

**FASCICLES  
OF  
FLORA OF INDIA**

**FASCICLE 1**



**BOTANICAL SURVEY OF INDIA  
P. O. BOTANIC GARDEN  
HOWRAH-711103**

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## PREFACE

The Botanical Survey of India has taken up the preparation of the Flora of India. It will be brought out in four series.

1. Flora of India : This will be the national Flora and will have the accounts of the various families, genera and species of vascular plants with keys, short descriptions and selected illustrations.

2. State Flora Analyses : These will have catalogues or census of vascular plants of different states of the country. These will not have keys or descriptions but short notes with analysis of distribution, uses, etc. These shall be useful as checklists for foresters, agricultural scientists, plant chemists, researchers and students.

3. District Floras : These will be detailed accounts with keys and short descriptions of vascular plants of small areas of one district, or of one to a few adjacent districts depending on density of the Flora. These will be useful as local identification manuals and in several developmental programmes based on plant resources including programmes of rural development and cottage industries.

4. Special Publications : These will include monographs, accounts of non-vascular cryptogams or any other floristic accounts not covered by other series.

## FLORA OF INDIA

This Flora covering the entire country will serve as a manual for identification of plants on an all-India basis. It is estimated that the new Flora will deal with approximately 15,000 species of vascular plants. In addition to keys and descriptions, it will also have short notes on uses, ecology, chromosome numbers, conservation status, etc.

In order to keep the size of the final product, *viz.* FLORA OF INDIA within a reasonable size, certain limits had to be laid on descriptions, references, synonymy, size and number of illustrations,

For utilizing the available expertise in the country, it was decided to prepare first the accounts of economically important families and genera for which specialists are available, or can be trained in the course of a few years. The accounts of families/genera will, therefore, be published not in sequence of any system of classification but as and when manuscripts on them become available to the Editorial Board.

The series will be published in small fascicles. The minimum contents of a fascicle are planned to be either a family, or an account of one or more genera, having about 25 species.

The present fascicle is the first in the series.

P.O. Botanic Garden  
Howrah-711103  
31st October 1978

S. K. JAIN  
Director  
Botanical Survey of India

Fasc. Fl. Ind. 1 : 1-8. 1978.

## CORIARIACEAE

A. P. DC. Prodr. 1 : 739. 1824 (Coriariae)

Shrubs or undershrubs, rarely small trees with winged angular branchlets. Leaves opposite, rarely ternate or sometimes alternate at ends of shoots, simple, generally exstipulate, but stipules, if present, minute, caducous. Flowers small, hermaphrodite or unisexual, in axillary or terminal racemes. Bracts deciduous. Sepals 5, free, persistent. Petals 5, shorter than sepals, keeled inside. Stamens 10, in alternating whorls of 5 each, inner whorl usually adnate to keel ; anthers exerted, ditheous, opening by longitudinal slits (introrse). Carpels 5-10(-12), superior, free, 1-loculed with a single pendulous ovule ; styles distinct, glandular. Fruit, a collection of dry achenes enclosed in accrescent, fleshy, coloured petals. Seeds compressed, exarillate ; endosperm scanty or absent.

Only genus, *Coriaria* L.

Hutchinson (Evoln. & Phyl. Fl. Pl. 45. 1969 ; Fam. Fl. Pl. 3rd. ed. : 136. 1973), stating that it is a difficult family to be placed satisfactorily in any system, included it in a distinct order, Coriariales, and placed it between the Dilleniales and Rosales.

