along margin; pedicels c. 1.5 mm long, puberulous. Sepals 5-lobed, free above, a connate below; lobes triangular ovate, c. 0.5 × 1 mm. Petal 5-lobed, campanulate below. Stamens 5; filaments inserted on or the corolla tube, short; anthers ellipsoid. Ovary globose, c. 1 × 1 mm; style short, c. 0.5 mm long; stigma 3-lobed. Berries globose, c. 2.5 mm across, many seeded; seeds hexagonal, dark brown, c. 1 × 0.5 mm, rugose.

Fl. & Fr.: February-May.

Distrib.: INDIA: Arunachal Pradesh, Assam and West Bengal. WORLD: Bhutan, Nepal and Tibet.

Specimen examined: Buxa National Park, Jainti range, Tashigaon, 326m, 8th oct., 2009, S.K. Srivastava & Gopal Krishna 46209; Buxa-Bhutan Road, 36th mile 16.05.1949, V. Narayanswami & party 2491.
Fig. 13. *Maesa macrophylla* (Wall.) A. DC.: a. Fruiting branch; b. Fruit; c. Seed
STYRAX L.

4 species in India and 1 species in BNP.


Trees, to 5–7 m tall; branchlets terete, glabrous. Leaves simple, alternate, ovate to ovate-elliptic, 4–9 × 1.6–4 cm, shortly acuminate at apex, serrate along margins, cuneate to slightly oblique at base, thinly coriaceous, glabrous; midvein faintly raised both sides; secondary veins 5–7 pairs, prominent beneath, nearly glabrous or stellate pubescent; petioles 3–5 mm long. Inflorescences axillary or terminal racemes, sometimes solitary. Flowers bisexual; pedicels c. 0.4 cm long, stellate tomentose; bracts linear, 2–3 mm long, stellate tomentose. Sepals 5-lobed, campanulate; lobes taringular c. 0.5 × 0.3 mm; tube 3–4 mm long, stellate tomentose. Petals white to cream yellow, 5, free, outside puberulous, inside glabrous; tube 2–3 mm long; lobes elliptic-oblong, 7–9 × 2–3 mm. Stamens 10, 1-seriate; filaments short, stellate tomentose at base; anthers yellow, linear, c. 4 mm long. Ovary semi-superior and semi-inferior, stellate tomentose, 3–1-loculed; style, c. 9 mm long; stigma capitate. Capsules ellipsoid, c. 1.5 × 1 cm, densely gray-brown stellate tomentose, sometimes sparsely stellate villose, apex slightly oblique and acute to apiculate, 1–2-seeded; seeds smooth or rugose.

Fl. & Fr.: March–December.


Specimens examined: Buxa National Park, Gadadhar range, Panbari 9, 60m, 12th March, 2011, Gopal Krishna 50553; East Damanpur, Checko 2, 54 m, 27th Nov. 2011, Gopal Krishna 50589.

OLEACEAE [364]

Key to genera

1a. Inflorescences pedunculate heads; fruit a capsules.......................... 1. Jasminum

1b. Inflorescences cymes; fruits a berry........................................... 2. Nyctanthes
1. **JASMINUM L.**

40 species in India and 3 species in BNP.

Key to species

1a. Leaves chartaceous; calyx teeth more than 10 mm long................. 2. *J. nervosum*

1b. Leaves subcoriaceous; calyx teeth less than 10 mm long

2

2a. Anthers shorter or equal to filaments ......................... 1. *J. multiflorum*

2b. Anthers longer than filaments .................................. 3. *J. scandens*


Other synonym: *Jasminum pubescens* (Retz.) Willd.

Illustrations: Rheede, Hort. Malab. 6: t. 54. 1686; Andrews, Bot. Repos. 8: t. 496.1807-1808.

Shrubs, to 2 m high, much branched; branches terete, pubescent. Leaves simple, ovate or ovate-elliptic, 1.5–4.5 × 1–2.4 cm, mucro-acute at apex, undulate, along margins, truncate or rounded or shortly oblique at base, subcoriaceous, shining, glabrous except veins; secondary veins inconspicuously 6–8 pairs, pubescent, looping at margins; petioles 2–3 mm long, pubescent. Inflorescences terminal, 5–6-flowered lax cymes. Flowers bisexual; pedicels c. 1 mm long, pubescent; bracts leafy, ovate, c. 1.5 × 0.8 cm, glabrous. Calyx green, 6–8-toothed above, tubular below; tube c. 2 mm long, tube densely hairy inside; teeth hairy c. 1 cm long, pubescent. Petals white, fragrant, 6–8-lobed; tube c. 2.5 cm long, glabrous; lobes lanceolate, 1–1.3 cm long, acute at apex. Stamens 2; filament epipetalous, attached to corolla tube; anthers oblong, c. 0.5 cm long, shorter than filaments. Ovary c. 1 × 1 mm; style c. 4 mm long; stigma oblong, c. 3 mm long. Fruits not seen.

Fl. & Fr.: October–April.


Notes: This species is known from Darjeeling district and the present collection from Jalpaiguri district.


Other synonyms: *Jasminum astomosans* DC.; *Jasminum stenopetalum* Lindl.

Illustration: Lindl., Bot. Reg. 11: t. 918. 1825 [as *Jasminum stenopetalum* Lindl.].
Scandent shrubs, 1–5 m high; branchlets drooping, terete, glabrous or sparsely pubescent. Leaves simple, ovate or ovate-lanceolate 3.2–7.3 × 1.6–3.5 cm, acuminate at apex, entire along margins, cuneate at base, chartaceous, dark green, with some brown patches, glabrous; midvein impressed above, raised beneath, glabrous; secondary nerves 5–7 pairs, anastomosing with intra-marginal nerves, 3-nerved at base, prominent beneath, glabrous; petioles 5–8 mm, terete, glabrous. Inflorescences 1–5-flowered cymes; peduncles 1–5.2 cm long. Flowers bisexual, fragrant; bracts leafy, narrowly ovate, c. 13 × 5–6 mm, mucro-acute at apex, midvein prominent; bracteoles linear 6–8 mm long; pedicels c. 4 mm long. Calyx teeth filiform above; teeth 10–15 mm long, subulate; tube 2–3 × 1.5–2 mm. Petals white, 7-lobed, free above; tube 10–13 mm long; lobes 7–10, linear-lanceolate 10–12 × 1–1.5 mm, acute. Stamens 2 epipetalous; filaments c. 1 mm long; anthers linear-oblong, 2.75–3 mm long. Ovary c. 1.5 × 1.5 mm; style 1.5–2 mm long, glabrous; stigma clavate, c. 2.75 mm long. Berries ellipsoid, 1.2–1.8 cm long, calyx in fruit often thickened, divaricate.

Fl. & Fr.: April–February.

Distrib.: INDIA: Assam, Manipur, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, Laos, Myanmar, Nepal and Vietnam.


Climbing shrubs, 5–10 m high; stems terete, reddish, swollen at node; stipules hairy at the nodes. Leaves simple, oblong-ovate, 8.5–11 × 3.5–8 cm, narrowly acuminate at apex, entire along margins, rounded or slightly cuneate at base, thinly coriaceous, shining, glabrous; midvein impressed above, raised beneath; secondary veins 3–4 pairs, 3-nerved at base, prominent beneath; petioles c. 1.4 cm long, more or less articulated, winged. Inflorescences 1-flowered, axillary or terminal or contracted cyme. Flowers bisexual. Calyx 7-lobed, free above, basal portion covering the remaining portion of flowers; lobes linear, c. 2 mm long, hairy. Petals white, fragrant, 6–7-lobed above; lobes ovate, 12–16 × 1.5–2.5 mm, acute at apex; tube 15–20 mm long. Stamens 2; filament short, sessile, adnate to corolla; anthers c. 1 × 1 mm, longer than filament, beaked. Ovary 1–1.5 × 1 mm; style c.
0.5 mm long; stigma indistinct. Berries ellipsoid, 6–13 mm long, ripening black, single or often paired.

Fl. & Fr.: November–March.

Distrib.: INDIA: Andhra Pradesh, Assam, Arunachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Odisha, Tripura and West Bengal. WORLD: Bhutan.


2. NYCTANTHES L.

1 species in India and BNP.


Local names: "Septalika", "Singhar", "Harsinghar" (Bengali).

Illustration: Curtis’s Bot. Mag. 82: t. 4900. 1856.

Shrubs or small trees, to 3–4 m high; branches quadrangular, scabrid. Leaves opposite, ovate, 3.7–11.5 × 1.3–5 cm, mucro-acute at apex, entire along margins, rounded to slightly oblique at base, coriaceous, scabrous; midvein appressed above, slightly raised beneath, scabrous; secondary veins 3–4 pairs, appressed hairy; petioles 5–7 mm long, hispid; stipules lanceolate, c. 2 mm long, hispid. Inflorescences cymes, terminal; peduncles 1.5–5.7 cm long, angled, pubescent. Flower pedicels 0.8–1.3 cm long, puberulous; bracts 1.5–5.6 × 0.5–2 cm. Calyx 4–5 toothed above, connate below; tube c. 7 × 3 mm, puberulous. Corolla hypocrateriform, white with orange red tube, 4–8-lobed above; tube c. 7 mm long; lobes lanceolate, 7–10 mm long. Stamens 2; filament subsessile, hairy; anthers oblong, c. 2.2 mm long. Ovary c. 1 × 1 mm, glabrous; style cylindric; stigma shortly 2-fid. Capsules elliptic or suborbicular, 15–18 × 14–15 mm, green, 2-lobed.

Fl. & Fr.: July–January.

Distrib.: INDIA: Almost throughout. WORLD: Pakistan (cultivated)

Specimens examined: Buxa National Park, Jainti range, NRVK 6, 10th April, 2012, Gopal Krishna 56095.

APOCYNACEAE [354]

Key to genera

1a. Anthers free from the stigma; fruits either follicles or drupaceous; seeds with or without coma ................................................................. 2
1b. Anthers conniving enclosing the stigma; fruits follicles; seeds always with coma at one or both ends ................................................................. 5

2a. Calyx glandular ................................................................. 3

2b. Calyx eglandular ................................................................................. 4

3a. Tress; corolla lobes overlapping to right; follicles slender, many seeded; seeds exarillate, with coma......................... 3. Holarrhena

3b. Erect shrubs; corolla lobes overlapping to left; follicles short and ellipsoid, few seeded; seeds orange or red arillate, coma absent ................................................................. 7. Tabernaemontana

4a. Trees; disk of 2 separate glands alternating with carpels; fruits follicles; many seeded; seeds comatose at both ends.............................. 1. Alstonia

4b. Shrubs; disk ring like or cup-shaped; fruits drupaceous; few seeded, wings or coma absent ................................................................. 5. Rauvolfia

5a. Anthers more or less exserted; corolla salver-shaped to subcampanulate ................................................................. 6

5b. Anthers included; corolla funnel shaped ......................................................... 7

6a. Trees; corolla rotate, surrounded by orange pink corona; corolla tubes scaly at the neck; carpels free below; follicles lenticellate......................... 10. Wrightia

6b. Climbing shrubs; corolla surrounded by creamish yellow corona; corolla tube without any scales at the neck; carpels connate or sub-connate; follicles without lenticels .............................................. 9. Vallaris

7a. Corolla lobes caudate, yellowish-green with crimson tinge at base and middle; corona present; disk absent ......................... 6. Strophanthus

7b. Corolla lobes not caudate, white or cream; corona absent; disk present................................................................. 8

8a. Corolla tube thickened at throat; lobes spathulate; disk divided into 5 erect lobes or 5 free scales................................. 10. Trachelospermum

8b. Corolla tube not thickened at throat; lobes not spathulate; disk entire or shortly 5-lobed ................................................................. 9

9a. Leaves broadly ovate or suborbicular; flowers large; corolla white with yellow spot at throat; lobes obovate, obtuse, not twisted at tip; follicles angled and close to each other ................. 2. Chonemorpha

9b. Leaves narrowly elliptic; flowers small; corolla uniformly white, lobes twisted at tip; follicles terete and divericate ................. 4. Ichnocarpus
1. ALSTONIA R. Br. (*nom. cons.*)

6 species in India and 1 species in BNP.


*Plate 33b*

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 422. 1845.

Trees, to 20–25 m tall; branchlets terete, glabrous, lenticellate; bark gray. Leaves whorled toward end of branchlets, elliptic-ovovate, 11.3–15 × 4.5–5.2 cm, obtuse at apex, entire along margins, attenuate at base, leathery, pale green, shining above, glabrous, punctuate glands beneath; midvein impressed above, raised beneath; lateral veins 30–34 pairs; petioles 10–12 mm long, stout. Inflorescences short branched cymes or sessile clusters at ends of umbellastout inflorescences branches; peduncles 4–7 mm long. Calyx green, 5-lobed; lobes ovate-lanceolate, 1.5–3 mm long, densely puberulent. Corolla white, fragrant, salver-form, 5-lobed above; tube 6–10 mm long, slightly inflated near attachment of anthers, puberulent; lobes broadly ovate or broadly obovate, 2–4 × 2–4 mm, rounded, puberulent both sides, margins undulate. Stamens included, inserted near or above middle of corolla tube; anthers ovate, free from stigma. Disk absent. Follicles linear, 24–44 × 0.5–0.6 cm, many seeded; seeds linear, c. 8 mm long, with coma like long brown cilia at both ends.

**Fl. & Fr.:** November-April.


**Specimens examined:** Buxa National Park, Jainti range, Jainti 5a, 8th April, 2012, Gopal Krishna 56061.

2. CHONEMORPHA G. Don (*nom. cons.*)

2 species in India and 1 species in BNP.


**Other synonym:** *Chonemorpha macrophylla* G. Don.

**Fig. 14; Plate 33c, d**

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 432. 1845.
Fig. 14. Chonemorpha fragrans (Moon) Alston: a. Fruiting branch; b. Seed with coma
Lianas; stems and branches terete, leticellate, tomentose. Leaves broadly ovate or suborbicular, 21–24.5 × 13.5–17.3 cm, obtuse or broadly acute at apex, entire along margins, rounded or sub-cordate at base, coriaceous, pale green, scabrous above, hispid beneath; midvein impressed above, raised beneath, hispid; lateral veins 11–13 pairs, prominent beneath, hispid; petioles 3–4 cm long, coarsely hairy. Inflorescences cymes lax, paniculate or racemose, terminal, 10–15-flowered; peduncle 6–10 cm long. Flowers 5–6 cm across. Calyx 5-lobed, free above, tubular below; lobes triangular-ovate, 4–7 × 3–4 mm, acute; tube 4–6 mm long, glabrescent outside. Corolla white, fragrant, twisted in buds, 5-lobed, lobes overlapping to right; lobes obliquely obovate, 3.5–5 × 2.5–3.5 cm; tube 3.5–6 cm long, glabrous outside, throat villous, dilated at base. Stamens 5; filaments short, pubescent. Follicles straight, close to each other, trigonous, c. 34 × 4 cm, woody, many seeded; seeds obovate, c. 1.5 × 0.5 cm, hard, brown; coma 6–7 cm long, white with yellowish centre.

Fl. & Fr.: April-November.

Distrib.: INDIA: Moist forests throughout India including Andaman Islands. WORLD: Bhutan, China, Indonesia, Malaysia, Myanmar, Sri Lanka and Thailand.

Specimens examined: Buxa National Park, Gadadhar range, Panbari 7–8, 29th Nov., 2011, Gopal Krishna 47177; Rajabhatlhawa Depot. Road, 14.05.1949, V. Narayanswami & party 2419.

3. HOLARRHENA R. Br.

1 species in India and BNP.

Holarrhena pubescens Wall. ex G. Don, Gen. Hist. 4: 78 1837.

Other synonyms: Echites pubescens Buch.-Ham.; Holarrhena antidysentrica Wall. ex A. DC.; Holarrhena malaccensis Wight

Illustration: Wight, Icon. Pl. Ind. Orient. 4: t. 1298. 1848 [as Holarrhena malaccensis Wight].

Trees, 10–12 m tall; branchlets terete, white lenticellate. Leaves ovate, or ovate-oblong 10–23 × 3.2–10 cm, acuminate at apex, entire along margins, obliquely cuneate at base, coriaceous, shining above, glabrous above, appressed hairy beneath; midvein impressed above, puberulous, raised beneath, hispid, reddish; lateral veins 15–18 pairs, prominent beneath, pubescent; petioles short or sub-sessile. Inflorescences cymes, 5–8 cm long; peduncles 1–2 cm long. Flowers fragrant; pedicels 0.5–3 cm long. Calyx glandular at base, 5-lobed above; lobes elliptic-linear, sub-equal. Corolla lobes in bud overlapping to right; salver-form when opened, 5-lobed above; lobes obovate, 10–20 × 3–8 mm, spreading,
slightly recurved; tube cylindric, 9–12 mm long. Stamens 5; filaments included; anthers narrowly ovate. Follicles in pair, linear, 24–30 \times 0.5–0.7 cm, white lenticellate, many seeded; seeds ellipsoid, 15–17 \times 3–4 mm, puberulent with coma at end; coma white, c. 3 cm long.


**Distrib.:** INDIA: Throughout. WORLD: Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam; Africa.


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4. **ICHNOCARPUS** R. Br. (*nom. cons.)*

3 species in India and 1 species in BNP.

**Ichnocarpus frutescens** (L.) W.T.Aiton, Hort. Kew. (ed. 2) 2: 69. 1811; Hook.f. in Hook.f., Fl. Brit. India 3: 669. 1882; Prain, Bengal Pl. 2: 680. 1903. *Apocynum frutescens* L., Sp. Pl. 213. 1753. Fig. 15; Plate 33f

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 430. 1840–1843.

Climbing shrubs; stems and branches terete, rusty tomentose. Leaves narrowly elliptic, 2.1–8.5 \times 0.7–3.2 cm, mucro-acute at apex, entire-wavy along margins, cuneate at base, sub-coriaceous, dark green, glabrous or subglabrous beneath; midvein impressed above, slightly raised beneath, hispid; lateral veins 4–6 pairs; petioles 5–7 mm long, hispid. Inflorescences axillary or terminal racemes or many flowered pedunculate heads. Flowers fragrant, pedicellate; pedicels 3–4 mm, pubescent. Calyx 5-lobed above, connate below; lobes ovate, c. 1 \times 1 mm, acute at apex, ciliate along margins. Corolla white, salverform, 5-lobed above; lobes oblanceolate, c. 5 \times 1 mm, tips curved, glabrous, densely hirsute at throat; tube overlapping to right, widened near base, c. 3 mm long, hairy outside, glabrous inside. Stamens 5; filaments c. 1 mm long, glabrous; anthers oblong, c. 1 mm long, sagittate, papillose. Ovary oblong, c. 0.75 mm long, hairy; style c. 5 mm long; stigma clavate c. 0.5 mm long, glabrous. Follicles slender, bent, divaricated, 2.5–7 \times 0.2 cm; seeds linear c. 1.5 cm, comatose, 1.2–2 cm long.

Fl. & Fr.: June–December.

**Distrib.:** INDIA: Throughout warmer regions. WORLD: Australia, Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.
Fig. 15. *Ichnocarpus frutescens* [L.] W.T. Aiton: a. Flowering branch; b. Flower bud; c. Flower; d. Corolla split open; e. Fruit

5. RAUVOLFIA L.

5 species in India and 2 species in BNP.

Key to species

1b. Leaves narrowly elliptic, usually 2 at each node, glabrous; calyx lobes lobulated; corolla tube 10–20 mm, lobes not lobulated..... 1. R. serpentina

1a. Leaves broadly obovate or elliptic, usually 4 at each node, tomentose when young; calyx lobes not lobulated; corolla tube 2–3 mm, lobes further lobulated at apex................................. 2. R. tetraphylla


Local name: “Chandra” (Bengali).


Undershubs, 30–50 cm high; stems terete, lenticellate below, glabrous above. Leaves crowded towards end of branches, ovate to ovate-elliptic, 7–13 × 2.8–6.5 cm, acute or shortly acuminate at apex, entire along margins, obtuse or rounded at base, membranous, glabrous; midvein impressed above, slightly raised beneath, glabrous; lateral veins 5–6 pairs; petioles 8–10 mm long. Inflorescences cymose; peduncles 4–9 cm long, stout. Flower pedicels 1–2 mm long. Calyx 5-lobed; lobes subequal, triangular lanceolate, c. 1.5 × 0.75 mm, lobulated at apex; tube c. 2 mm long. Corolla white, 5-lobed, connate below; lobes oblong-elliptic, c. 2 × 1 mm; tube c. 4 mm long, hairy at neck. Stamens 5, adnate to tube in middle; filaments short; anthers oblong, c. 1 mm long, sagittate, papillose at apex. Disk shallowly lobed. Ovary orbicular, c. 1 × 0.5 mm; style c. 0.75 mm long; stigma with a broad calyptrate base, tip bifid. Drupes obovoid, 5–8 mm long, prominently lobed.

Fl.: February-October; fr.: May-December.

Distrib.: INDIA: Throughout. WORLD: Bhutan, China, Indonesia, Malaysia, Myanmar, Sri Lanka and Thailand.

Plate 33: a. Jasminum nervosum Lour.; b. Alstonia scholaris (L.) R. Br.; c - d. Chonemorpha fragrans (Moon) Alston; c. Flowering branch; d. Follicles; e. Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don; f. Ichnocarpus frutescens (L) R. Br.; g - h. Rauvolfia serpentina (L.) Benth. ex Kurz; g. Flowering branch; h. Fruting branch

Other synonym: Rauvolfia canescens L.

**Local names:** "Gandhanakuli", "Bar-chandrika" (Bengali).

**Illustration:** Hook., Icon. Pl. 4: t. 366. 1841.

Shrubs, to 1–1.5 m high; stems terete, tomentose when young, glabrescent when mature. Leaves in whorls of 3–4, ovate, narrowly ovate, or oblong, 1.8–11 × 1–5 cm, broadly acute or obtuse at apex, entire along margins, broadly cuneate to rounded at base, membranous, green, shining; midvein flattened above, faintly raised beneath; lateral veins 5–12 pairs, conspicuous beneath; petiole 2–5 mm long. Inflorescences axillary cymose; peduncles 1–4 cm. Flower pedicels c. 2.5 mm long, pubescent; bracts triangular ovate, c. 0.8 × 0.5 mm, acute at apex, ciliate along margins. Calyx green, 5-lobed, cupular below; lobes triangular ovate, c. 1 × 1 mm, bifid at apex, ciliate along margins; cup c. 1 × 2 mm. Corolla greenish white, 5-lobed above; lobes suborbicular, c. 1 × 1 mm, notched/lobulate at apex; tube urceolate, c. 4 × 2.25 mm, pubescent both sides, more densely at neck of tube. Stamens 5, included; filaments fused with corolla tube; anthers c. 0.5 mm long. Disk angled, enclosing the ovary. Ovaries encased in calyx tube; style c. 0.1 mm long; stigma with a broad calyptrate base. Drupes subglobose, 5–10 mm across, faintly lobed, immature green, red when mature, sparsely pubescent, 1–2-seeded.

Fl. & Fr.: April–August.

**Distrib.:** INDIA: Throughout (Cultivated & naturalized). WORLD: Native to tropical America.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, SRVK 4, S.K. Srivastava & Gopal Krishna 47121.

Use: Medicinal.

6. STROPHANTHUS DC.

3 species in India and 1 species in BNP.

**Strophanthus wallichii** A. DC., Prodr. 8: 418. 1844; Hook.f. in Hook.f., Fl. Brit. India 3: 655. 1882; Prain, Bengal Pl. 2: 677. 1903.

Other synonym: *Nerium caudatum* Roxb.

Lianas; branches terete, lenticellate, reddish. Leaves elliptic-obovate, 5.2–13.1 × 2.5–6 cm, abruptly acuminate at apex, entire along margins, attenuate at base, chartaceous, shining, turned pale when dry, glabrous; midvein flattened both sides, glabrous; lateral veins 7–9 pairs, inconspicuous, glabrous; petioles 5–10 mm long, glabrous. Inflorescences many-
Fig. 16. Strophanthus wallichii A. DC.: a. Flowering branch
Fig. 17. *Strophanthus wallichii* A. DC.: a. Fruiting branch
flowered lax dichotomous cymes; peduncles 1.8–3.2 cm long, glabrous. Flower pedicels 5–12 mm long, glabrous; bracts linear-lanceolate, c. 20 × 2 mm, puberulent. Calyx 5-lobed; lobes linear-lanceolate, c. 19 × 2 mm, ciliate along margins, nerves conspicuous. Corolla lobes overlapping and twisted to right in buds, green with crimson tinge at base and middle lobes linear, 6–14 cm long, puberulent; tube 2–6 mm long, slightly swollen above, puberulent inside. Corona lobes 5, inserted at base of corolla, each bifurcated into two lobes, 2.8–6.5 mm high, white. Stamens inserted at apex of corolla tube; filaments short; anthers sagittate, connivent, adherent to stigma, spurred at base. Follicles in pairs, cylindric-lanceolate, 17–19 × 1.8–2.3 cm, lenticellate, narrow beaked, many seeded; seeds narrowly elliptic, c. 15 × 2 mm, with cream-white 5.5–8 cm long coma.

Fl. & Fr.: April-December.

Distrib.: INDIA: Almost throughout India. WORLD: Native to Africa.


Notes: This species is reported from Darjeeling district. The present collection is from Jalpaiguri district.

7. TABERNAEMONTANA L.

5 species in India and 1 species in BNP.


Other synonym: Tabernaemontana coronaria (Jacq.) Willd. Plate 34e

Local name: “Tagur” (Bengali).


Shrubs, to 2–3 m high; branches terete, lenticellate, glabrous. Leaves elliptic-lanceolate to lanceolate, 4.2–9.5 × 1.6–2.3 cm, acuminate at apex, entire along margins, cuneate at base, sub-coriaceous, shining above, glabrous; midvein impressed above, slightly raised beneath, glabrous; lateral veins 6–8 pairs, inconspicuous above, prominent beneath, glabrous; petioles 4–7 mm long, glabrous. Inflorescences dichotomous cymes, 1–8-flowered. Flowers buds ovoid, corolla lobes overlapping to left; bracts scaly. Calyx 5-lobed, free above, tubular below; tube 1.5–2 mm long; lobes variable in shape, rounded to acuminate, c. 1 mm. Corolla white, 5-lobed; tube 16–20 mm long, glabrous outside, pilose inside below stamens; lobes obovate, 15–22 × 10–20 mm. Stamens 5, below middle of
tube; filaments subsessile; anthers oblong c. 5 mm long. Follicles 2, divaricated, ellipsoid, 4–5 × 0.9–1.5 cm, green, orange-red when mature, few seeded; seeds with a red or orange fleshy aril, c. 9 × 4 mm; coma absent.

Fl. & Fr.: August–June.

Distrib.: INDIA: Throughout ( Cultivated or naturalized). WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal and Thailand (cultivated in tropical and subtropical Asia).


8. TRACHELOSPERMUM Lem. (nom. cons.)

4 species in India and 1 species in BNP.


Climbing shrubs; stems terete, puberulous. Leaves elliptic, 2.5–7 × 1.3–2.9 cm, mucro-acute at apex, entire along margins, cuneate at base, glabrous; midvein impressed above, raised beneath, puberulous beneath; secondary veins 11–13 pairs, raised above beneath, arched upwards; petioles c. 0.5 cm long. Inflorescences terminal or lateral corymbose cymes; peduncles 2–3 cm long. Flowers c. 1 cm long; pedicels c. 0.4 cm long. Calyx 5-lobed; lobes triangular-ovate, c. 2.5 × 1 mm, ciliated along margins. Corolla white, salverform, 5-lobed; tube cylindric, c. 0.6 cm long, dilated at throat, slender below; lobes spatulate, c. 6 mm long, hairy at base. Stamens 5, inserted in the middle of corolla tube; filaments included; anthers sagittate. Disk scales 5, free. Ovaries 2, free, usually longer than disk; ovules numerous in each ovary; style short; stigma conical. Follicles 2, linear or fusiform, divergent or parallel, many seeded; seeds linear-oblong, coma silky white.

Fl.: April–May.

Distrib.: INDIA Arunachal Pradesh, Assam and West Bengal. WORLD: Bhutan.


Note: New record for West Bengal.

9. VALLARIS Burm.f.

3 species in India and 1 species in BNP.

Fig. 18. Trachelospermum assamense Woodson: a. Flowering branch; b. Flower; c. L.S. of flower showing position of stamens; d. Anther; e. Gynoecium with calyx
Other synonyms: *Vallaris heynii* Spreng.; *Vallaris assamensis* Griff.; *Vallaris dichotoma* (Roxb.) Wall. ex G. Don.  

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 438. 1840–1843 [as *V. Dichotoma* (Roxb.) Wall. ex G. Don].

Climbing shrubs; branches and branchlets terete, lenticellate, puberulent or glabrous; bark whitish. Leaves ovate-lanceolate or oblong-ovate, 2.3–6.5 × 1.1–2.5 cm, shortly acuminate at apex, entire along margins, rounded at base, chartaceous, shining, pellucid dotted above, sparsely hairy beneath; midvein slightly raised beneath, hairy both sides; lateral nerves 7–10 pairs, pubescent; petioles 2–5 mm long. Inflorescences cymose; peduncles 0.5–3 cm long. Flowers 2–3 cm across, pedicellate; pedicels 5–14 mm long, tomentose; bracts narrowly ovate-lanceolate, 4–5 × 1 mm, tomentose. Calyx green, 5-lobed above, cupular below; lobes lanceolate, 3.5–4 × 1–1.25 cm, acute at apex, tomentose both sides, spreading. Corolla creamish, sub-campanulate, lobes overlapping to right in buds, 5-lobed above; lobes orbicular, 7–9 × 5–9 mm; cup c. 4 mm, glabrous outside, white villous inside near ovary. Stamens 5; filaments flattened, adnate to corolla tube, c. 3 mm long, spurred at base; anthers c. 1 mm long. Ovary 2-locular, hairy; style c. 2.5 mm long, hairy; stigma globose. Follicles oblong-ovoid, c. 7.5 × 1.8 cm, more less lenticellate, many seeded; seeds ellipsoid-ovate, c. 7 × 4 mm, rugose; coma white, c. 2 cm long.

**Fl. & Fr.:** February–September.

**Distrib.:** INDIA: Throughout. WORLD: Bhutan, Cambodia, China, Indonesia, Laos, Myanmar, Pakistan, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jainti range, Jainti 2a, 4th March, 2011, Gopal Krishna 47240.

**10. WRIGHTIA** R. Br.

5 species in India and 1 species in BNP.


Other synonym: *Wrightia tomentosa* Roem. & Schult.  

**Plate 35c, d**

**Local name:** “*Dudh-koraiya*” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 443. 1840–1843 [as *Wrightia tomentosa* Roem. & Schult.].

Trees, to 5–10 m tall; branches terete, white lenticellates. Leaves pinnately compound, 30–35 cm long, 8–10-leaflets; leaflets ovate-elliptic or ovate or oblong-ovate, 3.5–11.5 × 2–6
cm, shortly acuminate at apex, crenate along margins, attenuate at base, coriaceous, dark green above, pale beneath when dry, scabrid above, densely hispid beneath; midvein impressed above, puberulent, slightly raised beneath, densely hairy; lateral veins 13–16 pairs, hirtellous above, pilose beneath; petiolules 3–8 mm long, hispid. Inflorescences many flowered cymes; peduncles c. 2 cm long. Flower pedicels 1–1.5 mm long. Calyx pale green, 5-lobed above, tubular below; lobes triangular-ovate, 6–7 × 6 mm, acute at apex. Corolla white, 5-lobed, lobes overlapping to left; tube 5–7 mm long, glabrous; lobes linear-elliptic, c. 1 cm long, puberulent, acute to obtuse at apex. Stamens yellow-white, inserted midway up corolla tube, slightly exserted; anthers fused together forming a cone projecting from mouth. Corona present. Ovary greenish, narrowly ovate, c. 1 mm long, enclosed by staminal column; style c. 2 mm long. Follicles fused, cylindric, c. 28 × 2 cm, lenticellate, many seeded; seeds 15–17 mm long; coma white, 4–5 cm long.

Fl.: April-July; fr.: June-October.


ASCLEPIADACEAE [354]

Key to genera
1a. Epiphytic shrubs; leaves fleshy and leathery ......................................................... 2
1b. Erect or climbing shrubs; leaves membranous to leathery ........................................ 3
2a. Calyx glandular at base; corolla ovoid-urceolate and inconspicuous; corona lobes not fleshy, scaly and erect ......................... 3. Dischidia
2b. Calyx eglandular at base; corolla reflexed, conspicuous; corona lobes fleshy, stellately spreading ........................................... 6. Hoya
3a. Erect shrubs ................................................................................................................................................................. 4
3b. Climbing shrubs ............................................................................................................................................................... 5
4a. Leaves lanceolate, asymmetrically attenuate at base; corolla vermillion, reflexed; corona lobes yellow, broadly pouchet at base.............................................................. 1. Asclepias
4b. Leaves broadly ovate, sub-cordate to rounded at base; corolla purple to pale purple or white; corona lobes more or less with same colour ........................................................................ 2. Calotropis
5a. Inflorescences lax, many-flowered cymes; corolla urceolate, glabrous outside, and throat closed entirely by a ring of silvery bristles; follicles hirsute ............................................. 7. Marsdenia

5b. Inflorescences umbels; corolla sub companulate or rotate; follicles glabrous or minutely pubescent ................................... 6

6a. Flowers uniformly green; corolla sub-campanulate; corona distinctly lobed; follicles divaricate ............................................. 4. Dregea

6b. Flowers uniformly white; corolla spreading; corona lobes indistinct; follicles close to each other ............................................. 5. Gymnema

1. ASCLEPIAS L.

1 species in India and BNP.


Shrubs to 1 m high; stems terete, glabrous. Leaves elliptic or elliptic-lanceolate, 6.5–10.5 × 0.7–2.2 cm, acute at apex, entire along margins, asymmetrically attenuate at base, chartaceous, shining above, glabrous veins; midvein impressed above, raised beneath, hairy; lateral veins 10–13 pairs, pubescent, looping towards margins; petioles 5–10 mm long, pubescent. Inflorescences cymes, terminal, 7–10 flowered; peduncles 1.2–1.9 cm long, tomentose; peduncular bracts, linear, 6–8 mm long, tomentose. Flowers c. 7 × 7 mm; pedicels 8–10 mm long, filiform, tomentose; bracts linear, 2 mm long, hairy. Calyx 5, free, triangular ovate, c. 2.5 × 1 mm, margins ciliate, nerves conspicuous. Corolla orange-red, 5-lobed; lobes oblong-obovate, c. 5 × 2 mm, obtuse at apex, glabrous, reflexed. Coronal scales 5, very distinctive, yellow, erect, adnate to stamina column, broadly pouched at base. Gynostegium column c. 2.5 mm long, head c. 3 mm long; stigmatic head c. 2.5 mm broad. Pollinia 2 per pollinarium, pendulous. Follicles fusiform, c. 4.8 × 1 cm, with persistent calyx, many seeded; seeds obovate, c. 5 × 3 mm; coma c. 1.5 cm long.

Fl. & Fr.: Throughout the year.

Habitat: Grows in waste places.

Distrib.: INDIA: Throughout. WORLD: Native of tropical America, widely introduced elsewhere.

Specimen examined: Buxa National Park, Jainti range, NRVK 5a, Gopal Krishna 46288.
2. CALOTROPIS R. Br.

3 species in India and 1 species in BNP.


Local names: “Akanda”, “Gurtakanda” (Bengali).


Shrubs, to 1–2 m high; stems sub-terete, hairy. Leaves oblong-ovate to oblong-obovate, 6–19 × 3.6–9.4 cm, broadly acute to obtuse at apex, entire along margins, rounded to subcordate at base, sub-coriaceous, white tomentose; midvein impressed above, raised beneath; lateral veins 5–6 pairs; petioles 5–6 mm long, tomentose. Inflorescences umbelliform; peduncles 5–12 cm long, tomentose. Flower pedicels 1.1–2.2 cm long, hairy. Calyx 5-lobed; lobes ovate-lanceolate, c. 5 × 2.5 mm, acute at apex, margin denticulate. Corolla purplish or lilac with paler greenish base, 5-lobed; lobes ovate, 1–1.5 × 0.6–1 cm, spreading or reflexed, margin revolute. Corona shorter than gynostegium, lobes spurred at base. Follicles obliquely elliptic to oblong-lanceolate, 5–10 × 2.5–4 cm, both ends incurved; seeds broadly ovate, 5–7 × 3–4 mm; coma 2.5–4 cm.

Fl. & Fr.: Throughout the year.

Distrib.: INDIA: Throughout. WORLD: China, Iran, Nepal, Pakistan and Sri Lanka.


Note: This species having two color variant flowers (white and purple) in the park.

3. DISCHIDIA R. Br.

4 species in India and 1 species in BNP.


Other synonyms: Dischidia cuneifolia Wall.; Dischidia spathulata Blume; Dischidia littoralis Schltr.; Dischidia loeseneriana Schltr. Plate 35e, f


Twining rambling epiphytic shrubs; stems terete, glabrous, hang on other branches; rooting intrmitently. Leaves lanceolate, 2.2–6.5 × 0.5–1.7 cm, acute at apex, entire along margins, rounded at base, fleshy, leathery, pale-green, glabrous, gland dotted; midvein and lateral veins inconspicuous; petioles 3–7 mm long, stout, slightly bent, hispid.
Inflorescences axillary or terminal fascicles. Flowers shortly pedicellate; pedicels c. 1 mm long, glabrous. Calyx glandular at base, 5-lobed; lobes oblong-ovate, c. 1 x 0.5 mm, acute at apex, glabrous. Corolla valvate in bud, waxy, ovoid-urceolate, c. 3.5 mm, glabrous outside, hairy within, 5-lobed; lobes triangular ovate, c. 1.2 x 0.8 mm, acute at apex, spreading, reflexed. Corona 5-lobed, c. 1.2 mm long, scaly, membranous, erect. Stamens 5, c. 1.5 mm long; pollinia 5, pollen masses solitary in each anther cell, yellow, waxy, c. 0.2 x 0.9 mm. Gynostegium c. 1 mm long. Follicles linear, c. 5.5 x 0.5 cm, acute at apex, glabrous, many seeded; seeds oblong, 2–2.5 x 0.5–1 mm; coma silky white, 2–3 cm long.

Fl. & Fr.: March–December.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nicobar, Sikkim, Tripura, West Bengal. WORLD: Bhutan and Java.

Specimen examined: Buxa National Park, Jainti range, Jainti 1, 4th March, 2011, Gopal Krishna 47227.

4. DREGEA E. Mey. (nom. cons.)

2 species in India and 1 species in BNP.


Other synonym: Wattakaka volubilis (L.f.) Stapf.

Local name: “Tita-Kunga” (Bengali).

Illustration: Rheede, Hortus Malab. 9: t. 15.1689 [as witta-kakacodi].

Scandant shrubs; stems terete, glabrous, lenticellate, hollow. Leaves broadly ovate to ovate-oblong, 8.5–17 x 5.7–13.5 cm, cordate at base, incision up to 1–1.5 cm, entire along margins, acuminate at apex, sub-coriaceous, green, glabrous; midvein impressed above, raised beneath, glabrous; 5–7-nerved at base; 2–4 pairs above, glabrous; petioles 5–6 cm long, lenticellate, glabrous. Inflorescences axillary umbels, many flowered; peduncle 2.5–5 cm long, puberulent. Flowers 5–6 mm across, pedicellate; pedicels c. 2.5 cm long, tomentose; bracts liner, 1.5–3 x 1–2 mm, pubescent, caducous. Calyx green, 5-lobed; lobes ovate, c. 4.5 x 2.5 mm, margin ciliate. Corolla overlapping to the right in bud, green to pale green, tube short, widely campanulate, 5-lobed; lobes oblong-ovate, 4–5 x 4 mm, obtuse at apex, ciliate along margin, glabrous. Corona 5-lobed, free at apex. Stamens 5, c. 3 mm long; pollinia 5, pollen masses solitary in each cell, oblong-elliptic, c. 0.75 x 0.2 mm, yellow. Gynostegium c. 3 mm long. Follicles ovoid, 6–16.2 x 1.3–3.5 cm, divaricate, blunt at tip, tomentose when young, many seeded; seeds ovate, 11–13 x 7.5–8 mm, yellowish
Plate 35: a - b. Vallaris solanacea (Roth) Kuntze: a. Flower (close up); b. Follicles; c - d. Wrightia arborea (Derrnst.) Mabb.: c. Flower (close up); d. Follicles; e - f. Dischidia benghalensis Colebr.: e. Habit; f. Flowers; g - h. Dregea volubilis (L.f.) Benth. ex Hook.f.: g. Inflorescence; h. Follicles
with pinkish margin; coma silky white, c. 3.5 cm long.

Fl. & Fr.: March-September.


5. GYMNEMA R. Br.

8 species in India and 1 species in BNP.

Gymnema inodorum (Lour.) Decne. in Prodr. 8: 551. 1844. Cynanchum inodorum Lour., Fl. Cochinch. 166. 1790.

Other synonyms: Gymnema tingens Roxb. ex Spreng.; Bidaria tingens (Roxb.) Decne.

Illustration: Wight, Icon. Pl. Ind. Orient. 2(1): t. 592.1846 [as Gymnema tingens Roxb. ex Sprengel var. ovalifolia].

Climbing shrubs; branches terete, glabrous. Leaves broadly ovate or oblong-ovate, 5-12 × 3.5-8.2 cm, broadly acuminate at apex, entire along margins, sub-cordate or truncate at base, sub-coriaceous, pale green, glabrous; midvein flattened above, slightly raised beneath, glabrous; lateral veins 5–6 pairs, prominent beneath, puberulous; petioles 1.8-2.5 cm long, swollen at base. Inflorescences extra axillary corymbose, many flowered; peduncles 0.3–1.1 cm long, pubescent. Flower pedicels 0.7–1.5 cm long, terete, pubescent; bracts lanceolate, c. 3 × 0.5 mm, acute at apex, pubescent. Calyx 5-lobed; lobes linear-oblong, 3-4.5 × 1.5 mm, obtuse at apex, margins ciliate, glandular pubescent within. Corolla 5-lobed above; tube c. 3.5 mm long; lobes obliquely ovate, c. 3.5 × 2.5 mm, obtuse at apex. Corona corolline, uniseriate, five-ridged, adnate to corolla tube, alternating with corolla-lobes; corona lobes absent. Stamens 5, c. 3.5 mm long; pollinia 5; pollen masses solitary in each anther cell, yellow, waxy. Gynostegium c. 5 mm long. Follicles oblong-cylindraceous, 12-14.5 × 2-2.3 cm, close to each other, green; seeds obovate, c. 13 × 6 mm; coma white, c. 5 cm long.

Fl.: June-August; fr.: October-March.

Distrib.: INDIA: Andaman & Nicobar, Andhra Pradesh, Assam, Bihar, Karnataka, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Nepal, Philippines, Thailand and Vietnam.
Fig. 19. Gymnema inodorum (Lour.) Decne.: a. Fruiting branch; b. Seeds with coma
**Specimen examined:** Buxa National Park, Jainti range, Jainti 5-6, 11 Oct., 2009, S.K.Srivastava and Gopal Krishna 46309.

6. **HOYA** R. Br.

29 species in India and 2 species in BNP.

Key to species

1a. Leaves lanceolate to elliptic-lanceolate, c. 6 cm long; inflorescences
terminal umbel, 6–10 flowered; flowers white; corolla lobes incurved;
corona faded pink ................................................................. 1. *H. lanceolata*

1b. Leaves ovate to oblance-elliptic, c. 17 cm long; inflorescences
axillary, globose, umbellate, flowers c. 20 per cluster; flowers
cream-yellow; corolla lobes bend backwards; corona pink ........... 2. *H. parasitica*


Fig. 20; Plate 36b, c

Epiphytic shrubs; branches multiple, pendulous, terete, tomentose or glabrous. Leaves lanceolate to elliptic-lanceolate, 3.2–5.4 × 0.9–1.4 cm, bluntly acute at apex, entire along margins, cuneate at base, leathery, pale green, puberulous; midvein inconspicuous above, faintly raised beneath, puberulous; lateral veins inconspicuous; petioles 2–3 mm long, pubescent. Inflorescences umbel, terminal, 6–10-flowered, pendulous. Flowers 1–1.2 cm across; pedicels 1.6–1.8 cm long, pubescent; bracts linear-lanceolate to ovate, 0.8–1.1 × 0.2–0.6 mm, densely hairy. Calyx 5-lobed; lobes obovate, c. 2 × 2 mm, obtuse at apex, densely hairy outside, glabrous inside. Corolla white with purplish-pink in centre, 5-lobed above; tube c. 3 mm long; lobes triangular-ovate, 3.5–2.5 × 4 mm, acute at apex, ciliate along margins. Corona 5-lobed, fleshy, stellately spreading, ovate, c. 1.5 × 1 mm; spur triangular-ovate, c. 1.5 × 1 mm. Stamens 5, c. 1.5 × 1 mm; pollinia 5, pallen masses solitary in each anther cell, yellow. Gynostegium c. 2 mm long. Follicles solitary, long and very slender, 8–15.6 × 0.4–3 cm, glabrous, many seeded; seeds oblong, 2.5–3 × 1–1.5 mm, hairy along margin; coma silky white, 3–4 cm long.

Fl.: March-June; fr.: May-November.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bhutan.

**Specimen examined:** Buxa National Park, Jainti range, Near Bhutia Pond, 270m, 7th April,
Fig. 20. Hoya lanceolata Wall. ex D. Don: a. Flowering branch; b. Calyx; c. Corolla; d. Corona; e. Stamens f. Carpel; g. Pollinia
2012, Gopal Krishna 56045.


**Local name:** “Pargach” (Bengali).

Epiphytic shrubs; stems terete, glabrous. Leaves ovate to oblong-elliptic 14–17 × 4–5.3 cm, obtuse or acute at apex, entire along margins, narrowly rounded at base, thick leathery, pale-green, glabrous; midvein and lateral veins inconspicuous; petioles stout, c. 1.8 cm long, glabrous. Inflorescences globular, umbellate, axillary; peduncles c. 1.6 cm long, stout, Flowers sweetly fragrant, c. 1 cm across; pedicels 1.5–2.2 cm long, glabrous. Calyx 5-lobed; lobes ovate, c. 2 × 1 mm, acute at apex, glabrous. Corolla cream-yellow, 5-lobed; lobes triangular-ovate, 3–4 × 2–4 mm, acute at apex, ciliate, recurved. Corona 5-lobed, stellately spreading, fleshy; staminal column ovate, c. 3 × 1.5 mm, acute at apex. Stamens 5, c. 1.5 mm long; pollinia 5, pollen masses solitary in each anther cell, yellow, waxy. Gynostegium c. 1.5 mm long. Follicles single, linear, c. 3.5 × 1 cm, acute at apex, tip blunt, glabrous, seeds many; seeds elliptic, c. 3.5 × 1 mm, brown; coma silky-dull white, 1.5–3 cm long.

Fl. & Fr.: October-December.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Madhya Pradesh, Meghalaya, Mizoram, Odisha, Tripura and West Bengal. WORLD: Bhutan.

**Specimen examined:** Buxa National Park, Jainti range, NRVK 6, 11th Oct., 2009, S.K. Srivastava & Gopal Krishna 46303.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.

7. **Marsdenia** R. Br.

13 species in India and 1 species in BNP.


**Other synonym:** *Asclepias tinctoria* Roxb.

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 589. 1845.

Climbing shrubs; stems terete, appressed hairy when young, glabrous on maturity.

Leaves ovate-oblong or ovate or ovate-elliptic, 3.7–16.8 × 1.6–7.8 cm, acuminate at apex,
Fig. 21. Marsdenia tinctoria R. Br.: a. Flowering branch; b. Flower; c. Corolla split open; d. Corona; e. Pollinia; f. Seed with coma
entire along margins, rounded to sub-cordate at base, chartaceous, dark bluish green, turned bluish green or bluish brown when dry, glabrous; midvein slightly raised beneath, impressed above, appressed hairy; lateral veins 5–8 pairs, inconspicuous above, prominent beneath, appressed hairy; petioles 1.5–7 cm, appressed hairy. Inflorescences a lax, many-flowered cyme, 3–14 cm long; rachis appressed hairy. Flowers yellow initially, then turn whitish, c. 3 × 2 mm; pedicels filiform, 2–4 mm long, hairy. Calyx 5, free, dark green, oblong-ovate, 1–1.2 × 0.75 mm, ciliate along margin, pubescent outside, glabrous inside. Corolla tube cylindric, c. 1.5 × 1.5 mm, slightly swollen at base around minute gynostegium, glabrous outside but with lines of brown hairs inside and throat closed by a dense ring of bristles c. 0.8 mm long; lobes oblong-rounded, 0.9–1 × 1 mm, glabrous. Corona c. 1 × 1 mm, 5-lobed; lobes lanceolate. Pollinia narrowly oblong. Stigma head discoid. Follicles oblong-ovate, 0.7–0.8 cm long, densely covered with hairs, many seeded; seeds ovate, c. 12 × 4 mm; coma 2–4 cm long.

Fl. & Fr.: November-March.


PERIPLOCACEAE [354]

CRYPTOLEPIS R. Br.

3 species in India and 1 species in BNP.


Climbing shrubs; branches terete, lenticellate, glabrous. Leaves ovate-elliptic or ovate-oblong, 4.6–8.7 × 1.7–3.1 cm, mucro-acute at apex, undulate along margin, attenuate at base, sub-coriaceous, green shiny above, pale beneath, glabrous above, plucid dotted beneath; midvein impressed above, raised beneath, glabrous; secondary veins inconspicuous; petioles 5–8 mm, hairy at base. Inflorescences extra axillary cymes; peduncles 0.7–2.9 cm long; peduncular bracts linear, c. 1 mm long. Flower pedicels 2–3
mm long, glabrous; bracts triangular-ovate, c. 2 x 1 mm, glabrous. Calyx 5-lobed above; lobes broadly-ovate, c. 1.5 x 1.25 mm, obtuse at apex, membranous, ciliate along margins. Corolla cream-yellow, 5-lobed above; lobes linear-lanceolate, c. 4 x 1 mm; tube 2-3 mm long. Corona 5-lobed, arising from the base of corolla, c. 1 mm long. Gynostegium c. 1.5 mm long. Follicles paired, lanceolate, 2.5-11.4 x 0.3-2 cm, many seeded; seeds ovate-oblong, 5-8.5 x 2.5-3 mm; coma silky-white, c. 4.5 cm long.

Fl.: March-June; fr.: June-December.


Specimen examined: Buxa National Park, Janti range, Janti 3, Janti river, 8th April, 2012, Gopal Krishna 56062.

BUDDLEJACEAE [352]
BUDDLEJA L.

11 species in India and 1 species in BNP.

Buddleja asiatica Lour., Fl. Cochinch. 1: 72. 1790; C.B. Clarke in Hook.f., Fl. Brit. India 4: 82.1883; Prain, Bengal Pl. 2: 703. 1903. Fig. 22; Plate 36f

Local name: “Neemda” (Bengali).


Shrubs, 1–2 m high; branchlets terete or subterete, white tomentose. Leaves opposite, sometimes appears as alternate at the end of branchlets, simple, linear lanceolate, 5-14 x 0.7–1.4 cm, mucro-acuminate at apex, undulate along margins, cuneate or attenuate at base, coriaceous, dark green and glabrous above, white-tomentose beneath; midvein impressed above, faintly raised beneath; secondary veins 10–11 pairs, stellate tomentose beneath; petioles 1.3–1.5 cm long, tomentose. Inflorescences axillary or terminal spikes; rachis 3–14 cm long, tomentose. Flower c. 0.5 x 1.5 mm, pedicellate; pedicels c. 0.5 mm long, tomentose; bracts linear, c. 1 mm long. Sepals campanulate, 4-lobed above; tube c. 1.5 mm long, tomentose; lobes triangular-ovate, c. 0.25 x 0.25 mm long. Petals white, 4-lobed above; tube 2.5-4.8 mm, outside densely to sparsely stellate pubescent; lobes suborbicular, 1–1.7 x 1–1.5. Stamens 4, epipetalous, included; anthers oblong, c. 1 mm long. Ovary c. 1 x 0.5 mm, glabrous, 2-loculed; style simple, c. 5 mm long, glabrous; stigma clavate, c. 0.5 mm long. Capsules ellipsoid, 3–5 x 1.5–3 mm, compressed; seeds elliptic, 0.8–1 x 0.3–0.4 mm, shortly winged at both ends.

Fl. & Fr.: January–December.
Fig. 22. *Buddleja asiatica* Lour.; a. Flowering branch; b. Flowers; c. L.S. of flower; d. Stamens; e. Gynoecium
Habitat: Grows along Jainti river bank.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti range, Jainti river, Jainti 3, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 46388.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

HYDROPHYLLACEAE [361]

HYDROLEA L. (nom. cons.)

1 species in India and BNP.


Procumbent herbs, rooting at nodes; branches terete, glandular pubescent. Leaves lanceolate to ovate, 0.4–1.5 × 0.3–0.8 cm, acute at apex, entire along margins, cuneate at base, chartaceous, glabrous above, setose beneath; midvein flattened above, faintly raised beneath; secondary veins 5–6 pairs, obscure. Inflorescences short terminal raceme or cymes. Flower pedicels c. 7 mm long, glandular pubescent. Calyx 5-lobed, lobes free above, connate below; lobes elliptic-lanceolate, c. 4.5 × 1 mm, acute at apex, glandular pubescent outside; tube 1.5–2 × 3 mm, glandular pubescent outside. Corolla purple-blue, 5-lobed above, connate in a widely campanulate subrotate corolla below; lobes imbricate. Stamens 5; filament adnate to corolla tube; anthers scarlet, oblong, sagittate. Ovary c. 4 × 3 mm, glabrous; style 2-fid, c. 2 mm long; stigma capitate. Capsules globose or ovoid, c. 5 × 4 mm, glandular pubescent outsides, many seeded; seeds oblong-ovoid, c. 0.25 × 0.25 mm.

Fl. & Fr.: February-April.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Maharashtra, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal. WORLD: Africa, Australia, China, Indonesia, Malaysia, Nepal, Philippines and Sri Lanka.

BORAGINACEAE [356]

Key to genera

1a. Herbs; inflorescences helicoid cymes; style gynobasic;
   fruits nutlets........................................................................................................ 3. Heliotropium

1b. Trees or shrubs; inflorescences not helicoid cymes; style terminal;
   fruits other than nutlets.................................................................................... 2

2a. Scrambling shrubs; flowers in dense 2-rowed scorpioid cymes................ 4. Tournefortia

2b. Trees or shrubs; flowers in panicles or corymbs............................................ 3

3a. Leaves obovate to orbicular; flowers not fragrant; sepals and petals 4; style twice bifid; stigmas 4................................................................. 1. Cordia

3b. Leaves lanceolate to elliptic-lanceolate; flowers fragrant; sepals and petals 5; style once bifid; stigmas 2................................................................. 2. Ehretia

1. CORDIA L. (nom. cons.)

16 species in India and 1 species in BNP.


Other synonym: Cordia obliqua Willd. Plate 37a

Local name: “Bahubara” (Bengali).

Trees, 10-15 m tall; branchlets angled, brown tomentose. Leaves alternate, broadly obovate or suborbicular, 6-12.8 x 4.5-9.4 cm, obtuse or abruptly acuminate at apex, entire along margins, truncate or subcordate at base, coriaceous, upper surface scabrous with finely white cystoliths, brown tomentose beneath or glabrascent, densely pubescent in axil of nerves; midvein faintly impressed above, raised beneath, tomentose; lateral veins 4-6 pairs, palmately 3-5 nerved at base, prominent beneath, tomentose; petioles 1.5-3.5 cm long, angled, tomentose; axillary bud conspicuous, tomentose. Inflorescences dense, paniculate, c. 30 cm long; flowers subsessile, borne in dichotomous, corymb-like cymes. Buds pyriform to subglobose. Sepals 4-lobed, infundibular-campanulate, 5 mm long, pubescent or subglabrous outside, accrescent in fruits, densely hairy within. Petals white, 4-lobed above, 4.5-5 mm long, tube included in calyx, hairy within. Stamens 4; anthers c. 1 mm. Ovary 4-loculed; style terminal, twice bifid; stigma 4. Drupe white, conical when
young, later ovoid-elliptic, 3–4 mm across, mucronate, seated on accrescent funnel-shaped calyx; pulp viscid.

Fl.: October-February; fr.: March-April.

Distrib.: INDIA: Andhra Pradesh, Bihar, Gujarat, Jharkhand, Kerala, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, North East Australia, Pacific Islands, Pakistan, Thailand and Vietnam.


2. EHRETTA P. Browne

8 species in India and 2 species in BNP.

Key to species

1a. Trees, to 10–15 m tall; corolla tube equalling or shorter than calyx ..... 1. E. acuminata
1b. Shrubs, to 2–3 m high; corolla tube longer than calyx.............. 2. E. wallichiana


Other synonym: Ehretia serrata Roxb.


Trees, to 15 m high; branchlets sub-terete, glabrous. Leaves simple, alternate, elliptic-oblong, 7–9.2 × 3.2–3.5 cm, acuminate at apex, serrate along margins, cuneate at base; coriaceous, pale green, glabrous; midvein impressed above, raised benath, glabrous; secondary veins 5–6 pairs, glabrous; petiole c. 1.5 cm long, glabrous. Inflorescences terminal or axillary, divaricately branched; rachis 8–18 cm long, pubescent. Flowers fragrant, bisexual, c. 0.2 × 0.1 cm, sessile or sub-sessile. Sepals 5-lobed, lobes free above, connate below; lobes triangular ovate, c. 1 × 1 mm, obtuse at apex, margin ciliate; cup c. 0.5 mm long. Petals cream-white, 5-lobed above, tube enclosing the ovary; lobes oblong, c. 2 × 1.25 mm, obtuse at apex, nerves prominent; tube equalling the calyx, c. 2 mm long. Stamens 5; filaments 1.8–2 mm long, subulate; anthers oblong, c. 1 mm long, basifixied. Ovary 0.5–0.8 × 0.6 mm; style bifid. Fruits subglobose, 3–5.5 mm across.

Fl.: March-April; fr.: June-August.

Distrib.: INDIA: Assam, Bihar, Karnataka, Sikkim, Tamil Nadu and West Bengal. WORLD: Australia, Bhutan, China, Indonesia, Japan and Vietnam.

Shrubs, to 2–4 m high; stems and branches terete, glabrous; bark yellowish green. Leaves alternate, simple, obovate, ovate-elliptic, 4.2–18.5 × 1.6–7.2 cm, shortly acuminate at apex, entire along margins, cuneate at base, subcoriaceous, green, shining, glabrous; midvein impressed above, raised beneath, glabrous; secondary nerves 5–8 pairs, prominent beneath, arching at margin but not interlocking, glabrous; petiole 1.5–2 cm long; stipules present, c. 0.5 cm long. Inflorescences compound corymbs, 7–10 cm long. Flowers c. 1 cm; pedicels 1–2 mm long, pubescent. Sepals 5-lobed above, tubular below; lobes lanceolate, c. 2 × 0.6 mm, acute at apex, margin ciliate; cup c. 1.5 × 1.5 mm. Petals white, c. 1 cm long, 5-lobed above; lobes oblong, 3–4 mm long; tube 4–6 mm long, glabrous. Stamens 5 extrorse; filaments c. 4 mm long, adnate to crolla tube; anthers oblong, c. 1.75 mm long, dorsifixed. Ovary ovate c. 2 × 1 mm, glabrous; style c. 4 mm long, bifid. Fruits subglobose or ellipsoid, 4–5 × 5–7 mm, glabrous with persistent calyx

Fl. & Fr.: March-April.

**Distrib.:** INDIA: Assam, Sikkim and West Bengal. WORLD: Bhutan


**Notes:** The material collected by Griffith from Sikkim were recognized as *E. wallichiana* Hook.f. & Thomson. But, R.R. Mill separated some of these collections and erected *E. psilosiphon* based on glabrous nature of calyx tube outside. The present collections exhibit calyx tube glabrous outside, and justifies it identity with *E. psilosiphon* but in other features such as number of lateral veins and height of plants, it goes well with *E. wallichiana*, which is followed here. *E. wallichiana* was not included in Prain’s flora since most of collection from Darjeeling district were made after 1930s. The present collection is from Jalpaiguri district.
Fig. 23. *Ehretia wallichiana* Hook.f. & Thomson ex C.B. Clarke: a. Flowering & fruiting branch; b. Flower bud; c. Flower opened; d. Stamen; e. Fruit with stylar remnant.
3. HELIOTROPIUM L.

18 species in India and 1 species in BNP.


**Plate 37e**

_Illustration_: Wight, Ill. Ind. Bot. 2: t. 171.1850.

**Erect herbs**, to 30–40 cm high; stems and branches sub-terete, hispid. Leaves alternate, or sub-opposite, solitary or in whorl, ovate, 2.2–7.3 × 1.2–4.5 cm, acute at apex, rough, crenate-dentate along margins, truncate or attenuate at base, subcoriaceous, dark green, scabrid-hispid above, hispid beneath; midvein impressed above, slightly raised beneath, hispid; lateral veins 4–5 pairs, hispid, inconspicuous; petioles 0.6–3.4 cm long, filiform, setose. Inflorescences axillary or terminal helicoid cymes, 10–19 cm long. Flowers sessile. Sepals 5, free; lobes linear, 2–2.5 mm long, setose. Petals bluish, 5-lobed above; lobes sub-orbicular; tube c. 3 mm long, hispid outside, slightly curved. Stamens 4; filaments included; anthers obl0ng-sagitate, c. 1 mm long. Ovary c. 0.5 × 0.5 mm, glabrous; style c. 0.5 mm long, gynobasic. Nutlets 2–3 mm, ribbed, glabrous, shortly beaked.

**Fl. & Fr.:** November-May.

_Habitat_: Grows along roadside in waste places.

**Distrib.:** INDIA: Throughout. WORLD: Cambodia, Indonesia, Japan, Laos, Malaysia, Myanmar, Thailand, Vietnam; Africa, North America, Pacific Islands and South America.

**Specimen examined:** Buxa National Park, Rajabhatkhawa Range, 29th Nov. 2011, Gopal Krishna 47173.

4. TOURNEFORTIA L. (*nom. cons.)*

9 species in India and 1 species in BNP.


**Fig. 24; Plate 37f, g**

Scrambling shrubs, to 2–3 m high; branches weak, terete, densely pubescent; older branches glabrescent. Leaves alternate, simple, elliptic-lanceolate or broadly ovate, 2.8–12 × 1.4–5.1 cm, broadly acute at apex, entire along margins, cuneate at base, chartaceous, green, shining, pale green beneath, upper surface with few short yellowish hairs oranglouborescent, lower surface prominently reticulate-veined and often golden-brown, glabrescent or with sparse hairs along veins, more densely toward lower side; midvein impressed above, raised beneath, hispid; lateral veins 6–8 pairs, arching towards margins,
Fig. 24. *Tournefortia hookeri* C.B. Clarke: a. Flowering branch
hispid; petioles 6–14 mm long, hispid. Inflorescences 2-rowed scorpioid cyme, rachis 1.5–4.5 cm long, densely pubescent. Flowers bisexual c. 4.5 mm long; sessile. Sepals green, 5-lobed, lobes free up to 3/4, connate at base; lobes narrowly ovate, 2.5–3 × 0.7–1 mm, acute at apex, hispid; tube c. 0.5 mm long. Petals greenish-yellow, 5-lobed above; tube c. 3 mm long, hairy outside, gradually narrowed upwards, nerves visible; lobes spreading, c. 0.5 mm long. Stamens 5; filaments included, adnate to corolla tube; anthers oblong with broader base c. 0.8 mm long. Ovary c. 1 mm long; style c. 0.75 mm long; stigma 2-lobed. Fruits ovoid, c. 4 mm across, 2-seeded; seeds slightly curved.

Fl. & Fr.: February–April.

Distrib.: INDIA: Assam, Sikkim and West Bengal. WORLD: Bhutan.

Specimen examined: Buxa National Park, Jainti range, Jainti 8, 12th March, 2011 Gopal Krishna 50554.

CONVOLVULACEAE [357]

Key to genera

1a. Prostrate herbs; styles 2, free or joined; stigmas 4, minutely capitate

1b. Climbing herbs or shrubs; style 1; stigmas 1 or 2, globose or subglobose

2a. Inflorescences panicles; corolla white, tube uniformly cylindric, 4.5–9 mm...5. Porana

2b. Inflorescences cymes; corolla white or differently colored, tube infundibular,
narrow at base broaden at apex, above 9 mm..........................3

3a. Leaves broadly ovate, not palmately divided, densely hispid beneath;
secondary veins prominent; fruit a berry..........................1. Argyreia

3b. Leaves palmately lobed or not, hispid or not; secondary veins prominent or not; fruit a capsule..........................4

4a. Inflorescences usually dichasial cymes; calyx lobes acuminate and cuspidate at apex; anthers straight..........................3. Ipomoea

4b. Inflorescences umbellate cymes; calyx lobes emarginate, sometimes with a short mucro; anthers twisted............4. Merremia

1. ARGYREIA Lour.

40 species in India and 3 species in BNP.

Key to species

1a. Stems and leaves hispid, golden-yellow hairy; ovary 2-celled ...... 1. A. capitiformis
1b. Stems softly pubescent, strigose or tomentose; ovary 4-celled

2a. Peduncles more than 13 cm long ........................................ 2. A. hookeri

2b. Peduncles 2-9.5 cm long .................................................. 3. A. roxburghii


Other synonyms: Lettsomia strigosa Roxb.; Lettsomia peguensis C.B. Clarke; Convolvulus capitatus Vahl.; Ipomoea capitata Roem. & Schult.; Argyreia capitata Choisy.

Twining shrubs; stems terete, striate, hispid, golden yellow hairy. Leaves broadly ovate to cordate, 9–13 × 6.8–10 cm, acuminate to caudate at apex, entire along margins, cordate at base, subcoriaceous, hispid; midvein inconspicuous above, densely covered with golden yellow hairs; secondary veins 13–14 pairs, inconspicuous above, prominent beneath; petioles 5–7 cm long, hispid. Inflorescences capitate, 2–5-flowered; peduncles c. 15 cm long, hispid; bracts elliptic-oblong to lanceolate, 1.5–4 cm long, acute at apex. Flowers sessile. Calyx 5-lobed, unequal, obovate to lanceolate, 1–1.3 × 0.8 cm, hispid outside, glabrous inside, persistent. Corolla pale-purple, infundibular, 5-lobed; tube c. 3 cm long; lobes 8 mm long, hispid at middle of tube. Stamens 5, included; filaments filiform, c. 1.3 cm long; anthers oblong c. 5 mm long. Ovary 2-celled; style filiform, c. 2 cm long; stigma globose. Berries globose, 6–8 mm across, 4-seeded, embedded in mealy pulp.

Fl. & Fr.: September–March.

Distrib.: INDIA: Arunachal Pradesh, Andaman & Nicobar Islands, Assam, Manipur, Nagaland, Tripura and West Bengal. WORLD: Java.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 26, 1st Dec., 2011 Gopal Krishna 47182.

Note: Usually this species Grows along with Mikania sp.


Twining shrubs; stems subterete, more or less striate, sparsely pubescent. Leaves broadly-ovate or suborbicular, 7.5–14.2 × 8.5–13.4 cm, broadly acute to acuminate at apex, entire along margins, truncate, subcordate or cordate at base, coriaceous, tender leaves serecious, mature glabrous above, sparsely hairy beneath; midvein impressed above, raised beneath, hispid; palmately 3–5 nerved at base, lateral veins 7–8 pairs, glabrescent above, hispid beneath; petioles 11–13 cm long, sparsely pubescent. Inflorescences axillary,
Fig. 25. Argyreia capitiformis (Poir.) Ooststr.: a. Flowering branch
dichotomous cymes, peduncles c. 13 cm long, appressed hairy. Flower pedicles 1–2.5 cm long. Calyx connate below, 5-lobed above; tube c. 11 × 6 mm; lobes narrowly ovate or lanceolate, 8–9 × 3–4 mm, acute at apex. Corolla pink, infundibular, 6–8 cm long. Stamens 5, included; filaments base hairy. Ovary 4-celled, glabrous; style filiform, included. Berries greenish, bright orange when mature, globose, 1.5–2 cm across, 4-seeded; seeds ovoid or ovoid-trigonal or ellipsoid-trigonal, c. 6 × 5 mm, dark brown or dull black, glabrous.

Fl.: June-September; fr.: September-February.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Karnataka, Sikkim, West Bengal. WORLD: Bhutan.


Other synonyms: Ipomoea multiflora Roxb.; Convolvulus roxburghii Wall.

Climbing shrubs; stems subterete, hispid. Leaves alternate, simple, broadly ovate to suborbicular, 6–9.5 × 8.2–10 cm, broadly acute at apex, wavy along margins, truncate or shallowly cordate at base, coriaceous, sparsely hairy above, hairs with bulbous base, setose beneath, palmately 9–11 veined at base; pinnately veined above; midvein impressed above, raised beneath, hairy both side; lateral veins 5–6 pairs, prominent beneath, densely hairy; petioles 2.5–5.5 cm long, hispid. Inflorescences axillary cymes; peduncles 2–9.5 cm long, hispid, lenticellate, 2–4 flowered; pedicels 6–9 cm. Calyx 5-lobed above, connate below; lobes 7–11 × 7–9 cm, acute at apex, villous. Corolla purplish-pink, campanulate; tube 5–6.5 cm long, glabrous; lobes sparsely pilose. Stamens and style included. Berries globose, 1–1.5 cm across, orange-yellow, turn into brown when dry; seeds ovoid-trigonal to ovoid-globular, 6.5–7.5 × 5–6 mm, yellowish-white or light-brown to dark brown or dull black, glabrous.

Fl.: February-June; fr.: October.

Distrib.: INDIA: Assam, Sikkim and West Bengal. WORLD: Bhutan and Nepal.

2. EVOLVULUS L.

2 species in India and 1 species in BNP.

Evolvulus nummularius (L.) L., Sp. Pl. 1: 391. 1762; Prain Bengal Pl. 2: 726. 1903.


Other synonym: Volvulopsis nummularia (L.) Roberty. Plate 38c


Prostrate herbs, to 15 cm long; stems terete, week, rooting at node, glabrous. Leaves simple, alternate, orbicular, 0.5–1 × 0.4–0.8 cm, obtuse at apex, entire along margins, subcordate-cordate at base, subcoriaceous, glabrous; midvein inconspicuous above, prominent beneath; secondary veins not distinct; petioles c. 0.5 cm long. Flower solitary axillary or few flowered cymes, pedicellate; pedicels c. 0.25 cm long. Calyx 5-lobed, lobes free above, campanulate below, persistent; lobes ovate, c. 0.3 × 0.2 cm, outer 2 slightly longer than inner ones, pilose, margins ciliate. Corolla white, 5-lobed, broadly campanulate or subrotate; tube 5–6 mm long; lobes 7–8 mm across. Stamens 5, inserted at middle of corolla tube; filaments c. 1.5 mm, long, glabrous basally; anthers oblong, c. 0.5 mm long. Ovary globose; style linear, c. 3 mm; stigmas minutely capitate. Capsules ovoid, 2–3 mm across, 2–4-seeded; seeds brown, ovoid-trigonous, c. 1 × 0.5 mm, minutely tuberculate.

Fl. & Fr.: Throughout the year.

Distrib.: INDIA: Bihar, Jharkhand, Odisha and West Bengal. WORLD: Africa, Malaysia, North and South America


3. IPOMOEA L.

60 species in India and 3 species in BNP.

Key to species

1a. Leaves usually simple, unlobed; corolla scarlet; stamens exserted

2. I. hederifolia

1b. Leaves usually 3–5 lobed; corolla pale bluish-purple or pink; stamens included

2

2a. Stigma capitate; capsules ovoid, rarely formed

1. I. batatas

2b. Stigma 3-lobed; capsules globose, obvious

3. I. nil

Local names: “Lal-alu”, “Ranga-alu” (Bengali).
Illustration: Curtis’s, Bot. Mag. 39: t. 1603. 1814.

Climbing herbs; stems slender, with milky juice, trailing on ground, glabrous or pubescent. Leaves variable, palmately 3-5-lobed or ovate, 1.5-6.5 × 2-5.5 cm, obtuse or acute to acuminate at apex, dentate or often deeply lobed along margins, cordate at base, subcoriaceous, glabrous or hairy on both surfaces; midvein faintly raised both sides; secondary veins 7-9 pairs; petioles 1.5-5 cm long, glabrous or sparsely pubescent; stipules linear c. 5 mm long. Inflorescences axillary cymes; peduncles stout, angular, 4-8 cm long, glabrous or sparsely pubescent. Flower pedicels 7-9 mm long; bracts linear, 2-3 mm long, acute, caducous. Calyx 5-lobed; lobes unequal, oblong, 6-10 × 2-3 mm, mucro-acute at apex, ciliate. Corolla pinkish, white, pale purple, campanulate to infundibular; tube 3-4 cm long. Stamens 5, included; filaments c. 10 mm long, hairy at base; anthers oblong, c. 3 mm long. Ovary oblong-ovate, c. 2 × 1.5 mm, hairy or sometimes glabrous; style c. 13 mm long; stigma capitate. Capsules ovoid, glabrous, rarely formed.

Fl. & Fr.: December-April.

Distrib.: INDIA: Almost throughout.

Specimen examined: Buxa National Park, Rajabhatkhawa range, 26½ mile tower, 29th Nov., 2011, Gopal Krishna 47171.


Other synonyms: *I. coccinea* C.B. Clarke; *Quamoclit phoenicea* (Roxb.) Choisy. Plate 38d

Twiners; branches terete, sparsely pilose. Leaves simple, alternate, ovate to sub-orbicular, 3-10 × 3-18 cm, mucro-acuminate at apex, dentate along margins, cordate at base, subcoriaceous, glabrous; midvein faintly raised both sides; secondary veins palmately 7-9 pairs at base; 3-4 pairs above, prominent beneath; petioles slender, 3-12 cm long. Inflorescences terminal and axillary cymes, pedunculate; peduncles 1.5-2.4 cm long, glabrous. Flower pedicels c. 8 mm long, glabrous. Calyx 5-lobed above, cupular below; cup c. 1.5 × 1.2 mm; lobes linear-lanceolate, c. 3 mm long, acute, glabrous. Corolla scarlet, narrowly infundibular; tube c. 3 cm long, glabrous; limb 1.5-2 cm across, patent. Stamens 5, exerted; filaments c. 3 cm long; anthers oblong, c. 2 mm long. Ovary c. 1 mm across;
style long, c. 3.5 mm long stigma capitate. Capsules globose, 7–8 across, striate, glabrous, 4-seeded, 1-seed per locule; seeds ovoid-trigonous, c. 4.5 × 3–3.5 mm, densely pubescent.

Fl. & Fr.: October-December.

Distrib.: INDIA: Almost throughout (cultivated and naturalised as well). WORLD: Bhutan, China and Pakistan.


Other synonyms: Ipomoea hederacea Jacq.; Pharbitis nil (L.) Choisy.

Illustration: Bot. Mag. 6: t. 188. 1793.

Twining herbs; stems terete, glabrous. Leaves broadly ovate or orbicular, 4–14 × 3–12 cm, acute to acuminate at apex, entire or 3–5-lobed, cordate at base, subcoriaceous, appressed hairy; midvein inconspicuous above, raised beneath; petioles filiform, 2–3.1 cm long. Inflorescences axillary cymes, 3–4-flowered; peduncles c. 2 cm long. Flower pedicels c. 4 mm long, glabrous; bracts linear, c. 2 mm long. Calyx tubular below, 5-lobed; lobes oblong-linear or ovate, 6–7 × 1.5 mm, mucro-acute at apex, hirsute along margins outside, glabrous inside, unequal. Corolla purple, campanulate, 5-lobed; tube c. 1 cm long, glabrous. Stamens 5; filaments filiform, c. 1 cm long, glabrous; anthers c. 0.5 mm long. Ovary 4-celled; style filiform, c. 1 cm long; stigma 3-lobed. Capsules globose, 8–10 mm across, 4–6 valved; seeds ovoid-trigonous, 5–6 mm, pubrulent.

