

REVISION OF THE INDIAN SPECIES OF *HIBISCUS*

S. C. RAKSHIT

Kalyani University, Kalyani

AND

B. C. KUNDU

Bose Institute, Calcutta

ABSTRACT

In the paper 32 species of *Hibiscus* have been described. The section *Abelmoschus* of Masters in Hooker's flora of British India has been excluded since *Abelmoschus* Medicus is now widely recognised as a separate genus. Most of the species grow in the warmer regions with a moderate to heavy annual rainfall. In the Malabar Region occurs about 50 percent of the total Indian *Hibiscus* species; the eastern zone of Gangetic Plain contains 43.75 percent. Tree *Hibiscus* are mostly concentrated in the Gangetic Plain and the Assam Region.

A few species like *H. vitifolius*, *H. surattensis* etc., have wide distribution, while *H. watsoni*, is endemic to Burma.

INTRODUCTION

The genus *Hibiscus* was first described by Linnaeus in the first edition of his *Genera Plantarum* (1737). This comprised of two earlier concepts of *Ketmia* Tourn. (1700) and *Malvaviscus* Dill. (1732). In the same publication Linnaeus described another genus *Trionum*. Later in *Species Plantarum*, ed. 1 (1753) and *Genera Plantarum*, ed. 5 (1754), he merged *Trionum* with *Hibiscus*. Thus *Hibiscus* of Linnaeus's Sp. Pl. ed. 1 and Gen. Pl. ed. 5, was an assemblage of *Ketmia* Tourn., *Malvaviscus* Dill., *Trionum* Linn. and *Hibiscus* Linn. That *Trionum* Linn. and *Hibiscus* Linn. are cogenetic with *Ketmia* Tourn. and different from *Malvaviscus* Dill. there is no difference of opinion now.

In 1754, Miller in his *Gard. Dict.* (abridged ed. 4) split up *Hibiscus* Linn. into *Ketmia* and *Hibiscus* restricting *Hibiscus* to a single species e.g. *H. malvaviscus* Linn. and referring all other species then known under *Hibiscus* to *Ketmia*. This treatment was very unhappy because the single species placed under *Hibiscus* by Miller is a *Malvaviscus* (*M. arboreus* Cav.).

Fabricius in his *En. Meth. Plantarum*, ed. 1, 155 (1759) united *Ketmia*, *Hibiscus* and *Malvaviscus* and called this new genus as *Malvaviscus* reducing *Ketmia* and *Hibiscus* to synonymy. This treatment was not accepted by the subsequent authors. Cavanilles treated *Malvaviscus* as a distinct genus in his *Dissertation* (1787) based on *Hibiscus malvaviscus* Linn. and this species becomes the type of the genus because of Miller's reference to this single species under *Hibiscus* Mill. (non Linn.) which becomes a

synonym of *Malvaviscus* Cav. As lectotype of *Hibiscus* Linn., (Sp. Pl. ed. 1 and Gen. Pl. ed. 5) *H. syriacus* Linn. was proposed later.

Since the two genera *Hibiscus* and *Malvaviscus* are widely accepted as distinct, Borssum Waalkes (1966) has rightly proposed to conserve the two generic names to avoid further complications in future. On the basis of the deciduous nature of the calyx in a group of species described under the genus *Hibiscus*, Medicus (1787) established the genus *Abelmoschus*. The new genus was adopted by Gaertner (1791) and Moench (1794). But most of the workers on the Indian species of *Hibiscus* (Masters, Prain, Duthie, Gamble, Cooke and others) did not recognise the genus but considered *Abelmoschus* as a section of the genus *Hibiscus*. Hochreutiner (1924), however, considered that the genus *Abelmoschus* of Medicus should remain distinct from *Hibiscus* as in this genus the calyx, corolla and stamens are fused together at the base and fall as one piece after anthesis, although in an earlier publication (1900) he considered *Abelmoschus* only as a section of the genus *Hibiscus*. Recent workers on Malvaceae, (Hu, 1955; Borssum Waalkes, 1966) have recognised the characteristic differences between the two genera and treated *Abelmoschus* as a distinct genus. In the present work also *Hibiscus* and *Abelmoschus* are considered as two separate genera.

Following Schumann in Engler and Prantl, Hochreutiner (1900) in his revision of the genus *Hibiscus* referred *Thespesia lampas* as *Hibiscus lampas* under the Sect. Columnaris. The species has been merged

with *Hibiscus* because of its clearly lobed style, non-caducous involucre, distinctly five lobed calyx and also because of many seeded woody capsule which is dehiscent and of which the exocarp does not become separated as in *Thespesia populnea*. More recently, a few Indian workers also accepted Hochreutiner's view (Shah, 1962; Santiapau, 1962). Borssum Waalkes (1966), however, treated the species under *Thespesia* on account of its compound stigma and cupular, minutely 5-toothed calyx. The present authors also studied the living specimens and observed that the stigmatic lobes and their arrangements show a distinct morphological deviation from all the species of *Hibiscus*; the character is more inclined to *Thespesia*. Further the bases of the spines of echinate pollen grains showed semibulbous nature, a character intermediate between *Hibiscus* and *Thespesia* (Kundu et al. unpublished). From above observations of different authors it is concluded that this species may represent a link between the two genera, *Hibiscus* and *Thespesia*. The present authors are in favour of keeping the species under *Thespesia* until a detailed cytological and anatomical studies on this species are made. It has, therefore, not been included in this work. Borssum Waalkes (1966) has formed a new section Bombycidendron, which he claims to represent a link between the genera *Hibiscus* and *Thespesia*, on account of the similarity in discoid hypanthium. The new section has been partly based on the section Columnaris of Hochreutiner, wherein the species *H. lampas* has been included. But the present authors did not find any Indian species which could be properly fitted in this new section, Bombycidendron.

The concept of delimiting varieties on the basis of single character (Borss. Waalkes, 1966) will create confusions in delimiting formae. Usually more than single morphological characters have, therefore, been considered, in the present work, for treating a variety. Many of the subspecies formed by Borssum Waalkes have been treated here as varieties e.g. *Hibiscus tiliaceus* L. ssp. *hastatus* Borss. as *H. tiliaceus* L. var. *hastatus* Hochr.

From available data it is evident that *H. tiliaceus* L. ssp. *similis* Borssum Waalkes, is a natural hybrid between *H. macrophyllus* and *H. tiliaceus*. The new set of genome resulted from the recombination and also the morphological deviations suggest that the hybrid should be treated as a separate species. The original specific epithet, *H. similis* Blume, has therefore, been retained. The name *H. prainii* Raizada

et Chatterjee (= *H. tortuosus* Wall. ex Prain) (Raizada & Chatterjee, 1960) cannot therefore be regarded as valid.

India, as understood in this paper, includes India proper, the Andaman and Nicobar Islands the Laccadiv Islands, Pakistan and Burma. In all 32 species of *Hibiscus*, excluding *Abelmoschus*, have been found to occur in India. The distribution pattern shows that most of the species occur in the warmer regions with a moderate to heavy annual rainfall. The least number of species have been found in the warm but dry areas of Rajasthan and Beluchistan as well as in the cold and higher altitude of Kashmir.

The number of *Hibiscus* species and their percentage on the total number of Indian *Hibiscus*, in the different Botanical regions, have been recorded in Fig. 1. The botanical regions have been formed in accordance with those of Chatterjee (1939). In the Malabar Region occurs about 50 percent of the total Indian *Hibiscus* species; the Gangetic Plain (eastern zone) comes next in order having 43.75 per cent. The coastal zone of the Gangetic Plain and the Assam Region contain most of the tree *Hibiscus*. In the cold regions of the Central and Eastern Himalaya occur more number of species as compared to those of the Western Himalayan Region. Similarly, the occurrence of the number of species in the Indus Plain is comparatively much less than those of any warm region with more average rainfall. The Indian *Hibiscus* species are, thus found to be preferential to areas with comparatively more annual rainfall. In the Upper Burma region as well as in the Lower Burma region the distribution of the number of species is more or less equal. A few species like *H. amblyocarpus* occur only in hot and dry region, whereas a few other species like *H. vitifolius*, *H. surattensis*, etc. have wide distribution.

H. watsoni, was first reported from the South Shan State of Burma, by W. W. Smith in 1912. Since then the species has not been reported from any other part of the world (Hu, 1955; Hochreutiner, 1955; Borssum Waalkes, 1966). This indicates the endemic nature of the species. Another species, *H. beddomei* Rakshit et Kundu was originally reported from Central and South India. More recently its distribution has been reported from two other states of India, Uttar Pradesh (Bhattacharyya, 1964) and Rajasthan (Hemadri and Reddi, 1967). Distribution pattern of *H. procerus* Wall. ex Masters in India could not be ascertained since herbarium specimens

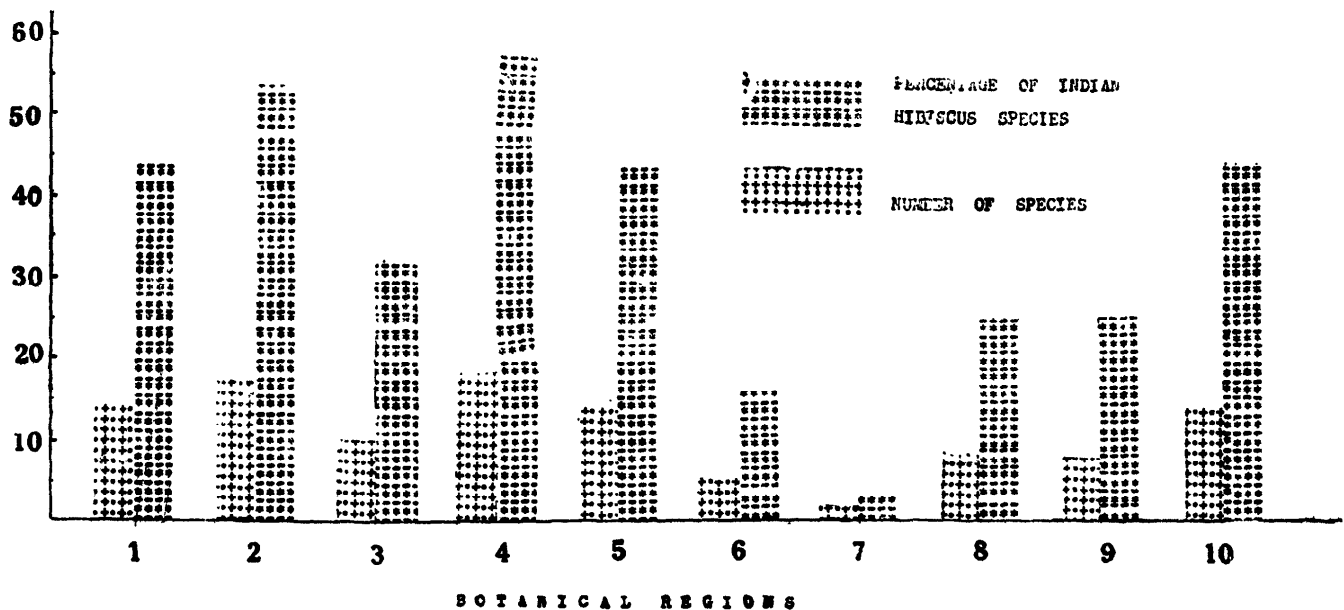


Fig. 1 showing the number of *Hibiscus* species occurring in different Botanical Regions and the percentages on the total Indian *Hibiscus* spp. 1. The Deccan Region; 2. Malabar Region; 3. The Indus Plain; 4. The Gangetic Plain; 5. Assam; 6. Eastern Himalaya; 7. Central Himalaya; 8. Western Himalaya; 9. Upper Burma; 10. Lower Burma.

of the plant are not available in India. A plate of the plant, as received from the Kew, has only been presented here.

The work is mostly based on the study of the herbarium sheets available in the Calcutta Herbarium. Besides these, the herbarium sheets obtained on loan from the Singapore Herbarium and the sheets of the Dehra Dun Herbarium have also been consulted. At the end of each species the names of the places of collections as referred to in the herbarium specimens of the Calcutta Herbarium have only been mentioned. Since then the names of many places have been changed.

Since the total number of species found in India are very small in comparison to the total species reported under the genus *Hibiscus*, the authors refrain from drawing any conclusion on the different sections of *Hibiscus* and have arranged all the species under different sections as proposed by Hochreutiner. The name *Hibiscus* has, however, been used in place of the section *Bombycella* since it includes the type species of the genus.

Hibiscus Linn., Sp. Pl. 693, 1753; et Gen. Pl. ed. 5. 310, 1754; Benth. & Hook. f., Gen. Pl. 1: 207, 1862; Masters in Hook. f. Fl. Brit. Ind. 1: 334, 1874; Schumann in Engler & Prantl, Pflanzenf. 3(6): 48, 1890; Hochr. in Ann. Cons. Jard. Bot. Genève 4: 23, 1900; *Ketmia* Miller, Gard. Dict. abr. 2: KE, 1754;

Medicus, Malv. 45, 1767; *Paritium* A. Juss., in St. Hilaire Fl. Brazil. 1(2): 255, 1872; Nakal, Fl. Sylv. Korea 21: 96, 1936.

Type: H. syriacus Linn.

Herbs, shrubs or small trees. Usually pubescent with stellate hairs and/or scales. Leaves stipulate, palmately 5 to 11 nerved, lobed or not incised. Flowers solitary, axillary or arranged in a terminal lax racemose or sub-corymbose inflorescence due to reduction of upper leaves. Segments of epicalyx 4-12, free or connate at the base, persistent; calyx 5-toothed or 5-fid, campanulate, rarely cyathiform or tubular, the basal half connate, persistent; corolla showy, yellow, scarlet or white, often with a deep purple centre, rarely purple; petals 5, connate at base with the staminal tube; staminal tube truncate or 5-toothed at the apex, antheriferous all through or in the upper half only; filamentella numerous; anthers reniforms; ovary 5-celled with 3 or more ovules in each cell; style distally 5-fid and spreading. Fruit loculicidally dehiscent 5-valved capsule, sometimes with false dissepiments forming a spuriously 10-celled fruit. Seeds numerous, reniform, subglobose, rarely obovoid, glabrous or tomentose or woolly.

A large genus; over 300 species are distributed chiefly in the tropical regions of both hemispheres (Willis, 1966).

According to Borssum Waalkes 250 spp. are distributed in the tropics and sub-tropics, whereas only 2 or 3 spp. in the temperate zone. While a few spp., e.g. *H. d'albertsii* F.M. is endemic to New Guinea, a few others like *H. vitifolius* L., *H. surattensis* L., are widely distributed. 32 species have been recorded in India including Pakistan and Burma.

KEY TO THE SECTIONS

- A. Trees, sometimes shrubs or woody climbers. Leaves ovate to orbicular cordate.
 - B. Leaves large, unlobed or rarely 3-lobed (cf. *H. scandens*), stipules large foliaceous, sometimes linear-lanceolate; segments of epicalyx connate at the base; seeds downy or hairy ... *Sect. Azanza*
 - BB. Leaves medium, 3-5 palmately-lobed, stipules small linear-lanceolate, segments of epicalyx free; seeds glabrous ... *Sect. Spatula*
- AA. Herbs, undershrubs or shrubs; leaves small to medium, deeply 3-7 palmately-lobed, sometimes unlobed; stipules small, filiform, linear to lanceolate or spatulate; segments of epicalyx free or connate or adnate to calyx.
 - B. Herbs or undershrubs; stem with prickles or bristles or both; leaves with nectary on mid-vein; segments of epicalyx linear or bifurcated at the tip or spatulate; calyx lobes with 3-prominent veins—one median and two marginal, midvein with prominent nectary. ... *Sect. Furcaria*
 - BB. Shrubs or undershrubs, rarely herbs; stem unarmed, without bristles or prickles; segments of epicalyx not bifurcated or spatulate; leaves and calyx with prominent nectary, veins on calyx not prominent.
 - C. Staminal column longer than petals, antheriferous in the upper-half; flowers usually drooping; usually shrubs and leaves unlobed ... *Sect. Lilibiscus*
 - CC. Staminal column shorter than petals, antheriferous all through.
 - D. Fruits winged or angled; leaves palmately-lobed; flowers drooping ... *Sect. Pterocarpus*
 - DD. Fruits not winged or angled; leaves lobed; flowers erect.
 - E. Calyx more or less inflated, particularly in fruits; seeds glabrous, sometimes hairy ... *Sect. Trionum*
 - EE. Calyx not inflated.
 - F. Segments of epicalyx very small, often caducous ... *Sect. Solandra*
 - FF. Segments of epicalyx well developed.
 - G. Seeds hairy.
 - H. Seeds with an auriole of long, silky, ferruginous hairs ... *Sect. Hibiscus*

- HH. Seeds tomentous, or velvety hairy ... *Sect. Trichospermum*
- GG. Seeds glabrous or scaly ... *Sect. Ketmia*

Section I. **Azanza**. DC. Prod. 1: 453, 1824. Hochr., Ann. Cons. Jard. Bot. Genève 58, 1900 ampl. Borss. Waalkes, Blumea 14: 29, 1966.