## CORIARIA

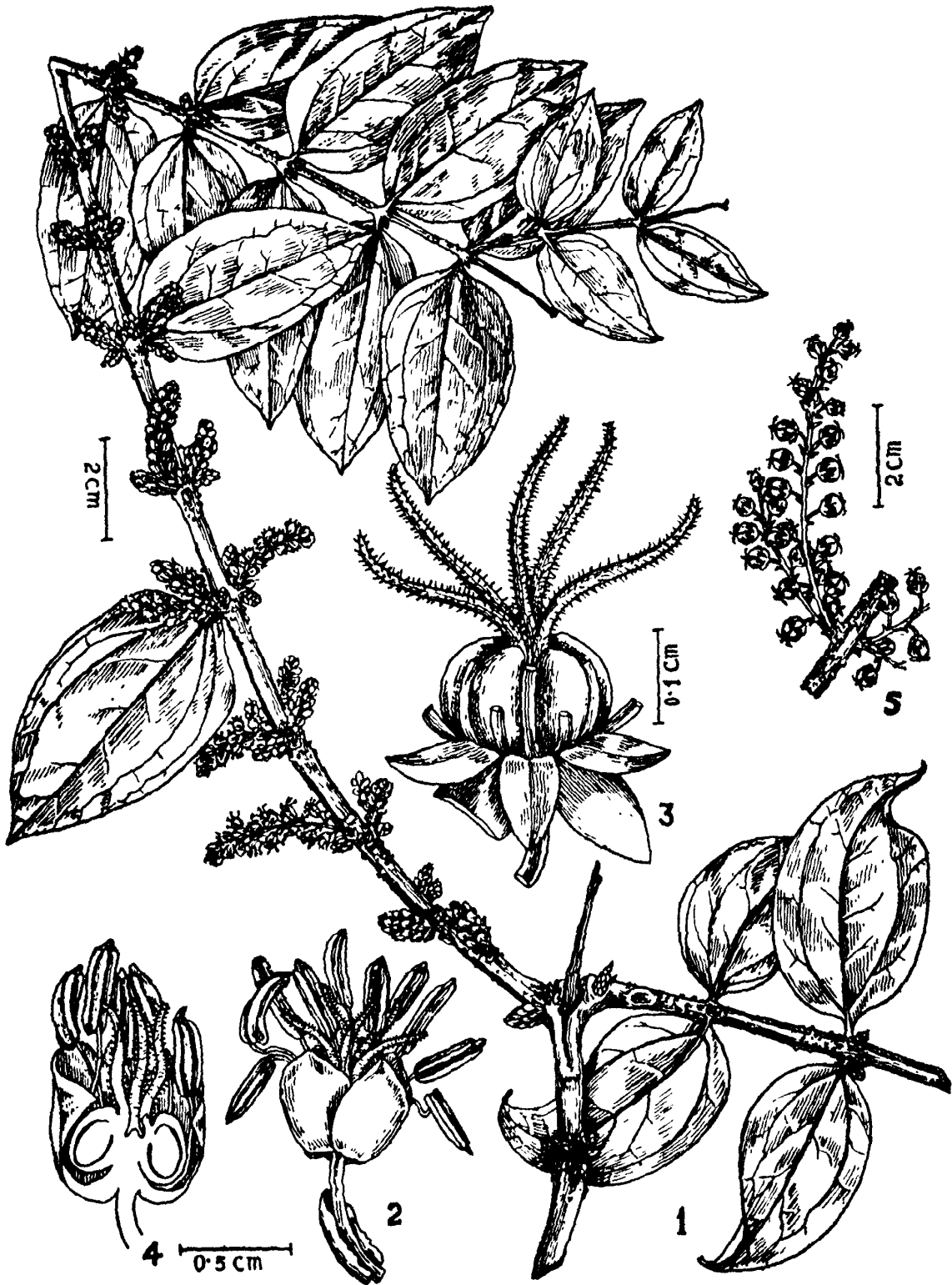
L. Sp. Pl. 1037. 1753 et Gen. Pl. ed. 5. no. 459. 1754 ; DC. Prodr. 1 : 739. 1824 ; Benth. & Hook. f., Gen. Pl. 1 : 429. 1862 ; Hutchinson, Gen. Fl. Pl. 1 : 172. 1964 et Fam. Fl. Pl. 3rd. ed. ; 183. 1973.

Characters of the Family.

*Distrib.* : ca 15 species, having a disjunct distribution in the warm temperate and tropical regions of the world viz. Himalayan region of India, Pakistan, Nepal, Bhutan ; Burma, China, Japan, Philippines, New Guinea, New Zealand, New Hebrides, Fiji, Mediterranean region in N. Africa and S. W. Europe, Central and South America (Mexico, Peru, Chile). 2 species in India.

*Ecol.* : Nitrogen-fixing root nodules are known in some species of *Coriaria* (Bond in Nature 193 : 1103. 1962).





*Coriaria nepalensis* Wall.

Figs. 1-5 : 1. Flowering twig. 2. Flower. 3. Flower split open to show gynoecium. 4. Flower in vertical section. 5. Branch bearing fruits (after V. K. Sharma, *Phytomorphology* 18 : 145. 1968).