Fl. & Fr.: April–December.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Daman and Diu, Goa, Gujrat, Himachal Pradesh, Jammu & Kashmir, Jharhand, Karnataka, Tamil Nadu, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Japan, Myanmar, Nepal, New Guinea, Pakistan, Sri Lanka and Thailand.


4. MERREMA Dennst. ex Endl. (nom. cons.)

15 species in India and 2 species in BNP.

Key to species

1a. Leaves narrowly oblong, auriculate, unlobed; inflorescences
axillary umbels; flowers white; anthers saggitate; seeds pilose........ 1. **M. umbellata**

1b. Leaves ovate, auriculate to perfoliate, lobed; Inflorescences axillary cymes; flowers yellow; anthers narrowly oblong; seeds glabrous......................................................... 2. **M. vitifolia**


Illustration: Addisonia 13: t. 441. 1928.

Climbers; stems terete, pubescent. Leaves narrowly oblong to oblong-ovate, 1.2–6 × 0.6–3.2 cm, mucro-acute to acuminate at apex, entire along margins, subcordate, cordate or truncate at base, subcoriaceous, softly whitish puberulent above, more densely beneath; midvein raised both sides; secondary veins 6–8 pairs, prominent beneath, pubescent; petioles 1–2.8 cm long, pubescent. Inflorescences axillary umbels, 4–5-flowered; peduncles 0.8–3.8 cm long, pubescent. Flower pedicels 10–13 mm long, pubescent; bracts early deciduous, lanceolate, minute. Calyx 5-lobed, lobes broadly elliptic-ovate, subequal; outer lobes 2, c. 8.5 × 6 mm, obtuse at apex, hyaline along margins, thick, more or less keeled, leathery, glabrous; inner lobes same as outer except size, c. 9 × 8 mm. Corolla white, infundibular; tube 2–2.5 cm long, glabrous except apices; lobes 3–4 cm across, 5-lobed; lobes suborbicular. Stamens 5; filaments c. 10 mm long; anthers saggitate, c. 3 mm long. Ovary oblong-ovate, c. 1.5 mm long, glabrous; style c. 1.5 mm long, hairy above, glabrous beneath; stigma capitate. Capsules ovoid to conical, 10–12 × 8 mm, 4-valved; seeds c. 5 mm, densely pilose.

**Fl. & Fr.**: February-April.

**Habitat**: Grows along river Bala.

**Distrib.**: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Odisha, Tamil Nadu, Tripura, Sikkim, Uttar Pradesh and West Bengal.

**Specimens examined**: Buxa National Park, Jainti range, Jainti 3B, 13th Feb., 2010, S.K. Srivastava & Gopal Krishna 47060; Rajabhatkhawa Range, SRVK 5, 5th March 2011, Gopal Krishna 47284.

Other synonym: *Ipomoea vitifolia* (Burm.f.) Blume.

**Illustration:** Burm.f., Fl. Ind. p. 45, t. 18, f. 1. 1768.

Climbing shrubs; stems terete, twisted, spreading hirsute with yellowish hairs or glabrous. Leaves simple, alternate, circular in outline, 1.6–10.5 × 1.6–10.5 cm, acuminate at apex, 5-lobed or sinuate along margins, lobes broadly triangular or ovate-lanceolate, yellowish appressed hirtellous, margin coarsely serrate or subentire, apex acuminate to obtuse; midvein flattened above, raised beneath, hirsute; secondary veins palmately 5–7-veined, prominent beneath; petioles 0.5–2.5 cm long, more or less twisted. Inflorescences axillary cymes, 3–5-flowered; peduncles 1.5–3 cm long, hirsute, hairs spreading. Flowers bisexual; pedicels thicker distally, 8–13 mm long; bracts subulate, 1.5–2 mm long. Calyx 5-lobed, lobes subequal, oblong-ovate; outer lobes c. 13 × 6.5 mm, hirsute outside, glabrous inside; inner lobes c. 17 × 8–9 mm, obtuse at apex, subcoriaceous, glabrous, accrescent in fruits. Corolla yellow, 5-lobed, lobes subequal, funnelform; tube 2.5–5.5 cm, glabrous outside; limb 5-angled. Stamens 5, subequal; filaments 2–3 mm long, glabrous; anthers narrowly oblong, c. 6 mm long. Ovary ovate, c. 1 × 1 mm, glabrous; style subulate, c. 9 mm long, glabrous; stigma globose. Capsules globose, c. 1.2 cm; seeds black-brown, trigonous-ovoid, c. 7 mm, glabrous.

**Fl. & Fr.:** February-April.

**Habitat:** Grows in dry places along with river stream and planted forest part.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Tamil Nadu, Tripura, Sikkim, Uttar Pradesh and West Bengal. WORLD: China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

**Specimens examined:** Buxa National Park, Rajabhatkhawa range, SRVK 6, S.K. Srivastava & Gopal Krishna 47065; Jainti range, Jainti 3B, 4th March, 2011 Gopal Krishna 47232; Buxa Road, 26.02.1934, Biswas 1599.

5. **PORANA** Burm.f.

6 species in India and 1 species in BNP.


**Illustration:** Roxb., Pl. Coromandel 3: t. 235. 1819.
Climbing shrubs, reached up to 30 m high; branches terete, white silky tomentose. Leaves ovate to oblong-ovate, 2.5–12 × 1.7–7.8 cm, broadly acuminate at apex, entire along margins, rounded or cordate at base, incision c. 1 cm, thinly coriaceous, tomentose beneath; midvein faintly raised both sides; secondary veins 7–8 at the base, prominent beneath, tomentose; petioles 0.4–2.9 cm long, terete, tomentose. Inflorescences axillary or terminal panicles, 5–30 cm long; rachis terete, tomentose. Flowers mild fragrant; bracts linear, c. 1.5 mm long, persistent; pedicels filiform c. 2 mm long, tomentose. Calyx connate below, 5-toothed above; teeth linear, c. 1.5 mm long, tomentose. Corolla cream-white, narrowly funnelform, faintly 5-lobed, nerves more or less visible on petal lobe; tube c. 2.5 mm long, puberulous; lobe suborbicular to orbicular, c. 1.5 × 1.5 mm, obtuse. Stamens 5, subequal; filaments connate to corolla tube at base, c. 1 mm long, hairy at base; anthers oblong, c. 0.5 mm long. Disk annular. Ovary globose, c. 0.6 × 0.6 mm, glabrous; style c. 0.3 mm long; stigma bilobed, lobes globose. Capsules ovoid-globose, c. 5 mm across, pubescent, apiculate, indehiscent, 1-seeded.

Fl.: October–December; fr.: March–April.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Jharkhand, Maharashtra, Meghalaya, Nagaland, Punjab, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bhutan, Myanmar, Nepal and Pakistan.


SOLANACEAE [358]

Key to genera

1a. Leaves usually armed, stellate pubescent or dendritic; flowers usually violet rarely violet; anthers opening by pores, connivent, forming a cone or tube around style; fruits unenveloped berries .............. 3. Solanum

1b. Leaves not armed, glabrous or hairy; anthers free from style; opening by longitudinal slits; fruits capsules or enveloped berries ........................................ 2

2a. Herbs; corolla yellow, sometimes with purple basal spots; fruit a globose berry enveloped in the enlarged bladder like calyx ............... 4. Physalis

2b. Shrubs; corolla white or cream; fruit a capsules or capsulate, spinescent or not ................................................................. 3
3a. Flower solitary, pendulous; capsules fusiform berry like
capsules; pericarp unarmed, smooth ........................................ 1. Brugmansia

3b. Flower solitary, erect; capsules globose; pericarp spiny or
    tuberculate ................................................................. 2. Datura

1. BRUGMANSIA Pers.

3 species in India and 1 species in BNP.

Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Sweet, Hort. Suburb. Lond. 41. 1818.
Other synonym: Datura arborea Mart.
Illustration: Ill. Hort. 4: t. 131. 1857.

Shrubs, to 3–4 m high; branches terete with white lepidotes. Leaves opposite, oblong-ovate or elliptic-ovate, 5.5–10.4 × 2.4–7.3 cm, acute at apex, undulate along margins, attenuate at base, chartaceous, green, shining, pale when dry, glabrous above, short hairy beneath; midvein impressed above, glabrous, raised beneath, pubescent; lateral veins 6–11 pairs, inconspicuous above, faintly raised beneath, pubescent; petioles 0.7–8.5 cm long, coarsely hairy. Inflorescences solitary, axillary. Flowers pendulous, sometimes appear as erect in bud; pedicels 1.5–2.5 cm long, pubescent. Calyx green, tubular below, 5-lobed above, puberulous outside, glabrous inside; tube 5–7 cm long; lobes triangular ovate, c. 14 × 7 mm, acute at apex. Corolla cream-white, infundibular, toothed at apex, slightly bent; tube 14–27 cm long, in bud 5–6 cm long. Stamens 5, alternating with corolla lobes; filaments filiform, 1.7–1.9 cm long, glabrous; anthers linear, c. 2.5 cm long. Ovary 2-loculed; style filiform; stigma 2-lobed. Capsules baccate, fusiform, c. 9 × 3 cm, pendulous; pericarp unarmed.

Fl. & Fr.: September-April.

Distrib.: INDIA: Arunachal Pradesh, Assam, Himachal Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Manipur, Sikkim, Tamil Nadu and West Bengal. WORLD: Bhutan.
Specimen examined: Buxa National Park, Jainti range, NRVK 6a, S.K. Srivastava & Gopal Krishna 46215.

2. DATURA L.

4 species in India and 1 species in BNP.

Other synonyms: Datura fastuosa L.; D. fastuosa L. var. alba (Rumph. ex Nees) C.B. Clarke;
**D. alba** Rumph. ex Nees.

**Local names:** “Dhutra”, “Dhutro”, “Kala-dhutra” (Bengali).

**Illustrations:** Curtis’s, Bot. Mag. t. 1440; Wight, Icon. Pl. Ind. Orient. 4: t. 1396. 1848 [as *D. fastuosa* L.].

Shrubs, to 1 m high; stems angled, glabrous, lenticellate. Leaves broadly ovate, 3.1–13.5 × 3–10 cm, acuminate at apex, undulate-sinuate along margin, asymmetrically cuneate-rounded at base, chartaceous, glabrous; midvein impressed above, raised beneath, pubescent; lateral veins 4–5 pairs, prominent beneath; petioles 1–7 cm long. Flower solitary, axillary, erect; pedicels stout, 5–7 mm long, puberulous. Calyx tubular below, 5-toothed above, glabrous; tube 3–3.5 cm long; lobes triangular-ovate, 1.2–1.5 × 0.4–0.6 cm. Corolla cream-white, infundibular; tube 12–13 cm long; lobes narrowly lanceolate, c. 1 cm long. Stamens 5, epipetalous; filament c. 4 cm long; anthers oblong, c. 1.4 m long, slightly curved, basifixed. Capsules pendulous, globose, c. 3 × 2.8 cm, spinulose.

**Fl. & Fr.:** August-December.

**Habitat:** Grows in waste places.

**Distrib.:** INDIA: Almost throughout. WORLD: Native of the Americas, long introduced and naturalized in Asia.

**Specimen examined:** Buxa National Park, Jainti range, S.K. Sricastava & Gopal Krishna 46337; Santrabari, 1000’, 18.05.1976, J.K. Sikdar 6918.

**Uses:** Many medicinal uses claimed, including for dropsy, epilepsy, leprosy, headache, hydrocephalus, mumps, smallpox, syphilis and madness in humans and animals.

### 3. PHYSALIS L.

8 species in India and 1 species in BNP.


**Local name:** “Ban-tepaaria” (Bengali).

**Illustration:** Wight, Illust. Ind. Bot. 2: t. 166 b-6. 1850.

Erect herbs, to 30–70 cm high; stems branched, angled, faintly winged along angles, glabrous. Leaves whorled, ovate to rhomboid, 0.9–3.9 × 0.5–1.7 cm, acute at apex, dentate along margins, attenuate at base, chartaceous, glabrous; midvein faintly raised beneath, hispid; lateral veins 5–7 pairs, prominent beneath, hispid; petioles 4–5 mm long, puberulent. Flower solitary, axillary c. 8 × 4 mm; pedicels 10–13 cm long. Calyx green, campanulate, accrescent in fruits, 5-lobed; tube c. 2 × 3.5 mm, pubescent; lobes triangular,
c. 2 × 1 mm, ciliate along margins. Corolla pale yellow, campanulate, faintly 5-lobed, c. 1.5 × 2 mm; tube 6–7 × 3.5 mm. Stamens 5; filaments 4.5–5 mm long, glabrous; anthers yellow, oblong, c. 2 mm long. Ovary c. 1.5 × 2 mm, glabrous, 2-locular; style subulate, 4.3–5 mm long; stigma minutely 2-lobed. Berries globose, 1.5–2.5 cm across, enveloped in the bladder like calyx; fruiting pedicels 15–20 mm long, puberulent, many seeded; seeds ovoid, c. 1 mm across.

Fl. & Fr.: September-December.

Distrib.: INDIA: Almost throughout. WORLD: World wide


Note: This species usually grow as weed.

4. SOLANUM L.

48 species in India and 4 species in BNP.

Key to species

1a. Unarmed; calyx unaltered in fruits .................................................. 1. S. americanum

1b. Armed; calyx enlarged ................................................................. 2

2a. Indumentum of a mixture of simple and stellate hairy; corolla white; anthers creamish white; berries light green, mottled dark green when immature, yellow at maturity .................................................. 3. S. viarum

2b. Indumentum of stellate hairy only; corolla white or purple; anthers yellow; berries uniformly green, yellow or red ............................................. 3

3a. Inflorescences of male and bisexual flowers; flowers white........... 2. S. torvum

3b. Inflorescences of bisexual flowers only; flowers violet or blue .... 4. S. violaceum


Other synonym: Solanum nigrum L.

Illustration: Griff., Icon. Pl. Rar. 2: 11, Pl. 326. 1786.

Herbs, suffrutescent at base, 20–50 cm high; stems terete, sparsely to moderately appressed-pubescent. Leaves alternate, ovate to ovate-rhombic, 1.5–10 × 0.6–3 cm, acute or acuminate at apex, margins sinuate-dentate or entire, base cuneate, subcoriaceous, subglabrous to sparsely pubescent both sides; petioles 0.8–4 cm long. Inflorescences 3–8-flowered, in extra-axillary, umbellate cymes; peduncle 0.8–3.5 cm long; pedicels 3–10 mm
long. Calyx 5-lobed, lobes free above, campanulate below, 0.6–2 mm long; lobes triangular-ovate, 0.3–0.6 mm long, ciliate along margins; tube 1–1.5 mm long. Corolla white, often with purple midvein, 5-lobed, lobes free above; lobes triangular c. 1.1 x 1 mm; tube c. 2.5 mm long. Stamens 5; filaments short, less than c. 1 mm long, hairy at base; anthers 1.5–2 mm long, opened by apical pore. Ovary globose, c. 1.5 x 1.2 mm, glabrous; style c. 2 mm long. Berries green to black, globose, 5–9 mm across, many seeded; seeds discoid, 1–1.2 mm long.

Fl. & Fr.: November-February.


Other synonym: S. stramonifolium Roxb.

Local name: “Gota-begun” (Bengali).


Shrubs, to 1–2 m high; stems stellate tomentose, recurve prickled. Leaves ovate-oblong, 3.5–15 x 2–12 cm, acute at apex, shallowly lobed along margins, sub-cordate or obliquely truncate at base, subcoriaceous, stellate tomentose, upper surface hispidulous; midvein faintly raised beneath, inconspicuous above; secondary veins 4–6 pairs, stellate tomentose; petioles 6–3 cm long, stellate hairy. Inflorescences extra-axillary, many-flowered racemose panicles; peduncle 1–1.8 cm, stellate pubescent. Flowers andro-monoecious; pedicels 4–5 mm, stellate hairy. Calyx campanulate, 5-lobed; lobes lanceolate, 3–5 x 1 mm, stellate tomentose outside. Corolla white, 5-lobed; lobes linear-lanceolate, 10–12 x 4–5 mm, stellate hairy outside, glabrous inside, veins prominent. Stamens 5; filament 1–1.5 mm long; anthers yellow, oblong, c. 6 mm long. Style c. 1 cm long; stigma capitate. Berries green, yellow when mature, globose, 1–1.2 cm across, calyx persistent; fruiting pedicels c. 1.6 cm long, stellate tomentose.

Fl. & Fr.: October-January.
Distrib.: INDIA: Bihar, Jharkhand, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal. WORLD: Native of the Caribbean, widely naturalized in tropical regions of world.


Other synonym: Solanum khasianum C.B. Clarke var. chatterjeanum Sengupta. Plate 39e, f
Local name: “Vezri-kanta” (Bengali).

Undershubs; branches terete, minutely tomentose intermixed with glandular hairs, prickled. Leaves broadly-ovate, 4–8 × 4–8 cm, acute at apex, lobed along margins; lobes broadly-ovate, acute at apex, subcordate at base; subcoriaceous, tomentose, glandular hairs on both surfaces intermixed with simple hairs; midvein faintly raised beneath, inconspicuous above; lateral veins 4–5 pairs; petioles 0.5–4 cm long. Inflorescences extra-axillary cymes, 1–5-flowered; peduncles short, only basal flowers fertile. Flowers male or bisexual; pedicels 4–6 mm long, glandular-stellate hairy. Calyx green, campanulate, 5-lobed; lobes triangular, 0.6–1.2 mm; tube c. 2 mm long. Corolla white, 5-lobed; lobes lanceolate, c. 2.5 × 1 mm, sparsely pubescent. Stamens 5; filaments 1–1.5 mm long; anthers light yellow to cream, lanceolate, 6–7 mm long. Ovary globose, puberulent, with simple acute hairs; style c. 8 mm long, cylindrical, glabrous; stigma green, capitate. Berries light green mottled with dark green when immature, yellow at maturity, globose, 2.2–2.5 cm across, many seeded; seeds flattened-reniform, 2–2.5 mm across, lenticular.
Fl. & Fr.: September–February.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Madhya Pradesh, Meghalaya, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Widespread in tropical Asia and Africa.

Other synonym: Solanum indicum L.
Local name: “Byakur” (Bengali).
Plate 39: a - b. Datura metel L.: a. Habit; b. Fruit (close up); c - d2. Physalis minima L.: c. Habit; d1. Flower (close up); d2. Fruit (close up); e - f2. Solanum viarum Dunal: e. Habit; f1. Flower (close up); f2. Fruits; g - h2. Solanum violaceum Ortega: g. Habit; h1. Flower (close up); h2. Fruits (close up)
Undershubs, to 1 m high; branches terete, greyish steallate-tomentose with recurved prickles; prickles 5–7 mm long, stout. Leaves shallowly lobed, broadly elliptic or oblong-elliptic, 3.5–8.5 × 2.8–5.6 cm, subacute at apex, repand or lobed along margins, unequally truncate or oblique at base, subcoriaceous, yellow-greyish, steallate tomentose; midvein flattened above, prickled; lateral veins 3–4 pairs inconspicuous; petioles 10–18 mm long, terete, steallate tomentose. Inflorescences extra-axillary cymes, 4–15-flowered. Flowers male or bisexual; pedicels 4–8 mm long, accrescent in fruits, terete, steallate tomentose. Calyx campanulate, 5-lobed; lobes triangular-ovate, c. 3 mm long, acute at apex, prickly; tube c. 2 mm long. Corolla purple or violet, 5-lobed; lobes lanceolate, c. 7 mm long. Stamens 5; filaments c. 1 mm long; anthers linear-oblong, 5–7 mm long, equal, apically pored. Ovary c. 1.5 mm across; style c. 7 mm long, pilose; stigma discoid. Berries globose, 8–12 mm across, yellowish-red when mature, many seeded; seeds c. 2 mm across.

Fl. & Fr.: July–March.

Distrib.: INDIA: Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bhutan.


SCROPHULARIACEAE [369]

Key to genera

1a. Aquatic or marsh herbs

1b. Terrestrial herbs

2a. Fertile stamens 2 or 4; stigma 2-lamellate

2b. Fertile stamens 2; stigma capitate

3a. Fertile stamens 2, staminodes 2

3b. Fertile stamens 4, staminode absent

4a. Corolla white, actinomorphic

4b. Corolla various colored, zygomorphic

5a. Bracts present; bracteoles present or absent

5b. Bracts absent; bracteoles absent

6a. Stems and leaves glandular hairy; stem-leaves opposite

6b. Stems and leaves glabrous or eglandular villous; basal leaves usually well developed, sometimes rosulate, upper stems leaves soften alternate

1. Limnophila

8. Veronica

3. Lindernia

4. Mazus

2. Lindenbergia

6. Scoparia
7a. Capsules ovoid or ellipsoid, not enclosed by persistent calyx........... 5. *Mecardonia*
7b. Capsules oblong, acute, enclosed by persistent calyx......................... 7. *Torenia*

1. **LIMNOPHILA** R. Br. (*nom. cons.*)
   
   20 species in India and 2 species in BNP.

   **Key to species**

   1a. Finely divided submerged leaves absent; pedicels 6–10 mm; seeds
       
       **Cylindric** ............................................................... 1. *L. chinensis*

   1b. Finely divided submerged leaves present; pedicels c. 2 mm;
       
       seeds ellipsoid ........................................................... 2. *L. sessiliflora*


   Other synonyms: *Limnophila hirsuta* (Heyne ex Benth.) Benth.; *Stemodia hirsuta* Heyne ex Benth.

   Erect herbs, to 8–15 cm high; stems striate, hollow, hairy, decumbent below densely lanate with eglandular hairs to subglabrous. Leaves opposite, whorled, usually in whorls of usually 3, rarely 4, ovate-lanceolate to linear-oblung, 7–20 × 3–8 mm, sub-acute or obtuse at apex, serrulate along margins, distinctly narrowed into semi-amplexicaul sometimes petiole-like base, subcoriaceous, gland-dotted both sides; midvein conspicuous both sides; lateral veins faintly visible above, inconspicuous beneath; sessile or narrowed to base in short petioles. Inflorescences axillary solitary or cymose or panicked at top of stems. Flowers bisexual; pedicels 0.6–1 cm long, slender, patent-hirsute; bracts filiform or subulate, 1–2 mm long. Sepals tubular-campanulate, 5-lobed, c. 0.7 cm long; lobes lanceolate, c. 4 mm long, acute-acuminate at apex, hairy outside, striate in fruits; tube c. 3 mm long. Petals mauve, 2-lipped; upper lip orbicular, emarginate or 2-lobed; lower lip c. 1.5 cm long, 3-lobed. Stamens 4, didynamous; longer filaments c. 6 mm long, shorter one c. 3 mm long. Ovary ellipsoid, c. 2.5 mm long; style 4–5 mm long; stigma bilamellate. Capsules broadly ellipsoid, 4–5 mm long, covered by calyx lobes, many seeded; seeds brown, cylindrical or, 1.5–3 × 2–2.5 mm, punctate.

   **Fl. & Fr.:** October–April.

   **Distrib.:** INDIA: Almost throughout. **WORLD:** Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Thailand and Vietnam.


Aquatic or amphibian herbs. Submerged stems to 50 cm, terete, glabrous. Submerged leaves 5-30 mm, divided into many flattened or capillary, glabrous. Aerial stems, to 20 cm high, terete, usually white-hirsute. Leaves uppermost opposite, becoming 3-6 in whorl below, elliptic-lanceolate, 1-1.5 × 0.2-0.3 cm, acute at apex, serrate or denteate along margins, half-amplexicaule at base, subcoriaceous, scabrous pubescent, lower leaves irregularly pinnetisect, 3-nerved. Flowers axillary, solitary; pedicels slender, c. 2 mm long. Sepals 5-lobed, lobes free above, campanulate below, 4-6 mm long, membranous with few gland-tipped hairs; lobes lanceolate, 2-3 mm long, acute; tube c. 3 mm long. Petals light pink to mauve, 1.5-1.8 cm long, 2-lipped; lobes of upper lip rounded, short; lower lip ovate, acute. Stamens 4, didynamous; posterior filaments c. 1 mm; anterior filaments c. 3 mm. Ovary c. 1 mm across; styles c. 3 mm long; stigma bilamellate. Capsules broadly oblong, c. 3 × 2 mm, many seeded; seeds ellipsoid, c. 0.5 × 0.3 mm.

**Fl. & Fr.:** November-February.

**Distrib.:** INDIA: Almost throughout. WORLD: Bhutan, China, Indonesia (Java), Japan, Korea, Malaysia, Myanmar, Nepal, Sri Lanka and Vietnam.


2. **LINDENBERGIA** Lehm.

7 species in India and 1 species in BNP.


Other synonym: *Lindenbergia urticifolia* Lehm. ex Link & Otto (as ‘urticaefolia’).

**Illustration:** Hooker’s, Icon. Pl. 9: t. 875. 1852.

Erect undershrubs, to 40 cm high; stems suffrutescent at base, terete, pilose to subglabrous. Leaves opposite, simple, rhomboid-ovate to obovate, 1-5 × 0.6-2.5 cm, acute
at apex, serrate above entire at base along margins, attenuate at base, chartaceous, eglandular and glandular hairy both sides; midvein faintly raised above, eglandular and glandular pubescent; lateral veins 4–6 pairs, prominent beneath; petioles 0.5–1.1 cm long, hairy. Inflorescences solitary, axillary. Flowers bisexual, c. 6 × 4 mm; pedicels filiform, 1–2 mm long, hispid; bracts leafy, obovate, 0.7–1.5 × 0.6–1.2 cm. Sepals 5-lobed, lobed free above, campanulate below; lobes oblong-ovate, c. 2 × 2 mm, hispid outside, glabrescent inside, midvein prominent; tube c. 2 mm long, hispid outside, densely hairy inside. Petals yellow, 2-lipped; upper lip 2–4 mm long, simple eglandular hairs inside, tip obcordate or 2-lobed; lower lip 2.5–7.5 mm long, densely eglandular hairs inside, tip obcordate or 2-lobed; lower lip 2.5–7.5 mm long, densely hairy along middle; tube 4–8 mm long. Stamens 4, fertile, didynamous; filaments 2–3 mm long. Ovary ovoid-globose, c. 2 × 0.75 mm, densely hairy; style c. 3 mm long, hairy at base; stigma lobed. Capsules ovoid, 2.5–4 × 2.5–3.5 mm, densely pilose.

Fl.: July–September; fr.: October.


3. LINDERNIA All.

27 species in India and 2 species in BNP.

Key to species

1a. Erect herbs; leaves sessile; corolla 5–10 mm ........................................... 1. L. ciliata
1b. Prostrate herbs; leaves petiolate; corolla 12–15 mm .......................... 2. L. ruellioides


Other synonyms: Bonnaya brachiata Link & Otto; Gratiola serrata Roxb.; Ilysanthes serrata (Roxb.) Urban. Plate 40b

Local name: “Bhumi-nim” (Bengali).

Annuals herbs, to 20 cm high; stems erect or diffuse, branched; branches decumbent, sometimes rooting from last node. Leaves sessile or short petiolate; leaf blade oblong to lanceolate-oblong, 0.7–4.5 × 0.3–1.2 cm, glabrous, base amplexicaul, margin densely aristate-serrate, apex acute to obtuse. Racemes terminal; bracts lanceolate, c. 1/2 as long
as pedicels. Calyx c. 5 mm, lobed to base; lobes narrowly lanceolate, tips spinose. Corolla light purple or white, c. 7 mm; tube to 4.5 mm; lower lip almost as long as upper lip, often unequally 3-lobed, middle lobe larger than other lobes; upper lip ovate; lobe apices rounded. Fertile stamens 2, posterior; reduced stamens 2, anterior, forming prominent plaits on base of lower lip. Style as long as fertile stamens. Capsules cylindric, c. 3 cm as long as persistent calyx, apex mucronate; seeds irregularly triangular.

Fl.: August-October; fr.: September-October.

Distrib.: INDIA: Almost throughout. WORLD: Cambodia, China, Japan, Laos, Malaysia, Myanmar, Philippines, Vietnam; N Australia.

Specimen examined: Buxa National Park, Jainti Range, S. Singh & party 79.


Other synonym: *Bonnaya reptans* (Roxb.) Spreng.

Prostrate perennials herbs; stems striate, diffusely branched, rooting at nodes. Leaves opposite, simple, broadly oblong or oblong-ovate, 1–3.5 × 0.5–1.8 cm, obtuse or subacute at apex, strongly spinous-serrate along margins, sub-amplexicaul or broadly-cuneate at base, subcoriaceous, shining, punctate cystoliths above, glabrous; midvein inconspicuous above, prominent beneath; lateral veins 4–5 pairs, inconspicuous both sides; petioles 5–9 mm long. Inflorescences terminal racemes, 2–10-flowered; c. 5 cm long. Flowers bisexual; pedicels c. 3 mm long; bracts, linear, 3–5 mm long, often curved. Sepals deeply 5-lobed, lobes free almost upto base; lobes linear-subulate c. 4 mm long, finely aristate, scarious margined. Petals white, pink, lilac or pale-bluish, c. 6 mm long, 2-lipped; lower lip 3-lobed, lobes subequal or middle lobe slightly larger than other lobes; upper lip 2-lobed; tube narrowly cylindric, c. 4 mm long, minutely glandular outside. Stamens 2, perfect; filaments 1.3–2.4 mm long; 2-staminodes, 2–3 mm long. Ovary narrow-ovate, c. 1 mm long; style c. 2 mm long, slender; stigma 2-lamellate. Capsules linear-oblong, 1–2.1 cm long, many seeded; seeds oblong-ovoid, 0.2–0.3 × 0.1–0.2 mm, rugose.

Fl. & Fr.: April–November.

Distrib.: INDIA: Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Cambodia, China, Indonesia, Japan, Malaysia, Myanmar, New Guinea, Philippines, Taiwan and Vietnam.

4. MAZUS Lour.

8 species in India and 1 in BNP.


Other synonyms: Lindernia japonica Thunb.; Mazus rugosus Lour.; M. japonicus (Thunb.) Kuntze.

Plate 40c

Annual herbs, to 7–20 cm high; stems procumbent to suberect, angled, eglandular, pubescent. Leaves mostly radical, crowded, oblong or obovate-spathulate, 2.3–5.3 × 1.2–2.5 cm, acute at apex, dentate along margins, decurrent onto petiole, chartaceous, upper surfaces subglabrous or with scattered hairs; midvein flattened above, faintly raised beneath; lateral veins 3–5 pairs, inconspicuous; petioles 1–2 cm long. Inflorescences scapiform racemes, 5–20 cm long. Flowers bisexual; pedicels 2–11 mm long; bracts linear-lanceolate, 3–4 mm long. Sepals 5-lobed, lobes free above, cupular below; lobes ovate-lanceolate, 3–6 × 1–1.5 mm, acute at apex, veins prominent; tube 3–4 mm long, nerves prominent. Petals white or pale blue, 6–10 mm long, 2-lipped; upper lip 2-lobed, concave with short linear lobes, palate brown, spotted with close hairs; lower lip 3-lobed. Stamens 4, didynamous, inserted on corolla tube; anthers locules divergent, apically connivent. Ovary glabrous; style glabrous; stigma 2-lamellate. Capsules obovoidc. 4 × 5 mm.

Fl. & Fr.: Almost throughout year.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Nagaland, Punjab, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bhutan, China, Indonesia, Japan, Korea, Nepal, New Guinea, Philippines, Russia, Thailand and Vietnam.


5. MECARDONIA Ruiz & Rav.

1 species in India and BNP.


Annual herbs, 10–30 cm high; stems quadrangular, slightly twisted, sometimes rooting at lower nodes. Leaves opposite, ovate-lanceolate, 1–2.5 × 0.8–1.2 cm, glabrous, base narrowed, subequal or unequal, margins serrate, apex acute; subsessile. Flowers axillary solitary or two; bracteoles 2, linear or linear-lanceolate, c. 5 mm long; peduncles 1.3–1.8 cm long. Calyx 7–9 mm long; posterior lobes ovate 3–5 mm broad, acute; others linear, one or two of them bear basal linear appendage. Corolla yellow, slightly exserted beyond calyx, hairy at throat; upper lip emarginate; lower lip spreadingly 3-lobed. Stamens inserted at base of corolla tube; anther cells separate, stipitate. Style short; stigma lamellate. Capsules cylindric, c. 6 mm long, 2-valved, septicidal; seeds reticulate.

**Fl. & Fr.** March–May.

**Distrib.** INDIA: Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bhutan.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 16th Feb., 2010, S.K. Srivastava & Gopal Krishna 47122.

### 6. SCOPARIA L.

1 species in India and BNP.


Other synonym: *Scoparia purpurea* Ridl.

**Plate 40d, e**

Herbs, to 30 cm high; stems and branches angled, glabrous. Leaves opposite, whorled, linear-oblancoelate, narrowly elliptic or narrowly obovate, 0.6–3.5 × 0.3–1.9 cm, acute at apex, doubly serrate above, entire below along margins, attenuate at base, chartaceous, dark green, glabrous; midvein impressed above, faintly raised beneath; lateral veins 3–4 pairs, prominent beneath; petioles c. 5 mm long. Inflorescences usually axillary, 1 or 2 per node; pedicels filiform, c. 6 mm long, glabrous. Sepals green, 4-lobed, lobes free up to base; lobes oblong, c. 2 × 1 mm, acute, margins hyaline, ciliate. Petals cream-white with purple tinge outside, 4-lobed, lobes free above, connate below; lobes oblong-obovate, 2–3.5 × 1.5 mm, acute or obtuse at apex, reflexed, glabrous outside, inside with dense tuft of long silky white hairs, covering stamens and ovary. Stamens 4, fertile, subequal; filaments terete, 1.5–2.5 mm long, glabrous; anthers subsaggitate 0.7–1 mm, yellow. Ovary c. 1 × 1
mm, 2-celled, glabrous; style subclavate c. 1.5 mm long, glabrous; stigma greenish, truncate. Capsules ovoid, c. 3 × 2 mm, many seeded; seeds obovoid, angled, c. 0.1 × 0.1 mm.

**Fl. & Fr.:** September-February.

**Distrib.:** INDIA: Almost throughout. WORLD: throughout tropics and sub-tropics.

**Specimens examined:** Buxa National Park, Jainti range, Tashigaon 2, S.K. Srivastava & Gopal Krishna 46134; NRVK 6, 13th Feb., 2010, S.K. Srivastava & Gopal Krishna 47056.

7. **TORENIA L.**

12 species in India and 1 species in BNP.

**Torenia cordifolia** Roxb., Pl. Coromandel 2: 52, Pl. 161. 1798. Plate 40f

**Illustration:** Roxb., Pl. Coromandel 2: t. 161.1798.

Annual herbs; stems usually erect, lower branches decumbent, sometimes prostrate below and rooting at lower nodes; stems quadrangular or narrowly winged, sparsely hirsute on angles or almost glabrous. Leaves opposite, simple, ovate, 10–23 × 7–18 mm, acute at apex, serrate along margins, cuneate at base, subcoriaceous, green, upper surface sparsely puberulent or glabrous, lower surface puberulent on veins; midvein flattened above, faintly raised beneath, hirsute; lateral veins 4–5 pairs, prominent beneath, hirsute; petioles 4–12 mm long, sparsely hirsute. Inflorescences umbel-like and in opposite axillary pairs, 1–3-flowered. Flowers bisexual; pedicels 10–31 mm long in flower, 20–35 mm in fruits. Sepals green, 2-lobed; one lobe with 2-tooth; other lobes 3-tooth. Petals pale bluish-purple or white with darker blotches at tips of lower lobes, 2-lipped; upper lip external in bud, emarginate or bifid; lower lip larger, spreading, 3-lobed. Stamens 4, didynamous, fertile; anterior filaments c. 2 mm long, inserted near top of tube, with short spur c. 0.5 mm, posterior 2 inserted at throat, with short filaments; anthers c. 2.5 mm long. Ovary bilocular; style slender c. 15 mm long. Capsules oblong, c. 8 mm, acute, enclosed by persistent calyx, many seeded; seeds yellow, c. 0.3 × 0.3 mm, truncate at both ends, rugose, pubescent.

**Fl. & Fr.:** September-February.

**Distrib.:** INDIA: Bihar, Himachal Pradesh, Jharkhand, Karnataka, Manipur, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, China and Vietnam.

8. VERONICA L.

32 species in India and 1 species in BNP.


Other synonym: V. anagallis var. punctata Hook.f. Plate 40g


Annual erect herbs, to 20–25 cm high; stems terete, tuberculate, glabrous. Leaves opposite, linear-lanceolate, 1.4–2.3 × 0.2–0.4 cm, acute at apex, serrate along margins, cuneate at base, coriaceous, green, scurfy hairy both sided; midvein impressed above, faintly raised beneath; lateral veins inconspicuous both sides; sessile. Inflorescences terminal raceme, 6–8.5 cm long; rachis glandular pubescent. Flowers bisexual; pedicels c. 3 mm long, glabrous; bracts lanceolate, c. 2 × 0.5 mm. Sepals 4, free; lobes elliptic, 2–2.5 × 1 mm, acute at apex, finely serrate along margins. Petals white, 4-lobed above, connate below. Stamens 2; filaments epipetalous, free c. 0.5 mm long, glabrous; anthers ovoid c. 0.2 mm long. Ovary globose, c. 2.25 × 2.25 mm, glandular pubescent; style c. 1 mm long; stigma capitate. Capsules globose, 2–2.5 mm across, shallow apically notched, many seeded; seeds ovate, c. 0.2 × 0.2 mm, black, glabrous.

Fl. & Fr.: April–August.

Distrib.: INDIA: Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Madhya Pradesh, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Uttar Pradesh and West Bengal. WORLD: Bhutan, China, Europe, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, North America, Pakistan, Russia, Tajikistan, Turkmenistan and Uzbekistan.


Note: Usually the capsule are glabrous but in present collection the capsules are glandular pubescent.

GESNERIACEAE [367]

Key to genera

1a. Corolla scarlet; fertile stamens 4; staminodes absent.......................... 1. Aeschynanthus
1b. Corolla pale purple or mauve; fertile stamens 2; staminodes present....................... 2

2a. Leaves serrate along margins; mouth of corolla wide open; inflorescences cymes; seeds tailed at both end.......................................................... 2. Lysionotus
2b. Leaves entire along margins; mouth of corolla closed inflorescences racemes; seeds without tail ........................................ 3. Rhynchoglossum

1. AESCHYNAUTHUS Jack. (nom. cons.)

20 species in India and 1 species in BNP.


Other synonyms: Aeschynanthus grandiflorus var. parasiticus (Roxb.) C.B. Clarke; Aeschynanthus grandiflorus Spreng. (nom. superfl.); A. parasiticus (Roxb.) C.B. Clarke (isonym.)


Epiphytic shrubs; stems slender, terete, glabrous, rooting at nodes, pendulous. Leaves opposite, elliptic or elliptic-lanceolate, 4.4–9.5 × 1.6–3 cm, acuminate at apex, entire along margins, narrowed at base, fleshy, leathery, coriaceous, glabrous; midvein and lateral inconspicuous; petioles 5–10 mm long. Inflorescences in terminal clusters. Flower bracts, linear-lanceolate, c. 3 × 1 mm; pedicels 5–8 mm long, accrescent in fruits upto 1.4 cm long. Calyx campanulate, 5-lobed; tube 3–5 mm long; lobes linear-lanceolate, 3–5 mm long, acute, glabrous. Corolla orange-red, tubular, bent and inflated upwards, glandular-pubescent outside, coarse gland tipped hairs inside at base of tube; tube 2–3 cm long. Stamens 4, fertile, exserted; filaments c. 1 cm long, glandular puberlous; anthers c. 1 mm long. Disk annular. Ovary linear, minutely gland dotted; style c. 2 cm long, glandular-pubescent. Capsules linear-falcate, 10–15 cm long, many seeded; seeds c. 1 mm long, 2 long tails at one end and one tail at other end.

Fl. & Fr.: September–January.

Distrib.: INDIA: Assam, Meghalaya, Odisha, Sikkim and West Bengal. WORLD: Bhutan.


2. LYSIONOTUS D. Don.

3 species in India and 1 species in BNP.

Lysionotus serratus D. Don in Edinburgh Philos. J. 7: 85. 1822; C.B. Clarke in Hook.f., Fl. Brit. India 4: 344. 1884 (as “serrata”)
Fig. 26. *Lysianthus serrotus* D. Don: a. Fruiting branch; b. L.S. of flower; c. Stamens; d. Gynoecium
Plate 40: a. Limnophila sessiliflora (Vohl) Blume; b. Lindernia ciliata (Colsm.) Pernell; c. Mazus pumilus (Burm.f.) Steenis; d - e. Scaparia dulcis L.: d. Flower (close up); e. Fruits (close up); f. Torenia cordifolia Roxb.; g. Veronica anagallis-aquatica L.; inset: flowers; h. Aeschynanthus parasiticus (Roxb.) Wall.

Sub-shrubs, to 30–50 cm high; stems sub-terete, lenticellate, glabrous. Leaves opposite, decussate, elliptic-ovate or ovate-lanceolate or ovate, 7.3–13.8 × 4.2–4.5 cm, acute or shortly acuminate at apex, crenate-serrate along margins, slightly obliquely cuneate at base, chartaceous, pale green, glabrous; midvein prominent beneath; lateral veins 6–8 pairs, inconspicuous above, conspicuous beneath, glabrous; petioles 0.6–1.4 cm long, glabrous. Inflorescences cymes, 4–10-flowered; peduncle 8–10 cm long, glabrous; bracts ovate to orbicular, 3.5–10 × 4–8.5 mm, caducous; pedicels 3–11 mm long, glabrous. Calyx 5-lobed; lobes linear-lanceolate, 7–10 × 1–1.2 mm, acute at apex, sub-coriaceous, obscurely 3-nerved, glabrous. Corolla whitish or mauve, campanulate, yellow marks on lower lip, hairy outside; tube slender infundibular, 2.2–3 cm long; lobes rounded or broadly ovate. Stamens 2, fertile, adnate to corolla tube; filament 6–9 mm long; anthers subglobose. Staminodes 2, 0.5–6 mm long. Disk annualar, margin entire. Ovary linear, c. 10 × 1 mm, glabrous; style 1–1.5 mm long, glabrous; stigma discoid, 1–1.5 mm across. Capsules linear, 6.5–10 × 2–2.5 mm, many seeded; seeds oblong, 0.7–0.8 × 0.1 mm, lateral appendages 2; appendages filiform, 1.5–2 mm long.

Fl. & Fr.: July–January.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand and West Bengal. WORLD: Bhutan, China, Japan, Myanmar, Nepal, Thailand and Vietnam.

Specimens examined: Buxa National Park, Jainti Range, Tashigaon Pond, 326 m, S.K. Srivastava & Gopal Krishna 46164.

3. RHYNCHOGLOSSUM Blume (‘Rhinchoglossum’) (nom. & orth. cons.).

3 species in India and 1 species in BNP.


Other synonyms: Rhynchoglossum obliquum var. parviflorum C.B. Clarke; Antonia obliqua (Blume) R. Br.


Herbs, to 30–60 cm high; stems sulcate, terete, sparsely puberulent. Leaves opposite, obliquely ovate, 1.8–11 × 0.8–6 cm, acuminate at apex, wavy along margins, oblique at base, often cordate-rounded on broad side, cuneate on narrow side, chartaceous, bluish
green when dry, glabrous, sometime sparsely pubescent beneath; midvein impressed or flattened above, faintly raised beneath; lateral veins prominent beneath; petioles 0.5–3 cm long. Inflorescences terminal or axillary racemes, 10–20 cm long. Flower pedicels 3–4 cm long. Calyx campanulate, 5-lobed; lobes triangular, 2.2–3 × 1–1.7 mm; tube 3–3.5 × 2.5 mm, scabrous on margins and mid-line. Corolla pale to dark purple or blue, 0.8–1.1 cm long, inside puberulent near mouth, upper lip minutely bilobed, 1.5–2.5 mm; lower lip larger, 3-lobed to undivided; lobes ovate to elliptic, 3.5–5 mm; tube 5–6 × 1.5–2 mm. Stamens 2, fertile; filaments included; anthers 0.7–1 mm. Staminodes 2, c. 0.8 mm long. Disk annular. Ovary c. 1 mm across; style 4–6 mm long, glabrous; stigma discoid, c. 0.3 mm across. Capsules ovoid-ellipsoid, 3–4.5 mm, enclosed by calyx, many seeded; seeds ellipsoid, c. 0.2 mm long more or less rugose.

Fl. & Fr.: July–November.


Specimen examined: Buxa National Park, Jainti range, 8th oct., 2009, S.K. Srivastava & Gopal Krishna 46203.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

**BIGNONIACEAE [379]**

Key to genera

1a. Capsule dehiscing septicidally ................................................................. 2. Oroxylum

1b. Capsule dehiscing loculicidally ................................................................. 2

2a. Sepals spathe like; petals bright yellow with reddish streak ...................... 1. Markhamia

2b. Sepals campanulate; petals creamish ....................................................... 3. Stereospermum

1. **MARKHAMIA** Seem. ex Baill.

1 species in India and 1 species in BNP.


**Illustration:** J. Bot. 3: t. 35. 1865 [as Muenteria tomentosa (Benth.) Seemann].
Trees, to 20 m tall; stems branched; branches sub-terete, tomentose. Leaves opposite, whorled, compound, 5–11 leaflets; rachis 14–30 cm long, terete, puberulous; stipules triangular-ovate, c. 7 × 3 mm, acute, thickened at base, tomentose; leaflets oblong-ovate, elliptic-ovate or elliptic, 9.8–23 × 4.8–9.4 cm, acuminate at apex, entire–undulate along margins, cuneate at base, coriaceous, shining, glabrous above, hairy beneath; midvein slightly impressed above, raised beneath, pubescent; secondary veins 5–8 pairs, prominent beneath, pubescent; petioles c. 1 mm long or sessile. Inflorescences racemes 15–20 cm long; rachis tomentose. Flowers bisexual, 5–6 × 4 cm; pedicels 8–14 mm long, tomentose; bracts triangular c. 2 × 1.8 mm, acute, yellow, tomentose. Sepals spatulate, tubular, 2–2.3 × 2 cm, tomentose outside, glabrous inside. Petals yellow with dark red streak, ventricose above, 5-lobed above; tube 4–5 cm, cup shaped, gland dotted above towards ventrrocose portion, flaccose beneath; lobes sub-orbicular c. 1.3 × 1.3 mm. Stamens 4, didynamous; filaments 1.5–2 cm long, glabrous; anthers ovate, c. 2.5 × 1.5 mm, connective slightly elongated. Ovary enclosed in calyx cup; style c. 2 cm long, glabrous; stigma oblong c. 1 mm long. Pods compressed, flattened, 85–100 × 1.6–1.8 cm, gland dotted, tomentose, margins thickened, median line prominent, many seeded; seeds linear-oblong, 3–3.5 × 0.6 cm, including wings.

Fl. & Fr.: November-February.

Distrib.: INDIA: Bihar, Jharkhand & West Bengal. WORLD: Native of Africa.

Specimen examined: Buxa National Park, Rajabhatkhawa range, 4th Dec., 2011, Gopal Krishna, 52346.

2. OROXYLUM Vent.

1 species in India and BNP.


Local name: “Sonpatti” (Bengali).

Illustration: M. Blanco, Fl. Filip. t. 219. 1875.

Trees, 15–20 m tall; branchlets terete, lenticellate, glabrous. Leaves opposite, imparipinnate, 29–36 cm long, 7–9-leaflets, ovate to oblong-ovate, 7.5–10 × 3.8–6.1 cm, shortly acuminate at apex, entire along margins, attenuate at base, sub-coriaceous, pale beneath when dry, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 4–6 pairs, prominent beneath, glabrous or puberulent; petiolules 5–7 mm long,
glabrous. Flowers bisexual, opening after sun-set; pedicels c. 7 cm long. Sepals 5-lobed, campanulate, 2.2–4.5 × 2–3 cm, glabrous, membranous. Petals yellowish purple, 5-lobed above; lobes sub-orbicular, 2–4.5 × 2.4–5 cm, reflexed, margins crenate; tube 4.5–8 cm long, reddish purple outside, yellow within. Stamens 4; filaments 3–4.5 cm long, tomentose at base; anthers ellipsoid, 8–10 mm long. Disk large, fleshy, 5-lobed. Ovary enclosed by disk; style 5–7 cm long; stigma 2-partite. Capsules 50–62 × 4–9 cm, woody, lenticellate, many seeded, dehiscing septicidally; seeds rounded, c. 6.5 × 3.2 cm, including papery wings.

Fl. September–December; fr.: November–March.

Distrib.: INDIA: Andaman and Nicobar Islands, Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan, Uttarakhnad, Uttar Pradesh and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia (Java, Sumatra), Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 6, 29th Nov., 2011, Gopal Krishna 47175.

3. STEREOSPERMUM Cham.

4 species in India and 1 species in BNP.


Other synonyms: Stereospermum tetratum DC.; S. chelonoides auct. non. C.B. Clarke.

Tree, to 30 m tall. Leaves opposite, compound, imparipinnate, 7–9-leaflet; leaflets oblong-elliptic, 6–12 × 2.5–4.4 cm, abruptly acuminate at apex, wavy along margins, cuneate at base, coriaceous, glabrous; midvein impressed above, raised beneath; secondary veins 8–10 pairs; petiolule 4–7 mm long. Inflorescences terminal, panicles. Flowers bisexual, c. 1.8 × 1.5 cm. Sepals campanulate, 5-lobed, glabrous, 0.5–1 cm. Petals cream white, 2-lipped, 5-lobed above; tube 1.3–1.5 cm long, narrow below, ventricose above, slightly curved, pubescent outside, villous within; upper lip 2-lobed, suborbicular, c. 7 × 7 mm, obtuse hairy at apex; lower lip 3-lobed, broadly oblong 5–6 × 3–5 mm, obtuse at apex, ciliate along margins. Stamens 4, didynamous; filaments terete, 1.8–2 cm long, glabrous; anthers c. 1 mm long, ventrified. Stigma 2-lobed. Capsules terete, angled, 30–80 × 0.8–12 cm, ridged, twisted, prominently ridged, many seeded; seeds ovoid, 5–6 × 1.3 mm including wing; wings white, membranous.

Fl.: May–July; fr.: September–November.
Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Kashmir, Madhya Pradesh, Maharashtra, Tamil Nadu, Meghalaya, Odisha, Rajasthan and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia (Sumatra), Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti range, NRVK 5a, 30th March, 2012, Gopal Krishna 50654.

ACANTHACEAE [378]

Key to genera

1a. Climbers; calyx cupular with 10–20 lobes or reduced to an entire ring; capsule with a prominent apical sterile beak; seeds not borne on hook like retinacula.......................................................... 15. Thunbergia

1b. Prostrate or erect herbs, shrubs; calyx 4 or 5-lobed; capsule lacking a prominent apical sterile beak; seeds borne on hook like retinacula or not.......................................................................................... 2

2a. Cystoliths absent; retinacula absent ................................................................. 9. Nelsonia

2b. Cystoliths present; retinacula present, hook like............................................. 3

3a. Calyx lobes heteromorphic; corolla lobe quincuncial........................................ 4

3b. Calyx lobes homomorphic (except Strobilanthes); corolla lobe not quincuncial............................................................................................................. 5

4a. Corolla large more than 3 cm, upper lip usually 4-lobed and lower lip 1-lobed................................................................................................... 2. Barleria

4b. Corolla small less than 3 cm, upper lip 2-lobed and lower lip 3-lobed.......................................................... 7. Lepidagathis

5a. Corolla lobes contorted; stamens (or stamens + staminodes) 4............................. 6

5b. Corolla lobes ascending cochlear in bud; stamens 2 (except Asystasia), staminodes absent or 2............................................................................................................. 9

6a. Style held in place by trichomes on one side of corolla tube; stamens monadelphous (by a sheath) at base ...................................................... 14. Strobilanthes

6b. Style not held in place by trichomes on one side of corolla tube; stamens not monadelphous at base........................................................................ 7

7a. Inflorescences second, strobilatate spikes with orbicular to reniform bracts; ovules 2 per locule; seeds to 4 per capsule; septa with attached retinacula separating from inner wall of mature capsule ...... 10. Phaulopsis
7b. Inflorescences not as above; ovules 4 to many per locule; seeds 4 or more per capsule; septa with attached retinacula not separating from inner wall of mature capsule ................................................................. 8

8a. Corolla limb nearly regular, lobes equal to subequal .................. 4. Eranthemum
8b. Corolla limb distinctly bi-lipped, lobes usually not equal .......... 5. Hemiadelphus

9a. Corolla scarlet to brick red; ovules 3 to many per locule; seeds 6 to many per capsule; pollen with apertural margins conspicuously thickened ................................................................. 11. Phlogacanthus
9b. Corolla other than scarlet; ovules 2 per locule; seeds 4 per capsule; pollen with apertural margins not thickened ...................................................... 10

10a. Stamens 4 .............................................................................. 1. Asystasia
10b. Stamens 2 ................................................................................ 11

11a. Flowers subtended by involucre of 2 or more pairs of floral bracteoles; corolla lip in upper position 3-lobed and lip in lower position entire to 2-lobed ................................................................. 3. Dicliptera
11b. Flowers subtended by a single pair of bracteoles (or bracteoles rarely lacking); corolla upper lip entire to 2-lobed and lower lip 3-lobed ................................................................. 12

12a. Staminodes 2; Corolla ± salverform (i.e., tube slender and cylindric, limb spreading and inconspicuously 2-lipped), tube conspicuously longer than limb, not or only slightly widened distally .... 12. Pseuderanthemum
12b. Staminode absent ........................................................................ 13

13a. Upper lip of corolla lacking a stylar furrow on internalsurface; anthers lacking basal appendages ................................................................. 8. Leptostachya
13b. Upper lip of corolla rugulate (i.e., with a furrow on innersurface of lip in which style resides); anther thecae (atleast lower theca) usually with a basal appendage ........................................ 14

14a. Septa with attached retinacula remaining attached to innerwall of mature capsule; inflorescences not as above .................................. 6. Justicia
14b. Septa with attached retinacula separating from inner wall of mature capsule; inflorescences often dense with imbricate bracts 2 or 4-ranked (but only 2 ranks fertile) .............................. 13. Rungia
1. **ASYSTASIA** Blume

2 species in India and 1 species BNP.

**Asystasia macrocarpa** Nees, Pl. Asiat. Rar. 3: 89. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 495. 1885; Prain, Bengal Pl. 2: 813. 1903.

Other synonym: *Mackaya macrocarpa* (Nees) Das. Fig. 27; Plate 41b, c

Perennial woody herbs, to 2 m high; stems angled, subglabrous. Leaves elliptic-oblanceolate, 3.5–7.5 × 1.3–3.5 cm, acute to acuminate at apex, entire along margins, cuneate at base, subcoriaceous, lineolate or pubescent both sides; midvein faintly raised both sides, pubescent; lateral veins 6–8 pairs, prominent beneath; pedicels 4–6 mm long, pubescent. Inflorescences narrow terminal panicle, 6–20 cm long, formed from short few-flowered cymes arising in axils of bracts; cymes 3–6 cm long, 3–6-flowered; rachis glandular-pubescent; bracts narrowly oblong or lanceolate, 11–50 × 4–13 mm, acute. Flowers pedicellate; bracteoles linear-subulate, 3–5 mm long, hairy. Calyx 5-lobed, cupular at base; lobes subulate, 3–5 mm long, in fruiting lobes upto 7 mm long, acute, glandular-pilose; cup c. 1.5 × 1.5 mm. Corolla dark purple with lilac veins, 2.5–3 cm long, tube cylindric, equaling with ventricose, 5-lobed, glandular pubescent outside, sericeous inside along the filaments; lobes suborbicular, c. 4 × 3 mm, subequal, puberulous. Stamens 4, didynamous; filaments 5–8 mm long, pubescent; anthers oblong-ovate, c. 4 mm long, 2-celled, spurred at base. Ovary narrowly oblong, c. 2.5 × 1 mm, densely white hairy; ovules 2 in each locule; style c. 1.6 cm long, glabrous; stigma globose. Capsules oblong, scarcely ventricose, 3.5–4 × 0.5 cm, glandular pubescent, 4-seeded; seeds orbicular, 4–5 mm across, rugose.

Fl.: October-December. fr.: March-April.

**Distrib.:** INDIA: Sikkim, Uttarakhand and West Bengal. WORLD: Nepal.


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2. **BARLERIA** L.

26 species in India and 2 species in BNP

Key to species

1a. Bracteoles erect; bracteoles and calyx spiny-margined;

   petals pink or white................................................................. 1. *B. cristata*

1b. Bracteoles deflexed; bracteoles and calyx not spiny margined;

   petals mauve or purple............................................................ 2. *B. strigosa*
Fig. 27. *Asystasia macrocarpa* Nees: a. Flowering branch; b. L.S. of flower; c. Calyx; d. Gynoecium; e. Capsule

**Local name:** “Jhanti” (Bengali).  

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 453. 1840–1843.

Undershubs, to 45–60 cm high; stems angled, branched; branches appressed hairy. Leaves opposite, simple, ovate-elliptic to elliptic-oblong, 2–9 × 1–2.6 cm, mucronate at apex, entire along margins, attenuate at base, sub-coriaceous, lineolate with prominent cystoliths above, appressed hairy both side; petioles 1–10 mm long. Flowers subsessile in dense axillary clusters becoming capitately; bracts absent; bracteoles very variable, linear to linear-lanceolate, 1.3–2.2 × 0.1–0.3 cm, acuminate, usually spine margined or oftened bristly margined. Sepals deeply 4-lobed, lobes in 2 whors, spiny margined; outer whorl, lanceolate or narrowly elliptic, 2–2.5 × 0.5–1 cm, mucronate at apex, nerves prominent; inner whorl, linear-lanceolate, 0.6–0.7 × 0.1–0.2 cm, acute at apex. Corolla pinkish-purple or white, 5-lobed above, sub equal; tube 5.5–7 cm long, narrowly cylindrical in the lower half and then widened up, glandular pubescent outside, pilose within; upper lobes ovate-oblong, c. 2.2 × 1.5 cm, glabrous; lower lobes, sub-ovate, c. 3 × 1.8 cm. Stamens 2; filaments 2–3 cm long, pubescent, exserted; anthers c. 2 mm long. Stamnodes 2, 4–6 mm long. Disk cupular. Ovary c. 3 mm long, ovules 2 in each locule; style 2–4 cm long, terete; stigma 2-lobed. Capsules oblong-ovate, c. 13 × 5 mm, glabrous, 4-seeded; seeds orbicular, 4–5 × 3–3.5 mm, compressed, silky-hairy.

**Fl. & Fr.:** June–March.  


**Other synonym:** *Barleria coerulea* Roxb.  

**Local name:** “Dasí” (Bengali).  

Unershubs, to 60–100 cm high; stems branched, angled, coarsely fulvous, strigose. Leaves opposite, simple, broadly ovate or elliptic, 4–15 × 1.4–5 cm, acute at apex, entire along margins, cuneate at base, lamina decurrent onto petioles, sub-coriaceous, dark
green, lineolate above with prominent cystoliths, strigose both sides; midvein raised both sides, strigose; lateral veins faintly 5–6 pairs, strigose; petioles 0.8–3.5 cm long, strigose. Flowers subsessile in dense shortly pedunculate, unilateral axillary or terminal clusters, 0.5–7 cm long; bracts absent; bracteoles foliaceous, ovate-elliptic, 0.8–2 × 0.4–1 cm, acute or strap shaped, tips with strigose hairs on nerves, margins undulated, reflexed in other side. Calyx deeply 4-lobed, densely strigose, lobes broadly overlapping; outer lobes, rhomboid-ovoid, 2.5–3 × 1.5–1.8 cm, acute at apex, 8–10-nerved, ciliate; inner lobes linear-lanceolate, 0.8–1 × 0.2 cm, acuminate at apex, bi-dentate with a prominent notch, densely strigose, ciliated. Corolla purplish-blue or mauve, 5-lobed above, sub equal; tube 5–6.5 cm, shortly glandular-pubescent, cylindrical lower half then widened; lobes ovate-oblong, c. 2 cm, thinly pilose. Stamens 2, exserted. Staminodes 2. Ovary ovate-oblong, c. 3 × 1.5 mm, glabrous, Ovules 2–1 in each cell; style 3.5–4 cm long, hairy at base; stigma linear c. 2 mm long. Capsules oblong, ellipsoid, 1.5–2 × 0.5–0.6 cm, acute at apex, shining, glabrous, 4-seeded; seeds deltoid to ovate, 5–6 × 4–5 mm, clothed with silky hairs.

Fl. & Fr.: August–March.


Uses: Plant is bitter and useful in ulcers, skin diseases. Root is used as a remedy of cough.

3. DICIPTERA Juss. (nom. cons.)

25 species in India and 1 species in BNP.

Diciptera bupleuroides Nees, Pl. Asiat. Rar. 3: 111. 1832.

Other synonyms: Diciptera roxburghii T. Anderson; Diciptera roxburghiana Nees var. bupleuroides (Nees) C.B. Clarke. Plate 41f

Perennial tufted herbs or undershrubs, to 30–60 cm high; stems quadrangular, striated with swollen nodes, puberulous. Leaves opposite, simple, elliptic, ovate to lanceolate, 2.8–9.8 × 1.4–4.3 cm, shortly acuminate at apex, entire or obscurely sinuate along margins, attenuate at base, chartaceous, dark green, glabrous and shining above; midvein slightly raised both sides; lateral veins 6–8 pairs, prominent beneath; petioles 1–3.5 cm long. Inflorescences on pedunculate, axillary or terminal capitate cymes; peduncle 3–5 mm.
Flower pedicels 1-1.5 cm; bracts clustered, foliaceous, linear-oblong, 6-15 × 3-7 mm, acute at apex, ciliate along margins, shortly stalked; bracteoles in whorls; outer oblong-lanceolate, 5-7 × 0.2 mm, pubescent; inner lanceolate, c. 4 × 1.5 mm. Calyx 5-lobed; lobes subulate, 4-5 mm long, acuminate, scarious, setaceous. Corolla rosy purple with violet spot inside, distinctly 2-lipped; tube white or pale lilac, 1.6-2.5 cm long; lower lip orbicular, c. 1.5 × 1.5 mm; upper lip shallowly 3-lobed; lobes ovate, c. 0.3 × 0.3 mm. Stamens 2, filaments pinkish, 4-5 mm long, hairy, anthers c. 1 mm long, 2-celled, superposed giving a spatulate appearance. Ovary oblong, c. 1.5 × 0.5 mm, pilose at tips; style creamish, filiform, c. 15 mm long, glabrous; stigma bifid. Capsules clavate, 0.5-0.8 cm long, sparsely pubescent at tips, 4-seeded; seeds compressed, c. 1 mm across, glabrous, verucose.

Fl. & Fr.: October-April.

Distrib.: INDIA: Throughout. WORLD: Bhutan, Cambodia, China, Laos, Myanmar, Thailand and Vietnam.


4. ERANTHEMUM L.

12 species in India and 2 species in BNP.

Key to species

1a. Stems hirsute with intermixed glandular hairs; leaves pilose;
   corolla bright crimson 3.5–4 cm long; prominently
   exserted ................................................................. 1. E. erythrochilum

1b. Stems lineolate; leaves glabrous; corolla purple or mauve 1.5–2 cm long; anthers shortly exserted ......................... 2. E. nervosus


   Fig. 28; Plate 41g, h1, h2

Shrubs to 1.5–2 m high; stems quadrangular, swollen at node, hirsute, intermixed with glandular hairs. Leaves opposite, simple, oblong-elliptic or oblong-oblong, 12–23 × 4.8–9 cm, acuminate at apex, crenate-ciliate along margins, attenuate at base, coriaceous, dark green, sticky due to glandular hairs, lineolate with prominent cystoliths, sparsely pilose both sides; midvein impressed above raise beneath, glandular pubescent both side; lateral veins 10–14 pairs prominent beneath, glandular pubescent; petiole 1–3.5 cm, glandular
Fig. 28. Eranthemum erythrochilum J.R.I. Wood: a. Flowering branch; b. Bract
Plate 41: a. Oroxylum indicum (L.) Benth. ex Kurz; b - c. Asystasia macrocarpa Nees; b. Flowering branch; c. Flowering and fruiting branch; d. Barleria cristata L.; e. Barleria strigosa Willd.; f. Dicliptera bupleuroides Nees; g - h2. Eranthemum erythracilum J.R.I. Wood: g. Habit; h1. Inflorescence; h2. Bracts (close up)
pubescent, stout. Inflorescences terminal panicked spikes, 16–28 cm long, branched; peduncles 6.5–9 cm long, angled, hirsute with intermixed with glandular hairs. Flowers enclosed by bracts at base; bracts dark green, obovate 1.6–2.8 × 0.9–1.6 cm, gradually narrowed to tip, glandular pubescent, nerves prominent, 8 pairs, whitish with green reticulate nerves; bracteoles linear-lanceolate, 11–12 × 1.5–2 mm, glandular pubescent. Calyx 5-lobed above; lobes linear-lanceolate, 9–10 × 1–1.5 mm, acute at apex, entire along margins, hyaline with prominent midvein, glandular mixed pubescent. Corolla bright crimson, 5-lobed above, slightly curved, 3.5–3.8 cm long, glandular pubescent throughout; lobes oblong or roundly elliptic, 10–12 × 6–7 mm, subequal, recurved with prominent striation, glabrous inside, nerves conspicuous toward inner sides. Stamens 2, exserted; filaments 2–2.5 cm long, glabrous; anthers oblong, c. 5 mm long, 2-celled, muticous. Ovary oblong, c. 3 × 1 mm, glandular pubescent at neck near base of style; style c. 5.5 cm long, pubescent; stigma conical, pubescent.

Fl.: November-December.

Habitat: Grows in moist and shady places on slopes in association with Costus sp. and Begonia nepalensis.

Distrib.: INDIA: West Bengal. Endemic

Specimens examined: Buxa National Park, Jainti range, Jainti 5a compartment, 6th December 2011, Gopal Krishna 52353.

Notes: There are three closely allied species in this genus. They includes E. splendens; E. erythriochilum and E. tubiflorum, all being very similar in appearance except for minor variations. It is very difficult to ascertain the specific identity particularly with reference to these three species.


Other synonyms: Daedalacanthus nervosus (Vahl) T. Anders.; Eranthemum pulchellum Andrews.


Undershrubs, to 40–100 cm high; stems quadrangular, lineolate with prominent cystoliths, glabrous. Leaves opposite, simple, ovate or ovate-elliptic, 6.6–18.4 × 2.4–5.6 cm, acuminate at apex, entire or crenate along margins, cuneate at base, lamina faintly decurrent onto petioles, subcoriaceous, dark green, lineolate, glabrous; midvein impressed above, raised beneath, lineolate; lateral nerves 8–12 pairs, impressed above,
prominent beneath; petioles 0.5-3.5 cm long. Inflorescences a trichotomously branched; spikes 3-8 cm long, strobilat pedundes 1.3-2.2 cm long, quadrangular, puberulous; bracts foliar, coriaceous-obovate, 1.8-2 x 1.1 cm, cuspidate, variegated, prominently nerved; bracteoles 5 mm long, scarious. Calyx 5-lobed above; lobes linear-lanceolate, 4.5-5 x 1 mm, acute, glandular pubescent; tube c. 5 x 1.2 mm, sericeous. Corolla blue, 5-lobed, outside covered with patent minute and ordinary hairs; tube 1.5-2 cm, elongate dialated near the top; lobes oblique-subulate, sub equal, 6-8 x 5-6 mm, rounded, glabrous. Stamens 2; filaments 1.2-1.5 cm long, shortly exserted; anthers 2-celled, muticous. Ovary c. 3.25 x 1.5 mm, glandular pubescent towards style, ovules 2 in each cell; style c. 3 cm long, nearly glabrous. Capsules oblong, 1-1.5 cm long, glabrous; seeds elliptic, 3-6 mm hairy.

Fl. & Fr.: October–March.

Distrib.: INDIA: Throughout. WORLD: Bhutan and Myanmar (Burma).


Note: Commonly seen in the Park in the month of February and March.

4. HEMIADELPHIS Nees
1 species in India and BNP.


Other synonym: Hygrophila polysperma (Roxb.) T. Anders. Plate 42b

Illustration: Wight, Icon. Pl. Ind. Orient. 4(3): t. 1492. 1846 [as Hemiadelphis polysperma (Roxb.) Nees].

Annual, rhizomatous, terrestrial or aquatic herbs, to 15–25 cm high; stems ascendant or rarely erect, more or less 4-angled, lineolate with prominent cystoliths, pubescent, slightly tumid at nodes above. Leaves opposite, simple, broadly elliptic to oblanceolate, 9-20 x 3-7 cm, acute at apex, entire along margins, cuneate at base, sub-coriaceous, dark green, lineolate with prominent cystoliths, glabrous; midvein conspicuous; lateral veins inconspicuous. Inflorescences terminal spikes, c. 5 cm long; bracts opposite decussate, obovate, 7-9 x 2.5-3 mm, often toothed, densely hirsute; 1-3-flowered in each axil; bracteoles linear-oblong, c. 6 mm long. Calyx 5-lobed above, connate below; lobes linear-subulate, c. 0.8 cm long, margin villose, glandular hairy outside, glabrous inside. Corolla rosy-purple, distinctly 2-lipped, 1.2-1.5 cm long, pubescent outside, sparsely hairy inside; upper lip erect, 2-lobed, lobes oval-oblong; lower lip 3-lobed, lateral lobes oblong, 0.1 cm
across. Stamens 2, slightly exserted, anthers 2-celled; cells parallel; staminodal appendages bristled. Ovary 0.3 cm long, hairy; style c. 2.5 mm long, hairy, 2-fid, one lobe suppressed. Capsules linear-oblong, c. 1 cm long, prominently exserted, glabrous, 14–20-seeded; seeds ovoid to orbicular-oblong, c. 1 × 0.5 mm, retinacula minute, hooked.

Fl. & Fr.: March–July.


6. JUSTICIA L.
42 species in India and 2 species in BNP.

Key to species

1a. Flowers 2–3 cm across; style hairy throughout; stigma simple.............. 1. J. adhatoda

1b. Flowers c. 1 cm across; style glabrous; stigma capitate................. 2. J. gendarussa


Other synonym: Adhatoda vasica Nees.

Local name: “Vasaka” (Bengali).


Shrubs, to 1.5–2 m high; stems subquadrangular to subterete, young stems softly pubescent. Leaves opposite, simple, elliptic or elliptic-lanceolate, 18–24 × 5.6–8.2 cm, acute at apex, entire or crenate along margins, attenuate at base, sub-coriaceous, green, shining, copiously pellucid above, pubescent on nerves beneath; midvein impressed above, raised beneath. Inflorescences terminal and axillary spikes, 6–9 cm long; peduncles 6–9 cm long, strigose. Flowers enclosed by bracts; bracts ovate or elliptic, 1.8–2.7 × 1.2–2 cm, broadly acute at apex, 5–7-nerved at base, pubescent; bracteoles linear-lanceolate, c. 1.4 × 0.4 cm, ciliate. Calyx 5-lobed, free up to base; lobes oblong-lanceolate, c. 7 × 2.5 mm, acute, 3–5-nerved, narrowly sericeous along margins, puberulous. Corolla white, broadly tubular, glabrous outside, villous inside at the base of tube; tube 1.3–1.6 cm long, faintly inflated and bent above, pubescent outside, throat villous, 2-lipped; upper lip erect, ovate-oblong, 1.6 cm long, galeate; lower lip 3-lobed, oblong-orbicular, c. 2.5 cm across, lateral lobes palate, marked with purple streaks. Stamens 2; filaments 1.4–2 cm long, villous at base, glabrous, exserted; anthers minutely spurred at base, acute. Ovary oblong,
c. 2.5 mm long, villous; style 2-2.5 cm long, hairy throughout; stigma simple. Capsules stipitate, obovoid, c. 2.5 cm long, pubescent, 4-seeded; seeds orbicular, glabrous, tuberculate.

Fl. & Fr.: October–April.

Distrib.: INDIA: Throughout. WORLD: Indonesia, Malaysia, Nepal, Pakistan and Sri Lanka [Widely cultivated and naturalized in tropics, obscuring native distribution].


Other synonym: Gendarussa vulgaris Nees.

Local name: “Jagatmadan” (Bengali).

Illustration: Bot. Reg. 8: 635. 1822.

Undershubs to 1–1.5 m high; stems erect, much branched, subterete, tumid above nodes, glabrous. Leaves opposite, simple, lanceolate, 2.2–11.5 × 0.6–2.4 cm, acuminate at apex, undulate along margins, cuneate to attenuate at base, coriaceous, pale green, glabrous; midvein impressed above, raised beneath; lateral veins 5–6 pairs, obscure above, prominent beneath; petioles 3–10 mm long. Inflorescences terminal or axillary spikes, 2–10 cm long; bracts elliptic or linear-lanceolate, c. 0.5 × 0.15 cm, ciliate along margins; pedicels 1–2 mm long. Calyx tubular, 5-lobed above; lobes linear-lanceolate, 7–8 × 1–1.2 mm, unequal, acuminate at apex; tube c. 1.5 × 1.5 mm. Corolla cream-white with pinkish streaks and dark maroon spot inside, 2-lipped; upper lip bilobed, c. 7 × 4 mm; lower 3-lobed, lobe, 3–4.5 × 3.5 mm; tube 9–10 mm long. Stamens 2; filaments c. 3 mm long, glabrous, exserted; anthers 2-celled, minutely spured, apiculate. Ovary oblong-cylindrical, c. 1.5 × 1 mm, glabrous, ovules 2 in each locule; style 9–10 mm long, glabrous; stigma capitate. Capsules clavate, 1.2–1.5 cm long, glabrous, 4-seeded.

Fl. & Fr.: May–October.


Uses: Plants is useful in bronchitis, inflammation, dyspepsia, and vaginal discharge. Oil prepared from leaves is applied on eczema.
7. **LEPIDAGATHIS** Willd.

23 species in India and 1 species in BNP.


Other synonym: *Lepidagathis hyaline* Nees.

Perennial herbs with woody root stock, to 17–30 cm high; stems suberete, with 4–5 raised streaks, more or less pubescent, mostly at nodes, sparsely lineolate. Leaves opposite, simple, ovate or linear-oblong or lanceolate, 5–12 × 1.4–4.3 cm, acute at apex, crenate along margins, cuneate at base, decurrent into petioles, sub-coriaceous, pale-green, often blotched along center, subcoriaceous, lineolate with prominent cystoliths both sides, scurfy hairy above; midvein flattened above, raised beneath, hairy; nerves 6–9 pairs, pubescent; petioles 0.8–3 cm long, shortly hairy. Inflorescence subsessile heads. Flowers bracts oblong-lanceolate, 6–10 × 1–3 mm, mucro-acuminate spinous at apex, scarious, ciliate and glandular hairy along margins, 3-nerved; bracteoles similar to bracts, finely spinescent with cilia, intermixed with simple and glandular hairs. Calyx 5-lobed above, cupular below, in 2 whorls; outer whorls larger; inner whorls smaller; lobes linear-lanceolate, 6–9 × 0.5–1.5 mm, acute at apex, intermixed with glandular and simple hairs, ciliate along margins, midvein prominent; cup c. 1 × 1.5 mm. Corolla 2-lipped above; tube c. 4 mm long, ventricose portion c. 4 mm long; white with mottled brown palate, finely pubescent outside, upper lip concave, suborbicular, c. 2.5 × 2.5 mm, slightly notched; lower lip 3-lobed; middle lobes twice than lateral lobes, oblong, obtuse. Stamens 4; filaments c. 1 mm long, glabrous; anthers oblong c. 1 mm long, anther cells bearded. Ovary oblong, c. 1 × 1 mm, glabrous below, hairy at apex, ovules 2 in each locule; style c. 6 mm long, hairy, slightly curved above; stigma 2-lobed. Capsules oblong-lanceolate, c. 5 mm long, acute, beaked, side parallel, puberulous dorsally, 4-seeded; seeds orbicular, c. 0.5 mm, clothed with hygroscopic hairs.