Usually trees, rarely herbs or shrubs or woody climbers; leaves ovate to orbicular cordate, large, unlobed; stipules large foliaceous, sometimes linear-lanceolate; segments of epicalyx connate at the base, more in number than calyx lobes, outside velvety tomentose; the shape of the stigmas capitate or discoid (difficult to make out in herbarium materials); capsule woody; seeds downy or hairy.

Lectotype: *H. tiliaceous* L.

Section II. **Spatula** Hochr. in Ann. Cons. Jard. Bot. Genève. 4: 166, 1900.

Leaves medium, 3-5 palmately-lobed, stipules small linear-lanceolate, segments of epicalyx free; calyx 5-lobed, not inflated, and veins not very prominent; seeds glabrous.

Lectotype: *H. platanifolius* Sweet

Section III. **Furcaria** DC. Prod. 1: 449, 1824. Hochr., Ann. Cons. Jard. Bot. Genève. 4: 101, 1900. Borss. Waalkes, Blumea 14: 57, 1966.

Plants annual or perennial herbs or undershrubs; stems with prickles or bristles or both; leaves lobed or unlobed, margin serrate, presence of one nectary (gland) on mid-vein of lower surface; flowers axillary; segments of epicalyx linear or bifurcated at the tip or spatulate. smaller than calyx and sometimes adnate to it; calyx deeply 5-lobed; lobes deltoid acuminate, with 3-prominent veins—one median and two marginal, mid-vein prominent.

Lectotype: *H. surattensis* L.

Section IV. **Lilibiscus** Hochr., in Ann. Cons. Jard. Bot. Genève 4: 130, 1900. Borss. Waalkes, Blumea 14: 71, 1966.

Trees or shrubs; leaves entire or serrated, rarely lobed, glabrous or glabrescent; peduncle jointed above middle; segments of epicalyx 5-8, linear, glabrous or glabrescent; flowers large, usually drooping; staminal column longer than the petals, antheriferous in the upper half.

Lectotype: *H. rosa-sinensis* L.

Section V. **Pterocarpus** Garcke in Bot. Zeit. 7: 817. 1849; Hochr., Ann. Cons. Jard. Bot. Genève, 4: 168, 1900. Borss. Waalkes, Blumea 14: 82, 1966.

Plant herbaceous, tomentose, or pilose; leaves palmati-lobed, margins serrated; flowers with long peduncles, drooping; segments of epicalyx approximately 10 in number, free, linear, shorter than calyx; calyx 5-lobed; petals 2 to 3 times longer than calyx; staminal column shorter than petals, antheriferous all through; fruits 5-winged or angled, equal to or shorter than calyx.

Type: *H. vitifolius* L.

Section VI. **Trionum** DC. Prod. 1: 453, 1824; Hochr., Ann. Cons. Jard. Bot. Genève, 4: 130; 1900. Borss. Waalkes, Blumea, 14: 66, 1966.

Shrubs, rarely annual herbs or trees; plants erect; leaves angled or lobed; flowers large, erect; segments of epicalyx many, linear, free, simple; calyx more or less inflated particularly in fruits, 5-lobed, lobes ovate, many veined; style 5-fid at the apex; stigma 5-lobed; capsule hirsute, villous or glabrous; seeds glabrous, sometimes hairy.

Lectotype: *H. trionum* L.

Section VII. **Solandra** Hochr., Ann. Cons. Jard. Bot. Genève, 4: 125, 1900. Borss. Waalkes, Blumea, 14: 77, 1966.

Plant herbaceous. Stem glabrous, tomentose or more or less villous; leaves membranous, lobed or unlobed margins serrate; flowers in terminal raceme, small; pedicels long, jointed near the top; segments of epicalyx absent or minute when present; calyx 5-lobed upto the middle, lobes membranous prominently 3-nerved, smaller than capsule; petals small, 1 cm long; capsule globose or oblong.

Type: *H. lobatus* (J. A. Murray) O. Kuntze (*H. solandra* L'Herit. = *Solandra lobata* J. A. Murray)

Section VIII. **Hibiscus** Borss. Waalkes in Blumea, 14: 75, 1966. *Hibiscus* Sect. *Bombycella* DC. Prod. 1: 452, 1824; Hochr., Ann. Cons. Jard. Bot. Genève, 4: 73, 1900.

Herbs, undershrubs or shrubs; leaves small to medium, lobed or unlobed, serrate or crenate; flowers small to medium, rarely large, pedicel articulated, segments of epicalyx well developed but rarely bigger than calyx, linear to sub-lanceolate, tomentose, hairy or glabrescent; calyx 5-lobed, lobes acute, tomentose, pubescent; petals yellow; staminal column rarely exerted; capsule glabrous, round; seeds with an auricle of long, silky, ferruginous hair.

Type: *H. syriacus* L.

Section IX. **Trichospermum** Hochr., Ann. Cons. Jard. Bot. Genève 4: 92, 1900.

Plant habit diverse; segments of epicalyx or ovate, lanceolate, spathulate or filiform; calyx membranous, deeply 5-lobed; capsule not exceeding the calyx; seeds tomentose-hirsute.

Lectotype: *H. panduraeformis* Burm. f.

Section X. **Ketmia** DC. Prod. 1: 449, 1824 ampl; Hochr., Ann. Cons. Jard. Bot. Genève 4: 195, 1900; Borss. Waalkes, Blumea, 14: 79, 1966.

Plants herbs or undershrubs; leaves diverse, segments of epicalyx many free, linear or filiform, villous or setaceous; calyx deeply 5-lobed; capsule globose, apiculate, seeds glabrous, rugosus or squamosus.

Lectotype: *H. puriens* Roxb. ex Hornem.

KEY TO THE SPECIES

SECTION I. AZANZA

A. Trees

a. Stipules foliaceous, large

b. Hairs long tufted from glandulated base, stipules more than 5 cm long

Flowers solitary or in cyme...

1. *H. macrophyllus*

bb. Hairs short, not tufted from glandulated base; stipules less than 5 cm long

c. Flowers in cyme, epicalyx much shorter than calyx ...

2. *H. tiliaceus*

cc. Flowers solitary or in panicles, epicalyx little shorter than calyx ...

3. *H. similis*

aa. Stipules linear-lanceolate, small, 1 cm long; flowers in panicles, fragrant ...

4. *H. fragrans*

AA. Shrubs or woody climbers

a. Small shrubs; leaves unlobed; flowers in terminal spike, epicalyx in double whorl ...

5. *H. watsoni*

aa. Woody climbers; leaves 3-lobed; flowers in panicle ...

6. *H. scandens*

SECTION II. SPATULA

Trees; leaves 3-5 lobed; epicalyx free, foliaceous, lanceolate, equal to calyx; capsule 5-angled, seeds glabrous ...

7. *H. plataniifolius*

SECTION III. FURCARIA

A. Epicalyx bifurcated or spathulated at the tip

a. Stems with stiff hairs but without prickles. Leaves unlobed or faintly lobed, flowers small ...

8. *H. beddomei*

aa. Stem armed with prickles

b. Stipules foliaceous ...

9. *H. surattensis*

bb. Stipules not foliaceous

c. Rambling or trailing undershrub ...

10. *H. furcatus*

cc. Erect undershrub ...

11. *H. radiatus*

- AA. Epicalyx simple, not bifurcated or spatulated at the tip
 a. Leaves deeply 3-5 or 7 palmately-lobed, rarely unlobed
 b. Epicalyx adnate to calyx; calyx without tomentose; flowers smaller ... 12. *H. sabdariffa*
 bb. Epicalyx not adnate to calyx; calyx with tawny or white tomentum; flowers bigger
 c. Calyx with white tomentum and one very prominent nectary gland on mid-vein ... 13. *H. cannabinus*
 cc. Calyx with tawny tomentum and nectary gland not prominent or absent ... 14. *H. procerus*
 aa. Leaves unlobed or faintly lobed; calyx with prominent nectary gland ... 15. *H. diversifolius*

SECTION IV. LILIBISCUS

Shrubs, leaves unlobed

- a. Segments of epicalyx connate at the base, petals entire ... 16. *H. rosa-sinensis*
 aa. Segments of epicalyx free, flowers drooping and fuschia-like, petals deeply lacinate ... 17. *H. schizopetalus*

SECTION V. PTEROCARPUS

- Leaves lobed flowers drooping; segments of epicalyx free, petals entire; staminal column antheriferous all through; fruits winged. ... 18. *H. vitifolius*

SECTION VI. TRIONUM

- A. Shrubs; leaves 5-7 angled or shortly lobed; calyx enlarged in fruits; capsule subglobose or orbicular
 a. Calyx lobes 5-nerved; seeds bearded ... 19. *H. mutabilis*
 aa. Calyx lobes single nerved; seeds minutely hispid ... 20. *H. indicus*
 AA. Herbs; leaves 3-5 palmately-lobed; calyx inflated covering the fruit, many nerved; capsule oblong seeds glabrous ... 21. *H. trionum*

SECTION VII. SOLANDRA

- Flowers small in terminal raceme; segments of epicalyx minute, free, sepals prominently 3 nerved ... 22. *H. lobatus*

SECTION VIII. HIBISCUS

- A. Shrubs; leaves 3-lobed, polymorphous
 a. Peduncles longer than petiole; flower small, less than 2.5 cm in diam.; capsule globose ... 23. *H. hirtus*
 aa. Peduncles equal to or shorter than petioles; flowers bigger, more than 3.5 cm in diam.; capsule oblong-ovoid ... 24. *H. syriacus*
 AA. Shrubs; leaves unlobed
 a. Peduncle longer than petiole, anthers in tuft on staminal tube ... 25. *H. micranthus*
 aa. Peduncles shorter than petiole; anthers in globose head ... 26. *H. scindicus*

SECTION IX. TRICHOSPERMUM

- A. Leaves deeply 3-7 palmately-lobed, flowers small, 2.5 cm or less in diam. Segments of epicalyx strap-shaped, equal to or shorter than calyx ... 27. *H. intermedius*

- AA. Leaves unlobed or faintly lobed or angled; flowers bigger, 3.5 cm or more in diam.
 a. Shrubs; segments of epicalyx linear-subulate, longer than calyx; capsule twice the length of calyx ... 28. *H. calyphyllus*
 aa. Herbs; segments of epicalyx linear-spathulate, shorter than calyx; capsule shorter than the calyx ... 29. *H. panduraeformis*

SECTION X. KETMIA

- A. Herbs; leaves lobed; petals 2-3 times the length of calyx
 a. Stem hairy, scabrous; segments of epicalyx longer than calyx; staminal column antheriferous all through; seeds with minute stellate scales ... 30. *H. lunariifolius*
 aa. Stem with bristles and prickles; segments of epicalyx equal to or shorter than calyx; staminal column antheriferous in upper half; seeds pilose ... 31. *H. caesioides*
 AA. Undershrubs; leaves unlobed or unequally 3 lobed, central lobe much bigger; petals scarcely exceeding the sepals
 Stem hairy glutinous; segments of epicalyx shorter than calyx; seeds muricated ... 32. *H. amblyocarpus*

Hibiscus macrophyllus Roxb. (Hort.) Beng. 51, 1814 nom. nud. ex Hornem., Hort. Hafu., Suppl. 149, 1819; Wall., Pl. As. Rar. 1: 44, t. 51, 1830; Masters, in Hook. f., Fl. Brit. Ind. 1: 337, 1874; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 68, 1900; Watt, Dict. Econ. Prod. 4: 241, 1903; Prain, Bengal Pl. 1: 268, 1903; Kanjilal & Das, Fl. Assam 1 (1): 142, 1935; Hu, Fl. China, Malvaceae, 43, 1955; Wealth Ind. 5: 89, 1959. *H. setosus* Roxb., Fl. Ind. 3: 194, 1832. *H. vulpinus* Reinward, in Miquel, Fl. Ind. Bat. 1(2): 157, 1859.

Common name: Assam: *Tyllen-ukhar* (Khasi). Bengal: *Khasia palle*, *Jabo* (Tipp.). Burma: *Taung-pelivum* (Insein).

Tree, 12-15 m tall and girth 1.5-1.8 m. All parts densely covered with yellowish brown filiform tufted hairs; hairs 5-10 mm long, 7-10 hairs developing from a common glandular base. Bark greyish white, somewhat rough on old stems, blaze at first yellowish brown with streaks of brown tissues turning darker brown after exposure. Leaves large, 17-36 cm diam., deeply orbicular-cordate, abruptly short acuminate, entire or minutely crenulate, 7-9 palmi-nerved, thinly coreaceous, stellate-tomentose on both surfaces specially on the lower deep-green; petioles 17-35 cm long; stipules foliaceous, large, 5-10 cm long, oblong, convolute; deciduous. Flowers solitary, axillary or in axillary

or terminal cymes, large, 10 cm diam. when open, showy, yellow or yellow with dark-red ribs or yellow with maroon centre; pedicels 3-6 cm long, shaggy like the petioles, jointed above middle, presence of two spathaceous caducous bracts at the joint; bracts connate below, 5-6 cm long; segments of epicalyx 10-12, about 2.5 cm long, linear connate only near the base, equal to sepals (in Malayan specimens the segments of epicalyx are slightly shorter than calyx); sepals 5, lanceolate, connate below middle into a bell-shaped 10 ribbed tube; petals soft-tomentose and stellate hairy outside, purplish on withering; staminal column yellow; styles deep purple. Capsules equal to or shorter than calyx, oblong, pointed, with dense tufted hairs. Seeds obliquely reniform, laterally compressed, with shining twany long hairs, 3 mm long in a line along the outer edge only.

Flowers: January-April; *fruits*: April-June.

Distribution: In the hilly tracts of Assam in eastern India, Chittagong hill tracts, Burma, Malaya, Java, Siam, China up to an elevation of 1050 m.

Specimens examined: ASSAM: Mann, King; Naga Hills, Narayan 1256; Khasia & Jaintia Hills, Hooper; Theria Ghat, Hooper 34742; Cachar, Hattichera, Mann. BENGAL: Chittagong, Clarke 19733, Gamble 6774, Lister 44. BURMA: Tenna-serim, Tharapan, Meebold 14475; Amherst, Danka Range, Lace 4769; Salvean, Sellaebold 16951; Tovoy, Ba Pe 863, Mokim 201; Kachin Hill, Nam-lao, Pottinger; Arracan, Schich; Insein, Pyin-mada-w Res., Parkinson 21; Pegu, Tonkyeghat, Kurz 1247. Without precise locality, Larcyon 1256, Falconer 265, 280, Wallich 1903.

Uses: Heartwood is used for rafters, posts and still plates especially in the Garo Hills. The inner layers of bark give fibre suitable for cordage. The fibre is considered suitable for making paper of good quality.

Hibiscus tiliaceus Linn., Sp. Pl. 694, 1753; Cav., Diss. 3: 151, 1787; DC., Prodr. 1: 454, 1824; Roxb., Fl. Ind. 3: 192, 1932; Miquel, Fl. Ind. Bat. 1 (2): 153, 1859; Masters, in Hook. f. Fl. Brit. Ind. 1: 343, 1874; Trimen, Fl. Ceylon 1: 157, 1893; Watt, Dict. Econ. Prod. 4: 247, 1893; K. Schumann in Engler & Prantl, Pflanzenfam. 3(6): 48, 1895; Prain, Beng. Pl. 1: 269, 1903; Haines, Bot. Bihar & Orissa 2: 69, 1921; Hu, Fl. China, Malvaceae 44, 1955; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 119, 1958

(repr. ed.); Wealth Ind. 5: 97, 1959. *H. tiliaceo-folius* Salisb., Prodr. 383, 1796. *H. tortuosus* Roxb., Hort. Beng. 51, 1814 nom. nud. et Fl. Ind. 3: 192, 1832. *Paritium tiliaceum* Wt. & Arn., Prodr. 1: 52, 1834; Wight, Icon. t. 7, 1840; Thwaites, Enum. 26, 1864; *H. tiliaceus* var. *tortuosus* Masters, in Hook. f., Fl. Brit. Ind. 1: 343, 1874. *H. tiliaceus* var. *genuinus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 63, 1900.

Common name: Hindi & Beng.: *Bola*. Mar.: *Belapala*. Mal. & Tam.: *Nirparathi*, Tel.: *Etagogu*. Oriya: *Baniah*.