**Pollen** : Grains 3-colporate exceptionally 2-colporate ; brevicolpate (Erdtman, Pollen Morph. & Pl. Tax. 129. 1966).

Woody shrubs. Leaves usually prominently 3-nerved from base. Racemes in clusters or fascicles produced usually on old wood in axils of leaf scars and leaves or at ends of short lateral branches. Anthers equal to or shorter than filaments

1. **C. nepalensis**

Herbaceous perennials. Leaves usually prominently 7-nerved from base. Racemes terminal, always solitary. Anthers much longer than filaments

2. **C. terminalis**

1. **Coriaria nepalensis** Wall. Pl. Asiat. Rar. 3 : 67. t. 289. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 44. 1876 ; Collett, Fl. Siml. 107. 1902 ; Parker, For. Fl. ed. 3. 116. 1956 ; Duthie, Fl. Upper Gang. Pl. 1 : 178. 1960 (Repr. ed.) ; Skog in Rhodora 74 : 364. 1972 ; Gafoor in Fl. W. Pak. 43 : 1. 1973. *Makela, Masuri* (Hindi) ; *Cangeru* (Jaunsar). **Figs. 1-5**

Shrubs up to 4 m high ; bases of lateral branches surrounded by persistent bud scales. Leaves ovate, oblong or elliptic, glabrous, shortly petioled, 3-8 × 1-3 cm, 3-5-nerved. Racemes 3-12 cm long. Flowers *ca* 5 cm diam. Petals greenish-yellow. Stamens 5+5, inner whorl adnate to keel ; anthers coral-red. Carpels 5, free, glandular in the upper part. Achenes enclosed in enlarged fleshy, reddish petals.

*Type* : Kumaon, *Blinkworth*—Wall. Cat. 6817 C (K, CAL !).

*Fls.* : Feb.-April ; *Frts.* : April-July.

*Distrib.* : Outer Himalaya, throughout up to 2800 m. INDIA : Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Manipur, Sikkim, Uttar Pradesh ; PAKISTAN, NEPAL, BHUTAN, BURMA, CHINA.

*Uses* : Handsome mottled wood reported to take good polish, suitable for various small articles (Duthie l.c.). Wood and leaves rich in tannin (Gamble, Indian Timbers 224. 1922 ; Indian For. leaflet no. 72 : 8. 1944). Fleshy petals in the fruit edible, but achenes poisonous.

*Chr. No.* n=20 (Mehra & Khosla in Taxon 18 ; 217. 1969).

2. **C. terminalis** Hemsley in Hook. Ic. Plant. 23. t. 2220. 1892 ; Rehder & Wilson in Sarg. Pl. Wilson. 2 : 171. 1916 ; Skog in Rhodora 74 : 245. 1972.

Perennials with underground rhizomes producing annual herbaceous stems up to 1.2 m high, sparingly branched ; bases of lateral branches mostly without bud scales. Leaves opposite to sub-opposite, sessile or subsessile, ovate but very often rounded with cordate or semiamplexicaul

base, 3-8 cm long, shortly acuminate, (5-)7(-9)-nerved, puberulous on veins beneath and ciliato-glandular along margins. Racemes 10-20 cm long. Stamens 5+5, inner whoil free ; anthers linear. Carpels 5, eglandular ; styles stigmatic all over. Achenes enclosed in the fleshy corolla, black-purple or orange-yellow when ripe.

Ripe fruits black-purple

var. **terminalis**

Ripe fruits orange-yellow

var. **xanthocarpa**

**var. terminalis**

*Type* : Tachienlu, West Szechuen and Tibetan Frontier (2745-3355 m)  
—Prat 820 (K).

*Distrib.* : INDIA (Sikkim), BHUTAN, CHINA (S. Tibet), 2745-3355 m.

var. **xanthocarpa** Rehder & Wilson in Sarg. Pl. Wilson. 2 : 171. 1916 ;  
Rehder in L. H. Bailey, Standard Cyclop. Hort. 1 : 847. 1942 ;  
Graf in Exotica 3. pt. 1 : t. 648. pt. 2 : 1584. 1963. *C. terminalis* auct.  
Sprague in Bot. Mag. 139. t. 8525. 1913 (*non* Hemsley 1892).

*Type* : Lachung (2745 m), Sikkim—Gammie 353 (K, CAL. !).

*Distrib.* : INDIA (Sikkim). A very ornamental plant, introduced into cultivation in Europe and North America.

*Notes* : Two well preserved fossils discovered from the Oligocene beds of southern France, described as *Coriaria longaeva* Saporta (Ann. Sci. Nat. Bot. ser. 5. t. 4. 122. 1865) and attributed by Good (New Phytol. 29 : 170-198. 1930) to *C. terminalis* Hemsley point to the past distribution of *C. terminalis*.

## PAEONIACEAE

Rudolphi, Syst. Orb. Vev. 61. 1830.