**Fl. & Fr.:** October-May.

**Distrib.:** INDIA: North East India and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jainti Range, Jainti 6 compartment 9th Feb., 2010, *S.K.Srivastava & Gopal Krishna* 46361.
8. **LEPTOSTACHYA** Nees (*nom. cons.*)

1 species in India and BNP.


Other synonyms: *Dianthera leptostachya* C.B. Clarke; *Dianthera debilis* C.B. Clarke; *Leptostachya debilis* Hosseus; *Ptyssiglottis leptostachya* (C.B. Clarke) Moore. Fig. 29

**Illustration:** Wight, Icon. Pl. Ind. Orient. 4(4): t. 1543. 1846.

Herbs, 25–100 cm high; stems terete and suffrutescent at base, terete, glabrescent, subquadrangular and puberulous above. Leaves simple, opposite and unequal in pairs, ovate-elliptic or elliptic, 2–5.2 × 1.3–2.8 cm, acuminate to cuspidate at apex, entire along margins, cuneate or rarely obtuse at base, subchartaceous, glabrous except puberulous along margins and nerves beneath; midvein flattened above, faintly raised beneath; lateral nerves 4–5 pairs, faintly raised beneath; petioles 6–13 mm long, puberulous. Inflorescences terminal spike, 5–13.5 cm long; rachis hairy mixed with glandular hair; bracts linear-lanceolate to oblanceolate, 0.1–0.5 cm long; bracteoles linear, 1–3 mm. Flowers in opposite pairs, one in each bracts; sessile; bracts obovate, c. 2.5 × 1.5 mm, obtuse at apex, pubescent; bracteoles subulate, c. 3 mm long, acute at apex, pubescent. Calyx 5-lobed tubular below; lobes subulate, 2–2.5 mm long, puberulous, glandular; tube c. 1 × 1 mm, puberulous, glandular hairy. Corolla white, 2-lipped, shortly tubular below, widened above, pubescent outside; upper lip shortly 2-lobed; lower lip deeply 3-lobed. Stamens 2; filaments 1–3 mm long, pubescent; anthers 1–1.3 × 1 mm long, 2-celled, muticous. Ovary oblong-ovate, c. 1.1 × 0.8 mm, glabrous except tips, ovules 2 in each cell; style c. 3.5 mm long, glabrous; stigma 2-cleft. Capsules clavate, 0.8–1.3 cm long, pubescent, 4-seeded; seeds lens shaped, c. 2.5 × 2 mm, rugose.

**Fl. & Fr.:** September-December.

**Distrib.:** INDIA: North Eastern India and South Western Ghats. WORLD: Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jantki range, 9th Oct., 2009, S.K. Srivastava & Gopal Krishna 46256.

9. **NELSONIA** R. Br.

1 species in India and BNP.

Fig. 29. *Leptostachya wallichii* Nees: a. Fruting branch; b. Capsule; c. Seed
Other synonym: *Nelsonia campestris* R. Br.

**Local name:** “*Paramul*” (Bengali).

**Illustration:** Endlicher, Icon. Gen. Pl. t. 79. 1837–1838.

Herbs, 10–20 cm high creeping, sprawling, prostrate, pordecumbent; stems suberete, villous, often rooting at nodes. Leaves dimorphic, on main stems petiolate, elliptic-oblong or sub-orbicular, 3–10 × 1.5–5 cm; petioles c. 4 cm long; on flowering twig, sessile, smaller, 1–4 × 0.8–2.5 cm, obtuse or rounded at apex; entire along margins, acute to attenuate at base, subcoriaceous, sparsely to densely pilose; midvein flattened above, faintly raised beneath; lateral veins 8–10 pairs, prominent beneath. Inflorescences cylindric spikes, terminally or on the lateral branches; bracts spirally arranged, densely packed, overlapping, broadly ovate or ovate-elliptic, 5–8 mm long, obtuse, silky pubescent, 5–7-nerved; bracteoles absent; flowers 1.5–5 cm long, glandular-villous. Calyx 4-lobed; lobes lanceolate, 0.3–0.5 × 0.1 cm, subequal, acute, hairy, 4–5-nerved. Corolla bluish purple, 2-lipped above; tube cylindric, c. 1.5 cm with a constriction; posterior lip, 2-lobed, c. 2 mm; anterior shorter, 3-lobed, c. 0.2 cm, glabrous. Stamens 2, inserted at the point of constriction; filaments, c. 0.5 cm long, glabrous; anthers subglobose, c. 0.5 mm across. Staminode absent. Ovary 1.5 mm long, glabrous; style c. 1 mm long; stigma unequally 2-lobed. Capsules ovoid-oblong, 4–6 cm, glandular pubescent at apex, 8–16-seeded; seeds broadly ellipsoid, yellow with brown granulations; retinacula absent.

**Fl.:** October–April; **fr.:** April–May.

**Distrib.:** **INDIA:** Throughout. **WORLD:** Africa, Bhutan, Cambodia, China, Indonesia, Laos, Madagascar, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

**Specimens examined:** Buxa National Park, Jainti range, 9th Feb, 2010, S.K. Srivastava & Gopal Krishna 46364; Rajabhatkhawa range, SRVK 6, 12th March 2011, Gopal Krishna 50557; Buxa Road, 1600’, 26.02.1934 Biswas s. n.

**Note:** Common herbs in the park.

**10. PHAULOPSIS** Willd. (*nom. cons.*)

20 species in India and 1 species in BNP.


Other synonyms: *Phaulopsis parviflora* Willd.; *Ruellia dorsiflora* Retz.

**Illustration:** Wight, Icon. Pl. Ind. Orient. 4: t. 1533. 1850 [as *Aetheilema reniforme*].
Herbs, to 60–70 cm high; stems angled, straggling, sub-quadrangular, villous. Leaves opposite in unequal pair, simple, ovate or elliptic, 2.5–7.5 × 1.1–3 cm, shortly acuminate at apex, crenate-dentate along margins, attenuate at base, membranous, pale-green, sparsely adpressed hairy both sides; midvein faintly raised both sides, hairy; lateral veins 5–6 pairs, prominent beneath; petioles 1.2–3 cm long, pubescent. Flowers in dense terminal spikes; bracts reniform to orbicular, c. 0.7 × 1.1–1.3 cm, densely glandular ciliate; bracteoles absent. Calyx 5-lobed, unequal, ciliate and glandular hairy; largest outer lobes, elliptic-ovate, 4–6 mm; inner ones, linear-lanceolate, 4–6 × 0.5 mm. Corolla white, lobes subequal, tube cylindric, 6–12 mm long, 2-lipped, lower lip 3-lobed, upper lip 2-lobed; lobes ovate-oblong, 1–2 × 0.8 mm, obtuse at apex. Stamens 4; filaments c. 0.5 mm long, pubescent; anthers c. 0.5 mm long, 2-celled, cells parallel, unequal. Ovary c. 1 mm long, hairy, 2 ovules in each cell; style c. 2.5 mm long, hairy; stigma 2-lobed, unequal. Capsules clavate, 5–6 × 0.2 cm, with a short stalk, glandular pubescent at apex otherwise glabrous, 4-seeded; seeds orbicular c. 1.5 × 1 mm, sub-compressed, densely hairy.

**Fl. & Fr.**: September-December.

**Distr.**: INDIA: Throughout. WORLD: Bhutan.

**Specimens examined**: Buxa National Park, Jainti range, Jainti 5, 9th Feb., 2010, S.K. Srivastava & Gopal Krishna 46360; Buxa Road, 26.02.1934, Biswas 1659; South Rajabhatkhawa, 09.12.1975, J.K. Sikdar 4268.

11. **PHLOGACANTHUS** Nees

13 species in India and 1 species in BNP.


**Plate 42f**

**Local name**: “Kalo-basak” (Bengali).

Shrubs, to 2.5–3 m high; stems quadrangular with yellowish bark, glabrous, swollen at nodes. Leaves opposite, simple often crowded near apex, elliptic-obovate to oblanceolate, 17.5–22 × 4.3–6 cm, acute or shortly acuminate at apex, entire along margins, base broadly cuneate and decurrent onto petioles, sub-coriaceous, green, shiny, dark glossy green above, pale beneath when dry, glabrous; midvein raised both sides, glabrous; lateral veins 10–12 pairs, almost obscure above, clearly visible beneath, glabrous; petiole 2–3.5 cm long, glabrous, slightly thickened and dark at base. Inflorescence terminal, thyrses 18–20 × 5 cm; rachis tomentose. Flowers pedicellate; bracts greenlinear, subulate, 2–2.4 cm
long, apiculate, caduceus, tomentose; pedicel 2–3 cm long, tomentose. Calyx green, 5-lobed; lobes linear 0.6–0.8 cm long, subulate, tomentose. Corolla orange-red, densely hairy outside 2-lipped; tube 1.5–1.75 cm long lower lip 3-lobed, lobes oblong-ovate, 5 × 3–4.5 mm, broadly acute at apex, entire, midvein prominent; upper lip 2-lobed. Stamens 2-exserted; filaments 1.5–1.7 cm long, sparsely pubescent, villous at base; anthers oblong 3.5–4 × 1–1.25 mm, 2-celled, spurred at base. Staminodes 2, small. Ovary oblong, slightly tapering toward, 2-ovuled, c. 4 × 1.5 mm, glabrous, angled; style linear 2–2.5 cm long, glabrous; stigma not distinct. Capsules nearly clavate or oblanceolate, 2–3 cm long, glabrous, 12–14-seeded; seeds much compressed, orbicular, densely shortly hairy, retinacula curved.

Fl. & Fr.: August to February.

Distrib.: INDIA: Eastern & North-Eastern India.


Uses: Flowers are eaten as cooked vegetable. Leaves and fruits are used by local people as medicine in fever.

### 12. PSEUDERANTHEMUM Radlk. ex Lindau

1 species in India and BNP.


Other synonyms: *Eranthemum palatiferum* Nees; *Pseudoeranthemum palatiferum* (Nees) Radk.


Undershubs, 30–50 cm high; stems sub-terete, adpressed hairy to glabrous, tumid at nodes above. Leaves opposite, elliptic or oblong-elliptic, 7–11.8 × 3–3.5 cm, acute at apex, entire along margins, attenuate at base, chartaceous, dull green above, pale beneath, lineolate with prominent cystoliths; midvein faintly impressed above, raised beneath; lateral nerves 6–7 pairs, obscure above, prominent beneath; petioles 5–8 mm long. Inflorescence of lax terminal and axillary racemes, those in leaf axils shorter and always solitary; raceme 5–17 cm long. Flowers usually in opposite pairs; pedicels 2–3 mm long, pubescent; bracts linear, 2–2.5 × 1 mm, acute, glandular pubescent. Calyx 5-lobed, free above, connate below; lobes linear-lanceolate, c. 6 × 0.5 mm, acute, puberulent. Corolla light purple with purple dots on lower lip, 2.5–3.5 cm long, finely glandular pubescent; tube ventricose from base, 5-lobed but weakly 2-lipped; upper lips 2-lobed, lobes elliptic-
lanceolate, c. 1 cm long; lower 3-lobed, middle lobes broadly ovate, obtuse at apex, lateral lobes equal to lobes of lower lip. Stamens 2, included; anthers muticous. Staminodes 2. Ovary oblong, c. 1 mm long; style c. 2.3 mm long; stigma 2-lobed. Capsules linear-oblong, 2.5–3 cm long, pubescent, 4-seeded; seeds ovate c. 4 × 3.5 mm, clothed with silky hairs. Fl. & Fr.: December–April.

Distrib.: INDIA: NE India and West Bengal. WORLD: Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Specimens examined: Buxa National Park, Jainti Range, Jainti compartment No 9, 5th March 2011, Gopal Krishna; Rajabhatkhawa range, Gopal Krishna 47257; Rajabhatkhawa Range, NRVK compartment No. 6, Gopal Krishna 50605.

13. RUNGIA Nees

14 species in India and 1 species in BNP.


Other synonym: Rungia parviflora var. pectinata (L.) C.B. Clarke.

Illustration: Wight, Icon. Pl. Ind. Orient. 4: t. 1547. 1850.

Herbs, to 20–30 cm long; erect or prostrate; stems angled, basally prostrate and rooting at lower nodes, pubescent, swollen at node, lineolate with prominent cystoliths. Leaves opposite, simple, oblong elliptic, 1.7–5.6 × 0.5–1.3 cm, bluntly acute at apex, entire along margins, cuneate at base, sub-coriaceous, green, shining, lineolate both sides; midvein impressed above, slightly raised beneath; lateral veins 3–5 pairs, obscure above, raised beneath; petioles 4–9 mm long. Inflorescence of short 1-sided axillary and terminal spikes, 0.5–2 cm long. Flowers sessile; bracts in 1-sided spike, dimorphic; outer barren bracts linear-oblong, 2.5–4 × 0.5–0.75 cm, mucronate at apex, often cuspidate, sparsely ciliate, glabrous; inner fertile bracts, broadly ovate to orbicular, 0.3–0.5 × 0.15–0.2 cm, mucronate at apex, hyaline along margins. Calyx hyaline, 5-lobed, deeply partite; lobes linear-lanceolate, 2–2.25 × 0.2–0.3 mm, acute at apex, ciliate along margins. Corolla mauve to bluish, 2-lipped hairy outside; upper lips emarginated; lower lips 3-lobed, pubescent. Stamens 2; filaments 0.3–0.4 mm long; anthers c. 0.6 mm long, 2-celled, spurred. Staminode absent. Ovary oblong-obovate, c. 5 × 0.4 mm, hairy, ovules 2 in each cell; style filiform c. 1 mm long. Capsules ellipsoid, c. 3 × 1.5 mm, pointed at apex, glabrous, 4-seeded; seeds ovoid c. 0.8 × 0.6 mm, compressed, minutely verrucose. Fl. & Fr.: May–November.

Distrib.: INDIA: Throughout. WORLD: Bangladesh, Bhutan, China, Laos, Myanmar,


14. STROBILANTHES Blume

150 species in India and 3 species in BNP.

Key to species

1a. Leaves unequal; inflorescence axillary or loosely terminal panicles; corolla cream-white................................. 1. S. hamiltoniana

1b. Leaves equal; inflorescence shortly pedunculate axillary clusters; corolla pale blue........................................... 2. S. persicifolia


Other synonyms: Goldfussia colorata Nees.; Strobilanthes colorata T. Anders.

Plate 42h

Shrubs or undershrubs, to 1–1.5 m high; stems quadrangular, lineolate with prominent cystoliths, subglabrous. Leaves in pair usually unequal, ovate or elliptic-lanceolate, 4.5–19 × 1.9–7 cm, acuminate at apex, crenate-serrate along margins, attenuate at base, subcoriaceous, green, pale beneath, lineolate on both surfaces with prominent cystoliths; midvein faintly raised both side, glandular pubescent or glabrescent; lateral nerves 6–7 pairs; petioles 0.8–7 cm long, glandular pubescent. Inflorescence axillary or loosely terminal panicles, 20–30 cm long; rachis finely glandular-pilose; bracts foliaceous, ovate-oblong, 2–4 × 0.6–0.8 cm; bracteoles similar but shorter than bracts. Calyx 5-lobed; lobes sub-equal, linear-oblong, 8–10 × 1.5–2 mm, obtuse at apex, lineolate, greyish-green, glabrous when young, becoming glandular at maturity, accrescent in fruits. Corolla cream-white, ventricose above, 5-lobed; tube 2.5–3 cm long, glabrous outside, hairy inside; tubular portion longer than ventricose portion; lobes orbicular, equal. Stamens 4, didynamous; shorter filaments c. 1 mm long, longer filaments 7–9 mm long; anthers c. 1.2 mm, partially recurved. Ovary 2–2.5 mm, glabrous, 2 ovules in each cell; style c. 3.8 cm long, sparsely pubescent, exserted. Capsules oblong 0.6–1.2 cm long, 4-seeded; seeds ovate, c. 6 × 5 mm, pilose with mucilaginous hairs.

Fl.: October-March; fr.: December-March.

Distrib.: INDIA: North East India, Tamil Nadu (cultivated) and West Bengal. WORLD: Bhutan, China, Myanmar and Nepal.


Small undershrubs, 30–60 cm high; stems erect, much branched, sometimes zigzag, often with knobby remains of old leaf nodes below, glabrous. Leaves strongly unequal; smaller ones very minute and soon deciduous (often appears alternate), ovate-lanceolate, 1.5–9 × 0.5–1.5 cm, cuneate or acuminate at base, obscurely serrulate at margin, acuminate at apex, lineolate, glabrous, sessile or petiolate; petioles upto 1 cm; larger leaves 8 × 1.5–2.5 cm, attenuate at base, acute or long acuminate at apex. Inflorescence shortly pedunculate axillary clusters on main stems and on axillary branchlets; clusters sometimes turn into a short 1-sided cymes; peduncles c. 1.2 cm; folial bracts below the heads, often caducous; bracts elliptic, 6–7 mm, green, sometimes as long as the calyx, obtuse at tip, deciduous; bracteoles oblong-lanceolate, 3–4 mm, shorter than bracts and calyx. Calyx 6–9 mm, glandular hairy with red glands; lobes subequal, linear, acute at apex. Corolla pale blue, lavender or white, 2.5–3 cm, glandular-pubescent; tube slightly curved, gradually widened to 1 cm. Stamens pubescent. Style pubescent. Capsules c. 1 cm, glandular hairy, 4-seeded.

Fl.: February–March; fr.: September–December.

Habitat: Along the bank of Bhutia pond at 300–330 m.


15. THUNBERGIA Retz. (nom. cons.)

8 species in India and 3 species in BNP.

Key to species

1a. Erect shrubs; leaves pinnately nerved; inflorescence solitary
raely in pairs; flowers violet; calyx bearing 10–16 subulate teeth............. 2. T. erecta

1b. Climbing shrubs; leaves palmately nerves; inflorescences not
    solitary; flowers not violet; calyx reduced to an entire ring...................... 2

2a. Leaves triangular ovate, not lobed, 3–5-nerved at base; corolla red;
    capsule glabrous........................................................ 1. T. coccinea

2b. Leaves triangular ovate or lobed, 5–7-nerved at base; corolla
    white with yellow central portion; capsule pubescent............... 3. T. grandiflora

Illustrations: Curit’s, Bot. Mag. 85: t. 5124. 1859; Hooker’s, Exot. 2: t. 195. 1857.

Climbing shrubs with stems climbing to 12 m and then pendulous; stems angled, subglabrous, setose near nodes. Leaves opposite, simple, ovate-triangular, 5–17 × 2.3–10 cm, acute to acuminate at apex, weakly sinuate with prominent teeth along margins, rounded to cordate at base, coriaceous, glabrescent to thinly pilose both sides; 3–5-nerved at base, prominent beneath; petioles 2.5–4 cm long, stout. Inflorescences pendulous, terminal racemes, 10–50 cm long; bracts ovate-lanceolate, 2–5 × 0.8–2.4 cm, sessile. Flower pedicels 0.5–1.5 cm long; bracteoles ovate-elliptic, sometimes falcate, dark red, 1.8–3 cm, acute at apex or apiculate, densely puberulent, especially on margins. Calyx reduced to a minute rim. Corolla orange-red or crimson, glabrous or finely puberulent, tube widened from just above base, 2.2–2.8 cm; lobes suborbicular, c. 7 × 7 mm. Stamens 4, didynamous; filaments 1.2–1.5 cm long, glabrous except base; anthers 4.5–5.5 mm long, cells spurred or not. Ovary suborbicular, c. 1 × 1 mm, glabrous, ovules 2 in each cell; style c. 15 mm long, glabrous, exserted; stigma 2-cleft. Capsules c. 4 cm, glabrous; beak 1.5–2.3 cm; seeds flattened, rugose.

Fl.: September–January; fr.: January–May.

Distrib.: INDIA: Throughout. WORLD: Bhutan, China, Laos, Myanmar and Thailand.

Meyenia erecta Benth. in Hook., Niger. Fl. 476. 1849; Prain, Bengal Pl. 2: 593. 1903. Plate 43c
Illustration: Ill. Hort. 3: t. 99. 1856 [as Meyenia erecta Benth.].
Shrubs, to 1 m high; stems much branched, angled, margin slightly winged, glabrous. Leaves opposite, simple, ovate to rhombic-ovate 2–9 × 1.5–3 cm, acute at apex, entire or undulate along margins, cuneate at base, sub-coriaceous, green, glabrous; midvein slightly raised both sides, short stiff hairy; lateral nerves 3–5 pairs; petioles 2–6 mm long; stipules persistant, hairy. Flowers axillary, solitary, rarely paired; pedicels 1.5–1.8 cm long; bracteoles broadly ovate, c. 2.5 × 1.8 cm, deciduous. Calyx connate below with small annular 10–16 teeth; teeth linear-lanceolate, 1–5 mm, unequal, glandular pubescent. Corolla purple, funnel-shaped, tube with short cylindric base then widened, 5-lobed, lobes free above; lobes sub-orbicular, c. 1 × 1 cm, obtuse at apex; tube, 2.4–2.6 cm long, glandular pubescent, yellow within. Stamens 4; filaments 1–2.3 cm long, glandular hairy pubescent at base; anthers oblong, 4–6 mm long, shortly mucronate, bearded posteriorly. Ovary c. 3 mm long; style c. 3.5 cm long; stigma 2-cleft, unequal, posterior one erect, more or less rolled in, anterior one spreading. Capsules from a broad base gradually narrowed or contracted in 1–2 cm long woody beak.

Fl.: November–March; fr.: February–April.

Distrib.: INDIA: Cultivated throughout India.

Specimen examined: Buxa National Park, Rajabhatkhawa Range 2nd December 2011, Gopal Krishna 52309.

Notes: Usually cultivated as an ornamental shrub in gardens and parks or cultivated as hedge-plant. Often found in wild form.


Local name: “*Nul-lata*” (Bengali).

Illustrations: Bot. Reg. 6: t. 495. 1820; Curtis’s, Bot. Mag. 50: t. 2366. 1822-1823.

Climbing shrubs; stems terete, pubescent; internodes almost equal. Leaves opposite, simple, ovate-triangular or sub-orbicular, shallowly or deeply palmately lobed, 9.5–17 × 6–17 cm, acuminate at apex, wavy along margins, cordate at base, subcoriaceous, green, tubercular-hairy above, glabrous beneath; 5–7-nerved at base, prominent beneath; petioles 5–13 cm long. Flower solitary or paired in leaf axils, sometimes in terminal racemes; peduncles 10–15 cm long, pubescent; bracts small, insconsipuous, caudocus, 1.5–2 cm, acute at apex, truncate at base; bracteoles oblong-elliptic, 3–5 cm long, acute to apiculate, nectariferous all over, pubescent. Calyx reduced to an entire ring. Corolla
white, 5-lobed above; lobes broadly ovate or sub-orbicular, 3–4 cm across, subequal, obtuse at apex; tube 3–3.5 cm long, yellowish within with a ring of hairs above the constriction. Stamens 4, didynamous; filaments 1.2–1.8 cm long, dilated at base; anthers oblong, 0.8–1 cm long, bearded at base, cells parallel with a linear basal thin spur. Ovary 2–3 cm long, glabrescent; style 1.5–2.6 cm; stigma large, funnel shaped, with 2-round lobes. Capsules 1.2–1.5 cm long; basal part 1.3–1.8 cm across, pubescent; seeds flattened subtrigonous, 3–8 mm, covered with soft brown scales.

Fl. & Fr.: Throughout the year.

Distrib.: INDIA: Throughout. WORLD: Bhutan, China, Myanmar, Thailand and Vietnam.


VERBENACEAE [382]

Key to genera

1a. Creeping herbs; stamens included; fruit of two 1-seeded pyrenes................. 6. Phyla
1b. Erect or climbing shrubs or trees; stamens exserted (excl. Lantana);

   fruit a drupe ......................................................................................................................... 2

2a. Petals actinomorphic; petals 4-lobed; stamens 4................................. 1. Callicarpa
2b. Petals zygomorphic; petals 5-lobed; stamens 5 or many.......................... 3

3a. Petals yellow; tube oblique, much ampliate towards apex;

   mid lobe much projecting forward................................................................. 3. Gmelina
3b. Petals not yellow; tube straight, not much ampliate towards apex;

   midlobe not much projecting forward................................................................. 4

4a. Drupes with two 1 or 2-seeded pyrenes ....................................................... 5. Lantana
4b. Drupes with one 4-seeded or four 1-seeded pyrenes................................. 5
5a. Sepals not saucer-shaped; filaments much exserted;

   fruiting-calyx not enlarged................................................................................. 2. Clerodendrum
5b. Calyx saucer-shaped; filaments not much exserted; drupes enclosed by enlarged fruiting calyx......................................................... 4. Holmskioldia
1. CAL LICARPA L.
8 species in India and 2 species in BNP.

Key to species

1a. Trees; leaves entire/reptand, stellate-tomentose and intermixed
    with sessile glands beneath; drupes purplish to black.................. 1. C. arborea

1b. Shrubs; leaves serrate-crenate, stellate tomentose and devoid of
    sessile glands beneath; drupes white.............................. 2. C. macrophylla

1. Callicarpa arborea Roxb., Fl. Ind. 1: 405. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 4:
    Other synonym: Callicarpa tomentose auct. non. Bakh.  Plate 43f, g
    Local name: “Bormalla”( Bengali).

Trees, to 15–20 m tall; branchlets angled, stellate tomentose. Leaves opposite, ovate
orelliptic, 23–26 × 12.5–13.8 cm, acuminate at apex, entire along margins, truncate or
cuneate at base, coriaceous, stellate tomentose beneath, intermixed with hyaline glands;
midvein slightly raised above, prominent beneath; lateral veins 7–10 pairs, stellate hairy,
prominent beneath; petioles angled, 2.5–4.3 cm long. Inflorescences axillary cymes;
peduncles 3–3.9 cm long, angled, stellate hairy. Flowers c. 4 × 2 mm, pedicellate; pedicels
1–1.5 mm long, stellate hairy. Sepals tubular below, shallowly 4-lobed above; lobes
orbicular to ovate, 1–1.25 × 1 mm, obtuse at apex, ciliate, gland-dotted outside; tube c. 1.5
× 1.25 mm, puberulent. Petals pink or purplish, infundibular, 4-lobed; tube narrow,
cylindric, c. 3 × 1 mm; lobes obovate, c. 1.5 mm long, obtuse, reflexed. Stamens 4,
exserted; filaments filiform, 3–3.5 mm long; anthers oblong-ovate, 1–1.25 mm long, 2-
celled. Ovary enclosed in calyx cup, floccose; style c. 5.5 mm long; stigma discoid or
globose. Drupes with 4, 1-seeded pyrenes, green when immature, deep purple when
mature, globose, c. 2.5 × 2 mm.

Fl. & Fr.: April–September.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Madhya
Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Tripura,
Uttar Pradesh and West Bengal. WORLD: Bangladesh, Burma, Cambodia, Indonesia,
Malaysia, Malayan Islands, Nepal, New Guinea, Philippine Islands, Thailand, Sri Lanka
and Vietnam.

Specimens examined: Buxa National Park, Gadadhar range, Panbari 7, 4th Dec., 2011,
Gopal Krishna 52339; Jainti range, NRVK 6, 1st Dec., 2011, Gopal Krishna 52301.

Other synonyms: Callicarpa macrophylla Vahl var. sinensis C.B. Clarke; Callicarpa incana Roxb.; C. roxburghii Wall. ex Walp.

Local name: “Mathara” (Bengali).

Illustration: Ind. Verbenac. 44. f. 4. 2002.

Shrubs, to 5–6 m high; stems and branches angled, stellate hairy. Leaves opposite, elliptic or elliptic-oblong, 7.5–22 × 2–8.5 cm, acuminate at apex, serrate along margins, cuneate or narrowly rounded at base, coriaceous, scabrous above, stellate hairy beneath; midvein impressed above, raised beneath, stellate hairy; lateral veins 10–13 pairs, hispid on above surface; petioles 1–1.6 cm long, stellate hairy; stipules 2-lobed, c. 3 × 2 mm, stellate hairy.

Inflorescences dense axillary cymes, 2–5 cm long; peduncles 1-2 cm long. Flower pedicels 1–2 mm long; bracts. Sepals cupular below, shallowly 4-lobed above; lobes broadly-ovate, gland dotted, tomentose. Petals light pink, 4-lobed above; tube 2.4–2.6 mm, long, gland dotted; lobes oblong-ovate. Stamens 4; filaments filiform, 4.5–5 mm long, exserted; anthers oblong, c. 0.4 mm long. Ovary globose; style slender, c. 6 mm long, glabrous; stigma capitate, depressed. Drupes white, globose, c. 1.5 mm across, dark brown.

Fl. & Fr.: June-September.


2. CLERODENDRUM L.

23 species in India and 6 species in BNP.

Key to species

1a. Inflorescence a cyme, corymb or capitulum ............................................................. 2
1b. Inflorescence a panicle or thyrsé ............................................................. 4

2a. Leaves linear-lanceolate, sessile or subsessile; calyx lobes green at base and red at tips, patent; corolla tube more than 7 cm long ............. 3. C. indicum

2b. Leaves broadly ovate, ovate or ovate oblong, petiolate; calyx lobes
unform in colour, and not so patent; corolla tube less than 7 cm long. 3

3a. Bracts prominent and attractive; petals salver-shaped,

5-lobed; stamens and ovary fertile................................. 1. C. bracteatum

3a. Bracts not prominent; petals campanulate, 10-15 lobed;

stamens and ovary rudimentary/modified into petals.................. 2. C. chinense

4a. Inflorescence a thyrsi; calyx truncate or subtruncate, turning
green to white in fruit.................................................. 6. C. serratum

4b. Inflorescence a panicle; calyx 5-lobed, green/scarlet and
colour remains in fruit.................................................. 5

5a. Leaves subcordate/rounded at base, dentate at margin;

secondary veins not closing in along margin; sepals green;

petals white with purple tinge...................................... 4. C. cordatum

5b. Leaves auriculate at base, entire at margin; secondary

veins closing in along margin; sepals and petals red or scarlet..... 5. C. japonicum

1. Clerodendrum bracteatum Wall. ex Walp., Repert. Bot. Syst. 4: 106. 1845; C.B. Clarke in


Illustration: Ind. Verbenac. 88. f. 15. 2002.

Shrubs, to 1–1.5 m high; stems angled, densely pubescent. Leaves opposite ovate to broadly ovate, 6–18.5 × 4.5–11.5 cm, acute at apex, entire or subentire along margins, rounded or truncate at base, coriaceous, hispid above, hispid, yellow gland dotted beneath; midvein impressed above, raised beneath, pubescent; lateral veins 5–7 pairs, prominent beneath, pubescent; petioles 1.5–7.5 cm long, terete, densely hairy. Inflorescences capitula axillary, bearing 1–3 capitate cymes; peduncle 5–7 cm long, densely hairy; bracts elliptic-ovate, c. 3 × 1 cm, acuminate at apex, glandular pubescent, persistent. Sepals red, 5-lobed, campanulate; lobes ovate-lanceolate, c. 1.1 × 0.5 cm, acuminate at apex, membranous; tube c. 0.5 cm long. Petals white, salver-shaped, 5-lobed above; lobes elliptic or obovate, 6–8 × 3 mm long, obtuse at apex; tube cylindric, 1–2.5 cm long, puberulent mixed glandular hairs. Stamens 4, didynamous; filaments slender, exserted, glabrous; anthers purple, turning brown. Drupes subglobose c. 6 mm across, enclosed in calyx cup.

Fl. & Fr.: Most part of the year.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Bhutan and Nepal.
Plate 43: a - b. Strobilanthes persicifolia (Lindl.) J.R.I. Wood: a. Flowering branch; b. Fruiting branch; c. Thunbergia erecta (Benth.) T. Anders.; d - e. Thunbergia grandiflora (Roxb. ex Rottl.) Roxb.: d. Flowers (close up); e. Capsules; f - g. Callicarpa arborea Roxb.: f. Habit; g. Fruits (close up); h. Clerodendrum chinense (Osbeck.) Mabb.

Other synonyms: Clerodendrum philippinum Schauer; C. fragrans (Vent.) R. Br. (nom. illeg.).

Illustration: Curtis's Bot. Mag. 43: t. 1834. 1816.

Shrubs, c. 1 m high; stems angled, pubescent. Leaves opposite, ovate, 9–14.8 x 9–11 cm, broadly acute at apex, irregularly dentate along margin, sub-cordate or truncate at base, subcoriaceous, pubescent both sides; midvein impressed above, raised beneath, hairy both sides, hairs hyaline; lateral veins 5–6 pairs, prominent beneath, looping toward margin, pubescent; petioles 5.2–11.5 cm long, terete, puberulent. Inflorescences corymbose cymes; peduncles 0.5–1.4 cm long, hirsute; bracts leafy, ovate, 2–2.2 x 1–1.2 cm, acute at apex, puberulent, densely hairy along margin and nerves, pinnately nerved, 3–4 pairs. Flowers fragrant; pedicels c. 1 cm long. Sepals green, campanulate, 5-lobed, lobes free above; lobes lanceolate, c. 5 x 2.2 mm; tube 3–4 x 5 mm. Petals white or pinkish, sub-campanulate, 10–15-lobed; lobes obovate or orbicular, 12–14 x 8–10 mm; tube 12–13 mm long. Stamens and ovary rudimentary/modified into petals.

Fl.: Almost throughout the year; fr.: Not seen.

Distrib.: INDIA: Andhra Pradesh, Assam, Himachal Pradesh, Karnataka, Kashmir, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Punjab, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Widely cultivated as ornamental plant.


Note: In Flora Bhutan [2(2) 934. 2000] it was stated that stamens and ovary modify into sterile petals.

Other synonym: Clerodendrum siphonanthus R. Br.


Shrubs, to 2 m high; stems corrugated, puberulent. Leaves opposite, whorled, linear-lanceolate, 9.5–25.5 x 0.7–1.6 cm, mucro-acute at apex, undulate along margins, cuneate at base, coriaceous, glabrous, gland dotted; midvein impressed above, raised beneath, glabrous; lateral veins 10–12 pairs, glabrous; petioles 3–4 mm long or sessile; stipules
hispid. Inflorescences axillary or terminal cymes; peduncles terete, 0.5–3.6 cm long, glabrous. Flower pedicels 2–13 mm long, glabrous; bracts linear-lanceolate, c. 8 × 1.2 mm, puberulent along margins; bracteoles linear-lanceolate, c. 5 × 0.5 mm, puberulent along margins. Sepals green-red, 5-lobed, free above, connate below; lobes ovate, c. 8 × 4 mm, glabrous outside, gland-dotted inside. Petals white, salver-shaped, 5-lobed; lobes obovate, c. 9 × 4 mm; tube 8–8.5 cm long, glandular pubescent. Stamens 5; filaments free above, adnate to corolla tube below, red; anthers oblong, c. 2.5 mm long, dorsifixed. Ovary globose, 4-celled; style glabrous filiform; stigma bifid. Drupe globose, 8–15 mm across, 1–4-lobed, dark blue, persistent.

Fl. & Fr.: Almost throughout the year.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Nepal, Burma, Malaya and Indochina, N & S. China, Madagascar, Indonesia and West Indies.


Other synonyms: C. viscosum Vent. (nom. illeg.); C. infortunatum sensu C.B. Clarke

Local name: “Ghetu” (Bengali).


Shrubs, to 1.5–2 m high; stems and branches angled, rusty tomentose. Leaves opposite, broadly ovate, 6–18 × 5.5–13.5 cm, acute at apex, serrate-dentate along margins, truncate to sub-cordate at base, subcoriaceous, hispid both sides, gland dotted beneath; midvein impressed above, raised beneath, puberulous; lateral veins 5–7 pairs, impressed above, slightly raised beneath, puberulous; petioles 2–9.5 cm long, villous; exstipulate. Inflorescences terminal or axillary panicles, 15–20 cm long, villous. Flower pedicels 8–12 mm long, tomentose; bracts ovate, 0.7–1.3 × 0.5–1 cm, rusty tomentose. Sepals red, campanulate, connate below, 5-lobed above; lobes equal, c. 1.1 × 0.7 cm, villous, gland dotted. Petals light pink or white or mauve, salver-shaped, 5-lobed above; tube cylindric, c. 6 mm long, tomentose outside, glabrous inside; lobes oblong-elliptic or slightly oblique, 7–8 × 4–5 mm, obtuse at apex, hairy outside, glabrous inside. Stamens 4; filaments hairy at base, exserted; anthers oblong, c. 2.5 mm long, 2-celled. Ovary c. 2 × 2 mm, glabrous;
style elongated, c. 2 cm long; stigma bifid. Drupes black, 8–10 mm across, 1–4-lobed, subtended by red persistent calyx.

Fl. & Fr.: October–March.

Habitat: Grows along Bala river bank.


Specimen examined: Buxa National Park, Rajabhatkhawa range, NRVK 6, Gopal Krishna 50621.


Other synonyms: Clerodendrum squamatum Vahl; C. kaempferi (Jacq.) Siebold ex Hass.; Volkameria kaemferi Jacq.


Shrubs, 1–1.5 m high; branches stout, obtusely 4-angled, sulcate between angles, subglabrous. Leaves opposite, ovate to broadly ovate-cordate, 12.5–17.5 × 6.9–14 cm, acute to acuminate at apex, denticulate-repand along margins, cordate at base, coriaceous, densely appressed hairy above, sparsely appressed hairy beneath including veins, dark green, paler with dense minute glands beneath; midvein flattened to faintly raised above, raised beneath, pubescent; lateral veins 6–9 pairs, prominent beneath; petioles 2.5–11 cm long, obtusely 4-angled, subglabrous. Inflorescences terminal, panicles, scarlet throughout, 10–16 decussate-opposite cymes; peduncles stout, deeply sulcate when dry, 3–6 cm long, pubescent; bracts foliaceous, ovate, c. 2.2 × 1.4 cm, acute, crenate-repand along margins. Flowers bisexual; pedicels 1–2 mm long; bracteoles linear or subulate, 3–5 mm long, pubescent. Sepals campanulate, deeply 5-lobed, lobes free above, connate below; lobes narrowly ovate, c. 5 × 3 mm, acute, glandular pubescent; tube 3–4 mm long. Petals scarlet, salver-shaped, 5-lobed; lobes subequal, obovate or spatulate-oblong, c. 8 × 5 mm, obtuse, pubescent; tube slender, 1–1.8 cm long, pubescent outside. Stamens 4, didynamous; filaments filiform, 2–3 cm long, exserted; anthers oblong, c. 3 mm long, basifixed. Ovary globose, c. 5 mm across, glabrous; style slender, 2–3 cm long, glabrous; stigma 2-lobed. Drupes bluish black, globose, 8–10 mm across, enclosed calyx cup; fruiting calyx reflexed.

Fl. & Fr.: March–December.
Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia and Vietnam.


Other synonyms: Rotheca serrata (L.) Steane & Mabb.; Clerodendrum serratum (L.) Moon var. wallichii C.B. Clarke.


Shrubs, to 2–3 m high; stems and branches angled, glabrous, ash-white. Leaves opposite, simple, acute at apex, serrate-dentate along margins, attenuate at base, sub-coriaceous, glabrescent above, puberulent beneath, gland dotted; midvein impressed above, slightly raised beneath, puberulent; lateral veins 4–6 pairs, prominent beneath, puberulent; exstipulate. Inflorescences panicles, terminal or axillary, 15–20 cm long. Flowers pedicels 4–5 mm long, pubescent; bracts leafy, elliptic, 1.5–4 × 0.8–3 cm. Sepals shallowly 5-lobed above, campanulate below; tube c. 5 × 5 mm, puberulous. Petals blue or violet, hypocrateriform, 5-lobed, lobes subequal; posterior lobe suborbicular or spatulate, 1–1.5 × 0.6–0.8 cm, concave, entire or emarginate; other lobes obovate or oblong, 8–10 × 6–7 mm obtuse-apiculate at apex, ciliate along margins, deep blue inside, pale blue outside; tube c. 1 × 0.4 cm, glabrous. Stamens 4; exserted; filaments filiform, c. 2.5 cm long, glabrous above, hairy at base; anthers oblong, c. 2.5 mm long. Ovary obovate, c. 2 × 1.2 mm, glabrous; style elongated, c. 2 cm long, exserted; stigma 2-lobed, oblique. Drupe subglobose, 6–10 mm across, 2–4-lobed, seed 1-per lobe.

Fl.: December-February; fr.: July-September.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, Burma, Cambodia, China, Greater Sunda Islands, Laos, Lesser Sunda Islands, Madagascar, Malaysia, Mascarene Islands, Nepal, Pakistan, South Africa, Sri Lanka, Thailand and Vietnam.

Notes: The current name for this species *Rotheca serrata* (L.) Steane & Mabb., as per the current classification system APG-III. Since, we have followed Bentham & Hooker system of classification, based on that we used the older name and later name as a synonym.

3. **GMELINA L.**

4 species in India and 1 species in BNP.


Other synonyms: *Gmelina arborea* Roxb. var. *glaucescens* C.B. Clarke; *Premna arborea* (Roxb.) Roth.


Trees, to 10 m tall; branchlets angled, glabrous, young shoots tomentose. Leaves opposite, broadly ovate, cordate or deltoid-ovate, 10-14 × 10-11.2 cm, macro-acuminate at apex, entire along margins, cordate or truncate at base, coriaceous, tomentose when young, glabrous above, fulvous-tomentose beneath; midvein flattened above, raised beneath, pubescent; lateral veins 6-8 pairs, prominent beneath; petioles 5.5-10 cm long, terete, subglabrous. Inflorescences terminal and axillary, in paniculate racemes; bracts linear or lanceolate, c. 8 × 2 cm, acuminate, laterally curved, densely villous. Flower pedicels c. 2 cm long. Sepals campanulate, 5-lobed, lobes minute; tube c. 5 mm long, densely hairy. Petals brownish-yellow, obliquely 2-lipped, 5-lobed, upper lip 2-lobed, lower lip 3-lobed; tube c. 1 × 0.5 cm, densely pubescent outside; lobes ovate or oblong, c. 1.5 × 1 mm; lower lip 3-lobed; middle lobe ovate, c. 2 × 1.5 cm, projecting forward; lateral lobes ovate, c. 1.5 × 1 cm, acuminate, crenulate. Stamens 4; filaments slender, exserted, 0.5-1.5 cm long; anthers oblong, c. 3 × 1 mm, basifixed. Ovary subglobose, c. 4 × 3; style slender, c. 2 cm long, glabrous; stigma minutely unequally bifid. Drupes obovoid or pyriform, 2-2.5 cm long, green when immature, orange yellow when mature.

Fl. & Fr.: Almost throughout the year.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, Burma, China, Cambodia, Greater Sunda Islands, Malaysia, Pakistan, Sri Lanka, Tanzania, Thailand and Vietnam.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 6, 31st March 2012, Gopal Krishna 50700.
4. HOLMSKIOIDIA Retz.

1 species in India and BNP.


Other synonym: Hastingsia scandens Roxb.  


Straggling shrubs, to 10–15 m high; stems quadrangular, puberulous. Leaves opposite, ovate, 4.5–7 × 2.8–3.5 cm, narrowly acuminate at apex, crenate-dentate along margins, cuneate or rounded at base, thinly coriaceous, puberulous both sides; midvein flattened above, faintly raised beneath; lateral veins 4–5 pairs, pubescent; petioles 1–1.5 cm long, pubescent. Inflorescences cymes; bracts foliaceous, ovate, c. 1.5 × 1 cm. Flower pedicels c. 1.5 cm long, glandular pubescent. Calyx campanulate to saucer-shaped, red to scarlet, obscurely 5-lobed, c. 2.5 × 1.5 cm, glandular pubescent both sides, encircling corolla tube. Petals infundibular, red to scarlet; tube cylindric, c. 2.5 cm long, glandular pubescent upper lip ovate, 3–4 mm long, sub-acute; lower lip 4-lobed; lobes rotund, 1–2 mm, obtuse. Stamens 4, didynamous; filaments c. 2 cm long, hairy, pubescent, adnate to corolla tube; anthers exerted. Ovary conical, c. 4 × 3 mm; style c. 2.3 cm long; stigma shortly bifid. Drupes obovoid or subglobose, c. 1 × 0.8 cm, included in the accrescent calyx, divaricately; 4-lobed.

Fl. & Fr.: Most of the year.

Distrib.: INDIA: Assam, Bihar, Gujrat, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Meghalaya, Nagaland, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, Burma, Costa Rica, Cuba, Greater Sunda Islands, Hawaiian Islands, Hispaniola, Jamaica, Leeward Islands, Malaysia, Mascarene Islands, Mexico, Molucca Islands, Nepal, New Caledonia, Philippine Islands, Puerto Rico, Sri Lanka, Venezuela and Windward Islands.

Fig. 30. Holmskioldia sanguinea Retz.: a. Flowering branch; b. Flower; c. Calyx; d. Gynoecium
5. **LANTANA** L. (*nom. cons.*)

4 species in India and 1 species in BNP.


*Other synonyms:* *Lantana aculeata* L.; *Lantana camara var. aculeata* (L.) Moldeenke.


Shrubs, to 1.5–2 m high; stems and branches angled, hispid. Leaves opposite, ovate, 1–4.7 × 0.6–3.4 cm, acute at apex, serrate along margin, rounded at base, coriaceous, puberulous both sides; midvein impressed above, slightly raised beneath, hispid; lateral veins 4–5 pairs, prominent beneath; petioles 0.6–1.1 cm long; stipules lanceolate, c. 2 mm long. Inflorescences umbel, terminal; peduncles 2.2–3.9 cm long. Flowers sessile; bracts lanceolate, 3.5–6 × 1 mm, puberulous outside, glabrous inside. Sepals 4-lobed; tube c. 1.5 mm long, hispid, intermixed with hyaline glands. Petal orange to red, 2-lipped, 5-lobed; tube cylindrical, 7–8 mm long, curved; lobe spreading, broadly obovate, intermixed with hyaline glands, glabrous inside. Stamens 4, didynamous; filaments adnate to tube; anthers broadly oblong, c. 5 mm long. Ovary c. 1 × 1 mm, glabrous; style short; stigma oblique. Drupes globose, c. 5 mm across, black, shining.

**Fl. & Fr.**: Nearly throughout the year.

**Distrib.**: INDIA: Throughout. WORLD: Almost all parts of the world.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, S.K. Srivastava & Gopal Krishna 46278.

6. **PHYLA** Lour.

1 species in India and BNP.


*Other synonyms:* *Verbena capitata* Forssk.; *Blairia nodiflora* (L.) Gaertn.; *Phyla chinensis* Lour.; *Zapania nodiflora* (L.) Lam.; *Platonia nodiflora* (L.) Raf.; *Lippia nodiflora* (L.) Michx.

**Plate** 44g

*Local names:* “Bhui-okra” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 4(3): 11. t. 1463.

Creeping herbs, usually near water courses or semi dry places, branched, often rooting at nodes; stems quadrangular, pubescent. Leaves opposite, obovate-oblong, 1–2.3 × 0.4–0.6 cm, acute at apex, serrate along margins, cuneate or attenuate at base, subcoriaceous,
scabrous; midvein flattened above, faintly raised beneath; lateral veins inconspicuous; sessile or short petioled. Inflorescences in elongated heads; peduncles 3–3.5 cm long, hairy. Sepals bilipped, 4-lobed; lobes rhomboid, c. 3 x 3 mm, acute apex. Petals cream-white, 2-lipped, 5-lobed above; tube cylindrical, slightly curved, c. 2.5 x 1.25 cm; lobes oblique, upper lobe slightly wider, 2-lobed; lower lips 3-lobed. Stamens 4, didynamous, adnate to corolla tube; anthers broadly ovate, very small. Ovary c. 1.5 x 1.3 mm, enclosed in calyx tube, 2-loculed; style linear, slightly curved, c. 5 mm long; stigma obliquely subcapitate, hairy. Fruit of 2 pyrenes, 1-seeded.

Fl. & Fr.: More or less throughout the year.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Goa, Gujrat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Almost throughout world.

Specimens examined: Buxa National Park, Jainti range, Jainti river, 7th April 2012, Gopal Krishna 56051; South Diana, 27.05.1975 J.K. Sikdar 376.

LAMIACEAE [373]

Key to genera

1a. Stamens 4, erect, exserted; nutlets with a large, oblique or lateral areola on the inner side ................................................................. 1. Achyrospermum

1b. Stamens 2 or 4, erect or declinate, exserted or not; nutlets with small basilar or slightly oblique attachment to outer side.......................... 2

2a. Coralla pale yellow to yellow; nutlets succulent.......................... 3. Gomphostemma

2b. Corolla other than yellow; nutlets dry........................................ 3

3a. Stamens declinate; anther cells confluent.................................................. 4

3b. Stamens erect or spreading or ascending; anther cells confluent or not.............. 5

4a. Lower lip of corolla declinate, flat or very slightly concave stamens exserted; anther 1-celled ......................................................... 8. Ocimum

4b. Lower lip of corolla deflexed, cocave boat shaped or saccate; stamens declinate; anthers 2-celled..................................................... 4. Hyptis

5a. Fertile stamens 2.......................................................... 6

5b. Fertile stamens 4........................................................................... 7

6a. Corolla scarlet; Stamens 2; staminodes 2, small or absent; nutlets obovoid to suborbicular.................................................. 10. Salvia

6b. Corolla purplish; Stamens 4, posterior 2 fertile,
anterior 2 reduced, with indistinct anther cells;
anthers 2-celled, divaricate; nutlets subglobose................................. 7. Mosla
7a. Corolla 2-lipped, upper lip 3-lobed, lower lip entire;
stamens subequal diverging............................................................. 9. Pogostemon
7b. Corolla 2-lipped, upper lip straight, hooded or erect entire,
lower lip 3-lobed; stamens didynamous............................................. 8
8a. Anterior anthers transversely 2-celled, cells parallel,
posterior anthers 1-celled; calyx 5-dentate, only slightly
dilated in fruit; verticillasters arranged in continuous or
interrupted, long terminal spikes...................................................... 2. Anisomeles
8b. Anther cells of both pairs equal, divaricate; calyx
deformed or dilated in fruit; inflorescences of terminal loose
panicles, rarely verticillasters axillary................................................. 9
9a. Flowers pinkish, purplish; anther cells parallel; stamens
more or less exserted; style apex equally 2-cleft, lobes subulate .......... 5. Leonurus
9b. Flowers white; anther cells divaricate; stamens not exserted;
style unequally 2-cleft at apex, posterior lobe short or obsolete........ 6. Leucas

1. ACHYROSPERMUM Blume
1 species in India and BNP.

Achyrospermum wallichianum (Benth.) Benth. ex Hook.f, Fl. Brit. India 4: 673. 1885.
Teucrium wallichianum Benth., Pl. Asiat. Rar. 2: 19. 1830. Plate 45a1, a2

Herbs, to 30–60 cm high; stems rigid, subfruticose, terete, pubescent, simple or branches.
Leaves elliptic-ovate, 2–8.5 × 0.8–4 cm, shortly acuminate at apex, serrate-dentate along
margins, attenuate at base, chartaceous, densely pubescent above, glabrous below except
veins; midvein flattened above, faintly raised beneath; secondary veins 5–7 pairs; petioles
1–1.5 cm long, hispid. Inflorescences in terminal spike, unbranches, 2–4.5 cm long. Flower
pedicels 1–3 mm long, pubescent; bracts broadly obovate, c. 8 × 5 mm, acute at apex,
ciliated along margins. Calyx obliquely 5-lobed, hairy throughout outside, nerves
prominent; tube 4–6 mm long; lobes subequal, ovate, c. 2 × 1 mm, accrescent in fruits.
Corolla purplish-white, tubular, c. 8 mm long, 2-lipped, pubescent outside; upper lip
nearly flat; lower lip 3-lobed. Stamens 4, exserted, didynamous; filaments adnate to
corolla tube; anthers 2-celled. Disk shallowly 4-lobed, c. 0.5 × 1 mm. Ovary oblong, c. 1
mm long, densely hairy; style 5–8 mm long; stigma bifid. Nutlets fleshy, 4, obovate-
oblong, c. 1.5 × 0.75 mm.
Fl. & Fr.: October–March.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Myanmar.


2. ANISOMELES R. Br.

1 species in India and BNP.


Other synonym: Anisomeles ovata R. Br. Plate 45b


Shrubs, to 1–2 m high; stems quadrangular, grooved, hairy along margins and grooves. Leaves ovate, 2–11 × 1–4.7 cm, acuminate at apex, serrate along margins, attenuate at base, chartaceous, glabrous above except veins, pubescent beneath; midvein flattened above, raised beneath, pubescent; secondary veins 4–6-nerved, prominent beneath; petioles 1–3 cm long, pubescent. Flowers sessile; bracts linear-lanceolate, c. 5 mm long, hairy. Calyx green, campanulate, 5-lobed above; tube 4–6 mm long, glandular pubescent outside, villous inside; lobes equal, triangular-ovate, c. 2 × 1 mm, acute. Corolla pinkish, 2-lipped, 5-lobed; tube 6–7 mm long; upper lips nearly flat, entire; lower lip spreading, c. 9 × 5 mm, 3-lobed; middle lobe obcordate, c. 3 × 4.5 mm, slightly undulate, bearded; lateral lobes ovate. Stamens 4, didynamous, exserted; filaments c. 4 mm long, hairy, adnate to corolla tube; anthers of posterior pair 1-celled, anthers of anterior pair 2-celled. Disk rounded, enclosing ovary. Ovary c. 1 mm long; style c. 7 mm long, hairy; stigma obliquely 2-fid. Nutlets fleshy, 4, c. 1 × 0.6 mm, glabrous, basal scar small.

Fl. & Fr.: August–November.

Distrib.: INDIA: Throughout. WORLD: Cambodia, China Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam.

3. GOMPHOSTEMMA Wall. ex Benth.

17 species in India and 2 species in BNP

Key to species

1a. Stems prostrate, rooting at base; leaves simple hairy above; corolla tube incurved, broad; nutlets usually 1–4................................. 1. G. ovata

1b. Stems stout; leaves branched hairy above; corolla tube slender, straight; nutlet solitary..............................2. G. parviflorum


Undershrubs; stems 30–50 cm, rooting at base and ascending above; branches quadrangular, stellate tomentose. Leaves ovate, 6–8.5 × 3–4.5 cm, acute at apex, crenate along margins, cuneate or rounded at base, sub-coriaceous, simple hairy above, stellate tomentose beneath; midvein flattened above, faintly raised beneath; secondary veins 5–7 pairs, prominent beneath, stellate hairy lower side, simple hairy upper side; petioles 1.2–3.5 cm long, stellate hairy. Inflorescence axillary verticel, more than 10-flowers. Flowers bisexual; pedicels short. Calyx campanulate to tubular, 5-lobed, lobes free above, connate below; tube 5–6 mm, stellate hairy; limbs equally 5-toothed, teeth narrowly triangular, 5–6 mm long. Corolla pale yellow, c. 3.5 cm long, 2-lipped above; tube slightly bent, c. 2.5 cm long, upper lip emarginated; lower lips 3-lobed. Stamens 4, didynamous; filaments fused with corolla tube; anthers 2-celled. Disk slightly swollen. carpel 1. Style filiform; stigma obliquely 2-lobed. Nutlets 4, c. 5 × 4 mm, glabrous.

Fl. & Fr.: July–October.

Distrib.: INDIA: Assam, Nagaland, Sikkim and West Bengal. WORLD: Bhutan.


Notes: The species is known from Darjeeling district. Present collection is from Jalpaiguri district.


Shrubs, to 1–1.5 m high; stems stout, quadrangular, densely white-stellate tomentose.
Leaves crowded toward end of branches, elliptic or obovate-elliptic, 14–17.5 x 5.2–6.2 cm, shortly acuminate at apex, serrate-dentate along margins, attenuate at base, subcoriaceous, dendritic, white stellate-tomentose beneath; midvein impressed above, raised beneath; secondary veins 7–9 pairs, prominent beneath, stellate tomentose; tertiary veins prominent beneath; petioles 8–3.5 cm long, stellate tomentose. Inflorescences lax or dense, axillary fascicles; peduncles 5–12 mm long, stellate tomentose. Flowers pedicel short or subsessile, c. 1 mm long; bracts linear, lanceolate, c. 5 mm long, stellate hairy. Calyx campanulate to tubular, 5-toothed above, equal; tube c. 4 mm long, stellate hairy outside; teeth 5, narrowly triangular, c. 3 mm long, acute at apex. Corolla pale-yellow, 2-lipped above, connate below; tube slender, c. 1.5 cm long, stellate hairy outside; upper lip hooded; lower lip 3-lobed; middle lobe longest. Stamens 4, didynamous; filaments fused with corolla tube; anthers 2-celled. Disk slightly swollen. Style c. 1.5 cm long, glabrous, filiform below; stigma obliquely 2-lobed. Nutlets usually 1, fleshy; basal scar broad.

Fl. & Fr.: March–October.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tripura and West Bengal. WORLD: Malaysia, Myanmar and Thailand.


4. HYPTIS Jacq. (nom. cons.)

4 species in India and 1 species in BNP.


Other synonym: Mesophaerum suaveolens (L.) Kuntze. Plate 45c

Local name: "Bilati-tulsi" (Bengali).


Shrubs, to 1–1.5 m high; stems ridged, angled, pubescent, branched, hairy. Leaves ovate or ovate-elliptic, 1–5.8 x 0.6–4.4 cm, broadly acute at apex, crenate or serrate along margins, sub-cordate or cuneate at base, chartaceous, pubescent both surfaces, yellow-orange glands beneath; midvein faintly raised both sides, pubescent; secondary veins 6–7 pairs, prominent at base, pubescent; petioles filiform, upto 5 cm long, pubescent.
Inflorescences axillary in lax secund cymes, 4–6-flowered; bracts linear, 2–3 mm long, persistent. Flowers sessile. Calyx campanulate-tubular, 5-toothed, c. 9 mm long, hairy both sides, more densely hairy along margin; tube c. 5 mm long; tooth linear-subulate, subequal c. 2 mm long, nerves prominent. Corolla purplish, 2-lipped, 5-toothed; upper lip c. 3 mm long, 2-lobed; lower lip 3-lobed; median lobe shorter than lateral ones, deeply cleft at apex; lateral lobes oblong, obtuse, tube cylindric, slightly bent at base; limb with 4 upper lobes subequal. Stamens 4, didynamous; filaments c. 2 mm long, densely hairy; anther cells confluent. Disk 4-lobed, glabrous. Ovary 4-partite; style c. 5 mm long, included; stigma shortly bifid. Nutlets oblong, c. 4 × 2.2 mm, rugose, basal scar prominent, apex concave, median line prominent, slightly winged.

Fl. & Fr.: September–March.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Native in tropical America, widespread tropical weed.


5. LEONURUS L.

2 species in India and 1 species in BNP.


Illustration: M. Blanco, Fl. Filip. t. 259. 1875.

Shrubs, to 1 m high; stems branched, quadrangular, slightly grooved, tomentose. Leaves pinnati or palmati-partite, 5–10 cm long; lobes linear, incised, puberulous above, tomentose, gland dotted beneath; secondary veins palmately 3-nerved at base, tomentose; petioles 1.5–2.3 cm long, tomentose. Flower-whorls axillary below, forming long interrupted spikes above, dense-flowered, 10–12 flowered. Flowers sessile; bracts linear, c. 4 mm long, hispid. Calyx campanulate-tubular, 5-toothed above; tube 4–5 mm long, pubescent outside; teeth narrowly triangular, c. 1 mm long, pubescent, awned. Corolla pinkish, 2-lipped, connate below, tomentose to villous outside, glabrous inside; tube c. 6 mm long; upper lip 1-lobed, obovate 7 × 3 mm, obtuse at apex, ciliate along margins;
lower lip 4-lobed. Stamens 4, didynamous; filaments 4–5 mm long; anthers c. 0.5 × 1 mm, 2-celled. Ovary 4-celled, c. 1 × 1 mm; style c. 6 mm long, glabrous; stigma 2-fid. Nutlets 4, oblong, c. 2 × 1 mm, rugose, slightly winged, fleshy, basal scar small.

**Fl. & Fr.:** February-April.

**Habitat:** Grows along roadside as a weed.

**Distrib.:** INDIA: Assam, Bihar, Madhya Pradesh, Manipur, Meghalaya, Sikkim, Tripura and West Bengal. WORLD: Europe, Malay peninsula and West Indies.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, 14th Feb., 2010, S.K. Srivastava & Gopal Krishna 47096.

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6. **LEUCAS** R. Br.

50 species in India and 1 species in BNP.

**Leucas lavandulifolia** Sm., Cycl. 2: 20. 1812.

Other synonyms: *Leucas linifolia* (Roth) Spreng.; *Phlomis linifolia* Roth.  Plate 45e

**Illustration:** Rheede, Hortus Malab. 10: t. 91. 1690 [as *Leucas linifolia* (Roth) Spreng.].

Under shrubs, to 30–40 cm high; stems branched, quadrangular, adpressed puberulous. Leaves simple, opposite, whorled at nodes, linear or linear-lanceolate, 1.7–5.1 × 0.3–0.7 cm, acute at apex, undulate along margins, attenuate at base, chartaceous, pubescent above, hispid beneath; midvein faintly raised both sides; secondary veins 4–6 pairs, inconspicuous; petioles c. 5 mm long, pubescent. Flowers subsessile or shortly pedicelled, in axillary and terminal but always in leafy whords, towards apex of stems and branches; bracts linear, c. 8 mm long, subspinescent, finely puberulous. Calyx tubular below, 6-toothed above, striate, 10-nerved pubescent outside, glabrous inside except throat, throat densely pubescent; tube c. 5 mm long; mouth oblique. Corolla white, 2-lipped, 5-toothed above; tube c. 5 mm long; upper lip concave, villous outside; lower lip 3-toothed, obovate, c. 5 × 3 mm, villous outside. Stamens 4, didynamous; filaments flattened, 5–7 mm long. Disk 4 lobed, equal. Ovary 4-partite; style subulate, c. 7 mm long. Nutlets 4, triquetrous, obtuse, c. 0.5 mm long, fleshy, basal scar small.

**Fl. & Fr.:** Throughout year.

**Distrib.:** INDIA: Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Tripura and West Bengal. WORLD: Africa; China, Indonesia, Malaysia, Philippines and Thailand.

**Specimen examined:** Buxa National Park, Jainti range, NRVK 6, 11th Oct., 2009, S.K. Srivastava & Gopal Krishna 46302.
7. MOSLA Buch.-Ham. ex Benth.

1 species in India and BNP.


Erect aromatic herbs, to 1 m high, branched; branches quadrangular, pilose. Leaves ovate to elliptic, 1.5–4.2 × 0.8–2.3 cm, acute at apex, serrate-dentate along margins, cuneate at base; subchartaceous, sparse or densely pilose on both sides, yellow punctuate gland dotted beneath; midvein faintly raised both sides; secondary veins 4–6 pairs; petioles 0.5–1.2 cm long. Inflorescences terminal or axillary racemes, 3–10 cm long. Flowerpedicels c. 3 mm long, pubescent with few punctuate glands; bracts triangular ovate, c. 1 × 0.75 mm. Calyx campanulate or obconic, 2 lipped, 10 prominent nerves, punctuate yellow gland dotted above; upper lip 2-toothed, teeth triangular ovate, c. 1 mm long; lower lip 3-tooth, c. 4 × 3 mm, accrescent in fruiting, enlarged up to 5 × 3 mm. Corolla white-purple, c. 3.5 mm long, sub-bilabiate; upper lip emarginate, puberulous outside; midlobe of lower lip much broader than lateral ones; lobes puberulous outside. Stamens 4, posterior 2 fertile, anterior 2 reduced, with indistinct anther cells; anther cells 2, divaricate. Ovary 4-celled; style 3–4 mm long, deeply bifid. Fruits dry, 4 nutlet; nutlets sub-globose, 1–1.2 mm across, reticulation on outer surface, basal scar present.

Fl. & Fr.: July-August.

Distrib.: INDIA: Assam, Kashmir, Meghalaya, Nagaland, Himachal Pradesh, Sikkim Tripura, and West Bengal. WORLD: Bhutan, China, Japan, Malaysia, Myanmar, Nepal, Pakistan and Vietnam.

Specimen examined: Buxa National Park, Rajabhatkhawa range, Bala river, 4th Dec., 2011, Gopal Krishna 52344.

8. OCIMUM L.

6 species in India and 2 specis in BNP.

Key to species

1a. Herbs; fruiting calyx appressed reflexed; posterior tooth circular, with marginal broad wings decurrent to middle of calyx; lateral teeth triangular to broadly obovate, apex acute; anterior teeth 2, narrow, nearly not approximate................................................. 1. O. americanum

1b. Shrubs; fruiting calyx pendulous; posterior tooth broadly

Other synonym: *O. canum* Sims.

**Local name:** “Ban-tulsi” (Bengali).

**Illustration:** Bot. Mag. 51: pl. 2452. 1824 [as *Ocimum canum* Sims.].

Aromatic herbs, to 50 cm high; branches quadrangular, pubescent. Leaves lanceolate, 0.7–3.3 × 0.3–1.3 cm, acute at apex, serrate-ciliate along margins, cuneate or rounded at base, chartaceous, glabrous to pubescent, gland dotted both surfaces; midvein flattened above, faintly raised beneath, pubescent; lateral nerves 5–7 pairs; petiole 0.5–1.8 cm long, pubescent. Inflorescences of spiciform racemes, terminal, 6–10 cm long; verticillasters 5–6-flowered. Flower pedicels c. 2.5 mm long, pubescent; bracts, lanceolate to elliptic-lanceolate, 3–5 mm long, ciliate, deciduous. Calyx 2-lipped, pubescent outside, villous inside toward base of tube, tooth unequal; broadest lobe c. 2.5 × 2 mm, broadly acute at apex, hairy; remaining lobes subequal, triangular ovate, c. 1.5 mm long acute. Corolla mauve, 2-lipped, 5-toothed; tube 2–2.5 mm long; upper lip 4-lobed; lobes subequal, ovate-rounded, 1–1.5 mm long, ciliate outside; lower lip entire, oblong, ovate-oblong, 2–2.5 mm long, concave, sparsely hairy. Stamens 4, didynamous, exerted; filaments decline, c. 4 mm long; anthers c. 0.5 mm long. Disk 4-lobed. Ovary 4 partite, c. 1 mm long; style 5–6 mm long; stigma 2-lobed, oblique. Nutlets 4, triquetrous, oblong-ellipsoid, c. 1 × 0.5 mm, rugose, dry, basal scar small.

**Fl. & Fr.:** October–December.

**Distrib.:** INDIA: Almost throughout. WORLD: Africa China, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka and South West Asia.

**Specimen examined:** Buxa National Park, Jainti range, NRVK 6, 12th Oct., 2010, S.K. Srivastava & Gopal Krishna 46336.


**Local name:** “Ram-tulsi” (Bengali).

**Illustration:** Rheede, Hortus Malab. 10: t. 86. 1690.
Aromatic shrubs, to 50–80 cm high; stems subquadrangular, hispid. Leaves opposite, 2.5–7 × 1.3–2.5 cm, acuminate at apex, serrate-dentate along margins, attenuate at base, coriaceous, hispid scabrous above intermixed, softly pubescent beneath, yellow or pale gland dotted both sides; midvein faintly raised both sides, pubescent; secondary veins 6–7 pairs, pubescent; petiole 5–12 mm long, pubescent. Inflorescence in terminal or axillary raceme, simple or branched, 6–12 cm long, 4–6 flowered at a place. Flowers bisexual; pedicels 2 mm long, pubescent. Calyx campanulate, 2-lipped, 5-toothed, deflexed in fruiting, hairy intermixed with glands outside, glabrous inside; tube c. 2 mm long; upper lip broadly ovate to suborbicular, c. 1.5 mm long, pubescent; lower lip 4-toothed; 2 lateral teeth c. 1 mm long, 2 lips triangular, c. 2 mm long, hairy; fruiting calyx up to 5 mm long, prominently nerved, pendulous. Corolla 5, connate into 2 lipped corolla; tube 2–3 mm long; upper lip 4-lobed, lobes triangular ovate, subequal or median lobes slightly larger, 0.5–0.7 × 0.5 mm long, acute, pubescent towards tip outside; lower lip entire, spatulate-oblong, c. 2 × 2 mm, acute, glabrous. Stamens 4, didynamous; filaments 3–3.5 mm long, declinate, hairy at base, connate to petal tube; anthers basifixed, c. 0.25 mm long. Ovary 4-celled, c. 0.75 × 0.5–0.6 mm; style 4–5 mm long; stigma 2-lobed, flattened. Nutlets 4, blackish, oblong, c. 1.5 mm long, finely tuberculate, mucilaginous when wet.

Fl. & Fr.: August–March.

Distrib.: INDIA: Andhra Pradesh, Assam, Karnataka, Kerala, Maharashtra, Manipur, Odisha, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimen examined: Buxa national Park, Jainti range, NRVK 6, 11th Feb., 2011, Gopal Krishna 47033

9. POGOSTEMON Desf.

40 species in India and 3 species in BNP.

Key to species

1a. Inflorescences a spike…………………………………………………………………………1. P. auricularius

1b. Inflorescences a panicles……………………………………………………………………..2

2a. Verticillasters many-flowered, congested; bracts oblanceolate

or lanceolate, 6–8 mm long, persistent………………………………2. P. benghalensis

2b. Verticillasters less than 10-flowered, loose; bracts 3–5 mm long,

ovate, ovate-lanceolate or elliptic, deciduous…………………………3. P. parviflorus


Mentha auricularia L., Mant. Pl. 1: 81. 1767.
Other synonym: *Dysophylla auricularia* (L.) Blume.

**Illustration:** Wight, Icon. Pl. Ind. Orient. 4: t. 1445. 1849.

Herbs, 50–80 cm long; prostrate basally; rooting at nodes; stems branched, slender, obtusely quadrangular, hirsute or villous with spreading tawny hairs. Leaves opposite-decussate, elliptic, oblong-elliptic or ovate-lanceolate, 3–7.6 × 0.9–2.3 cm, acute at apex, crenate-serrate along margins, cuneate at base, submembranous to chartaceous, yellow strigose, with scattered glands; midvein faintly raised both sides; lateral veins 5–7 pairs; petioles up to 1 cm long, slender, hairy. Inflorescences lateral and terminal spikes, 3–10 cm long, villous; verticillasters many-flowered. Flowers c. 1 mm across; bracts ovate-elliptic, 1.5–2 × 0.8 mm, acute at apex, spathulate, margins strigose. Calyx cupular below, 5-toothed above; cup c. 1 × 1 mm, pearl gland-dotted, glabrous or puberulous outside; teeth broadly ovate, c. 0.3 × 0.5 mm, acute, strigose along margins; fruiting calyx enlarges up to 2.5 mm long, teeth c. 0.5 mm long and incurved. Corolla white or lilac, sometimes violet, 2-lipped, 2–2.5 mm long; tube exserted, minutely hairy inner side, glabrous outside; lobes of upper lip subequal, hairy outside; lower lip glabrous. Stamens 4, exserted; filaments 2.5–3 mm long, bearded at middle and minutely hairy at base. Style 2.5–3.5 mm long, slender; lobes c. 0.5 mm long. Nutlets 4, light brown, ellipsoid to obovoid. c. 0.8 × 0.5 mm, more or less rugose.

Fl. & Fr.: April–November.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Manipur, Sikkim and West Bengal. WORLD: Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.


Other synonym: *Pogostemon plectranthoides* Desf.

**Local name:** “*Jui-lata*” (Bengali).

**Illustration:** Burm.f., Fl. Ind. 128, t. 38, f. 3. 1768.

Shrubs, 150–200 cm high; stems branched, obscurely quadrangular, rigid, puberulous to hoary-pubescent, tomentose or villous on younger portions. Leaves opposite-decussate, ovate to ovate-elliptic, 2.5–7 × 1–2.5 cm, acute at apex, serrate-dentate along margins, often irregularly dentate, rounded to subcordate at base, membranous to subchartaceous,
hairy-pubescent or villous both sides; midvein flattened above, faintly raised beneath; lateral veins 4–7 pairs; petioles 2–5 cm long, slender, pubescent. Inflorescences of axillary and terminal panicles, 3.5–9 cm long; rachis densely pubescent. Flowers sessile; bracts lanceolate or oblanceolate, 4–6 × 1–2, acute at apex, entire along margins, hairy both sides, nerves prominent, persistent. Calyx tubular-campanulate, 4–5 mm long, 5-nerved, gland-dotted, hairy outside, villous or hirsute inside; teeth narrowly triangular, 1–1.5 × 0.6–1 mm, hairy; tube c. 3 mm long. Corolla whitish with purple or pinkish-purple spots, 5–7 mm long, bilipped; tube, c. 5 mm long, exserted; upper lips 3-lobed; middle lobe elliptic, subacute; lower lip puberulous outside. Stamens 4, exserted; filaments 4–8 mm long, purple; filaments bearded at middle and puberulous at base. Style 6–8 mm long; lobes c. 1 mm long. Nutlets 4, dark brown, broadly ellipsoid to suborbicular, c. 1 × 0.8 mm.

Fl. & Fr.: November–June.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Karnataka, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bhutan.

Specimen examined: Buxa National Park, Rajabhatkhawa range, S.K. Srivastava & Gopal Krishna 47034.


Other synonym: Pogostemon glaber Benth.

Under shrubs, 50–100 cm high; stems quadrangular, grooved, pubescent. Leaves opposite, decussate, ovate or ovate-lanceolate, 4.3–9.5 × 1.5–5.5 cm, acute to acuminate at apex, serrate along margins, attenuate at base, chartaceous, glabrous above, tomentose beneath; midvein flattened or faintly raised, pubescent; secondary veins 4–5 pairs, inconspicuous; petiole 2.5–4.5 cm long, tomentose, filiform. Inflorescence panicles, terminal or axillary, 5–11 cm long; rachis angled, pubescent. Flowers sessile; bracts ovate, ovate-lanceolate or elliptic, 3–5 mm long, deciduous. Calyx campanulate, 4–5-toothed; tube 2–3 mm long, gland dotted, hairy; tooth subequal, narrowly triangular, 1–1.5 × 0.5–0.6 mm, acute at apex, hairy. Corolla white with purple dots or pinkish-purple, 2-lipped; upper lip, 4-lobed, 5–6 mm long. Stamens 4; exserted; filaments c. 3 mm long, bearded at middle and puberulous at base; anther cells confluent. Disk prominent. Ovary 4-loculed; style 2-fid, c. 3 mm long, glabrous. Nutlets 4, ovoid or oblong, c. 0.8 × 0.7 mm, more or less rugose, shining.
Fl. & Fr.: September-February.

Distrib.: INDIA: Andhra Pradesh, Assam, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Specimens examined: Buxa National Park, Jainti range, S.K. Srivastava & Gopal Krishna 46318; Buxa National Park, Rajabhatkhawa range, Gopal Krishna 47156.

10. SALVIA L.


Other synonym: Salvia pseudococcinea Jacq.

Illustration: Curtis's Bot. Mag. 55: t. 2864. 1828 [as Salvia pseudococcinea Jacq.].

Herbs, to 30–40 cm high; branches quadrangular, villous. Leaves whorled, deltoid or broadly ovate, 1.5–4.5 × 1–3 cm, acute at apex, serrate along margin, truncate to subcordate at base, sub-coriaceous, appressed hairy both sides; midvein impressed above, faintly raised beneath; secondary veins inconspicuously 3–5 pairs, puberulous; petioles filiform, 0.5–3 cm long, hairy. Inflorescences verticillasters, 6–8-flowered widely spaced, in terminal racemes. Flower pedicels c. 2 mm long, villous; bracts narrowly ovate, 3–5 mm long, acuminate, villous. Calyx campanulate-tubular, 2-lipped, finely pilose outside intermixed with glands, glabrous inside, nerves prominent; tube 5–6 mm long; upper lip ovate, c. 2.5 × 3 mm, ciliolate, apex mucronate; lower lip nearly as long as upper, deeply 2-toothed. Corolla scarlet, tubular; tube c. 1.8 cm; lower lip c. 7 × 8.5 mm; upper lip shorter than lower. Stamens 2, exserted; filaments short. Disk prominent. Ovary c. 2 mm long; style shortly 2-fid, longer than filament. Nutlets ovoid-triangular, smooth, glabrous, basal scar small.

Fl. & Fr.: April–November.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Jharkhand, Kerala, Lakshadweep, Maharashtra, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Native of South America.