A small much-branched tree; branches usually close to the ground, young parts pubescent. Leaves 5-12.5 cm diam., (in some Malayan specimen up to 25 cm diam.), ovate or orbicular cuspidate, crenulate or entire, 7-9 palmi-nerved, subcoriaceous, glabrous above and hoary beneath; petioles 2.5-4 cm long, pubescent; stipules foliaceous, 1.5-2.5 cm long. Flowers in axillary or terminal cymes; pedicels stout, up to 2 cm long, with 2 small bracts at the base; segments of epicalyx 7-10, linear-lanceolate, connate above middle to form a campanulate persistent cup, acute, very much shorter than the calyx, tomentose; calyx 1-2 cm long, divided nearly to the base; lobes lanceolate with a prominent mid-rib, downy outside; corolla campanulate, pubescent outside yellow with crimson centre turning red in the afternoon; staminal tube 3.8 cm long, antheriferous all the way down. Capsule 1-2 cm diam., globose-ovoid, with a short beak, spuriously 10-celled, -5-valved, tomentose, covered with persistent calyx. Seeds sub-reniform, black or brown with pale dots, sulcate, glabrous or thinly pilose.

Flowers and fruits: July-April.

KEY TO THE VARIETIES

- | | |
|---|--------------------------|
| Leaves unlobed ovate or orbicular cuspidate | a. var. <i>tiliaceus</i> |
| Leaves 3-lobed, base round or cordate | b. var. <i>hastatus</i> |

var. ***tiliaceus***—*H. tiliaceus* Linn., Sp. Pl. 694, 1753.

Distribution: In India it is found along the eastern and western coasts near back waters and banks of tidal streams and mangroves. It is particularly common in Sundarban and Andaman Islands. Also found in Tropical Asia, Africa, South America and China.

Specimens examined: BENGAL: Sundarban, Heinig 33; Kakdwip, Prain; Pathuria, Heinig 51; Noakhali coasts; Calcutta Salt Lake, Kurz, H.B.C.; Chittagong, Clarke 19918A; Harbang range, Jaldi,

Hornfray 19, 41. ORISSA: *Gamble* 9226. MADRAS: *Naidoo*, *Wight* 208. Travancore: *Quilon*, *Meebold* 12632; *Cochin*, *Meebold* 12553. ANDAMAN ISLAND: *Prain* 37; *Cocos Island*, *Prain*; *Nicobar*, *Kurz* 26116, *Roger*, *Jelissek* 158; *South Andaman*, *Prain*, *Kurz*; *Middle Andaman*, *Kurz*; *Little Andaman*, *Prain*; *Borren Island*, *Prain*. LACCADIV ISLE: *Mikinoi*, "Investigator"; *Aucutta*, "Investigator"; *Gardiner*. BURMA: *Pegu*, *Karway*, *Kurz* 1250, *Falconer* 267; *Tenasserim*, *Kadwe*, *Manson* 720; *Mergui Harbour*, *Futtan Island*, *Rogers* 453. Without precise locality, *Wallich* 1912.

Uses: The plant is used for its bark fibre in the manufacture of cordage, ropes and mats. The fibre is more resistant to water than sunn-hemp and jute and gain considerable strength and durability when coated with tar. The fibre can be extracted even from green or unretted stalks by stripping the bark, exposure to the sun for a day or two, and beating with a wooden mallet or stick to remove the outer layers. Retting gives the fibre a better appearance.

var. **hastatus** Hochr., in Ann. Cons. Jard. Bot. Genève 4: 63, 1900. *H. hastatus* Linn. f., Suppl. 310, 1781. *H. tricuspis* Banks, in Cav. Diss. 3: 152, 1787.

Leaves palmately 3-lobed, base round or cordate. Specimens from Saharanpur having dimorphous leaves, orbicular-cordate cuspidate and palmately 3-5 lobed with round cordate base.

Distribution: Usually cultivated in gardens in North India. Also reported from the Andamans and Polynesia.

Specimens examined: U.P.: Saharanpur Botanical Garden, *King*. BENGAL: *H. B. C.*, *Prain*, *Debbarman*. ANDAMAN: *King*. Without precise locality, *Wallich* 1914.

Hibiscus tiliaceus Linn. var. **elatus** Hochr., in Ann. Cons. Jard. Bot. Genève 4: 63, 1900.

Commonly known as *Cuba bast*, differs from the original species by its larger plant and much bigger flowers. This was observed only in the Indian Botanic Garden, Calcutta where it was cultivated.

H. similis Blume. Bijdr. 2: 73, 105, 1825. *H. tiliaceus* L. var. *similis* (Bl.) Hochr., in Ann. Cons. Jard. Bot. Genève. 4: 15-16; 244, 1900; *H. tiliaceus* L. ssp. *similis* (Bl.) Borss. Waalkes, Blumea 14(1): 33-35, 1966. *H. prainii* Raizada et Chatterjee, in Sci. & Cult. 1960. *H. tortuosus* Wall. ex *Prain*, in Beng. Pl. 1: 268, 1903, non Roxb.

Tree; stem pubescent, older parts glabrous or glabrescent. Leaves 10-20 cm diam., orbicular-cordate, cuspidate, 7-9 palmi-nerved, stellately pubescent on both surfaces usually more beneath; petioles 7.5-15.5 cm long, shorter than the blade, pubescent, deciduous. Flowers solitary, axillary or in terminal panicle, large, 7.5-10 cm diam., pedicels unjointed, 1-1.5 cm long, densely pubescent, in fruits become elongated; segments of epicalyx 8-10, 1-2.5 cm long, linear-lanceolate, acuminate, connate below middle, pubescent on both sides; calyx 2-3 cm long, longer than the epicalyx, 5-lobed, divided to below middle; lobes lanceolate, acuminate, 3-nerved, densely pubescent; corolla hairy outside. Capsule orbicular, beaked, velvety hairy. Seeds not seen.

"*H. tortuosus* ripens its fruits regularly but always has abortive seeds; it is with hardly a doubt a natural hybrid of *H. setosus* (*macrophyllus*) × *H. tiliaceus*" *Prain*.

Distribution: In Sundarban area in Bengal.

Specimens examined: BENGAL: East of Ganges, *Wallich* 1913, 1913A; *H. B. C.*, *Prain*.

The plant has the general appearance of *H. tiliaceus* with regard to its leaves; it can be easily distinguished from it by its larger and longer epicalyx and its segments.

H. fragrans Roxb., Hort. Beng. 97, 1814, et Fl. Ind. 3: 195, 1832; *Masters* in Hook. f., Fl. Brit. Ind. 1: 337, 1874; *Kanjilal & Das*, Fl. Assam 1: 143, 1935; *Hochr.*, in Ann. Cons. Jard. Bot. Genève 4: 61, 1900.

Common name: Assam: *Pichhola-lata* (Lakh.), *Susang-ribue* (Miri). *Nork-pen* (Naga).

Small tree, young parts and petioles stellate-tomentose. Leaves 5-15 cm by 5-10 cm, ovate-cordate, acute or acuminate, dentate or repand, at first stellately hispidulous above, buff-tomentose beneath, ultimately glabrescent, chartaceous, palmately 5-7 nerved; petioles 5-7.5 cm long; stipules 1.0 cm long, linear, caducous. Flowers axillary or in terminal panicles, white or light pink with a pale yellow centre, fragrant, 2.5-3.8 cm diam.; pedicels 2.5-7.5 cm long, tomentose, jointed above middle; segments of epicalyx 5, ovate, acute, connate below middle forming a broad shallow cup, tomentose, persistent; calyx lobes 5, divided to middle or above middle, similar to epicalyx but slightly bigger, tomentose, persistent; petals 5, stellate pubescent outside; filamentella purplish. Capsules

2.5-3.0 cm long, ovoid-cylindric with angles, downy outside, longer than persistent calyx. Seeds reniform, small, covered with long white or brown hairs; hairs 1.5-2.0 cm long.

Flowers and fruits: December-March.

KEY TO THE VARIETIES

Small tree; ovary hairy	...	a. var. <i>fragrans</i>
Climbers, ovary glabrous	...	b. var. <i>glabra</i>

var. **fragrans**—*H. fragrans* Roxb., Hort. Beng. 97, 1814, et Fl. Ind. 3: 195, 1832.

Distribution: Eastern Himalaya in Sikkim and Upper Assam up to 1350 m alt. also in Upper Burma and in Chittagong Hill Tracts and China (Hu).

Specimens examined: SIKKIM: King 68, Gamble, Prain 213, J. D. H. Kalimpong: King 9505. ASSAM: Sapacaty, Prain 449, Jenkins 495, Makurea sepa 20; Upper Assam, Simons 10; Goalpara, King; Lusai Hills, Prazer; Cachar, Prazer; Khasia, Marindedit, Kurz; Saddya, Groff 583, 1030; Wallich 1911; Abor Hill, Burkill 37097, 35947, 583; Pangua, Collett.

Uses: Bark yields good fibre (Simons).

var. **glabra** Fischer in Kew Bull., 465, 1926.

Climber, ovary glabrous.

Specimens examined: BURMA: Myitkyina, Parkinson 364.

Hibiscus watsoni W. W. Smith, in Kew Bull., 198, 1912.

Shrub, 1-1.5 m high. Stem hispidus, rugose, scabridulous, with a single spiral row of long tufted hairs. Leaves 15-22.5 cm diam., orbicular-cordate, entire-ciliate margins, obtuse apex, 5-7 palmi-nerved, stellately hairy on both the surfaces; petioles shorter than lamina, pubescent. Flowers sessile, showy, yellow, in dense terminal club shaped spike, 15-20 cm long; segments of epicalyx in two whorls, outer segments free, linear, 4-5 cm long, with dense long silky hairs, also with glandular hairs, inner whorl 3 cm long, 10-14 lobed, connate below middle. silky hairy, equal to calyx, lobes unequal, approximately 2 cm long, acuminate; calyx campanulate, 3-3.5 cm long, sub-spathaceous, coriaceous, 5-lobed down to the middle or above middle, white, stellate hairy; lobes lanceolate, acuminate, 3-nerved, pubescent below; petals 5, base tubulosus, golden yellow in colour, each petal obovate, cuneate, acute or emarginate, 3-3.5 cm long and 1 cm broad;

staminal column epipetalous, 3-4 cm long, hairy at the base; filamentella short; anthers arranged closely down to the middle, reniform, open by transverse vertical slits; pollen globular, spiny; ovary ovoid, 0.8 cm long, densely silky hairy; styles 5-fid, shortly connate below; stigma 5, capitate, spreading. Capsule ovoid, dense silky villous, pointed, 3 cm long and 1.5 cm broad. Seeds reniform, villous, 5 mm long, testa coriaceous, cotyledons oblong 3.5 mm long, radicle cylindrical, 2.5 mm long.

Flowers: July.

Distribution: Reported from Burma up to an elevation of 1050 m.

Specimens examined: BURMA: South Shan States, Watson 206 in Herb. Cal.

H. scandens Roxb., Hort. Beng. 51, 1814, nom. nud., et Fl. Ind. 3: 200, 1832 not of Wall.; Masters, in Hook. f., Fl. Brit. Ind. 1: 337, 1874; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 61, 1900; Prain, Beng. Pl. 1: 267, 1903.

A woody climber; young shoots stellate-tomentose. Leaves 7.5-20 cm by 5-12.5 cm cordate-ovate, 3-lobed; lobes deltoid, acute or acuminate; petioles smaller than lamina, pilose; stipules linear-lanceolate, caducous. Flowers white or yellow with crimson centre, 2.5-3.0 cm diam., when open, in terminal panicles; flower bud globose; pedicels 2.5 cm long, jointed above middle, pilose; segments of epicalyx 5, connate only near the base; lobes lanceolate, minutely tomentose, soft, less than 1.3 cm long; calyx 5-lobed, connate below; lobes oblong-lanceolate, slightly exceeding the epicalyx, minutely tomentose, soft, both epicalyx and calyx are persistent; petals twice the size of the calyx. Capsule ovoid-cylindric, exceeding calyx, 1.3-1.9 cm long. Seeds reniform with long hairs.

Epicalyx, calyx, capsule and seeds are similar to those of *H. fragrans* but are remarkably smaller in size and slightly differ in shape also. Hairs in seeds are more numerous in *H. scandens*.

Flowers and fruits: November-March.

Distribution: In Burma, Chittagong Hill tracts, Assam and Andamans.

Specimens examined: CHITTAGONG HILL TRACTS: Lister 146. BURMA: Pegu, Kurz 1251, 2100; Brandis 805; Martaban, Kurz; Thaton, Lace 4664. SOUTH ANDAMAN: Parkinson 1053, Heimig 162, King.

Hibiscus platanifolius (Willd.) Sweet, Hort. Brit. 2 : 51, 1827; Hochr., in Ann. Cons. Jard. Bot. Genève 4 : 168, 1900; Gamble, Fl. Madras 1 : 70, 1957 (repr. ed.). *Paronia platanifolia* Willd., in Berl. Mag. Ges. Naturf. Fr. 4 : 220, 1810. *H. collinus* Roxb., Hort. Beng. 51, 1814, nom. nud., et Fl. Ind. 3 : 198, 1832; Masters, in Hook. f. Fl. Brit. Ind. 1 : 338, 1874; Trimen, Fl. Ceylon 1 : 152, 1893; Woodr., in Jour. Bombay nat. Hist. Soc. 11 : 127, 1897; Watt, Dict. Econ. Prod. 4 : 236, 1903; Rama Rao, Fl. Travancore 41, 1914; Haines, Bot. Bihar & Orissa 2 : 68, 1921; Cooke, Fl. Pres. Bombay 1 : 114, 1958 (repr. ed.). *H. acerifolius* DC., Prodr. 1 : 448, 1824. *H. eriocarpus* DC., Prodr. 1 L 452, 1824; Wt. & Arn., Prodr. 1 : 51, 1834; Thwaites, Enum. 26, 1864.

A small tree, girth up to 0.9 m, bark pale and greenish, wood hard and light; shoots tomentose and young twigs hoary with stellate and simple hairs. Leaves cordate, 3-lobed, sometimes 5-lobed, stellate hairy beneath and thinly so above, 10-16 cm long and broad, lobes narrow at the base, acute or acuminate, irregularly toothed; petioles 2.5-11.5 cm long; stipules subulate. Flowers axillary, pink with dark purple centre, 5-7.5 cm diam. when open; peduncles 5-7.5 cm long, jointed near the apex, hairy; segments of epicalyx 5 or 8-10, free, leaf-like, lanceolate, acuminate, 1.3-1.8 cm long, equalling the calyx, pubescent; calyx 5-lobed, divided to below the middle, pubescent, lobes ovate or oblong-lanceolate, acute, 1-nerved; petals tomentose outside; staminal tube antheriferous all through, stamens whorled. Capsule 1.9-3.3 cm diam., globose, cuspidate, 5-angled, yellow tomentose and densely setose, 5-loculi with long bristles within. Seeds grey-black, subspherical, 0.4 cm diam., glabrous, smooth.

Flowers and fruits: August-January.

Distribution: In eastern India, Bengal, Orissa and in South India. Also in Ceylon.

Specimens examined: BENGAL: H.B.C. ORISSA: Haines 4075. BOMBAY: Fischer 4150; Poona, Garade; Concan, Stocks 258. MADRAS: Ballipalle, Gamble 11104. Without precise locality, Helfer.

Uses: Bark gives a fibre used as substitute for hemp and for cordage (Watt, 1903). Extensively cultivated in gardens.

H. beddomei Rakshit et Kundu, in Sci. & Cult. 27 : 192, 1961.

Stem erect, unarmed, densely covered with rigid stellate hairs, nearly hirsute. Leaves ovate-cordate,

3-angled or slightly 3-lobed, 7 cm diam., 5-7 palmi-nerved, lobes ovate, acute, upper leaves narrow-ovate or lanceolate, all serrate-dentate, hairy on both surfaces usually more beneath; petiole 3-6 cm long, pubescent with simple and stellate hairs; stipules linear, hairy. Flowers axillary, solitary; in terminal portion flowers are closer forming a more or less racemose inflorescence; pedicel short, 0.5 cm long, unjointed, hairy; segments of epicalyx 9, 0.7 cm long, shorter than calyx, linear, tips spathulated with 0.3 cm long linear appendage arising from the base of the spathulated tip, covered with stiff hairs all through; calyx campanulate, 1.0 cm long, 5-lobed upto middle, lobes deltoid, acuminate, 3-nerved, membranous, hairy, persistent in fruit; petals 5, hairy outside; staminal column short, pollen globular, spiny; ovary ovoid-oblong, densely covered with white silky hairs, chambers 5, many ovules in each chamber arranged in axile placentation arising from the inner angle; stigma 5, reddish, spreading above the staminal column. Capsule ovoid, beaked, densely hairy, equal to calyx, open by five longitudinal valves.