Erect, stout, perennial herbs or undershrubs. Stem leafy. Leaves alternate, petiolate, 1 to 2-ternately compound, exstipulate. Flowers usually solitary or sometimes paniced, large, 8-12 cm diam., hermaphrodite, regular. Sepals 5, free, persistent. Petals 5-10, larger than the sepals, imbricate, variously coloured (white, pink or red). Stamens many, free, centrifugal; anthers 2-celled, dehiscent by longitudinal slits (extrorse). Carpels 1-5, free, girdled below by a fleshy disc; stigma sessile, thick, 2-lipped. Follicles 2 to many-seeded. Seeds, large, oval or sub-globose with fleshy endosperm, arillate.

Only genus, *Paeonia* L.

*Notes* : Previously treated under Ranunculaceae, *Paeonia* is regarded as a rather isolated primitive type of the Ranales (Hutchinson, Evoln. & Phyl. Fl. Pl. 477. 1969) and included in a distinct family Paeoniaceae under the Ranunculales Lindl. ('Ranales'). Nakai (J. Jap. Bot. 24 : 8-14. 1949) placed it in the order, Paeoniales and this has been accepted by some authors.

## PAEONIA

L. Sp. Pl. 530. 1753.

Characters of the family.

*Distrib.* : ca 40 species distributed in the temperate zone of Asia, Europe and North America. A number of species of *Paeonia* are cultivated as ornamentals. 1 species recorded from India.

***Paeonia emodi*** Wall. ex Royle, Ill. Bot. Himal. 57. 1834; Hook. f. in Bot. Mag. t. 5719. 1868; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 30. 1872. *P. emodi* var. *glabrata* Hook. f. & Thoms. l.c. 1872. 'Udsalap (Hindi); Mid (Kashmir); Mamekh (Panjab)'. **Figs 1-3**

Erect herbs up to 1 m high. Roots fleshy, tuberous. Stems somewhat woody. Leaves alternate, 1 to 2-ternate, leaflets decurrent, entire



*Paeonia emodi* Wall. ex Royle

Figs. 1-3. 1. Part of the plant. 2. A flower bud.  
3. Dehisced follicle with seeds.

or incised, ultimate segments oblong or lanceolate, acute or acuminate, glabrous. Flowers usually in the axils of upper leaves, on long peduncles ; buds globose, 2-3 cm diam. ; open flowers nearly 10 cm across ; bracts foliaceous. Sepals 5, herbaceous often unequal, persistent. Petals 5-8, usually white. Stamens many. Follicles 1 or 2, each 3-4 cm long, somewhat curved, strigose with yellowish brown hairs to glabrate. Seeds shining black, smooth, 1 cm long.

*Type* : Shalma Mountain, Kumaon, *Wall. Cat.* 4727 (K. CAL !).

*Fls.* : March-May ; *Frts.* : April-June.

*Distrib.* : Throughout western Himalaya in the altitude range, 1500—3000 m (at present, not known from any locality of eastern Himalaya).  
INDIA : Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh ; PAKISTAN.

*Uses* : Roots, leaves and seeds are used in local medicine.

*Chr. No.*  $n=5$  (Mehra & Remanandan in *Cytologia* 37 : 281. 1972).

*Notes* : In its wide range of distribution in the western Himalaya, *P. emodi* exhibits monocarpellary as well as bi-carpellary follicles ; while mostly the follicles are strigose, glabrous follicles are occasionally met with and there are intergrading forms in this respect. In view of this, the variety, *glabrata* Hook. f. & Thoms. (*op. cit.*) is reduced to synonymy under the species.

P. Bruhl (*Ann. R. bot. Gdn. Calcutta* 5 : 114-115. 1896) described *Paeonia moutan* subsp. *atava* from the Chumbi Valley in Tibet which is just outside the limit of this Flora. According to him, this represented the wild form of the well known cultivated *P. moutan* Sims, (*Bot. Mag.* t. 1154. 1808) which is now *P. suffruticosa* Andr. (*Bot. Rep.* 5. t. 373. 1804). F. C. Stern (*A study of the genus Paeonia*. London, 1946), who monographed the genus *Paeonia*, however, reduced the subsp. *atava* Bruhl to a synonym of *P. suffruticosa*, as in his view it was not truly wild, but an escape from cultivation, and simply a small form of *P. suffruticosa*.

Grateful acknowledgement is made to Dr. B. L. Burtt, Royal Botanic Garden, Edinburgh for furnishing some useful information.

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