Specimen examined: Buxa National Park, Jainti range, S.K. Srivastava & Gopal Krishna 46269.
**MONOCHLAMYDEAE**

**NYCTAGINACEAE [307]**

**BOERHAVIA L.**

4 species in India and 1 species in BNP.


Other synonyms: *Boerhavia procumbens* Banks ex Roxb.; *B. repens* var. *diffusa* (L.) Heimerl ex Hook.f.


Prostrate herbs; branches terete, pubescent. Leaves simple, alternate, orbicular to cordate, 1.6–3.6 × 1.6–3.4 cm, obtuse or micro-acute at apex, wavy along margins, subcordate or rounded-cuneate at base, chartaceous, pale green, pubescent both surfaces; midvein impressed above, faintly raised beneath, pubescent; secondary veins 5-nerved at base, 4–5 pairs above, prominent beneath, pubescent; petioles c. 1.6 cm long, pubescent. Inflorescences corymb; peduncles c. 1.5 cm long, pubescent, accrescent in fruiting. Flowers c. 2 × 1 mm; sessile; bracts narrowly ovate, c. 1.5 × 0.5 mm, acute at apex, pubescent. Perianth shallowly 5-lobed above; tube c. 2 mm long, pinkish purple, pubescent, narrowed above; limb funnel shaped, with a 5 lobed margin; lobes plicate. Stamens 3; filaments filiform, c. 1.2 mm long, purple, attached at base of perianth; anthers reniform, c. 0.5 mm. Ovary obovate, c. 1 mm long, ribbed, glandular pubescent; styles c. 1.5 mm long, purplish; stigma peltate. Utricles elliptic-oblong, c. 3.5 × 1.5 mm, 5-ribbed, glandular pubescent.

Fl. & Fr.: Almost throughout the year.

Distrib.: INDIA: Throughout. WORLD: Cambodia, China, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; Africa, America, Australia, Pacific Islands.


**AMARANTHACEAE [298]**

Key to genera

1a. Leaves opposite; anther 1-celled; ovary 1-loculed.............................. 3. *Alternanthera*

1b. Leaves alternate or opposite; anthers 2-celled; ovary 1-2 loculed........... 2

2a. Leaves alternate; ovary 2-many loculed........................................... 5. *Deeringia*

2b. Leaves opposite; ovary 1-loculed.......................................................... 3
3a. Flowers clustered, 1-3 perfect surrounded by deformed one ........................ 4. Cyathula
3b. Flowers all perfect ........................................................................................................... 4
4a. Sepals spinescent, not wooly; staminiode long ........................................... 1. Achyranthes
4b. Sepals hyaline, wooly; staminiode short .............................................................. 2. Aerva

1. ACHYRANTHES L.

5 species in India and 1 species in BNP.


Other synonyms: Achyranthes _porphyristachya_ Moq.; _A. aspera_ var. _indica_ L.

Local name: “Apang” (Bengali).


Perennial herbs, 20–80 cm high; stems angled, pubescent; nodes slightly inflated. Leaves simple, opposite, ovate-elliptic, or obovate or elliptic-oblong, 1.5–7 × 0.4–4 mm, acute at apex, entire or undulate along margins, cuneate or rounded at base, chartaceous, sparsely hairy on both sides; petioles c. 1 cm long, sparsely pubescent. Inflorescences terminal spikes, 10–30 cm long, erect, reflexed after anthesis; rachis angular, stout, densely hairy. Flowers sessile; bracts lanceolate to narrowly ovate, 2–3 × 1 mm, mucronate at apex, entire along margins, rounded at base; bracteoles spiny, shiny, 2.5–4.5 mm, rigid, base 2-winged; wings 1.5–2 mm, membranous, margin entire. Tepals greenish with hyaline margins 4–5, lanceolate, 3.5–5 × 1–1.5 mm, mucronate at apex, midvein prominent. Stamens 2–5, filaments pinkish, 2.5–3.5 mm long. Pseudostaminodes pinkish, 5, c. 2 mm long, fimbriate and ciliate at apex. Ovary oblong, sub-compressed; ovule 1-celled; style pinkish, c. 2 mm, filiform; stigma capitellate. Utricles ovoid, 2.5–3 mm; seeds brown, ovoid, c. 2 mm across.

Fl.: June–August; fr.: October.


2. AERVA Forssk. \textit{(nom. cons.)}

4 species in India and 1 species in BNP.


Other synonym: \textit{Aerva sanguinea} Miq.

\textbf{Illustration:} Wight, R., Icon. Pl. Ind. Orient. 2(2): t. 724. 1846 [as \textit{Aerva scandens} (Roxb.) Wall.].

Undershubs, to 50–70 cm high; stems and branches angled, hispid. Leaves opposite, simple, ovate-lanceolate, 1.9–5.5 × 0.7–1.6 cm, mucro-acute at apex, entire along margins, attenuate at base, sub-coriaceous, pale green, scabrid above, tomentose beneath; midvein flattened above, slightly raised beneath, pubescent; secondary veins 5–6 pairs, prominent beneath; petioles 3–10 mm long; stipules ovate, c. 2.1 × 1 mm, acute, hispid. Inflorescences axillary or terminal spikes. Flowers bisexual or unisexual, sessile. Tepals white, 5-lobed above; lobes lanceolate, c. 3 × 1 mm, densely hairy outside. Stamens 5; filaments c. 0.5 mm long, connate at hypogynous cup; anthers oblong, 2-celled. Pseudostaminodes 5, triangular, alternate with stamens on hypogynous cup. Ovary globose, c. 1 mm across; style 0.3–0.4 mm long; stigma 2, capitate. Utricle, ovate, c. 1 × 1 mm, glabrous, 1-seeded; seed reniform.

\textbf{Fl. & Fr.:} November–June.


3. \textbf{ALTERNANTHERA} Forssk.

10 species in India and 1 species in BNP.


Other synonym: \textit{Alternanthera nodiflora} R. Br.


Prostrate herbs, stems terete, pubescent, rooting at nodes. Leaves opposite, simple, lanceolate, 1.8–3 × 0.7–0.9 cm, acute at apex, crenate along margins, attenuate at base,
sub-coriaceous, green, turned pale when dry, glabrous; midvein conspicuous both side, glabrous; lateral veins inconspicuous both side; sessile. Inflorescence axillary head, sessile, globose to cylindric; rachis densely white hairy. Flowers bisexual: Tepals cream-white, 5-lobed, free; lobes ovate-lanceolate, c. 2 × 1 mm, papery. Stamens 3, fertile; filaments c. 0.7 mm, connate into a cup at base; anthers oblong. Pseudostaminodes subulate, shorter than stamens. Ovary broadly obovate, c. 1.25 × 1 mm, notch at apex; style short; stigma capitate. Utricles rounded, c. 2 mm across, enclosed in perianth, compressed, emarginated; seeds c. 1 mm across.

Fl. & Fr.: June–September.


4. CYATHULA Blume (nom. cons.)

3 species in India and 1 species in BNP.


Other synonym: Achyranthes alternifolia L.f.


Prostrate herbs, branches angled, pubescent. Leaves opposite, usually in 3s, simple, rhombic-ovate, 1.7–5.8 × 1–3.5 cm, acute at apex, undulate along margins, cuneate at base, chartaceous, pale green, glabrescent both side; midvein slightly raised both side, pubescent; secondary veins 5–6 pairs, conspicuous, pubescent; petioles 0.5–0.7 cm long, pubescent. Flower clusters forming terminal spikes or dense heads, each cluster composed of 1–2 central fertile flowers and an outer 1–2 sterile flowers with perianth lobes reduced to hooked awns, 5–15 × 0.4–0.6 cm. Fertile flowers: pedicels c. 1 mm long; bracts ovate, concave, c. 1.2 × 0.5 mm; bracteoles ovate, c. 1 × 0.5 mm. Tepals 5, free, subequal, ovate, 1.5–2 × 0.5 mm, acute, prominently 3-nerved. Stamens 5; filaments c. 1.5 mm long, connate below in a hypogynous membranous cup; anthers oblong, 2-celled. Ovary obovoid, c. 1 × 0.5 mm, glabrous; style simple, filiform, c. 1 mm long; stigma capitate. Sterile flowers: Tepals and bracts yellow, c. 1.5 mm, base villous, hooked at apex. Staminode 2-fid or retuse. Utricle, globose, c. 0.5 mm across, glabrous; seeds brown, ovoid-oblong, smooth, shiny.

Fl. & Fr.: October–March.
Distrib.: INDIA: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam; Africa, Pacific Islands.


5. DEERINGIA R. Br.
1 species in India and BNP.

Achyranthes amaranthoides Lam., Encycl. 1: 548. 1785.

Other synonym: Deeringia celosioides R. Br. Plate 46b, c


Climbing herbs; stems angled, glabrous. Leaves alternate, ovate-lanceolate, 1.5-3 x 1-1.8 cm, shortly acuminate at apex, crenate along margins, asymmetrically attenuate at base, chartaceous, green, shining, glabrous; midvein inconspicuous above, raised beneath, glabrous; lateral veins 4-6 pairs, inconspicuous above, prominent beneath, glabrous; petioles 7-10 mm long, puberulent. Inflorescences axillary or terminal racemes; 4-5.8 cm long. Flowers bisexual, c. 2.5 x 2 mm; pedicel 1-2 mm long; bracts triangular-ovate, c. 1 x 1 mm. Tepals 5-lobes, light green turned crimson in fruits; lobes elliptic-ovate or oblong-ovate, 1.5-2 x 0.6-1 cm, membranous. Stamens 5; filaments c. 1.5 mm, free above, forming cup below; anthers 2-celled. Ovary globose, 3-4 mm across; style short; stigma capitate. Berries red, sub-globose, c. 5 mm across; seeds 1-6, black, compressed-reniform shiny.

Fl. & Fr.: November-March.

Distrib.: INDIA: Arunachal Pradesh, Assam, Bihar, Jharkhand, Meghalaya and West Bengal. WORLD: Australia, Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.


CHENOPODIACEAE [298]

CHENOPODIUM L.

11 species in India and 1 species in BNP.

Local name: “Chandan-betu” (Bengali).

Herbs to 30–40 cm high; stems corrugated, angled, often striped green, red or purple, glabrous. Leaves variable in shape and size, rhombic, deltoid or lanceolate, 0.8–5.5 × 0.3–1.9 cm long, acute or obtuse at apex, entire or toothed or irregularly lobulated along margins, cuneate at base, subcoriaceous, glabrous; midvein faintly raised beneath, glabrous; lateral veins 5–6 pairs, faintly beneath, glabrous; petioles 3–10 mm long, lamina decurrent onto petioles. Inflorescences lax panicked spike. Flowers bisexual or lower female flowers, c. 1.5 mm across, sessile. Tepals 5 (4), ovate-orbicular or oblong-ovate, c. 1 × 1 mm, acute, keeled enclosing the utricle, sub-membranous, glabrous. Stamens 5 (4); filaments flattened, c. 1 mm long, hyaline, glabrous; anthers yellow, exserted, c. 0.3 mm. Ovary depressed-globose, orbicular, c. 0.8 mm across; style c. 0.3 mm long; stigmas 2. Urticles c. 1 mm across, 1-seeded; seed black with thin pericarp, smooth, keeled. Seeds black, 1.2 —1.5 mm, with faint radial striations.

Fl. & Fr.: January–August.

Distrib.: INDIA: Throughout. WORLD: Native of Europe.

Specimen examined: Buxa National Park, Jainti range, Jainti river, 7th April, 2012, 56052 Gopal Krishna.

POLYGONACEAE [286]

Key to genera
1a. Stems and petioles bearing reflexed hooked, prickles or bristles........... 1. Persicaria
1b. Stems and petioles without hooked prickles.............................................. 2
2a. Perianth 3–5-partite; stamens 7-8 or rarely 4; style 2 or 3 ....................... 2. Polygonum
2b. Perianth 6-partite; stamens 6; styles 3 ..................................................... 3. Rumex

1. PERSICARIA (L.) P. Miller

52 species in India and 5 species in BNP.

Key to species
1a. Petioles winged.......................................................... 5. P. nepalensis
1b. Petioles not winged.......................................................... 2
2a. Stems creeping or prostrate......................................................... 2. P. capitatum
2b. Stems erect or decumbent............................................................ 3
3a. Ocrea ciliate; cilia 1.5–2 cm......................................................... 1. P. barbatum
3b. Ocrea not ciliate, if ciliate than cilia less than 1.5 cm.............................. 4
4a. Peduncles glandular pubescent................................................. 3. P. chinensis
4b. Peduncles glabrous.................................................................4. P. minor

Local name: "Bekh-unjubaz" (Bengali).
Illustration: Wight, Icon. Pl. Ind. Orient. 5(2): t. 1798. 1852 [as Polygonum barbatum].

Herbs perennial, rhizomatous; stems erect, 40–90 cm high, robust, pubescent, simple or branched above. Leaves simple, alternate, whorled, lanceolate or elliptic-lanceolate, 5–14.1 x 0.8–2.3 cm, acuminate at apex, ciliate along margins, cuneate at base, subcoriaceous, pubescent, both surfaces; midvein flattened above, raised beneath, hispid; lateral veins 14–16, prominent beneath, inconspicuous above; petioles 5–8 mm, densely hispidulous; ocrea tubular, 1.5–2 cm, membranous, densely hispidulous, apex truncate, ciliate, cilia 1.5–2 cm long. Inflorescence terminal, spicate, erect, 4–8 cm, several spikes aggregated and panicle-like, rarely solitary. Flowers bisexual; bracts funnel-shaped, glabrous, margin ciliate, each 3–5-flowered. Pedicels short. Perianth white or greenish, 5-parted, elliptic, 1.5–2 mm. Stamens 5–8, included. Styles 3; stigmas capitate. Achenes included in persistent perianth, black, shiny, ovoid, trigonous, 1.5–2 mm.
Fl.: August–September; fr.: September–October.


Prostrate herb; stems terete, creeping, tufted, sparsely glandular pubescent or glabrous, branched. Leaves simple, alternate, ovate-elliptic, 1.2–2.5 x 0.9–1.7 cm, broadly acute at apex, ciliate along margin, cuneate or rounded at base, reddish, thinly coriaceous, glandular pubescent both sides; midvein prominent beneath, simple hairy pubescent; lateral veins 8–10 pairs, reddish, prominent beneath; petioles 2–3 mm long with small
rounded auricles at base; ocrea tubular, 5–8 mm long, membranous, glandular pubescent, truncate at apex, ciliate along margins. Inflorescence in terminal head, 6–10 mm across; peduncle, 0.7–3.1 cm long, glandular pubescent. Flowers bisexual; pedicels short, pubescent; bracts narrowly ovate, membranous. Tepals pinkish red, 5-lobed, free; lobes elliptic, c. 2 × 1.5 mm. Stamens 8; filaments short; anthers ovoid, 0.1–0.2 × 0.1–0.2 mm. Ovary trigonous, glabrous, c. 1 mm long; stigma simple. Achenes black-brown, slightly shiny, narrowly ovoid, trigonous, 1.5–2 mm, densely punctate.

Fl. & Fr.: March-September.


Specimen examined: Buxa National Park, Santrabari 300m, Gopal Krishna & S.K. Srivastava 46266.


Other synonym: Ampelygonum chinense (L.) Lindl.

Local name: “Ameta” (Nepali).

Illustration: Wight, Icon. Pl. Ind. Orient.5(2): t. 1806. 1852 [as Polygonum chinense].

Large scrambling sub-shrubs, to 80 cm high; stems terete, glabrous. Leaves simple, alternate, ovate-elliptic, 3–13 × 1.5–4.5 cm, acuminate at apex, entire along margin, truncate or rounded at base, thinly coriaceous, glabrous; midvein flattened to faintly raised above, raised beneath, glabrous; secondary nerves obscurely 6–7 pairs, sparsely pubescent; petioles 4–10 mm long, covered with auricle; auricle 3–7 mm long at the base; ocrea 1–2 cm, membranaceous. Inflorescences terminal or axillary, capitate, several capitula aggregated and panicle like; peduncles 0.5–2 cm long, glandular pubescent; involucral bracts triangular ovate to hastate, 4–5 × 2.5–3 mm, acute at apex, truncate at base, subcoriaceous, glabrous. Flowers bisexual. Tepals white or pink, 5-lobed; lobes elliptic, 2.3–3 mm, membranous. Stamens 7–8; filaments 1.2–2 mm long, subulate, glabrous; anthers c. 0.15 × 0.15 mm. Ovary c. 1 mm; style 3, c. 0.5 mm long, connate below half of length; stigma capitulate. Achenes trigonous, c. 4 mm.

Fl. & Fr.: October-February.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.


Herbs annual, glabrous throughout; stems erect, 70–100 cm tall, rooting at nodes branched; branches terete, glabrous. Leaves, simple, alternate, lanceolate or oblong-lanceolate, 1.1–5.1 x 0.3–1 cm, acute at apex, entire along margins, ciliate, narrowly cuneate at base, subcoriaceous, glabrous except veins, gland dotted beneath; midvein flattened above, faintly raised beneath, sparsely hairy; lateral veins; ocrea tubular, 6–10 mm, membranous, awned, appressed hairy. Inflorescence terminal or lateral, 8–20 mm long, usually with several dense spikes aggregated and panicle-like; bracts funnel-shaped, 2–2.5 mm, ciliate, usually each 3 or 4-flowered. Flowers bisexual. Tepals white or pinkish, 5-lobed; lobes elliptic, 2–2.5 x 1.5 mm, chartaceous, glabrous. Stamens 6–8; filaments flattened, c. 1 mm long, subulate; anthers ovoid c. 1.5 x 1.5 mm. Ovary c. 0.5 x 0.3 mm, broaden at base, glabrous; styles 2, c. 0.5 mm long, connate to below middle, glabrous; stigma globose. Achenes included in persistent perianth, black-brown, shining, ovoid, biconvex, c. 1.5 x 1.5 mm.
Fl.: June–August; fr.: July–September.
Distrib.: INDIA: Almost throughout hotter part of the country. WORLD: Bangladesh, Bhutan, China, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, North and South America, Pacific Islands.

Polygonum nepalense Meisn., Monogr. Polyg. 84, Pl.7. f. 2. 1826.
Other synonyms: Polygonum alatum Buch.-Ham. ex Spreng.; Persicaria alata (Buch.-Ham. ex D. Don) Nakai. Plate 46e
Local name: “Jaseb” (Khasi.).
Illustration: Wight, Icon. Pl. Ind. Orient.5(2): t. 1804. 1852 [as Polygonum alatum].
Herbs, to 30 cm high; stems decumbent or ascending, terete; internodes 2.5–4.8 cm long, much branched, rooting at lower nodes. Leaves simple, alternate, ovate or ovate-elliptic, 1.5–5 × 1.1–2.2 cm, narrowly acuminate at apex, entire along margins, broadly cuneate at base, decurrent along petioles forming wing, chartaceous, glabrous, punctate; midvein flattened above, faintly raised beneath, glabrous; secondary veins 6–7 pairs, obscure; petioles upto 1.5 cm long; auricle thin, c. 1 cm long; ocrea brownish, tubular, 5–10 mm, membranous, apex obliquely truncate, not ciliate, with recurved seta at base. Inflorescence in head, pinkish red; peduncles 1.3–3.5 cm long, pubescent. Flowers bisexual; pedicels short; bracts ovate-elliptic, usually glabrous, margin membranous. Tepals 4, pinkish. Stamens 6; filaments c. 0.6 mm long, glabrous; anthers ovoid, c. 0.3 × 0.3 mm. Ovary obovoid-trigonous, c. 0.8 × 0.4 mm; style 3, c. 0.6 mm long, glabrous; stigma capitate. Achene trigonous.

Fl. & Fr.: September–March.

Distrib.: INDIA: Assam, Meghalaya, Sikkim and West Bengal. WORLD: Afghanistan, Africa, Bhutan, China, Indonesia, Japan, Korea, Malaysia, Nepal, New Guinea, Pakistan, Philippines, Russia and Thailand.


Use: The whole plant is being used as chutney by local peoples.

2. POLYGONUM L. (nom. cons.)

49 species in India and 1 species in BNP.


Other synonyms: Polygonum caespitosum Blume; Persicaria posumbu (Buch.-Ham ex D. Don) H. Gross.

Annual herbs, decumbent, 30–70 high; stems slender, branched at base, glabrous, angulate. Leaves simple alternate, ovate-lanceolate or ovate, 1.1–3.8 × 0.5–1.5 cm, caudate-acuminate at apex, ciliate along margins, broadly cuneate at base, papery, sparsely appressed hispid orglabrescent above, densely hispid beneath; midvein prominent above; lateral veins 6–7 pairs, obscure above, prominent beneath; petioles 3–4 mm long; ocrea tubular, 4–6 mm, thinly membranous, appressed hispid, apex truncate,
cilia 7–8 mm long, stout. Inflorescences terminal or axillary, spicate, lax, 5–10 cm, interrupted below; bracts greenish, funnel-shaped, c. 2 × 1 mm, glabrous, margin ciliate, each 3-or 4-flowered. Tepals pinkish, 5-parted above, connate below, oblong-elliptic, 2–2.5 × 1–1.2 mm, obtuse at apex, membranous, glabrous. Stamens 8, exserted; filaments 1–1.1 mm long, subulate; anthers ovoid, c. 0.1 × 0.1 mm. Ovary c. 1 × 0.7 mm, glabrous; styles 3, connate at base; stigmas capitate. Achenes included in persistent perianth, blackish brown, ovoid, trigonous, 2–2.5 × 1–1.2 mm, shining.

Fl.: June–September; fr.: July–October.

Distrib.: INDIA: Assam, Manipur, Sikkim and West Bengal. WORLD: China, Indonesia, Japan, Java, Korea, Myanmar, Nepal, Philippines and Thailand.

Specimen examined: Buxa National Park, Jainti range, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 46389.

3. RUMEX L.

23 species in India and 1 species in BNP.


Local name: “Bampalang” (Bengali).


Perennial herbs, to 15–60 cm high; stems branched below middle, grooved, glabrous or shortly papillose. Leaves lanceolate or oblong-lanceolate, 4–15 × 1–3 cm, acute at apex, entire along margins, narrowly cuneate at base, subcoriaceous, glabrous or shortly papillose below, smooth, or occasionally slightly undulate; petioles 1–2.5 cm long, cauline leaves shortly petiolate or nearly sessile, smaller than basal ones; ocrea fugacious, membranous. Inflorescences paniculate. Flowers bisexual; pedicel filiform, articulate at base or slightly above base, articulation in distinctly swollen. Tepals 6, outer tepals elliptic, c. 2 mm long; inner tepals narrowly ovate-lanceolate, c. 3 × 1.25 mm, acute at apex, accrescent and enveloping fruit, valves narrowly triangular-ovate, 2.5–3.5 × 0.8–1.5 mm wide, all valves with tubercles, base truncate, each margin with 2 or 3(or 4) teeth, apex acute; teeth 2.5–3 mm, narrow; tubercles oblong, c. 1.5 mm. Achenes yellow brown, shining, ellipsoid, sharply trigonous, 1.5–2 × 1 mm.


Distrib.: INDIA: Assam, Meghalaya and West Bengal. WORLD: Asia, Europe, North Africa, North America and South America.
ARISTOLOCHIACEAE [15]

ARISTOLOCHIA L.

12 species in India and 1 species in BNP.

Aristolochia tagala Cham. in Linnaea 7: 207. 1832; Prain, Bengal Pl., 2: 891. 1903.

Other synonyms: Aristolochia acuminata Lam.; Aristolochia roxburghiana Klotzsch. Plate 46f


Twining herbs, to 10–15 m high; stems terete, slightly furrowed, glabrous. Leaves simple, alternate, broadly ovate, 13–17 × 7–8 cm, acute or acuminate at apex, undulate along margins, deeply cordate at base, incision c. 2 cm, coriaceous, glabrous; veins palmately 5-nerved at base, prominent beneath, glabrous; petioles 3–4 cm long, glabrous. Inflorescences raceme in leafy axillary shoots, 2–3-flowered. Flowers bisexual, showy; pedicels c. 1 cm long, pubescent. Perianth lobes, pale yellowish or greenish, throat dark purple, 4–6 cm; tube rectilinear or slightly curved; utricle globose, 5–8 mm in across, with stipe 1–3 mm; tube 5–10 × 2–3 mm; limb ligulate, oblong, 2–3 × 0.5–0.6 cm, obtuse apex. Stamens 6, adnate to style column; anthers oblong, c. 1 mm long. Style column c. 3 mm long, 6-fid, conical. Capsules lantern like, opening through valves; valves 6, c. 6 × 5 cm, many seeded; seeds triangular ovate, c. 0.7 × 0.5 cm.

Fl. & Fr.: April-June.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, Indonesia, Japan, Nepal, Malaysia, Myanmar, Philippines, Thailand and Vietnam.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, 14th Feb., 2010, S.K. Srivastava & Gopal Krishna 47086.

PIPERACEAE [12]

Key to genera

1a. Herbs; flowers bisexual; anther cells confluent; stigma 1, penicillate…. 1. Peperomia

1b. Free-standing or scandent shrubs; flowers unisexual; anther cells distinct; stigmas 3–5, confluent................................................................. 2. Piper
1. **PEPEROMIA** Ruiz & Pav.

12 species in India and 1 species in BNP.


Prostrate herbs; stems terete, fleshy, glabrous or sparsely pubescent. Leaves alternate, ovate, 1.1–2.3 × 0.9–2.1 cm, acute at apex, entire along margins, sub-cordate or shallowly cordate at base, chartaceous, pale-green, glabrous, pellucid dotted; midvein flattened above, faintly raised beneath, glabrous, palmately 5–7-nerved at base, lower most 2 pairs very weak and inconspicuous; lateral veins 2–3 pairs above, obscure above, slightly visible beneath, glabrous; petioles 5–6 mm long; stipules linear-lanceolate, c. 2 × 0.3–0.4 mm. Inflorescences axillary spike, 0.8–4.5 cm long; bracts suborbicular, c. 0.5 × 0.5 mm, stalk short. Tepals absent. Stamens 2; filaments short, almost sessile; anthers ovoid-subglobose, c. 0.1 mm, confluent. Ovary ellipsoid, c. 0.5 × 0.3–0.4 mm, ribbed, articulated, 1-loculed; style short; stigma penicillate. Nutlet globose, c. 0.5 mm across, pericarp thin; seeds minute.

Fl. & Fr.: April–October.

Habitat: Grow in moist and shady places.

Distrib.: INDIA: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and West Bengal. WORLD: Bhutan, China, Myanmar, Nepal (native to tropical North and South America).


2. **PIPER** L.

50 species in India and 5 species in BNP.

Key to species

1a. Infructescences globose or nearly so, never more than 2 times as long as wide................................................................. 3. *P. mullesua*

1b. Inflorescences cylindric, more than 3 × as long as wide (usually much more)..................................................................................................................... 2

2a. Bracts of male and female spikes basifixed, with decurrent wings, never peltate or medifixed ......................................... 1. *P. attenuatum*

2b. Bracts of male and female spikes peltate, stalked or sometimes sessile and medifixed ......................................................... 2
3a. Leaves with reddish brown glands, mainly along veins, uniformly dispersed beneath.............................................. 5. P. sylvaticum
3b. Leaves with glands colorless or apparently absent................................. 3
4a. Female flowering and fruiting spikes borne on short peduncles 2–8 mm........................................................... 4
4b. Female flowering and fruiting spikes borne on longer peduncles 2–4 cm............................................................ 2. P. betleoides
5a. Leaves 5–7-nerved at base; axillary buds conspicuous; petioles 7–10 mm; fruiting spikes globose........................................ 3. P. mullesua
5b. Leaves 3–5-nerved at base; axillary buds few, minute and inconspicuous; petioles 3–5 mm; fruiting spikes shortly cylindric ............................................................... 4. P. peepuloides

Plate 46h

Climbing shrubs; stems terete, striate, glabrous, rooting at nodes; internodes 3–11.8 cm long. Prophyll 3–7 mm long. Leaves alternate, simple, broadly-ovate or ovate-orbicular, 3.6–8 × 4–6.9 cm, acuminate at apex, entire along margin, truncate to subcordate at base, sub-coriaceous, glabrous, palmately 7–9-nerved at base, obscure above, prominent beneath, glabrous; petioles 2.5–5.4 cm long, sparsely hispidulous; stipules short. Flowers monoecious; spikes leaf-opposed. Male spikes slender, 6–8 cm long, basifixed; bracts oblong-obovate, c. 2 × 0.6–1 mm, apex rounded, basifixed, margin free. Stamens 3; filaments short; anthers ovoid. Female spikes, 7–9 cm long; peduncle 5–8 mm long; bracts shallowly cupular, c. 3 × 1 mm. Ovary globose; stigmas 4. Fruiting spike interrupted, up to 12 cm long. Drupes ovoid-globose, c. 4 × 2.8 cm, sessile loosely aggregated.
Fl. & Fr.: August–October.
Distrib.: INDIA: Southern and North-Eastern Region. WORLD: Bhutan and China.
Specimen examined: Buxa National Park, Jainti range, Tashigaon 1, Bhatia Hill, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 46394.

Local name: “Jangl-ipaan” (Bengali).
Climbing shrubs; stems terete, weakly striate, puberulous; internode 2.9–5.9 cm. Leaves alternate, simple, oblong-ovate, ovate, 2–15 × 1.6–7.2 cm, acuminate at apex, entire along margins, oblique-cordate at base, chartaceous, green shining above, pale beneath when dry, glabrous; midvein depressed to flat above, raised beneath, glabrous, palmately 5–7-veined at base, obscure above, prominent beneath, lateral veins 2–3 cm above to base of petiole; petioles 1–1.5 cm long, glabrous. Male spike axillary hanging, cylindric, c. 3.3 cm long; peduncles 2.5–3 cm long, more or less striate, glabrous. Tepals absent. Stamens 3; filaments short; anthers globose, c. 2 × 2 mm. Female spikes, 2.5–3.5 cm; peduncles 2–4 cm. Stigmas 4 or 5. Fruiting spikes swollen, 8–10 mm broad. Drupes c. 2 mm across, densely aggregated.

Fl. & Fr.: March-September.

Distrib.: INDIA: Assam, Sikkim and West Bengal. WORLD: Bhutan.


Other synonym: Piper brachystachyum Wall. ex Hook.f.

Climbing shrubs; stems terete, striate, glabrous, basal part tuberculate. Prophylls 5–6 mm long. Leaves elliptic or narrowly elliptic or broadly ovate-lanceolate, 7.5–14.5 × 4–9 cm, caudate-acuminate at apex, entire along margins, cuneate or symmetric or slightly oblique at base; papery to thinly leathery, glabrous; midvein raised beneath, glabrous; 5–7-nerved at base; lateral veins 1–2 pairs, prominent beneath, apical pair arising 1–2.5 cm above base, usually alternate; reticulate veins conspicuous; petioles 7–10 mm long, slender; stipules absent; axillary buds 5–10 mm, persistent and conspicuous. Flowers bisexual. Spikes leaf-opposed, at apices of branchlets, subglobose, c. 3 × 3–4 mm; peduncle 2–3 mm long; rachis pubescent; bracts orbicular, c. 1 mm wide, peltate, abaxially glabrous; stalk short. Stamens 2; anthers reniform. Ovary obovoid; stigmas 3 or 4, small. Drupe obovoid, c. 2 mm across.

Fl. & Fr.: February–June.

Distrib.: INDIA: North east India and West Bengal. WORLD: Bhutan, China and Nepal.


Local names: “Janglipan”, “Pipla” (Bengali).


Terrestrial or epiphytic shrubs, to 0.5–1 m, sometimes climbing; stems terete, more or less striate, glabrous; internodes 2.5–7.4 cm long. Leaves alternate, simple, ovate-elliptic, ovate-lanceolate or lanceolate, 6–9 × 1.7–2.8 cm, acuminate to caudate at apex, entire along margins, slightly oblique-cuneate at base, subcoriaceous, green shining, glabrous; midvein faintly raised above, prominent beneath, glabrous; lateral veins palmately 3–5-nerved at base prominent beneath, glabrous; petioles 3–5 mm long, glabrous; stipules absent; axillary bud inconspicuous, minute. Male spike slender, erect, cylindric, 2.8–3 cm long; peduncles 7–9 mm long, glabrous; bracts c. 1 × 1 mm. Tepals absent. Stamens 2; filaments flattened c. 0.4 mm long, glabrous; anthers ovoid-globose c. 0.2 mm, slightly exserted beyond bracts. Female spikes shortly cylindric, rarely subglobose, in fruit 6–15 × 5–6 mm, on peduncles 1–4 mm long. Drupes c. 1 mm across.

Fl. & Fr.: November–February.

Distrib.: INDIA: Assam, Meghalaya and West Bengal. WORLD: Bhutan and Nepal.


5. *Piper sylvaticum* Roxb., Fl. Ind. 1: 158. 1820; Hook.f. in Hook.f., Fl. Brit. India 5: 84. 1886; Prain, Bengal Pl. 2: 893. 1903. Plate 47b, c

Other synonym: *Chavica sylvatica* (Roxb.) Miq.

Climbing shrubs; stems terete, striate, glabrous, rooting at nodes; internodes 3–11.2 cm long. Leaves alternate, simple, ovate, oblong-elliptic or oblong-ovate, 4–14 × 2–6.1 cm, acuminate to caudate at apex, wavy along margins, cuneate or rounded, symmetric or slightly oblique at base, chartaceous, green shining, turned pale when dry, densely reddish brown glandular, glabrous except for densely finely pubescent veins; midvein inconspicuous above, prominent beneath; 5-nerved at base; petioles 1–5 cm long, glabrous; stipule narrow, inconspicuous; axillary buds, c. 10 mm long. Male spike slender, erect, 0.8–5.5 cm long; peduncles 6–10 mm long, glabrous; bracts ovoid, c. 1 mm across, subcoriaceous, glabrous. Tepals absent. Stamens 4; filaments, 0.1–0.3 mm long; anthers ovoid, exserted. Female spike cylindric, c. 3 cm long; peduncle 6–8 mm long,
glabrous; stigmas 3–4. Fruiting spikes 1.5–3 × 0.7–1 cm. Drupes globose, c. 3 mm across, densely arranged.

Fl. & Fr.: September-February.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bangladesh, Bhutan, China and Myanmar.


CHLORANTHACEAE [6]

CHLORANTHUS Sw.

2 species in India and 1 specis in BNP.


Other synonyms: Chloranthus elatior R. Br.; C. officinalis Blume. Plate 47d, e

Illustration: Curtis’s, Bot. Mag. 48: t. 2190. 1820.

Undershrubs, to 1 m high; stems and branches terete, corrugulate, glabrous. Leaves opposite, simple, elliptic to elliptic-ovate, 6.5–17.1 × 3.2–6.5 cm, acuminate at apex, sharply serrate along margins, cuneate at base, sub-coriaceous, shining, dark brown above when dry, pale green beneath when dry, pellucid gland dotted both sides; midvein impressed above, raised beneath, glabrous; lateral veins 8–10 pairs, impressed above, slightly raised beneath, glabrous; petiole 5–8 mm long, glabrous. Inflorescences terminal spike, c. 7 cm long, dichotomously or racemously branched. Flowers unisexual or bisexual, white, sessile; bracts broadly ovate, 1–1.5 mm. Perianth absent. Stamens 1 or 3; filaments short; anthers 2-lobed. Ovary 1-loculed, enclosed by bracts; style short. Drupes green when young, white at maturity, ovoid or globose, c. 5 × 3 mm, 1-seeded; seed pendulous.

Fl. & Fr.: April-October.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti range, Jainti 8, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 46319.
Notes: The authors have followed B. Verdcourt (Kew Bull. 40: 217. 1985), who rejected the name *Chloranthus elatior* R. Brown ex Sims as a *nom. nud.*, and *C. elatior* Link as too poorly known to be usable; the latter was based on a sterile cultivated plant and the type was destroyed in Berlin.

**MYRISTICACEAE** [16]

**HORSFIELDIA** Willd.

4 species in India and 1 species in BNP.


*Local name:* “Ramguwa” (Bengali, Nepali).


Trees, 15–20 m tall; trunk slender; bark dark brown, lenticellate. Branches spreading; branchletsterete, lenticellate, glabrous. Leaves, alternate whorled toward end of branchlets, simple, obovate, elliptic–oblong or oblong–lanceolate, 18–33 × 6–11 cm, acuminate at apex, entire along margins, attenuate at base, coriaceous, dark green, glabrous; midvein depressed to flat above, raise beneath, puberulous; lateral veins 14–18 pairs, prominent beneath; petioles 1.5–2.5 cm long, glabrous. Plant dioecious. Male inflorescence axillary, lax panicles, branched, 9–15 cm long, rachis tomentose to puberulous, hairs dendroid. Male flowers 3–10 in clusters, 3–4 mm across; pedicels 1.5–2 mm long; bracts accrescent in fruiting. Tepals 4, free; lobes triangular, thick, coriaceous. Stamens 12–20; anthers sessile. Androphore subsessile or 0.2–0.5 mm long. Female inflorescences in panicles, 3–7 cm long, tomentose to puberulous, hairs dendroid, 7–8-flowered. Female flowers c. 5 mm across. Tepals in male flowers. Ovary ellipsoid or obovoid, 2–2.5 × 2 mm, pubescent. Fruits ellipsoid to ellipsoid–oblung, 4.5–5 × 2–2.5 cm, rounded to sub-acute at apex, 2 persistent perianth valves at base; pericarp 3–4 mm thick; stalk 3–6 mm long; aril entire, rarely lacerate at apex seeds 3–3.5 cm long, hard.

*Fl.:* June–July; *fr.:* April–July.

**Distrib.:** INDIA: Assam, Sikkim and West Bengal. WORLD: China and Thailand.

**Specimen examined:** Buxa National Park, Gadadhar Range, Panbari 8, 10th April, 2012, Gopal Krishna 56093.

*Notes:* Fruits are edible, but said to intoxicate. Kernel is used as a substitute for areca nut. The gum is good against mouth sores.
**LAURACEAE [28]**

Key to genera

1a. Inflorescences fasciculate cymes or pseudoumbels; flowers unisexual; bracts large, forming an involucre; stamens of all whorls with introrse anthers ................................................................. 2

1b. Inflorescences panicles or clusters, rarely pseudoumbels; flowers bisexual; bracts small, not forming an involucre; stamens of 3rd row when present with extrorse anthers ....................... 3

2a. Involucral bracts imbricate, caducous or late deciduous................. 1. Actinodaphne

2b. Involucral bracts decussate, persistent or late deciduous ................... 5. Litsea

3a. Anthers 2-celled ......................................................................................... 4

3b. Anthers 4-celled ......................................................................................... 5

4a. Branches spreading; fruits drupaceous, enveloped by dilated perianth tube .................................................................................. 4. Cryptocarya

4b. Branches drooping; fruits baccate, not enveloped by perianth tube ................................................................................... 2. Beilschmiedia

5a. Leaves triplinerved or pinnately veined with presence of domatia .................................................................................. 3. Cinnamomum

5b. Leaves pinnately veined with absence of domatia .................................................................................. 6

6a. Staminodes 9, in 3 whorls; persistent perianth lobes soft, longer, reflexed or patent, not tightly clasped at fruit base, green ........................................................................ 6. Machilus

6b. Staminodes 6, in 2 whorls; persistent perianth lobes durable, shorter, erect or patent, tightly clasped at fruit base, yellow .................................................................. 7. Phoebe

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**1. ACTINODAPHNE Nees**

15 species in India and 1 species in BNP.


Other synonym: *Litsea obovata* (Nees) Nees.

Trees, to 10–15 tall; branchles terete, stout, densely ferruginous pubescent; terminal buds dark brown. Leaves opposite, crowded at the end of branchlets, variable in shape and size, ovate-oblong, ovate-elliptic or obovate, 17.5–25 × 6.5–10 cm, acuminate at apex, wavy along margins, cuneate at base, coriaceous, dark green, shining above, turned brown when dry, immature leaves tomentose, glabrous when matured; midvein flattened...
above, raised beneath, rusty tomentose; lateral veins 6–7 pairs, slightly impressed above, prominent beneath, rusty tomentose; petioles 2.3–3.5 cm long; stipules caducous. Flowers infasciculate cymes; bracts obovate c. 9 × 6 mm, tomentose outside, glabrous inside; pedicels c. 3 mm long. Male flowers: Tepals 6, yellow, sub-equal, ovate, c. 3.5 × 2–2.5 mm, silky tomentose outside, glabrous inside except at base. Stamens 9, perfect, in 3 whorls, 1st and 2nd whorls eglandular, of the 3rd whorls bi-glandular; filaments c. 5 mm long, pillose at base; anthers oblong, c. 2 × 1 mm, 4-celled, rudimentary, pilose. Female flowers: Tepals as in male flowers. Staminodes 9. Ovary sub-globose, villous; style slender, glabrous; stigma dilated. Fruits ellipsoid, 10–13 × 6–7 mm, seated on persistent perianth cup; fruiting pedicels c. 1 cm.

Fl. & Fr.: March–April.

Distrib.: INDIA: Assam, Arunachal Pradesh, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal. WORLD: Bhutan, China and Nepal.


2. BEILSCHMIEDIA Nees

9 species in India and 1 species in BNP.


Trees, to 20–25 m tall; branches terete, glabrous, shining, drooping; terminal buds lanceolate, 8–12 × 2–3.5 mm. Leaves opposite or subopposite, ovate to ovate-elliptic, 10.5–16 × 3.5–7 cm, acute at apex, entire along margins, attenuate or cuneate at base, coriaceous, glabrous; midvein flattened above, raised beneath; lateral veins 11–13 pairs, prominent beneath, reddish, glabrous; petioles 1–1.5 cm long. Inflorescences axillary panicles, 12–14 cm long; Tepals 5, tube short; lobes subequal. Stamens 9, perfect, in 3-series; two outer series with eglandular filaments and anthers introrse; third series with bi-glandular filaments and anthers extrorse; fourth series with cordate staminodes. Ovary free from perianth. Berries on thickened fruiting pedicels, oblong-ovoid, green initially, turned dark blue once ripened, c. 2.5 × 1.5 cm.

Fl. & Fr.: August–December.

Distrib.: INDIA: Assam, Manipur, Tripura and West Bengal. WORLD: Bhutan, and Myanmar.
Specimen examined: Buxa National Park, Gadadhar Range, Panbari 8, 1st Dec., 2011, Gopal Krishna 52304.

3. CINNAMOMUM Schaeff. (nom. cons.)
16 species in India and 1 species in BNP.

Other synonym: Cinnamomum obtusifolium Roxb. ex Hook.f.
Local name: “Ram-Tejpata” (Bengali).

Trees, to 7–10 m tall; branches sub-terete, glabrous. Leaves sub-opposite, simple, oblong-obovate, 18–36 × 5–13 cm, obtuse at apex, entire along margins, attenuate at base, coriaceous, shining, pale-green both sides when dry, glabrous above, puberulous beneath; 3-veined from above base, veins flattened above, raised beneath, puberulous; veinlets reticulate, prominent beneath; petioles 10–22 mm long, stout, glabrous; terminal buds ovate, c. 5 × 4 mm, tomentose. Inflorescences terminal panicles, 12–20 cm long; peduncles 7–11 cm long, sparsely pubescent. Flowers c. 3 × 3 mm, white silky tomentose; pedicels 2–3 mm long, pubescent. Tepals 6, in 2-whorls, appressed hairy; outer whorl ovate-oblong, c. 2.5 × 1.5 mm; inner whorl broadly ovate, 2 × 2 mm. Stamens 9, perfect; filaments c. 1 mm long, hairy at base; anthers oblong-ovate, c. 1 mm long, 4-celled. Staminodes 9, hairy at base. Disk densely white hairy. Ovary c. 1 × 0.5 mm, glabrous; style subulate, c. 1 mm long; stigma discoid. Berries seated on a persistent perianth cup, eillipsoid, c. 12 × 8 mm.
Fl.: Mar–April; fr.: May–July.
Use: Leaves used as spices.
4. CRYPTOCARYA R. Br. (*nom. cons.*)

11 species in India and 1 species in BNP.


Other synonyms: *Cryptocarya floribunda* Nees; *Laurus amygdalina* Buch.-Ham. ex Wall.

Plate 48a, b

Trees, to 5–8 m tall; branches sub-terete, puberulent. Leaves alternate, sometime sub-opposite, variable, ovate, elliptic-ovate, ovate-lanceolate, 5.1–18 × 2–6.5, shortly acuminate at apex, entire along margins, cuneate at base, coriaceous, dark green, shining above, turned brownish green above when dry, yellowish brown beneath when dry, glabrous above, puberulous beneath; midvein impressed above, raised beneath, glabrous; lateral veins 7–9 pairs, prominent beneath, puberulous; petioles 10–20 mm long, glabrous. Inflorescences terminal and axillary branched cymes, 10.5–19 cm long; rachis minutely pubescent or glabrous. Flowers bisexual, c. 2 × 1 mm; pedicels 1–1.5 mm long, tomentose. Tepals 6, free, appears like united, in 2 whorls; lobes broadly ovate, c. 1 × 1 mm, hooded at apex, tomentose outside, puberulous inside. Stamens 9, perfect; filaments short, hairy at base; anthers falcate, c. 0.5 mm long. Ovary sessile, enclosed in the tube; style shortly exserted; stigma discoid. Drupes ellipsoid-ovate, 1.8–2.3 × 1–1.3 cm, green, turned brown black when ripened, glabrous, shining, 1-seeded; seed ovoid, c. 9 × 5 mm.

Fl. & Fr.: October–August.

Distrib.: INDIA: Assam, Meghalaya, Sikkim, Tamil Nadu and West Bengal. WORLD: Bhutan, China and Nepal.


5. LITSEA Lam. (*nom. cons.*)

46 species in India and 3 species in BNP.

Key to species

1a. Leaves broadly elliptic with broad obtuse ends and prominent tertiary nerves beneath; 5–11 cm broad; fruits with persistent perianth tube.......................................................... 2. *L. monopetala*

1b. Leaves lanceolate, oblanceolate or narrowly elliptic-oblong,
2–5 cm broad; fruits without perianth tube………………………………………………………… 2

2a. Leaves lanceolate, glabrous beneath except on veins; lateral
veins 8–12 pairs, not prominent beneath; umbels in clusters of
2–6; fruit subglobose, lemon scented……………………………………… 1. L. cubeba

2b. Leaves elliptic-oblong, minutely silky-pubescent beneath;
lateral veins 10–15 pairs, prominent beneath; umbels in clusters of
6–18; fruits ellipsoid, not lemon scented ……………………………… 3. L. salicifolia

Other synonym: Litsea citrata Blume.

Plate 48c, d

Deciduous trees, to 7–10 m tall; branchlets drooping, terete, glabrous; bark greenish, shining. Leaves alternate, lanceolate to ovate-lanceolate, 6.4–14.5 × 2.2–4.2 cm, acuminate at apex, entire along margins, obliquely attenuate at base, chartaceous, shinning green above, faded green beneath, glabrous above, glabrescent beneath; midvein slightly raised both sides; lateral veins obscurely 7–10 pairs, glabrous, reddish; petioles 1.2–1.5 cm long. Inflorescences umbel, 2–6-flowered; peduncles 3–4 mm long, puberulous. Male flowers: Tepals 6, broadly ovate. Stamens 9, fertile; filaments hairy below middle, of 3rd whorls each with 2 shortly stipitate glands at base. Pistilode glabrous. Female flowers c. 2 × 2 mm; pedicels 3–4 mm long, puberulous. Tepals 6, free, orbicular, c. 5 × 1 mm, hyaline gland dotted. Staminodes 9, c. 5 mm long, hairy. Ovary c. 5 × 5 mm; style not distinct; stigma peltate. Drupes subglobose, 6–7 mm across, perianth rim c. 1.5 mm across, on thickened pedicel 3–5 mm long.
Fl.: December–March; fr.: July–September.

Distrib.: INDIA: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal. WORLD: South and South East Asia.

Specimen examined: Buxa National Park, Rajabhatkhawa range, 4th Dec., 2011, Gopal Krishna 52310.

Notes: The species is known from Darjeeling district and present collection is from Jalpaiguri district.

Other synonym: Litsea polyantha Juss.


Plate 48e
Tress, to 7–10 m high; branchlets subterete, densely ferruginous pubescent. Leaves alternate, simple, oblong-obovate to oblong-elliptic, 6.3–15.6 × 3.8–6.5 cm, broadly acute-obtuse at apex, undulate along margins, cuneate or rounded at base, coriaceous, green, shining, villous beneath; midvein slightly impressed above, raised beneath, villous beneath; lateral veins 5–9 pairs, inconspicuous above, prominent beneath, villose; petioles 1–1.5 cm long, villous. Inflorescences axillary fascicles. Flowers unisexual. Male flowers c. 5 × 5 mm, hairy above; pedicels 3–5 mm long; bracts triangular-ovate, c. 2 × 1 mm, hairy. Tepals yellow or cream, 6, free, ovate, subequal, c. 1 × 0.5 mm, gland dotted outside, sericeous along margins. Stamens 9, perfect, in 3 whorls, inner whorl of stamens having 2 oblate glands. Female flowers: Tepals as in male flowers. Staminodes 9, c. 1 mm long, sericeous. Ovary c. 5 × 5 mm, hairy; style c. 1 mm long; stigma discoid. Drupes ellipsoid, 6–8 × 4–5 mm, glabrous, with persistent perianth tube.

Fl.: November–May; fr.: June–July.

Distrib.: INDIA: Assam, Punjab and West Bengal. WORLD: Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand and Vietnam


Trees, to 3–4 m high; branches subterete, appressed hairy. Leaves alternate, simple, oblong-obovate or ovate-elliptic, 10–23 × 2.9–6.8 cm, mucro-acute at apex, undulate along margins, cuneate at base, coriaceous, reddish brown above when dry, yellowish brown beneath when dry, appressed hairy beneath; midvein impressed above, raised beneath, hispid; lateral veins 8–14 pairs, prominent beneath; petioles 8–15 mm long. Inflorescences axillary fascicles; peduncle 4–5 mm long, hairy. Bracts linear, 2–2.5 × 1 mm, silky tomentose; bracteole orbicular, c. 2.5 × 2.5 mm, hairy outside, glabrous inside. Male flowers: Tepals yellow 6, free; lobes obovate, c. 1.5 × 1 mm, gland dotted. Stamens 9, perfect; filaments c. 1 mm long, villous; anthers oblong, 1–1.5 mm long, 4-celled. Female flowers: Tepals as in male flowers. Staminodes 9. Drupes ellipsoid, 4–6 × 3–4 mm, glabrous, with persistent perianth tube.

Fl.: April–May; fr.: April–September.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal and Vietnam.
Plate 48: a - b. Cryptocarya amygdalina Nees: a. Flowering branch; b. Fruits enclosed by dilated perianth; c - d. Litsea cubeba (Lour.) Pers.: c. Flowering branch; d. Fruiting branch; e. Litsea monopetala (Roxb.) Pers.; f - h. Litsea salicifolia (Roxb. ex Nees) Hook.f.: f. Flowering branch; g. Flowers (close up); h. Young fruits (close up)

6. MACHILUS Nees
15 species in India and 1 species in BNP.


Other synonyms: Machilus villosa (Roxb.) Hook.f.; Laurus villosa Roxb.; Persea glaucescens (Nees) D. G. Long; P. villosa (Roxb.) Kosterm.; Phoebe glaucescens (Nees) Nees; P. villosa (Roxb.) Wight.


Trees, to 8-10 m high; branchlets terete, yellowish pubescent, becoming glabrate on maturity; bark dark brown, longitudinally striate. Leaves alternate, opposite, whorled, crowded towards end of branchlets, simple, elliptic to elliptic-lanceolate, 4.2-9.5 x 2-2.9 cm, acute at apex, entire along margins, attenuate at base, coriaceous, greenish brown above on drying, reddish brown beneath on drying, glabrous above, puberulous beneath; midvein impressed above, slightly raised beneath, puberulent; lateral veins 5-7 pairs, prominent beneath, puberulent; petiole 7-12 mm long, appressed hairy. Inflorescences terminal panicles, 6-10 cm long; rachis rusty tomentose. Flowers c. 5 x 4 mm, pedicellate; pedicels 1.5-2 mm long; bracts linear-lanceolate, 1.5-2 mm long, tomentose. Tepals 6, free ovate, c. 3 x 2 mm, acute at apex, rusty tomentose outside, puberulous inside. Stamens 9, fertile; filaments subequal, 1-1.5 mm long, hairy at base; anthers oblong, c. 1 mm long, 4-celled. Staminodes 9, in 2 whorls, c. 1 mm long, hairy at base. Disk hairy. Ovary c. 1 mm across, glabrous; style c. 1 mm long, glabrous. Berries globose-ovoid, 5-8 mm across, green, seated on persistent perianth lobes.

Fl.: January–March, fr.: March–April.

Distrib.: INDIA: Assam, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar and Nepal.

Fig. 32. *Machilus glaucescens* (Nees) Wight: a. Fruiting branch
7. PHOEBE Nees

9 species in India and 1 species in BNP.


Other synonyms: *Laurus lanceolaria* Roxb.; *Ocotea ligustrina* Nees. Fig. 33

**Illustration:** Wight, Icon. Pl. Ind. Orient. 5: t. 1821. 1843.

Trees, to 10–15 m tall; bark light brown; branches subterete, whitish with bud like scale scars. Leaves whorled, crowded at end of branchlets, elliptic-oblanceolate, 4.5–12.5 × 1.1–2.2 cm, acuminate at apex, entire-undulate along margins, attenuate at base, subcoriaceous, light reddish-brown on drying, glabrous above, puberulous beneath; midvein impressed above, slightly raised beneath, reddish, pubescent; lateral veins 6–8 pairs, inconspicuous above, faintly raised beneath, glabrous; petioles 6–10 mm long, puberulent; stipules triangular-ovate, 1.5 × 1 mm, hispid. Inflorescences terminal panicle, 4–8 cm long, glabrous. Flowers c. 3 × 3 mm; pedicels 3–4 mm long, glabrous; bracts lanceolate, c. 1 × 0.5 mm, ciliate along margins, densely hairy at apex. Tepals 6, in 2 whorls, sub-equal, oblong-ovate, 2–2.5 × 1.5–1.6 mm, acute at apex, puberulent-ciliate along margins, glabrous outside, white silky tomentose inside, more densely pubescent at apex. Stamens 9, in 3 whorls; outer whorl and inner most whorl filaments subequal, c. 1 mm long, pubescent; anthers triangular-ovate, c. 0.75 × 0.5 mm, 4-celled; outer 6 introrse; inner 3 extrorse, hairy at base. Disk serecious. Ovary globose, c. 1 mm across, glabrous; style subulate, c. 5 mm long, glabrous. Drupes ovoid, 9–11 × 6–8 mm, glabrous; fruiting pedicel slightly thickened; persistent perianth lobes straw-yellow, leathery, clasping base offruit or lax.

**Fl.:** April–May; **fr.:** July–September.

**Distrib.:** INDIA: Meghalaya, Tamil Nadu and West Bengal. WORLD: Bhutan, China, Indonesia, Malaysia, Nepal and Thailand.

**Specimen examined:** Buxa National Park, Jantie range, Tashigaon 2, Bhutia Pond, 7th April, 2012, *Gopal Krishna* 56050.

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**ELAEAGNACEAE** [1]

**ELAEAGNUS** L.

8 species in India and 1 species in BNP.

Fig. 33. *Phoebe lanceolata* (Nees) Nees: a. Flowering branch; b. Flowers; c. Flower (opened); d. Stamens; e. Staminodes
Straggling shrubs, to 3 m high; branches terete, covered with silvery scales, armed. Leaves alternate, simple, elliptic-ovate, 6.1–10.5 × 2.4–4.8 cm, acute or shortly acuminate at apex, entire or obscurely undulate along margins, cuneate at base, coriaceous, glabrous above, silver scaly beneath; midvein impressed above, raised beneath, silver scaly; lateral veins 6–7 pairs, impressed above, prominent beneath, silver scaly; petioles 5–7 mm long, silvery scaled. Inflorescence axillary in fascicles, 5–10-flowered. Flower pedicels 2–3 mm long; bracts c. 2 mm long. Tepals 4-lobed above, apparently 4-angled; tube 10–15 mm long; lobes triangular-ovate, c. 2.5 mm long. Stamens 4, adnate to tube; filament, c. 1 mm long; anthers 0.8–1 mm long, partly exserted. Ovary ellipsoid; style c. 1 mm long, pubescent; stigma flat. Drupes pear-shaped, 9–10 × 6–7 mm, densely covered with yellowish brown scales.

Fl. & Fr.: October–February.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan.

Specimens examined: Buxa National Park, Jainti range, Mahakalguri, 16.11.1891, E.A. Beawood 131; Rajabhatkhawa, 200 ft., 25.2.1934, K. Biswas s. n.

LORANTHACEAE [280]

Key to genera

1a. Bracts foliaceous forming involucres and enclosing the flowers;
   flowers creamish with dark pink streaks................................................... 3. Tolypanthus

1b. Bracts scaly, inconspicuous, not enclosing the flowers;
   flowers not as above................................................................................... 2

2a. Bracts 3; flowers 6-merous, glabrous, straight in unopened state;
   calyx lobed; petals orange yellow with green tinge; ovary globose....... 1. Macrosolen

2b. Bracts 1; flowers 4–5-merous, densely flaccose, bent in unopened state;
   calyculus annular; petals green; ovary claviform ................................. 2. Scurrula

1. MACROSOLEN (Blume) Rchb.

3 species in India and 1 species in BNP.

Epiphyte shrubs; branchlets terete, glabrous, scattered lenticellate; swollen at nodes. Leaves opposite, obovate or obovate-elliptic, 6–7 × 2.5–3.6 cm, broadly acute or obtuse at apex, entire along margins, attenuate at base, coriaceous, green, shining, turned pale when dry; midvein flattened above, faintly raised beneath; secondary veins 5–6 pairs, inconspicuous; petioles c. 5 mm long. Inflorescences cymose on 5–8 mm long peduncles. Flower pedicels c. 3 mm long; bracts 3, scaly. Calyx tubular below, lobed above; tube 2–3 mm long, 6-lobed above, green, glabrous. Petals orange-yellow with green tinge, tubular, inflated in the middle, 6-lobed; tube 6–8 mm long, glabrous, striate; lobes lanceolate, c. 2 mm long, acute. Stamens 6, epipetalous; filaments c. 7 mm long; anthers c. 1 mm long. Ovary c. 2.3 mm across; style filiform, c. 8 mm long; stigma capitate. Drupes orange-yellow, subglobose, c. 5 mm across.

Fl. & Fr.: February–August.

Distrib.: INDIA: Andaman & Nicobar Islands, Assam, Bihar, Meghalaya, Odisha, Sikkim Tripura, and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Thailand and Vietnam.


2. SCURRULA L.

10 species in India and 1 species in BNP.


Other synonym: Loranthus scurrula L.

Illustration: Roxb., Pl. Coromandel 2: t. 140. 1798.

Epiphytic shrubs; branchlets terete, c. 0.5 cm across, stellate tomentose or subglabrous; bark dark brown, lenticellate. Leaves opposite or subopposite, broadly ovate, 6–12 × 4.2–7.2 cm, acute at apex, entire along margins, rounded at base, subcoriaceous to coriaceous, young leaves stellate tomentose both sides, glabrescent on maturity; midvein impressed above, faintly raised beneath; secondary veins 5–6 pairs; petioles 1.6–2.1 cm long. Inflorescences stellate tomentose, in 2–3-flowered fasciculate racemes, rarely solitary; bract at the apex of flower pedicels. Calyx annular. Corolla 4-lobed above, c. 3 cm long, curved in middle, greenish. Stamens 4, adnate to petals; filaments filiform, c. 2.5 cm long; anthers linear, c. 4 mm long. Ovary claviform, 2–2.3 mm long; style columnar, filiform, c. 2.9 cm long; stigma subcapitate. Berries reddish, broadly pyriform, 8–10 × 3 mm, pilose.
Fl. & Fr.: October-April.

Habitat: Grows along the river sides as a parasite on *Trewia nudiflora* and *Streblus asperin* in the Park.

Distrib.: INDIA: Throughout. WORLD: Bangladesh, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

3. TOLYPANTHUS (Blume) Rchb.

3 species in India and 1 species in BNP.


Fig. 34; Plate 49d, e

Local names: “Santepru” (Lepcha); “Ajeru” (Nepali).

Epiphytic shrubs; branches terete, lenticellate, glabrous, young shoots tomentose. Leaves opposite, oblong-ovate or elliptic oblong, 3.5–9.5 × 1.6–4.5 cm, acute at apex, entire along margins, rounded or cordate at base, coriaceous, scabrous both sides; lateral veins 5–7 pairs; petioles 7–10 mm long. Inflorescences in the axils of existing/fallen leaves; flowers in clusters of 3–4-flowers, enclosed by an involucre bracts; bracts foliaceous, green, broadly ovate, c. 1.5 × 1.1 cm, acute at apex, undulate along margins, subcoriaceous, pubescent both sides, nerves faintly visible; peduncle c. 4 mm long, stout, pubescent. Calyculus shallowly 4-lobed; tube c. 4 mm long, densely pubescent; lobes triangular c. 0.5 × 0.5 mm, acute at apex. Corolla creamish with pink streak, lobes reddish, pubescent, inflated below; tube c. 15 × 8 mm; lobes lanceolate 3–4 × 1 mm, acute at apex, recurved. Stamens 6; filaments c. 2 mm long, glabrous; anthers linear c. 1.5 mm long. Ovary subglobose, c. 2 mm long; style c. 1.4 cm long; stigma reddish-pink, capitate, obscurely lobed. Drupes broadly ellipsoid, orange red, 5.5–5.8 × 2.8–3 mm, crowned by persistent enlarge calyculus.

Fl. & Fr.: February–May.

Habitat: Parasite on *Dillenia indica*.
Fig. 34. Tolypanthus involucratus (Roxb.) Tieg.: a. Flowering branch; b. Flowers (opened)
Distrib.: INDIA: Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal.

WORLD: Bangladesh and Bhutan.


Note: This species is reported from Darjeeling district and present collection is from Jalpaiguri district.

**EUPHORBIACEAE [184]**

Key to genera

1a. Inflorescences cyathia with much reduced male florets
    surrounding a solitary female floret...................................................... 14. Euphorbia

1b. Inflorescences not as above .......................................................................................... 2

2a. Ovary with 2 ovules in each locule ............................................................................. 3

2b. Ovary with 1 ovule in each locule.............................................................................. 12

3a. Leaves digitately trifoliolate ........................................................................... 7. Bischofia

3b. Leaves simple ...................................................................................................................... 4

4a. Male inflorescences axillary or terminal; spicate or racemose ................................... 5

4b. Male inflorescences axillary clusters, mostly less than 1 cm long ......................... 7

5a. Filaments of stamens inserted in cavities on disk; ovary
    unilocular; fruit a drupe ............................................................................ 2. Antidesma

5b. Filaments of stamens not in cavities of disk; male disk intrastaminal
    or extrastaminal; ovary 2 or 3 or 4 locular; fruits a capsule........................................ 6

6a. Leaves evenly distributed along branches, usually distichously
    arranged; male flowers in dense spikes while female flowers
    in clusters; stamens 2.............................................................................. 3. Aporosa

6b. Leaves usually spirally arranged, clustered toward tips;
    male and female inflorescences in racemes, often fascicled
    on trunks; stamens 3-10........................................................................ 4. Baccaurea

7a. Fruits 1-loculed and 1-seeded, drupaceous...................................................... 13. Drypetes

7b. Fruits 2 or 3-locular, capsular, rarely berry and drupe........................................... 8

8a. Petals present, usually shorter than sepals...................................................... 9. Bridelia

8b. Petals absent, if present usually as long as sepals ................................................ 9

9a. Disk present, at least in female flowers .......................................................... 22. Phyllanthus

9b. Disk absent in both male and female flowers ............................................... 10
10a. Anthers sessile, connate by their connective into a
column; styles usually entire; ovary 3–8-locular ......................... 16. Glochidion
10b. Anthers with free/connate filaments; styles bifid or
emarginate; ovary 3-locular ............................................................... 11
11a. Calyx tube turbinate, minutely toothed ......................................... 8. Breynia
11b. Calyx tube not turbinate; lobes inflexed ...................................... 23. Sauropus
12a. Petals present at least in male flowers ........................................ 13
12b. Petals absent ..................................................................................... 14
13a. Leaves palmately lobed, eglandular at base of lamina;
stamens 6–10; ovary 2–4-celled; capsules 2–4-seeded ...................... 17. Jatropha
13b. Leaves unlobed, bi-glandular at base of lamina;
stamens 10–12; ovary 3-celled; capsules 3-seeded ......................... 12. Croton
14a. Leaves opposite; disk absent in male flowers; fruits a berry ........ 21. Trewia
14b. Leaves alternate, sometimes subopposite or crowded;
fruit aberry or capsule ........................................................................ 15
15a. Disk present in male flowers .......................................................... 16
15b. Disk absent in male flowers .......................................................... 20. Ricinus
16a. Anthers 2-loculed ............................................................................ 17
16b. Anthers 4-loculed ............................................................................. 18
17a. Leaves not peltate, eglandular beneath; stamens
many, up to 70; styles long, erect, filiform ...................................... 11. Cleidion
17b. Leaves peltate, yellow gland dotted beneath;
stamens 3–30; styles short, recurved or diskiform and
sessile on ovary.................................................................................... 18. Macaranga
18a. Stamens inserted on a central receptacle, intermixed
with glands or scales with a tuft of hairs; anther thecae
diverging, attached basally to the connective; seeds
completely covered by fleshy aril ..................................................... 10. Claoxylon
18b. Stamens not intermixed with glands, scales and
hairs; anther-thecae not diverging; seeds arillate or not,
if arillate then not completely covering the seeds .............................. 19
19b. Sepals valvate connate at base up to various lengths ................... 20
20a. Indumentum stellate mixed with sessile glands; stamens many .... 19. Mallotus
20b. Indumentum of simple hairs without sessile glands; stamens 2–10 ................. 21
21a. Stamens 5–10; bracts without large glands .............................................. 1. *Acalypha*
21b. Stamens 2 or 3; bracts with large glands or not ....................................... 22
22a. Leaves simple, entire or undulate, whitish beneath;
   bracts without basal glands; fruits baccate, green ......................... 5. *Balakata*
22b. Leaves compound; shallowly to distinctly serrate,
   not whitish beneath; bracts with large basal glands;
   fruits capsular, dark crimson, shiny........................................... 15. *Falconeria*

1. **Acalypha** L.

  10 species in India and 1 species in BNP.


  **Local name:** “Mukta-jhuri” (Bengali).


  Erect herbs, 20–50 cm high; stems angled, sulcate, puberulous. Leaves whorled, broadly-ovate to rhombic-ovate, 1.8–4.4 × 1.5–2.8 cm, broadly acute at apex, serrate along margins, attenuate to acute at base, chartaceous, glabrous, except veins; midvein impressed above, raised beneath, pubescent; secondary veins 5-nerved at base, 3–4 pairs above, prominent beneath, pubescent; petioles angled, filiform, 1–3.3 cm long, pubescent. Inflorescences racemose, c. 5.5 cm long; rachis angled, pubescent; bracts suborbicular, c. 8 × 6 mm, ciliate, nerves prominent. Male flowers clustered at the upper portion of the spike, c. 1 mm across; pedicels subsessile c. 0.3 mm long. Sepals 4, greenish, obovate, c. 0.5 mm. Stamens 10–15 on a convex receptacles; filaments, free, c. 0.2 mm long; anthers vermiculiform, 0.4–0.5 mm long. Pistillode absent. Female flowers one in the axils of each bract, subsessile; flowers 1–2 mm across; bracts cup-shaped, denticulate along margins, 5–13 mm. Sepals 3, ovate toovate-lanceolate, 0.5–0.7 mm long, hairy. Ovary 1–1.5 mm across, densely whitish tomentose; style lacinate, filiform, c. 2 mm long, pubescent. Capsules ovoid, 3–4 mm across, densely minutely pubescent, mixed with a few short stipitate pale brown glands, 3-lobed; seeds reddish-brown, subglobose to ovoid, 1.5–2 mm across, smooth.

  **Fl. & Fr.**: Almost throughout the year.

  **Habitat:** Wastelands, moist shaded riverbanks and wetlands.
Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. WORLD: Widespread in Old world tropics.

Specimen examined: Buxa National Park, Jainti range, SRVK 6a, 4th March, 2011, Gopal Krishna 47236.

2. ANTIDESMA L.

15 species in India and 1 species in BNP.


Plate 49f

Shrubs, to 1–2 m high; branchlets terete, glabrous, with scars of fallen leaves. Leaves alternate, elliptic or oblong-elliptic to obovate or sometimes oblong-lanceolate or oblanceolate, 7–19 × 3–8 cm, acute to cuspidate at apex, entire along margins, cuneate or rounded at base, subcoriaceous to coriaceous, green, glossy above, glabrous or sometimes sparsely puberulous on midrib above, glabrous beneath except for the bearded lower axils of the lateral nerves; midvein impressed above, faintly raised beneath, glabrescent; lateral nerves 5–8 pairs; petioles 3–10 mm long, puberulous to glabrous; stipules linear-lanceolate, 4–5 mm long, hairy. Male inflorescences spicate, 1–10 cm long; rachis fulvous tomentose. Male flowers c. 1.5 mm across, sessile; bracts ovate, c. 1 × 1 mm, hairy, deciduous. Sepals cup-shaped, shallowly 4-lobed; lobes suborbicular c. 1 × 1–2 mm, ciliate, puberulous to glabrous outside. Disk annular, consisting of free lobes, enclosing stamens and pistillode, glabrous. Stamens 3 or 4; filaments 1–2 mm, inserted into the cavities of the disk; anthers c. 1 mm. Pistillode capitate. Female inflorescences racemose, 5–20 cm long, stout; rachis puberulous. Female flowers pedicellate; pedicels 0.5–2 mm long. Sepals 4-lobed; lobes deltoid c. 1.5 × 1.5 mm, glabrous. Ovary c. 7 mm long, unilocular, glabrous; styles 3 (4), c. 1 mm long. Drupes ovoid to broadly ellipsoid, 5–6 × 4–6 mm, slightly compressed, glabrous; fruiting pedicels 2–3 mm long.

Fl. & Fr.: March–October.

Distrib.: INDIA: Andaman and Nicobar Islands, Andhra Pradesh, Assam, Kerala, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Uttar Pradesh and West Bengal.

Specimen examined: Buxa National Park, East Damanpur range, Checko 2, 8th April, 2012, Gopal Krishna 56076.

Use: Leaves and fruits edible.

3. **APOROSA** Blume

6 species in India and 1 species in BNP


Other synonyms: *Alnus dioica* Roxb.; *Aporosa dioica* (Roxb.) Mull.Arg. Plate 49g

Local name: “Kokra” (Bengali).


Trees, 10–15 m tall; branches subterete, glabrous; bark grey-white. Leaves simple, alternate, evenly and distichously arranged, ovate or ovate-elliptic, 5.3–14.2 × 2.2–6.7 cm, acuminate at apex, undulate along margins, cuneate at base, coriaceous, glabrous; midvein prominent; secondary veins 6–7 pairs, prominent beneath; petioles swollen and biglandular at the base, 5–18 mm long, glabrous. Male flowers in compact cylindric spikes, 2–3 cm long; bracts broadly ovate, c. 1.5 × 2 mm, obtuse at apex, ciliated. Sepals 4, elliptic or elliptic-ovate, c. 1.25 × 0.5 mm, ciliated. Stamens 2; filaments c. 0.5 mm long; anthers c. 0.5 mm long. Pistilode absent. Female inflorescences 1-3 together, 3–11 mm long, puberulous, flowers up to 11, densely arranged along rachis; bracts triangular, 0.6–0.9 mm long. Female flowers 3–5 mm long, sessile. Sepals 4, ovate, patent, 0.7–1 mm long. Staminodes occasionally 2. Ovary stiped, 2(3)-locular, (sparsely) sericeous; stigmas slightly raised, 0.8–2 mm long, bifid to near base. Fruits drupaceous capsule, ovoid to ellipsoid (to globose), young ones slightly stiped, slightly beaked, 9–13 × 6–10 mm, drying (dark) brown to black, sparsely hairy, not fleshy; septae and column sparsely sericeous, 2-seeded; seeds ellipsoid, c. 6 × 3 mm.

Fl. & Fr.: Almost throughout year.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Praesh, Assam, Manipur, Mizoram, Meghalaya, Nagaland, Odisha, Sikkim, Tripura, and Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal and Vietnam.

4. BACCAUREA Lour.

3 species in India and 1 species in BNP.


Other synonyms: Baccaurea sapida (Roxb.) Mull. Arg.; Pierardia sapida Roxb. Plate 49h

Local name: “Latka” (Bengali).

Illustration: Wight, Icon. Pl. Ind. Orient. 5: t. 1917. 1852.

Trees, 7–10 m tall; branches and branchlets terete, glabrous, with scars of fallen leaves; bark greyish-white, rough. Leaves opposite or alternate in whorl, crowded toward end of branchlets, elliptic or elliptic obovate, 8.5–16 × 3–6.6 cm, caudate–acuminate at apex, undulate along margins, cuneate or acute at base, coriaceous, glabrous except veins towards lower side; midvein raised both sides, pubescent; secondary veins 6–8 pairs, prominent beneath, glabrous above, pubescent beneath; petioles 0.4–3 cm long, glabrous. Male inflorescences axillary racemes, cauliflorus. Male flowers yellowish, 1–2 mm across, pubescent, pedicellate; pedicels c. 1 mm long, pubescent; bracts lanceolate, 3–3.5 × 1 mm, ciliate, hairy outside, glabrous inside. Sepals 4 (5), orbicular or broadly ovate, c. 1 × 1 mm, hooded, hairy outside, glabrous inside. Staments 8; filaments short, free; anthers yellow c. 0.25 mm long, didynamous. Pistillode terete, bipartite. Female inflorescences racemes, single to many together, cauliflorus, drooping. Female flowers 3–5 mm across, pedicellate; pedicels 1.5–3 mm long; bracts narrowly ovate, c. 1 × 1 mm. Sepals 4 (6), spatulate, linear to oblanceolate, 2–4 × 1–2 mm. Ovary subglobose to ovoid, 1.5–2 mm across, 3-locular; style short; stigmas 2–5, discoid or flabellate. Capsules baccate, ovoid, c. 2 cm across, woody, yellow when ripe, tardily dehiscent, 2–3-seeded; seeds flat-elliptic or rotund, 1–1.3 cm, arillate.

Fl. & Fr.: December–August.

Plate 49: a. Machilus glaucescens (Nees) Wight; b - c2. Scurrula parasitica L.: b. Habit; c1. Flower (close up); c2. Fruit (close up); d - e. Tolypanthus involucratus (Roxb.) Tiegh.: d. Habit; e. Flowers (close up); f. Antidesma bunius (L.) Spreng.; inset: flowers; g. Aporosa octandra (Buch.-Ham. ex D.Don) A.R. Vickery; inset: male spike; h. Baccaurea ramiflora Lour.; inset: female flower

Use: Fruits are eaten as vegetable.

5. BALAKATA Esser

1 species in India and BNP.


Local name: “Chota-mal” (Bengali).


Evergreen trees, 10–15 m tall; branchelets terete, glabrous. Leaves simple, alternate, ovate or ovate-elliptic, 7–11 × 3.2–4.8 cm, acuminate at apex, entire or undulate along margins, rounded-acute at base, chartaceous, shining above, glabrous; midvein flattened above, raised beneath, glabrous; secondary veins 11–13 pairs, prominent beneath, reddish, glabrous, looping along margin; petioles filiform, 2.5–5 cm long, glabrous. Inflorescences unisexual, terminal or axillary compound paniculate thyrses, erect; rachis c. 15 cm long; male spike usually branched; female spike usually simple sometime branched; bracts biglandular at base. Male flowers pedicellate, c. 1.5 × 1 mm; pedicels c. 0.5 mm long, glabrous; bracts broadly obovate c. 2 × 1 mm, acuminate at apex. Sepals cupular, shallowly 2-lobed; lobes obvate-orbicular, c. 1 × 1 mm, acute at apex, margins serrulate near apex, entire toward base. Stamens 2; filaments vary, c. 1 mm long; anthers c. 1 mm long. Pistilode absent. Female flowers at base of inflorescences, larger than male ones, pedicellate: Pedicels 0.6–1 mm long. Sepals 3-lobed; lobes ovate c. 1.5 × 1 mm. Staminodes absent. Ovary c. 1.5 mm long, 2-loculed; style 0.1–0.5 mm long; stigma 2, 0.75–2 mm long. Fruits baccate, green, subglobose or shallowly 2-lobed, 0.8–1.2 × 0.8–1.1 cm, 1–2-seeded, latex translucent, sticky; seeds subglobose, c. 5 × 4.5 mm.