The species is quite distinct from other species of *Hibiscus*. It is very near to *H. radiatus* Cav., but differs in the following characters. Stem unarmed, hairy and with dense rigid stellate hairs, nearly hirsute; leaves unlobed or faintly 3-lobed or 3-angled, upper leaves narrow ovate, hairy on both surfaces; flower smaller; capsule equal to the persistent calyx.

Distribution: Central and South India. Recently reported from Uttar Pradesh (Bhattacharyya, 1964) and Rajasthan (Hemadri & Reddi, 1967).

Specimens examined: SOUTH INDIA: without precise locality: Beddome 91 and 92 (Type in Herb. CAL.). Central India: without precise locality: Jerdon.

H. surattensis Linn., Sp. Pl. 696, 1753: Cav., Diss. 3 : 149, 1787; DC., Prodr. 1 : 449, 1824; Roxb., Fl. Ind. 3 : 205, 1832; Wt. & Arn., Prodr. 1 : 48, 1834; Wight, Icon. t. 197, 1840; Miquel, Fl. Ind. Bat. 1 (2) : 161, 1859; Dalz. & Gibs., Bombay Fl. 20, 1861; Thwaites, Enum. 26, 1864; Masters, in Oliver, Fl. Trop. Africa 1 : 201, 1868; Masters, in Hook. f., Fl. Brit. Ind. 1 : 334, 1874; Watt, Dict. Econ. Prod. 4 : 246, 1893; Trimen, Fl. Ceylon 1 : 152, 1893; K. Schumann, in Engler & Prantl, Pflanzenfam. 3(6) : 48, 1895; Woodr., in Jour. Bombay nat. Hist. Soc. 11 : 127, 1897; Hochr.,

in Ann. Cons. Jard. Bot. Genève 4: 110, 1900; Prain, Beng. Pl. 1: 267, 1903; Rama Rao, Pl. Travancore 40, 1914; Bamber, Pl. Punjab 551, 1916; Kanjilal & Das, Fl. Assam 1(1): 144, 1935; Hu, Fl. China, Malvaceae 56, 1955; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 112, 1958 (repr. ed.); Wealth Ind. 5: 96, 1959. *H. surattensis* var. *genuinus* Hochr. in Ann. Cons. Jard. Bot. Genève 4: 111, 1900.

Herb or undershurb, erect or trailing, covered with soft hairs and scattered recurved prickles. Leaves suborbicular or ovate, palmatipartite, 3-5 lobed, lobes linear lanceolate with a more or less truncated base, acute, crenate-serrate, sparsely hispid; petioles longer than lamina; stipules foliaceous, broad, ear-shaped, toothed. Flowers showy, solitary, axillary, yellow with deep red centre or completely yellow, 5-6 cm, wide when open; peduncles prickly, longer or shorter than the petioles; segments of epicalyx 9-12, each having a linear hispid stalk 1.25 cm long and a spatulate-apiculate blade 0.8 cm long with a linear ciliate appendage 1.25 cm long, near the base of the blade; calyx membranous, 5-cleft, about 2.5 cm long, persistent in fruit, lobes ovate, acuminate, with bristles or prickles along the coloured margins and midribs; petals 5, united at the base and also with staminal tube; staminal tube antheriferous all through; ovary ovoid, 5-locular with many ovules in each chamber, ovules arranged on axile placentation; stigma 5 lobed, spreading, red or yellow. Capsule ovoid, 1.2 cm long, 1 cm in diam. at the base, covered with bristle-like shining white or yellow hairs. Seeds reniform.

Flowers: September-October; *fruits*: December-February.

KEY TO THE FORMAE

- | | | |
|-----------------------------------|-----|-----------------------------|
| Flowers yellow with purple eye | ... | a. forma <i>surattensis</i> |
| Flowers yellow with no purple eye | | b. forma <i>immaculata</i> |

forma *surattensis*—*H. surattensis* Linn., Sp. Pl. 696, 1753.

Distribution: In Northern India from Delhi to Assam; in Southern India, Andhra, Konkan, Kanara and Tinnevely. Also in Sumatra, Singapore, Malaya Peninsula and Burma.

Specimens examined: BURMA: Teikgyi Range, 1882; Nyopyay: Sydney, *Toppin* 4124; Segma, Warawaddy, *Rodger* 330; Tungo, Minge (Saing-Yami Reserves), *Lace* 5028; South Shan State; Keng Tang, *McGregor* 900; Mergin, *Mokim* 7; Sagu Milen, *Mokim* 427, *Huk*; Bhamo, *Anderson*. ASSAM:

Khasia, *Clarke* 44931, 5400. Cachar, Arunachal, *Kanjilal* 4714, *Fischer*. BENGAL: Agartala, *Debbarmann* 1009; Darjeeling, Jaldaka, *Balensgu* 15; Chitragong Hill Tracts, *Badul Khan* 199, 650, *Lister* 174; MALABAR DIST: Tekkadi Forest, *Fischer* 3516, *Wight* 195, *Keinio*. TRAVANCORE: Kollar, *Calder* and *Ramaswami* 442, 465, 660; Pulegar, *Rama Rao* 1710, *Ainlon* 1325. GOA: Savantvade, Agasgao, *Dalgado*.

forma *immaculata* Kurz ex Rokshit, in Sci. & Cult. 27: 194, 1961.

Stipules narrower, flowers yellow, no purple eye.

Distribution: Reported only from Burma.

Specimen examined: BURMA: Pegu Yomah, *Kurz* 1248.

Hibiscus furcatus Willd., Enum. Hort. Berol. 736, 1800; Roxb., Hort. Beng. 51, 1814, nom. nud.; et Fl. Ind. 3: 204, 1832; DC., Prodr. 1: 449, 1824; Wt. & Arn., Prodr. 1: 48, 1834; Miquel, Fl. Ind. Bat. 1 (2): 161, 1859; Dalz. & Gibs., Bombay Fl. 19, 1861; Thwaites, Enum. 26, 1864; Masters, in Oliver, Fl. Trop. Africa 1: 201, 1868; Masters, in Hook. f., Fl. Brit. Ind. 1: 335, 1874; Trimen, Fl. Ceylon 1: 152, 1893; Watt, Dict. Econ. Prod. 4: 241, 1893; Woodr., in Jour. Bombay nat. Hist. Soc. 11: 127, 1897; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke Fl. Pres. Bombay 1: 112, 1958 (repr. ed.), Wealth Ind. 5: 89, 1959. *H. aculeatus* Roxb., Fl. Ind. 3: 206, 1832. *H. hispidissimus* Griff., Notul. 4: 520, 1854. *H. surattensis* var. *furcatus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 112, 1900.

A trailing or rambling suffruticose, 60-120 cm high; stem downy and with recurved prickles from thickened coloured bases. Leaves entire or palmately 3-5 lobed, crenate-dentate or crenate-serrate, cordate or truncate at the base, soft hairy except the hispid nerves; petioles 5-10 cm long with prickles; stipules 1.5 cm long, oblong or linear-lanceolate. Flowers solitary, axillary, 5-10 cm in diam. when open, upper becoming subracemose; flowerbuds with a tuft of hairs at the apex; segments of epicalyx 8-12, variable, usually hispid, divided at the apex into 2 leafy portions, each portion enlarged beyond the middle; from the base of the enlargement of the upper side an erect and incurved horn-like appendage develop, this form a cancellated dome over the rigid, glandular calyx; calyx deeply 5 cleft; lobes lanceolate, rigidly acuminate, 3-nerved, hispid with stiff bristles from thickened bases, per-

sistent and enlarged in fruits, often red; petals yellow with purple centre. Capsule 1.5 cm long, ovoid, pointed, covered with rigid deciduous hairs, enclosed in the enlarged calyx.

Flowers: September to January; *fruits*: November-February.

Distribution: In Eastern and Southern India. Also in Burma and Yunnan.

Specimens examined: BIHAR: Chota Nagpur. Wood. BENGAL: H. B. C. ASSAM: Sylhet, H. f. & T., Simon. MADRAS: Rampa, Palakonda, Narayanswami; Nilgiris, Dunn. Travancore: Koni, Bourdillon; Malabar, -1151a.

Uses: Bark yields white fibres suitable for cordage and rope. The fibre has a breaking strain of 89 lbs when dry and 92 lbs when wet (Naidu). Root and bark are used in medicine. It is reported to be highly resistant to drought, remaining green even under prolonged dry periods.

Hibiscus radiatus Cav., Diss. 3: 150, 1787; DC., Prodr. 1: 449, 1824; Roxb., Fl. Ind. 3: 209, 1832; Wt. & Arn., Prodr. 1: 48, 1834; Miquel, Fl. Ind. Bat. 1 (2): 161, 1859; Dalz. & Gibs., Bombay Fl. 20, 1861; Masters, in Hook. f., Fl. Brit. Ind. 1: 335, 1874; Cooke, Fl. Pres. Bombay 1: 112, 1958 (repr. ed.). *H. heptaphyllus* Dalz. & Gibs., Bombay Fl. 20, 1861. *H. cannabinus* L. var. *unidentens* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 115, 1900.

An erect undershrub, branches unarmed smooth or armed with a very few prickles. Leaves usually 3.5 deeply palmately lobed, sometimes unlobed, 10.0-12.5 cm by 5.0-8.5 cm; lobes oblong-lanceolate, serrated margins red in young condition, acute, glabrous except a few hairs on the veins, smooth; petioles as long as or longer than the blade, pubescent, sparsely armed with prickles, upper surface coppery red in young condition; stipules linear, hairy. Flowers showy, solitary, axillary, all purple or yellow with crimson-red-centre, rarely violet, 5-12.5 cm in diam. when open; peduncle short, jointed at the middle, with few stiff hairs; segments of epicalyx 8-10, linear, usually with unequally forked tip, outer lip bigger and ovate in shape, inner smaller and linear, with stiff hairs along the margins, 1.5-2.0 cm long, shorter than calyx; calyx 2.5 cm long, campanulate, deeply 5 lobed; lobes 2 cm long, about 3 times the cup, ovate, acuminate, entire, veins prominent without glands, bristles and prickles on the margins, upper prickles hooked, membranous, persistent in fruits; petals obliquely obovate, 6-7 cm

long; staminal column truncate, crimson red with glandular hairs, 2.5-3.0 cm long; anthers laxly arranged throughout the column, reniform; ovary broadly ovoid, 0.6-0.7 cm long, densely covered with white silky hairs, 5 locular; ovules many in each chamber arranged in 2 rows in axile placentation; style 2.5-3.5 cm long, lower white, upper 5-fid and crimson-red; stigma 5 spreading crimson-red. Capsule broad, ovoid, beaked, densely hairy, smaller than calyx, dehiscence in 5 loculicidal valves. Seeds smooth, brown, reniform.

Flowers: August-February; *fruits*: October-February.

Distribution: In Eastern and Southern India. Also in Burma and Chittagong Hill Tracts.

Specimens examined: U.P.: Kumaon, Gills 420. BENGAL: H. B. C., Kurz, Prain. ASSAM: Jenkins; Kamrup, King; Lushai Hills, Leslie 4; Khasia, Fischer. Chittagong Hill Tracts: King 1886. BURMA: Milen, Mokim 548; Kyonkse, Tameinekhan, Khalil. Without precise locality, Jerdon; Wallich.

Hu (1955) in Flora of China (Malvaceae) has included this species under *H. cannabinus*. On careful examination of both living and herbarium material it has been found to be quite distinct.

H. sabdariffa Linn., Sp. Pl. 695, 1753; Cav., Diss. 3: 170, 1787; DC., Prodr. 1: 453, 1824; Wt. & Arn., Prodr. 1: 52, 1834; Miquel, Fl. Ind. Bat. 1 (2): 158, 1859; Dalz. & Gibs., Suppl. 7 (*H. subdariffa*); Masters, in Hook. f., Fl. Brit. Ind. 1: 340, 1874; Watt, Dict. Eon. Prod. 4: 243, 1893; Woodr., in J. Bombay nat. Hist. Soc. 11, 127, 1897; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 116, 1900; Prain, Beng. Pl. 1: 267, 1903; Duthie, Fl. U. Gang. Plain 1: 91, 1903; Rama Rao, Fl. Travancore 41, 1914; Bamber, Punjab Pl. 244, 1916; Haines, For. Fl. Central Province 16, 1916, et Bot. Bihar & Orissa 2: 67, 1921; Hu, Fl. China, Malvaceae 58, 1955; Cooke, Fl. Pres. Bombay 1: 117, 1958 (repr. ed.); Wealth Ind. 5: 92, 1959; Borss. Waalkes, in Blumea 14: 64, 1966. *H. digitatus* Cav., Diss. 3: 151, 1787, DC., Prodr. 1: 453, 1824. *H. sanguineus* Griff., Notul. 4: 520, 1854.

Common name: Hindi: Lal Ambari, patwa; Bengal: Chukar. Mar.: Lal Ambari, patwa, Assam: Chukiar. Eng.: Roselle, Red sorrel of West Indies, Kan.: Pulachakiri pundibija. Mal.: Polechi, pulichchai. Tam.: Pulichchai kerai, gogu. Tel.: Yerra gogu.

Annual, erect, unarmed herb, 1-2 m high. Stem green or red-purple, pubescent and sometimes with a few bristles. Leaves cuneate at the base, usually deeply 3-5 lobed, 5-12 cm long, lobes lanceolate or oblong or ovate, middle lobe the longest, serrulose, glandular on the midrib beneath, often blotched with purple, glabrous smooth or with stiff hairs along the nerve beneath, red or green; petioles 2.5-7.5 cm long, equal to or shorter than lamina, green or reddish-purple; stipules 1.3 cm long, linear. Flowers solitary, axillary, yellow with deep purple centre or full yellow, 5-6.5 cm diam. when open; peduncles very short, stout, jointed; segments of epicalyx 8-12, linear, shorter than the calyx and adnate to its base, green or purple, sometimes with bristles at the margins, persistent; calyx fleshy, particularly in fruits, sepals connate below the middle, lobes deltoid-lanceolate, acuminate, 3-nerved, usually smooth or with a few bristles, green or purple, persistent; corolla in some plants turn pink during withering; staminal column epipetalous, about 1 cm long, antheriferous all through; ovary 5 locular; ovules many in each chamber in axile placentation. Capsule ovoid, beaked, hairy. Seeds brownish, more or less 3-angled, reniform, closely covered with minute stout stellate hairs.

KEY TO THE VARIETIES

Bristle absent or a few when present; calyx usually enlarged and fleshy in fruits ...	a. var. <i>sabdariffa</i>
Bristle dense on stem; calyx not fleshy ...	b. var. <i>altissima</i>

var. *sabdariffa*—*H. sabdariffa* Linn. Sp. Pl. 695, 1753.

Flowers and fruits: October-February.

Distribution: Cultivated in the hotter parts of India and in Ceylon and throughout tropics. A native of tropical Africa and Asia.

Specimens examined: BIHAR: Santal Pargana, Deoghar, Fulzhuree Hills, *Das* 34523; Manbhum, Pukuria, *Campbell*. ORISSA: Ganjam, *Hooper* 39610. BENGAL: Darjeeling, *Cane* 29; Tripura, Agartala, *Debbarmar* 522; Chittagong Hill Tracts, Kodda Hills, *Khan* 623, 104. CONCAN: *Stocks*. BURMA: Bhamo, *Anderson*; Minlen, Shingange road, *Mokim* 585; Minbu, Arracan Yomah, *Aubert & Gage*; Mandalay, *Anderson*. ANDAMAN: Cocos Island, *Prain*; without precise locality, *Wallich* 1909.

Uses: Mainly cultivated for the edible fleshy calyces. There are four races—*ruber*, *albus*, *intermedius* and *bhāgalpuriensis* (*Howard & Howard*,

1911). Cultivated throughout India as a monsoon crop. The calyces are used for jellies, chutneys, etc. An infusion of the calyces is used for preparing a beverage used in medicine. The seeds and leaves are said to be eaten in some parts of India and Africa.

var. *altissima* Wester, Philipp. Agric. Rev. 7: 266, 1914. Wealth India 5: 94, 1959.

Common name: Bengal: *Lal mesta*.

Annual erect herb, 3-4.5 m high. Stem green, green-red or red, hairy and with bristles all over. Leaves green or red, deeply palmately 3-5 lobed, 3-5 palmately veined, 5-15 cm long, lobes oblong-lanceolate, serrulose, acuminate, central lobe longest, hairy on both the surfaces, upper smooth lower scabridulous; petiole 6-12 cm long, finely pubescent or hairy and with bristles; stipules linear 0.5-0.7 cm long, hairy. Flowers solitary, axillary, yellow or yellow with deep red centre, 3-4 cm diam.; peduncles short, 0.3-0.4 cm long, unjointed, green or red, hairy, sometimes with bristles; segments of epicalyx 8-10, short, 0.5 cm or less long, hairy and with bristles, adnate to calyx below, persistent; calyx 1.5-2.0 cm long, 5 lobed, connate below middle, lobes 1.5-2 times the cup, deltoid-ovate, acute, prominently 3-nerved, midrib with one gland not very prominent, hairy and with bristles, valvate in bud, persistent; petals 5, free, inside glandular hairy, twisted; staminal column 1.0 cm long, truncate, white or red, glandular hairy; filamentella 0.1-0.2 cm long, white or red; anthers reniform; pollen globular, spiny, orange coloured; ovary ovoid, densely covered with white silky hairs, 0.3-0.5 cm long, 5 locular, many ovules in each loculus and are arranged in axile placentation; style 1.0 cm long, 5-fid; stigma 5 spreading, hairy, white or red. Capsule ovoid, shorter than calyx. Seeds reniform, 3 angled, brownish grey, with stellate scales.

The agricultural races are mainly classified on the basis of stem pigmentation.

Flowers and fruits: October-January.

Distribution: Cultivated throughout India and in other tropical countries. Native of West Africa. Introduced into India as single seed in consignment of seeds of *Calopogonium mucunoides* Desv., from Java.

Uses: It produces fibres from the stem, which can be mixed with jute and spun in jute machinery. It is used for sacking, cordage, rope, and generally for all purposes for which jute is used. The woody stalk, left over after fibre extraction are used as fuel

and for making paper pulp. Length of ultimate fibre cell is 1.2-3.3 mm and width is 0.01-0.03 mm.

Hibiscus cannabinus Linn., Syst. Nat. 10: 1149, 1759; Cav., Diss. 3: 148, 1787; DC., Prodr. 1: 450, 1824; Roxb., Fl. Ind. 3: 208, 1832; Wt. & Arn., Prodr. 1: 50, 1834; Dalz. & Gibs., Bombay Fl. 20, 1861; Thwaites, Enum. 26, 1864; Masters, in Hook. f., Fl. Brit. Ind. 1: 339, 1874; Watt, Dict. Econ. Prod. 4: 231, 1893; Woodr., in Jour. Bombay Nat. Hist. Soc. 11: 127, 1897; Prain, Beng. Pl. 1: 267, 1903; Duthie, Fl. U. Gang. Plain 1: 90, 1903; Haines, For. Fl. Cent. Province 15, 1916; et Bot. Bihar & Orissa 2: 67, 1921; Cooke, Fl. Pres. Bombay 1: 116, 1958 (repr. ed.); Wealth Ind. 5: 77, 1959. *H. cannabinus* L. var. *genuinus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 115, 1900.

Common name: Beng.: *Mesta pat.* Guj.: *Ambari Sheria*. Bihar: *Kudrum*, *Dare Kudrum*. Hindi: *Ambari*, *Patsan*, *Patwa*. Kan.: *Pundi*. Mal.: *Kanjuru*. Mar.: *Ambadi*. Orissa: *Kanuriya*. Punj.: *Sankokla*. Eng.: *Kenaf*.

An annual or perennial herb, 2.5-4.0 m high. Stem glabrous, sparsely prickly. Leaves unlobed or lower leaves unlobed and upper deeply palmately 5-7 lobed, ovate-cordate, 5-7 palmately reticulate nerved, gland on the midrib beneath, sparingly hairy on both surfaces, upper smooth, lower, scabridulous, lobes narrow lanceolate, serrate, acute; petioles 4-18 cm long, lower much longer than the blade, hairy and prickly; stipules 1.0 cm long, linear subulate, hairy. Flowers solitary, axillary or in terminal racemes due to shortening of leaves, 8-10 cm diam., showy, yellow with crimson centre or full yellow, sometimes white with crimson centre; pedicels very short; segments of epicalyx 7-10, free, linear, 0.9 cm long with bristles on the margins, shorter than calyx, persistent; calyx 5-lobed, connate below middle, campanulate with bristles and white tomentose; lobes long, lanceolate, acuminate, twice the length of the cup, with a strong midrib often prickly, each with a gland at the base, valvate in bud, persistent; petals 5, free, obliquely obovate, obtuse, 7-8 cm long, outside hairy; staminal column 2.5 cm long, truncate, with white glandular hairs; filamentella short, deep red, arranged throughout the column; anthers reniform, open by vertical longitudinal slits; pollens many globular, spiny; ovary ovoid, 0.7-0.8 cm long, densely covered with white silky hairs, 5 locular; ovules many in each chamber in two vertical rows in axile placentation;

style connate above middle, upper 5-fid deep-red, sometimes white; stigma 5 spreading, hairy, red or white. Capsule ovoid, beaked, very hairy, hairs become stiff at maturity, open by 5 loculicidal valves. Seeds large, greyish black, reniform, 3-angled, dotted with minute stellate scales.

Flowers and fruits: August-November.

Distribution: Throughout India up to an elevation of 1500 m. Apparently indigenous to India, but some consider it to be of African origin.

The plant is mainly cultivated as a fibre crop, a substitute for jute. According to Howard & Howard (1911) there are five agricultural races in India (i) simplex, (ii) viridis, (iii) ruber, (iv) purpurens and (v) vulgaris. The classification has been done on stem pigmentation.

Specimens examined: N. W. I.: Banda, Bell 75, Edgeworth 216. WEST-HIMALAYA: Hazara, Shinkiyari, Inajat, Handerson; Tehri-Garhwal, Mackinnon. U.P.: Lucknow; Dehra Dun, Lachivala, Kanjilal 883. BIHAR: Chota Nagpur, Wood. ORISSA: Mayurbhanj, Baripada, Hooper 37819. BENGAL: Gorrie; Sahibganj, Kurz; CHITTAGONG HILL TRACTS: Khan 102. ASSAM: Naga Hills, Tamlu, Watt 11863; Kohima, Watt 7348; Simon. BOMBAY: Poshetre, Dhurma D65. MADRAS: Rampa, Boruagudem, Narayanswami 295, Naidoo, Clegghora; Coimbatore, Fischer 1753. BURMA: Pegu, Kurz 1252, King 53.

Uses: Being similar to jute in spinning characteristics, the fibre is used on a large scale in jute manufactures, sometimes to the extent of 60-80 per cent in hesian and sackings.

H. procerus Roxb., in Wall. Cat. 2692, 1828-1849. Masters, in Hook. Fl. Brit. Ind. 1: 339, 1874; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 122, 1900.

Perennial, prickly; prickles of stem conical, with whitish base. Leaves 20 cm × 12.5 cm, roundish, deeply 3-7-9 lobed, lobes lanceolate, serrate, glabrous, midrib prickly, upper leaves 3-parted, uppermost lanceolate; petioles 2.5-5 cm, lower 10 cm; stipules 1.3 cm, linear, pilose. Flowers 15 cm diam., pink with dark centre; peduncles 1.3 cm, aggregated at the ends of the branches; segments of epicalyx and calyx lobes clothed with tawny tomentum; segments of epicalyx 8-10, free, linear; sepals 1.3 cm, lanceolate, bristly. Capsule ovoid, pointed, shorter than the sepals. Seeds black, tubercled.

Distribution: Burma.

The above description has been taken from Hooker in the Flora of British India, but no specimen was observed by the present authors in Calcutta Herbarium. However, the figure of the species, received from the Kew Herbarium, has been given in plate I.

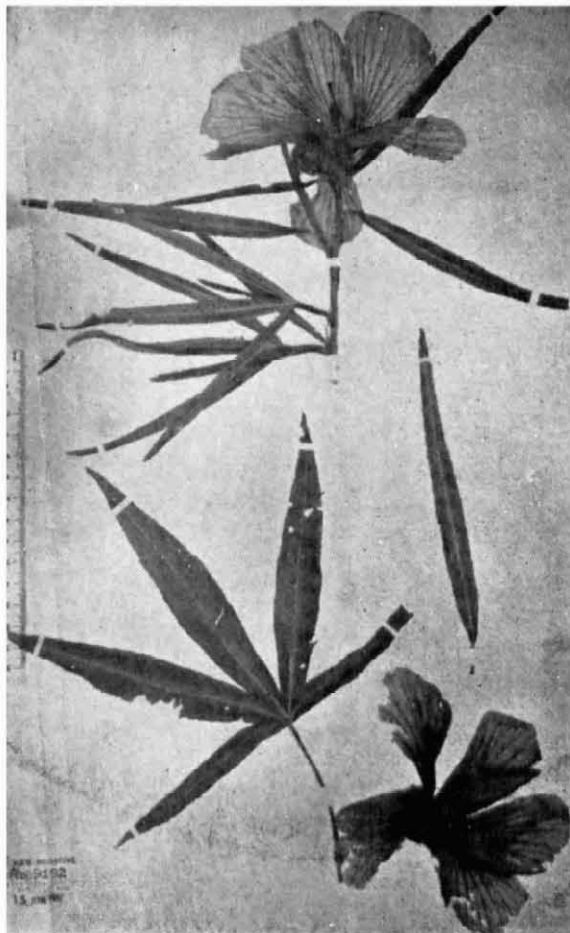


Plate I. *Hibiscus procerus* Roxb.

Hibiscus diversifolius Jacq., Ic. Pl. Rar. 3: t. 551, Coll. 2, 307, 1786-93; DC., Prodr. 1: 449, 1824; Roxb., Fl. Ind. 3: 208, 1832; Masters, in Oliver, Fl. Trop. Africa 1: 198, 1868; Masters, in Hook. f., Fl. Brit. Ind. 1: 339, 1874. *H. diversifolius* Jacq. var. *genuinus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 119, 1900.

A tall herb or undershrub, the branches, petioles and nerves of leaves armed with hard conical prickles and also pubescent. Leaves 5-7 cm diam., variable, usually cordate, roundish, serrate or dentate,

hairy on both surfaces, 5-7 palmately nerved, one big gland on the midrib beneath, slightly lobed, lobes lanceolate, acute, upper nearly entire; petiole 5-10 cm long, longer than the lamina; stipules small, linear. Flowers axillary and in terminal clusters; peduncles very short, with bristles; segments of epicalyx 8-10, linear-subulate, with bristles, 1.0 cm long; calyx 5-lobed, connate at the middle, equal to or longer than epicalyx, one big gland on the midrib of each lobe above middle, lobes lanceolate, acuminate, densely covered with bristles; corolla 3 or 4 times the size of the calyx. Capsule ovoid, pointed, hispid, ultimately glabrescent. Seeds smooth.

Flowers and fruits: During the cold season (Roxb.).

Distribution: Burma. Also in tropical Africa and Australia.

Specimens examined: Without precise locality, Wallich, 1897.

H. rosa-sinensis Linn., Sp. Pl. 694, 1753; Cav., Diss. 3: 158, 1787; DC., Prodr. 1: 448, 1824; Lindl., in Bot. Reg. 21, t. 1826, 1836; Roxb., Fl. Ind. 3: 194, 1832; Wt. & Arn., Prodr. 1: 49, 1834; Miquel, Fl. Ind. Bat. 1(2): 156, 1859; Masters, in Hook. f., Fl. Brit. Ind. 1: 344, 1874; Watt, Dict. Econ. Prod. 4: 242, 1893; Woodr., in Jour. Bombay Nat. Hist. Soc. 11: 128, 1897; Prain, Beng. Pl. 1: 268, 1903; Bamber, Punjab Pl. 82, 1916; Haines, Bot. Bihar & Orissa 2: 69, 1921; Kanjilal and Das, Fl. Assam 1: 145, 1935; Hu, Fl. China, Malvaceae 46, 1955; Santapau, Fl. Purandhar 26, 1957, et Fl. Saurashtra 48, 1962; Cooke, Fl. Pres. Bombay 1: 120, 1958 (repr. ed.); Wealth Ind. 5: 91, 1959; Borss. Waalkes, in Blumea 14: 72, 1966. *H. javanicus* Mill., Gard. Dict. 6(7): 1768. *H. fragilis* DC., Prodr. 1: 446, 1824. *H. rosa-sinensis* L. var. *genuinus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 134, 1900.

Common names: Assam & Bengal: *Jaba*. Eng.: *China rose*; *Shoe flower*. Guj.: *Jasuva*. Hindi: *Jasut*, *Jasum*. Kan.: *Dasavala*. Mal.: *Dasindachaphula*, *Jasavanda*. Orissa: *Mondaro*. Punj.: *Jasum*. Tam.: *Semparuthi*. Telegu: *Java-pushpamu*.

Shrubby, 0.9-2.4 m high. Stem woody, without prickles, glabrous. Leaves ovate or ovate-lanceolate, acuminate, somewhat tapering at the base, coarsely serrate towards the apex, palmately 3-nerved, glabrous or with few stellate hairs on the nerves beneath, shining, 7.5-11.5 cm long; petioles long or short; stipules lanceolate-subulate, glabrous, 5-12 mm long.

Flowers solitary from the upper axils, usually red, 7.5-13 cm diam.; peduncles as long as or longer than the leaves, jointed above middle, pubescent; segments of epicalyx 5-8, half as long as calyx, connate at the base, lanceolate, glabrous; calyx connate below middle, puberulous with very minute stellate hairs, 1.7-2 cm long, lobes lanceolate; corolla funnel-shaped, 3 times as long as calyx, 6-11 cm across; staminal tube exerted far beyond corolla. Capsule rarely formed, roundish, many seeded; seeds glabrous.

There are numerous single and double varieties, varying from very large brilliant crimson flowers, often 14 cm diam., through red to salmon coloured and yellow flowers. It flowers practically all the year round, but profusely from April to September.

KEY TO THE VARIETIES

- Leaves serrate to dentate, not coriaceous a. var. *rosa-sinensis*
 Leaves entire or dentate at the apex, coriaceous b. var. *lilliflorus*

var. ***rosa-sinensis***—*H. rosa-sinensis* Linn. Sp. Pl. 694, 1753.

Distribution: Cultivated in gardens in India. Common in all warm countries. Probably a native of China.

Specimens examined: SIND: Nasirabad gardens, Watt 20669. BENGAL: *H. B. C. Kurz*; Lower Bengal, *Kurz*. ASSAM: Manipur city, Watt. BOMBAY: Poona,—105. MADRAS: *Nilgiris*, *Schind, Naidoo*; Triplicane, *Naidoo*. BURMA: Bhamo, *Anderson*; Mantyan, *Anderson*; Monay, *Khalil*. LACCADIVE ISLAND: Minikoy, "Investigator". Without precise locality, *Wallich* 1890, *Wight* 188.

var. ***lilliflorus*** Hochr., in Ann. Cons. Jard. Bot. Genève 4: 134, 1900; Borss. Waalkes, in Blumea 14: 73, 1966. *H. lilliflorus* Griff. (non Cav.) ex Masters, in Hook. f., Fl. Brit. Ind. 1: 344, 1874. *H. arnotti* Graham ex Masters, in Hook. f., Fl. Brit. Ind. 1: 344, 1874.

Leaves firm, margins entire or dentate only at the apex. Flowers simple red. Sepals connate above middle. Segments of epicalyx slightly shorter than calyx.

Distribution: Cultivated in gardens; introduced into India from Mauritius.

Specimens examined: BENGAL: Calcutta Botanic Garden; Secrampore. Without precise locality, *Naidoo*.

Hibiscus schizopetalus (Mast.) Hook. f., in Bot. Mag. 106: t. 6524, 1880; Hochr., in Ann. Cons. Jard.

Bot. Genève 4: 131, 1900; Haines, Bot. Bihar & Orissa 1(2): 69, 1921; Kanjilal and Das, Fl. Assam 1: 145, 1935; Santapau, Fl. Khandala in Rec. Bot. Surv. Ind. 16(1): 22, 1953 et Fl. Purandhar 26, 1957; et Fl. Saurashtra 48, 1962; Hu, Fl. China, Malvaceae 46, 1955. *H. rosa-sinensis* var. *schizopetalus* Mast., in Gard. Chron. 12: 272, 1879.

Common name: Eng.: *Coral Hibiscus*. Beng.: *Lanthan Jaba*.

Shrub. Stem glabrous. Leaves narrowly ovate or sub-rhomboidally elliptic, both sides glabrous, shining, 5-9 cm long, 1.5-4 cm wide, 3-5 palmately nerved, basal half entire, upper half serrate; stipules minute, subulate, caducous. Flowers axillary, drooping and fuschia-like, scarlet-red or red with white or creamy lines; peduncles slender, long, jointed; segments of epicalyx 6-7, minute, subulate; calyx spathaceous and 2-3 lobed, 1.8 cm long, oblanceolate; petals scarlet, deeply lacinate and reflexed, 5-7.5 cm long; staminal column very long upto 15 cm, in length, filiform, pendulous, red; ovary pear-shaped, minutely hairy; styles divided at the top into 5 long arms; stigma capitate, 5 spreading. The plant does not seem to fruit in India. It is reported that the fruit is oblong-cylindrical capsule and seeds are smooth.