Fl.: March-May; fr.: June-August.

Distrib.: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 13th March, 2011, Gopal Krishna 50564.

Use: The wood is useful for making packing boxes.
6. BALIOSPERMUM Blume

2 species in India and 1 species in BNP.


Other synonyms: Baliospermum axillare Blume; B. montanum (Willd.) Müll. Arg.; Jatropha montana Willd. Plate 50b

Local name: “Hakum” (Bengali).

Illustration: Wight, Icon. Pl. Ind. Orient. 5: t. 1885. 1852.

Shrubs, 1–2 m high; stems terete, pubescent, weak, more or less hollow. Leaves simple, alternate, 5-nerved at base, oblong-lanceolate to oblong-ovate, 2–14 × 0.9–6.2 cm, acute at apex, sinuately lobed along margins, rounded or cuneate at base, subcoriaceous, scabrous above, hirsute beneath; secondary veins 4–6 pairs, hispid; 2 glands at the base of lamina; petioles 1–3.5 cm long, tomentose. Inflorescences axillary raceme; rachis upto 5 cm long tomentose. Male flowers 2–4 mm across; pedicels 2–12 mm long; bracts ovate, c. 1 mm long, hairy. Sepals 5, imbricate, broadly ovate or ovate-orbicular, c. 1 × 1.5 mm, hairy at base, hyaline at apices. Disk urceolate. Stamens 14–25; filaments c. 5 mm long, adnate to disk; anthers reniform or suborbicular. Female flowers axillary or inserted at base of male inflorescences, 2–4 mm across, pedicellate; pedicels 2–10 mm long. Sepals 5, ovate to triangular, 1–2 × 0.8–1 mm, pubescent outside, glabrous inside. Ovary subglobose, 1–3 mm across; style stout, 1.5–3 mm long. Capsules subglobose to turbinate-ovoid, prominently, 3-lobed, c. 1.2 × 1 cm, hairy outside, 1-seed per locule; seed ovoid c. 3.5 × 3 mm.

Fl. & Fr.: February–May.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 13th Feb., 2010, S.K. Srisvasti & Gopal Krishna 47067.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.
7. **BISCHOFIA** Blume

1 species in India and BNP.


**Local name:** “Kanjali” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 5: t. 1880. 1852.

Trees, 20–25 m tall; branchlets suberete, glabrous; bark gray-brown to brown with red latex. Leaves alternate, 3-foliolate; leaflets elliptic or elliptic-ovate or oblong-ovate, 9–17.3 x 3.9–9.4, acute to acuminate at apex, crenate along margins, cuneate at base, coriaceous, green shining, glabrous; midvein raised both sides, glabrous; secondary veins 7–9 pairs, prominent beneath, reddish, glabrous; petiolules: lateral leaflets 1–1.5 cm long, glabrous; terminal leaflet 3.6–7.5 cm long, glabrous. Male inflorescence axillary thyrsiform, much branched, pedunculate. Male flower pedicellate: pedicels 2–3 mm long, thick; bracts broadly ovate, c. 1 x 1 mm, hyaline, acute at apex. Sepals 5, free, valvate, oblong-ovate to orbicular, c. 1 x 1 mm, hooded, thick, ciliate, hyaline. Stamens 5; filaments c. 1 mm long; anthers tetrathecoues, c. 5 mm long. Pistillode broad, looks like disk. Disk absent. Female flowers pedicellate; pedicel articulated at middle. Sepals and petals as in male flowers. Ovary ellipsoid, 4–5 mm long, 2-ovules in each locule; style reflexed, 5–6 mm. Fruits baccate, globose, 0.8–1 cm across, pedicillate, 3–6-seeded; seeds reniform, c. 4 x 2.25 mm, smooth, glabrous, shining.

**Fl. & Fr.:** March–December.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Odisha, Sikkim, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal. WORLD: Australia, Bhutan, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pacific Islands (Polynesia), Philippines, Sri Lanka, Thailand and Vietnam.


8. **BREYNIA** J.R. Forst. & G. Forst. (*nom. cons.)*

3 species in India and 1 species in BNP.

Burm.f., Fl. Ind. 61. 1768.

Other synonyms: Breynia rhamnoides (Willd.) Mull.Arg. (nom. illeg.); P. vitis-idaea (Burm.f.) J. Konig ex Roxb.; Phyllanthus rhamnoides Retz. (nom. illeg.).

Local names: "Kalisitki", "Kamkatajuli" (Bengali).

Illustration: Wight, Icon. Pl. Ind. Orient. 5: t. 1898. 1852.

Erect shrubs, c. 1 m high, glabrous, branched; branches terete, slender. Leaves distichous, ovate, elliptic, oblong or orbicular, 1–5 × 0.8–3 cm, acute at apex, entire along margins, obtuse to rounded at base, membranous to chartaceous, often glaucous beneath, glabrous; midvein impressed above, faintly raised beneath; lateral nerves 4–7 pairs, prominent beneath; petioles 2–5 mm long; stipules prominent, sheathing petiolar base, triangular to lanceolate, 1–2 mm long. Flowers unisexual, small, green, solitary or several in axillary clusters. Male flowers: pedicels 2–3 mm long. Calyx tube obconic, minutely 6-toothed above; teeth ovate, c. 1–2 × 1–1.5 mm. Stamens 3, filaments connate into capitate column; anthers 0.5 mm long. Female flowers in clusters in leaf axils, drooping: pedicels 1–4 mm long. Sepals cupular or obconic, 1–1.5 × 1.2–2 mm, 6-toothed at apex. Ovary ovoid-depressed, 1–2 mm across, 2-ovules per locule; styles subulate or triangular, c. 0.2 mm long. Capsules depressed globose or ovoid, 2–6 × 4–6 mm, reddish when mature.

Fl. & Fr.: January–October.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Chhattisgarh, Goa, Karnataka, Kerala, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 5th April, 2013, Gopal Krishna 56033.

9. BRIEDELIA Willd. (nom. cons.)

10 species in India and 2 species in BNP.

Key to species

1a. Woody lianas or scandent shrubs; leaves ovate, obovate or elliptic; sepals usually more than 6 mm across................................. 1. B. stipularis

1b. Erect shrubs or trees; leaves lanceolate or elliptic-lanceolate; sepals usually less than 6 mm in across................................. 2. B. tomentosa

9. BRIEDELIA Willd. (nom. cons.)

10 species in India and 2 species in BNP.

Key to species

1a. Woody lianas or scandent shrubs; leaves ovate, obovate or elliptic; sepals usually more than 6 mm across................................. 1. B. stipularis

1b. Erect shrubs or trees; leaves lanceolate or elliptic-lanceolate; sepals usually less than 6 mm in across................................. 2. B. tomentosa

Other synonyms: Bridelia scandens (Roxb.) Willd; Clutia scandens Roxb.

Illustration: Roxb., Pl. Coromandel 2: t. 173. 1802 [as Cluytia scandens].

Scrambling shrubs, to 8 m high; branchlets terete, brownish tomentose. Leaves alternate, ovate, obovate or elliptic, 4.5–12 × 2.4–7 cm, acute at apex, subentire or crenate along margins, rounded or obtuse at base, sub-coriaceous, glabrous above, puberulous beneath; midvein faintly raised above, prominent beneath, pubescent; secondary veins 11–12 pairs, prominent beneath, tomentose; petioles 7–9 mm long, stout, tomentose; stipules triangular-ovate, 3–10 × 2–4 mm, pilose. Flowers in axillary or spicate clusters, shortly pedicellate; bracts c. 2.5 × 1 mm, acuminate at apex, tomentose. Male flowers cream to greenish yellow, 6–10 mm across; sessile. Sepals 5, broadly ovate to triangular, c. 1 × 0.6 mm, glabrous. Petals 5, spathulate to orbicular-ovobate, c. 1.5 × 1.25 mm, margins lacinate. Disk shallowly cup-shaped, c. 1 mm across. Staminal column c. 0.6 mm long; filaments c. 0.5 mm long; anthers ellipsoid-oblong, c. 0.5 mm long. Pistillode ovoid. Female flowers reddish green, c. 12 mm across; sessile. Sepals 5, ovate, c. 0.5 × 0.3 cm, acuminate at apex, hairy outside. Petals 5, broadly obovate, c. 2.5 × 1.5 mm. Ovary ovoid to globose, glabrous, 1.5–2 mm across; style 2, basally united free above. Drupes c. 1.5 cm across, sap sticky, transparent, 2-seeded; seeds elliptic, c. 1 × 0.5 cm.

Fl. & Fr.: August–November.

Distrib.: INDIA: Andaman Islands, Andhra Pradesh, Assam, Meghalaya, Karnataka, Kerala, Maharashtra, Mizoram, Odisha, Sikkim, Tripura, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Sri Lanka, Taiwan and Thailand.

Plate 50: a. Balakata baccata (Roxb.) Esser; b. Baliospermum solanifolium (Burm.) Suresh; c - d. Bischofia javanica Blume; c. Fruiting branch; d. Fruits (close up); e - g. Breynia vitis-idaea (Burm.f.) C.E.C. Fisch.; e. Flowering branch; f. Flowers (close up); g. Fruiting branch; h. Bridelia stipularis (L.) Blume

Other synonyms: **Bridelia lancifolia** Roxb. (as ‘lancaefolia’); **B. tomentosa** var. lancifolia (Roxb.) Mull.Arg. Plate 51a1, a2

**Illustration:** Engler, Pflanzenr. 147: p. 59, f. 11 A.1915.

Erect shrubs or trees, 3–4 m high; branchlets terete, often over hanging, tomentose when young, become glabrous when mature, lenticels scattered. Leaves alternate, lanceolate or elliptic-lanceolate, 4.5–7.6 × 1.7–2.8 cm, round or acute at apex, undulate along margins, rounded or cuneate at base, sub-coriaceous, glabrous above, except veins, sparsely tomentose to subglabrous beneath including veins; midvein faintly raised above, hairy, prominently raised beneath, hairy; secondary nerves 10–12 pairs, obscure above, faintly raised beneath, hairy; petioles 2–4 mm long, simple hairy. Inflorescences glomerate, usually unisexual; bracts broadly triangular, 0.4–0.7 mm long, scarious. Male flowers sessile. Sepals 5, triangular-ovate, 1–1.25 × 0.6–0.75 mm, acute at apex, glabrous. Petals cream-white, 5, alternating with sepal, spathulate to orbicular-obovate, c. 0.5 × 0.5 mm. Disk shallowly cup-shaped, 1–1.2 mm across. Staminal column c. 0.6 mm long; filaments c. 0.5 mm long; anthers ellipsoid-oblong, c. 0.5 mm long. Pistillode ovoid. Female flowers c. 1.5 × 1.5 mm; sessile or subsessile. Sepals and petals as in male flowers. Staminodes absent. Ovary globose, c. 1 mm across, glabrous; style 2, free; stigma 2-lobed. Drupes globose, c. 6 mm across, emarginated at apex, slightly 2-lobed at apex, 2-seeded; seeds semigloboid with deep lateral furrow, c. 4 × 2–2.5 mm.

**Fl. & Fr.:** August–November.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Meghalaya, Odisha, Sikkim, Tripura, Uttar Pradesh and West Bengal. WORLD: Bhutan, Bangladesh, China, Malaysia, Myanmar, North Australia and Taiwan.

**Specimens examined:** Buxa National Park, Jainti range, NRVK 6a, S.K. Srivastava & Gopal Krishna, 13th Oct., 2010 46353; Rajabhatkhawa Range, SRVK 4, Bala river, 27th Nov., 2011, Gopal Krishna 50594.

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10. **CLAOXYLON** A. Juss.

9 species in India and 1 species in BNP.

Dioecious shrubs or trees, 5–8 m tall; branchlets terete, glabrous, yellow, glaucous, finely pubescent or puberulous in young parts, hollow. Leaves elliptic-lanceolate or oblong-lanceolate or broadly oblong-ovate, 11–27.5 × 4.5–11 cm, acute to acuminate at apex, crenate-dentate to obscurely serrate along margins, each tooth ending with glands, rounded at base, chartaceous, green, glossy, scaberulous when young, nearly glabrous on both sides, pilose to minutely pubescent in young leaves, finely pubescent on nerves beneath, pale green above and brownish beneath or green on both sides when dry; midvein flat above, raised beneath; lateral nerves 6–7 pairs, faint above, prominent beneath; cross-nervules remote, more or less parallel, faint above, distinct beneath; minor nervules indistinct; petioles terete, slender, 2.5–10.5 cm long, nearly glabrous or finely hairy. Male inflorescence densely yellow-pubescent or hirsute spikes, upto 30 cm long, pendulous. Male flower-buds globose, c. 2 mm across; flowers 3–5 mm across, clustered; bracts minute, ovate, 0.5–1.5 × 1 mm, rounded at base, obtuse to acute at apex; pedicels 2–3 mm long, finely pubescent. Sepals 3 or rarely 4, ovate, c. 3 × 2 mm, rounded at base, acute at apex, rough, densely clothed with yellow hirsute hairs. Petals absent. Stamens 35–40 clustered on a convex receptacle, mixed with hyaline cells, c. 0.5 mm long scales or glands; filaments free, up to 3 mm long; anthers 0.5–0.7 mm long, extrorse. Female flower solitary in 3–9 cm long panicles, 3–7 mm across, yellow-glaucous pubescent. Sepals as in male flowers. Ovary white-pubescent; styles 3, entire, 3–5 mm long, plumose. Capsules globose-rounded, 3-lobed, 1–1.8 cm across, clothed with minute hirsute hairs or finely soft yellowish or whitish pubescent, thinly crustaceous; seeds dark brown, rounded or globose, 6–8 mm across, arillate.

Fl. & Fr.: February–November.

Distrib.: INDIA: Assam, Meghalaya, Nagaland and West Bengal. WORLD: Bangladesh.


Notes: Usually the length of inflorescences highly variable in this species sometimes it reaches upto 40 cm in length. The male plants are very frequent in comparison to female pants in the park.
Fig. 35. Claoxylon khasianum Hook.f.: a. Flowering branch; b. Male flower (opened); c. Stamens; d. Gynaecium
11. CLEIDION Blume

2 species in India and 1 specie in BNP.


Other synonyms: Cleidion javanicum var. moniliflorum (Airy Shaw) Chakrab. & M. Gangop.; C. spiciflorum var. moniliflorum (Airy Shaw) Radcl.


Dioecious trees, to 7–8 m tall; branches terete, glabrous. Leaves sub-opposite, whorled, elliptic or elliptic-ovate, 10–21 × 3.5–7.6 cm, abruptly acuminate at apex, distantly serrate along margins, cuneate at base, coriaceous, green, shining above, glabrous on both surfaces; midvein impressed above, faintly raised beneath, glabrous; lateral veins 5–7 pairs, prominent beneath; petioles 2–5 cm long, glabrous; stipules triangular-ovate, c. 2 × 1 mm, acute at apex. Male Inflorescences racemose, c. 10 cm long, 1 or 2–3-flowered at a place. Male flowers 2–3 mm across, pedicellate; pedicels 2–3 mm long, hairy; bracts ovate-triangular, c. 1 × 1 mm. Sepals 4, broadly ovate, c. 3 × 3 mm, pubescent outside, glabrous inside. Stamens 40–70; filaments c. 1.5 mm long, hyaline gland dotted; anthers globose, tetrahedrous, c. 1 mm across. Pistilode absent. Female flowers 1 (2)-flowered in axils of fallen leaves, pedicellate; pedicel c. 3 cm long, glabrous. Sepals 4 or 5, ovate-triangular, 2–3 × 1.5–1.8 mm, mucro-acute at apex, glabrous. Staminodes absent. Ovary subglobose, 3–5 mm across, usually 2 (3)-locular; style filiform, c. 2.5 cm long, deeply bifid. Capsules 1–3, 2-valved cocci, 2–2.5 × 1–1.5 cm, with persistent style; seeds brownish sub-globose, 2–3-lobed, c. 1.5 × 2.5 cm.


Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal. WORLD: Bhutan, China, Malaysia, Myanmar, Nepal, North Australia and Pacific islands.


Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district. Also this is the first representative collection for West Bengal state at CAL. The male plants are more frequent than female plants in the park.
12. CROTON L.
16 species in India and 2 species in BNP.

Key to species

1a. Straggling shrubs; leaves palmately 3–5-nerved at base;
capsule globose, c. 2 × 2 cm.............................................................. 1. C. caudatus

1b. Erect shrubs; leaves pinnately nerved; capsules subglobose,
8–12 mm across.............................................................. 2. C. persimilis

Local name: “Nan bhantur” (Bengali).

Stragling shrubs, to 3–4 m high; branches terete, fulvous, stellate pubescent. Leaves opposite, cordate, 5–12.5 × 4–9.5 cm, acuminate at apex, dentate along margins, cordate at base, subcoriaceous, stellate pubescent both surfaces, more densely beneath; 5-nerved at base, 4–5 pairs above; petioles 1.5–3.5 cm long, stellate hairy. Male Inflorescences terminal raceme, c. 20 cm long; rachis stellate pubescent. Male flowers c. 3 × 3 mm; pedicel c. 5 mm long. Sepals 5-lobed, lobes free, ovate-lanceolate, c. 3 × 1 mm, acute, stellate hairy outside, glabrous inside. Petals 5, free, ovate, c. 1.5 × 1.2 mm, villous outside, glabrous inside. Stamens many attached to disk; filaments c. 1 mm long, glabrous, attached with anther’s whole length; anthers oblong, c. 1 mm long. Female inflorescences terminal racemes, c. 10 cm long; rachis stellate hairy. Female flowers c. 5 × 5 mm, pedicellate; pedicel c. 5 mm long, stellate hairy; bracts triangular-ovate, c. 1 × 1 mm, stellate hairy. Sepals 5, ovate, c. 5 × 3 mm, stellate hairy outside, glabrous inside. Ovary globose or obovoid, 3–4 × 3–3.5 mm, densely stellate tomentose; styles 5–13 mm long, free, bifid. Capsules globose, c. 2 × 2 cm, 3-valved, stellate pubescent outside; seeds ellipsoid, ovoid or suborbicular, c. 6 × 4 mm, smooth, outside floccose.

Fl. & Fr.: January–December.

Distrib.: INDIA: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and West Malaysia.

Specimens examined: Buxa National Park, Jainti range, NRVK 7, 3rd March, 2011, Gopal Krishna 47213; 3rd March, 2011, Gopal Krishna 47215; Buxa-Bhutan Road, 3-3500',


Local names: “Baragach”, “Chucka”, “Putri” (Bengali).


Deciduous shrubs, to 2–3 m high; branches terete, lenticellate, glabrous. Leaves simple, alternate, elliptic to ovate-oblong, 11–22.5 × 4.5–8.5 cm, bluntly acute or obtuse at apex, serrate along margins, rounded at base, coriaceous, green, brown or reddish-brown above when dry, glabrous; midvein flattened above, raised beneath; secondary veins 14–15 pairs, glabrous; petioles 2–3.5 cm long, thickened at base, bi-glandular at the base of lamina. Inflorescences raceme, c. 22 cm long. Male flowers 2–5 mm across; bracts linear-lanceolate, c. 2 mm long, hairy; pedicel 2.5–3 mm long. Sepals 5, ovate-elliptic or triangular-ovate, c. 3 × 1 mm. Petals 5-lobed; lobes lanceolate, c. 2.5 × 1 mm, hairy. Stamens 10–15, attached on hairy receptacle; filaments filiform, c. 1.25 mm long, glabrous; anthers oblong, c. 1 mm long, tetratheceous. Pistilode absent. Female flowers c. 5 mm across, pedicellate; pedicels 2–5 mm long, Sepals 5, ovate, triangular to elliptic, 2–3.5 × 1–2.5 mm. Petals 5, spatulate to filiform, 0.3–3.5 mm long. Ovary subglobose, 2–4 mm across; styles filiform, 4–6 mm long, free, bifid. Capsules subglobose, 8–12 mm across, 3-lobed; seeds oblong to ellipsoid, 7–7.5 × 3.5–4.5 mm, brown.

Fl. & Fr.: January–December.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka and Thailand.


13. DRYPETES Vahl
20 species in India and 1 species in BNP.


**Local name:** "Ban-bakul" (Bengali).

Trees, to 8–10 m high; branches and branchlets terete, glabrous; bark white-ash coloured. Leaves alternate, elliptic or elliptic-lanceolate, 5.8–13.5 × 2.3–5.3 cm, acute at apex, entire along margins, acute or cuneate at base, coriaceous, dull green, glabrous; midvein flattened above, raised beneath, glabrous; secondary veins obscurely 6–8 pairs, glabrous; petioles 0.5–1 cm long, tomentose; stipules triangular-ovate, c. 2 × 1 mm, tomentose. Male inflorescence axillary, fasiculate. Male flowers c. 1 cm across, pedicellate; pedicels c. 5 mm long. Sepals 4, sub-orbicular, 6–8 × 5–8 mm, ciliate, pubescent outside, glabrous inside. Stamens 6–15; filaments 3–4 mm long; anthers oblong c. 1 mm long. Disk cup shaped. Female flower solitary. Sepals and petals as in male flowers. Ovary globose or oblong-ellipsoid, 1.5–3 mm across, hairy; style 1–2 mm long; stigma small. Drupes subcubical, c. 1.5 × 1.2 cm, pubescent; fruiting pedicels c. 4 mm long.

Fl. & Fr.: January–December.

Distrib.: INDIA: Andaman Islands, Andhra Pradesh, Assam, Uttar Pradesh, Bihar, Mizoram, Meghalaya, Nagaland, Odisha, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Myanmar and Thailand.


Notes: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

14. EUPHORBIA L.

82 species in India and 1 species in BNP.


Other synonyms: **Euphorbia pilulifera** L.; **Chamaesyce hirta** (L.) Millsp. Plate 51f

**Local names:** “Baro-kheruie”(Nepali), “Kerui”(Bengali).

Illustration: Burm., Thes. Zeylan. t. 104.1737.

Herbs, ascending or prostrate, all parts hirsute with yellow spreading hairs; stems terete or slightly ribbed, 10–25 cm long; nodes slightly thickened; internodes 2–4 cm long.
Fig. 36. Drypetes assamica (Hook.f.) Pax & K. Hoffm.: a. Fruiting branch; b. Flower bud; c. Flower (opened)
Leaves opposite, simple, asymmetric, oblong-ovate to elliptic-lanceolate, 0.9–2.5 × 0.4–0.6 cm, acute at apex serrate along margins, oblique at base, membranous, lateral nerves 3–5 from base; petioles 1–6 mm long; stipules linear-lanceolate, c. 2 mm long, lacinate. Cyathia axillary, in globose heads, 0.5–1 cm across; peduncles simple or dichotomously branched, 2–5 mm long, leafless; involucre turbinate, c. 1 × 0.5 mm; lobes acute, c. 1 mm long; glands 4, cupular, 0.5–0.8 mm across; limbs minute or as large as the gland, rounded, hyaline. Male florets: 4–6; pedicels c. 0.8 mm long; anthers subglobose; bracteoles setaceous, c. 0.5 mm long. Female floret: gynophore c. 1 cm long. Ovary globose, c. 0.75 × 0.5 mm, trigonous, hispid; styles 3, c. 0.4 mm long, free, each bifid halfway; stigma capitate. Capsules subglobose to trigonous, 1.2–2 mm across, pubescent.

Fl. & Fr.: February–December.

Distrib.: INDIA: Almost throughout. WORLD: Tropical and subtropical regions in both hemispheres.


15. FALCONERIA Royle

1 species in India and BNP.


Other synonyms: Sapium insigne (Royle) Trimen; Sapium insigne var. malabaricum (Wight) Hook.f.; Excoecaria insignis (Royle) Mull.Arg.; Falconeria wallichiana Royle. Plate 52a


Deciduous trees, to 15–20 m tall, often fruiting when leafless; branchlets terete, with leaves scars; bark dark. Leaves pinnately compound, terminally whorled, leaflets broadly-ovate, 3.5–6 × 1.9–3.5 cm, abruptly acuminate at apex, undulate along margins, slightly oblique at base, sub coriaceous, glabrous; midvein faintly raised both sides, glabrous; secondary veins 10–12 pairs, prominent beneath; petioles 2.5–6 cm long, apex bi-glandular, glabrous; stipules subulate, c. 4 mm. Inflorescence terminal, thyrs, unisexual; bracts c. 0.75 mm, apex rounded, basal glands large, mostly decurrent along axis. Male flowers subsessile, c. 1 mm across. Sepals 2, sub-orbicular, c. 1 × 1 mm. Stamens 2; filament, c. 0.1 mm, glabrous; anthers orbicular, c. 0.3 × 0.2 mm. Female flower solitary, subsessile. Sepals 2. Petals absent. Staminodes absent. Ovary ovoid to obovoid, c.
3 mm long, glabrous; styles 3, 0.5–1 mm; stigma recurved. Fruits capsular, dark crimson, shiny, ovoid, subglobose to globose, c. 8 mm across, glossy, sap sticky; seeds ovoid, 5–6 mm across, yellowish brown.

**Fl.**: March–April; **fr.**: May–December.

**Distrib.:** INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal. **WORLD**: Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jainti range, Jainti river, 8th April, 2012, Gopal Krishna 56060.

**Use:** Plants used in stupefying fish.

### 16. GLOCHIDION J.R. Forst. & G. Forst. (*nom. cons.*)

22 species in India and 3 species in BNP.

**Key to species**

1a. Stamens 4–6 ................................................................. 3. G. zeylanicum var. tomentosum

1b. Stamens 3 ................................................................................................................................. 2

2b. Leaves glabrous; sepals 6; capsules flush colour, glabrous..............1. G. ellipticum

2a. Leaves tomentose; sepals 5; capsules densely yellowish or grey-villous.............................................................. 2. G. nubigenum


**Other synonyms:** *Phyllanthus assamicus* Mull.Arg.; *Glochidion assamicum* (Mull.Arg.)

**Local name:** “Holdikath” (Nepali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 5(2): t. 1906. 1852.

Trees to 5–7 m high; branches and branchlets terete, glabrous. Leaves alternate, simple, elliptic or ovate-elliptic, 9.4–13.5 × 4.7–5.7 cm, acute to acuminate at apex, entire or undulate along margins, cuneate or slightly oblique at base, coriaceous, green, shining above, glabrous, midvein faintly raised above, prominently raised beneath, glabrous; secondary veins 7–9 pairs, glabrous, reddish, prominent beneath; petioles 3–4 mm long, stout, glabrous; stipules triangular ovate. Inflorescences axillary or supra axillary...
fascicles. Male flowers: pedicels 5–8 mm long, filiform, puberulous. Sepals 6-lobed; lobes ovate-elliptic, oblong or spatulate, 1.5–5 × 0.5–2 mm. Petals absent. Stamens 3. Female flowers: pedicels 3–5 mm long. Sepals 6-lobed, arranged in 2 whorls; outer lobes ovate, c. 1.25 × 0.5 mm, acute at apex, margins ciliate; inner whorls: lobes linear-lanceolate, c. 1 × 0.5 mm, acute at apex, margins ciliate. Petals absent. Disk absent. Capsules prominently clustered, compressed, 7–8 mm across, 7–8-loculed, tomentose outside, glabrous inside, 1-seed per locule; seeds triangular-ovate, c. 3 × 3 mm, glabrous, shining, hollow inside.

Fl. & Fr.: April–November.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Bhutan, China, Hainan, Myanmar, Nepal Taiwan and Thailand.

Specimens examined: Buxa National Park, Rajabhatkhawa range, SRVK 5-6, 12th March, 2011, Gopal Krishna 50549; Buxa Road, 04.09.1981, V. Naraynswami & party 10318.

Note: Common in the park.


Other synonyms: Glochidion velutinum Wight var. nubigenum (Hook.f.) Chakrab. & M. Gangop. Plate 52c


Trees, 5–8 m tall; branchlets angled, more or less longitudinally ribbed, glabrous. Leaves alternate, simple, oblong-elliptic or ovate elliptic, 2.5–12 × 1.3–6.9 cm, acute to shortly acuminate at apex, entire along margins, acute to cuneate at base, chartaceous to coriaceous, glaucous beneath, sparsely hairy on major nerves to glabrous above, greyish-tomentellous to sparsely pilose beneath, acute, rounded to truncate or unequal at base, caudate or acuminate at apex; lateral nerves 4–8 pairs; petioles 2–6 mm long. Inflorescences unisexual or mixed. Male flowers: pedicels 8–12 mm long. Sepals 6-lobed; lobes obovate, 2–2.5 × 1.5–2 mm, puberulous to glabrous outside. Petals absent. Stamens 3; filaments c. 1.5 mm long. Female flowers: pedicels 1–2 mm long, tomentellous. Sepals 6-lobed; lobes broadly elliptic, suborbicular, ovate or obovate, 1–2 × 0.5–1.5 mm; ovary depressed, 1–2 mm across, tawny-tomentellous; styles 3–5, variable, 0.7–1.5 mm long. Capsules depressed globose, 3–4 × 8–10 mm, 3–5-locular, prominently lobed; lobes deeply bilobulate, glabrous; fruiting pedicels 3–10 mm long.
Fl. & Fr.: April–November.

Distrib.: INDIA: Assam, Sikkim and West Bengal. WORLD: Bhutan and Myanmar.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Other synonyms: Bradleia hirsuta Roxb.; Glochidion hirsutum (Roxb.) Voigt; G. tomentosum var. talbotii Hook.f.; G. zeylanicum var. talbotii (Hook.f.) Haines. Plate 52d

Illustration: Rheede, Hortus Malab. 4: t. 55. 1683.

Trees, to 4–5 m tall; branchlets terete, tomentose. Leaves simple, alternate, ovate, or ovate-elliptic, 3.2–10.5 × 2.8–5.3 cm, broadly acute at apex, undulate along margins, rounded at base, sub-coriaceous, glabrous; midvein impressed above, raised beneath, tomentose; secondary veins 5–7 pairs, tomentose, reddish, prominent beneath; petiole 2–3 mm long, stout, tomentose. Inflorescence axillary fascicled, 10–15-flowered. Male flowers: pedicels c. 5 mm long, filiform, glabrous. Sepals 6-lobed, lobes free, arranged in two whorls; outer whorl oblong, c. 1.25 × 0.75 mm, hispid outside, glabrous inside, thick; inner whorl lanceolate, c. 1 mm long, glabrous. Petals absent. Disk absent. Stamens 4. Female flowers: pedicel 2–5 mm long. Sepals and petals as in male flowers. Ovary c. 1.5 mm across, tomentose; style broad and flat, 5–6 minute raised lobes. Drupes green with reddish patch, strongly depressed, 3–5 × 6–11 mm, 4–6-loculed, tomentose; seeds suborbicular c. 4 × 4 mm, shining.

Fl. & Fr.: April–September.

Distrib.: INDIA: Almost throughout. WORLD: Bangladesh, Bhutan, China, Hong Kong, Myanmar, Sri Lanka, Thailand and Taiwan.

Specimen examined: Buxa National Park, East Damanpur range, Checko 2, 8th April, 2012, Gopal Krishna 56077.
17. JATROPHA L. (nom. cons.)

11 species in India and 1 species in BNP.


Local name: “Bagbheranda” (Bengali).

Illustration: M. Blanco, Fl. Filip., t. 384. 1875.

Shrubs, to 2–3 m high; branches terete, glabrous. Leaves simple, whorled, broadly orbicular-ovate, 6–12 × 6–12 cm, apex of median lobes acutely acuminate, obtuse or rounded lateral apex, sub-cordate or cordate at base; coriaceous, glabrous; midvein raised both sides; 5–7-nerved at base, prominent beneath; petioles terete, 6–18 cm long, cylindric; stipules minute, early caducous. Inflorescence sub-corymbiform, often paired up to 10 cm long, sparingly pubescent or sub-glabrous; peduncle up to 7 cm long; bracts elliptic 4–8 mm long. Male flowers: pedicel c. 7 mm long, hairy. Sepals green, 5-lobed, imbricated; lobes elliptic-oblong, c. 4 × 2.5 mm, hairy. Petals green-yellow 5-lobed; lobes oblong-elliptic, c. 4 × 3 mm. Stamens 10; outer 5 free, 1–1.5 mm long, attached to disk; inner 5 united into a column; anthers oblong, 1–1.5 mm long. Female flowers: Sepals and petals freely or basally united; lobes elliptic, c. 6 × 2.5 mm, apex obtuse, glabrous inside, pilose in middle. Disk gland free. Ovary glabrous; stigma elongate, bifid. Capsules ellipsoid, trilobed, 2–3.5 × 2.3 cm; seeds compressed, ovoid-ellipsoid, c. 1.7 × 1 cm, caruncle minute.

Fl.: September–October; fr.: October–December.

Distrib.: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Bihar, Karnataka, Kerala, Goa, Gujarat, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Native of tropical America (Brazil), now in cultivation throughout the tropics of the world, often as an escape.

Specimens examined: Buxa National Park, Jainti range, SRVK 1, 1st Dec., 2011, Gopal Krishna 52303; Buxaduar, 13.05.1976, J.K. Sikdar 4621; Buxa to Chunabhati 2500’, 17.05.1949, V. Narayanswami & party 2622.

Use: Seeds contain oil.

18. MACARANGA Thouars

10 species in India and 1 species in BNP.

Macaranga denticulata (Blume) Mull.Arg., A. DC., Prodr. 15(2): 1000. 1866; Hook.f. in
Local name: “Jagura” (Bengali).

Trees, to 10–15 m tall; branches teretely densely ferruginous-tomentose. Leaves simple, alternate, peltate, broadly ovate 18–24 × 15–18 cm, acuminate at apex, entire along margins, cordate at base, immature leaves mostly tomentose, mature leaves glabrous, yellow gland dotted beneath; midvein flattened above, raised beneath, glabrous; secondary veins 13–14 pairs, prominent beneath at base, 10-nerved; petioles c. 15 cm long, rusty tomentose. Male inflorescence 3–4 cm long, branched racemes, rachis rusty tomentose. Male flowers sessile. Sepals 3, broadly ovate, c. 1 × 1 mm, rusty tomentose outside, glabrous inside. Petals absent. Stamens 20; filament, c. 2.5 mm long, glabrous; anthers c. 0.25 mm long, tetrathecous. Pistilode absent. Female inflorescences dense, overlapping small racemes to 7 × 3–5 cm, bracts and bracteoles. Sepals and petals as in male flowers. Pedicels, c. 1 mm long. Stamens absent. Ovary bilobed, c. 3 × 4 mm, densely glandular-scaly, 2–3-loculed; style 2, recurved. Capsules 1(3) per cluster, divaricate, strongly bilobed, broader than long, c. 3 by 5 mm, smooth, blackish brown, drying finely dark glandular, without spines; pedicel stout to 1 cm long.

Fl. & Fr.: February–August.


19. MALLOTUS Lour.

19 species in India and 3 species in BNP

Key to species

1a. Scandent shrubs; capsules bilobed................................................................. 2. M. repandus

1b. Erect shrubs or trees; capsules subglobose or trilobed........................................ 2

2a. Female flower sepals not spathaceous; capsules subglobose

   to shallowly lobed, smooth, crimson red.............................................. 1. M. philippensis

2b. Female flower sepals spathaceous; capsules trilobed, softly spinose................................................................. 3. M. roxburghianus
Plate 52: a. Falconeria insigne Royle; inset: fruits; b. Glochidion ellipticum Wight; c. Glochidion nubigenum Hook.f.; inset: flower; d. Glochidion zeylanicum (Goerl.) A. Juss. var. tomentosum (Dalzell) Trimen (fruits close up); inset: flower (close up); e - f2. Jatropha curcas L: e. Flowering branch; f1. Flowers; f2. Fruit (close up); g. Macaranga denticulata (Blume) Mull. Arg.; h. Mallotus philippensis (Lam.) Mull.Arg.

Other synonym: *Rottlera tinctoria* Roxb.

**Local name:** “Pung-tung” (Bengali).

**Illustration:** Roxb., Pl. Coromandel 2: t. 168. 1798.

Trees, to 5–7 m high; branches terete, striate, glabrous. Leaves opposite or subopposite, simple, ovate, or oblance-elliptic, 4.6–21 × 1.5–9 cm, acuminate at apex, toothed along margins, cuneate at base, coriaceous, green, glabrous, orange glands dotted beneath; midvein flattened or faintly raised above, raised beneath, glabrous; secondary veins 3-nerved at base, 5–6 pairs above, prominent beneath, 2 cup shaped glands at the base of lamina; petioles 3.2–7 cm long. Inflorescence axillary or terminal spike, 7–8 cm long; rachis stellate pubescent. Male flowers 4–6 mm across, clustered along terminal or axillary solitary or fascicled 4–15 cm long racemes or panicles; rachis simple or often much-branched at base, densely rusty stellate-pubescent, granular-glandular; pedicels c. 3 mm long, articulated at base; bracts triangular, c. 1 mm long, 1–3-flowered. Sepals 3–4-lobed; lobes ovate to elliptic-lanceolate, 1.5–2.5 mm long. Stamens 18–32. Female flowers 3–5 mm across; pedicels c. 0.5 mm long; bracts triangular, c. 1 mm long, acute, stellate tomentose. Sepals 3 (5), unequal, lanceolate c. 1.5–2 × 1 mm, tomentose above. Ovary 3-loculed, 2–3 mm across, tomentose, densely crimson-red glandular; style c. 4 mm long, free, spreading and recurved above, papillose. Capsules subglobose, 8–10 mm across, 2 or 3-loculed, covered with a red glandular-scaly layer; seeds subglobose, c. 4 mm across, black.

**Fl. & Fr.:** July–March.


**Specimen examined:** Buxa National Park, Jainti range, NRVK 6, 4th Dec., 2011, *Gopal Krishna* 52317.


Other synonym: *Croton repandus* Rottler ex Willd.

**Plate 52h**
Local name: “Nanbhantur” (Bengali).

Illustration: Rheede, Hortus Malab. 5: t. 32. 1685.

Scandent shrubs, 5–10 m; branchlets terete, dull yellowish-brownish stellate-tomentulous. Leaves simple, alternate, broadly ovate, 3–9 × 2–7.5 cm, mucro-acute at apex, undulate along margins, truncate at base, peltate, sub-coriaceous, pale green, stellate tomentose, mixed with hyaline glands on lower surface; midvein faintly raised above, prominently raised beneath, stellate tomentose; secondary veins 3-nerved at base, pinnately 3–4 pairs above, prominent beneath, tomentose beneath; petioles 2.3–4 cm long, tomentose, sessile glands at base near margin. Male inflorescences terminal, rarely axillary, branches few or absent, 5–10 cm; bracts subulate, c. 1.5 mm long, tomentose. Male flowers c. 2 × 2 mm, tomentose; pedicels c. 1.5 mm long, tomentose. Sepals 3-lobed, free; lobes triangular ovate, c. 2 × 0.2 mm, tomentose outside. Stamens many; filaments c. 0.75 mm long, filiform, slightly thickened at base; anthers irregular, c. 0.25 mm long. Female inflorescences 4–9 cm long. Female flowers: pedicels 2–3 mm long; bracts lanceolate, c. 2 mm. Sepals 4 or 5, lanceolate, 2–3 mm, tomentulose. Ovary 2-celled; style 3–5 mm long, almost free, plumose. Capsules deeply bilobed, c. 7 mm across, stellate tomentose.

Fl. & Fr.: July–March.


Specimen examined: Buxa National Park, Rajabhatkhawa range, 4th Dec., 2011, Gopal Krishna 52317.


Plate 53b

Local name: “Nim-puteli” (Bengali).


Shrubs, to 3–4 m high; branches terete, pubescent. Leaves simple, alternate, broadly ovate, 13–17 × 6.5–13.5 cm, acuminate at apex, dentate along margins, peltate at base, coriaceous, simple hairy above, stellate pubescent beneath, yellowish gland dotted on both surfaces; midvein raised both sides; 5–7-nerved at base, 5–6 pairs above, stellate
pubescent; petioles 5–11 cm long, stellate pubescent. Male inflorescence terminal raceme, 10–25 cm long. Female inflorescence 6–12 cm long. Male Flowers 3–5-fascicled, 2–3 mm across, hairy outside; pedicels 2–4 mm long, stellate tomentose; bracts linear, c. 3 mm long. Sepals 4-lobed, free up to base; lobes oblong-ovate, c. 2.1 x 1 mm, hairy outside, glabrous inside, midvein prominent. Petals absent. Stamens many; filaments filiform, 1–1.5 mm long, glabrous. Pistilode absent. Female flowers 2–2.5 mm across; pedicels 2–3 mm long. Sepals 5 (6), spathaceous, lanceolate, 3–4 mm long. Petals absent. Ovary 3-locular, 2–3 mm across, stellate-bristly and warty, with dense soft spines; styles 3, papillose, recurved 3–5 mm long. Capsules subglobose, 10–12 mm, deeply 3-lobed, hirsute, densely covered with soft spinules; seeds subglobose, c. 5 mm across.

Fl. & Fr.: February–August.

Distrib.: INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram Sikkim, Tripura and West Bengal. WORLD: Bhutan, Bangladesh, China and Myanmar.

Specimens examined: Buxa National Park, East Damanpur range, Cheko-2, 10th, Feb., 2010, Gopal Krishna 50582; 8th April, 2012, Gopal Krishna 56075.

20. PHYLANTHUS L.

48 species in India and 5 species in BNP.

Key to species

1a. Fruit an indehiscent berries or drupes, fleshy .................................................. 2
1b. Fruit a dehiscent capsule, not fleshy ................................................................. 3

2a. Erect shrubs/trees; leaf base oblique; fruit a drupe, globose, not depressed above, green ................................................................. 2. P. embelica
2b. Scandent shrubs; leaf base symmetrical; fruit a berry, depressed globose, purplish violet ......................................................... 3. P. reticulatus

3a. Proximal leaves of branchlets double the size of the distal leaves .................................................................................. 1. P. airy-shawii
3b. All leaves of the branchlets more or less of the same size ........................................................................ 4

4a. Erect shrubs; male flowers sepals 4; stamens 4; capsules muriculate ................................................................................ 4. P. sikkimenisis
4b. Prostrate herbs; male flowers sepals 6-lobed; stamens 3; capsules not muriculate ......................................................... 5. P. simplex

Other synonym: *Phyllanthus debilis* Wall. ex Hook.f.

**Illustration:** Nordic J. Bot. 4: 470, f. 3. 1984.

Herbs, to 80 cm high; stems compressed, angled, glabrous. Leaves simple, alternate, distichous, proximal ones of branchlets double the size of distal ones, elliptic, obovate or suborbicular, 0.6–1.4 × 0.4–0.8 cm, obtuse at apex, entire along margins, cuneate or acute at base, chartaceous, glabrous, greenish above, whitish beneath; midvein conspicuous; lateral veins 5–6 pairs; petioles c. 1 mm long; stipules linear, 1.5–3 mm long.

Inflorescences axillary, solitary, the males at the proximal axils, the females towards the tips; bracts linear-filiform, 1–2 mm long. Male flowers: pedicels c. 1 mm long. Sepals 6, ovate, ovate-elliptic or obovate, 1–1.2 × 0.4–0.8 mm, scarious along margins. Petals absent. Disk glands 6, small, lobed, shortly stipitate. Stamens 3; filaments connate below into a column, c. 0.3 mm long, trifid at apex; anthers oblong, minute, vertically dehiscent. Female flowers: pedicels 1.2–2 mm long. Sepals 6, obovate to spatulate, 1.2–2.5 × 0.4–1.5 mm, scarious and white along margins. Disk glands 6, minute. Ovary globose, c. 0.5 mm across; styles 3, 0.3–0.5 mm long, free, bifid. Capsules depressed globose, c. 3 × 3 mm; seeds dark grey-blackish coloured, triangular ovate, c. 2.25 × 1.25 mm.

**Fl. & Fr.:** April–December.

**Distrib.:** INDIA: Andhra Pradesh, Assam, Bihar, Jharkhand, Kerala, Madhya Pradesh, Meghalaya, Odisha, Sikkim, Uttaranchal, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Myanmar and Thailand.

**Specimen examined:** Buxa National Park, Jainti range, Jainti 3, 29th Nov., 2011, Gopal Krishna 47163.


Other synonym: *Emblica officinalis* Gaertn.

**Local names:** “Amla”, “Amlaki” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 3: t. 1896. 1852.

Trees, 3–15 m high; branchlets terete, puberulous to glabrous. Leaflets linear-oblong, 3–20 × 1–5 mm, obtuse, mucronate or apiculate at apex, entire along margins, rounded, truncate or subcordate at base, chartaceous, usually glabrous; midvein faintly raised above; lateral nerves 5–12 pairs; petioles 0.4–1 mm long, glabrous; stipules triangular, 1–1.5 mm long. Inflorescences arising with young flush of leaves; cymules fascicled; usually
crowded towards the proximal portions of the branchlets, also on leafless racemes; bracts triangular, 0.8–1.5 mm long. Male flowers: pedicels 1–4 mm long. Sepals 6, oblong, obovate to ob lanceolate, 1–2.5 × 0.5–2 mm, glabrous. Disk glands 6, clavate, c. 0.2 mm across. Stamens 3; filaments 0.5–1 mm long, connate into a column; anthers oblong, 0.5–1 mm long. Female flowers subsessile. Sepals 6, obovate-oblong to ob lanceolate, 1.5–3 × 0.5–2 mm. Disk cupular-annular, deeply 6-lobed. Ovary 3-locular, c. 0.8 mm across, glabrous; styles 3, 2–3 mm long, shortly connate below into a column, bifid to quadrifid above. Drupes globose, 1.5–3 cm across, fleshy, hard, indehiscent.

**Fl. & Fr.:** September–April.

**Distrib.:** INDIA: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttaranchal, Uttar Pradesh and West Bengal.

**WORLD:** Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal and Sri Lanka.

**Specimen examined:** Buxa National Park, Jainti range, NRVK 6a, 13th Oct., 2010, S.K. Srivastava & Gopal Krishna 46343.


Other synonym: *Kirganelia reticulata* (Poir.) Baill.

**Local name:** “Panjuli” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 5: t. 1899. 1852.

Shrubs, to 1–2 m high; branches terete, lenticellate, glabrous. Leaves simple, alternate, elliptic ovate or broadly obovate, 1.3–3 × 0.6–1.8 cm, acute or obtuse at apex, entire along margins, cuneate at base, chartaceous, glabrous; midvein conspicuous; secondary veins obscurely 6–7-nerved; petioles c. 2 mm long; stipules linear, c. 1 mm long, puberulent. Flowers axillary fascicles, 3–4- flowered. Male flowers 1–1.5 mm across; bracts triangular ovate, 1–1.5 mm long; pedicels filiform, c. 7 mm long, puberulent. Sepals 5–(6), unequal; lobes elliptic to broadly obovate, 2.5–3 × 1–2 mm, obtuse or flat at apex. Petal absent. Disk glands 5 or 6. Stamens 5; 3 free and 2 united forming a staminal column; filaments unequal, 0.5–1.25 mm long, thick; anthers dithecos. Pistilode absent. Female flowers c. 1 mm across; bracts triangular ovate; pedicels slightly thicker than male flower, c. 3 mm long. Sepals 5-lobed; lobes obovate, sub-equal, c. 1.5 × 0.75 mm, obtuse at apex. Petal
absent. Disk glands 6-lobed. Berries subglobose, 2–5 × 3.5–5 mm fleshy, 8–10-loculed, 1 or 2 seed per locule; seed triangular.

Fl. & Fr.: August–April.


Specimen examined: Buxa National Park, Rajabhatkhawa range, SRVK 6, 3rd March, 2011, Gopal Krishna 47225.


Shrubs or trees, 1–5 m high; branchlets puberulous to subglabrous. Leaves ovate to elliptic, 2–5 × 1–3 cm, membranous to chartaceous, pilose to glabrous, glaucous beneath, unequal at base, acute-mucronate or apiculate at apex; lateral nerves 6–11 pairs; petioles 1.5–3 mm long; stipules triangular, 1–3 × 0.4–1 mm, caducous. Inflorescences axillary, racemiform, up to 10 cm long; male cymules 3–5-flowered, at the proximal axils; female cymules 1-flowered, at the distal axils; bracts ovate to lanceolate, 1–2 mm long. Male flowers: pedicels 5–15 mm long, filiform. Sepals 4, ovate, c. 1 × 0.5 mm, fimbriate, sparsely puberulous outside. Disk glands 4, occasionally connate and deeply lobed. Stamens 4; filaments connate into a short column; anthers subglobose. Female flowers: pedicels 10–25 mm long. Sepals 6, ovate or triangular-ovate, 2–2.5 × 0.8–1.2 mm, denticulate, fimbriate or undulate, sparsely puberulous outside. Disk cupular-annular. Ovary subglobose, 1–2 mm across, scattered pubescent; styles 3, up to 1 mm long, free, bifid. Capsules subglobose, 2.5–3 × 3–4.5 mm, 3-lobed, muriculate, puberulous to glabrous.

Fl. & Fr.: April–November.

Distrib.: INDIA: Assam, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, Malaysia, Myanmar, Nepal and Thailand.


**Illustration**: Wight, Icon. Pl. Ind. Orient. 5: t. 1902.1852 [as *Macraea oblongifolia* Wight].

Prostrate or erect herbs; branches angled, more or less winged, glabrous. Leaves simple, alternate, oblong elliptic, 4–10 × 1.5–2 cm, mucronate at apex, entire along margins, truncate at base, chartaceous, glabrous; midvein prominent; secondary veins obscurely 5–6 pairs, looping at margin; petioles c. 0.5 mm long, glabrous; stipules to narrow triangular. Inflorescence axillary fascicle. Male flowers c. 1.5 × 1 mm; pedicel c. 2 mm long. Sepals pinkish-red, 6, narrowly obovate, c. 0.5 × 0.3 mm, sub-equal. Petals absent. Disk glands 6, orbicular. Stamens 3; staminal column 0.1-0.2 mm long. Pistilode absent. Female flowers pedicel 0.1–0.5 mm long, accrescent in fruits. Sepals 6, subequal, oblong 0.5–0.8 × 0.2–0.5 mm, acute or obtuse, entire. Petal absent. Disk shallowly annular. Ovary subglobose, c. 1 mm across; style 0.1–0.2 mm long; stigmas c. 0.4 mm long. Capsules depressed globose, 1.5–2.3 mm across, 1–2-seeded per locule; seeds trigonous c. 1.5 mm long, papillate; fruiting pedicel 4–5 mm long.

**Fl. & Fr.**: January–December.

**Distrib.**: INDIA: Almost throughout India. WORLD: Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Thailand and Vietnam.

**Specimen examined**: Buxa National Park, Gadadhar range, Panbari 8, 10th April, 2012, Gopal Krishna 56085.

21. **RICINUS** L.

1 species in India and BNP.


**Local name**: “*Rerri*” (Bengali).

**Illustration**: Curtis’s Bot. Mag. 48: t. 2209. 1821.

Shrubs or undershrubs or small trees, 1–6 m high; stems hollow except at base. Leaves narrowly peltate at base, suborbicular in outline, 10–60 × 10–70 cm, dark green above, pale glaucous green beneath, often suffused with purplish red, minutely puberulous on both sides, palmately divided beyond the middle into 5–10 lobes; lobes oblong-ovate to
lanceolate, acute to acuminate lobes with coarse teeth along margins; petioles 10–40 cm long, angular, hollow, finely pubescent; stipules ovate-lanceolate to triangular, 1–3.5 cm long, early caducous. Inflorescences terminal or leaf-opposed, bearing many 1–4 cm long subsessile cymes, with 3–25-flowered male cymes below and 1–7-flowered female cymes above; peduncles c. 10 cm long. Male flowers 12–15 mm across; pedicels 8–15 mm long. Sepals dark pinkish, valvate, closed in bud, 3 (5), subequal, ovate-lanceolate, 5–9 mm long. Stamens many, crowded and connate into c. 8 mm long cluster; anthers globose to ovoid. Female flowers 8–9 mm across, pedicellate; pedicels 2.5–4 mm long, accrescent in fruits. Sepals 5 (7), lanceolate, 5–6 mm long, caducous. Ovary globose, c. 4 mm across, densely hairy with appressed soft spines, 1 ovule per locule; styles 3, spreading, entire or bifid, red; stigmas red, 4–6 mm long, papillose-plumose on inner surface. Capsules ellipsoid to subglobose, 1.2–2.5 × 1.5–2 cm, reddish brown to blackish purple, marked with various shades of white, grey or brown, covered with 3–6 mm long brown or dark brown soft spines; seeds ellipsoid, to ovoid, 9–14 × 5–6 mm, smooth, shiny dark brown, variegated with white or mottled with grey and brown at margins, with a large caruncle.

Fl. & Fr.: January–December.

Habitat: Usually Grows in waste places of the park.

Distrib.: INDIA: Throughout. WORLD: Pantropical, probably native of Africa.


Use: Seeds contain oil.

22. SAUROPUS Blume

12 species in India and 3 species in BNP.

Key to species

1a. Leaves 3-nerved at base; sepals in two series, unequal;
  disk present................................................................. 3. S. trinervis

1b. Leaves pinnately nerved; sepals in one series, equal; disk absent.............. 2

2a. Calyx lobes in male flowers with no further lobulation,
  yellowish-green; fruits prominently drooping with long
  pedicels and recurved calyx............................................. 1. S. androgynous

2b. Calyx lobes in male flowers further bilobulate,
  crimson red; fruits not drooping with short pedicels...................... 2. S. compressus

Other synonyms: *Sauropus albicans* Blume; *S. lanceolatus* Hook.f.; *S. oblongifolius* Hook.f.


Shrubs, to 2 m high; branches terete, smooth, glabrous. Leaves ovate-oblong, 3–6 × 1.3–3.2 cm, mucro-acute at apex, entire along margins, cuneate or attenuate at base, chartaceous, glabrous; midvein faintly raised beneath, glabrous; secondary veins 6–8 pairs, conspicuous beneath; petioles c. 3 mm long, glabrous; stipules triangular ovate, c. 1.5 × 2 mm. Flowers axillary, 1 or 2-flowered, or several male and female per cluster. Male flowers 3–18 mm across; pedicels 4.5–13 mm long. Sepals flat, disk shaped, 6-distinctly or indistinctly lobed; lobes ovate, 0.7–3 × 1.3–5 mm, apices rounded. Stamens 3; androphore 0.1–0.3 mm long; filaments short; anthers extorse. Female flowers 5.5–10 mm across; pedicel c. 3.2 mm long, accrescent in fruits upto c. 1.5 cm long. Sepals 6-lobed; lobes obovate, 1.8–4 × 1.8 mm. Ovary depressed globose, 1.1–1.5 × 1.2 mm; styles c. 1.2 mm long, bifid. Capsules subglobose, 6–13 mm across, depressed, 1-seed per locule; seed triangular, c. 8 × 5 mm, black or greenish white, hollow; fruting pedicels c. 1.5 mm long; calyx red, persistent.

*Fl. & Fr.:* July–December.

*Distrib.:* INDIA: Arunachal Pradesh, Assam, Kerala, Meghalaya, Nagaland, Sikkim, Tamil Nadu and West Bengal. WORLD: Bangladesh, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.


*Note:* Number of individuals are increasing in Jainti range of the park.


Other synonym: *Sauropus quadrangularis* (Willd.) Mull.Arg. var. compressus (Mull.Arg.) Airy Shaw.

Shrubs, to 1 m high; branches terete, glabrous, reddish. Leaves ovate-elliptic, 0.6–2 × 0.4–1.4 cm, acute or obtuse at apex, entire along margins, cuneate or rounded at base, subcoriaceous, glabrous; midvein flattened, obscure above, faintly raised beneath, glabrous; secondary veins 5–6-nerved, obscure above, prominent beneath, glabrous. Inflorescence axillary fascicles, 4–5-flowered. Male flowers: pedicels c. 3 mm long, pubescent. Sepals crimson-red, flattened, 2–3.5 mm across, flabellate, suborbicular or squarish, emarginate-truncate to deeply bilobulate, in the latter case the sepals appearing more or less equally 12-lobed. Disk absent. Stamens 3; filaments connate in a short trigonous column, c. 0.5 mm long; anthers sub-globose. Pistillode absent. Female flowers: pedicel filiform. Sepals 6-lobed, shortly connate, accrescent in fruit. Petals absent. Disk absent. Stamens absent. Ovary turbinate, c. 0.5 × 1 mm; styles up to 1.5 mm long, bifid. Capsules globose, 7–8 mm across, subtended by enlarged calyx.

Fl. & Fr.: February–November.

Distrib.: INDIA: Assam, Meghalaya, Mizoram, Odisha, Sikkim, Uttar Pradesh and West Bengal. WORLD: Myanmar, China and Thailand.

Specimens examined: Buxa National Park, Gadadhar range, Panbari 8-9, 12th March, 2011, Gopal Krishna 50544; Rajabhatkhawa range, 13th May 1949, V. Narayanswami & party 2350, 2313.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Plate 53e

Shrubs, to 2–3 m high; stems angled, puberulent. Leaves broadly ovate to ovate-lanceolate, 5.4–10 × 2.4–3 cm, narrowly acute at apex, entire along margins, cuneate-rounded at base, sub-coriaceous, glabrous; midvein raised both sides; 3-nerved at base, projected above, lateral nerves 3–4 pairs above; petioles, c. 3 mm long, puberulent; bracts lanceolate, c. 5 × 1 mm. Male flowers c. 1.5 mm across, axillary; pedicels filiform, c. 3 mm long, glabrous. Sepals stellately 6-lobed, arranged in 2 whorls; lobes triangular-ovate, c. 4 × 2 mm, reflexed. Disk lobes 6, biseriate. Stamens 3; filaments connate into a cylinder. Female flower solitary, axillary; pedicels c. 7 mm long. Sepals 4–6 mm across, 6-lobed, biseriate, usually unequal; lobes obovate, outer longer than inner. Ovary oblong-ovoid, c. 1 mm, truncate; styles short, bifid, incurved. Capsules globose, c. 2.5 cm across, 6-loculed
Fl.: April–September; fr.: August–November.

Distrib.: INDIA: Assam, Arunachal Pradesh, Meghalaya and West Bengal. WORLD: Bangladesh, China and Myanmar.

Specimen examined: Buxa National Park, Jainti range, Jainti 7, 5th April, 2012, Gopal Krishna 56030.

Notes: Present collection is new record for West Bengal. Sauropus rependus is very close to S. trinervius, but differs in its rounded leaf base and stellately-lobed male calyx.

23. TREWIA L.

1 species in India and BNP.


Deciduous trees, to 7–15 m tall; branchlets subterete, nearly glabrous, swollen at nodes. Leaves opposite, simple, broadly ovate to deltoid, 6–20 × 3–15 cm, caudate-acuminate at apex, entire-undulate along margins, truncate or sub-cordate at base; chartaceous, glabrous above, hairy beneath; midvein raised both sides, glabrous above, pubescent beneath; lateral nerves 3–6 pairs; petioles unequal, 1–8.5 cm long long; stipules linear-lanceolate, 2–4 × 1–2 mm, caducous. Male inflorescences racemose, c. 16 cm long, pubescent, pendulous. Male flowers 3–5 mm across, usually 2–3-flowered in a clusters; pedicels 1–7 mm long; bracts ovate-lanceolate, c. 3 mm. Sepals green, 3, ovate, 3.5–5 × 2–4 mm, softly pubescent outside, glabrous inside. Petals absent. Stamens many; filaments 1–2 mm long, subulate, clustered on a convex receptacle; anthers oblong, c. 1 mm long. Female flowers solitary, 4–8 mm across; pedicels 5–9 mm long. Sepals 3 (5), broadly ovate, 4–5 × 2 mm long, caducous. Ovary 3–4 mm across, 1-ovule per locule; styles spreading, shortly connate at base, 1.5–3 cm long, free and papillose or plumose above. Berries ovoid to subglobose, 1–3.5 cm across, dark greyish green or pale brown with dark spots, 3–5-seeded; seeds globose to ovoid, 0.5–1.3 cm across, brown.

Fl. & Fr.: January–July.

Habitat: Grows along the bank of Jainti river.

Distrib.: INDIA: Andhra Pradesh, Gujarat, Maharashtra, Odisha, Sikkim, Tripura and West Bengal. WORLD: Bangladesh, Myanmar, and Thailand.

**URTICACEAE [155]**

Key to genera

1a. Woody climbers; filaments of stamens erect ................................................. 5. *Poikilospermum*
1b. Herbs or erect shrubs; filaments of stamens inflexed ...................................................... 2

2a. Plants armed with stinging hairs; female flowers without staminodes ............................................................... 3
2b. Plants without stinging hairs; female flowers with or without staminodes ................................................................. 4

3a. Leaves alternate; perianth lobes of female flower connate ............. 2. *Dendrocnide*
3b. Leaves opposite; perianth lobes of female flowers free ...................... 8. *Urtica*

4a. Cystoliths linear or fusiform; stigma sessile; perianth lobes of female flowers free or connate at base; staminodes present ......................... 5
4b. Cystoliths dot like; stigma often on a style; perianth lobes of female flowers usually connate into a tube; staminodes absent ........................................... 6

5a. Leaves alternate, leaf blade asymmetric ......................................................... 3. *Elatostema*
5b. Leaves opposite, leaf blade usually symmetric ......................................... 6. *Pilea*
6a. Leaves opposite ........................................................................................................ 7
6b. Leaves alternate ...................................................................................................... 4. *Oreocnide*

7a. Achene not lustrous, remaining attached to perianth; stigma persistent ......................................................................................... 1. *Boehmeria*
7b. Achene lustrous, easily detached from perianth; stigma usually deciduous ......................................................................................... 7. *Pouzolzia*

1. **BOEHMERIA** Jacq.

12 species in India and 2 species in BNP.

Key to species

1a. Leaves ovate to orbicular, 4–25 cm long, membranous or subcoriaceous, rarely rugose ................................................................. 1. *B. macrophylla*
1b. Leaves narrowly lanceolate, usually 15–30 cm long, rigid and rugose .............................................................................................. 2. *B. pendulifolia*

Other synonyms: *Boehmeria platyphylla* Buch.-Ham. ex D. Don; *B. platyphylla* var. *macrostachya* (Wight) Wedd.


Shrubs, to 1–2 m high; branches angled, scabrous, hidpid. Leaves opposite, simple, broadly ovate or suborbicular, 9–15 × 10–14 cm, caudate at apex, sharply serrate-dentate along margins, rounded or sub-cordate at base, subcoriaceous, green, strigose above, glabrous beneath except veins and veinlets; palmately 3-nerved at base, prominent beneath, hispid; minor veins inconspicuous, arching upwards; petioles 4–11.3 cm long, hairy. Female spike 22–40 cm long, many flowers at a place. Male flowers globose, c. 1 mm across, hispid, sessile; bracts ovate, c. 1 × 1 mm, acuminate at apex, ciliate along margins, midvein prominent, hispid. Tepals 4 lobed, free above, connate below; lobes ovate, c. 1 × 0.8 mm, acuminate at apex, hispid outside, glabrous inside. Stamens 4; filaments 0.6–0.8 mm long; anthers oblong ovate c. 0.5 × 0.5 mm. Pistilode clavate 0.2–0.3 mm long. Female flowers: ellipsoid c. 1 mm across long; sessile; bracts ovate-elliptic, c. 0.25 × 2.5 mm. Tepals compressed-oblanceolate, 3-4 toothed above, hispid outside; tube 0.6–1 mm long; teeth c. 0.2 mm long. Staminodes absent. Ovary included; style filiform 0.5–1 mm long, pubescent, exserted, curved at tip. Achenes ovoid-ellipsoid, 0.8–1 × 1 mm with persistent style ellipsoid, sparsely hispid.

Key to varieties

1a. Leaves cuspidate at apex, membranous.............. 1.1. *B. macrophylla* var. *macrophylla*

1b. Leaves acuminate at apex, chartaceous................. 1.2. *B. macrophylla* var. *scabrella*

1.1. *Boehmeria macrophylla* Hornem. var. *macrophylla*.

Local names: “Pua” (Lepacha.); “Kamli” (Nepali).

Stems and petioles sparsely strigose. Leaves ovate, lower surfaces appressed strigose, reticulate veins slightly raised, upper surfaces sparsely strigose. Spikes branched, long, slender, pendulous.

Fl. & Fr.: September-November.

Distrib.: INDIA: North East India and West Bengal. WORLD: China and Nepal.


Leaves ovate, lower surface with strongly raised reticulate veins, upper surface tiffly hispid. Spikes rigid, 5-15 cm long.

Fl. & Fr.: September-November.


Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, Gopal Krishna, 50597


Other synonym: *B. macrophylla* D. Don auct. non. Hornem.

Local name: “Kamli” (Nepali).

Shrubs, to 1 m high; branches angled, hispid. Leaves opposite, simple, lanceolate, 9-25 × 2.1–4.1 cm, acuminate at apex, crenate-dentate along margins, cuneate at base, coriaceous, green above, pale beneath, glabrous above but roughen, hispid beneath; midvein impressed above, raised beneath, hispid; palmately 3-nerved at base, prominent beneath, hispid; lateral veins 5-6 pairs, above, prominent beneath, hispid; petioles 8–34 mm long, hispid; stipules lanceolate, 1.5-2 cm. Inflorescences monoecious, axillary or terminal, 30-40 cm long. Male spikes borne below, 5–12 cm long, clusters few-flowered. Female spikes borne above, 15–35 cm long, flowers many in dense globose head. Male flowers: globose c. 1 mm across, hispid; sessile; bracts ovate, c. 1.5 × 1 mm, acuminate at apex, ciliate along margins, midvein prominent, hispid. Tepals 4-lobed, free above, connate below; lobes ovate, c. 1 × 0.8 mm, acuminate at apex, hispid outside, glabrous inside. Stamens 4; filaments 0.6–0.8 mm long; anthers oblong-ovate c. 0.5 × 0.5 mm. Pistilode clavate, 0.2–0.3 mm long. Female flowers ellipsoid c. 1.3 mm long; sessile. Tepals compressed, oblanceolate below, 3–4 toothed above, hispid outside; tube 1–1.5 mm long; teeth c. 0.2 mm long. Staminodes absent. Ovary included; style filiform 1.5–1.8 mm long, pubescent, exserted, curved at tip; stigma simple, hairy, persistent.
Fl.: April-June; fr.: July-October.


Specimen examined: Buxa National Park, Gadadhar range, 5th March., 2011, Gopal Krishna 56016.

2. DENDROCNIDE Miq.

2 species in India and 1 species in BNP.


Other synonym: Laportea crenulata Gaudich.


Plate 54a

Shrubs, to 2–3 m high; stems succulent, terete, puberulous, sap transparent, watery. Leaves opposite, narrowly ovate to ovate-elliptic, 15–25 × 7.3–14.1 cm, acute at apex, entire along margins, cuneate at base, chartaceous, shining above, turned pale-green when dry, scabrous above, distantly hispid beneath; midvein slightly raised both sides, hispid; lateral veins 8–10 pairs, conspicuous, glabrous above, puberulous beneath; petioles 4–14.5 cm long, terete, papillate. Male inflorescences in axillary panicles, 5–10 cm long, armed with stinging hairs. Male flowers c. 2 × 2 mm; sessile or sub-sessile, covered with stinging hairs outside. Tepals 4, cream-white, free, ovate, c. 1.5 × 2 mm, chartaceous. Stamens 4; filaments included; anthers obovate, c. 1 × 1 mm. Ovary rudimentary, ovoid. Female inflorescences in axillary panicle, 10–15 cm long, armed with densely stinging hairs. Female flowers pedicellate; pedicels 3–4 mm long, stinging hairy. Tepals 4, cream-white, free, ovate, c. 1.5 × 1 mm, stinging hairy. Staminodes absent. Ovary c. 3 × 2 mm, stinging hairy; style, c. 1 mm long; stigma 1.5–2 mm long, ligulate. Achenes white, obliquely ovate, 3–5 × 2.5–4.5 mm, with transparent sap.

Fl. & Fr.: February-August.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Manipur and West Bengal. WORLD: Bhutan, China, Malaysia, Myanmar, Sri Lanka and Thailand.


Uses: Sap causes very painful stings. Stems produce good fibres for rope-making. This species is known from Darjeeling district and present collection is from Jalpaiguri district.
3. **ELATOSTEMA** J.R. Forst. & G. Forst. (*nom. cons.*)

31 species in India and 2 species in BNP.

Key to species

1a. Subshrubs; stems densely strigose; male inflorescences sessile........ 1. *E. lineolatum*

1b. Herbs; stems hairy; male inflorescences shortly pedunculate............. 2. *E. parvum*


Other synonym: *Elatostema lineolatum* var. *majus* Wedd.

**Illustration:** Wight, Icon. Pl. Ind. Orient. 6: t. 1984. 1853.

Undershubs, to 80 cm high; stems branched, terete, lineolate with prominent cystoliths, hispid. Leaves simple, alternate, asymmetrically elliptic or lanceolate, 1.1–6.7 × 0.6–1.4 cm, narrowly acuminate at apex, distinctly serrate along margins, obliquely cuneate at base, coriaceous, green, lineolate with prominent cystoliths both sides, scabrous beneath; midvein inconspicuous above, faintly raised beneath; secondary veins palmately 3-nerved at base, inconspicuous, pinately 3–4 pairs above, inconspicuous both sides. Inflorescences axillary fascicled; petioles c. 2 mm long or sessile. Male flowers c. 1 mm across; pedicels c. 1 mm long, filiform. Tepals cream-white, 4-lobed; lobes subequal, obovate or broadly ovate, c. 1 × 1 mm, obtuse at apex, chartaceous, glabrous. Stamens 4; filaments flattened, connate to calyx, short; anthers obovate, clavate, c. 1 mm long. Pistillode minute. Female flowers: Tepals 3-lobed, very small. Staminodes 3–5, linear. Achenes ellipsoid, 7 or 8-ribbed.

**Fl. & Fr.:** March–June.

**Habitat:** Grows under moist and shady place.

**Distrib.:** **INDIA:** Sikkim and West Bengal. **WORLD:** Bhutan, China, Myanmar, Nepal, Sri Lanka and Thailand.

**Specimen examined:** Buxa National Park, Jainti range, Jainti 7, 5th March., 2011, *Gopal Krishna* 47263.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.
2. Elatostema parvum (Blume) Miq. in Zollinger, Syst. Verz. 2: 102. 1854. Procris parva
Other synonym: Elatostema reptans Hook.f.

Prostrate herbs; branches terete, simple hairy pubescent, rooting at nodes. Leaves alternate, oblique-ovate, 1–3.1 × 0.4–1.5 cm, acute at apex, sharply serrate along margins, obliquely cordate at base, chartaceous, green above, pale beneath, lineolate with prominent cystoliths, glabrous beneath except nerves; palmately 5–6-nerved at base, prominent beneath, hirsute; sessile or sub sessile; stipules lanceolate to linear, 2–3 × 0.5–0.6 mm long, glabrous, with cystoliths. Male inflorescences solitary or in pairs, simple, sessile; receptacle obscure; bracts connate, c. 5 mm; bracteoles narrowly ovate, lanceolate, or linear. Male flowers c. 1.5 × 1.5 mm. Tepals 5-lobed; lobes obovate, c. 1 × 1 mm, hyaline, glabrous. Stamens 5; filaments adnate to base of tepal, flattened, c. 1.2 mm long, glabrous; anthers broadly oblong, c. 1 mm long. Pistillode present. Female inflorescences solitary or in pairs, broadly elliptic, sessile; receptacle small; bracts narrowly lanceolate or subulate. Female flowers c. 1.5 × 1.5 mm. Teapals as in male flowers. Achenes ovoid, ribbed.

Fl. & Fr.: July–August.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, China, Indonesia, Myanmar, Nepal and Philippines.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

4. OREOCNIDE Miq.

2 species in India and 1 species in BNP.


Other synonyms: Villebrunea frutescens (Thunb.); Boehmeria frutescens (Thunb.) Thunb.

Shrubs, to 2–3 m high; branches terete, spreading, appears leafless when flowers, pubescent, lenticellate. Leaves alternate or sub-opposite, oblong-lanceolate, lanceolate or ovate-elliptic, 2.4–15 × 1–6 cm, acuminate at apex, crenate-serrate along margins, rounded at base, sub-coriaceous, dull green, cystoliths punctate both sides, sparsely hirsute both sides more densely on veins; midvein faintly raised above, prominently raised beneath,
hirsute; 3-veined at base; lateral veins 3-5 pairs arising from upper half of leaf blade, secondary veins arising from 2 lateral veins and from midvein giving abaxial surface a tesselate looks; petioles 0.9–2.1 cm long; stipules lanceolate, c. 5 × 2 mm, acute, pubescent. Inflorescences in clusters on simple branches or dichotomously branched short cymes, 4.5–9 mm long. Male flowers c. 1 mm across, pedicellate; pedicels c. 1.5 mm long, pubescent. Tepals 4, obovate, c. 1 × 1 mm pubescent outside, glabrous inside. Stamens 4; filaments flattened, c. 1.5 mm long, attached at the base of tepal; anthers tetrothecous. Pistilode very small in centre, obovate-clavate, c. 0.75 mm long. Female flowers: Tepals tubular, mouth narrowed, obovate, c. 1 × 0.35 mm, hairy outside. Staminodes absent. Ovary erect, c. 1 mm; stigma sessile. Achenes ovoid, c. 1.2 mm long; seeds ovate, c. 1 × 0.5 mm.

Fl. & Fr.: February-October.

Distrib.: INDIA: Sikkim and West Bengal. WORLD: Bhutan, Cambodia, China, Japan, Laos, Malaysia, Myanmar, Thailand and Vietnam.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

5. POIKILOSPERMUM Zipp. ex Miq.
   2 species in India and 1 species in BNP.


Other synonym: C. suaveolens sensu Hook.f., 1888. Fig. 37; Plate 54d

Local name: “Dolia-sat” (Bengali).


Large climbing shrubs; branches sub-terete, glabrous. Leaves, alternate, broadly-ovate or ovate-elliptic, 14–22 × 9.5–10 cm, broadly acute at apex, entire-undulate along margins, rounded at base, coriaceous, green, shining, glabrous above, setose beneath, midvein raised both sides; midvein impressed above, raised beneath, pubescent; lateral veins 11–12 pairs, prominent beneath, pubescent; petioles 3–8.9 cm long. Inflorescences globose head; peduncle 7–8 mm long; bracts triangular-ovate, c. 1.5 × 1 mm, acute, scaly. Male flowers c. 3 × 1.5 mm, sessile; bracts oblind-ovate, c. 2.5 × 1.25 mm, acute or obtuse at apex. Tepals pinkish green, shallowly 4-lobed; lobes triangular c. 0.5 × 0.5 mm. Stamens 3
Fig. 37. *Poikilospermum lanceolatum* (Trécul) Merr.: a. Flowering branch; b. Female-inflorescence; c. Male flower; d. Female flower; e. Achene (enclosed by perianth); f. Seed with stylar remnant.
or 4; filaments short, erect. Pistillode small. Female flowers: pedicels c. 1.25 mm; bracts as in male flowers. Tepals 4-lobed, free above; lobes triangular c. 0.5 × 0.5 mm, acute, each lobes with 2 lobules; tubeovoid c. 3 × 2 mm. Staminode absent. Ovary oblong-ovoid, c. 1 × 0.6 mm, covered with mucilaginous sap; style simple c. 0.5 mm long; stigma recurved, hairy. Achene ovoid, 3.5–4.5 mm, apex exerted from persistent perianth.

Fl. & Fr.: January-April.

Distrib.: INDIA: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, China and Myanmar.