Flowers: April-September.

Distribution: Commonly cultivated in gardens throughout India. A native of Africa.

Specimens examined: CENTRAL INDIA: Indore, *Mukherji* 3. BENGAL: Chandernagore, *Hosein*; Tipperah Hills, Agartala, *Debbarman* 47, TRAVANCORE: *Calder & Ramaswami* 1280. BURMA: Sagaing, *Huk*.

H. vitifolius Linn., Sp. Pl. 696, 1753; Cav., Diss. 3: 145, 1787; DC., Prodr. 1: 450, 1824; Roxb., Fl. Ind. 3: 200, 1832; Wt. & Arn., Prodr. 1: 50, 1834; Miquel, Fl. Ind. Bat. 1(2): 160, 1859; Dalz. & Gibs., Bombay Fl. 20, 1861; Thwaites, Enum. 26, 1864; Masters, in Oliver, Fl. Trop. Africa 1: 197, 1868; Masters, in Hook. f., Fl. Brit. Ind. 1: 338, 1874; Trimen, Fl. Ceylon 1: 154, 1893; Watt., Dict. Econ. Prod. 4: 248, 1893; Woodr., in Journ. Bombay Nat. Hist. Soc. 11: 127, 1897; Prain, Bengal Pl. 1: 267, 1903; Duthie, Fl. Upp. Gang. Plain 1: 90, 1903; Rama Rao, Fl. Travancore 41, 1914; Bamber, Punjab Pl. 244, 1916; Haines, Bot. Bihar & Orissa 1(2): 68, 1921; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 115, 1958 (repr. ed.). *H. obtusifolius* Willd., Sp. Pl. 3:

829, 1801. *H. truncatus* Roxb., Hort. Beng. 51, 1814; et Fl. Ind. 3: 200, 1832. *H. cuspidatus* Edgew., in Jour. As. Soc. Bengal 21: 168, 1853. *H. vitifolius* L. var. *genunius* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 169, 1900.

Common name: Ban kapas.

Annual, weak suffrutescent, 0.9-2.1 m high, grey tomentose or villous, sometimes sparingly with stellate hairs, green and violet. Leaves 2.5-10 cm diam., ovate-cordate, palmately 5-nerved, 3-7 lobed; lobes acute or acuminate, crenate-serrate or toothed, tomentose beneath or on both surfaces, smooth; petiole 3-15 cm long, hairy adaxial side deep coppery red, abaxial side green; stipules very small, setaceous. Flowers axillary, solitary or clustered at the end of branches, drooping, 5-6.5 cm diam., yellow with purple centre; peduncles shorter than the petiole, 2-6 cm long, jointed at the middle or below middle, green or lower portion violet; segments of epicalyx 7-12, free, 1-1.3 cm long, linear, hairy, shorter than calyx, persistent; calyx campanulate, 1.9 cm long, 5-lobed, divided to below middle, lobes 1.3 cm long, ovate, acute, 3-5 nerved, soft dense hairs with a few bristles, valvate, persistent; corolla 5-6.5 cm across, twisted; staminal tube 1.5-2.0 cm long, truncate, light violet-red, with ribs, antheriferous all through; anthers reniform; ovary orbicular, 5-angled, densely hairy, 5-locular; ovules many in each chamber and arranged in two vertical rows in axile placentation; style 5-fid, connate below; stigma 5, spreading, hairy, deep crimson red. Capsule suborbicular apiculate, shorter than calyx, 1.5 cm diam., 5-winged, the wings reticulately veined, opens along the wings into 5 valves. Seeds reniform, muddy brown or black, minutely tubercled.

The depth of leaf-incision, the shape of the lobes of the leaves and also the density and the rigidity of hairs have been found to be highly variable even within a single plant. The subdivisions of the species into the formae, *indica* Hochr., *zeylanica* Hochr. etc. on the basis of the above noted characters are therefore, not satisfactory.

Flowers and fruits: April-December.

Distribution: Throughout India, especially in the hotter parts ascending up to 1100 m. Also in Burma, Ceylon and Australia.

Specimens examined: U.P.: Moradabad, Thomson 339; Dehra Dun, Mackinnon. SAURASHTRA: Junagad, Girna Hill, Mehta 1766. M.P.: Gwalior, Mariés 46. BENGAL: Berhampore, Vicary: Kurz;

Sibpore, Kurz; Dacca, Simolia, Kurz, 7865; Ranecunge, Kurz; Jessore, Clarke 4196, Kurz; *H. B. C.* ASSAM: Jenkins. MADRAS: Rampa, Peddukonda hills, Narayanaswami 164; Cuddapah, Gamble 15135, 16560; Nilgiris, Schmidt, Naidoo; Coimbatore, Narayanaswami 19175, Fischer 445; Mettappollium, Meebold 12027; Madura, Meebold 13764; Shevaroi hills, Perrottet 278, 279, 418; Godavari, Bison hill, Barber 5173; Timmapuram, Ramaswami 1713; Ongole, Allum, Barber 7913; Kurnul, Digungametta, Barber 8004; Jabadi Hill, Komattigeri, Fischer 3996, Ramaswami 330, Wight 190. BOMBAY: North Canara, Arbail Ghaut, Talbot 894, Dalzell. Travancore: Ramaswami 690, Calder & Ramaswami 122. Without precise locality, Wallich 1899. BURMA: Minles, Mokim 46; Pegu, Kurz 2091; without precise locality, Huk, McLelland, Henderson.

Hibiscus mutabilis Linn., Sp. Pl. 694, 1753; Cav., Diss. 3: t. 62, f. 1. 1787; DC., Prodr. 1: 452, 1824; Roxb., Fl. Ind. 3: 201, 1832; Wt. & Arn., Prodr. 1: 51, 1834; Miquel, Fl. Ind. Bat. 1(2): 158, 1859; Griseb., Fl. West. Ind. 1: 85, 1864; Masters, in Hook. f., Fl. Brit. Ind. 1: 344, 1874; Watt, Dict. Econ. Prod. 4: 242, 1893; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 147, 1900; Prain, Beng. Pl. 1: 268, 1903; Haines, Bot. Bihar & Orissa 2: 69, 1921; Kanjilal & Das, Fl. Assam 1(1): 144, 1935; Hu, Fl. China, Malvaceae 49, 1955; Cooke, Fl. Pres. Bombay 1: 120, 1958 (repr. ed.); Wealth Ind. 5: 91, 1959. *Ketmia sinensis* Burm., Thes. Zeyl. 132, 1737. *H. sinensis* Miller, Dict. 8(2): 1768. *Ketmia mutabilis* Moench, Method 617, 1794.

Common name: Beng.: *Sihalapadma*. Hindi: *Sihal kamal*. Eng.: *The changeable rose*, *Changeable hibiscus*, *Cotton rose*, *Confederate rose*. Kan.: *Suryakanti*. Mal.: *Chinapperatti*. Oriya: *Sthalopadmo*. Punj.: *Gul-i-ajab*. Tam.: *Sembarattai*.

A large bushy shrub or a small deciduous tree, about 2.4 m high, unarmed branches stellate-tomentose and with golden glandular hairs. Leaves cordate, sub-orbicular, 10-22.5 cm diam., 5-7 angled or lobed, irregularly crenate or dentate, often entire at the base, downy, sub-tomentose beneath; petioles 7.5-22.5 cm long, terete, tomentose stipules linear-lanceolate. Flowers axillary and sub-corymbose at the ends of the shoots, white or pink in the morning and turns deep red at night; pedicel 7.5-12.5 cm, nearly as long as the leaf, jointed near the flower;

segments of epicalyx 7-10, free, linear-lanceolate, 2.0-2.5 cm long, shorter than the calyx; calyx 3-4 cm long, 5-lobed, connate below the middle, lobes ovate-lanceolate, acuminate, velvety-glandular-hairy, 5-nerved, yellowish green; petals 5 or several times that number, orbicular-obovate, shortly clawed, hairy below, nearly twice as long as calyx; where the corolla is double the extra petals arise from the staminal tube; staminal tube shorter than corolla, toothed, white or yellowish white, antheriferous all through; ovary roundish truncate, densely covered with white silky hairs, 5-locular; ovules many in each chamber arranged in axile placentation; style 5 cleft above middle; stigma 5, greenish yellow. Capsule sub-globose, 2.0 cm diam., hirsute, endocarp with dense white hairs. Seeds reniform, brown, densely bearded on the sides away from the raphe.

Flowers and fruits: September-November.

Annual pruning induces profuse flowering.

Distribution: Cultivated in gardens throughout India up to 600 m. A native of China.

Specimens examined: BIHAR: Chhota Nagpur, Hazaribagh, *Clarke* 20726. BENGAL: *H. B. C.*, *Kurz*, *J. D. H.*, Calcutta, Gopalnagar, *Roy*; Tipperah Hills, Agartala, *Debbarman* 846. MADRAS: *Wight* 191, *Naidoo*. BURMA: Fort Stedman, *Khalil*; Nantyen, *Anderson*. ANDAMANS: South Andaman, *Parkinson* 692. Without precise locality, *Wallich* 1907.

Uses: The bark of the plant yields a strong fibre of inferior quality. Leaves and flowers have medicinal properties.

Hibiscus indicus (Burm. f.) Hochr., Mem. Soc. Hist. Nat. Afr. Nord. 2: 163, 1949; Bates, *Baileya* 13: 104, f. 29B, 1965. *H. venustus* Blume, *Bijdr.* 71, 1825-26; Hook. f., in *Curtis*, Bot. Mag. III. 47. t. 7183, 1891; Hochr., in *Ann. Cons. Jard. Bot. Genève* 4: 93, 1900; Hu, *Fl. China*, Malvaceae 48, 1955. *Abelmoschus venustus* (BL.) Walp., *Rep. Bot. Syst.* 1: 309, 1842.

Common name: Taw-wa.

Shrub; stem and the young parts densely covered throughout with short close stellate hairs. Leaves 12.5-15.0 cm diam., cordate-orbicular, 5-7 angled, slightly lobed (according to Hu, lower ones 7-lobed, upper 3- or 5-lobed) acute, dentate, 7-9 palmi-nerved, tomentose on both surfaces, more beneath; petioles 5-10 cm long, shorter than lamina, tomentose; stipules linear. Flowers axillary, solitary or in a terminal lax panicle, 7.5-10 cm diam., yellow (Hu, in

Fl. China reported white or red flowers); peduncles 6-15 cm long, jointed at the middle or slightly above; segments of epicalyx 5-7, linear lanceolate, 1-1.5 cm long, hairy; calyx 1-2 cm, 5-lobed, divided up to middle, equal to or longer than epicalyx, lobes deltoid, acuminate, densely hairy, single nerved; staminal tube shorter than petals. Capsule orbicular, obtuse, densely tawny-hispid, shorter than calyx. Seeds minutely hispid, hairs red-brown.

According to Hu this species differs from *H. mutabilis* only in the width of involucral bracts. Difference on this character only does not justify the formation of a new species. The present authors, however, noted differences in the character of calyx, colour of flower, seed character, etc.

Flowers and fruits: March.

Distribution: Reported from Burma upto 600 m. Also in Java and China and cultivated as garden plant in many places.

Specimens examined: BURMA: Martaban, *Brandis* 810; Tavoy, *Brandis* 8043, *Ba pe* 895, *Amherst*, *Lace* 5688.

H. trionum Linn., *Sp. Pl.* 697, 1753; Cav., *Diss.* 3: 171, 1787; DC., *Prodr.* 1: 453, 1824; Boiss., *Fl. Orient* 1: 840, 1867; Masters, in *Hook. f.*, *Fl. Brit. Ind.* 1: 334, 1874; K. Schumann, in *Engler & Prantl*, *Pflanzenfam.* 3: 49, 1895; Woodr., in *Jour. Bombay Nat. Hist. Soc.* 11: 127, 1897; Hochr., in *Ann. Cons. Jard. Bot. Genève* 4: 144, 1900; Prain, *Beng. Pl.* 1: 266, 1903; Duthie, *Fl. Upp. Gang. Plain* 1: 88, 1903; Bamber, *Punjab Pl.* 243, 1916; Collett, *Fl. Simlensis* 60, 1921; Kanjilal & Das, *Fl. Assam* 1(1): 143, 1935; Hu, *Fl. China*, Malvaceae 57, 1955; Gamble, *Fl. Madras* 1: 70, 1957 (repr. ed.); Cooke, *Fl. Pres. Bombay* 1: 111, 1958 (repr. ed.); *Wealth Ind.* 5: 98, 1959. *H. vesicarius* Cav., *Diss.* 3: 171, 1787; Wt. & Arn., *Prodr.* 1: 48, 1834; Dalz. & Gibs., *Bombay Fl.* 19, 1861. *H. trionum* L. var. *hispidus* DC., *Prodr.* 1: 453, 1824. *H. trionum* L. var. *vesicarius* Hochr., in *Ann. Cons. Jard. Bot. Genève* 4: 144, 1900.

Common name: Black-eyed Susan, Trailing Hollyhock.

Annual herb, 0.3-0.4 m high, pubescent with simple and stellate hairs. Leaves orbicular-ovate, lower undivided, upper palmately 3-5 lobed; 2.5-7.5 cm long; lobes obovate or oblong, pinnatisect, punctate, hairy on both surfaces, usually more beneath, sometimes upper surface glabrous; petioles

2.5-4 cm long; stipules subulate, clothed with long stiff hairs. Flowers solitary, axillary, yellow with dark purple centre; peduncles longer than petioles and jointed above middle; segments of epicalyx 8-12, linear, half as long as calyx or slightly more, with long hairs; calyx campanulate, inflated, 5 lobed about half-way down; lobes broadly ovate, acute, membranous, with many hispid nerves which are green at first, afterwards turning purple; petals 5, united below and with the staminal tube; styles 5, united half-way up. Capsule oblong, obtuse, hairy, opens longitudinally from above into 5 valves. Seeds many, more or less reniform, mature ones glandular papillose, rugose.

Flowers and fruits: July-January.

Distribution: Throughout India, upto 2000 m alt. Also in Burma, Baluchistan, Afghanistan and China.

Specimens examined: BURMA: South Shan States, Keng Taung, *Khalil*. TEHRI GARHWAL: Bansu, *Gamble* 27262. Kashmir: *Falconer* 279; Syedpore, *Clarke* 24136; Mt. Salinis, *Kabis* 14499. MADRAS: Chittor, Madanapalli, Batlapuram, *Fischer* 4742; Anantapur, Bukkapatam, *Gamble* 20952; Nilgiris, Masnigudi, *Gamble* 17977. CENTRAL INDIA: *King* 99; *Vicary*. BALUCHISTAN: Shawlkote, *Duke* 70; *Aitchison* 474, 799, 840. Without precise locality, *Wight* 189, *Beddome* 87.

Uses: The plant is used in South Africa for treatment of round worm. In China and Malaya the dried leaves are considered stomachic. An infusion of the flowers is used for itch and painful skin diseases; it is also considered diuretic. It is reported to be poisonous to stock, particularly horses.

Hibiscus lobatus (J. A. Murray) O. Kuntze, Rev. Gen. Pl. 3(2): 19, 1898; Hochr., in Fl. Madag. fam. 129: 42, 1955. *H. solandra* L'Herit., Stirp. 1: 103, t. 49, 1784; Roxb., Fl. Ind. 3: 197, 1832; Masters, in Oliver, Fl. Trop. Africa 1: 206, 1868; et in Hook. f., Fl. Brit. Ind. 1: 336, 1874; Trimen, Fl. Ceylon 1: 155, 1893; Woodr., in Jour. Bombay Nat. Hist. Soc. 11: 127, 1897; Prain, Beng. Pl. 1: 267, 1903; Duthie, Fl. Upp. Gang. Plain 1: 89, 1903; Rama Rao, Fl. Travancore 41, 1914; Haines, For. Fl. Central Province 14, 1916, et Bot. Bihar & Orissa 2: 66, 1921; Bamber, Punjab Pl. 245, 1916; Collett, Fl. Simlensis 60, 1921; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 114, 1958 (repr. ed.).

Solandra lobata Murr., Comm. Soc. Reg. Sc. Goetting. 6: 21, t. 11, 1784; Cav., Diss. 1(1): 55, 1787. *Lagunea lobata* Willd., Sp. Pl. 3: 733, 1801; DC., Prodr. 1: 474, 1824; Wt. & Arn., Prodr. 1: 55, 1834; Dalz. & Gibs., Bombay Fl. 21, 1861; Thwaites, Enum. 27, 1864. *H. pumilus* Roxb., Fl. Ind. 3: 203, 1832. *H. solandra* L'Herit. var. *genuinus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 128, 1900.