Specimens examined: Buxa National Park, Rajabhatkhawa range, SRVK 5, 14th Feb., 2010, S.K. Srivastava & Gopal Krishna 47088; Rajabhatkhawa range, SRVK 4, 29th March, 2012, Gopal Krishna 50619; Rajabhatkhawa Depot. Road, 14.05.1949, Narayanswami & party 2429.

6. PILEA Lindl. (nom. cons.)

20 species in India and 2 species in BNP

Key to species

1a. Flaccid herbs; female perianth 2-lobed ................................. 1. P. peploides

1b. Erect shrubs; female perianth 3-lobed ................................. 2. P. symmeria


Other synonym: Dubrueilia peploides Gaudich.

Plate 54e

Succulent, flaccid herbs to 5–15 cm, branched from base; stems terete, pink reddish, glabrous. Leaves crowded on upper 2 or 3 nodes, orbicular or orbicular-ovate, 2–12 × 2–12 mm, obtuse or subacute at apex, weakly sinuate-crenate along margins in upper half, entire in lower half, cuneate or rounded at base, chartaceous, pale green, lineolate with prominent cystoliths both sides, glabrous; palmately 3-veined, prominent beneath; lateral veins inconspicuous; petioles 10–15 mm long, glabrous; stipules ovate, deciduous. Inflorescences axillary, cymose-capitate. Male flowers c. 0.8 mm long. Tepals 4-lobed; lobes ovate. Stamens 4. Pistilodes minute. Female flowers: Tepals 2-lobed, lobes triangular-ovate, unequal. Staminode present. Achenes ovoid, c. 0.6 mm, compressed, smooth, 1-seeded; seed ovoid c. 0.4 × 0.3 mm, smooth.

Fl. & Fr.: April–August.
Distrib.: INDIA: Assam, Meghalaya, Sikkim, Uttarakhand and West Bengal. WORLD: Bhutan, Indonesia, Japan, Korea, Myanmar, Russia, Thailand and Vietnam.


Herbs, to 30–50 cm high; stems terete, succulent, glabrous. Leaves opposite, simple, slightly asymmetric in shape, elliptic-lanceolate to oblong-lanceolate, 5.5–12.6 × 2.5–5.8 cm, acuminate at apex, serrate along margins, cuneate or rounded at base, chartaceous, green, shining, glabrous, lineolate with prominent cystoliths beneath, punctate gland dotted beneath; 3-veined at base, prominent beneath, glabrous; lateral veins many, conspicuous, reticulations interruptedly thickened; petioles 0.3–3 cm long, glabrous; stipules lanceolate or ovate, c. 2 × 1 mm, acute, chartaceous, punctate gland dotted, glabrous, persistent. Inflorescences in axillary, cymose-panicles. Male flowers c. 1 mm long. Tepals 4-lobed, lobes connate up to half of length, ribbed. Stamens 4. Female flowers: Tepals 4-lobed, lobes free above, connate below; lobes triangular ovate, c. 1 × 1 mm, acute, hyaline, connate at base, unequal. Staminode present. Achenes broadly ovate, c. 1.5 × 1.1 mm, compressed, smooth, glabrous, 1-seeded; seed ovate, c. 1 mm across, smooth, glabrous.

Fl. & Fr.: March–August.

Distrib.: INDIA: Meghalaya, Sikkim, Uttarakhand and West Bengal. WORLD: Bhutan, China and Nepal.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, 1st Dec., 2011 Gopal Krishna 47189.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

7. POUZOLZIA Gaudich.

12 species in India and 1 species in BNP.


Other synonyms: Pouzolzia indica (L.) Gaudich.; Pouzolzia indica var. alienata Wedd.

Plate 54g
Annual erect herbs, to 30–50 cm high; stems more less striate, reddish, appressed hairy when young, glabrescent when matured. Leaves opposite, decussate, ovate or broadly ovate, 1–3.1 × 0.4–1.3 cm, acute or acuminate at apex, undulate along margins, sub-cordate or rounded at base, sub-coriaceous, green, shining, punctiform cystoliths above, glabrous except hairs along margins; 3-nerved at base, inconspicuous above, conspicuous beneath, hairy; petioles 2–4 mm long, hairy; stipules broadly-ovate, c. 4 × 2.25 mm, acute, chartaceous, midvein conspicuous, glabrous. Inflorescences axillary fascicled, 4–6-flowered; bracts broadly ovate, c. 1 × 2 mm, acuminate at apex, margin ciliate, hyaline. Male flowers globose, c. 1.5 mm across; pedicels 1–1.5 mm long, pubescent. Tepals 4-lobed, lobes free, cupular below; lobes obovate, c. 1.25 × 0.5 mm, obtuse at apex, slightly hooded at apex, hairy outside, glabrous inside. Stamens 4; filaments c. 1.2 mm long, hyaline, adnate to tepal; anthers ovoid-orbicular c. 1 × 1 mm, dorsifixed. Pistillode clavate, c. 0.5 mm long. Female flowers ovoid, c. 1.5 × 1 mm, angled, sessile. Tepals connate in a tubular perianth below; tube c. 1.25 mm long, hairy outsides. Staminode absent. Ovary c. 1.2 × 1 mm, glabrous, shining; stigma filiform c. 1.25 mm long, hairy, jointed at apex of ovary, deciduous. Achenes black-brown, ovoid, 1–1.25 mm across, hairy, lustrous, 1-seeded; seed c. 1 mm across.

Fl. & Fr.: April–November.

Distrib.: INDIA: Almost throughout. WORLD: Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Papua, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Maldives, Polynesia, Yemen (Socotra); introduced in Africa and the New world.

Specimens examined: Buxa National Park, Janti range, 1st Dec., 2011, Gopal Krishna 47193; Gadadhar range, Panbari 8, 10th April, 2012, Gopal Krishna 56090.

8. URTICA L.

3 species in India and 1 species in BNP.


Herbs or shrubs, to 1–1.5 m high; branches terete, glabrous or with scattered stinging hairs. Leaves opposite, broadly ovate, 5–11 × 2.2–5 cm, acuminate at apex, serrate-dentate along margins, sub-cordate or rounded or truncate at base, chartaceous, green, glabrous,
punctiform cystoliths both sides; midvein raised both sides; 5-6-nerved at base, prominent beneath; lateral veins 2-3 paired above, prominent beneath, glabrous; petioles 2-4.5 cm long, stinging hairy; interpetiolar stipules ovate-lanceolate, c. 8 mm long. Inflorescences in short, lax panicles; 2-5 cm long; rachis hairy, pubescent. Male flowers: Tepals 4, free, orbicular, c. 2 x 1 mm. Stamens 4; filaments short. Female flowers pedicellate: pedicels c. 3 mm long, pubescent; bracts lanceolate, c. 3 mm long, hairy. Tepals 4, broadly ovate or suborbicular, c. 2 x 1 mm, pubescent. Staminode absent. Ovary ovoid or ellipsoid, c. 1.25 x 1 mm; style not distinct; stigma branch like. Achene ovoid or ellipsoid, c. 1.25 x 1 mm, punctate gland dotted.

Fl. & Fr.: May-August.

Distrib.: INDIA: Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, China and Nepal.


Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

**ULMACEAE [152]**

**TREMA Lour.**

4 species in India and 1 species in BNP.


Other synonym: *Sponia wightii* Planch.

Illustration: Wight, Icon. Pl. Ind. Orient. 6: t. 1971. 1853 [as *Sponia wightii*].

Plate 54h

Shrubs or trees to 2-5 m high; stems and branches terete, pubrulent. Leaves alternate, ovate or ovate-oblong, 2.5-14 x 1-6 cm, caudate-acuminate at apex, finely serrate along margins, obliquely cordate at base, subcoriaceous, hispid, rough with minute whitish papillae above, tomentose beneath; midvein slightly impressed above, raised beneath, pubescent; 3-7-nerved at base, 4-5 pairs above, prominent beneath, white-tomentose; petioles up to 10 mm long, pubescent. Inflorescences axillary cymes. Flowers unisexual or polygamous. Male flowers globose, 1-1.5 mm across, pubescent, white villous at apex; pedicels 2-12 mm long, pubescent; bracts triangular ovate, 1-1.2 x 0.5-0.7 mm, acute at apex, ciliate along margins. Tepals greenish white, 5-lobed; lobes elliptic, induplicate, appears as boat shape, c. 1.5 x 0.6 mm, villous at apex, pubescent outside, glabrous...
inside. Stamens 5; filaments c. 1.2 mm long, subulate, glabrous; anthers ovate, 0.6-0.7 × 0.4-0.5 mm, dorsifixed. Pistilode obovate, compressed, c. 1.25 × 0.7 mm, densely white sericeous at base. Female flowers: Tepals as in male flowers. Staminate absent. Ovary linear-oblong, 1.25 mm long, densely white hairy at base; style bifid; stigma villous and reflexed in fruits. Drupes dark green, turned black when mature, globose to ovoid-globose, compressed, 3–5 × 2.5–3.5 mm.

Fl. & Fr.: April–December.

Distrib.: INDIA: Throughout. WORLD: China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam; Australia, Pacific Islands.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, 8th April, 2012, Gopal Krishna 56072.

**MORACEAE [154]**

Key to genera

1a. Inflorescences in syconium, with many minute flowers enclosed in a hollow receptacle, opened by an apical pore guarded by bracts............. 3. Ficus

1b. Inflorescences catkins, racemes or globose heads, rarely solitary, or with flowers inserted on discoid receptacle................................. 2

2a. Stamens straight in flower buds, rarely inflexed........................................ 3

2b. Stamens inflexed in flower buds................................................................. 4

3a. Trees; branches without any spines; inflorescences monoecious; tepals 2; stamen 1................................................................. 1. Artocarpus

3b. Scandent shrubs; branches with spines; inflorescences dioecious; tepals 4; stamens 4................................................................. 4. Maclura

4a. Inflorescences 1-8-flowered; mature drupes usually surrounded by persistent perianth............................................................. 6. Streblus

4b.Inflorescences many flowered; fruit enclosed within a syncarp or fleshy perianth........................................................................ 5

5a. Shoots leafless during flowering; perianth lobes valvate in male flowers; female inflorescences in globose heads........... 2. Broussonetia

5b. Shoots at least with young leaves during flowering; perianth lobes imbricate in male flowers; female flowers in axillary spikes............. 5. Morus
1. **ARTOCARPUS** J.R. Forst. & G. Forst. (*nom. cons.*)

12 species in India and 1 species in BNP.


Evergreen trees, to 10–15 m tall; branches striate, lenticellate. Leaves spirally arranged, obovate-oblanceolate or elliptic-oblong. 5.5–11 × 4–6.6 cm, obtuse at apex, entire along margins, attenuate at base, leathery, shining, floccose, lenticellate; midvein raised both sides; lateral veins 6–9 pairs, prominent beneath; petioles 1.5–2.5 cm long; stipules clasping, ovate, 1.5–8 cm, caducous, leaving a scar on branches. Male inflorescences axillary on apical branchlets, cylindric to conic-ellipsoid, 2–3 × 1.3 cm; peduncles 1.3–2 cm long. Male flowers: Tepals tubular, 2-lobed, 1–1.5 mm, pubescent. Stamen 1; filament short; anthers c. 2 × 2 mm. Female inflorescences with globose fleshy rachis. Female flowers: Tepals tubular, apically 2-lobed. Ovary 1-celled; style central or ± lateral; stigmas 1 or 2, equal or unequal. Fruiting syncarp pale yellow when young, yellowish brown when mature, ellipsoid, with stiff hexagonal tubercles and thick hairs. Drupes elliptic, c. 3 × 1.5–2 cm.

Fl. & Fr.: December–May.

Distrib.: INDIA: Almost throughout. WORLD: Cultivated throughout the tropics.


2. **BROUSSONETIA** L'Her. ex Vent. (*nom. cons.*)

3 species in India and 1 species in BNP.


Dioecious large scandent shrubs; branchlets terete, glabrous, drooping. Leaves alternate, oblong-ovate, 8–11 × 3.1–4.8 cm, caudate at apex, serrate along margins, truncate at base, chartaceous, both surfaces glabrous or smooth or very minutely papillate; midvein impressed above, raised beneath, glabrous; secondary veins 3–6 pairs, looping toward margins; petioles 5–8 mm long puberulous; stipules obliquely triangular or lanceolate, 4–5 × 2.5–3 mm, glabrous. Male inflorescences cylindric, spike, 3–5 cm long, pendulous; rachis pubescent; bracts orbicular, c. 1 × 1 mm. Male flowers: Tepals 4, free, triangular ovate, 1.25 × 1 mm, acute at apex, pubescent both sides. Stamens 4; filaments subulate, 2–
2.5 mm long, glabrous; anthers ovoid, c. 0.5 mm long. Pistilode minute. Female inflorescences densely capitate globose, flowers intermixed with bracts; bracts broadly ovate, 2–3 × 1–1.5 mm, acute, ciliate along margins, pubescent both sides. Female flowers: Tepals tubular, apically 4-toothed. Ovary sessile, minute; style linear, exserted, pubescent. Syncarp 0.8–1 cm across. Drupelets compressed, smooth; exocarp woody. 

Fl. & Fr.: February-April. 

Habitat: Grows in open deciduous forests of the park. 

Distrib.: INDIA: Arunachal Pradesh, Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, China, Laos, Myanmar, Thailand and Vietnam. 


Notes: The plant appears to be rare since the last collection was said to be from 1929 from Darjeeling. However, such specimen from (Darjeeling) West Bengal is not found at CAL. 

3. FICUS L. 

115 species in India and 11 species in BNP 

Key to species 

1a. Trailing or stragglers or scandent shrubs ................................................................. 2 

1b. Erect shrubs or trees .......................................................................................................... 4 

2a. Leaves palmately lobed, 3-5-nerved at base; receptacles 

   solitary......................................................................................................................... 6. F. heterophylla 

2b. Leaves unlobed, 3-nerved at base; receptacles in pairs or clusters ......................... 3 

3a. Stipules ovate, early falling; leaves rounded or shortly acuminate at 

   apex; figs greyish green with roughened surface, glabrous ....................5. F. hederacea 

3b. Stipules lanceolate, not early falling; leaves caudate at apex; 

   figs yellow-orange, scabrous ............................................................................... 7. F. heteropleura 

4a. Leaves either opposite or few alternate; receptacles in the 

   axils of leaves/fallen leaves or on tubercles of the stem ............................................. 5 

4b. Leaves alternate; receptacles on leafy branches or leafless 

   drooping branches ......................................................................................................... 7 

5a. Leaf margins serrulate; figs axillary, solitary or in recemes, 

   subglobose, 1.5–2 cm, hirsute ........................................................................... 8. F. hispida 

5b. Leaves margins entire; figs subglobose, 2–3 cm, glabrous
or pubescent; peduncles more than 1 cm, on slender lateral leavesless shoots or on main trunk................................. 6

6a. Leaves obovate to oblong; figs dioecious, globose reddish orange when mature, subglabrous, smooth, arranged in fascicles........ 4. F. fistulosa

6b. Leaves elliptic or elliptic-ovate; figs monoecious, pear shaped basally attenuated into a stalk, green, arranged in a clusters of racemes......................................................... 9. F. racemosa

7a. Leaves strongly asymmetric, unequal; one of the lobes auriculate at base; receptacles on leafless drooping branches.................. 10. F. semicordata

7b. Leaves symmetric, base equal or slightly oblique; receptacles on leafy branches................................................................. 8

8a. Leaves 3-nerved at base; lateral veins not close parallel...............1. F. altissima

8b. Leaves not 3-nerved at base; lateral veins close parallel................................. 9

9a. Leaves sharply or bluntly apiculate or abruptly acuminate at apex; figs green, turned yellow on maturity; achenes smooth....... 2. F. benjamina

9b. Leaves obtuse at apex; figs creamish-white with pinkish spots; achenes tuberculate .......................................................... 3. F. curtipes


Other synonyms: F. laccifera Roxb.; F. latifolia Oken; Ursotigma lacciferum (Roxb.) Miq.; U. altissimum (Blume) Miq.


Trees or sometimes scandent shrubs when young, to 15–20 m tall; branchlets sub-terete, glabrous. Leaves whorled, elliptic-ovate, or oblong-ovate 9.3–30 × 5.5–19.2 cm, broadly acute at apex, entire along margins, asymmetrically truncate or cuneate or rounded at base, coriaceous, green, shining, glabrous; midvein impressed above, raised beneath, glabrous; 3-nerved at base, above lateral veins 5–7 pairs, prominent beneath, looping at margins; petioles 2.5–7 cm long, glabrous, more or less decurrent; stipules ovate-lanceolate, 14–16 × 5–6 mm, acute, glabrous enclosing the bud. Figs axillary on leafy branchlets, usually in pairs, red or yellow when mature, ellipsoid-ovoid, 1–2 × 1–2 cm, sometimes pubescent when very young, glabrous when mature, apical pore navel-like, convex. Involucral bracts hood like, covering young figs, coriaceous, caducous, apex
broadly obtuse, scar ring like. Male flowers: Tepals 4, hyaline. Stamens 1. Gall flowers:
Tepals 4, hyaline; style sub-apical. Female flowers pedicellate; pedicels 1–1.5 mm long.
Tepals 4, sub orbicular, c. 1 × 0.5–0.6 mm. Ovary c. 1 × 0.5 mm; style, c. 0.5 mm long.
Achene tuberculate.

Fl. & Fr.: March–September.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Mizoram,
Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia,

Specimens examined: Buxa National Park, Santrabari Range, 300m, 5th October, 2009,
S.K. Srivastava & Gopal Krishna 46177; 9th October 2009, S.K. Srivastava & Gopal Krishna
46282; Jainti Range, Bhutia Pond, 302m, 7th April, 2012, Gopal Krishna 56048; Gadadhar
Range, Panbari 1-2, 8th April, 2012, Gopal Krishna 56071.

Notes: This species shows variation in habit and leaf size, when young and juvenile this
appears as a scandant shrubs, while on maturity this appears as a tree. Also this size of
leaf decrease as they mature.

Other synonyms: Urostigma benjamina (L.) Miq.; Ficus nitida Thunb.; F. retusa L. var. nitida
(Thunb.) Miq.; F. retusa forma nitida (Thunb.) King;  Ficus retusa Hook.f. nitida (Thunb.)
King. Plate 55c

Local name: “Kamrup-Zir” (Bengali).

Orient. 2: t. 642. 1840-1843.

Trees, to 20–30 m tall; branches pendulous sometimes with few aerial roots, terete,
glabrous. Leaves alternate, ovate-elliptic, 7.5–10.5 × 1.5–5.4 cm, acuminate to caudate at
apex, entire-wavy along margins, cuneate to rounded at base, coriaceous, pale green,
shining above, glabrous; lateral nerves many, inconspicuous; petioles 1–2.5 cm long,
glandular at tip; stipules lanceolate, c. 1 cm long. Hypanthodium monoecious, axillary,
solitary or in pairs, red–bluish orange, sessile; basal bracts 2–3, 2–3 mm long; orifice with
3 apical bracts. Male flowers few, scattered. Tepals 2–4-lobed; lobes ovate–lanceolate, c. 2
mm long, brown. Stamens 1; filament c. 0.3 mm long; anthers subsessile. Gall flowers:
Tepals 3–4-lobed; lobes spatulate. Ovary smooth. Female flowers sessile. Tepals 3–4-
lobed; lobes spatulate. Ovary ovate, c. 0.7 mm across; style and stigma shorter than
achenes. Achenes ovoid, c. 2 mm long, reniform, smooth.
Fl. & Fr.: October–April.

**Distrib.: INDIA:** Almost throughout. **WORLD:** Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; N Australia, Pacific Islands.

**Specimen examined:** Buxa National Park, Gadadhar range, Panbari 8, 31st March, 2012, *Gopal Krishna* 50679.


Other synonym: *F. obtusifolia* Roxb.  

Trees, to 5–10 m high, epiphyte when young, much branched; branchlets sub-terete, glabrous. Leaves alternate, whorled, obovate or oblong-ovate, 9–18 × 3.9–7.5 cm, obtuse or broadly acute at apex, entire along margins, attenuate at base, leathery, green, shining, glabrous; midvein impressed above, slightly raised beneath, glabrous; lateral veins 8–12 pairs, inconspicuous on both sides, glabrous; petioles 1.5–2.3 cm long, robust, glabrous; stipules lanceolate to ovate-lanceolate, 13–18 × 4–9 mm, mucro-acute at apex, glabrous. Figs axillary in pairs on leaf branches, globose to depressed globose, 10–13 × 10–12 mm, greenish yellow with pink spots, pinkish ring at depression, apical pore flat, sessile; bracts suborbicular c. 5 × 6 mm, glabrous. Male flowers shortly pedicellate. Tepals 3, lanceolate, c. 1.25 × 0.5–0.6 mm. Stamen 1. Gall flowers sessile. Tepals 4 (5), lanceolate. Female flowers sessile. Tepals as in male flowers. Ovary c. 1 × 0.5 mm; style sub-apical, c. 1.5 mm long; stigma funneliform. Achene ovoid, tuberculate.

Fl. & Fr.: November–April.

**Distrib.: INDIA:** Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal. **WORLD:** Bangladesh, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Janti range, Bhutia Pond, 312m, 2nd Dec., 2011, *Gopal Krishna* 52306.


Fig. 38. *Ficus fistulosa* Reinw. ex Blume: a. Leafy branch; b. A bunch of figs
Trees, to 7–10 m high; branchlets terete, glabrous. Leaves opposite, whorled, simple, obovate, ovate-elliptic or oblong-ovate, 13.5–19.5 × 6–8.3 cm, shortly acuminate at apex, sinuate along margins, cuneate at base, coriaceous, dull green, glabrous, plump gland dotted beneath; midvein impressed above, raised beneath, glabrous; lateral veins 6–9 pairs, conspicuous above, prominent beneath, glabrous; lateral veins 6–9 pairs, conspicuous above, prominent beneath, glabrous; petioles 1.4–2.5 cm long, scaly; stipules ovate-lanceolate, c. 10 × 4 mm, acute, glabrous, caudous. Figs dioecious, cauline, 3–5 in a fascicles, globose, c. 1.5 cm across, green, reddish orange when mature, glabrous, apical pore not open; peduncles 3–4 cm long, glabrous; peduncular stipules, triangular ovate, c. 0.5 × 1 mm, glabrous. Male flowers few near apical pore, pedicellate; pedicels short. Tepals 3–4-lobed. Stamens 1; filament short. Gall flowers: Tepals 3-lobed; lobes short. Ovary obovate; style lateral; stigma enlarged. Female flowers pedicellate; pedicel c. 1 mm long. Ovary obliquely obovate, c. 3 × 1 mm; style c. 1.25 mm long, hairy; stigma cupular. Achene obovate, c. 10 × 5 mm, with small tubercles

**Fl. & Fr.:** April-July.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jharkand, Meghalaya, Mizoram, Tripura and West Bengal. WORLD: Bangladesh, China, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Vietnam.


**Notes:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.


**Local names:** “Parkat-Dumar” (Bengali).

**Illustration:** Wight, Icon. Pl. Ind. Orient. 2: t. 643. 1840–1843.

Scandant shrubs; branches terete, glabrous, spreading. Leaves alternate, broadly ovate or ovate-elliptic, 3.1–10.5 × 2.3–7.3 cm, bluntly acute at apex, entire along margins, rounded or cuneate at base, leathery, pale green, reddish pale when dry, papillate cystoliths both sides; midvein impressed above, raised beneath glabrous; lateral veins 4–5 pairs, prominent beneath, 3-nevers at base, basal veins up to mid of lemma, glabrous; petioles 9–15 mm long, scaly; terminal stipules lanceolate, c. 13 × 4 mm, glabrous, acute at apex. Figs axillary solitary or 2–3-fascicles, globose, 9–12 mm across, apical pore not opened;
peduncles 7–10 mm long; involucral bracts triangular ovate, c. 0.5 × 1 mm. Male flowers: sessile, scattered. Tepals 3–4-lobed. Stamen 1, free. Gall flowers: pedicellate. Tepals 4-lobed; lobes lanceolate. Ovary obovate; style subapical, short; stigma curved. Female flowers: pedicellate or sessile. Tepals 4-lobed, lobes linear. Achene ellipsoid, c. 2 × 1 mm.

**Fl. & Fr.:** May–March.

**Distrib.:** INDIA: North East India and West Bengal. WORLD: Bhutan, China, Laos, Myanmar, Nepal, and Thailand.


**Notes:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.


**Other synonyms:** *Ficus heterophylla* var. *scabrella* (Roxb.) King; *F. scabrella* Roxb. Plate 55f

**Local name:** "Gaori-Sheora" (Bengali).


Under shrubs, procumbent, to 20–40 cm high; branchlets becoming reddish brown, slender, shortly pubescent, glabrous. Leaves alternate, simple or 1–5-lobed, ovate, 2–4 × 1.8–3 cm, obliquely cordate at base, crenate or denticulate along margins, broadly acute at apex, scabrid above, hispid beneath, green; midvein inconspicuous above, slightly raised beneath, hispid, 5-nerved at base, 3–4 pairs above, inconspicuous both side; petioles 1–2.4 cm long, scabrid; stipules ovate-lanceolate, c. 3 × 1.25 mm, hispid outside, glabrous inside. Figs on leafy or older leafless branches, green, solitary, axillary, globose, 10–16 mm across, appressed hairy, apical pore navellike, convex; peduncles 13–22 mm long, shortly hairy, hispid; peduncle stipular, sub-orbicular, small. Male flowers toward apical pore. Tepals 4-lobed, hyaline; lobes elliptic-lanceolate 1–1.5 × 0.5–0.6 mm. Stamens 1, filament c. 1 mm long; anthers oblong, c. 1 mm long, obliquely attached to filament. Gall flowers as in female flowers. Female flowers: pedicels c. 0.5 mm long. Tepals white, 4-lobed; lobes liner lanceolate, 1–1.25 mm long. Ovary ellipsoid, c. 1.25 × 0.5 mm, slightly awned; style laterally attached, c. 0.5 mm long; stigma capitate. Achenes shortly ellipsoid, c. 1 × 1 mm.

**Fl. & Fr.:** June–December.
Distrib.: INDIA: Almost throughout the hotter parts. WORLD: China, Malaysia, Myanmar and Sri Lanka.

Specimen examined: Buxa National Park, Jainti Range, Jainti 7b, 1st Dec., 2011, Gopal Krishna 52302.


Other synonyms: Ficus heteropleura var. mindanaensis (Warb.) Corner; F. radicans Roxb. (non. Desf. 1829); F. urophylla Wall. ex Miq. Fig. 39; Plate 55g


Scandent shrubs, often epiphytic, young branchlets with scurfy hairs, scabrid. Leaves alternate, elliptic to obovate, 9.3–12.5 × 3.8–5 cm, slightly asymmetric, cuneate at base and, entire or undulate along margin, caudate at apex, tip 1–2 cm long, coriaceous, green, glabrous; midvein impressed above, glabrous, raised beneath, puberulous; lateral veins 5-6 pairs, glabrous, prominent beneath; petiole 6–13 mm long, decurrent, hairy in young; stipules subulate, small. Figs axillary on normal leafy shoots, pinkish to orange or yellow at maturity, hairy, globose, 8–10 mm across, with short thick hairs, apical pore navel-like, convex; peduncles 3–5 mm long, hairy; peduncular bracts 2–3, mostly near the base. Male flowers near apical pore, subsessile. Calyx lobes 4, linear. Stamen 1; rudimentary ovary present. Gall flowers shortly pedicellate; calyx lobes 3; ovary globose; style lateral, short, curved. Female flowers: calyx lobes deeply 3-lobed; style persistent, long; stigma funnelform. Achenes obliquely ovoid, coarse.

Fl. & Fr.: January-August.

Distrib.: INDIA: Andaman & Nicobar islands, Arunachal Pradesh, Assam, Tripura and West Bengal (present collection). WORLD: Bangladesh, Bhutan, China, Indochina, Malaysia, Myanmar and Taiwan.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 6, 30th March, 2012, Gopal Krishna 50659.

Note: New record for West Bengal.


Other synonyms: Ficus oppositifolia Roxb.; Gonosuke hispida (L.f.) Raf.; Covellia hispida (L.f.) Miq. Plate 55h

Local names: “Dumar”, “Kak-dumur”, “Jag-dumar” (Bengali).
Trees or shrubs, to 3–5 m high; stems terete, scurfy, hirsute. Leaves opposite, simple, elliptic-ovate or obovate, 12.5–30 × 6.8–13.5 cm, acuminate at apex, serrate along margins, cuneate at base, coriaceous, green, scurfy hairy, scabrid above, hirsute beneath; midvein impressed above, slightly raised beneath, hirsute; lateral veins 6–8 pairs, prominent beneath, hirsute; petioles 1–2.3 cm long, hirsute; stipules triangular-ovate, 0.6–1.8 × 0.4–0.6 cm, hairy, caducous. Figs solitary or paired, axillary, urn shaped, 1.5–2 cm across, hirsute; peduncle 8–9 mm long, hirsute; peduncular bracts 2–3, broadly ovate, c. 1.25 × 1.5 mm, hirsute outside, glabrous inside. Male flowers near apical pore, sessile, c. 1.25 × 0.8 mm. Tepals 4-lobed; lobes obovate, 1–1.5 × 1 mm. Stamen 1; filament flattened, c. 1 mm long; anthers sub orbicular c. 1 × 0.75 mm. Gall flowers: Tepals absent, style subapical, short, thick. Female flowers: Tepals absent; style lateral, hairy.

Fl. & Fr.: June–December.


Specimen examined: Buxa National Park, Rajabhatkhawa Range, 4th Dec., 2011, Gopal Krishna 52313.

Use: Fruits used as vegetable.


Other synonyms: Ficus glomerata Roxb.; Covellia glomerata Miq.; F. lanceolata Buch.-Ham. ex Roxb. Plate 56a


Trees, to 10–15 m high; branchlets terete, pubescent. Leaves alternate, elliptic-ovate, elliptic, or narrowly elliptic, 7.3–12.1 × 1.8–2.8 cm, acuminate at apex, entire along margins, cuneate at base, sub-coriaceous, green, glabrous except veins; midvein impressed above, raised beneath, pubescent; lateral veins 7–9 pairs, inconspicuous above, prominent beneath, puberulous; petioles 10–22 mm long, appressed hairy; stipules ovate-lanceolate, 8–13 × 2–3 mm, ciliate along margins, midvein hairy, membranous. Figs borne laterally, rarely axillary on leafless branches, occasionally axillary on leafy shoot or on older leafless branchlets, paired, subglobose, 2–2.5 cm across, reddish orange when mature; peduncles c. 1 cm long; involucral bracts triangular ovate. Male Flowers near

Fl. & Fr.: September-February.


10. Ficus semicordata Buch.-Ham. ex Sm. in Rees, Cycl. 14: no. 71. 1810.
Other synonym: Ficus cunia Buch.-Ham. ex Roxb.
Local names: “Jog-dumur”, “Kurali”, “Parah” (Bengali).

Trees, 10–15 m tall; branchlets sub-terete, scurfy hairy, scabrid. Leaves alternate, simple, ovate-lanceolate, 16–20 × 4.5–6.6 cm, acuminate at apex, denticulate along margins, semicordate at base, coriaceous, green, scabrid both sides; midvein impressed above, raised beneath, coarsely hairy; basal lateral veins 3 or 4 on auriculate side of leaf blade, and extending into auriculate base; secondary veins 10–14 pairs, prominent beneath, coarsely hairy; petioles 10–14 mm long, hairy; stipules triangular ovate, c. 3 × 2 mm. Figs in raceme, 1–2 at per axile, borne in leafless branches, globose, 5–11 mm across, green; peduncle 5–7 mm long, robust, stiffly hairy; stipules triangular ovate, c. 2 × 1.5 mm, hairy outside, glabrous inside. Male flowers: near apical pore. Tepals 3-lobed; lobes oblanceolate. Stamens 1; filaments short; anthers white. Gall flowers: Tepals 4-5 lobed; lobes linear-lanceolate 5–6 mm long; style lateral, short. Female flowers: Tepals 4–5-lobed. Ovary ovoid-ellipsoid, 2–3 × 2–5 mm; style lateral, 7–9 mm long; stigma shallowly 2-lobed. Achene broadly ovoid.

Fl. & Fr.: May–October.


Specimen examined: Buxa National Park, Rajabhatkhawa Range, 70m, 9th October, 2009, S.K. Srivastava & Gopal Krishna 46263.
4. **MACLURA** Nutt.
   
   6 species in India and 1 species in BNP.


Other synonym: *Cudrania cochinchinensis* (Lour.) Kudo & Masam; *Cudrania javanensis* Trecul.

Local name: "*Manda*" (Hindi).

Illustration: M. Blanco, Fl. Filip. t. 418.1875.

Scandent or erect shrubs; young branches pubescent turned glabrous on maturity; spines axillary, curved or straight, 1–3 cm long. Leaves alternate, elliptic-obovate, 3–9 × 1.5–3 cm, acuminate at apex, entire along margins, cuneate at base, leathery, glabrous; midvein prominent; secondary veins 5–9; petioles 0.5–1 cm long; stipules small, lateral, caducous. Inflorescences dioecious, in small globose heads. Male inflorescences capitate, 0.5–1 cm across, pedunculate. Male flowers: Tepals 4, puberulous. Stamens 4, filaments straight in bud; anthers short. Female inflorescences heads 6–8 mm across. Female flowers: Tepals as of male flowers; joined in the lower part and fused; style 1, 1.5–2.5 mm long, undivided. Fruiting syncarp 1.5–2 cm wide, succulent, yellow to orange-red. Drupes brown when mature, ovoid, smooth.

Fl. & Fr.: March–July.


Specimens examined: Buxa National Park, Damanpur Forest, Rajabhatkhawa, 23.04.1959, C. R. Das 54; Rajabhatkhawa Depot Road, 14.05.1949, V. Narayanswami & party 2404.

Uses: It is usually used as a hedge plant. Fruits are edible and wood yields a yellow dye.

5. **MORUS** L.

9 species in India and 1 species in BNP


Local name: "*Tut*" (Bengali).

Dioecious shrubs or trees, to 2–3 m high, much branched; branchlets subterete, glabrous. Leaves ovate or ovate-lanceolate, 3–9 × 2.5–6 cm, acuminate or caudate at apex, serrate along margins, subcordate to cordate at base, chartaceous to subcoriaceous, pubescent, scabrous or glabrous scabrous both sides; midvein impressed above, faintly raised beneath, pubescent; secondary veins 3–5 pairs, prominent beneath, pubescent; petioles 1–2 cm long, pubescent; stipules linear-lanceolate, 5–8 mm long, chartaceous. Male spikes lax, on short slender peduncles. Male flowers pedicellate; pedicels c. 2 mm long, pubescent. Tepals 4, free; ovate, c. 2 × 1 mm, acute at apex, chartaceous. Stamens 4; filaments c. 2 mm long; anthers ovoid c. 1 mm long. Female spikes short, ovoid. Female flowers: sessile. Tepals 4 in 2-whorls, overlapping; outer lobes obtuse at apex, ciliate along margins, more or less keeled; inner lobes, obtuse, ciliate along margins. Ovary c. 1 × 1 mm, glabrous, enclosed by the perianth lobes; style bifid above, 2–3.5 mm long, whitish hairy. Fruiting spikes 0.75–2 × 0.75 cm, the perianth base become fleshy, red at first, becoming blackish-purple when mature and enclosing the achenes.

Fl. & Fr.: February–May.

Distrib.: INDIA: Almost throughout (cultivated).

Specimen examined: Buxa National Park, Rajabhatkhawa range, 26th mile watch tower, 14th Feb., 2010, S.K. Srivastava & Gopal Krishna 47080.

Use: fruits are edible.

6. STREBLUS Lour.

5 species in India and 1 species in BNP.


Plate 56d, e

Local name: "Assan" (Bengali).


Trees, to 10–15 m tall; bark grey with whitish patches, scabrous; branchlets hanging, terete, with short stiff hairs, lenticelate; lenticels conspicuous when young. Leaves alternate, simple or lobed, elliptic or elliptic-obovate, 2.5–6 × 2–3.5 cm, blunt to shortly acuminate at apex, crenate along margins, obtuse or cordate at base, coriaceous, green, scabrous; midvein conspicuous above, raised beneath; lateral veins 4–7 pairs, prominent beneath; petioles sessile or sub-sessile; stipules small, caducous. Male inflorescences solitary or paired, capitate; peduncles 8–10 mm long, pubescent; bracts few at
inflorescence base, none between flowers, small, narrowly elliptic; bracteoles 2, at base of calyx, larger than bracts. Male flowers: subsessile; pistillode conic to cylindric, apically tuberculate. Female inflorescences pedunculate; bracts 1 or 2, at base of peduncle, minute; bracteoles at base of calyx. Female flowers: calyx lobes pubescent; ovary globose; style apically branched, 6–12 mm in fruit. Drupes yellow, globose, c. 6 mm across, enclosed by enlarged sepals.

Fl.: February-April; fr.: April-June.

Habitat: Grows along the Bala river.


Specimen examined: Buxa National Park, Jainti range, NRVK 5a, 9th March 2011, Gopal Krishna 50515.

Notes: In literature, it was reported that in some cases inflorescences are monoecious with flower heads with 1 central sessile female flower surrounded by male flowers. This was not noticed in present collections.

FAGACEAE [157]

CASTANOPSIS (D. Don) Spach (nom. cons.)

6 species in India and 3 species in BNP.

Key to species

1a. Cupules smooth, unarmed, with 4-6 wavy bands ......................... 2. C. lanceifolia
1b. Cupules spiny .......................................................... 2

2a. Leaves margins entire; spines of cupules, 4–6 mm long................ 1. C. ferox
2b. Leaves margins serrate-denatate; spines of cupules 5–12 mm long...... 3. C. Indica

Other synonym: Castanopsis tribuloides var. ferox (Roxb.) King ex Hook.f.


Trees, 10–20 m tall; branchlets terete. Leaves alternate, oblong or oblong-ovate, 8–12.5 × 3.2–5.5 cm, acute to acuminate at apex, entire along margins, cuneate at base, coriaceous; midvein impressed above, raised beneath, glabrous; lateral veins 11–13 pairs, prominent beneath; petioles 1.5–2 cm long. Inflorescences in spike; rachis tomentulose. Male flowers: Tepals 6, connate below, free above. Stamens 12; filaments short. Female spikes 15–20 cm
long. Cupules globose to broadly ovoid, 2–2.5 cm across, greyish-brown pubescent, thin walled, covered with 4–6 mm long spines. Nuts subglobose, c. 1 cm across, smooth.


**Distrib.**: INDIA: North East India, Sikkim and West Bengal. WORLD: Bangladesh, China, Laos, Myanmar, Thailand and Vietnam.

**Specimen examined**: Buxa National Park, East Damanpur range, NRVK 11-12, 29th Nov., 2011, Gopal Krishna 47170.

**Note**: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

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**Other synonym**: *Quercus serrata* var. *roxburghii* (Endl.) A. DC; *Quercus serrata* Roxb.

**Plate 56f**

**Local names**: “Banakkatus”, “Dalnekatus” (Nepali).


Trees, to 15–20 m tall; branchlets terete, hispid. Leaves oblong-ovate, 10.3–18 × 4.1–7 cm, acute or acuminate at apex, serrate-dentate along margins, rounded or cuneate at base, coriaceous, green shining, glabrous above, finely brownish pubescent beneath; midvein impressed above, raised beneath, hispid; lateral veins 15–19 pairs, prominent, hispid beneath; petioles 4–5 mm long, hispid. Inflorescences spikes often paniculate, 10–15 cm long; rachis densely brownish tomentose, suberect, male spikes several, 1–2 terminal female spikes below. Male flowers 2–3 mm across, in axils of minute bracts. Tepals 6-lobed; lobes ovate, c. 1 × 1 mm, hairy both sides. Stamens 8; filaments 2–3 mm long; anthers white, ovoid, c. 1 mm. Female flowers usually solitary, densely tomentose. Cupule globose, c. 2.5 cm across including branching needle-like spines, puberulent; spines 5–12 mm long, splitting irregularly into 3–4-segments at maturity. Nuts ovoid, c. 1.25 × 1 cm, pubescent at apex around mucronate stylar remains.

**Fl. & Fr.**: September–May.

**Distrib.**: INDIA: North East India, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

**Specimen examined**: Buxa National Park, Jainti range, Jainti 8–9, 6th Oct., 2009, S.K. Srivastava & Gopal Krishna 46197.
Fig. 40. *Castanopsis lanceifolia* (Oerst.) Hickel & A. Camus: a. Flowering branch
Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.


Other synonym: Pasania lanceifolia Oerst.


Trees, to 5–7 m high; branchlets terete, glabrous. Leaves alternate, simple, oblong-ovate or oblong-lanceolate or oblong-obovate, 7.5–15 × 3–5 cm, acuminate or obtuse at apex, entire along margins, cuneate at base, coriaceous, green shining above, pale green beneath, glabrous; midvein impressed above, raised beneath, glabrous; lateral veins 10–13 pairs, prominent beneath, glabrous; petioles 1.8–2 cm long, glabrous; axillary bud conspicuous. Male spikes 5–15 cm long, branched; rachis terete, white tomentose. Male flowers, sessile. Tepals 6-lobed, free above, connate below; lobes linear-lanceolate or suborbicular, c. 1.5 × 0.5–1.5 mm, obtuse at apex, slightly thickened at base, hairy both sides. Stamens 12; filaments 1–2.5 mm long, glabrous; anthers crimson, globose, 2–3 mm. pistilode villous. Female flower solitary or in clusters of 3–5. Tepals as in male flowers. Staminodes present. Ovary 3-loculed; styles 3; stigmas punctiform or shallow terminal pores. Cupules ovoid, asymmetric 2–3 × 1.5–2 cm, thin, completely enveloping nut, smooth with 4–6 wavy bands, rupturing irregularly at maturity. Nut ovoid, 1.5–3 × 1–1.5 cm, brown, glabrous but with a few reddish hairs at apex.

Fl. & Fr.: November-February.

Distrib.: INDIA. North East India and West Bengal. WORLD: Bangladesh, Myanmar, Nepal and Thailand.


**MONOCOTYLEDONS**

**HYDROCHARITACEAE [34]**

Key to genera

1a. Usually monoecious; leaves lanceolate to orbicular, usually petiolate; stamens 1–3; fruits winged; seeds densely hairy............... 1. Ottelia

1b. Dioecious; leaves linear to ribbon like, sessile; stamens 6–15; fruits
not winged; seeds glabrous

1. **OTTelia** Pers.

   1 species in India and BNP.


   **Local name:** “Parmi-kalla” (Bengali).

   **Illustrations:** Roxb., *Pl. Coromandel* 2: t. 185. 1798; Curtis’s, *Bot. Mag.* 30: t. 1201. 1809.

   Monoecious or rarely dioecious, glabrous submerged herbs; roots fibrous, branched. Leaves radical, submerged or partly emergent, crowded, ovate-suborbicular, or lanceolate, c. 20 × 18 cm, acute at apex, wavy along margin, sub-cordate to truncate at base, coriaceous, veins obscure both sides; petioles angular, 8.5–27 cm long, variable in length depends upon depth of water. Inflorescences solitary flower, sessile; spathe 2.5–4 × 1.5–2.5 cm, 2 or 3-lobed at apex, with 3–6 longitudinal wings. Sepals 3, green, linear-lanceolate, 1.2–1.8 × 0.6–0.8 cm, obtuse at apex. Petals 3, white, obovate or orbicular with fleshy basal appendages, c. 2.5 × 2.5 mm, obtuse at apex. Stamens 6–15, 2–5-seriate; filaments glandular hairy; anthers yellow, narrowly oblong, 3–4 mm. Ovary sub-globose; style 6, linear, 2-fid. Fruits oblong, enclosed in a spathe, 2–5 × 0.8–1.8 cm, 3–6-winged, many seeded; seeds fusiform, 1–2 mm, densely hairy.

   **Fl. & Fr.:** February–October.

   **Distrib.:** **INDIA:** Assam, Bihar, Goa, Karnataka, Maharashtra, Manipur, Madhya Pradesh, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. **WORLD:** Cambodia, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Sri Lanka, Vietnam; Africa, Australia; introduced in North America.

   **Specimen examined:** Buxa National Park, Rajabhatkhawa range, 16th Feb., 2010, S.K. Srivastava & Gopal Krishna 47129.

2. **Vallisneria** Mich. ex L.

   1 species in India and BNP.


   **Local name:** “Sayala” (Hindi).

   **Illustration:** Hook., *Bot. Misc.* 3: 87, t. 23. 1833.
Dioecious submerged, stoloniferous herbs. Leaves tufted, linear, 20–30 × 0.3–0.7 cm, acute at apex, wavy along margin, coriaceous, glabrous, veins impressed above, glabrous. Male flowers many, minute in an ovoid 3-lobed, shortly peduncled spathe, female flower solitary in a tubular, 3-toothed spathe; scape spiral, filiform, 30–50 cm long. Male flowers: Sepals 3-lobed; lobes oblong-ovate, c. 2 × 1 mm; tube c. 12 mm long, glabrous. Petals absent. Stamen 1–3; filaments thick; anthers 2-celled. Pistilodes absent. Female flowers: Sepals and petals as in male flower. Staminodes 3, bifid. Ovary linear, c. 6 × 1.5 mm; style c. 2 mm long; stigma 3-fid. Fruits linear, 6–7 mm long, enclosed by spathe, many seeded; seeds many, oblong, c. 0.5 mm long.

Fl. & Fr.: December-March.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Delhi, Goa, Himachal Pradesh, Karnataka, Manipur, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Burma, Sri Lanka, Nepal and Pakistan.


**ORCHIDACEAE [62]**

Key to genera

1a. Plants usually terrestrial, grows from tubers or a horizontal fleshy rhizome; anthers basifixed or not; pollinia segmented, comprising massulae or mealy.......................................................... 2

1b. Plants usually epiphytic or lithophytic, growing from cylindric stems or pseudobulbs, borne on woody or tough rhizomes; anthers not basifixed; pollinia mealy or hard, often attached by a stalk to a sticky viscidium.......................................................... 3

2a. Stigma 1, stigma lobes connate, positioned below rostellum................. 6. Goodyera

2b. Stigmas 2, stigma lobes separate, convex, lateral or at apical corners of column.......................................................... 12. Zeuxine

3a. Monopodial.......................................................... 4

3b. Sympodial.......................................................... 8

4a. Pollinium porate at apex.......................................................... 5

4b. Pollinium cleft or split, or sometimes divided into 2 unequal halves........... 6

5a. Leaves linear-lanceolate; lip spurred or saccate at base......................... 5. Gastrochilus

5b. Leaves narrowly terete; lips neither spurred nor saccate......................... 8. Luisia
6a. Stipe broad, short, shorter or slightly longer than pollinia;
   viscidium usually suborbicular to transversely elliptic......................... 12. Vanda
6b. Stipe narrow, long, much longer than pollinia, usually
   widened toward apex; viscidium not as above............................................ 7
7a. Plants large, with thick aerial roots; leaves 20–40 cm long................. 11. Rhynchostylis
7b. Plants medium-sized, without thick aerial roots;
   leaves 4–20 cm long............................................................................. 1. Acampe
8a. Pollinia 8 ................................................................................................................................. 9
8b. Pollinia 4–6 ............................................................................................................................ 10
9a. Column with a conspicuous foot......................................................... 4. Dendrobium
9b. Column without a conspicuous foot.................................................... 9. Phaius
10a. Inflorescence arising from base of pseudobulbs or from rhizome...2. Bulbophyllum
10b. Inflorescence arising from upper part of stem or pseudobulbs............... 11
11a. Pollinarium with neither caudicle nor viscidium; stems fleshy or with
   internodes enlarged to form pseudobulbs, sometimes bamboo like or
   bamboo-shoot-like toward end, or covered completely by fleshy
   bases of laterally compressed leaves....................................................... 12
11b. Pollinarium with both caudicle and viscidium; stems without above
   combination of characters, occasionally corm like at base................... 13
12a. Stems unbranched, short or tall; leaves equitant
   and fleshy or membranous................................................................. 4. Dendrobium
12b. Stem branched, branches formed by chains of
   superposed, sessile pseudo bulbs; leaves not as above..................... 7. Flickingeria
13a. Lip not or only slightly concave, but never
   saccate at base............................................................................. 3. Coelogyne
13b. Lip concave-saccate at base ......................................................... 10. Pholidota

1. ACAMPE Lindley (nom. cons.)
   5 species in India and 1 species in BNP.
Prain, Bengal Pl. 2: 1022. 1903.
Other synonyms: Acampe carinata (Griff.) Panigrahi; Gastrochilus carinatus (Ridl.) Schltr;
Sarcanthus papillosus (Lindl.) Tixier. Plate 57a
Illustration: Edwards’s Bot. Reg. 18: t. 1552. 1832 [as Saccolabium papillosum].

Stems 5–20 cm or longer, 7–9 mm across; internodes 1–2 cm long, laxly clothed with many distichous leaf-sheaths; rooting at nodes. Leaf blades oblong, 9–13 × 1.1–1.8 cm, obtuse and obliquely bi-lobed at apex, amplexicaul-sheathing at base, entire, leathery, glabrous. Inflorescences often several, leaf-opposed or axillary, 1–4 cm, sub-umbellate, densely few to many flowered; peduncle 3–10 cm; floral bracts broadly triangular, 1–2 mm, fleshy, acute. Flowers slightly fragrant, opening widely; sepal and petals yellow with reddish brown transverse stripes, lip creamy white, spotted with purple-red, spur yellow; pedicel and ovary c. 5 mm, pale yellow. Dorsal sepal oblong, c. 8 × 2.5 mm, obtuse; lateral sepals falcate-oblong, c. 8 × 2.5 mm, obtuse. Petals narrower. Lip 3-lobed, hypochile weakly saccate, with erect-triangular side-lobes; epichile ovate, c. 3.5 × 3 mm, erose, papillose towards base, warty above; spur straight, cylindric-conical, c. 3 × 2 mm, pubescent within. Column c. 1.5 mm, stout, slightly shortly hairy; anther cap sub-globose. Capsules erect or ascending, fusiform, 2–3 × 0.4–0.8 cm.

Fl.: November-December.

Distrib.: INDIA: North East India. WORLD: Bhutan, Cambodia, China, Laos, Myanmar, Sri Lanka, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti range, NRVK 5a, 27th Nov., 2011 Gopal Krishna 47147.

2. BULBOPHYLLUM Thouars (nom. cons.)

103 species in India and 1 species in BNP.

Other synonym: Bulbophyllum careyanum var. crassipes (Hook.f.) Pradhan.
Illustration: Curtis’s, Bot. Mag. 71: t. 4166. 1845 [as Bulbophyllum careyanum sensu Hook.].

Epiphytes. Rhizome stout, rooting from base of pseudobulbs. Pseudobulbs ovoid-conical, 2.5–3.5 × 1.8–2.5 cm, inserted at intervals of 3–8 cm along rhizome. Leaf 1, oblong, 6.5–13.5 × 1.8–3.3 cm, entire, obtuse and slightly emarginate at apex, tapered at base, thickly leathery, glabrous, mid-vein prominent beneath; petioles 1–1.5 cm long. Racemes lateral from pseudobulb base, stout, densely many-flowered; peduncle thick, short, sheathed, 1.5–2 × 0.3–0.6 cm; sheaths overlapping, tubular, 0.7–1.2 cm long, mouth wide; rachis 4–5 cm long; floral bracts pale brown, ovate-lanceolate, 4–6 × 1.2–1.6 mm, acute. Flowers 4–6 mm long, sepals greenish to golden, spotted with purple; dorsal sepal oblong, concave, c. 6 × 3 mm, obtuse-rounded; lateral sepals ovate-lanceolate, oblique, glabrous, 5–7.5 × 3–4
Petals whitish with purple markings, obliquely triangular, 2.5–3 × 2 mm, 1-veined, apex shortly caudate. Lip yellowish-gold or purplish-red, simple to obscurely 3-lobed, oblong, grooved above, margins entire, 2.5–3 × 2–2.5 mm. Column slender, 2–3 mm; stelidia deltoid, c. 1 mm, apex acute; foot c. 2 mm, with free part c. 1 mm; anther cap glabrous.

Fl.: September–October.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, Malaysia, Myanmar and Thailand.


3. COELOGYNE Lindl. (’Caelogyne’)

37 species in India and 1 species in BNP.


Other synonyms: Coelogyne fuliginosa Lodd. ex Hook.; Pleione fuliginosa (Lodd. ex Hook.) Kuntze; Coelogyne arunachalensis H.J. Chowdhery & G.D. Pal.


Epiphytes. Rhizomes creeping, branching, sheathed. Pseudobulbs ovoid-fusiform to fusiform, c. 5.5 × 1.8 cm, smooth, ridged when matured, sheathed at base, with 2 leaves at apex; sheaths c. 2.5 cm, membranous, deciduous. Leaves elliptic or ovate-lanceolate, c. 12 × 4 cm, acute to acuminate at apex, coriaceous, glabrous, midvein prominent; petioles c. 2 cm long, grooved. Inflorescences few flowered, hysteranthous; peduncle slender, enclosed at base by tubular sheathes, c. 5 cm long; rachis often with 1 or 2 or rarely to 3 or 4 flowers opening successively, apex of rachis enclosed in several white bracts; floral bracts caducous. Flowers 3–4 cm across, pale yellowish-green, lip marked brown, keels darker brown, column yellowish green; pedicel and ovary slender, 1–1.4 cm long. Dorsal sepal ovate-lanceolate, c. 2.7 × 1.3 cm, acute; lateral sepals lanceolate, acuminate, reflexed, c. 3 × 0.7 cm. Petals linear, c. 2.7 × 0.1 cm, acute, reflexed. Lip 3-lobed, saccate at base; lateral lobes oblong to triangular, erect, partly enclosing the column, lower part of margins ciliate; mid lobe ovate, rounded at apex, mucronate, ciliate margins. Disk 3-keeled at base of lip. Column c. 13 mm, slightly arching, winged both sides; wings
widened toward column apex, obtuse at apex; anthers c. 2.5 mm; rostellum c. 2 mm.
Capsules sub-obovoid, c. 2.5 x 1.2 cm; fruiting pedicel c. 5 mm.

Fl. & Fr.: August–November.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, Myanmar, Nepal and Vietnam.


4. DENDROBIUM Sw. (nom. cons.)

16 species in India and 2 species in BNP.

Key to species

1a. Sepals and petals pinkish or white; lip uniformly pinkish,
margins not strongly plumose fimbriate ................................................. 1. D. aphyllum

1b. Sepals and petals bright yellow; lip with a single central
purple blotch, margins strongly plumose-fimbriate......................... 2. D. fimbriatum


Other synonym: Cymbidium aphyllum (Roxb.) Sw. Plate 57b

Illustration: Roxb., Pl. Coromandel 1: t. 41. 1795.

Epiphytes; stems slender, pendent, 25–65 cm long, expanded at nodes; internodes sheathed, 1.6–2.5 cm long; sheaths funnel shaped. Leaves lanceolate to ovate-lanceolate, 4.5–10 x 0.4–3 cm, sub-acuminate, distichous, subcoriaceous, glabrous, sessile.

Inflorescences lateral, arising from nodes of old stems, 1-flowered; floral bract ovate, 4–5 mm long, scarious. Flower fragrant, 2–5 cm across; pedicel and ovary slender, 1.5–2 cm long. Sepals pinkish to pale purplish, subequal, oblong-lanceolate, sub-acute, 5-veined; dorsal sepal c. 2.4 x 0.5 cm; lateral sepals adnate at base to form a mentum, c. 2.5 x 0.4 cm; mentum c. 4 x 2 mm, short, obtuse. Petals ovate-lanceolate to elliptic, 2.1–2.4 x 0.9–1 cm, obtuse, 5-veined. Lip pale yellow with purple lines basally, broadly suborbicular, shortly clawed, margins erose basally, becoming ciliate towards apex, pubescent, convolute over the column, 2.5–2.6 x 1–2.1 cm. Column 6–7 mm long. Fruits clavate, 3–6 x 0.6–0.9 cm

Fl. & Fr.: March–April.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan.

Other synonyms: Callista fimbriata (Hook.) Kuntze; Dendrobium normale Falc. Plate 57c
Illustration: Hook., Exot. Fl. 1: t. 71. 1823.

Epiphytes; stems rigid, decumbent or pendulous, cylindric or sometimes slightly fusiform above base, 30–100 cm, stout, unbranched, with many nodes; internodes 1–2 cm. Leaves oblong-lanceolate to narrowly elliptic-lanceolate, 8–11.4 × 0.9–1.8 cm, mucro-acute at apex, entire along margins, leathery, glabrous, sheaths clasping at base. Inflorescences racemose, arising from nodes, pendent, laxly 6-12-flowered; peduncle 2–4 cm; rachis glabrous, 5–15 cm; floral bracts ovate-triangular, 3–7 × 1.5–2 mm, acute at apex, membranous. Flowers mild fragrant, spreading, thinly textured; pedicel and ovary pale green, 2.5–3 cm. Sepals and petals bright yellow, lip with purplish red blotch on either side at base. Dorsal sepal oblong, 2–3 × 1.2–1.8 cm, 5-veined, obtuse at apex, margin entire; lateral sepals obliquely ovate, adnate at base to form a mentum, 2.6–3 × 0.6-lcm, obtuse at apex, entire along margins; mentum rotund, c. 3 mm. Petals suborbicular, to oblong-elliptic, 2–3 × 1.4–1.8 cm, 5-veined, obtuse at apex; lips suborbicular, 2.5–3 × 2–3 cm, densely pubescent, base narrowed into a claw c. 3 mm, margin plumose-fimbriate. Column c. 2 mm.; foot c. 4 mm; anther cap conic, glabrous, front margin denticulate.
Fl.: March–May.

5. GASTROCHILUS D. Don

11 species in India and 1 species in BNP.
Other synonym: Gastrochilus bigibbus (Rchb.f. ex Hook.f.) Kuntze.

Epiphytes; stems stout, with 3–5 leaves, pendent, covered with overlapping leaf sheaths; leaf sheaths 1.5–2 cm long. Leaves nearly basal, distichous; blade oblong to oblong-
lanceolate, 8–20 × 1.7–6 cm, unequally 2-lobed, apex obtuse and slightly fleshy or leathery. Inflorescences 1–4, from base of stem, subumbellate, often 5–8-flowered; peduncle straight, 1–2 cm, stout, with 2 cupular sheaths; floral bracts broadly ovate, c. 3 mm; pedicel and ovary 1–1.5 cm. Flowers fragrant, with yellow sepals and petals and white lip, all with brownish purplish spots. Sepals similar, subelliptic, 6–12 × 3.5–6 mm, base contracted, apex obtuse. Petals spreading, oblong-oblanceolate, 6–7 × 1–1.5 mm, obtuse. Lip 3-lobed, adnate to the column, with an epichile and a saccate hypochile; epichile subtriangular, c. 5 × 8–10 mm, glabrous, with a central cushion; hypochile saccate, 5–6 × 4–5 mm lateral lobes shallow; mid-lobe thick, semi-circular to triangular, margins deeply lacinate; disk glabrous; sac 3–5 mm deep. Column 1–2 mm long; anther cap shortly beaked, depressed; caudicle c. 1.5 mm long; pollinia 0.8–1 mm across; viscidium 0.8–1 mm long. Fruits cylindric, 2.5–4 × 0.5–0.7 cm.

Fl.: October–December.


6. GOODYERA R. Br.

17 species in India and 1 species in BNP.


Other synonyms: Epipactis procera (Ker Gawl.) A.A. Eaton; Goodyera carnea A. Richard; Orchidoides procera (Ker Gawl.) Kuntze; Peramium procerum (Ker Gawl.) Makino. Plate 57d

Illustrations: Hook., Exot. Fl. 1: t. 39. 1823; Edward’s, Bot. Reg. 8: t. 639. 1822 [as Neottia procera Ker Gawl.].

Terrestrial herbs, to 50–70 cm high; rhizomes creeping, decumbent, rooting at the nodes; stems erect, terete, unbranched, 3–4 mm across, glabrous, enclosed with leaf sheath due to withering of upper leaves. Leaves 5–7 enclosed with stem, ovate elliptic or oblong-elliptic, 8.9–12 × 2.3–4.2 cm, apex mucro-acute, margins entire, base attenuate, chartaceous, pale green, glabrous, obscurely 7–9-veined, glabrous; petioles 5–8 cm long, sheathing; sheath 2.5–4 cm long, glabrous. Inflorescences densely flowered; rachis 12–30 cm long; floral bracts ovate-lanceolate, acuminate, margins ciliate, 0.5–1 cm long. Flowers
fragrant, subglobose, 3–4 mm across, white; pedicel and ovary, 3–5 mm long. Sepals ovate to ovate-elliptic to elliptic, 3–3.5 × 1.7–2.5 mm, acute. Petals spathulate, acute, forming a hood with the dorsal sepal, 2–3 mm long. Lip subglobose-saccate. 1.5–2.5 mm long. Disk covered with pellucid glands; apex recurved, with 2 white tubercles at the base. Column fleshy, 1–1.5 mm long; rostellum divergent, finely streaked.

Fl. & Fr.: March–May.


7. FLICKINGERIA A. D. Hawkes (nom. cons.)

7 species in India and 1 species in BNP.


Other synonym: Dendrobium sordidum King & Pantl.

Epiphytes; stems long, pendent, branched, yellowish, shining; internodes 1.5–2.5 cm long; pseudobulbs on stem nodes, narrowly fusiform, more or less compressed, shining, grooved, 3–5 × 0.5–0.6 cm. Leaf solitary, terminal from pseudobulb, linear-oblong, to narrowly oblong-elliptic, minutely emarginate, veined, sessile, 7–16 × 1.7–2.7 cm. Inflorescences 1- or 2-flowered; peduncle sheathed, short; sheaths overlapping, lanceolate, 3–5 mm long, acute, membranous; floral bracts triangular, 0.5–1 mm long. Flowers 0.8–1.5 cm long. Sepals and petals white, lips white, apex green-yellow, lateral lobes marked with purple spots; pedicel and ovary glabrous, 5–6 mm long. Dorsal sepal elliptic-oblong to oblong, c. 1 × 4 mm, subacute, spreading, 5-veined; lateral sepals elliptic-oblong, 1–1.2 × 0.3–0.6 cm, sub-acute; mentum short, broad, conical. Petals narrowly elliptic-oblong, c. 0.1 × 0.1–0.2 cm, subacute. Lip oblong-ovate 1–1.3 × 0.6–0.7 cm; hypochile wedge-shaped; lateral lobes oblong, c. 3 mm long, erect; mesochile narrow, margins plicate; epichile broadly oblong-elliptic, apex truncate to obscurely 2-lobed, margins undulate; disk with 2 plicate lamellae from hypochile base to epichile. Column 6–7 mm long, apical margin denticulate; foot medium; anther cap c. 0.3 mm wide. Fruits ovoid, c. 2 × 1.2 cm.

Fl.: May-August.
Distrib.: INDIA: North East India, Sikkim, Uttarakhand and West Bengal. WORLD: Bhutan, Myanmar and Thailand.


8. LUISIA Gaudich.

16 species in India and 1 species in BNP.


Other synonyms: Luisia siamensis Rolfe ex Downie.; Luisia indivisa King & Pantl. Plate 57e

Epiphytes; stems sub-erect, to 18 cm long, stout, internodes 1-1.5 cm, covered by leaf sheaths; sheaths striate, tubular, adherent, glandular-pubescent, overlapping, 1-1.5 cm long. Leaves terete, straight to curved, 5-17 x 0.3-0.4 cm, obtuse at apex. Inflorescences leaf-opposed, short, 4-5-flowered; peduncle thick, 1-2 mm long, sheathed; rachis thick. 4-5 mm long; floral bracts triangular-ovate, 1-1.5 x 1-1.5, fleshy. Flowers 3-4 mm long. Sepals and petals yellowish green, midvein purplish brown, lip pale yellow, column green, purple margined, anther cap yellow spotted with purple; pedicel and ovary c. 6 mm, pale yellow, tinged with purplish brown. Dorsal sepal ovate, c. 4 x 2.3 mm, obtuse; lateral sepals ovate-oblong, 4-4.5 x 2.5 mm, apex obtuse. Petals narrowly oblong, 5-6 x 1.6-1.8 mm, obtuse; lip c. 5 mm, glabrous; hypochile concave, narrower than epichile, base without distinct lateral lobes; epichile nearly suborbicular or triangular-rhombic, c. 3 x 4.5 mm, obtuse. Column c. 2 mm, stout; stigma transversely elliptic; anther cap c. 2 x 1.5 mm. Fruit cylindric, 2.5-3.5 x 0.3-0.4 cm.

Fl.: March-April.

Distrib.: INDIA: Uttarakhand, Meghalaya and West Bengal. WORLD: Bhutan, China, Laos, Myanmar and Vietnam.


9. PHAIUS Lour.

7 species in India and 1 species in BNP.

Plate 57: a. Acampe papillosa (Lindl.) Lindl.; inset: flower (close up); b. Dendrobium aphyllum (Roxb.) C.E.C. Fisch.; c. Dendrobium fimbriatum Hook.; d. Goodyera procer (Ker Gowl.) Hook.; e. Luisia brachystachys (Lindl.) Blume; f. Phaius tankervilleae (Banks) Blume
Other synonym: Phaius wallichii Lindl.


Terrestrial herbs, to 1–2 m high. Pseudo-bulb conic, ovoid, or subglobose, 6–8 × 3–6 cm, sheathed by leaves. Leaves 2–6, on upper part of pseudobulb; elliptic-lanceolate, 30–100 × 8–20 cm, glabrous, apex acuminate. Inflorescences arising from base of pseudobulb or axils of leaves, 50–200 cm, loosely 10–25-flowered, glabrous; floral bracts lanceolate, 4–5.5 × 1.8 cm, glabrous, caducous. Flowers large, 7–12.5 cm across; pedicel and ovary 2.5–4.5 cm, glabrous; sepals and petals whitish outside, reddish brown or brown inside. Sepals oblong-lanceolate, 4–6.5 × 1–1.5 cm, glabrous, apex acuminate to acute. Petals lanceolate-oblong, 4–6.5 × 0.8–1.5 cm, apex acuminate to acute; lip white toward base, pink or red-pink toward entrance with white stripes on inside, 3.5–6 × 2–5 cm, broadly rhombic-ovate, shallowly 3-lobed; lateral lobes short, margin undulate, apex rounded; mid-lobe orbicular or transversely oblong, margin slightly undulate, apex truncate and emarginate or rounded and mucronulate; disk usually with 2 or 3 ridges, densely puberulent; spur hooked, whitish yellow, narrowly cylindrical, 0.6–1 × 0.1–0.2 cm, apex unequally 2-lobed or unlobed. Column white, 2–2.2 cm, puberulent ventrally; rostellum subligulate. Fruits ellipsoid, 5–7 × 1.5–3 cm.

Fl.: March–June.

Distrib.: INDIA: North East India and West Bengal. WORLD: widely distributed in tropical and subtropical Asia and Oceania.


Note: This species is confined to Panbari compartment 8, 9, 10 of Gadadhar range of the Park.

10. PHOLIDOTA Lindl. ex Hook.

11 species in India and 1 species in BNP.


Other synonyms: Coelogyne imbricata (Lindl.) Rchb.f.; Cymbidium imbricatum (Hook.) Roxb.; Pholidota bracteata (D. Don) Seidenf.; Ptilocnema bracteata D. Don.


Epiphytes. Rhizome creeping, 5–7 mm across, densely covered with scaly sheaths; sheaths lanceolate 2–13 × 0.5–0.8 cm, acute. Pseudobulbs sub-oblong, 4–8 × 1–1.5 cm,
obscurely 4-ridged. Leaf oblong-oblanceolate or broadly oblanceolate, 19-32 × 4.2–4.5 cm, shortly acuminate or micro-acute at apex, cuneate at base, thinly leathery, midvein prominent; petioles 1.5–6 cm. Inflorescences arising from young pseudobulbs; rachis nodding, 15–30 cm, 4-to 10-flowered; floral bracts broadly ovate, 4–7 × 4–8 mm, persistent. Flowers c. 5 mm across, cream coloured; pedicel and ovary 4–5 mm. Dorsal sepal orbicular or broadly elliptic, 3–4.5 × 3–4.5 mm, 5-veined, midvein slightly raised; lateral sepals free, ovate, 4–6 × 3.5–4 mm. Petals sublinear-lanceolate, 3–4.5 × 1–1.5 mm, 1-veined; lip saccate, 4–6 mm long, slightly 3-lobed; lateral lobes broadly oblong, 2.5–3 × 2 mm, erect; mid-lobe sub-oblong, 3–4 mm wide, margin slightly undulate, apex emarginate; disk with 2 or 3 longitudinal lamellae or thickened veins near base. Column spatulate-clavate, 3–4 mm long, hooded; foot 0.2–0.4 mm long. Capsules obovoid-ellipsoid, 1–1.3 cm × 6–7 mm; fruiting pedicel 2–4 mm.


Distrib.: INDIA: North East India, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Sri Lanka, Thailand, Vietnam; Australia, South West Pacific islands.


11. RHYNCHOSTYLIS Blume

1 species in India and BNP.


Other synonyms: Aerides retusa (L.) Sw.; Gastrochilus retusus (L.) Kuntze.; Limodorum retusum (L.) Sw.; Saccolabium retusum (L.) Voigt.

Local names: “Kapu”, “Sita”(Bengali).

Illustration: Curtis’s, Bot. Mag. 70: t. 4108. 1844.

Plants epiphytes, pendant; stems ascending, stout, usually 3–10 cm, enclosed in leaf sheaths; sheaths overlapping, 1.5–2 cm long. Leaves broadly lorate, 12–18 × 2.4 cm, retuse or unequally bilobed, thickly leathery, glabrous, sessile. Inflorescences emerging from leaf sheath, cylindric, densely many-flowered 1–3, pendulous; rachis c. 23 cm long, thick; floral bracts reflexed, broadly ovate 5–6 × 1.5–2 mm, membranous. Flowers unscented, 1.7–2.3 cm across; pedicel and ovary 7–10 mm. Sepals white and spotted with pink or
pale purple; dorsal sepal elliptic, 7–11 × 4.2–5 mm, obtuse at apex; lateral sepals obliquely oblong, 7–11 × 4.5–5.5 mm, base adnate to column foot, obtuse at apex. Petals white and spotted with pink or pale purple, narrowly oblong, 7–7.5 × 2.5–3 mm, obtuse at apex; lip purplish pink often conduplicate, oblong-spathulate, 8–10 × 5–6 mm, rounded, apiculate, or slightly retuse, spurred; spur laterally compressed, 6–8 mm, rounded.

Column c. 4 mm, foot c. 2 mm; stipe c. 2.2 mm, linear, dilated and capitate; viscidium oblanceolate, c. 1.8 × 0.6 mm. Capsules obovoid or subclavate, 6-ribbed, 2.5–2.8 × 1–1.3 cm.


12. VANDA Jones ex R. Br.

12 species in India and 2 species in BNP.


Other synonym: Vanda roxburghii R. Br. Plate 58b

Local name: “Rasna”( Bengali).

Illustration: Bot. Reg. 6: t. 506 1820 [as Vanda roxburghii R. Br.].

Epiphytic herbs; stems 10–30 cm long, ascending or rarely arching, stout, rigid, with short internodes. Leaves linear, distichous, keeled and unequally bilobed at apex. Inflorescence erect, axillary racemes, equalling the leaves. Flowers yellow to yellowish-brown, about 1.5 cm across, stout, long peduncled, with small, ovate, acute floral bracts. Sepals yellow, spathulate, obtuse, spreading; dorsal larger. Petals yellow, almost equalling the sepals, falcate, spathulate-oblong, spreading. Lip reflexed, 3-lobed, with erect oblong, rounded lateral lobes; mid lobe ligulate, oblong, thick, fleshy, with dilated apex. Spur conical, slender, half the length of the lip, hairy within.

Fl.: April–September.

Distrib.: INDIA: Throughout.

Specimen examined: Buxa National Park, Jainti range, Jainti 6a, 10.3.2011, Gopal Krishna 46521.

16 species in India and 2 species in BNP.

Key to species

1a. Withering at anthesis; lips yellow...................................................... 1. *Z. clandestina*

1b. Not withering at anthesis; lips white................................................... 2. *Z. nervosa*


Terrestrial herbs, 10–25 cm tall. Rhizome creeping, terete, pale brownish to yellowish-green, rooting at nodes. Roots fleshy, pale brown, with minute root-hairs; stems terete, erect, unbranched, 5–10 cm long, 2–5 mm thick, glabrous, occasionally with 1–3 membranous sheaths formed by withered leaf-bases. Leaves 4–7, scattered along stem, sometimes crowded towards apex, glabrous; petioles 2–5 mm long, sheathing at base; lamina ovate to ovate-lanceolate, 12–35 x 9–25 mm, occasionally oblique, obtuse at base, acute at apex, green with obscure reticulations when young, 3-veined. Inflorescences terminal raceme, laxly 6 to many flowered, pale brown, pubescent; peduncle up to 12 cm long, with 2–4 sheathing bracts; sheathing bracts lanceolate, 10–16 mm long, long-acuminate at apex, pubescent, 1-veined; rachis up to 10 cm long. Floral bracts ovate-lanceolate, 4.5–8 x 1.5–2.2 mm, acuminate at apex, pale pinkish-white, shorter or slightly longer or as long as pedicel plus ovary, pubescent, with one distinct mid-vein and two obscure lateral veins. Flowers 6–10 mm long, resupinate. Sepals free, pale green to brownish-green, pubescent, sub-acute to obtuse at apex, with 1 distinct mid-vein and 2 incomplete obscure lateral veins; dorsal one ovate, 2.5–4 x 1.5–2.2 mm, adnate to petals forming a hood on column; lateral ones ovate, 2.5–4 x 1.5–2.2 mm, occasionally slightly oblique. Petals obliquely linear-oblong, 2.9–3.8 x 0.8–1.1 mm (at widest portion), acute at apex, pale white, glabrous, 2-veined, one extending to tip and the other not. Labellum 3-lobed, 2.5–3 mm long, pale lemon-yellow to yellowish-white or rarely white, base with pale pinkish-white to pale greenish to greyish tinge; hypochile sacculate, 0.9–1.1 x 1–1.2 mm, with 1 narrowly oblong-filiform curved appendage on either side; mesochile oblong-squarish, 0.6–1 x 0.6–1 mm, incurved in margins; epichile 2-lobed, lobes sub-squarish, 0.6–1.1 x 0.5–0.9 mm, sub-truncate at apex, divergent, often with a minute sinus in between. Column 1–1.5 mm long, pale white to pale pinkish-white, without true wings but with a seam with upward tongues which appears as small wing-like projections below rostellum; rostellum bifid, arms 0.5–0.7 mm long, projecting, sub-acute at apex. Stigma 2-lobed, lobes elliptic-orbicular, well separated, sub-lateral. Anther-cap oblong-ovate, 1.3–1.8 x 0.4–0.7 mm, white with reddish tinge; pollinarium 1.5–2 mm long, pale
yellow; pollinia 2, narrowly oblong-ovate to obclavate, 0.9–1.2 mm long, sectile, bifid; caudicles linear-oblong, 0.3–0.4 mm long; tegula linear-oblong to ovate-oblong, about c. 1 × 0.25 mm, pale mustard yellow, semi-transparent; viscidium narrowly oblong-elliptic, about c. 0.75 × 0.2 mm. Ovary including pedicel elliptic-oblong to terete, c. 4.8 × 1.2 mm, twisted, green, laxly pubescent to nearly glabrous.

Fl.: March-April.

Distrib.: INDIA: Arunachal Pradesh, Assam and West Bengal. WORLD: Indonesia, Malaysia and Thailand.

Specimen examined: Buxa National Park, Jainti range, Jainti 7, 5 March, 2011, Gopal Krishna 47288.

Notes: New record for West Bengal. This is the first representative collection at CAL.