Common name: Telegu: *Atakarana*.

An erect annual herb, 30-90 cm high. Stem slightly branched, pubescent or somewhat hispid. Leaves polymorphous, lower long petioled, orbicular-ovate, upper deeply 3-lobed, uppermost 3 fid, all cordate and acute or obtuse, crenate or coarsely serrate, simple and stellate hairs on both surfaces; petiole 1.5-3.8 cm long, slender, pubescent; stipules setaceous. Flowers arranged in a terminal lax raceme, yellow, white or pink, 1.3-1.9 cm diam.; pedicels 2.5-3.8 cm long, jointed above middle near the top; segments of epicalyx usually absent or minute, linear; calyx 5 lobed divided to about the middle, pubescent, lobes lanceolate, prominently 3 nerved, as long as or smaller than the capsule; petals white or yellow, obliquely obcordate; staminal tube 5 toothed. Capsule 1.0 cm long, ovoid, somewhat wrinkled, beaked, beak short, hairy. Seeds obovate-tetrahedral, 3-4 in each chamber, blackish, smooth or tubercled.

Flowers and fruits: July-January.

Distribution: Along the Himalayan range from Punjab eastwards and throughout Central and Southern India up to 1500 m. Also in Burma, Ceylon and Laccadive Islands. Present in Tropical Africa, Madagascar and Java.

Specimens examined: PUNJAB: Simla, Hayakhud, Johnson. U.P.: Dehra Dun, Mackinnon, King; Mussourie, King; Garhwal, *Falconer* 283, T. T.; Kumaon, Jeolikote, *Gill* 223. BIHAR: Kurz; Jamal-pore, Monghyr Hills, *Kurz*, *Wallich* 1876. SIKKIM: *Dikeeling*, 9670; Teesta, *Clarke* 10076, 36896A, *Selim*. BHUTAN: *King*. CENTRAL INDIA: 658. M.P.: Moharli Reserve, *Duthie* 9301, *King* 186. BOMBAY: North Canara, *Talbot* 136; Dwarka; *Dhruna* D26, 22; Ahmedabad, *Saxton* 1766; Dharwar. MADRAS: Rampa, Kodiguddla konda, *Narayanswami* 235, *Wight* 207, *King*; Chettoor, *Naidoo*; Tinneveli, *Fischer* 3900. *Ramaswami* 612; Godavari Delta. Coringa Reserve, *Foulkes* 102; Nilgiris, *Schmid*; Nelahota, *Gamble* 15444; Coimbatore, Gullur, *Fischer* 776. TRAVANCORE: Acchankoril Gap, *Bour-*

dillon 690, CEYLON: Thomson. LACCADIVE ISLE: Minikoy. BURMA: Rubz Mines, Tangaung, *Lace* 4408; Minhen, Mahoo Chin Hills, *Mokim* 681; Shan State, *Huk*.

Hibiscus hirtus Linn. Sp. Pl. 694, 1753; Wt. & Arn., Prodr., 1: 51, 1834; Wight, Icon. t. 41, 1840; Dalz. & Gibs., Bombay Fl. 20, 1861; Masters, in Hook. f., Fl. Brit. Ind. 1: 335, 1874; Woodr., in Jour. Bombay Nat. Hist. Soc. 11: 127, 1897; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 86, 1900; Prain, Beng. Pl. 1: 266, 1903; Duthie, Fl. Upp. Gang. Plain 1: 89, 1903; Rama Rao, Fl. Travancore 41, 1914; Bamber, Punjab Pl. 89, 1916; Haines, Bot. Bihar and Orissa 2: 67, 1921; Santapau, Rec. Bot. Surv. Ind. 16(1): 21, 1953; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 113, 1958 (repr. ed.). *H. phoeniceus* Willd., (excl. syn. Linn.); Cav., Diss. 3: t. 67, 1787; Roxb., Fl. Ind. 3: 194, 1832. Common name: Beng.: *Lal-surgumuni*; Bomb.: *Dupari*; Khandala: *Nareri*.

Shrubby, hairy. Leaves 2.5-7.0 cm by 1.0-6.5 cm, ovate, acuminate, crenate-serrate or irregularly toothed, lower often cordate and slightly 3-lobed, more or less stellately hairy on both surfaces, often with a gland on the midrib beneath; petioles 0.5-0.7 cm long, hairy; stipules 1.3 cm long, subulate. Flowers 1.3-2.5 cm diam., white or pink, with spreading corolla, axillary; peduncles as long as or longer than the leaves, jointed above middle, covered with spreading hairs; segments of epicalyx 6-9, subulate, shorter than the calyx; calyx 5-cleft nearly to the base, not distended, lobes 1.3 cm long, linear-lanceolate, hairy, persistent; staminal tube toothed; anthers whorled. Capsule 5-valved, globose, shorter than the calyx. Seeds cottony.

KEY TO THE VARIETIES

Leaves ovate unlobed or lower shallowly 3-lobed; peduncles jointed above middle ... a. var. *hirtus*

Leaves ovate oblong-lanceolate prominently 3 lobed, upper leaves narrow lanceolate; peduncles jointed at or below middle. ... b. var. *talbotii*

var. ***hirtus***—*H. hirtus* Linn., Sp. Pl. 694, 1753.

Distribution: Throughout India.

Specimens examined: U.P.: Hort. Moradabad. T. T. 3351. BIHAR: *Hope*. BENGAL: *H. B. C.* MADRAS: North Division, *Naidoo* 1852; *Cleghora*. BOMBAY: Concan, *Ramaswami*. Without precise

locality, *Jerdon*, *Hume*, *Finlaydon*, *Wallich*.

Uses: This plant yields a strong fibre. Santapau (1953) says "A very fibrous plant, but on account of its relative scarcity no use is made of the fibres by the local people".

var. ***talbotii*** Rakshit, in Sci. & Cult. 27: 193, 1961.

Tall shrub, hairy. Leaves 7-12 cm by 2.5-6 cm, ovate, oblong-lanceolate, 3-lobed, central lobe oblong lanceolate much bigger than the two lateral lobes which are short ovate and near to the base, upper leaves narrow lanceolate, smaller, all serrate or dentate, acuminate, 5-7 palmately nerved, hairy on both the surfaces; petioles 1-5 cm long, hairy; stipules 1.2 cm long, linear-subulate, hairy. Flowers 1-2.5 cm diam., axillary, or in terminal panicles due to shortening of the leaves; peduncles longer than the petioles, jointed at the middle or below, hairy; segments of epicalyx 6-9, linear, equal to or smaller than the calyx; calyx 5-lobed, divided near the base; lobes 1.3 cm long, lanceolate, acuminate, densely hairy; petals spreading, hairy outside; staminal tube toothed, anthers whorled. Capsule 5-valved, globose, hairy, shorter than calyx.

Differs from the type species in the following characters. Leaves 3-lobed, central lobe oblong-lanceolate, acuminate, much bigger than the two lateral lobes; upper leaves narrow-lanceolate, acuminate, gradually become smaller; peduncles jointed at the middle or below.

Distribution: Western India.

Specimens examined: BOMBAY: North Canara, *Talbot* 68 (Type in Herb. Cal.), 3529; *Matheran*: Poona College of Science Herb.; Concan, *Stocks*. Without precise locality, *Gibson*, *Dalzell*.

H. syriacus Linn., Sp. Pl. 695, 1753; Cav., Diss. 3: 169, 1787; DC., Prodr. 1: 448, 1824; Roxb., Fl. Ind. 3: 195, 1832; Miquel, Fl. Ind. Bat. 1(2): 157, 1859; Boiss., Fl. Orient 1: 839, 1867; Masters, in Hook. f., Fl. Brit. Ind. 1: 344, 1874; Forbes et Hemsley, in Jour. Linn. Soc. Bot. 23: 88, 1886; K. Schumann, in Engler & Prantl, Pflanzenfam. 3(6): 49, 1895; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 76, 1900; Dalz. & Gibs., Suppl. 7; Prain, Beng. Pl. 1: 268, 1903; Bamber, Punjab Pl. 89, 1916; Haines, Bot. Bihar & Orissa 2: 69, 1921; Kanjilal & Das, Fl. Assam 1(1): 145, 1935; Hu, Fl. China, Malvaceae 50, 1955; Cooke, Fl. Pres. Bombay 1: 121, 1958 (repr. ed.); Wealth Ind. 5: 96, 1959. *Ketmia-syriaca* Scopoli, Fl.

Cerniol 2: 45, 1772. *K. syrorum* Medic., Malvaceae 45; 1787. *K. arborea* Moench., Method Suppl. 617, 1794. *H. floridus* Salisb., Prodr. 383, 1796.

Common name: Beng.: *Swet-jaba*. Eng.: *Rose of Sharon*, *Shrubby Althaea*.

A bushy shrub, 3-6 m high, young parts sparsely pubescent, unarmed. Leaves 5-7.5 cm long, cuneate at the base, lower ovate or rhomboid-ovate, often 3-lobed, repand, toothed, slightly pubescent when young; petioles 1.3-1.7 cm long, puberulous; stipules filiform. Flowers axillary, 5-7.5 cm diam. when open, usually lilac with a purple eye; peduncles as long as or shorter than petioles; segments of epicalyx 6-8 linear, single nerved, shorter than the calyx; calyx scurfy-tomentose, 5-lobed to above middle, lobes oblong or ovate-lanceolate, acute; petals obovate, ciliate with white hairs; staminal tube not exerted, 4 cm long, white or very pale purple; ovary pubescent; style filiform, stigma white. Capsule oblong-ovoid, 2.5 cm long, obtuse or abruptly short-beaked, slightly hispid. Seeds pilose.

There are many single and double horticultural varieties, classified mainly on the colour of the flowers. Flower colours range from purple-pink to pink-white and pure white. Hu, in Fl. China, reported 9 varieties mainly on the basis of size and colour of flowers.

Distribution: Cultivated in gardens throughout India. Indigenous to China.

Specimens examined: SIND: Naserabad gardens, Watt 20654. U.P.: Lucknow. BENGAL: *H. B. C.*; CHITTAGONG HILL TRACTS: *Khan* 538. BURMA: Sonda, *Anderson*; Momien, *Anderson*.

Uses: The stem yields a strong fibre. Tender leaves are reported to be used as a substitute for tea in China. It has also medicinal value.

Hibiscus micranthus Linn. f., Suppl. 308, 1781; Cav., Diss. 3: 1787; DC., Prodr. 1: 453, 1824; Wt. & Arn., Prodr. 1: 51, 1834; Dalz. & Gibs., Bombay Fl. 20, 1861; Thwaites, Enum. 26, 1864; Masters, in Oliver, Fl. Trop. Africa 1: 205, 1868; et in Hook. f., Fl. Brit. Ind. 1: 335, 1874; Trimen, Fl. Ceylon 1: 163, 1893; Duthie, Fl. Upp. Gang. Plain 1: 89, 1903; Prain, Beng. Pl. 1: 266, 1903; Rama Rao, Fl. Travancore 41, 1914; Haines, Bot. Bihar and Orissa 2: 67, 1921; Santapau, in Rec. Bot. Surv. Ind. 16(1): 22, 1953; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 113, 1958 (repr. ed.). *H. ovalifolius* Vahl Symb.

1: 50, 1790; Boiss., Fl. Orient. 1: 339, 1867. *H. micranthus* Linn. f. var. *genuinus* Hochr. in Ann. Cons. Jard. Bot. Genève 4: 83, 1900.

Common name: *Bari Barari* (in North West India).

Small shrub, erect, 0.9-1.8 m high, with slender terete branches and scabrid with scattered stellate bristles. Leaves 1.9-5 cm, ovate or oblong, acute or obtuse, serrate, without glands, more or less scabrid with stiff stellate hairs; petioles 1.3-2.5 cm long, often very short towards top of the plant; stipules 0.3-1.3 cm long, filiform, hairy. Flowers axillary, white or pink, 0.8-1.3 cm diam., peduncles longer than the petioles, reaching 3.1 cm, slender, jointed above or below middle; segments of epicalyx 6-8, filiform, hairy, shorter than the calyx; calyx 0.5 cm long, 5-lobed, divided upto middle; lobes lanceolate, hairy; corolla white or pink, often reflexed, stellately hairy outside; stamens in tuft on the staminal tube. Capsule globose. Seeds reniform, black, cottony.

Flowers and fruits: Throughout the year.

Distribution: From North India to Bihar and throughout South India. Recently reported from Bengal (*Ghose*, 1966). Also in West Pakistan, Burma and Ceylon.

Specimens examined: PUNJAB: Simla, *Stewart* 349; Banda, *Bell* 1940. CENTRAL INDIA: Khandwa, *Burhanpur*, *Duthie* 8190, *King* 231, 1126. ORISSA: Ganjam, Chilka Island, *Prain*; Gopalpur, *Prain*; Balugao, *Hooper* 39519. GWALIOR: *Maries* 14. BOMBAY: Dharwar, *Talbot* 1720; Talegaon, *Woodrow*. MADRAS: Rampa Hills, *Narayanswami* 219; Guntur, Kondvedu fort, *Dunn* 4633, *Kurz*, *Wight* 197; Kurnool, Mandalakatea, *Gamble* 18668; Gud-dapah. Madumaduga, *Gamble* 11122; *Malderen* 1485, *Rev. Aug. Sanlin* 176, *Ramaswami*; Godavari, Samalkot, *Ramaswami* 1705; Nellore, Sangam. *Ramaswami* 1128; Tinnevely, Tirukavungudi, *Ramaswami* 38311; Waltair, *Proudlock*; Carnatic, G. T.; *Hook*; Vellore, Coimbatore. Nerinjipet, *Fischer* 543, 1888; Nilgiri Hills, *King*. BURMA: Chan Cha, *Huk* 40; Minbu, *Mokim*, 706, 452.

Uses: In Ceylon it is valued as a febrifuge.

H. scindicus Stocks in Hook., Icon. Pl. t. 802, 1852; Boiss., Fl. Orient. 1: 839, 1867; Masters, in Hook. f., Fl. Brit. Ind. 1: 336, 1874; Hochr., in Ann. Cons. Jard. Bot. Genève 4: 82, 1900; Burkill, Fl. Pl. Baluch. 14, 1909; Cooke, Fl. Pres. Bombay 1: 113, 1958 (repr. ed.).

A much branched subspinosus shrub, height 30 cm or less, branches terete light coloured stellately tomentose. Leaves 1.3-2.5 cm long, obovate, cuneate, retuse or truncate, toothed at the top, with stellate hairs and with glands, subsessile; stipules 0.3-0.4 cm long, subulate. Flowers axillary, solitary, pale yellow; peduncles shorter than the leaves; segments of epicalyx 6-8, linear-subulate, connate at the base, much shorter than calyx; calyx 5-lobed, lobes linear-lanceolate, connate at the base; petals very pale yellow, longer than the calyx, convolute and twisted below into a tube; anthers in a globose head; ovary cells 2-ovuled. Capsule globose, smooth. Seeds with long white woolly hairs.

Distribution: Reported only from Sind.

Specimens examined: SIND: Stocks. Without precise locality, -Dalzell.

Hibiscus intermedius Rich., Fl. Abyss. 1: 58, 1847; Masters in Oliver, Fl. Trop. Africa 1: 198, 1868; et in Hook. f., Fl. Brit. Ind. 1: 336, 1874; Cooke, Fl. Pres. Bombay 1: 114, 1958 (repr. ed.). *H. intermedius* Rich. var. *genuinus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 94, 1900.

var. **aristaevalvis** Hochr., in Ann. Cons. Jard. Bot. Genève 4: 94, 1900.

A weak-stemmed annual; stem slender hispid with reflexed simple or stellate white hairs. Leaves 2.5-5 cm long, polymorphous, glandless, pellucidopunctate, cordate or truncate at the base, deeply palmately 3-7 lobed, divided up to the base; lobes narrow lanceolate or linear, upper sub-glabrous, slightly stellately hairy beneath; petioles 2.5-6.3 cm long. Flowers solitary, axillary, yellow with purple centre, 2.5 cm diam. when open; peduncles shorter than the petioles, jointed near the base; segments of epicalyx strap-shaped, hairy, shorter than or equalling the calyx; calyx lobes lanceolate, 3-nerved, connate at the base hispid on the nerves beneath; petals twice the length of the calyx. Capsules beaked, hispid, valves slightly winged at the edges. Seeds many, black, clothed with adpressed unicellular shining hairs.

Distribution: Reported only from Sind and Gujarat.

Specimens examined: SIND: Karachi, Rayan 3. GUJARAT: Dalzell 1157. Without precise locality. Dalzell, Stocks.

H. calyphyllus Cav., Diss. 5: 283, t. 140, 1787.

H. canescens Heyne, in Wall. Cat. 2698, 1828-49

nomen nud.; Wt. & Arn., Prodr. 1: 49, 1834; Masters, in Hook. f., Fl. Brit. Ind. 1: 337, 1874; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.).