Terrestrial herbs, 20–35 cm high. Rhizome elongate. Stems erect, 1–2 mm across. Leaves clustered at stem apex, not usually withering at anthesis, ovate to ovate-elliptic, 4–6 × 1.5–2.5 cm, acute at apex; adaxially green, usually with silvery blotches or a white line along midvein, petiole-like base 1–1.5 cm including tubular sheath. Inflorescences 18–28 cm, with 2 or 3 widely spaced sterile bracts, sparsely villous; rachis 3–10 cm, with a few to more than 10 subdensely arranged flowers; floral bracts ovate-lanceolate, cymbiform, 6–10 × 3–4.5 mm, reddish brown, abaxially puberulent to glabrous, margin ciliate, apex acuminate. Flowers fragrant, resupinate, weakly spreading, small; ovary and pedicel fusiform, 8–9 mm, glabrous to puberulent. Sepals reddish brown to yellowish green, glabrous; dorsal sepal ovate, 5–5.5 × 4.5–5 mm, concave, apex acute or subacuminate; lateral sepals oblong-ovate, 6–6.5 × c. 3.5 mm, apex acute to obtuse. Petals white, ovate, c. 5.5 × 3.2 mm, oblique, glabrous, apex obtuse; lip white or pale yellow, to 7 mm long, 3-partite; hypochile concave-saccate, c. 2.5 × 2.5 mm; mesochile relatively long and narrow, c. 1.5 mm, margin incurved; epichile dilated, c. 4 mm wide, 2-lobed; lobes diverging at an acute angle, suborbicular, c. 2 × 2 mm. Column c. 2.2 mm; wings prominent, broadly triangular; rostellum arms c. 1.2 mm.

Fl.: February–March.


Specimen examined: Buxa National Park, Jainti range, Jainti 6-7, 8.03.2011, Gopal Krishna 50502.
COSTACEAE [88]

HELLENIA Retz.

5 species in India and 1 in BNP.


Other synonyms: Costus speciosus (J. Koenig) Sm.; Hellenia speciosa (J. Koenig) Govaerts (isonym).

Local names: “Kust”, “Keu” (Bengali).


Rhizomes tuberous, 1–2 cm thick, branched, perennial, yellowish-green inside. Leafy shoots to 1–2 m high. Stems covered with leaves sheaths. Leaves spirally on the stems, elliptic, elliptic-oblong or oblong-ovatovate, 9.5–25.5 x 4.5–7.5 cm, acuminate at apex, entire along margins, cuneate at base; coriaceous, tuberculate above, appressed hairy beneath; midvein obscure above, raised beneath; leaf sheath tubular, c. 5.5 x 1.2 cm, hairy. Inflorescences terminal dense head, c. 9 x 6 cm. Flowers sessile; bracts green to crimson-red, oblong-ovate, c. 3.6 x 1.5 cm, cuspidate at apex, entire, hairy along margins, coriaceous, glabrous, gland dotted beneath; bracteoles oblong-ovate, 1-1.5 x 0.7 cm, acute, keeled, glabrous or minutely hairy, tinged with red. Sepals white, 3-lobed above; lobes elliptic-oblong, 3.8–4.3 x 2–2.3 cm, acute at apex, entire, membranous, glabrous. Petals white, shallowly 3-lobed above, c. 5 cm long, glabrous, yellowish inside; densely hairy, faintly pinkish; labellum 5–8 cm wide, suborbicular, white with a creamy-yellow median band, hairy along the band. Perfect stamen 1; filament c. 3 mm long, subulate, glabrous. Ovary compressed, flattened, 5–8 mm long, hairy, 3-celled; style filiform; stigma ciliate. Capsules subglobose, c. 1.3 x 1 cm, many seeded; seeds black with fleshy white aril, tetragonous, 3–4 x 2.5–3 cm.

Fl. & Fr.: April-November.

Distrib.: INDIA: Throughout. WORLD: Bhutan, Sri Lanka and Malaysia.


ZINGIBERACEAE [89]

Key to genera

1a. Bracts of inflorescences adnate to each other by their lower
margins, forming pouches; anther versatile, spurred basally................. 2. Curcuma
1b. Bracts usually free to base, not forming pouches; anther
versatile or not................................................................. 2
2a. Inflorescence terminal on a leafy shoot, shoot well-formed; rarely plant
stemless and infl. arising from centre of a tuft of leaves................................. 3
2b. Inflorescence basal, borne directly on rhizome.......................................... 5. Hemiorchis
3a. Filament strongly curved in upper part; ovary unilocular;
flowers under 3 cm long, sometimes replaced by bulbils........................ 3. Globba
3b. Filament not or slightly curved; ovary trilocular; flowers
usually much larger; bulbils rarely formed ............................................. 4
4a. Lateral staminodes reduced to small subulate points or
swellings; plane of distichy of leaf blades transverse to rhizome................. 1. Alpinia
4b. Lateral staminodes well-formed, petal-like; plane of distichy leaf
blades parallel to rhizome...................................................... 4. Hedychium

1. ALPINIA Roxb. (nom. cons.)
11 species in India and 1 species in BNP.

Burm.f., Fl. Ind. 2. 1768. Plate 58g

Rhizomatous herbs; pseudo-stems c. 3 m or more. Ligule 2-cleft, to 1 cm, slightly
tomentose. Leaves oblong-lanceolate or lanceolate, 34–56 × 5–7 cm, acuminate at apex,
entire undulate along margins, acute at base, coriaceous, glabrous shining above,
pubescent to glabrescent beneath, midvein impressed above, prominently raised
beneath, pubescent; petiole 3–4 cm long, grooved. Inflorescence racemes erect, 25 cm;
rachis stout, densely yellow pubescent; bracteoles white, broadly elliptic, 3.5–4 cm,
pubescent, enveloping the flower bud. Flower pedicels c. 3 mm long, densely yellow
pubescent. Sepals campanulate, c. 1.5 cm, densely sericeous. Petals white, sericeous; tube
c. 1 cm; lobes oblong-lanceolate, 2.5–3 cm. Lateral staminodes absent. Labellum yellow
orange with red stripes, broadly ovate, c. 3.5 × 3 cm, apex emarginate. Stamens 1;
filaments c. 1 cm long; anthers c. 1.2 mm. Ovary villous. Capsules yellow, globose, c. 2 cm
across, pubescent, dehiscing irregularly, many seeded; seeds ovoid, c. 5 mm long, 3–4-
angled.
Fl.: April; fr.: April–November.
Fig. 41. Curcuma aromatica Salisb.: a. Habit; b. Flower (opened); c. Anther
Plate 58: a. Pholidota imbricata Hook.; b. Vanda tessellata (Roxb.) Hook. ex G. Don; c - d. Zeuxine nervosa (Wall. ex Lindl.) Benth. ex Trimen: c. Inflorescence; d. Flowers (close up); e - f. Hellenia speciosa (J. Koenig) S.R. Dutta: e. Flowering branch; f. Fruiting branch; g. Alpinia malaccensis (Burm.f.) Roscoe
Distrib.: INDIA: Assam, Meghalaya and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia, West Malaysia, Myanmar and Thailand.

Specimen examined: Buxa National Park, Rajabhatkhawa range, 21 mile from Rajabhatkhawa, 13.5.1949, V. Narayanswami & party, 2359.

2. CURCUMA L. (nom. cons.)

29 species in India and 1 species in BNP.

Curcuma aromatica Salisb., Parad. Lond. 1: t. 96. 1807; Baker in Hook.f., Fl. Brit. India 6: 210. 1870; Prain, Bengal Pl. 2: 1042.1903. Fig. 41; Plate 59a

Illustration: Parad. Lond. 1: t. 96. 1807.

Rhizomatous herbs; rhizome yellow, scented; roots thick, stout. Leaves broadly lanceolate, 25–70 × 0.6–14 cm, acuminate at apex, wavy along margin, leathery, glabrous above, shortly hairy pubescent beneath, parallel-veined; nerves prominent beneath, shortly hairy pubescent; petiole sometime equaling to length lamina. Inflorescence compound spike, c. 14 × 7 cm, pedunculate; peduncle 15–16 cm, puberulent; lower bracts green, obovate, 3–3.2 × 1.5–1.6 cm, broadly acute at apex, ciliate along margin, truncate at base, membranous, shortly hairy pubescent both side; upper bracts deep pink, oblong-ovate, c. 5.5 × 1.6 cm, broadly acute at apex, ciliate along margins, truncate at base, membranous, shortly hairy pubescent both side. Sepals green, 3-lobed, free above; lobes unequal, ovate, c. 3 × 2.5 mm, hairy; tube c. 8 mm long. Petals cream-yellow, 3-lobed; lobes c. 7.5 × 5 mm, outer hooded, concave, hairy. Stamen 1; filament short; anthers oblong, c. 3.5 × 2 mm, spurred at base. Ovary 3-celled; style filiform, 10–13 m long, sparsely hairy; stigma turbinate, c. 1 mm across, shortly hairy along margin.

Fl.: March-July.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, China, Myanmar, Nepal and Sri Lanka.


Note: The leaves appear after flowering.

3. GLOBBA L.

21 species in India and 1 species in BNP.

Other synonym: *Globba bulbosa* Gagnep.

**Illustration:** Sm., Exot. Bot. 2: t. 117. 1808.

Erect herbs with creeping rhizome to 30–60 cm high; stems terete, striate, glabrous. Leaves alternate, simple, elliptic-lanceolate, 7–15 × 09–2.4 cm, acute to acuminate at apex, entire along margin, cuneate at base, sub-coriaceous, sparsely hairy above, glabrous beneath except midvein, acrodromous; midvein impressed above, raised beneath, densely short hairy. Flowers in terminal panicle, 5–7 cm long; rachis puberulent; bracts ovate, 5–11 × 3.5–6 mm, acute at apex, undulate along margin, nerves acrodromous, caducous. Sepals 3-lobed, connate below; lobes triangular 1.5–2 × 1.5–2 mm; tube c. 3 mm long. Petals orange, 3-lobed, free above; lobes oblong-ovate, 3–4 × 2–2.5 mm, gland dotted; tube c. 4 mm long, slightly curved. Stamen 1; filament long, incurved, c. 3 mm long, with 2-dorsal appendages; anthers oblong, c. 2 mm long, connected spurred. Staminode petaloid. Ovary 1-loculed; style filiform, c. 9 mm long, pubescent, placed in grove of style; stigma turbinate, hairy. Capsules globose smooth.

**Fl.:** May-August; **fr.:** August–October.

**Distrib.:** INDIA: Meghalaya, Sikkim and West Bengal. WORLD: Bhutan, China, Myanmar, Nepal, and Thailand.

**Specimen examined:** Buxa National Park, Jainti range, Bhutia Hills, 4th Oct., 2009, S.K. Srivastava & Gopal Krishna 46121.

4. **HEDYCHIUM** J. Koenig


Herbs with perennial, horizontal tuberous rootstocks. Leafy shoots 1–1.5 m. Leaves alternate, elliptic or ovate-oblong 24–45 × 5.8–11.5 cm, acuminate at apex, entire along margin attenuate at base, coriaceous, scabrous above, appressed hairy, floccose beneath; midvein impressed above, raised beneath; lateral veins conspicuous acrodromous; petioles 1–1.5 cm long. Flowers in terminal spike, 7–13 cm long; bracts convolute, oblong-ovate, 2.4–3.2 × 2–2.7 cm, broadly acute at apex, ciliate along margin, cuneate-rounded at base, subcoriaceous, keeled, imbricating, main axis concealing, each subtending 1–2 flowers. Sepals shorter than bracts, tubular, pale green, tubular enclosing the petals, c. 2 cm long, sparsely pubescent outside, glabrous inside, chartaceous-leathery. Petals white, tubular, 3–3.5 cm long, sparsely pubescent throughout outside, densely pubescent at
base, glabrous inside. Lateral staminodes linear-lanceolate; lip 3–4 cm, 2-fid, clawed. Stamens 1, perfect; filaments long, exserted, 6–7 cm long; anthers 5–7 mm long. Ovary 3-loculed; placentation axile; style long, filiform; stigma sub-globose.

Fl.: August–November.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bangladesh and Bhutan


5. HEMIORCHIS Kurz

3 species in India and 1 species in BNP.


Herbs with rhizomes; rhizomes 15–25 cm long, branching, sparsely clothed with short fibers. Leafy shoot to 80 cm with well-developed pseudo-stem appears after flowering. Leaves ovate-lanceolate, 15–40 × 3–6 cm, acuminate at apex, margins strigulose, narrowed at base into short winged petioles, subcoriaceous, glabrous beneath, strigulose above; veins of upper surface strigulose. Inflorescence basal, appearing before leaves; peduncle erect 8–10 cm, clothed with lanceolate; bracts linear-lanceolate, c. 1 cm. Flowers bisexual spicate, yellow and pink, axis slightly tomentose. Sepals tubular, 3-lobed; lobes subequal, 0.6–0.8 cm, sub-acute, lobes shorter than the corolla-tube. Petals 6-lobed, arranged in 2-whorls; outer whorl pinkish, ovate-narrowly lobed, c. 1.2 cm; inner whorl yellowish, shorter than the outer whorl lobes; middle lobes rhomboidal concave with a central thick ridge from base to apex; two lateral segments broad, obovate, emarginated. Lateral staminodes yellow with pinkish-brown spots, suborbicular, 0.5–0.6 cm across; lips yellow, central thickened part purplish, c. 1 cm, suborbicular. Fertile stamens 2, incurved; filament c. 0.5 cm; anthers 0.3–0.5 cm. Ovary obliquely and narrowly ellipsoid, striate, 1-celled; style filiform, lying in a groove on the face of the filament and between the anther-cells; stigma projecting slightly above the apex of the anther, minute, cup-shaped. Capsules fusiform, c. 3 cm long, puberulous, 8–10-ribbed; seeds broadly ovoid, c. 2.5 mm long, with a short white fleshy arillus.

Fl.: March–April.
Fig. 42. Hemiorchis pantlingii King: a. Leafless plant with flower; b. Flower (opened)
MARANTACEAE [87]

Key to genera

1a. Herbs; leaves more than 20 cm long; inflorescences a condensed head .................................................. 1. Phrynium

1b. Shrubs; leaves less than 20 cm long; inflorescences terminal, pedunculate raceme............................................. 2. Schumannianthus

1. PHRYNIUM Willd. (nom. cons.)

6 species in India and 1 species in BNP.


Other synonym: Phrynium capitatum Willd. Plate 59e

Local name: “Kudali” (Nepali).

Illustration: Wight, Icon. Pl. Ind. Orient.: t. 16. 1845 [as Phrynium capitatum Willd.].

Rhizome creeping, thick. Basal leaves 1 or more; cauline leaf 1 or absent. Leaf blade oblong-elliptic, 20–30 × 10–14 cm, shortly cuspidate, entire along margins, attenuate at base, subcoriaceous, midvein impressed above, raised beneath, appressed-bristly beneath; leaf sheath and petiole long. Inflorescences of c. 3 narrow, condensed, spike-like cymes; cymule 2.3–2.5 × 1.4–1.6 cm. Phylls broadly oblong, apex fibrous, reddish-brown, margins scarious, finely ribbed, very stiff, with scattered, appressed, whitish hairs on outside. Flowers bisexual. Sepals linear, c. 1 cm, glabrous. Petals purple, 3-lobed; tube cylindric; lobes oblong, obtuse at apex, spreading, chartaceous, hairy towards inner side, prominently bluish nerved. Staminodes 3; outer 2 obovate (1 larger than other); 1 with retuse apex, pinkish-white. Ovary glabrous, 3-locular, 1-ovule in each locule or rarely 2; style adnate below to the staminal tube, free, hooked above; stigma capitate. Capsules turbinate, 3-lobed, oblong-obovoid, c. 1.3 × 0.8 cm, truncate at apex, retuse, enclosed by bracts; bracts ovate, c. 2. 8 × 2 cm, rigid, several fid, coriaceous, sparsely pubescent outside, glabrous inside.

Fl. & Fr.: May-March.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan and Sri Lanka.

2. SCHUMANNIANTHUS Gagnep.

2 species in India and 1 species in BNP.


Other synonym: Clinogyne dichotoma (Roxb.) Salisb.; Maranta dichotoma (Roxb.) Wall.


Illustration: Wall., Pl. Asiat. Rar. 3: t. 286. 1832 [as Maranta dichotoma].

Shrubs, 2–4.5 m high; stems dichotomously branches. Leaves narrowly elliptic, or oblong-elliptic, 8–15 × 3.5–7 cm, shortly acuminate at apex, entire along margins, coriaceous, glabrous; petioles narrowly winged up to pulvinus; pulvinus c. 0.5 cm. Inflorescences terminal panicles, c. 13 cm long. Flowers usually in pairs with 3–7 prophylls; prophylls stiffly erect, narrowly lanceolate, acute, 4–4.5 cm long, pale brown. Sepals 3, narrowly triangular, 6 × 1.5 mm. Petals 3, white, lanceolate, c. 3.5 × 0.6 cm, tube short. Stamens 1, perfect; connate in a corolla tube, segments petaloid. Staminodes 2, oblanceolate, c. 3.5 cm. Ovary 3-loculed, 1-ovule in each locule; style adnate below to the staminal tube, free, hooked above; stigma capitate. small, densely hairy. Fruit indehiscent, 1–3-seeded; seeds sub-globose, arillate.

Fl. & Fr.: June-October.

Habitat: Grows in moist and damp places.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bangladesh, Bhutan and Malaya Peninsula.


Use: The older stems are used for preparation of mates (Pati).

CONVALLARIACEAE [75]

OPHIOPOGON Ker Gawl. (nom. cons.)

11 species in India and 1 species in BNP.

d. Hemiarchis pantingii King (flowers); e. Phrynium pubinerve Blume; f - g. Ophiopogon
intermedius D. Don: f. Habit; g. Fruits (close up)
Other synonym: *Ophiopogon wallichianus* (Kunth) Hook.f.

**Illustration:** Wight, Icon. Pl. Ind. Orient. 6: t. 2050. 1853.

Perrenial herbs, with thick root stocks, 30–40 cm high. Leaves basal, borne in tufts, linear, 21–39 × 0.3–1 cm, acute at apex, serrulate along margins, attenuate and swollen at base, sub-coriaceous, pale green, glabrous, 5–7 veined. Scape c. 25 cm long, strongly curved below the Inflorescence. sometimes slightly flattened and narrowly 2-winged.

Inflorescences 4–13-flowered panicle; bracts oblong-ovate, c. 2 × 0.75 mm; pedicel c. 2 mm long. Flower solitary or in paired, white, cup-shaped, 7–11.1 mm. Tepals 6, free; lobes ovate to ovate-lanceolate, 7–8 × 2.5–3.5 cm, acute, membranous. Stamens 6; filaments 1–2 mm long; anthers 2–4.5 mm long. Ovary globose; style basally slightly widened. Berries ovoid, 7–10 mm across; seeds ovoid, 5–7 × 5–6 mm.

**Fl.**: May-August; **fr.**: August-October.

**Distrib.:** INDIA: Arunachal Pradesh, Meghalaya and West Bengal. WORLD: Bhutan, China and Nepal.

**Specimens examined:** Buxa National Park, Jainti range, Jainti 8, 12th Oct., 2010, S.K. Srivastava & Gopal Krishna 46317; East Damanpur range, Checko, 29th Nov., 2011, Gopal Krishna 47164.

**Note:** The species is known from Darjeeling district. Present collection is from Jalpaiguri district.

**DRACANEACEAE [75]**

**DRACAENA** Vand. ex L.

10 species in India and 1 species in BNP.

*Dracaena angustifolia* (Medik.) Roxb., Hort. Bengal. 24. 1814; Hook.f. in Hook.f., Fl. Brit. India 6: 327. 1892. *Terminalis angustifolia* Medik., Theodora: 83. 1786. **Fig. 43; Plate 60a, b**

Pachycaul herbs, to 1–3 m high; stems terete, stout, glabrous, simple or forked. Leaves spaced along distal part of stems, whorled, simple, sword-shaped to linear-oblanceolate, 22–42 × 2–2.8 cm, acute at apex, wavy along margins, leathery, green, shining, glabrous; paralleloclomorous, midvein obscure above, raised beneath. Inflorescences terminal panicles, branched; rachis 20–28 cm long, glabrous; branches subtended by bracts; inflorescence bracts leafy, linear-lanceolate or ovate, 2.2–4 × 0.6–1 cm, acute at apex, wavy along margins. Flowers in clusters of 2 or 3, bisexual, oblong-cylindric in bud, 0.8–1.1 cm long; pedicels 2.5–5 mm long, glabrous; bracts broadly ovate, c. 2 × 2 mm, acute at apex. Tepals greenish white, tubular, 6-lobed; tube linear-oblong, 7–8 × 0.5 mm; lobes linear,
Fig. 43. *Dracaena angustifolia* (Medik.) Roxb.: a. Flowering branch; b. Flower (opened); c. Gynoecium
1.1–1.6 cm long. Stamens 6, adnate to base of ytepalm; filaments c. 5 mm long, flattened; anthers linear-oblong, c. 2.5 mm long, sagittate at base, divergent. Ovary oblong-ovate, c. 2 x 1.25 mm, glabrous, 3-loculed; style flattened, c. 6.5 mm long; stigma capitate. Berries globose, 0.8–1.2 cm across, green, shining, shallowly 2-lobed.

Fl. & Fr.: November–March.


Notes: This species preferably grown in moist and damp places, under shade. In the Park this species having good population in East Damanpur and Godadhar ranges.

**DIOSCOREACEAE [46]**

**DIOSCOREA L. (nom. cons.)**

29 species in India and 3 species in BNP.

Key to species

1a. Stems angled or winged ................................................................. 2. *D. hamiltonii*

1b. Stems terete ................................................................. 2

2a. Leaves coriaceous; secondary veins prominent on underside,
forming ladder-like pattern; upper leaves usually shallowly
cordate, lower ones sagittate with angled basal lobes .................. 1. *D. belophylla*

2b. Leaves thin-textured; secondary veins not prominent on underside,
not forming ladder-like pattern about midrib; upper leaves truncate,
no leaves sagittate ................................................................. 3. *D. glabra*


*Dioscorea nummularia* Lam. var. *belophylla* Prain, Bengal Pl. 2: 1065, 1067. 1903.

Twining herbs; stems terete, pubereluent. Leaves alternate, cordate or triangular ovate, 6–12 x 3–6.3 cm, broadly acute to acuminate at apex, undulate along margin, cordate at base (in basal leaves) or truncate or subcordate at base (terminal leaves), coriaceous, glabrous; nerves palmately 7–9-nervous, prominent beneath, glabrous; petioles 4–6.4 cm, terete, glabrous. Inflorescences axillary panicle, 8–17 cm long; rachis hirsute. Flowers sessile;
bracts narrowly ovate or sub-orbicular. Male flowers: sessile, c. 0.5 × 0.5 mm; bracts sub-orbicular, c. 0.5 × 0.5 mm. Perianth lobes 6, obovate, c. 0.75 × 0.5 mm, thickened, glabrous. Stamens 6; filament free around pistilode, 0.2–0.3 mm long; anthers small, tetrathecous. Capsules with narrower wings so more obovate in outline.
Fl.: October-December; fr.: December-January.
Distrib.: INDIA: Bihar, Jharkhand and West Bengal. WORLD: Bhutan.

Tuber deeply buried, long-stalked, narrowly cylindric, skin dark or black, flesh white; plant glabrous; stems twining to right angled, drying reddish-brown, lacking prickles, bulbils apparently abundant. Leaves usually opposite, lower ones ovate, c. 21 × 12.5 cm, cuspidate at apex, base deeply cordate; upper and lateral ones deltoid, 6–11 × 3.5–6 cm, acuminate at apex, cordate at base, basal lobes slightly angled; petioles short, angled. Male inflorescence: spikes borne in groups of 2–6 on leafless, unbranched axes; axes 7–20 cm, borne singly or in unequal pairs, angled; spikes l–2 cm, axis zigzag, filiform, flowers distant. Male flowers globose: Sepals ovate, c. 1 × 1 mm, concave, subacute to rounded at apex, thick-textured, reddish-brown. Petals smaller, oblanceolate, fused into cup below. Anthers c. 0.3 × 0.2 mm, longer than filaments. Female spikes single or paired in axils, rather few-flowered. Capsules erect, apex retuse, c. 2.9 cm, pale brown; wings c. 2.2 cm wide, semi-circular, margin thickened. Seed surrounded by circular wing.
Fl.: August-October; fr.: October-December.
Distrib.: INDIA: Assam, Jharkhand, Maharashtra, Meghalaya and West Bengal. WORLD: Bhutan, Myanmar, Malaya Peninsula.

Other synonym: Dioscorea glabra var. longifolia Prain & Burkill.
Tubers cylindric, developed from short, thick rhizome; cork deciduous; stems twining to right, glabrous, prickly at base or not. Leaves alternate basally on stem, opposite distally on stem, simple; leaf blade drying blackish, usually ovate or long elliptic-ovate to lanceolate, 5–17 × 0.5–10 cm, glabrous, basal veins 5–9, base cordate to truncate or rounded,
rarely sagittate or hastate, apex acuminate or caudate. Male spikes solitary or 2–4 together, 1–2.5 cm, usually in narrow, axillary panicles to 14 cm; rachis straight. Male flowers: outer perianth lobes orbicular, c. 1 mm, inner ones obovate, smaller but thicker than outer; stamens 6, inflexed. Female spikes solitary or paired, to 25 cm. Capsules not reflexed, oblate, 1.5–2.5 cm; wings 1.2–2.2 cm wide; seeds inserted near middle of capsule, winged all round.


Distrib.: INDIA: Himachal Pradesh, Sikkim and West Bengal. WORLD: Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Specimen examined: Buxa National Park, Jainti range, 46175, Buxa National Park, Jainti range, NRVK 5a, 6th Dec., 2011, Gopal Krishna 52348.

LILIACEAE [61]

DRIMIA Jacq. ex Willd.

6 species in India and 1 species in BNP.


Other synonym: Urginea indica (Roxb.) Kunth.

Local names: “Ban-piyaj”, “Jangli-piyaj” (Bengali).


Perennial herbs; bulbs globose, 5–5.5 cm across, tunicate. Leaves appearing after flowers, linear-lanceolate, ensiform, 15–50 x 1.5–2 cm. Inflorescences racemose on a leafless scape often appearing before leaves; scape 15–31 cm long. Flowers bisexual, pale brown, very distant in laxy flowered; bracts minute, deciduous; pedicels 2.5–4 cm long, articulate. Perianth campanulate with 6 linear-oblong pale brown, white at margin lobes. Stamens 6, adnate at the base of perianth lobes, included; filaments flattened below, 6–7 mm; anthers oblong-linear, versatile, yellow. Capsules ellipsoid, tapering at both ends 1.5–1.8 cm long, 6–9-seeded; seeds elliptic, flattened, black.

Fl. & Fr.: April-May.

Distrib.: INDIA: North East India, Odisha and West Bengal. WORLD: Myanmar, Pakistan, Uganda, Kenya, Tanzania, Africa West to Mauritania and South to South Africa.

SMILACACEAE [59]

SMILAX L.

31 species in India and 1 in BNP.

Smilax perfoliata Lour., Fl. Cochinc. 2: 622. 1790.

Other synonym: Smilax prolifera Wall. ex Roxb. Plate 60c

Climbing shrubs; stems angled, lenticellate, prickled; prickles short, stout. Leaves alternate, ovate or oblong-ovate, 11.1–21.6 × 6.3–13.2 cm, broadly acute at apex, wavy along margins, rounded to attenuate at base, coriaceous, glabrous; nerves anastomosing and reticulate; midvein and lateral veins impressed above, raised beneath; petioles 3.5–4.5 cm long, glabrous, stout. Inflorescences umbels; peduncles 2.4–4.5 cm long, glabrous; bracts ovate, c. 4 × 1.5 mm. Flowers unisexual, tubular, 7–9 mm long, glabrous; bracteoles c. 0.5 × 0.2 mm. Male flowers: Tepals 6, subequal; lobes linear-oblong, 5–5.5 × 0.3–0.5 mm. Stamens 6, free from base; filaments 3–3.5 mm long, glabrous; anthers oblong 1–1.2 mm long. Pistilodes absent. Female flowers: Tepals slightly smaller than male flowers. Staminodes 3, filiform. Ovary 3-loculed; style short; stigma 3, stout, recurved. Berries globose, c. 0.9 mm across, usually 1-seeded rarely 2-seeded.

Fl.: March-April; fr.: October-December.


Specimen examined: Buxa National Park, East Damanpur range, SRVK 11, Gopal Krishna 50516.

PONTEDERIACEAE [80]

MONOCHORIA K. B. Presl

2 species in India and 1 species in BNP.

Key to species

1a. Leaf deeply cordate, basal lobes sharply-angled; inflorescences remaining erect after anthesis............................................................... 1. M. hastata

1b. Leaf truncate to shallowly cordate, basal lobes rounded; inflorescences reflexed after anthesis......................................................... 2. M. vaginalis

Other synonyms: *Monochoria hastifolia* C. Presl; *Monochoria dilatata* (Buch.-Ham.) Kunth.; *M. sagittata* (Roxb.) Kunth; *Pontederia dilatata* Buch.-Ham.; *P. sagittata* Roxb.

**Illustration:** Roxb., Pl. Coromandel 2: t. 111. 1798 [as *Pontederia hastata* L.].

Rhizomatous perennials. Leaves basal, hastate, 12–18 × 5.8–6.5 cm, acute at apex, wary along margins, cordate at base, subcoriaceous, gland dotted beneath; petioles 10–52 cm, enclosed with leaf sheath; leaf sheath c. 30 cm long, membranous. Inflorescence sub-umbellate, enclosed by spathe; spathe membranous, ovate, c. 3.4 × 2 mm, membranous, gland dotted. Flowers pedicellate; pedicel filiform, 2.5–3 cm long, puberulent. Tepals blue, 6-lobed; lobes subequal. Stamens 6; filaments adnate to tepal; anthers (5-smaller + 1-longer) oblong, 4–5 mm long. Ovary ellipsoid; Style densely and shortly spreading hairy at apex. Capsules oblong, c. 1 cm; seeds brown, oblong, winged; wings c. 10.

**Fl.:** July-August; **fr.:** March.

**Distrib.:** INDIA: Throughout. WORLD: Bangladesh, Bhutan, Cambodia, China, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka and Vietnam.

**Specimen examined:** West Bengal, Rajabhat Khawa, 22.4.1959, C.R. Das 8.


**Local name:** “Nukha” (Bengali).

**Illustration:** Roxb., Pl. Coromandel 2: t. 110. 1798.

Annual or weakly rhizomatous perennial herbs. Root stock short, 1.5–5 cm. Leaves radical, solitary, emerging at the top of stem, shallowly cordate-ovate or sagittate, 2.8–6 × 1.1–3.2 cm, acute at apex, entire along margin, cordate at base, subcoriaceous, gland dotted, hairy both sides; basal lobes rounded; veins obscure both sides; petioles 4.5–9.0 cm, lenticellate enclosed with leaf sheath; sheath membranous; scape 3–17 cm long. Inflorescence sub-umbellate to racemose. Flowers pedicellate. Tepal 6, free, blue, lanceolate, 7–9 × 2–3 mm, acute at apex, membranous, gland dotted. Stamens 6, 5 smaller, 1 larger; filaments adnate to base of perianth; anthers 0.75–1.5 × 0.6–1 mm. Ovary oblong, c. 3.5 × 2 mm, white, lenticellate; style 1–1.25 mm long; stigma 2-lobed. Capsules ovoid to ellipsoid, 0.7–1 cm; seeds ellipsoid, c. 1 mm; wings 8–12 mm.
Fl.: August-October; fr.: September-October.

**Distrib.:** INDIA: Almost throughout. WORLD: Africa, Australia, Bhutan, Cambodia, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Russia, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Rajabhatkhawa range, S.K. Srivastava & Gopal Krishna 47118.

**COMMELINACEAE [78]**

**Key to genera**

1a. Inflorescences emerging through the leaf sheaths, sessile, capitate;
   fertile stamens 6 .......................................................... 1. Amischotolype

1b. Inflorescence not emerging through leaf sheath, nor sessile
   nor capitate; fertile stamens 6 or fewer ........................................... 2

2a. Fruits baccate; inflorescences terminal .............................................. 6. Pollia

2b. Fruits capsular; inflorescence terminal or not ..................................... 3

3a. Inflorescences terminal panicles, glandular pubescent;
   capsule small, 2-loculed .......................................................... 4. Floscopa

3b. Inflorescence terminal or not, not a panicle, eglandular; capsule
   usually 3-loculed, rarely 2-loculed when fertile stamens 3 ...................... 4

4a. Involucral bracts spathe like; fertile stamens 6; staminode absent .......... 5

4b. Involucral bracts present or absent, spreading or sheath like,
   never spathe like; fertile stamens 2–3; staminodes 3–4 ........................... 6

5a. Petals connate, tubular, with 2 free ends; fertile stamens 6;
   bracts falcate-curved, imbricately arranged in 2 rows ......................... 4. Cyanotis

5b. Petals wholly free; fertile stamens 3 or 6; bracts not imbricately
   arranged in 2 rows ...................................................................... 2. Commelina

6a. Staminodes apically entire and sagittate; fertile stamens 3,
   all inserted opposite sepals; capsules eglandular ............................... 5. Murdannia

6b. Staminodes apically dumbbell-shaped; fertile stamens 2 or 3, inserted
   in posterior or anterior position; capsule densely hooked glandular
   hairy .................................................................................. 7. Rhopalephora
1. AMISCHOTOLYPE Hassk.

3 species in India and 1 species in BNP.


Erect herbs, 30-50 cm high; stems angled, glabrous. Leaves elliptic-obovate, 14-26 × 3.8-8.4 cm, acuminate at apex, wavy along margins, narrowed to petiole like base, hairy, subcoriaceous, green, shining, glabrous; parallelomomous; midvein obscure above, prominent beneath; sheaths widely tubular, 2.3-3.5 × 1-1.2 cm, striate, hairy, persisting after fall of the leaf, almost covering the entire stem. Inflorescences in dense capitulate head at the base of sheath, sessile. Sepals pinkish, 3-lobed, free upto base; lobes obovate-oblong, 8-9 × 6 mm, obtuse at apex, keeled, silky golden hairy at apex, sharply ciliate along margins. Petals 3-lobed, free upto base; lobes oblong, 8-9 × 5-6 mm, chartaceous, glabrous. Stamens 6; filaments flattened, c. 8 mm long, bearded; anthers c. 2.5 mm. Ovary ellipsoid, c. 2.75 × 2.5 mm, sericeous at base of style; style c. 2.5 mm long; stigma capitate. Capsules ellipsoid-trigonoous, c. 8 × 5 mm, golden hairy at apex, 3-loculed, 3-4-seeded, 1-locule having 2 seeds, other two locule having 1 seed; seeds oblong, 3-4 × 2.5 mm, dry, rugose, glabrous.

Fl. & Fr.: July–November.

Distrib.: INDIA: Assam, Manipur, Meghalaya, Sikkim and West Bengal. WORLD: Bangladesh, Bhutan, China, Laos, Myanmar, Nepal and Vietnam.


2. COMMELINA L.

24 species in India and 2 species in BNP.

Key to species

1a. Spathes pedunculate, solitary, with free margins, ovate to lanceolate; seeds reticulate ......................................................... 1. C. diffusa

1b. Spathes sub-seesile to sessile, in clusters, margin fused, funneliform; seeds smooth ......................................................... 2. C. paludosa

Illustration: Burm.f., Fl. Ind. P. 18, t. 7, f. 2. 1768.

Annual herbs; stems creeping, branched, striate, glabrous. Leaves alternate, lanceolate or oblong-lanceolate, 5–9.5 × 1.4–2 cm, acuminate at apex, entire along margins, narrowed at base forming like a petiole, chartaceous, glabrous or hispid; midvein prominent; lateral veins parallelodromous; leaf sheath tubular, 6–15 mm long, hispid or hispid-ciliate, with red lines. Inflorescences cymes, surrounded by spathe; spathe pedunculate, peduncle stalk 1.8–2.3 cm long, spathes ovate to lanceolate, 3.2–4.3 × 1.6–2.4 cm, acuminate at apex, chartaceous, glabrous. Sepals 3–4 mm, membranous. Petals blue, 2 longer 4.2–6 mm. Capsules oblong, trigonous, c. 5 mm, 3-locular; dorsal locule with 1-seed, indehiscent; other 2 locules each with 2 seeds, dehiscent; seeds black, ovoid-globose, c. 2 mm, reticulate.

Fl. & Fr.: Throughout year.

Distribution: INDIA: Almost throughout. WORLD: Tropics and subtropics World wide.


Other synonyms: Commelina obliqua Buch.-Ham. ex Don; C. polyspatha Wight. Plate 60f

Straggling herbs, 30–100 cm long; stems terete, striate, glabrous. Leaves alternate, elliptic-lanceolate, 5.4–15.5 × 1.3–4.1 cm, acuminate at apex, wavy along margins, cuneate short petiole like base, chartaceous, floccose, gland dotted above, glabrous beneath; midvein obscure above, prominent beneath, parallelodromous; sheath tubular, 1.7–2.5 cm long, glabrous outside, mouth ciliate. Inflorescences cymes, 7-flowered, surrounded by spathe; spathe shortly stalked or seesile, clustered, obovoid, 1.3–2 × 1–1.6 cm, glabrous; stalk c. 5 mm long. Sepals 3, membranous. Petals purplish or pale blue, 3 (2 outer + 1 inner); outer 2 oblong, 4–5 × 3–3.5 mm; inner petal lanceolate, c. 3 × 1.5 mm. Stamens 3; filaments coiled; anthers oblong. Ovary globose, c. 1.5 × 1.5 mm, 3-loculed; style simple, c. 1 mm. Capsules obovoid, c. 5 × 4 mm, 3-loculed, each locule with solitary seed; seeds oblong, c. 4 × 3 mm, smooth, granular outside.

Fl.: August–October; fr.: October–April.

Habitat: Abundant along the forest margins, forest undergrowth, in marshy low land conditions; full to partial exposed to Sun.
Plate 60:  

- a. Dracaena angustifolia (Medik.) Roxb.: Habit; 
- b. Fruits; 
- c. Smilax perfoliata Lour.; inset: flowers (close up); 
- d. Monochoria vaginalis (Burm.f.) C. Presl; 
- e. Amischotolype hookeri (Hassk.) Hara; 
- f. Commelina paludosa Blume
Distrib.: INDIA: Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sikkim, Thailand and Vietnam.


3. CYANOTIS D. Don (nom. cons.)

13 species in India and 1 species in BNP.


Prostrate herbs; stems decumbent, much branched, 6–20 cm long. Leaves cauline, oblong-lanceolate to ovate-lanceolate, or narrowly elliptic, 2–4 × 0.5–1 cm, acute at apex, entire along margins, abaxially glabrous or sparsely arachnoid. Inflorescences axillary or terminal scorpioid cymes, subtended by leaf like spathe; bracteoles falcate, 8–10 × 6–7 mm, densely ciliate along margins. Sepals 3, free above, connate below; lobes oblanceolate, 3–4 × 1 mm, hairy near apex or keeled. Petals 3, free above; oblong-ovate, c. 4 × 1.25 mm. Stamens 6; filaments filiform, adnate to corolla tube, 4–5 mm, bearded; anthers oblong, c. 1 × 0.5 mm, yellow. Ovary c. 2.5 × 1.5 mm, truncate at apex. Capsules columnar, trigonous, c. 2.5 × 2.5 mm, 3-loculed, each loculed 2-seeded; seeds superposed, pyramidal, 1.5–2 × 1–1.5, gray-brown, pitted, rugose.

Fl. & Fr.: Throughout year.

Habitat: Rocky outcrops, usually in moist crevices or shallow soil, roadside ditches and banks, under trees and shrubs, thicket edges, near streams; sun exposed or partial shade.


4. FLOSCOPA Lour.

1 species in India and BNP.


Illustration: Roxb., Pl. Coromandel 2: t. 109. 1798 [as Tradescantia paniculata Roxb.].
Erect herbs, 23–30 cm high. Leaves alternate, lanceolate or elliptic-lanceolate, 3.1–9 × 1.3–2.6 cm, acute at apex, wavy along margins, sheathing at base, subcoriaceous, pale green, glabrous; midvein prominent; lateral veins parallelodomous; sheath tubular, 5–10 mm long hairy along margin towards base of leaf, densely hairy at mouth. Inflorescences terminal panicles, 6–8 cm long; involucral bracts ovate, 3–5 × 2–3 cm. Flowers c. 2 × 2 cm; pedicels 2–3 cm long, hairy; bracts ovate-oblong, 0.5–10 × 0.5 mm. Sepals 3, free above; lobes ovate-oblong c. 2 × 1 mm, glandular pubescent outside, glabrous inside. Petals 3, free; lobes obovate, c. 2 × 1 mm, glabrous. Stamens 6; filaments 1–1.5 mm long, glabrous; anthers dimorphic, suborbicular, c. 0.5 × 0.5 mm. Ovary glabrous, globose, c. 0.3 × 0.3 mm, 2-locular; style c. 0.5 mm long. Capsules compressed, loculicidal, 2-locular, c. 3 × 2.5 mm; pericarp crustaceous, shining; seed solitary in each locule, hemispheric, embryotega dorsal, hilum elliptic.

Fl. & Fr.: July–November.

Habitat: evergreen forests of Western Ghats and, chiefly occurs along streams and swampy places.

Distrib.: INDIA: North East India and West Bengal. WORLD: Bhutan, China, Laos, Myanmar, Thailand and Vietnam.


5. MURDANNIA Royle (nom. cons.)

27 species in India and 1 species in BNP.


Other synonyms: Aneilema nudiflorum (L.) R. Br.; Tradescantia malabarica L.

Illustrations: M. Blanco, Fl. Filip.: t. 467.1875 [as Aneilema nudiflorum (L.) R. Br.].

Annual herbs, to 10–30 cm high, branched at base. Leaves linear-lanceolate, 1.9–6.5 × 0.2–0.5 cm, reduced distally in flowering shoots, acute at apex, entire along margin, abruptly rounded at base, glabrous; veins inconspicuous, parallelodomous; sheath tubular, 3–5 mm long, mouth hairy. Inflorescences axillary or terminal reduced thyrses. Flowers pedicel 2–4 mm long, terete, glabrous. Sepals pale green, 3-lobed, free; lobes elliptic-oblong, c. 3 × 1.5 mm, equal, membranous, glabrous. Petals purple, 3-lobed, free; lobes
obovate, equal, c. 3 x 3 mm, membranous. Stamens 2; filaments c. 2.5 mm long, densely bearded terete; anthers oblong, c. 0.5 mm long, dorsifixed; staminodes 4, sparsely bearded, one antisepalous without antherode, antherodes trilobed, white. Ovary obovoid, c. 1.5 x 1 mm, trigonous, glabrous; style c. 2 mm long, slightly curved at tip; stigma simple. Capsules trilocular, ovoid or ovoid to subglobose, c. 5 x 3 mm, glabrous, each locule 2-seeded; seeds ovoid or ellipsoid, c. 1.5 x 1.5 mm, rugose, embryotega semi-dorsal and hilum linear.

Fl. & Fr.: June-October.

Habitat: Common along the roadside, ditches, rocky outcrops, open flats, stream margins, waste lands, in cultivation fields, full or partial shade.


Specimens examined: Buxa National Park, Rajabhatkhawa range, 16th Feb., 2010, S.K. Srivastava & Gopal Krishna 47123; Rajabhatkhawa, B. Safui & party 05.09.1981.

6. POLLIA Thunb.

5 species in India and 1 spece in BNP.


Other synonym: Aclisia subumbellata C.B. Clarke. Fig. 44; Plate 61d

Illustration: C.B. Clarke, Comm. & Cyrt. Beng. t. 30. 1874 [as Aclisia subumbellata C.B. Clarke].

Herbs, to 30-50 cm high; stems terete, covered with tubular leaf-sheaths. Leaves whorled, elliptic or ovate-elliptic, 10-15 x 4.1-6 cm, acuminate at apex, entire along margins, attenuate at base, chartaceous, glabrous above, scabrous beneath; midvein obscure above, prominent beneath; lateral veins acrodromous, obscure above, prominent beneath, glabrous; petioles 1.5-2.3 cm long; leaf sheath tubular, 1.5-2.2 cm long, glandular pubescent, overlapping. Inflorescences lax, 3.5-4.5 cm long, branched; rachis puberulent; involucral bracts ovate, c. 8 x 5 mm. Flowers bisexual; pedicels 3-4 mm long, glabrous. Sepals 3, free; lobes orbicular, concave, 4.3-5.5 x 3.5-5 mm, hairy outside, glabrous inside. Petals white, 3-lobed above; lobes suborbicular, concave, 3-4.5 x 3 mm. Stamens 6; filaments c. 2.5 mm long; anthers c. 1.5 mm long. Ovary globose, 1.3-2 mm, glabrous;
Fig. 44. Pollia subumbellata C.B. Clarke: a. Fruiting branch
style 1–3.5 mm long. Fruit baccate, globose, 5–6 × 5 mm, bluish-black, glabrous; seeds trigonous or rhombic, grandular, 1.5–2 × 1.5–2 mm, rugose or smooth.

**Fl.:** June–July; **fr.:** August–November.

**Habitat:** Occasionally in thick primary, evergreen forest, undergrowth or along the streams.

**Distrib.:** INDIA: North East India and West Bengal. WORLD: Bhutan and China.

**Specimen examined:** Buxa National Park, Jainti range, Jainti 5–9, 12th Oct., 2009, S.K. Srivastava & Gopal Krishna 46312.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.

### 7. RHOPALEPHORA Hassk.

1 species in India and BNP.


Other synonyms: *Aneilema scaberrimum* (Blume) Kunth; *Aneilema protensum* (Wight) Wall. ex Thwaites; *Dictyospermum protensum* Wight.

**Illustration:** Wight, Icon. Pl. Ind. Orient. 6: t. 2071. 1846 [as *Dictyospermum protensum* Wight].

Erect herbs; stems creeping to ascending, spreading perennial herbs; rooting at the nodes, ascending distally, 50–100 cm, glabrous below, scabrous above, leafy throughout. Leaves narrowly ovate-lanceolate, 9–13 × 1.2–2.5 cm, acuminate at apex, shortly scattered hispid above, densely on margins, glabrous beneath, veins obscure both sides; leaf sheaths 1.5–2.1 cm, slightly inflated, chartaceous, ciliated near mouth; petioles short or absent. Inflorescences terminal thyrs, branches arising from condensed axis, cyme branches hairy; involucral bracts narrowly oblong or ovate-orbicular. Flowers bisexual; bracts small, membranous, enveloping cincinnus axis; pedicels slender, 1–1.5 cm. Sepals green, ovate boat-shaped, c. 2 × 2 mm, scarious margins, glabrous, persistent. Petals pale lilac or white. Fertile stamens: filaments c. 6 mm; anthers elliptic. Antherodes bright yellow, c. 2 mm across. Ovary globose, 1–1.3 mm, densely whitish, hooked hairy, shortly stipitate; style persistent, accrescent, c. 4 mm. Capsules trilocular, c. 4 × 6–10 mm, shortly stipitate, humpbacked, covered with hooked hairs, subglobose, crowned by the long persistent style; seeds usually 3, one per locule, sometimes 2, very rarely 1, broadly oblong-elliptic, c. 4 × 3 mm long, flat, plano-convex, reticulately foveolate.
Fl. & fr.: August–November.

**Distrib.:** INDIA. Arunachal Pradesh, Meghalaya Sikkim and West Bengal. WORLD: Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Gadadhar range, Panbari 8, 1st December, 2011, *Gopal Krishna* 47191.

**Notes:** Usually leaf surface is scabrous, rarely it is glabrous as in this present collection leaf is glabrous. This species known from Darjeeling district and present collection is from Jalpaiguri district.

### JUNCACEAE [98]

**JUNCUS L.**

45 species in India and 1 species in BNP.


**Illustrations:** Fl. Males. 4: P. 213, f. 2 a. 1948–1954.

Tufted perennials; clumps erect, or ascending, 17–35 cm high, terete or compressed, glabrous. Basal leaves few, cauline leaves 2–4; leaf sheath auricles obtuse, short, slightly inflated; leaf blade linear, terete to compressed, 10–25 × 2–4 mm, distinctly and perfectly to incompletely septate, obtuse, acute or acuminate at apex. Inflorescences terminal, branched panicles or corymb, 10–18 cm high; involucral bracts, leafy, shorter than inflorescences. Flowers in groups of 7–9; bracts broadly ovate to ovate-lanceolate, 2–2.2 × 1 mm, mucro-acute at apex, chartaceous, hyaline, glabrous, 1-nerved, slightly keeled. Tepals 6, in 2 whorls; outer whorl, lanceolate, 3–4 × 0.5–0.7 mm, acute at apex, coriaceous, prominently 3-nerved, keeled; inner whorl, lanceolate, 3–3.1 × 0.4–0.6 mm, acute at apex, coriaceous, prominently 3-nerved. Stamens 3, inserted opposite to outer perianth lobes; filaments 1.3–1.4 mm long; anthers oblong, 0.4–0.5 mm. Ovary linear-oblong to trigonous, c. 1.5 × 0.4–0.5 mm, glabrous; style 0.4–0.5 mm long; stigma 3-fid. Capsules elliptic-oblong, c. 4 × 1 mm, trigonous, glabrous, many seeded; seeds yellow, elliptic-oblong, c. 0.2 × 0.3 mm.

**Fl.:** March–June fr.: May–November.

**Habitat:** Grows in muddy and marshy places.
Distrib.: INDIA: Meghalaya, Punjab and West Bengal. WORLD: Bhutan, Cambodia, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Sikkim, Sri Lanka, Thailand, Vietnam; Australia, Pacific Islands (New Zealand).


ARACEAE [30]

Key to genera

1a. Flowers unisexual; perianth absent.............................. 1. Alocasia

1b. Flowers bisexual; perianth present............................ 2

2a. Terrestrial or palustrine armed herbs; leaves entire or pinnately cut;
   petioles not winged; ovary 1-celled .................................. 2. Lasia

2b. Epiphytic unarmed climbers; leaves entire; petiole with phyllodic
   wings; spadix flowering upwards; ovary 3-celled ................... 3. Pothos

1. ALOCASIA (H.W. Schott) G. Don (nom. cons.)

9 species in India and 1 species in BNP.


Other synonym: Colocasia fornicata (Roxb.) Kunth. Plate 61f, g1, g2

Illustration: Wight, Icon. Pl. Ind. Orient. 3: t. 789. 1846 [as Arum fornicatum Roxb.].

Perennial erect herbs, to 1 m high. Leaves basal, simple, broadly ovate, 33–37 × 21–22.5 cm, peltate, deeply cordate at base, lobes obtuse, wavy along margins, broadly acute at apex, subcoriaceous, glabrous, green shining, coetaneous, palmately veined, obscure above, visible beneath; petiole stout, sheathing below. Inflorescences spadix, 7–9 cm long, pedunculate, enclosed by spathe; spathe yellowish-green, c. 5 cm long, ovate-lanceolate, 7–8 × 4 cm, cream, subcoriaceous, glabrous, female portion towards lowerside, male portion above. Male flowers: Sepals and petals absent. Stamens 8, in an obpyramidal column with flattened apex; anthers linear-oblong, 1–1.5 mm long. Female flower: Sepal and petals absent. Ovary ovoid-oblong, 1.5–2 × 1.5–1.75 mm, white spotted; style 1–1.5 mm long; stigma broadly peltate, cushion like, 3–6-lobed. Berries obovoid or ellipsoid, few-seeded included in the persistent tube of the spathe, orange red when mature; seeds subglobose;
Fl. & Fr.: August–January.

Distrib.: INDIA: Andhra Pradesh, Assam, Bihar, Karnataka, Odisha, Tripura and West Bengal. WORLD: Bangladesh and Sri Lanka.

Specimens examined: Buxa National Park, Jainti range, NRVK 6, 5th March, 2011, Gopal Krishna 47261; East Damanpur range, NRVK 14, 8th April, 2012, Gopal Krishna 56080.

Use: The matured spadix along with seeds is sold in market @ 10/- per piece, which is being used for adornment purpose.

2. LASIA Lour.

1 species in India and BNP.


Other synonym: Lasia heterophylla (Roxb.) Schott. Fig. 45; Plate 61h

Illustration: Wight, Icon. Pl. Ind. Orient. 3: t. 777. 1846 [as Lasia heterophylla (Roxb.) Schott].

Spinous herbs; prickle small curved. Leaves simple, hastate, pedately lobed, 12.8–22 × 9.8–27 cm, lobes ovate-oblong, asymmetric, 5.5–13.5 × 2.3–6.3 cm, acute or acuminate at apex, entire along margins, subcoriaceous, green, glabrous except veins beneath; palmately nerved; midvein impressed above, raised beneath, prickled; veinlets short hairy along both sides; petioles 14.5–25 cm. Inflorescences borne on long peduncle; peduncle 15–20 cm long, prickled; spadix cylindrical, dense-flowered, 2–3 cm long, enclosed with spathe; spathe crimson, narrow, 15–20 cm long, attenuate, convolute. Flowers bisexual, sessile. Tepals 4–6, free; lobes suborbicular, c. 1.5 × 1.25 cm, white lenticellate, hooded, keeled. Stamens 4–6; filament flattened, c. 1.5 × 0.8 mm; anthers ovoid, c. 0.8 × 0.8 mm. Ovary c. 1.5 mm across; stigma discoid, sessile. Berries obpyramidal, c. 1 × 0.5–1.3 cm, rugose, densely warty-aculeate, sides unarmed, when dry irregularly ribbed, apex truncate; seed ovoid-cordate, 5–7 mm

Fl.: July–November.


Specimens examined: Buxa National Park, Jainti range, Jainti 8, 5th March, 2011, Gopal Krishna 47262; Rajabhatkhwa Depot road, 14.05.1949, Narayanswami & party, 2462.
Fig. 45. *Lasia spinosa* (L.) Thwaites: a. Flowering branch
Note: The Inflorescence is being used as a vegetable by people residing in the fringe area of the park.

3. POTHOS L.

7 species in India and 1 species in BNP.


Fig. 46; Plate 62a, b, c

**Illustrations:** Hook., Icon. Pl. 2: t. 175. 1837; Wight, Icon. Pl. Ind. Orient. 3: t. 776. 1846.

Perennial epiphytic shrubs; stems weakly 4-angled or subterete, rooting at nodes. Leaves alternate, ovate to elliptic or lanceolate, 2-8.5 × 5-3 cm, acuminate-mucronate at apex, entire along margins, rounded to acute at base, coriaceous, paler beneath, bright to deep green above, glabrous, each side with 2 or 3 secondary veins and numerous veinlets; petioles obovate-oblong to broadly winged, 1-8 × 0.4-1.4 cm, each side with 2 intramarginal veins arising from base and either reaching leaf tip or merging into a prominent submarginal collecting veins, all additional veins arising obliquely from midvein. Flowering shoot much abbreviated, arising from most of mid to distal leaf axils of fertile shoots, bearing a minute prophyll and a few cataphylls 3-10 mm. Inflorescences solitary; peduncle erect to spreading, green to purple tinged, 3-15 mm, slender. Spathe greenish to maroon, ovate, concave, 4-8 × 4-7 mm, base short or somewhat long clawed, margins variously in rolled, apex rounded to acute with a tiny, rather stout mucro. Spadix stipitate; stipe erect, greenish to maroon, terete, 5-10 mm, erect; fertile zone yellow-green to off-white, globose or ovoid to sub-clavate, 4-10 × 3.5-10 mm. Flowers bisexual, c. 1 mm. Perianth 6-lobed, hooded at apex. Stamens 6; filament dilated; anthers ovoid, c. 0.2 mm. Ovary ovoid, oblong or depressed, 3-locular. Infructescence with 1-5 berries. Fruits mid-green, ripening to deep scarlet, obclavate, 8-17.5 × 10-14 mm.

Fl. & Fr.: Throughout year.

**Distrib.:** INDIA: Almost throughout. WORLD: Bangladesh, Brunei, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; Indian Ocean islands (Comoros), Madagascar.

Fig. 46. *Pathos scandens* L.: a. Flowering branch
ACORACEAE [29]

ACORUS L.

2 species in India and 1 species in BNP.


Aromatic rhizomatous herbs; rhizome pinkish. Leaves ensiform, distichous, 50–65 × 0.7–1.5 cm, acute at apex, wavy along margins, green, glabrous, parallel veined; midvein conspicuous on both sides, glabrous; enclosed with membranous leaf sheath. Peduncles compressed trigonous, 9–10 cm long. Spathe mid-green, leafy, 30–50 cm, acute. Spadix straight or slightly curved, erect, oblique, narrowly conic to subcylindric, greenish, 2.8–5.5 × 0.5–1 cm, densely flowered. Tepals 4-lobed; lobes oblong, c. 1.2 × 0.5–0.8 mm, hooded at apex, keeled. Stamens 4; filaments 1.2–2.4 × 0.3–0.5 mm; anthers cream-white, 0.5 mm long. Ovary 1.5–3.5 × 0.8–2.3 mm; stigma capitate, sessile. Infructescence 1.5–2 cm across, berries densely arranged. Berries oblong-obovoid, 4–4.5 × 2–3 mm, 1-many seeded; seeds oblong-ellipsoid to ovoid, 2.5–3 × 1–1.2 mm, without bristles.

Fl.: April–September.

Distrib.: INDIA: Throughout. WORLD: Afghanistan, Bangladesh, Bhutan, China, Indonesia, Japan, Korea, Malaysia, Mongolia, Nepal, Pakistan, Russia, Sri Lanka, Thailand, Vietnam; South West Asia, Europe, North America.

Specimens examined: Buxa National Park, Rajabhatkhawa range, 16th Feb., 2010, S.K. Srivastava & Gopal Krishna 47127; Bhutanghat, 28.06.1949, V. Narayanswami & party, 3069.

CYPERACEAE [99]

Key to genera

1a. Ovary and nutlet enclosed by an utricle ...................................................... 1. Carex

1b. Ovary and nutlet not enclosed in an utricle...................................................... 2

2a. Spikelets unisexual or with a basal female flower and 1 or more male
    or empty glumes; fruits stipitate, bony.................................................... 6. Scleria

2b. Spikelets with the lower empty glumes, intermediate glumes bisexual
    and uppermost glumes male or imperfect or empty; fruit stipitate or not........... 3

3a. Flowering glumes spirally arranged; style jointed with ovary and
    clearly demarcated from it ........................................................................... 3. Fimbristylis

3b. Flowering glumes distichous; style continuous with ovary and
    not demarcated from it .............................................................................. 4

4a. Stigmas-3, rarely 2; nutlets trigonous, rarely biconvex
with 1 side facing spikelet axis .................................................. 2. Cyperus
4b. Stigmas 2; nutlets 2-sided with 1 margin facing spikelet axis ......................... 5
5a. Spikelets with 1 or 2 glumes; rachilla of spikelets deciduous...................... 3. Kyllinga
5b. Spikelets with more than 2 glumes; rachilla of spikelets persistent.......... 4. Pycreus

1. CAREX L.
160 species in India and 2 in BNP.

Key to species
1a. Urticles with 2 stigmas............................................................................. 1. C. longipes
1b. Urticles with 3 stigmas............................................................................. 2. C. myosurus


Rhizome short, woody. Culms tufted or loosely tufted, 25–70 cm high, rather thin, triquetrous, smooth on lower part, scabrous on upper part. Leaves basal, much shorter than culm; blades 2–4 mm wide, flat, scabrous on both surfaces and margins; sheaths less than 2 cm long, usually splitting. Involucral bracts sheathed, lower ones leaf like, upper ones setaceous, uppermost 1 or 2 nearly bladeless; sheaths 0.5–4.5 cm long. Spikes 3–5, single in an involucral bract sheath, remote, spaced up to 18 cm, upper spikes rather contiguous, usually not branched, androgynous, cylindric, 2–4 cm long, with few male flowers on upper part, sparsely with more than 10 female flowers on lower part; lower spikes long pedunculate, upper spikes shortly pedunculate. Female glumes yellowish green, ovate-lanceolate, 3.5–5 mm long, membranous, several veined, midrib slightly thick, acuminate at apex, aristate, scabrous on awn. Urticles greenish, obliquely patent, longer than glume, elliptic or broadly elliptic, plano-convex, 5–6 mm long, membranous, glabrous, 5–9-veined abaxially, base cuneate at base, apex gradually narrowed into a slightly long beak at apex, beak c. 2.5 mm, scabrid on margins, 2-toothed at orifice. Nutlet stramineous, tightly enveloped, broadly elliptic, compressed plano-convex, c. 2.5 mm long, shortly stipitate at base; style base slightly thickened; stigmas 2.

Fl. & Fr.: January–August.

Distrib.: INDIA: Arunachal Pradesh, Tamil Nadu and West Bengal. WORLD: Bhutan, China, Indonesia and Nepal.

Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

2. Carex myosurus Nees in Wight, Contr. Bot. India, 122. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 6: 723. 1894. Fig. 47

Rhizome short, thick, woody. Culms tufted, robust, 80–120 cm high, trigonous angles rounded, scabrid, leafy below middle. Leaves longer than culm, flat, 4–8.5 mm wide, finely serrate at margins, glabrous above, scabrid beneath; leaf sheaths reddish to brownish-purple toward base, dull, reticulately fibrillose. Inflorescences compound panicles, 20–30 cm long, 3–6-branched; branch racemose, single 5–7 cm, 2–4-spiked; peduncles of inflorescence branches 3–11 cm long; inflorescence axes triquetrous, scabrid; bractlets glume like. Involutral bracts leafy, longer than inflorescences, long sheathed. Spikes single, bisexual and androgynous, cylindric, 20–60 × 3.5–4.5 mm; male portion protandrous, upto half of spike length; female portion with dense and many flowers. Male glumes pale green, oblong-lanceolate, 4–5 mm long, membranous, hyaline, glabrous on both sides, midrib not prominent. Stamens 2–3; filaments 4–5 mm long, hyaline; anthers linear, obtuse at apex. Female glumes green or pale green at middle and pale brown laterally, oblong, 3–3.5 mm, papery, hyaline with 1 scabrid prominent midrib, hyaline at upper margin, acuminate at apex, shortly awned. Ovary compressed or triquetrous, c. 1.5 × 0.4 mm, enclosed in an urceolate 2-toothed utricle; style slender c. 1 mm long; stigmas 2–3, protruding from utricle, finely serrate; utricle pale green, longer than glumes, obovate-lanceolate, compressed trigonous, 3.5–4 × 1 mm, papery, with several fine veins, glabrous or lateral keels hairy, attenuate at base, subsessile, shortly beaked at apex, beak minutely 2-toothed. Nutlet dark brown at maturity, closely enclosed in utricle, c. 5 mm long.

Fl.: August–October; fr.: September–July.


Fig. 47. Carex myosurus Nees: a. Habit; b. Stamen; c. Male glume; d. Urticle; e. Gynaecium; f. Nut
Note: This species is known from Darjeeling district and present collection is from Jalpaiguri district.

2. CYPERUS L.

70 species in India and 4 species in BNP.

Key to species

1a. Rachilla of spikelets deciduous ........................................... 1. C. cyperinus
1b. Rachilla of spikelets persistent ............................................................... 2

2a. Perennials; rhizome woody stock; inflorescences decompound
    umbellate; stamens usually 3...................................................... 2. C. diffusus
2b. Annuals or prennials; rhizome fibrous, not woody;
    inflorescences umbellate; stamens 1 or 2........................................... 3

3a. Stems medium or slender; flowering in inflorescence always
    umbellate; glumes obtuse at apex; stamens 2–3................. 3. C. haspan
3b. Stems slender; umbels contracted or reduced to a single head;
    glumes acute at apex; stamen 1 (2)............................................. 4. C. silletensis


Other synonym: Mariscus cyperinus (Retz.) Vahl

Illustration: Clarke, C.B., Ill. Cyper. t. 23, f. 1, 2. 1909. [as Mariscus cyperinus (Retz.) Vahl].

Plate 62d

Rhizomatous perennials; stems tufted scattered, slightly stout, 17–32 cm high, rigid, triquetroius, smooth. Leaves sub-basal, exceeding the stem, linear, flat or canaliculate, 32–40 cm long, 5–6 mm wide, long-attenuate at apex, scabrid on margins and keeled; midvein prominent, glabrous; sheaths purplish brown, 8–10 cm long. Inflorescences simple anthela; involucral bracts leafy, linear, 6–22 × 0.4–0.5 mm, acuminate at apex, serrate along margin, truncate at base, coriaceous, glabrous. Spike oblong-obovoid, often appearing to taper toward base or rarely cylindric, 1.5–2.3 cm long. Spikelets erect to erect-spreading, narrowly linear-ovoid to linear-oblong, 4–6 mm long. Lowermost glumes sterile, empty; upper glume fertile, narrowly lanceolate-ovate, 1–2 × 0.4–0.8 mm, membranous, keeled. Stamens 3; filaments 0.2–0.4 mm long, hyaline, glabrous; anthers oblong, 0.8–1 mm long. Ovary ovate-lanceolate, trigonous, c. 0.7 mm; style c. 0.5 mm long; stigmas 3, longer than the style. Nutlet dark grayish brown, narrowly oblong, 2–2.5 × 0.6–0.9 mm, slightly curved, shortly apiculate at apex.
Fl. & Fr.: May–October.

**Distrib.:** INDIA: Andaman & Nicobar Islands, North-West India and West Bengal.

**WORLD:** Bangladesh, Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; South West Asia (Yemen), North East Australia, Indian Ocean islands, Pacific islands.

**Specimen examined:** Buxa National Park, Gadadhar range, 31st March, 2012, Gopal Krishna 56027.


Other synonym: *Cyperus laxus* Lam.

**Illustration:** Fl. Males. 7(3): P. 620, f. 54. 1974.

Rhizomatous perennials; stems tufted, trigonous below, triquetrous above, 26–45 cm high, more or less ribbed, smooth, glabrous. Leaves basal, linear-lanceolate, equaling or longer than stems, 1–1.2 cm wide, acuminate at apex, finely serrate scabrous along margins, subcoriaceous, glabrous, nerves prominent; sheaths pale green and eventually reddish brown. Inflorescences a decompound anthela, 8–10 × 17 cm; involucral bracts leafy, linear-lanceolate, 11.7–26 × 0.7–1.4 cm; spikes 4–6 × 2–3 mm; spikelets sessile, 5–7, loosely arranged, oblong to linear-oblong, 1.5–2 × 1 mm, slightly turgid, 6–12-flowered; rachilla narrowly winged. Glumes ovate to orbicular-ovate, c. 1.8 × 1.2 mm, mucro-acute at apex, subcoriaceous, slightly thick towards midvein, prominently 3–5-nerved, keeled, mucronate at apex. Stamens 3; filaments 1.1–1.2 mm; anthers linear-oblong. Ovary ovate-lanceolate, c. 0.5 mm, trigonous; style short; stigmas 3, exserted from the glume. Nutlets dark brown to dusky black, triquetrous, ellipsoid or subpyramidal, c. 1.3 × 0.9–1 mm, acute and shortly apiculate at apex, glabrous, shining.

Fl. & Fr.: June–September.

**Distrib.:** INDIA: Throughout. **WORLD:** Bhutan, Cambodia, China, Indian Ocean islands, Indonesia, Laos, Malaysia, Myanmar, NE Australia, Nepal, Pacific islands, Philippines, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jainti range, S.K. Srivastava & Gopal Krishna 46320.

Tufted annuals or short lived perennials. Clums triquetrous, 15–20 cm high, glabrous. Leaves basal or sub-basal, linear, 12-15 cm long, 0.5 cm wide, acute at apex; midvein prominent; sheath 4–7.5 cm long, chartaceous, glabrous. Inflorescences compound or decompound, umbellate; peduncle 1.3–4.5 cm long; involucral bracts usually 2–3, linear, 4–7.5 × 0.3–0.5 cm, acute at apex. Spikelets 2–5 cm long, digitately arranged. Glumes oblong-ovate, 1.25–1.5 × 1 mm, muticous at apex, subcoriaceous, glabrous, keeled, 3-nerved, purplish; stamens 2–3; filaments 1–2 mm long; anthers oblong, c. 0.5 mm long. Style c. 0.5 mm long; stigmas 2. Nutlet trigonous-ovoid, 0.5 × 0.3–0.4 mm, white.

Fl. & Fr.: September–February.

Distrib.: INDIA: Throughout. WORLD: Bhutan, Cambodia, China, Indonesia, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, SW Asia, Australia, Indian Ocean islands, Madagascar, North America, Pacific islands.

Specimen examined: Buxa National Park, Rajabhatkhawa range, 16th Feb., 2010, S.K. Srivastava & Gopal Krishna 47126.


Tufted annuals or short living perennials. Clums triangular, 14–20 cm high, glabrous. Leaves sub-basal, linear, 2–12 cm long, 1.5–2 mm wide, acuminate at apex, membranous along margins. Involucral bracts linear, 2–5 × 0.1–0.2 cm, acuminate at apex; finely serrate along margin, glabrous; spikelets digiatte, 4–5 mm long; glumes ovate-oblong, c. 1.1 × 0.7 mm, acute at apex, subcoriaceous in the middle, membranous towards margins, 3-nerved, keeled. Stamen 1; filament c. 0.4 mm long; anthers oblong, c. 0.4 mm long. Ovary elliptic, trigonous, c. 0.5 × 0.3–0.4 mm; style c. 0.5 mm long; stigmas 3. Nutlet trigonous or triquetrous.

Fl. & Fr.: April-May.

Habitat: Usually grows in shade and moist places

Distrib.: INDIA: Assam, Sikkim and West Bengal. WORLD: Bangladesh, Myanmar and Vietnam.

Specimen examined: Buxa National Park, Gadadhar Range, Panbari compartment 9, 10th April, 2012, Gopal Krishna 56091.
3. **FIMBRISTYLIS** M. Vahl *(nom. cons.)*

115 species in India, 1 species in BNP.

**Fimbristylis bisumbellata** (Forssk.) Bubani, Dodecanthea 30. 1850. *Scirpus bisumbellatus* Forssk., Fl. Aegypt.-Arab. 15.1775.

Annuals to 9–16 cm high; clumps triangular, striate, glabrous. Leaves linear, 2–9 cm long, 1–1.5 mm wide, acute at apex, inrolled at margins, serrate, glabrous above, scabrous beneath; sheaths chartaceous, 1.3–2.5 cm long, margin serrate. Inflorescence decompound coryms of many spikelets. Involucral bracts 4–5, linear, 1–3 x 0.1–0.2 cm, acute at apex, serrate along margin. Spikelets oblong-ovoid, rachila winged. Glumes spirally arranged, ovate, c. 2 x 1.5 mm, acute at apex, membranous, keeled, prominently 3-nerved. Stamen 1; filament 0.2–0.3 mm long; anthers oblong, c. 0.8 mm long, beaked. Ovary 0.3–0.4 mm long; style c. 1.3 mm long; stigmas 2, plumose. Nutlet broadly obovoid, c. 1 x 0.8 mm, trabeculate, shortly stipitate, biconvex, with transversely oblong reticulation.

Fl. & Fr.: July–September.

Distrib.: INDIA: Andhra Pradesh, Chandigarh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Sikkim, Uttaranchal and West Bengal.


Specimen examined: Buxa National Park, Jainti range, S.K. Srivastava & Gopal Krishna 46157.

4. **KYLLINGA** Rottb. *(nom. cons.)*

10 species in India 1 species in BNP.


Other synonym: **Kyllinga monocephala** Stokes.

Rhizomatous perennials, 8–15 cm high. Clumps triquetrous, glabrous. Leaves sub-basal, linear, 1.5–8 cm long, 0.1–0.3 cm wide, acute at apex, finely serrate along margins; sheaths 0.8–1.2 cm, reddish. Inflorescences ovoid to globose heads, 6–8 x 6–7 mm; spikelets many, subobovoid to lanceolate-ovate, 2.75–3 x 0.5–1.1 cm, compressed, 1-flowered. Lower glumes sterile, narrowly triangular, c. 1.5 x 1 mm, acute at apex, entire along margin, truncate at base, chartaceous, hyaline, 6–7-nerved, keeled; middle glume sterile, ovate, slightly curved, c. 3 x 1.5 mm, mucrocaule at apex, membranous along margins,
subcoriaceous except margins, 7–9-nerved, keeled, hispid along keel, margins membranous. Upper glumes fertile, ovate-lanceolate, c. 2.5 × 1.2 mm, muroacute at apex, membranous along margin, subcoriaceous except margins, faintly 2–3-nerved, keeled, serrate along keel. Stamens 3; filaments ribbon shaped, 2–2.2 mm, hyaline. Ovary oblong, c. 1.5 × 0.5–0.8 mm, glabrous; style long; stigmas 2. Nutlet oblong to obovoid-oblong, c. 1.3 × 1 mm, densely puncticulate, shortly mucronate at apex.

Fl. & Fr.: July-November.


Specimen examined: Buxa National Park, Jainti range, on the way to Bhutia pond, 8th October, 2009, S.K. Srivastava & Gopal Krishna 46230.

5. PYCREUS P Beauv.

33 species in India 2 species in BNP.

Key to species

1a. Spikelets spreading; stigmas longer than style; nutlet coarsely reticulate or with transverse wavy wrinkles................................. 1. P. flavidus

1b. Spikelets erect or suberect; stigmas equal or shorter than style;

nutlet smooth or minutely dotted.................................................. 2. P. stramineus


Other synonym: Pycerus capillaris (J. Koenig ex Roxb.) Nees ex C.B. Clarke.

Illustration: Fl. Madag. 29: P. 47. 1937.

Annual or shortly lived perennials. Roots fibrous. Culms rigid, tufted, trigonous, smooth, 30–50 cm high, with a few basal leaves. Leaves shorter or slightly longer than culm, 1–2 mm wide, canaliculate, folded or flat, glabrous below, scabrous at apex; sheath reddish brown at base, 1–2.5 cm long, glabrous. Inflorescences a simple anthela; rays 1–6, unequal in length, 2–6 cm, sometimes short, each with many spikelets; involucral bracts 2–4, longer than inflorescence, slender, 1–2 mm wide. Spikelets linear-oblong to linear, 0.5–1 × 1–2.5 mm, strongly compressed; rachilla 4-angled, wingless. Glumes yellowish brown, reddish brown, dark purplish red, dark grayish brown, or purplish brown on both
surfaces, lax or dense, oblong-ovate, 1.5–2 × 1 mm, keeled, 3-nerved, obtuse at apex, margin hyaline. Stamens 2; filaments 0.3–0.5 mm long; anthers oblong, c. 0.5 mm long. Ovary c. 0.25 × 0.25 mm, glabrous; style c. 1.1 mm long; stigmas 2, slender, longer than style. Nutlet obovoid, 0.8–1.2 mm, slightly compressed, mucronate at apex.

Fl. & Fr.: June-November.

Distrib.: INDIA: Throughout. WORLD: Afghanistan, Bangladesh, Bhutan, Cambodia, China, Indonesia, Japan, Kashmir, Kazakhstan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan and Vietnam; Africa, SW Asia, Australia, S Europe, Indian Ocean islands, Madagascar.


Other synonym: Cyperus substramineus Kük.

Tufted annuals. Roots fibrous. Clumps obtusely trigonous, smooth, 14–23 cm high. Leaves basal, linear, very narrow, canalicular, shorter than clumps or equalling to the clumps, gradually acuminate; midvein impressed above, raised beneath; sheaths pale brown to purplish. Inflorescences simple terminal spike of 3–8-spikelets; involucral bracts foliaceous, linear, longer than inflorescence, c. 1 mm wide, narrowly acuminate at apex, inrolled along margin. Spikelets suberect, strongly compressed, ovate-lanceolate, 4–9 × 2 mm; rachilla 4-angled, laterally grooved. Glumes ovate, 2–2.3 × 1.5–1.8 mm, mucronate at apex, keeled, prominently 3-nerved, subcoriaceous, hyaline along margins. Stamens 2; filaments 1–1.5 mm long; anthers linear-oblong, c. 0.5 mm. Ovary c. 1 × 0.8 mm; style 1–1.1 mm long; stigmas 2, about as long as the style. Nutlet biconvex, orbicular-ovobovate, 0.9–1 × 0.7–0.9 mm, laterally compressed, transversely rugulate, brown to blackish-coarsely reticulately rugose.

Fl. & Fr.: August–December.

Habitat: Commonly seen in waste places and along roadsides. Also common in places where better soil and moisture is available.

Distrib.: INDIA: Andhra Pradesh, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: China, Malaysia, Sri Lanka, Thailand and Vietnam.

6. SCLERIA Bergius

c. 27 species in India and 1 species in BNP.


Other synonyms: Scleria radula Hance; S. elata Thw.

Illustrations: Rheede, Hortus Malab. 12: t. 60. 1703 [as Zizania terrestris L.]; C.B. Clarke, Ill. Cyper. t. 128. 1909.

Perennials with short-creeping, woody rhizome. Clums acutely trigonous, 6–8 mm thick, glabrous, erect or scrambling. Leaves scattered, evenly distributed on the clumps linear, 3–4.5 × 0.9–1.2 cm, gradually narrowed into a very long tip, minutely scabrous on the margins; sheaths more or less widened upwards, 3-winged, chartaceous, scabrid on angles, reddish-brown at base; contra-ligule short, obtuse, ciliate or glabrous. Inflorescences paniculate, with 1–4 distant branches; branches 5–8 × 1.5–4 cm. Involucral bracts leaf like, basalmost to 40 cm, sheathing; bracteoles setaceous, elongated, scabrous. Inflorescences very variable in size, consisting of up to 4 distant partial panicles. Spikelets unisexual, solitary or in groups of 2–3. Male spikelets oblong-lanceolate, 3.5–4 mm long; pedicels trigonous, 2–3 mm long, scabrous, stout. Glumes 2–3 mm long, thickly membranous; basal ones keeled and with rust-colored short lines; apical ones pale colored and scarious. Stamens 3; filaments 0.8–3 mm long; anthers linear, 1–1.4 mm long, apiculate. Female spikelets usually growing at base of branch, sessile or subsessile. Glumes broadly-ovate to ovate-lanceolate, apiculate at apex, 2–4 mm long, chartaceous, with rust-colored short lines, keeled, Ovary c. 0.6 × 0.3 mm, glabrous; stigmas 3, plumose. Disk shortly 3-lobed; lobes obtuse, appressed to the base of the nut, finely denticulate at apex. Nutlets subglobose or slightly elongate, apiculate, base truncate, 2.8–4 × 2.5–3 mm, white or tinged dark purplish, reticulately pitted, shortly hairy or glabrous on reticulations.

Fl. & Fr.: May-October.


POACEAE [100]

Key to genera

1a. Spikelets 1-many-flowered, breaking up at maturity above the persistent glumes

1b. Spikelets 2-flowered, falling entire at maturity, upper floret bisexual and the lower male or barren

2a. Spikelets often paired with one sessile and the other pedicelled

2b. Spikelets solitary or paired more or less similar

3a. Spikelets in each pair dissimilar, the sessile bisexual, the pedicelled male or sterile

3b. Spikelets of each pair similar, the sessile and pedicelled bisexual; joints of the panicle thin, linear or somewhat expanded at the top

4a. Spikelets arranged in compound racemes along the central axis

4b. Spikelets arranged in single or in several racemes arranged digitately

5a. Inflorescences digitate spike; lower glumes deeply furrowed on the back; stamens 3

5b. Inflorescences a single raceme; lower glumes flat and rounded on the back; stamens 2

6a. Spikelets arranged in more or less open panicles, or with the panicle contracted and spike like

6b. Spikelets arranged in one sided spikes or racemes

7a. Spikelets not subtended by bristles

7b. Spikelets subtended by bristles

8a. Spikelets dorsally compressed or almost terete, the glumes and the lower lemma rounded on the back

8b. Spikelets laterally compressed, obliquely ovate; upper glumes boat-shaped, with row of glands or hooked hairs or bristles between the nerves

9a. Spikelets usually with 2 or more fertile florets

9b. Spikelets with one fertile floret

10a. Lemma usually 5-many nerved, awnless

10b. Lemma 1-3 nerved

11a. Spikelets arranged on digitate spike-like racemes

11b. Spikelets not subtended by bristles

2. Chrysopogon

3. Eleusine

4. Saccharum

5. Microstegium

6. Pogonatherum

7. Oplismenus

8. Panicum

9. Setaria

10. Pseudechinolaena

11. Echinochloa
11b. Spikelets in open, contracted or spike-like panicles.......................... 4. Eragrostis
12a. Spikelets with 3 florets, the lower 2 represented by empty
    lemmas and upper bisexual................................................................. 9. Phalaris
12b. Spikelets with 1-2 florets......................................................................... 13
13a. Spikelets with one fertile floret............................................................. 14. Sporobolus
13b. Spikelets with 2 florets, the lower male or barren,
    the upper bisexual........................................................... 14
14a. Small decumbent or erect grass; lower floret male or barren
    with palea, upper glumes as long as the spikelets; caryopsis ellipsoid
    or subglobose ................................................................. 5. Isachne
14b. Robust grass; lower floret empty and without a palea,
    glumes up to half the length of the spikelets; caryopsis oblong......15. Thysanolaena

1. CENTOTHECA Desv.
   1 species in India and BNP.

in Hook.f, Fl. Brit. India 7: 332. 1896; Bor, Grass. Burma Ceylon India Pakistan: 457, t. 50.
Other synonym: *Cenchrus lappaceus* L.
**Illustration:** Griff., Icon. Plant. Asiat. 3: t. 152. f. 1. 1851.

Tufted perennials. Culms geniculate, 30-65 cm high, ribbed, glabrous. Leaves blade lanceolate, elliptic, 7.5-11.5 × 1.3-2.4 cm, acuminate at apex, finely serrate along margin, chartaceous, glabrous or sparsely hairy; hairs with tubercles base; parallel veined, with cross veinlets obscure above, prominent beneath; leaf sheaths 3-4.5 cm, prominent nerved, glabrous; ligules membranous; panicles 10-13 × 2.3 cm, retuse; rachis finely pubescent; spikelets 3-4 mm long; lower glume ovate, c. 2.3 × 1 mm, acute, entire, membranous along margin, sub-coriaceous, greenish hyaline along margin, prominently 3-nerved, 1-keeled, hairy along keel; upper glume elliptic-ovate, boat shaped, c. 3 × 1 mm, greenish, acute at apex, entire along margins, membranous along margin, sub-coriaceous, obscurely 3-nerved, glabrous, keeled. Florets 2 or 3, bisexual, 3rd smaller; upper rachilla c. 1 mm long; lower lemma lanceolate, boat shaped, c. 3.5 × 1.2 mm, mucro-acute at apex, membranous along margin, greenish, sub-coriaceous, 5-nerved, keeled; lower palaea lanceolate, boat shaped, c. 2.5 × 0.8 mm yellowish green, acute, membranous along margin, 2-nerved, 2-keeled, fimbriated along keel, folded; upper
lemma ovate-lanceolate, c. 3.1 × 1.2 mm, acute at apex, entire along margins, subcoriaceous, scabrous above, prominently 5-nerved; upper palaea similar to lower palaea, c. 3 × 0.6 mm. Stamens 2; filaments filiform, 0.2–0.3 mm long; anthers oblong, c. 1 mm long. Ovary 1–2 mm; style filiform, c. 5 mm long, hyaline; stigma plumose, c. 0.8 mm long, hyaline.

Fl. & Fr.: April–November.

Habitat: In moist shaded places of hilly areas.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Throughout the old world tropics.


Use: A fodder grass.

2. CHRYSOPOGON Trin. (nom. cons.)

18 species in India and 1 species in BNP.


Other synonym: Holcus aciculatus (Retz.) R. Br.

Illustration: Griff., Icon. Plant. Asiat. 3: 141. f. 1. 1851 [as Holcus aciculatus (Retz.) R. Br.].

Tufted perennials. Culms erect, to 30–40 cm high, leafy toward base. Leaves blade linear-lanceolate, 1.3–4.2 × 0.2–0.4 cm, acute at apex, infolded, sharply serrate along margins, rounded at base, glabrous, parallel veined; midvein prominent beneath; ligules membranous; leaf sheath 1.3–8.3 cm, ribbed, puberulent. Inflorescences effuse panicles, c. 4.5 × 0.8 cm, purplish, sessile spikelets lanceolate, c. 3.25 × 1 mm; glumes oblanceolate, c. 3.5 × 1 mm, purplish green, acute at apex, ciliate along margin, keeled; lemma oblong, c. 3.5 × 1.1 mm, mucronate at apex, membranous along margin, keeled; palaea ovate, c. 2 × 1 mm, hyaline, awned; awn c. 4.5 mm long. Stamens 3; filaments filiform, c. 0.5 mm, hyaline; anthers 0.5–0.6 mm long. Pedicellate spikelets lanceolate, c. 5 × 0.5–0.6 mm,
purple; pedicels 2.5–3 mm long, hairy. Lower glume lanceolate, c. 5 × 1.2 mm, acute at apex, hairy, infolded, membranous along margins, 2-nerved, keeled.

Fl. & Fr.: April–November.

Habitat: Along bunds of paddy fields.

Distrib.: INDIA: Andaman, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Australia, China, Malaysia, Nepal, Polynesia, Sri Lanka and Tropical Asia.


3. ELEUSINE Gaertn.

3 species in India and 1 species in BNP.


Tufted annuals. Culms geniculate, 15–20 cm high. Leaves basal or sub-basal, linear-lanceolate, 3.5–22 × 0.3–0.4 cm, acute at apex, inrolled along margins, chartaceous, glabrous; midvein prominent, glabrous; leaf sheaths 2–7 cm long, keeled, membranous along margins, hyaline, remaining sub-coriaceous, glabrous; ligules 0.4–0.5 mm, membranous, hyaline. Inflorescences spike digitate, 6.5–7 cm long; rachis flat, cartilaginous. Spikelets sessile, arranged in two row, 4–4.5 × 1 mm; lower glume, ovate-lanceolate, c. 2 × 0.8–0.9 mm, hyaline, chartaceous, acute, margin membranous, 1-keeled, 1-nerved, nerve prominent; upper glume elliptic-lanceolate, boat shaped, c. 3 × 1 mm, acute at apex, margin hyaline, membranous, greenish toward middle, sub-coriaceous, prominently 3-nerved, 1-keeled; lower lemma elliptic-lanceolate, c. 3 × 1–1.25 mm, acute, margin serrulate, chartaceous, hyaline, prominently 1-nerved, 1-keeled; keel membranous; lower palea ovate-lanceolate, 2–2.25 × 0.8–0.9 mm, acute, chartaceous, hyaline, prominently 1–3-rowed, 1-keeled; keel membranous; upper florets gradually reduced in size. Stamens 3; filament c. 0.4 mm, filiform, hyaline; anthers saggitate, c. 0.4 mm long. Ovary oblong, c. 0.4 × 0.2 mm; style c. 0.5 mm; stigma plumose. Lodigule 2, c. 0.4 × 0.2 mm, membranous, hyaline. Caryopsis ovate, 1–1.4 × 1.4 mm, 3-angled, depressed or shallowly furrowed in middle.
Fig. 48. *Eleusine indica* (L.) Gaertn.: a. Habit; b. Ligule; c. Spikelet; d. Lower glume; e. Upper glume; f. Lemma (dorsal & lateral views); g. Palea; h. Stamens; i. Lodicules; j. Caryopsis
Fl. & Fr.: Almost throughout the year.
Habitat: Along field bunds and roadsides, also a weed of cultivation.
Distrib.: INDIA: Andaman, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Jammu-Kashmir, Karnataka, Kerala, Lakshadweep, Maharashtra, Manipur, Meghalaya, Nagaland, Nagarhaveli, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.
Specimen examined: Buxa National Park, Jainti range, 4th December, 2011, Gopal Krishna 52336.

4. ERAGROSTIS Wolf

32 species in India 2 species in BNP.

Key to species

1a. Spikelet axis fragile, disarticulating, florets falling from apex downwards; palea keels often long-ciliate....................................................... 1. E. coarctata

1b. Spikelet axis tough, persistent, florets falling from base upwards; palea keels never long-ciliate.......................................................... 2. E. unioloides


Tufted perennials. Culms geniculate, 30–55 cm high, ribbed, glabrous. Leaves linear-lanceolate, 1.1–9.3 × 0.2–0.3 cm, acuminate at apex, inrolled along margin or membranous, purplish at base, glabrous; nerves prominent outside; leaf sheaths 0.4–3.4 cm long, ribbed, hispid at mouth; ligules membranous, fimbriated. Inflorescences terminal panicle, 5–7 × 1.2 cm, cylindric, effuse, greenish-purple; peduncles 8–17.5 cm long, ribbed, glabrous; lower glumes oblong-lanceolate, c. 1.25 × 0.5 mm, acute, serrate along margin, chartaceous, 1-nerved, keeled, hairy along keels, hyaline; upper glumes, oblong-ovate, c. 1.5 × 0.6–0.7 mm, acute, serrate along margins, chartaceous, 1-nerved, keeled, hairy along keel, hyaline with purplish ting at apex. Florets 5–9, bisexual; lemma oblong-ovate, c. 1.5 × 0.7 mm, acute at apex, fimbriated along margin, chartaceous, prominently 3-nerved, keeled. Palaea lanceolate, c. 1.5 × 0.5 mm, fimbriated at apex, hispid along margin, chartaceous, 2-nerved, 1-keeled, hairy along keel, winged. Stamens 3; filaments 0.3–0.4 mm, hyaline; anthers 0.3–0.4 mm, black, sagittate at base. Ovary narrowly oblong, 0.2–0.3 mm; style 0.2–0.3 mm long, hyaline; stigma plumose, 0.6–0.7 mm long. Caryopsis ovoid, c. 0.4 × 0.3 mm, glabrous.
Fl. & Fr.: October–February.
Habitat: Roadsides and sandy shores.
Distrib.: INDIA: Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Bangladesh, Myanmar and Nepal.
Specimen examined: Buxa National Park, East Damanpur Range, SRVK 12-13, Gopal Krishna.

Tufted annuals. Culms geniculate, 4.5–10 cm high simple, leafy throughout. Leaf blade lanceolate 4.3–6.2 × 0.4 cm, acuminate at apex, inrolled or finely serrate along margin, truncate at base; ligules fimbriate; leaf sheath ribbed, 12–2.8 cm, glabrous. Panicles 3.5–9 × 0.8–2.4 cm. Lower glume ovate, c. 1.5 × 0.6 mm, acute, chartaceous, purplish to hyaline, prominently 1-nerved, keeled with finely membranous margin; upper glume triangular-ovate, c. 2 × 1 mm, acute, chartaceous, hyaline prominently 1-nerved, keeled; florets 5–17, bisexual; rachilla angled, shortly strigose; lemma ovate, c. 2 × 1 mm, prominently 3-nerved, 1-keeled, acute chartaceous, hyaline; palea oblong-ovate, c. 2 × 1 mm, acute, margin ciliate, chartaceous, hyaline, 2-nerved, along margin. Stamens 1 or 2; filament short, filiform, hyaline, 0.2–0.3 mm; anthers 0.3–0.4 × 0.2–0.3 mm, hyaline; style 0.4–0.5 mm, filiform; stigma plumose, 0.2–0.3 mm. Caryopsis oblong-ovate, c. 1 × 0.4 mm, glabrous, embryo basal.
Fl. & Fr.: August–October.
Distrib.: INDIA: Almost throughout. WORLD: Tropical Asia and West Africa.

5. ISACHNE R. Br.
25 species in India and 1 species in BNP.
Other synonym: Isachne miliacea Roth ex Roem. & Schult.
Slender perennial. Culms 10–15 cm, erect to decumbent and rooting from nodes. Leaf blades lanceolate, 1.1–1.8 × 0.3–0.5 cm, subacute at apex, hispid along margins, sub-chartaceous, hispid on both surfaces; sheaths 8–14 mm long, glabrous, margins ciliate; ligule hairs 0.8–1.2 mm. Inflorescences panicle, 2–6 cm, 1.5–4 cm wide at anthesis, branched to 2 orders, branches with glandular bands. Spikelets elliptic-globose, 1.7–2 mm; pedicels 1–3 mm long, shortly hispid with glandular bands. Lower glume ovate, c. 1.4 × 1 mm, shorter than spikelet, narrowly oblong elliptic, bluntly apiculate, glabrous, or with short bristles, obscurely 7-nerved, chartaceous, sides not inflexed, hyaline. Upper glume wider than lower. Lower floret male, upper floret female. Lower floret: Lemma oblong-elliptic, 1.6–1.9 × 0.9–1 mm, weakly convex, blunt, glabrous, thinly chartaceous. Stamens 3; filaments short; anthers 1–1.4 mm. Upper floret: lemma broadly ovate, c. 1.1 × 1.2 mm, strongly convex, glabrous or hairy, crustaceous. Ovary ellipsoid, c. 0.4 × 0.2 mm, glabrous; style 2, filiform, c. 0.7 mm, hyaline. Caryopsis ellipsoid or subglobose.

Fl. & Fr.: May–November.


6. MICROSTEGIUM Nees

7 species in India and 1 species in BNP.


Tufted perennials. Culms genticulate, to 40–70 cm high, branched, ribbed, woody at base. Leaves linear-lanceolate, 10–16 × 0.8–1.1 cm, acuminate at apex, in rolled-serrate along margin, attenuate at base, chartaceous, glabrous above, hispid beneath, hair base tuberculate, parallel veined; midvein impressed above, raised beneath; leaf sheath 4–5–8 cm, hispid outside, ribbed; ligule c. 0.8 mm. Inflorescences digitate spike, 4.3–7 cm; peduncle 5–10 cm long, glabrous, ribbed. Spikelets sessile or pedicellate; pedicel c. 2 mm long, hispid. Upper glume lanceolate, 2.8–4.1 mm, apiculate; apiculus 0.5–1.6 mm, margins and sides ciliate above; lower glume, linear-lanceolate, pale green, 3.1–4.3 mm, apex hyaline, sharply bidentate, back grooved, sometimes hispid, sometimes 2-veined,
keels hispid, sides with few long hairs above. Florets in pair; lower lemma oblong-lanceolate, c. 3.5 × 1 mm, acute at apex, hispid towards apex, margin hairy, 2-nerved, keeled; lower palaea lanceolate, c. 3 × 0.7 mm, acute, chartaceous, hyaline; upper lemma oblong-ovate, c. 3.5 × 1.1 cm, acuminate at apex, hispid, 1-keeled, hairy along keel, hyaline; upper palaea ovate, c. 1 × 0.3–0.4 mm, acute at apex, chartaceous, hyaline; stamens 3; filaments short, 0.1–0.2 mm long, filiform; anthers oblong, c. 1.5 mm long. Ovary narrowly lanceolate, c. 0.8 × 0.1–0.2 mm; style c. 1 mm long, filiform, hyaline; stigma plumose, c. 1 mm long.

Fl. & Fr.: August–January.


7. **OPLISMENTUS** P. Beauv. (nom. cons.)

3 species in India and 1 species in BNP.


Tufted perennials. Culms geniculate, 45–55 cm high, ribbed, densely hairy. Leaves blade elliptic-lanceolate, 1.2–6.5 × 0.5–1.5 cm, acute at apex, fimbriated along margin, rounded at base, chartaceous, densely hairy both surface, parallel veined; midvein impressed above, raised beneath; leaf sheaths 1.1–2 cm, prominent nerve, densely hairy; ligules 1–1.3 mm, truncate, cilia 1.2–1.5 mm. Spikelets on lateral axis, main axis 24–30 cm long, triquetrous, densely hairy, glumes owned. Lower glumes oblong-ovate, 1.5–2 × 1 mm, awned; awn 7–9 mm long, stout, fimbriated along margin, sub-coriaceous, greenish, 3-nerved, hairy outside. Upper glumes oblong-ovate, c. 2 × 1 mm, awned at apex; awn 1–1.2 mm long, sub-coriaceous, 3–5-nerved. Florets 2; lower empty, upper bisexual; lower lemma ovate, c. 3 × 1.2 mm acute at apex, chartaceous, greenish, 2–3-nerved, sparsely hairy outside; lower palaea absent; upper lemma elliptic, c. 2.5 × 1.2 mm, acute at apex, sub-coriaceous glabrous; upper palaea elliptic or lanceolate, c. 2.25 × 1 mm, acute at apex,
Fig. 49. Oplismenus compositus (L.) P. Beauv.: a. Habit; b. Dorsal view of upper floret; c. Ventral view of upper floret; d. spikelet
sub-coriaceous keeled. Stamens 3; filaments c. 0.6 mm long; anthers c. 2 mm, yellowish. Ovary ovate-oblong, 0.4–0.6 cm; style c. 0.4 mm; stigma plumose 1.2–1.4 mm. Caryopsis oblong-elliptic, 1.5–2 × 0.6 mm, with persistent style.

Fl. & Fr.: July–March.

Distrib.: INDIA: Throughout. WORLD: Pantropical.


8. PANICUM L.

35 species in India and 3 species in BNP.

Key to species

1a. Glumes acuminate to cuspidate .................................................................3. P. miliaceum

1b. Glumes obtuse or acute.........................................................................................................2

2a. Leaf blades linear to narrowly lanceolate; glume distinctly shorter than upper.........................1. P. auritum

2b. Leaf blades ovate to lanceolate, asymmetric; glumes subequal................................................2. P. brevifolium


Slender perennial. Culms 62–200 cm, soft, unbranched, base decumbent and rooting from nodes. Leaf blades to 21–40 × 1.2–4 cm, linear lanceolate, very acute, margins minutely hispid, rounded and slightly clasping at base, glabrous, with a few long cilia at extreme base. Sheath margins ciliate; ligule c. 0.4 mm, membranous, truncate. Panicle 12–36 × 1.5–4 cm, narrowly cylindric, very dense, branches erect. Spikelets greyish-purple, c. 2.5 × 1 mm, oblong-lanceolate, not gaping, acute, glabrous; pedicels slender, hispid. Lower glume c. 1.2 × 1 mm, broadly, asymmetrically ovate, blunt, strongly 3-veined, slightly keeled, keel minutely hispid; upper glume c. 2.5 mm, lanceolate, convex, slightly keeled, very acute, glabrous, strongly 5-veined, keel minutely hispid. Lower floret: lemma c. 2.4 mm, similar to upper glume, but not keeled; palea 1.1–1.5 × 0.4 mm, narrowly oblong to oblanceolate, blunt or subacute. Upper floret: lemma cream, c. 2.1 × 0.9 mm, lanceolate,
convex, finely acuminate, very thinly coriaceous, smooth, margins incurved; palea 1.8–2 × 0.6–0.8 mm, lanceolate, acute, margins inflexed.

Fl. & Fr.: August–October.


Specimen examined: Buxa National Park, East Damanpur range, 1st Dec., 2011, Gopal Krishna 47197.


Other synonym: Panicum ovalifolium Poir.

Tufted annuals. Culms geniculate decumbent, 15–18 cm high, rooting at lower nodes. Leaves ovate, ovate-lanceolate, 1.1–9.0 × 0.6–3.1 cm, acuminate at apex, undulate-serrate along margins, hairy at base, amplexicaul at base, chartaceous, sparsely hairy, hairs with tubercles base, parallel veined, glabrous; leaf sheaths 1–3.9 cm, hispid along margins, ribbed; ligules membranous, hairy. Panicles raceme, 4.5–7.5 × 3.5–6.5 cm, spikelets ovate-elliptic, c. 2 × 1 mm. Lower glumes oblong-lanceolate, c. 2 × 0.5 mm, acute at apex, entire along margins, chartaceous, 3-nerved. Upper glumes ovate, boat shaped, c. 1.5 × 1 mm, acute at apex, hairy outside, hairs with tubercles base, 5-nerved, keeled. Florets 2; lower empty, upper bisexual. Lower lemma ovate, c. 1.25 × 0.75 mm, acute at apex, folded, chartaceous, hyaline; lower palaea oblong-lanceolate, c. 1.5 × 0.5–0.6 mm, acute at apex, membranous, finely ciliate along margins, hyaline. Upper lemma, broadly ovate, c. 1.5 × 1.2 mm, acute at apex, folded along margins, keeled; upper palaea ovate elliptic, boat shaped, 1.3–1.5 × 0.8–1 mm, acute at apex, sub-coriaceous, faintly 2-nerved. Stamens 3; filaments filiform, c. 0.3 mm long, hyaline; anthers c. 1 mm long, sagittate at base. Ovary oblong-elliptic, 0.5-0.7 × 0.2–0.3 mm; style 0.8–1 mm, hyaline; stigma plumose, c. 0.6 mm. Caryopsis elliptic, c. 1.2 × 1 mm, acute to obtuse, brownish.

Fl. & Fr.: November–May.

Habitat: Usually found as forest undergrowth in shaded areas.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Meghalaya, Nagaland, Odisha, Sikkim and Tamil Nadu. WORLD: Tropical Africa and Asia.


**Illustration:** Rheede, Hort. Malab. 12: t. 61.1703.

Rhizomatous perennials. Clumps geniculate, 20–35 cm high, ribbed, leafy throughout. Leaf blade linear-lanceolate, 7.8–20 × 0.4–0.7 cm, acuminate at apex, inrolled along margins, acute at base, villose, hairs 3–5 mm long; ligules coriaceous, hairy above, glabrescent beneath; parallel nerved, sharply serrate along nerves; ligules densely hairy; leaf sheath 4.5–11 cm long, ribbed, hairy outside, glabrous inside, membranous along margin except toward base of petiole, slightly ciliate. Inflorescence terminal raceme, c. 6 cm long; rachilla c. 1 mm long, hairy. Lower glume broadly ovate-suborbicular, c. 1.2 × 1.2 mm, broadly acute, ciliate along margin, greenish purple, prominently 6–7-nerved; upper glume oblong ovate, c. 2 × 1.25 mm, acute, ciliate along margin, greenish purple, prominently 5-nerved. Lower florets sterile; lemma oblong-ovate, c. 2.5 × 1–1.2 mm, mucro-acute, membranous along margin toward base, ciliate toward apex, chartaceous, greenish-purple, 5-nerved; palea lanceolate, c. 1.5 × 0.5 mm, acute, membranous along margins, hyaline. Fertile spikelets: lemma oblong-ovate, c. 2.75 × 1 mm, coriaceous, inrolled, beaked, purplish, glabrous; palea oblong-ovate, c. 2 × 1 mm, chartaceous, hyaline, acute at apex, 3-nerved, 1-keeled. Stamens 3; filament 0.3–0.4 mm; anthers oblong, c. 1 mm long, sagittate at base. Ovary c. 0.3 × 0.2 mm; style 0.5–0.6 mm long; stigma plumose, c. 0.3 mm long.

**Fl. & Fr.:** November-December.

**Habitat:** Cultivated sporadically and at times naturalized.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Jammu-Kashmir, Karnataka, Maharashtra, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

**Specimen examined:** Buxa National Park, East Damanpur range, SRVK 11, *Gopal Krishna* 50630.

9. *Phalaris* L.

3 species in India and 1 species in BNP.


Tufted annuals. Culms geniculate, 14–29 cm high, ribbed, glabrous. Leaf blade linear-lanceolate 2.5–13.5 × 0.3–0.4 cm, acuminate at apex, membranous, finely serrate along margins, rounded at base, glabrous except veins; parallel veined, finely short hairy pubescent; ligules membranous; leaf sheath 2–4.8 cm long, ribbed, glabrescent; panicle cylindric, 1.5–2.5 × 1–1.2 cm; peduncle 5.3–7.8 cm long. Spikelets ovate-oblong-ovate, 4.5–5 mm; pedicels hairy; glumes broadly ovate, boat shaped, 4.5–5.1 × 3 mm, winged, acute at apex, serrate at apex, entire, membranous towards base, prominently 3-nerved, keeled, winged; finely serrate. Florets 2; lower florets reduced to lemma, upper florets bisexual. Lower lemma linear-lanceolate, c. 1.5 × 0.3 mm, acuminate; lower glume absent; upper lemma ovate, c. 3 × 2 mm, acute at apex, hairy along margins, cuneate or rounded at base, appressed hairy outside, glabrous inside; upper palaea oblong-elliptic, c. 2.5 × 1.2 mm, boat shaped, hyaline membranous, keeled; keels serecious, hispid. Stamens 3; filament filiform, c. 1.5 mm long; anthers 1.6–1.8 mm. Ovary oblong-ovate, c. 1.5 × 1 mm; style c. 1.6 mm, hyaline; stigma plumose, 1.5–1.7 mm. Caryopsis ovate, c. 2.5 × 1.5 mm, acute, shining.

Fl. & Fr.: March–April.

Habitat: Weed of cultivation, usually in hilly areas.

Distrib.: INDIA: Andhra Pradesh, Bihar, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Apparently native to the Mediterranean and east to Baluchistan and Northwest Himalayas.

Specimen examined: Buxa National Park, Jainti range, 8th April, 2012, Gopal Krishna 56065.

10. POGONATHERUM P. Beauv.

2 species in India and 1 species in BNP.


Other synonym: Pogonatherum saccharoideum P. Beauv.


Tufted perennials. Culms geniculate, 30–40 cm high, terete, glabrous, woody at base. Leaves linear, 1.8–5.5 × 0.2–0.3 cm, acuminate at apex, inrolled along margin, cuneate at base, densely short hairy above, sparsely short hairy beneath, parallel veined; nerves
conspicuous above; ligules c. 0.5 × 1 mm, membranous, ciliate; leaf sheath 0.9–3.5 cm, keeled, hispid at base as well as at mouth. Inflorescences a single raceme borne on a flexuous peduncle, terminating the culm branches, 0.9–2.6 cm long; spikelets paired, lanceolate-oblong to ovate, 1.9–3.2 × 0.3–0.75 mm, 2-awned; pedicels 2–2.2 mm, hispid.

Lower glume, oblong, boat-shaped, c. 2.75 × 1 mm, acuminate at apex, chartaceous, hyaline, prominently 3-nerved, glabrous; upper glume oblong-ovate, c. 2.75 × 1.5 mm, awned at apex, chartaceous, hyaline, 1-nerved, keeled, hairy along keel; awn c. 0.9 cm long, barbelliate. Florets 2; lower male, upper bisexual. Lower lemma ovate-lanceolate, c. 2 × 0.5 mm, fimbriated at apex, chartaceous, hyaline; lower palaea linear-oblong, 1.5–2 mm long, fimbriated at apex, 2-nerved. Upper lemma oblong-lanceolate, c. 2.25 × 0.6–0.7 mm, awned, chartaceous, hyaline, keeled; awn 1.8–2 cm long, barbellate; upper palaea oblong, c. 2.25 × 0.6 mm, chartaceous, hyaline, fimbriated at apex. Stamens 2; filaments filiform, 0.4–0.5 mm long, hyaline; anthers oblong, c. 1.1 mm long, sagittate at base. Ovary lanceolate, c. 0.4 mm long; style c. 1.2 mm long, hyaline; stigma plumose, c. 1 mm. Caryopsis narrowly oblong.

Fl. & Fr.: August–June.

Habitat: Along streamlets and riversides; in dry rocky places and hill slopes.

Distrib.: INDIA: Andaman, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Southern Asia, Australia, Bhutan and Nepal.


11. PSEUDECHINOLAENA Stapf

1 species in India and BNP.


Other synonym: Panicum uncinatum Raddi.

Illustration: Hook., Icon. Pl. 31: t. 3094.1922.

Rhizomatous perennials. Culms geniculate, 24–48 cm high, decumbent, rooting at lower nodes. Leaves blade lanceolate, 1.9–6.5 × 0.7–1 cm, micro-acute at apex, inrolled or finely serrate along margins, acute at base, sparsely hispid both surface, chartaceous; leaf
sheaths 1.1–2.1 cm, hispid, fimbriated along margins, nerves prominent; ligules membranous. Inflorescence unilateral spikes; spikelets 4–4.5 × 2–2.5 mm; pedicels c. 1 mm long. Lower glume broadly ovate, c. 4 × 2 mm, mucro-acute at apex, rounded at base, sub-coriaceous, villous; upper glume oblong-lanceolate, c. 4.5 × 1.2 mm, mucro-acute at apex, entire along margins, sub-coriaceous, prominently 3-nerved, keeled, pubescent along keel. Flores 2; lower bisexual, upper empty. Lower lemma elliptic ovate, c. 2.75 × 1.5–1.6 mm, acute at apex, entire along margins, sub-coriaceous, nerves keeled, obscure, shining; lower palaea, elliptic-ovate, c. 2.6 × 1.5–1.6 mm, acute at apex, subcoriaceous, obscure, shining, keeled; upper lemma oblong-ovate, c. 3.5 × 1.5–2 mm, acute at apex, greenish, chartaceous, 5-nerved, keeled, glabrous; upper palaea lanceolate, c. 3 × 0.7 mm, acute at apex, chartaceous, hyaline, prominently 2-nerved, keeled. Stamens 3; filaments filiform, hyaline, c. 2.5 mm; anthers 1-1.5 mm.

Fl. & Fr.: July–January.

Habitat: Forest floor in moist shady localities.

Distrib.: INDIA: Arunachal Pradesh, Assam, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu and West Bengal. WORLD: Pantropical.

Specimens examined: Buxa National Park, East Damanpur Range, SRVK 11-12, Gopal Krishna 47194; East Damanpur range, 29th Nov., 2011, 1st Dec., 2011, Gopal Krishna 47154.

12. SACCHARUM L.

15 species in India and 1 species in BNP.


Rhizomatous perennials. Culms 1–1.5 m high. Leaves linear 60–65 × 0.5–0.7 cm, acumin along margin, truncate at base, coriaceous, glabrous, parallel veined; midvein prominent, glabrous; leaf sheath 25–33 cm, prominently nerved, puberulent; ligules membranous, ovate, 2–3 mm; panicle 25–35 cm long. Spikelets lanceolate, 3.5–4.5 × 1–1.2 mm, covered with silver hairy hairs exceeding the spikelets, one sessile and 2 pedicellate; pedicel 3–5 mm long, stout, sessile; spikelets lanceolate c. 4.5 × 1 mm. Lower glume silvery-greenish, marked purplish above, oblong-lanceolate, 3.5–4 mm, acuminate at apex, hairy on back, rounded on back; upper glume, oblong-lanceolate, 2.7–3.6 mm, acuminate at apex, glabrous, margins ciliate above. Lower lemma oblong-lanceolate, c. 4.2 × 1–1.2 mm, acuminate at apex, thickened at base, sub-coriaceous, 2-nerved, 2-keeled. Upper palaea lanceolate, c. 3.2 × 0.5–0.6 mm, acute at apex, chartaceous, hyaline, glabrous. Stamens 3;
filaments hyaline, c. 0.75 mm long. Ovary elliptic-oblong, c. 0.6 × 0.2–0.3 mm; style c. 2 mm long, filiform; stigma plumose, 0.5–0.7 mm. 

Fl. & Fr.: January–February.

Distrib.: INDIA: Andaman, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: Malaysia, Myanmar and Sri Lanka. 


13. SETARIA P. Beauv. (nom. cons.)
15 species in India and 1 species in BNP.


Other synonyms: Setaria paniculifera (Steud.) E. Fourn. ex Hemsl.; Panicum paniculiferum Steud.; Setaria plicata Bor.


Rhizomatous perennials. Culms 40–70 cm, lower part decumbent and rooting from nodes high, ribbed, glabrous. Leaves linear-lanceolate, c. 17 × 1.4 cm, acuminate at apex, finely serrate, inrolled along margins, coriaceous, glabrous except nerves; nerves prominent, sharply serrate-dentate; leaf sheath 14.5–17.8 cm, ribbed, glabrous; ligules lanceolate, hispid, sub-digitate. Inflorescence panicles, 16–35 × 2.5–3.5 cm; rachis pubescent. Lower glumes oblong-ovate, boat shaped, c. 2 × 1 mm, acute, hairy at apex, membranaceous, serrulate, hyaline along margins, subcoriaceous, 3-nerved, 1-keeled, hairy along keel; upper glume ovate-elliptic, boat-shaped, c. 2.75 × 1 mm, acute at apex, membranous, entire hyaline along margins, subcoriaceous, 3-nerved, 1-keeled, hairy along keel. Florets 2; lower male, sessile; upper bisexual, pedicellate; pedicel c. 1 mm long. Lower lemma oblong-ovate, boat-shaped, c. 3 × 1.6 mm, acute at apex, membranous along margins, subcoriaceous, prominently 7-nerved, keeled; lower palaea lanceolate, c. 2 × 0.5 mm, acute at apex, membranous along margin, subcoriaceous, yellowish-hyaline, 2-nerved, 2-keeled, hairy along keel; upper lemma ovate-elliptic, c. 2 × 0.8 mm, 3-lobed at apex, fimbriated along margins, chartaceous, hyaline, 1-keeled; upper palaea lanceolate, c. 1.75 × 0.5 mm, acute at apex, membranous along margin, keeled. Stamens 3; filaments
brownish, c. 0.2 mm long; anthers oblong, 0.6-0.75 mm long, sagittate at base. Ovary ovate, 0.1-0.2 × 0.1-0.2 mm; style hyaline, 0.3-0.5 mm, unequal; stigma plumose, 0.3-0.5 mm.

Fl. & Fr.: July–April.

Habitat: In ravines, other sheltered places, at times in marshy areas, also along rocky hill slopes.

Distrib.: INDIA: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. WORLD: Tropics of Old world and introduced elsewhere.


14. SPOROBOLUS R. Br.

20 species in India and 1 species in BNP.


Other synonym: Sporobolus indicus (L.) R. Br. var. fertilis (Steud.) Jovet & Guedes.

Rhizomotous perennials. Culms 0.75-1 m high. Leaves linear to oblong, 5-29 × 0.2-0.6 cm, very acute, flat or inrolled, glabrous; leaf sheaths c. 2.3 cm long, glabrous. Inflorescence panicles, c. 22 cm long; rachis triquertous, appressed hairy. Spkelets silvery-grey, 1.7-2.2 mm; pedicels c. 3 mm long, hairy. Lower glumes elliptic-ovate, c. 3 × 1 mm, acute at apex, sub-coriaceous, 2-nerved, villous beneath, glabrous outside; upper glume c. 3.25 × 1 mm, acute at apex, hairy, sub-coriaceous, 3-nerved. Florets 1, bisexual. Lemma elliptic-lanceolate, c. 2.5 × 1 mm, acute at apex, hairy along margin, sub-coriaceous, faintly 1-3-nerved; palaea lanceolate, c. 2.1 × 0.8 mm, acute at apex, fimbriated along margins, chartaceous, hyaline. Stamens 3; anthers c. 1.1 mm long, yellowish. Ovary obovate, c. 1 × 0.3 mm; style 0.75–1 mm long, hyaline; stigma plumose, c. 1.25 mm long.

Fl. & Fr.: Throughout the year.

Distrib.: INDIA: Andaman, Andhra Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. WORLD: China, Japan, Sri Lanka and throughout SE Asia.

15. **THYSANOLAENA** Nees

1 species in India and BNP.


Other synonyms: **Thysanolaena maxima** (Roxb.) Kuntze; **Thysanolaena agrostis** Nees; **Agrostis maxima** Roxb. **Plate 63b**


Rhizomatous perennials. Culms geniculate, 1–2 m high, smooth, glabrous. Leaves blade lanceolate, 28–44 × 3.1-6.2 cm, acuminate at apex, serrulate along margins, semi-amplexicaul at base, coriaceous, glabrous, midvein prominent above, cross-veinlets; leaf-sheath 3.1-6.8 cm long, prominently nerved; ligules c. 1.5 mm, truncate. Inflorescence panicles effuse, 30–35 × 18–25 cm; spikelets lanceolate, 1.6–1.8 × 0.4–0.6 mm; pedicels, 0.4–1 mm. Lower glumes ovate, c. 0.9 × 0.4–0.5 mm, acute at apex, fimbriate along margins, chartaceous, hyaline; upper glume oblong-ovate, 0.9–0.5 mm, acute at apex, fimbriate along margin, chartaceous, hyaline. Florets 2 or 3, lower empty, upper or middle bisexual. Lower lemma elliptic-lanceolate, c. 1.5 × 0.5–0.6 mm acute at apex, ciliate along margins, chartaceous, hyaline, 3-nerved; lower palaea absent; upper lemma ovate-lanceolate, c. 1.25 × 0.5–0.6 mm, acuminate at apex, villous along margins, prominently 3-nerved, hyaline chartaceous; upper palea lanceolate, c. 1.25 × 0.4 mm acute at apex, ciliate along margins, chartaceous hyaline. Stamens 2; filaments hyaline, filiform 0.2–0.3 mm long; anthers c. 0.4 mm long.

**Fl. & Fr.:** April–December.

**Distrib.** INDIA: Almost throughout. WORLD: Widespread in tropical Asia from India and Sri Lanka, occasionally introduced into other parts of world.

**Specimens examined:** Buxa National Park, Jainti Range, Tashigaon 2, Bhutia Pond, 6th March, 2011, **Gopal Krishna** 47299; Tashigaon 2, Bhutia Pond, 11th Feb., 2010, S.K. Srivastava & Gopal Krishna 47046.

**Uses:** Inflorescence used for making brooms; leaves are of great fodder value.

### 7.3 GYMNOSPERMS

**Group B: Gymnosperms**

1a. Perianth present in male and female flowers

1b. Perianth absent in male and female flowers
**GNETACEAE**

**GNETUM L.**

8 species in India and 1 species in BNP.

*Gnetum scandens* Roxb., Fl. Ind. 3: 518. 1832; Hook.f. in Hook.f., Fl. Brit. India 5: 642. 1888; Prain, Bengal Pl. 2: 991. 1903. Plate 63c, d


Evergreen climbing shrubs; stems and branches terete, glabrous. Leaves opposite, simple, oblong-ovate, 5.8–8 × 2–3.4 cm, acuminate at apex, entire along margins, base rounded or broadly cuneate at base, coriaceous, green shining, glabrous; midvein raised both sides, prominent beneath, glabrous; lateral nerves 8–10 pairs, prominent beneath, glabrous; petioles 6–8 mm long, glabrous. Male inflorescences lax, once or twice branched, 3–5 cm long; peduncle 5–10 mm long; male spikes 10–15 × 2.5–3 mm, involucral collars 13–18, each collar with 25–45 flowers plus 10–15 sterile female flowers, basal hairs forming a dense, short cushion. Female inflorescences lateral, solitary or fascicled, main axis thin, with 3 or 4 pairs of branches; peduncle 2–3 cm; female spikes 2–3 × 0.4 cm, enlarging to c. 10 cm when mature, nodes each with 5–8 female flowers, basal hairs sparse, short; seeds yellowish brown or reddish brown, cylindric-ovoid or cylindric, 1.2–1.5 × 0.6–0.9 cm, base rounded, sometimes contracted into a stipe to 3 mm, outer coat smooth longitudinally wrinkled when dried, sometimes covered with silvery scales.

Fl.: March–April; fr.: September–October.

Distrib.: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh and West Bengal.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, East Damanpur range, 30th March, 2012, Gopal Krishna 50648.

**PINACEAE**

**PINUS L.**

7 species in India and 1 specie in BNP.


Trees, to 20 m tall; branches spreading, drooping, terete with scars of fallen leaves. Leaves acicular, in bundle of 4–5, c. 16–25 cm long, upper surface grass green, lower surface conspicuously whitish bloomed; fascicle sheaths bright golden brown, c. 2 cm long. Cone
elongate-cylindric, 12–20 cm long. Cone peduncle 4.5–6 cm long. Cone scales thinly woody, apex flat; seeds 6–8 mm long, winged; wings c. 2 cm long.

**Distrib.:** INDIA: Arunachal Pradesh, Sikkim and West Bengal. WORLD: Afganistan, Bhutan and China.

**Specimen examined:** Buxa National Park, Jainti range, Tashigaon 1-2, 70m, 6th March, 2011, Gopal Krishna 47291.

### 7.4. PTERIDOPHYTES

**Group C: Pteridophytes**

1a. Sporangia solitary, in axils of simple or forked leaves ....................... *Lycopodiaceae*

1b. Sporangia several, borne directly on surface of fronds or frond axes or on specialized sporophores .......................................................... 2

2a. Sporangia borne on peltate sporophores; aerial stems usually hollow, longitudinally ridged, articulate, with base of internode surrounded by tubular sheath, branches absent or whorled, rarely irregular at node..... *Equisetaceae*

2b. Sporangia borne on fronds, these sometimes modified into sporocarps enclosing sporangia; stems never hollow.............................................. 3

3a. Fronds vine like with a twining rachis .............................................. *Lygodia*c*ae*

3b. Fronds not vine like, sometimes scrambling but never with a twining rachis........... 4

4a. Ferns tree like, with an erect rhizome and with large compound fronds in a crown .......................................................... *Cyatheaceae*

4b. Ferns with rhizome short, creeping or climbing, sometimes massive but then prostrate or hardly longer than wide, never tree like ............... 5

5a. Fertile fronds or pinnae without visible lamina; sporangia in dense clusters directly on rachis and rachillae, not covered by indusium or modified lamina; sporangia opening by a lateral tear, annulus vertical; spores not green .................. *Dryopteridaceae* (*Bolbitis*)

5b. All pinnae with lamina, sporangia borne on abaxial surface or at margin, sometimes pinnae very narrow with lamina inrolled to cover sporangia ............. 6

6a. Fronds with brown leathery stipules at base of swollen stipe, and a pulvinus at base of each pinna; sporangia in synangia or free, without annulus.......................................................... *Marattia*c*ae*

6b. Fronds with neither stipules nor pulvini; sporangia not fused into synangia, with obvious annulus of thick-walled cells...................................................... 7

7a. Lamina narrowly linear, grass like, erect or pendent; sporangia in coenosori, borne in strictly marginal grooves, in 2 submarginal lines, or a single line along costa.............................................. *Pteridaceae* (*Vittaria*)

7b. Lamina not grass like, sori not as above................................................ 8

8a. Fronds 2–4-pinnate, sometimes also simple or pinnatifid, abaxially glabrous, farinose, densely covered with amass of brown hairs, or
sparsely covered with scales; typically ferns of exposed and/or dry situations ................................................. Pteridaceae (Pityrogramma)

8b. Fronds 1-or 2-pinnate or pinnatifid, or simple, abaxially hairy or glabrous; typically ferns of forest understory, often along streams......................... 9

9a. Fronds simple, pinnatifid, or 1-pinnate, rarely pedately lobed ....... Polypodiaceae
9b. Fronds bipinnatifid to decompound ................................................................. 10

10a. Sori marginal or submarginal ............................................................................. 11
10b. Sori between costae and margin, occasionally also with a few borne near lamina margin ........................................................................................................... 12

11a. Rhizome and stipe with unicellular or multicellular hairs or rarely bristles ................................................................. Dennstaedtiaceae
11b. Rhizome and stipe scaly, at least at base, scales sometimes narrow....... Pteridaceae

12a. Sori marginal or submarginal ............................................................................. 11
12b. Sori between costae and margin, occasionally also with a few borne near lamina margin ........................................................................................................... 12

1a. Fronds pinnatifidite or more divided................................. 1. A. finlaysonianum
1b. Fronds simple or 2-or 3-forked............................................................................. 2

2a. Stipe basal scales subulate to very narrowly triangular-ovate, more than 10 times longer than wide................................. 2. A. nidus
2b. Stipe basal scales triangular-ovate, less than 10 times longer than wide................................................................. 3. A. phyllitidis

1. Asplenium finlaysonianum Wall. ex Hook., Icon. Pl. 10: t. 937. 1854; Prain, Bengal Pl. 2: 1249. 1903.
Other synonym: Hemidictyum finlaysonianum (Wall. ex Hook) T. Moore.
Illustration: Hook., Icon. Pl. 10: t. 937. 1854.

Plants 30-50 cm; rhizomes erect, short, scaly; scales dark brown, narrowly triangular, entire. Fronds caespitose, stipe grayish green or stramineous, 15-26 cm, with scales similar to those on rhizome, toward rachis subglabrous; lamina ovate-elliptic, 20-32 x 10-22 cm, 1-pinnate; pinnae 2-6 pairs, shortly stalked; lower pinnae not much reduced,
ovate-lanceolate, 7–12 × 2–3.6 cm, cuneate at base, gradually decurrent on stalk, margin entire to repand, acuminate at apex; terminal pinnae similar to lateral ones but usually wider and more rhombic or hastate, 8–15 × 5–11 cm, often 3-lobed at base. Venation subflabellate with indistinct costa, veins faintly visible, almost parallel, anastomosing near margin. Frond papery or sub-leathery, brownish green when dry, with small scales along rachis and costa, becoming glabrous when old; rachis stramineous to grayish green, with sparse small narrowly triangular scales. Sori linear, variable in length, 0.5-4.5 cm; indusium yellowish to brown, linear, papery, entire, opening toward costa.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Meghalaya, Nagaland and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal and Vietnam.

**Specimen examined:** Buxa National Park, Jainti range, 6th October, 2009, S.K. Srivastava & Gopal Krishna 46186.


**Illustrations:** Curtis's Bot. Mag. 58: t. 3101. 1831.

Plants 1–1.2 m tall. Rhizome erect, thick and short, woody, apex scaly; scales dark to purplish brown, narrowly triangular to linear-subulate, margin ciliate to fimbriate. Fronds caespitose; stipe pale brown, up to 5 cm, woody, when dry semiterete abaxially, base densely scaly; lamina lanceolate, 90–120 × 9–15 cm, gradually decurrent on stipe, base cuneate, margin entire, apex acute to acuminate. Midrib raised and semiterete on upper adaxial side but flat abaxially, subglabrous, grayish to pale brown; veinlets simple or forked, parallel and connected at their apex to marginal vein. Fronds papery or thinly leathery, when dry grayish green, glabrous. Sori linear, 3–5 cm, on acroscopic side of veinlets, running from near their base up to ½ of their length; basal part of lamina usually sterile; indusial brownish, linear, thickly membranous, entire, persistent.

**Distrib.:** INDIA: Throughout hilly regions of Northern India (Punjab, Kashmir, Delhi) and throughout all the districts of northeastern India. WORLD: Africa, Australia, Bhutan, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Sri Lanka, Pacific islands (Polynesia) and Vietnam.

**Specimen examined:** Buxa National Park, North Rajabhatkhawa, J.K. Sikdar 7003.

Other synonym: *Asplenium phyllitidis* Holtum.

Rhizomes short creeping, thick, paleaceous; roots profuse, soft, hairy; paleae 8–12 × 2–3 mm, basifixed, ovate-lanceolate, margin laciniated, these very long and zigzag, acuminate, brown, concolorous, heterotoechae. Fronds 60–90 × 5.5–7.5 cm, tufted or closely originated, simple; stipes 1.5–2 mm long, thick, stout, elliptic-oblong, attenuate, entire and repand, caudate acuminate, tip oblique curved, rachis prominent below; veins once forked, running obliquely; drying brownish pale, coriaceous. Sori oblique, 0.7–2.5 cm long, on acroscopic veinlets of forking; indusium entire, thin, c. 1 mm wide, not pushed back; paraphyses absent.

**Habitat:** Epiphytes on trees.

**Distrib.:** INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Manipur and West Bengal. WORLD: Bangladesh, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea and Thailand.


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**ATHYRIACEAE**

**DIPLAZIUM** Sw.

50 species in India and 1 species in BNP.


Other synonyms: *Anisogonium esculentum* (Retz.) C. Presl; *Asplenium bipinnatum* Roxb. ex Griff.; *Diplazium serampurense* Spreng.; *Athyrium esculentum* (Retz.) Copel.

**Local name:** “Dhenki-sag” (Bengali).

**Illustration:** Rheede, *Hortus Malab.* 12: t. 15. 1703.

Rhizomes erect, densely scaly; scales brown, narrowly lanceolate, c. 10 × 1 mm, thin, toothed at margin. Fronds 90–120 × 25–35 cm, tufted, lanceolate, bipinnate with pinnatifid apex, caudate acuminate; stipes 30–40 cm long, black and sparsely scaly, glabrous or hairy. Lamina 60–75 cm long; pinnae 11–16 pairs, alternate, lower pinnae stipitate, broadly lanceolate, 20–35 × 9–18 cm, pinnatifoliate or 1-pinnate; upper pinnae sub sessile, linear-lanceolate, 6–10 × 1–2 cm, base truncate, margin serrate or pinnatifolate, acuminate at apex; pinnately veined, veinlets 8–10 pairs, ascending, lower 2 or 3 pairs usually conjoined; lamina herbaceous, glabrous or hairy, rachis glabrous or
hairy; costae shallowly grooved, glabrous or occasionally with light brown short hairs. Sori mostly linear, slightly curved, from near midribs to laminar margin; indusial yellow-brown, linear, membranous, entire.

**Habitat:** Grows in moist and shady place, often forming thickets.

**Distrib.:** INDIA: Throughout. WORLD: China, Myanmar and Vietnam.

**Specimen examined:** Buxa National Park, Gadadhar range, South Rajabhatkhawa, J.K. Sikdar 4277.

**Use:** Tender frond is edible.

### CYATHEACEAE

**ALSOPHILA R. Br.**

c. 6 species in India and 1 species in BNP


Other synonyms: *Cyathea gigantea* (Wall. ex Hook.) Holttum; *Gymnosphaera gigantea* J. Sm.

Plate 64c, d

Trees; trunk erect, 1-3 m tall with a loose crown of leaves; rhizome massive. Fronds herbaceous or submembranaceous, tufted, 2-pinnate-pinnatifid, 2-3 m; stipes c. 1 m long, reddish-purple or black, upper part more or less glabrous, and adaxial side with dense dark brown scales; scales dark brown to black and castaneous on stipe base, 10-12 x 1-2 mm, middle portion dark brown; few deciduous scales on rachis and costae; rachis dark or black, rough after abscission of scales; pinnae spreading, shortly stipitate, oblong, 50-60 x 20 cm; middle pinnules c. 25 pairs, stalked, lanceolate, 5-12.5 x 1.5-2.5 cm, gradually narrowed towards apex, distinctly lobed up to 2/3rd of costa; veins 2-6 pairs; pinnule segments 12-15 pairs, slightly ascending, broadly triangular, 5-6 x 4-5 mm, margin minutely serrulate, apex obtuse; veinlets 6 or 7 pairs, simple, basal basiscopic veinlets arising from costule. Lamina papery, abaxially gray-brown, adaxially dark brown, both surfaces glabrous. Sori light brown, orbicular, medial, forming v-pattern; paraphyses dark brown, shorter than sporangia; indusia absent.

**Habitat:** Grows along ditches in Gadadhar range of the park.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Mizoram, Sikkim and West Bengal. WORLD: Cambodia, China, Indonesia (Java), Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Gadadhar range, 9th March, 2011, Gopal Krishna 50526.
Notes: This species known from Darjeeling district and present collection is from Jalpaiguri district. This species is restricted in Gadadhar range of the park.

**DRYOPTERIDACEAE**

**BOLBITIS** Schott

20 species in India and 1 species in BNP.


Other synonyms: *Egenolfia appendiculata* (Willd.) J. Sm.; *Acrostichum appendiculatum* Willd.; *Polybotrya appendiculata* (Willd.) J. Sm.

Illustrations: Hook., Exot. Fl. 2: t. 108. 1825 [as *Acrostichum appendiculatum* Willd.].

Rhizomes creeping, paleaceous; paleae lanceolate, c. 4 x 1 mm, margin glandular hairy, acuminate at apex, pointed or with terminal globose cell, brown. Fronds dimorphic, sterile pinnate: lanceolate 40-50 x 8.5 cm; stipes 15-20 cm, paleaceous, winged narrowly, dirty brown; rachis similar; pinnae subulate-oblong, c. 5 x 1.7 cm, sessile, basal pair deflexed, subopposite, acroscopic base auricled and overlapping the rachis, truncate and basiscopic base less or not auricled towards apex, shallowly lobed, lobes rotund, spinules at sinus c. 1 mm long, acutish obtuse; costae sparsely paleaceous; veins pinnate, ending well before the margin into broad hydathode; bulbils subterminal, c. 3 cm below the tip; narrow lanceolate, 50-60 x 5 cm, acuminate at apex; stipes c. 35 cm long, narrowly winged, paleaceous throughout, stramineous brown; pinnae c. 2.2 x 0.6 cm, shortly stipicellate, oblong, acroscopic base slightly auricled and basiscopic base cuneate to broad cuneate, entire, obtuse. Sori acrostichoid, covering full length of lower surface of pinnae.

Habitat: Lithophytic fern frequent to abundant inside the forest in moist and shady places.

Distrib.: **INDIA**: Almost throughout. **WORLD**: Bangladesh, Bhutan, China, Indonesia, Japan, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan and Thailand.

DENNSTAEDTIACEAE

MICROLEPIA C. Presl

11 species in India and 1 species in BNP.


Other synonyms: *Microlepia speluncae* var. *pubescens* (Hook.) Sledge; *Davallia speluncae* (L.) Baker.


Rhizomes creeping. Fronds c. 3 m long; rachis grooved shallowly dorsally, hairy on both surfaces, hair reddish-brown, articulate, thick, somewhat stiff; pinnae, c. 16 x 10 cm, alternate; stipicellus c. 5 mm long, deltoid-lanceolate, short caudate acute, bases auricled, costae grooved above, hairy on both surfaces; pinnules basal basiscopic, deltoid-lanceolate, c. 5 x 1.6 cm, sessile to adnate acuminate, gradually narrowed, long acuminate, lower base narrowly decurrent up to some distance; secondary-pinnules basal acrosopic the largest, subquadrangular c. 10 x 4-5 mm, sessile, lobed, obtuse, tip crenate, acrosopic base truncate and sub-auricled and basiscopic base cuneate; secondary-costules sparsely hairy above, hairs spreading, pale, stiff, short to quite long, flaccid hairs absent, lower surface similar to costules but a bit shorter; lobes oblong-obtuse, basal ones shallowly-lobed, entire; veins simple, pinnate, ending before margin, indistinct, hairy on both surfaces, upper surface hairs sparse, stiff, spreading and of lower surface more dense, spreading pale and adpressed, flaccid, intermixed; lamina-tissue with scattered long hairs above and short, erect, more dense hairs beneath, margin not hairy; drying pale, herbaceous. Sori davallioid, terminal, more nearer to margin, small.

**Habitat:** Grows in moist shady places in the park.

**Distrib.:** **INDIA:** North East India, Western Himalayas and West Bengal. **WORLD:** Bhutan, Cambodia, China, Indonesia, Japan, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam.

EQUISETACEAE

EQUISETUM L.

7 species in India and 1 species in BNP.


Plants small to medium-sized; rhizomes creeping, erect, or ascending, blackish brown, nodes and roots with dense long yellowish brown trichomes or glabrous. Aerial stems annual, monomorphic, 10–30 cm tall, branched; internodes 1.5–6 cm, green but those of lower 1–3 nodes blackish brown, not lustrous. Main stems 4–10-ridged; each side of ridge raised and forming edges reaching lower sheath teeth; each edge with a row of tubercles reaching sheath teeth; sheath tubes long, narrow, grayish green in lower portion, blackish brown in upper portion, with a deep groove going through back of sheath; sheath teeth 5–10, blackish brown, lanceolate, leathery, caudate at apex, persistent. Lateral branches slender, rigid, terete, 4–8-ridged; each side of ridge with edges and tubercles; sheath teeth 4–6, grayish green, deltoid, leathery, persistent. Strobilus terete, 1–9 cm long, apex blunt; stalk prolonged when mature, 1–3 cm.

Habitat: Grows along streams in the park.

Distrib.: INDIA: Andaman Islands, Arunachal Pradesh, Assam, Kerala, Meghalaya, Sikkim, Tamil Nadu and West Bengal. WORLD: Bhutan, China, Japan, Myanmar, Nepal, Pakistan and Vietnam.

Specimen examined: Buxa National Park, Gadadhar range, Panbari 8, 1st December, 2011, Gopal Krishna 47192.

LYCOPODIACEAE

HUPERZIA Bernh.

17 species in India and 1 species in BNP.


Other synonym: Phlegmariurus squarrosus (G.Forst.) Å. Löve & D. Löve.


Epiphytes; stems caespitose, robust, mature branches pendulous, 1 to several times forked, 25–100 cm; stems together with leaves 2.5–3 cm wide at middle. Trophophylls lustrous, lanceolate 11–15 × 1–2 mm, attached at right angles or slightly angled upward, thinly leathery, midrib distinct, base cuneate, decurrent, sessile, margin entire, apex

Rhizome shortly creeping, densely covered with roots, stipes very close together, apex of rhizome covered with dark brown to nearly black hairs. Juvenile fronds once or twice dichotomous, each branch bearing a single pinna deeply palmately 3–7-lobed, lobes almost equal, base cordate, margins serrate to crenately lobed. Rachis of scandent fronds narrowly winged, flattened and puberulent on adaxial surface between wings; primary rachis branches c. 3 mm, dormant apex covered with pale brown hairs; secondary rachis branches pinnate to somewhat bipinnate, narrowly ovate to deltoid in outline, c. 15 × 8 cm; sterile pinnae of lower branches palmate, often 5-lobed, cordate at base; higher secondary branches bearing 3–5 (7) pinnae on each side, lower pinnae asymmetrical or lobed at base, lowest of branches with 2 or 3(-6) separate quaternary pinnae at base; sterile pinnae 3–10 × 0.8–1.5 cm, lobed above the base, margin serrate, apex subacute; lower pinnae stalked, upper pinnae sessile, lamina thin; costae usually with scattered long hairs, less often with dense short hairs, veins often with scattered short hairs on
abaxial surface, lamina sometimes similarly hairy; fertile pinnae smaller than sterile pinnae, sorophores 3–5 mm, at apices of small triangular lobes.

**Distrib:** INDIA: Throughout. WORLD: Australia, Bhutan, China, Japan, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.


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**MARATTIACEAE**

**ANGIOPTERIS** Hoffm.

15 species in India and 1 species in BNP

*Angiopteris helferiana* C. Presl, Suppl. Tent. Pterid. 22. 1845.

Other synonym: *Angiopteris evecta* (G. Forst.) Hoffm. Fig. 50; Plate 64g, h

Illustration: Com. Soc. Regiae Sci. Gott. 12: 29, t. 5 1794 [as *Angiopteris evecta* (G. Forst.) Hoffm.].

Rhizome globose; scales long, linear, subulate. Frond 50–100 × 30–50 cm, paripinnate, 9–15 pairs; pinnae lanceolate, 12.5–19 × 1.8–3.2 cm, acuminate at apex, serrate along margin, rounded-truncate at base, subcoriaceous, pale-dark brownish, glabrous; midvein prominent; lateral veins furcate, recurrent; stalk 2–3 mm long. Sori of two close row of sporangia attach along veins, elliptic-oblong, 1.1–1.6 mm long.

**Distrib.:** INDIA: North East India and West Bengal. WORLD: Bhutan, China, Myanmar and Nepal.

**Specimens examined:** Buxa National Park, East Damanpur Range, NRVK 10 compartment, *Gopal Krishna* 47162; West Bengal, Baradabari, 28.7.1961, without collector’s name 357.

**Note:** This species is known from Darjeeling district and present collection is from Jalpaiguri district.

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**POLYPODIACEAE**

**Key to genera**

1a. Fronds not covered with stellate-hairs on either surface................. 1. *Phymatosorus*

1b. Fronds covered with stellate-hairs always on lower surface or on both surfaces.................................................. 2. *Pyrrosia*
Fig. 50. Angiopteris helferiana C. Presl a. A frond
Plate 64: a. *Asplenium phyllitidis* D. Don; b. *Diplazium esculentum* (Retz.) Sw. c - d. *Alsophila gigantea* Wall. ex Hook.; b. Habit; c. Sori (close up); e. *Microlepia speluncae* (L.) T. Moore (Sori); f. *Huperzia squarrosa* (G. Forst.) Trevis.; g - h. *Angiopteris helferiana* C. Presl; g. Habit; h. Sori (close up view)
1. PHYMATOSORUS Pic. Serm.

4 species in India and 1 species in BNP.


Other synonyms: *Polypodium lucidum* Roxb.; *Phymatodes cuspidata* (D. Don) J. Sm.

**Illustration:** Bedd., Ferns Brit. India 1: t. 79. 1866 [as *Goniophlebium cuspidatum* (D. Don) Bedd.].

Epiphytes; rhizomes wide, creeping, thick and stout, sparsely scaly; scales dark brown at middle, paler toward margins, orbicular, peltate, entire. Stipes straw-colored, 30–50 cm, glabrous except for scaly base, articulated to the rhizome, grooved dorsally, smooth, glandular, green. Lamina imparipinnate, 9–11 pairs, 30–50 × 20–25; pinnae ascending, opposite to subopposite, linear-lanceolate, 15–25 × 1.5–3 cm; cuneate at base, entire along margins, acuminate at apex, non-articulated; subcoriaceous; midvein prominent both sides; veins reticulating, veinlets obscure; pale green when dry. Sori orbicular in 1 row on each side of costa, c. 1.5 mm across, sunken, papillae on dorsal side, paraphyses absent.

**Habitat:** Grows under shade in moist and wet place on truck of trees.

**Distrib.:** INDIA: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal. WORLD: Bhutan, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Gadadhar range, 8th October, 2009, S.K. Srivastava & Gopal Krishna 46247.

2. PYRROSIA Mirb.

29 species in India and 1 species in BNP.


Other synonyms: *Apalophlebia flocculosa* (D. Don) C. Presl; *Cyclophorus flocculosus* (D. Don) C. Chr.; *Cyclophorus rhomboidalis* Bonap.

Plants 25–50 cm tall. Rhizome, 3.4–6 mm across, scaly; scales pseudopeltate, 4–5.7 × 0.5–1 mm, base entire to irregularly dentate, dull brown to blackish, dentate, entire toward apex. Fronds monomorphic, stipitate; stipe 6–20 × 0.25–1 cm; lamina widest around or below middle, often slightly lyrate, 9–32 × 1.3–7.8 cm, base cuneate to truncate, occasionally cordate, apex acuminate, occasionally acute. Hydathodes distinct, superficial
to distinctly sunken. Indument persistent, dimorphic, thin to dense, light dirty grayish; upper layer with stellate hairs, 0.3–2.2 mm in across, with spreading to appressed, boat-shaped to acicular rays, lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses.

**Habitat:** On tree trunks in forests.

**Distrib.:** INDIA: Western to Eastern Himalayas, Meghalaya, Nagaland and West Bengal. WORLD: Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand and Vietnam.

**Specimen examined:** Buxa National Park, Jainti range, 8th October, 2009, S.K. Srivastava & Gopal Krishna 46244.

**PTERIDACEAE**

**Key to genera**

1a. Sporangia in discrete sori, usually near lamina margin.........................1. Adiantum

1a. Sporangia along veins or over most of abaxial surface of lamina......................2

2a. Sporangia along veins or over most of abaxial surface of lamina......................3

2b. Sporangia in discrete sori, usually near lamina margin..............................4

3a. Lamina 1–3-pinnate.....................................................................................3. Pityrogramma

3b. Lamina simple, entire....................................................................................5. Vittaria

4a. Ultimate segments or lobes 1–2 mm wide...............................................2. Onychium

4b. Ultimate segments or lobes larger, usually more than 5 mm wide...............4. Pteris

**1. ADIANTUM L.**

25 species in India and 1 species in BNP.

**Adiantum lunulatum** Burm.f., Fl. Ind. 235. 1768; Prain, Bengal Pl. 2: 1243. 1903.

Other synonym: *Adiantum philippense* L. Plate 65a, b

**Local names:** “Maiden-hair” (Eng.); *Kali-jhant*” (Bengali).

**Illustration:** Hook., Icon. Fili. 1: t. 104. 1831.

Plants terrestrial or epilithic, 10–50 cm tall. Rhizomes erect, short, scales dark brown, lanceolate, margins denticulate. Fronds clustered; stipe castaneous, glossy, 6–25 cm long, terete, base with same scales as rhizome, distally glabrous; lamina 1-pinnate, lanceolate, 12–25 × 2–6.5 cm; rachis, costae, and stalks same color as stipe, apex usually prolonged into a whip like stolon and rooting to form new plantlets; pinnules 6–12 pairs, alternate, obliquely spreading; stalk 1–2 cm, articulate, persistent after pinnules fall; blade below middle subequal in size, dimidiate-lunate or semi-orbicular-reniform, 1–4 × 1–2.3 cm,
herbaceous, green or brown-green, both surfaces glabrous, upper margin rounded, apex obtuse or bent downward, sterile pinnules stalked, both sides asymmetrical; margins undulate-lobed, segments obtuse and serrulate at apex, lower margins entire, truncate or slightly bent downward, rarely broadly cuneate, fertile pinnules subentire or with 2–4 shallow sinuses, or slightly undulate; distal pinnules slightly smaller; terminal pinnules flabellate, slightly larger than basal pinnules; veins multidichotomously forked and reaching margins, visible on both surfaces. Sori 2–6 per pinna; false indusia dark brown or brown-green, linear-oblong, membranous, upper margins flat and straight or slightly depressed, entire, persistent.

Habitat: Grows on rock surfaces.


### 2. ONYCHIUM Kauf.

c. 8 species in India and 1 species in BNP


Other synonyms: *Onychium auratum* Kauf.; *Lomaria decomposita* Don; *L. auria* Wall.; *L. caruifolia* Wall.; *Pteris chrysocarpa* Hook.f. [Plate 65c]

Local name: “Golden-fern” (Eng.).


Rhizomes erect or short, ascending, scaly; scales linear-lanceolate, dark brown; paleae c. 10 × 0.75 mm, basal, lanceolate, entire to sometimes with a few hairs. Fronds dimorphic (fertile fronds with longer, broader segments), clustered, tufted, deltoid to lanceolate, 25–80 × 8–25 cm, tripinnate to quadripinnate, sterile fronds more dissected; fertile fronds ovate-lanceolate; stipes 13–40 cm long, stramineous to brownish tinged, grooved; lamina 13–30 cm long; pinnae lowest pair the largest, 10–16 × 5–10 cm, alternate, stipicellus 5–20 mm long, ascending, deltoid, narrowing from base, acuminete crenate; pinnules basal pair the largest, 3–7 × 1.2–3 mm, stipicellules 3–6 mm long, oblique-deltoid, pinnate to bipinnatifid, acuminete to caudate acute; ultimate-segments in sterile pinnules spathulate, short; in fertile fronds 10–20 × 2–3 mm, shortly stalked, linear, entire, apex short acute to mucronate, herbaceous, drying pale green. Longest sori 10–20 mm or more,
intermixed with bright yellow farina. False indusia linear, extending nearly to midvein, with entire margins.

**Distrib.:** INDIA: Eastern to Western Himalaya. WORLD: Bangladesh, Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines and Taiwan, Thailand and Vietnam.


3. **PTERIS L.**

54 species in India and 2 species in BNP.

**Key to species**

1a. Lowest pinnae divided ................................................................. 1. *P. khasiana*

1b. Lowest pinnae undivided ............................................................. 2. *P. vittata*


Plants 50–90 cm tall. Rhizome ascending, short, c. 1 cm across, apex densely scaly; scales linear-lanceolate, c. 3 mm, dark brown. Fronds clustered; stipe straw-colored, 30–50 cm, with dark brownish scales, glabrous, adaxially grooved; rachis similar; lamina 2(or 3)-pinnatipartite, ovate to ovate-triangular, 25–45 × 17–24 cm; lateral pinnae 3–6-pairs, basal pairs opposite, 4–8 cm, decumbent, rarely slightly decumbent, basal pair sessile or shortly stalked, often with a basiscopic pinnule near base similar to main part of pinnae but smaller; upper pairs sessile, base attenuate, broadly cuneate, pectinate and forming narrow wings along costa, apex linear-caudate, 2–3 cm, acuminate; terminal pinna similar; segments 20–30 pairs, alternate or opposite, conjoined or c. 1 mm apart (fertile segments up to 2 mm apart), decumbent, falcate, broadly lanceolate, basal pair or several pairs of segments shortened at base, entire, obtuse at apex; costae abaxially prominent, straw-colored, glabrous, grooved adaxially, with needle like flat spines on both sides of groove, and few spines on costa; veins conspicuous on both surfaces, oblique, 2-forked at base, basiscopic vein of segment arising from rachis, and acroscopic vein arising from base of costa, opposite veins at base oblique up to margin of incision; lamina light green to pale green, papery when dried, glabrous. Indusia gray-brown, linear, membranous, persistent.


Other synonyms: Pteris amplexicaulis Roxb.; Pycnodoria vittata (L.) Small; Polypodium trapezoids Burm.f.

Rhizomes erect to short creeping, decurrent, paleaceous; paleae subulate-lanceolate, c. 4 × 0.5 mm, basifixed, acuminate, entire, pale, isotoechae, thin. Fronds oblongate, 50–75 × 18–22 cm, tufted, caudate acute, pinnate; stipes 10–15 cm long, paleaceous at base, grooved, edges raised, light pale brown; lamina 40–60 cm long; pinnae linear to subulate lanceolate, c. 12 × 0.7 cm, sessile, base auricled, serrulate, acute to obtuse, largest pinnae in apical 1/3, gradually reduced downwards to the base into small sub-opposite auricles; terminal-pinnae like other pinnae except auricled base; veins simple to twice forked, prominent, ending into margin, subcoriaceous. Sori marginal, elongated, uninterrupted, indusium entire, thick, pale brown, slightly folded back on maturity.

Distrib.: INDIA: Almost throughout. WORLD: Tropics and subtropics of world.


4. Pityrogramma Link

3 species in India and 1 species in BNP.


Other synonym: Gymnogramma calomelanos (L.) Kaulf.

Local name: “Silver-fern” (Eng.).

Illustration: Hook., Gard. Ferns t. 50. 1862 [as Gymnogramme calomelanos (L.) Kaulf.].

Rhizomes erect, decumbent ascending, short, paleaceous; paleae subulate-lanceolate, c. 6 × 0.5 mm, acuminate, entire. Fronds oblong-lanceolate, 50–90 × 7–16 cm, tufted, bipinnate to tripinnatifid, acuminate to caudate at apex; stipes 20–40 cm long, blackish to purplish brown, dorsally grooved, glabrous; lamina 15–45 cm long; pinnae 5–11 × 1.5–4 cm, basal pinnae slightly reduced, stipicellus up to 2 mm long, lanceolate-oblique-oblong,
Plate 65: a - b. Adiantum lunulatum Burm. f.: a. Habit; b. Sori (close up); c. Onychium siliculosum (Desv.) C. Chr.; d - e. Pteris khasiana (C.B. Clarke) Hieron.: d. Frond; e. Sori (close up); f. Pityrogramma calomelanos (L.) Link
ascending, pinnate to bipinnatifid, long acuminate; costae like rachis, grooved dorsally or edges raised from decurrent base, narrowly winged; pinnules oblique-deltoid-lanceolate, 10–30 × 4–6 mm, sessile, pinnatifid, crenate, acroscopic base truncate and auricled, basiscopic base cuneate, costules grooved above; veins pinnate to forked, free, indistinct, ending into margin; lower surface covered with white powder; upper surface lustrous, subcoriaceous. Sori scattered on lower surface on veins and along midvein, exindusiate.

**Distrib.**: INDIA: Andaman & Nicobar Islands, Arunachal Pradesh, Manipur, Meghalaya, Sikkim, Tripura, West Bengal; Western and South India. WORLD: Australia, Bhutan, China, Malaysia, New Guinea, Nepal, Philippines, Seychelles, Singapore, Sri Lanka, Thailand and Vietnam.

**Specimens examined**: Buxa National Park, Jainti range, NRVK 5a, 9th March, 2011, Gopal Krishna 50517; Jainti range, NRVK 6a, S.K. Srivastava & Gopal Krishna 46108; Jalpaiguri, Murti River, 24.5.1975, J.K. Sikdar 357.

5. **Vittaria** Smith

17 species in India and 1 species in BNP.


Other synonyms: *Haplopteris elongata* (Sw.) E.H. Crane.

Rhizomes creeping, paleaceous throughout; paleae lanceolate, c. 5 × 1 mm, blackish-brown, widest at base, peltate, acuminate, dentate, glandular at apex. Fronds 15–35 × 0.5 cm, caespitose, subsessile to stiped; stipe c. 1.5 cm, paleaceous at base; lamina linear-lanceolate, acuminate, decurrent at base; rachis invisible, veins inconspicuous, not overlapping, ending into margin. Sori elongate, marginal, sunk in the lamina; sporangium with thick stalk, glandular; paraphyses branched, funnel shaped.


**Specimens examined**: Buxa National Park, Jainti range, Jainti 6, 10th Feb., 2010, S.K. Srivastava & Gopal Krishna 46400; Darjeeling, 29.10.1976, R. Ghosh 54529.