Shrubby, stem smooth. Leaves 7.5-15 cm by 7.5-10 cm, cordate-ovate, acute or acuminate, irregularly toothed, palmately 7-nerved, sometimes shortly acutely lobed, tomentose on both surfaces, usually more beneath; petioles usually shorter than lamina; stipules linear, setaceous 1.3-2.5 cm long. Flowers axillary, large, showy yellow or primrose with purple centre; peduncles shorter than petiole, unjointed, angular; segments of epicalyx usually 5, linear-subulate, about 2.5 cm long, longer than the calyx, striated, at the base slightly adnate to the calyx; calyx lobes ovate, acute or obtuse, 3-nerved, connate near the middle; petals downy outside. Capsule 4 cm long, twice the length of the calyx, oblong pointed, villous. Seeds densely velvety.

Flowers and fruits: January-February.

Distribution: Mysore and Tinnevely districts of South India. Also in Ceylon.

Specimens examined: TINNEVELLY: Papanasam to Mundandurai, Ramaswami 39290. CEYLON: Galoter 1628. Without precise locality, Wallich 2693.

H. panduraeformis Burm., Fl. Ind. 151, t. 47, f. 2, 1768; DC., Prodr. 1: 455, 1824; Wt. & Arn., Prodr. 1: 50, 1834; Miquel, Fl. Ind. Bat. 1(2): 157, 1859; Dalz. & Gibs., Bombay Fl. 20, 1861; Thwaites, Enum. 26, 1864; Masters, in Oliver, Fl. Trop. Africa 1: 203, 1868 (*H. panduriformis*); et in Hook. f., Fl. Brit. Ind. 1: 338, 1874; Trimen, Fl. Ceylon 1: 115, 1893; Prain, Bengal Pl. 1: 267, 1903; Duthie, Fl. U. Gang. Plain 1: 90, 1903; Rama Rao, Fl. Travancore 41, 1914; Haines, For. Fl. Cent. Province 14, 1916 et Bot. Bihar and Orissa 2: 68, 1921; Gamble, Fl. Madras 1: 70, 1957 (repr. ed.); Cooke, Fl. Pres. Bombay 1: 115, 1958 (repr. ed.); *H. tubulosus* Cav., Diss. 3: 161, 1787; Roxb., Hort. Beng. 51, 1814; et Fl. Ind. 3: 196, 1832; DC., Prodr. 1: 447, 1824; Miquel, Fl. Ind. Bat. 1(2): 157, 1859. *H. velutinus* DC., Prodr. 1: 452, 1824. *H. panduraeformis* Burm. var. *tubulosus* Hochr. in Ann. Cons. Jard. Bot. Genève 4: 95, 1900.

Annual herb, 1.8-4.5 m high; stem and branches are covered with sticky and pungent hairs; hairs are of three types—unicellular pointed, 0.3-0.4 cm long, multicellular glandulated, 0.1 cm long and stellate hairs, soft when young, later becomes stiff.

Leaves 4-15 cm long, lower ovate-cordate and shallowly 3-5 lobed, upper oblong-lanceolate, all coarsely irregularly toothed, acute to acuminate, both surfaces covered with silky hairs, 3-5-nerved; petioles 5-18 cm long, thickened above, green, hairy; stipules linear, 0.5 cm long. Flowers solitary, axillary, 4-6 cm diam when open, yellow with purple centre or all purple; peduncles very short, 0.5-0.7 cm, jointed, hairy; segments of epicalyx 6-10, 1.0 cm long, shorter than calyx, linear-spathulate, densely ciliate, persistent; calyx 1.5-2 cm long, divided up to middle into 5 lobes, lobes lanceolate, 3-nerved, hispid; petals pubescent outside, inner lower portion with white glandulated hairs, obliquely obovate to oblanceolate, twisted in bud; staminal column, 1.0-1.5 cm long, white or light pink, glabrous or lower portion with white glandular hairs, distinctly 5-toothed apex; antheriferous all through, anthers orange coloured; ovary ovoid, 0.7-0.9 cm long, densely covered with white silky hairs, 5-locular; ovules many in each chamber arranged in two vertical rows on axile placentation; style terminal, 5-fid, 1.3-1.8 cm long, usually 0.3-0.4 cm longer than staminal column; stigma capitate, deep red. Capsule ovoid, 1.3 cm long, shorter than the calyx, densely hairy. Seeds about 10 in each chamber, brown, densely hairy.

Flowers and fruits: October-January.

Distribution: Throughout India, usually in the hotter parts and in Burma, Ceylon, Java, Tropical Africa and Australia.

Specimens examined: CENTRAL INDIA: Nagpur, Duthie 10316; Yenkatipur, Duthie 9303; Jabalpur, Prain. BIHAR: Chota Nagpur, Munka Palamau, Wood, Kurz. MADRAS: Kistna, Papayapalem, Gamble 18641, Wight 187. NORTH CANARA: Yellapore, Talbot 911. COIMBATORE: Araipalayam, Fischer 677. BURMA: Annandale 183, Huk, Scott 478, Wight 1901, 1902. Without precise locality, Wallich 1902.

Hibiscus lunariifolius Willd., Sp. Pl. 3: 811, 1800; DC., Prodr. 1: 451, 1824; Wt. & Arn. Prodr. 1: 49, 1834; Wight, Ic. t. 6, 1840; Miquel, Fl. Ind. Bat. 1(2): 159, 1859; Thwaites, Enum. 401, 1864; Masters, in Oliver, Fl. Trop. Africa 1: 202, 1868; Masters, in Hook. f., Fl. Brit. Ind. 1: 338, 1874; Trimen, Fl. Ceylon 1: 153, 1893; Rama Rao, Fl. Travancore 41, 1914; Gamble, Fl. Pres. Bombay 1: 115, 1958 (repr. ed.) *H. pruriens* Roxb., Hort. Beng. 51, 1814, et Fl. Ind. 3: 196, 1832; DC.,

Prodr. 1: 448, 1824; *H. sidoides* Wt. & Arn., Prodr. 1: 494, 1834. *H. lunariifolius* Willd. var. *racemosus* Hochr., in Ann. Cons. Jard. Bot. Genève 4: 160, 1900.

Common name: Malayalam: *Malankuruparethi*.

Herbaceous, 3-4.5 m high, young parts densely clothed with appressed simple and stellate hairs, scabrous, green or deep violet. Leaves 7.5-16 cm diam., orbicular-cordate to ovate-lanceolate, serrated, hairy beneath along the nerve, glabrate when mature, 3-5 palmately nerved, shallowly 3-5 lobed with wide sinus; lobes wedge-shaped, acute or acuminate; petiole as long as or longer than the blade, green, upper violet, pubescent; stipules subulate, 1.5-1.7 cm long, green. Flowers axillary, ultimately growing out into a terminal leafless raceme, yellow, 6-10 cm diam. when open; pedicel unjointed, 0.5-0.8 cm long, stout; segments of epicalyx 5-10, usually 5, alternate with the sepals, narrow-linear, acute, green, 2.7-3.0 cm long, longer than the calyx, connate at the base, persistent; calyx cup-shaped, divided below the middle sinuses round; lobes 3 times the cup, linear-lanceolate, acuminate, single nerved, green-white or violet, valvate in bud, persistent; petals slightly united at the base, broadly obovate, outer hairy, inner glabrous, twisted in bud, convolute; staminal column 3.0-3.5 cm long, distinctly 5-toothed, light yellow with a few white glandular hairs, antheriferous all the way down; anthers orange coloured; ovary ovoid-oblong, beaked, pubescent, 5 locular, 0.5-0.7 cm long; ovules many in each chamber. Capsule ovoid, beaked, at first hairy, afterwards sub-glabrous. Seeds reniform, brown-black, covered with minute scattered stellate scales.

Flowers and fruits: October-January.

Distribution: In the Western Ghats from N. Canara to Travancore, up to an altitude of 1200 m. Also in Ceylon, Burma and Africa.

Specimens examined: NORTH CANARA: Talbot 1585. COIMBATORE: Pachatani, Fischer 3523; Nilgiris, Coonoorshah, Fischer 1566. TRAVANCORE: Kulkuntal, Meebold 13199. BURMA: North Shan State, Goktick Gorge, Lace 4987; Shan Hill, Huk 41; Sagaing, Huk 24; South Shan States, Khalil; Ava, Taongdong, 983; Upper Burma, Khalil.

H. caesius Garcke, in Oester, Bot. Zeit. 7: 850, 1849, et in Peters, Reise Mossamb. 125; Cooke, Fl. Pres. Bombay 1: 116, 1958 (pedr. ed.). *H. pentaphyllus*

F. Muell, *Fragm.* 2: 13, 1860; Masters, in Oliver, *Fl. Trop. Africa* 1: 198, 1868 (non. Roxb.). *H. gibsoni* Stocks ex Harv. & Sond., *Fl. Cap.* 2: 587, 1861-62; Masters, in Hook. f., *Fl. Brit. Ind.* 1: 339, 1874; Duthie, *Fl. Upp. Gang. Plain* 1: 91, 1903. *H. caesus* Garcke var. *genuinus* Hochr., in *Ann. Cons. Jard. Bot. Genève* 4: 160, 1900.

Herbaceous, erect, 1.2-1.5 m high; stem and branches light coloured, terete; branches bristly or with minute bristle-pointed prickles. Leaves 2.5-7.5 cm long, 3-5 partite; lobes oblong-lanceolate, sharply serrate, glabrous or stellately hairy; petioles as long as the blade, with a few small prickles and scattered bristles; stipules 1.3 cm long, subulate, with long hairs. Flowers solitary, axillary, yellow with purple centre or complete purple; peduncles longer than the leaves, upto 10 cm long, jointed near the flower, slender with a few small prickles below, the prickles longer and more numerous above the joint; segments of epicalyx usually 10, free, 2.5-3.8 cm long, linear, straight or very slightly curved, spreading like a ray beneath the flowers, sub-spinous, prickly, equal to or shorter than calyx; calyx 2.5-3.8 cm long, divided to below middle; lobes lanceolate, strongly nerved, distantly ciliate, persistent; corolla twice the length of the calyx; staminal tube half covered with anthers. Capsule ovoid, pointed, shorter than calyx, valves setose. Seeds pilose.

Flowers and fruits: September-October.

Distribution: North-Western, Western and Southern India. Also in Afghanistan, South Tropical Africa and North Australia.

Specimens examined: NORTH-WEST INDIA: Malahand, *Toppin* 2015, *Royle*. PUNJAB: *Falconer* 282, *Chaug tract*, *Aruk Bun* 92. SIND: 429. CENTRAL INDIA: *King* 211. Kutch, *Dhurma* D75. Baroda, *R.E.P.* 15683, Poona.

Hibiscus amblyocarpus Hochst., in Kotschy, *Pl Nubic.* n. 183, 1841; Boiss., *Fl. Orient* 1: 840, 1867; Hochr., in *Ann. Cons. Jard. Bot. Genève* 4: 159, 1900 (*H. amblyocarpus*). *H. obtusilobus* Garcke, in *Bot. Zeit.* 837, 1859; Masters in Oliver, *Fl. Trop. Africa* 1: 197, 1868. *H. punctatus* Dalz. in Dalz. & Gibbs., *Bombay Fl.* 20, 1861; Masters, in Hook. f., *Fl. Brit. Ind.* 1: 340, 1874; Woodr., in *Jour. Bombay Nat. Hist. Soc.* 11: 127, 1897; Hochr., in *Ann. Cons. Jard. Bot. Genève* 4: 70, 1900, Cooke, *Fl. Pres. Bombay* 1: 116, 1958 (repr. ed.). *H. laqueoides* Edgew., in *Jour. Linn. Soc.* 6: 199, 1862.

Annual suffrutescent, 0.9-1.2 m high, laxly branched, stellately pubescent and glutinous. Leaves 2.5-10 cm long, pellucido-punctate, rounded-ovate, acute, unlobed or unequally 3-lobed, middle lobe very long, lobes oblong, sinuate-dentate, with scattered stellate hairs on both surfaces; petioles 2.5-7.5 cm, shorter than the blade; stipules small, linear-lanceolate. Flowers solitary, or sub-panicled, pale rose-coloured; peduncles 1.3-6.3 cm long, shorter than petiole, jointed near the flower; segments of epicalyx 8-10, linear, acute, 0.5 cm long, shorter than calyx, connate at the base; calyx campanulate, divided to below middle into 5-lobes, 1.0 cm long, lobes deltoid-lanceolate, densely covered with stellate tomentum; petals scarcely exceeding the sepals. Capsule ovoid, beaked, pubescent, as long as the calyx. Seeds reniform, muricated, black.

Flowers and fruits: August-December.

Distribution: In Western India. Also in Africa.

Specimens examined: PUNJAB: *Sanders*, SIND: *Stocks* 15.

Uses: Leaves are sour and are cooked and eaten in Punjab.

ACKNOWLEDGEMENTS

We are indeed grateful to the Director, Singapore Botanical Garden for kindly lending us all the herbarium sheets of the genus *Hibiscus* and *Abelmoschus*, and to Dr. S. K. Mukerjee, ex-Keeper, Central National Herbarium, Calcutta, for permitting us to examine all the herbarium specimens of the genus *Hibiscus*. Our thanks are also due to Dr. Kedarnath for permitting one of us (B.C.K.) to examine the herbarium sheets of this genus as available in the Dehra Dun Herbarium. We are also grateful to Mr George Taylor, Director, Royal Botanic Gardens, Kew, for kindly sending a copy of the photograph of the type sheet of *H. procerus* Roxb. of which no herbarium sheet is available in India.

REFERENCES

- ADANSON, M. *Families des plantes*. Part II. Paris, 1763.
 BEDDOME, R. H. *The flora sylhetica for South India*. Madras, 1869.
 BENTHAM, G. *Flora Australiensis*. 1: 214. London, 1863.
 BHATTACHARYA, U. N. A contribution to the flora of Mirzapur-H. *Bull. bot. Surv. India* 6: 191-210, 1964.
 BLUME, C. L. *Bijdragen tot de flora van Nederlandsch Indie*. 2: 105-109, Batavia, 1825.
 BOISSIER, E. *Flora Orientalis*, Basileae. 1: 840, 1867.

- BURKILL, I. H. *A working list of the flowering plants of Baluchistan*, 14, Calcutta, 1909.
- BURMANNI, N. L. *Flora Indica etc.* 151-153, Amsteladami, 1768.
- BORSSUM, WAALKES J. VAN. *Taxon* 15 : 43, 1966.
- Malesian Malvaceae revised. *Blumea* 14 : 24-84, 1966.
- CAVANILLES, A. J. *Monodelphiae classis dissertationes decem.* 1785-1790.
- COLLETT, H. *Flora simlensis.* Calcutta : 60-61, 1921.
- COOKE, T. *The Flora of the Presidency of Bombay* (Repr. ed.), 1 : 110-121, Calcutta, 1958.
- DALZELL, N. A. AND A. GIBSON. *The Bombay flora*, 19-21, Bombay, 1861.
- DE. CANDOLLE, A. P. *Prodromus systematis naturalis regni Vegetabilis.* 1 : 446-455, Paris, 1824.
- DUTHIE, J. F. *Flora of the Upper Gangetic Plain etc.* 1 : 87-93, Calcutta, 1903.
- FISCHER, C. E. C. Contributions to the flora of Burma. *Kew Bull.* 463-466, 1926.
- GAMBLE, J. S. *The Flora of the Presidency of Madras* (Repr. ed.), 1 : 68-71, Calcutta, 1957.
- GAERTNER, J. *De fructibus et seminibus plantarum.* 2 : 249-253, 1791.
- GARCKE, A. Kritische bemerkungen zu der familie der Malvaceen nebst beschreibung neuer arten aus derselben. *Bot. Zeit.* 7 : 817-825, 833-841, 849-855, 1849.
- GHOSE, M. K. *Hibiscus mixanthus* L. F.-A new record for West Bengal. *Sci. & Cult.* 32 : 260, 1966.
- GRIFFITH, W. *Notulae ad plantas asiaticas.* 4 : 520, Calcutta, 1854.
- GRISEBACH, A. H. R. *Flora of the British West Indian Islands*, 84-85, London, 1864.
- GURKE, M. *Flora Brasiliensis.* 3 : 457-596, 1892.
- HAINES, H. H. *The Botany of Bihar and Orissa.* 1 : 66-72, Calcutta, 1921.
- HARVEY, W. H., W. SONDERS, ET AL. *Flora Capensis.* 2 : 587, Calcutta, 1861.
- HEMADRI, K. AND B. V. REDDI. New and interesting plant records. *Proc. Indian Sci. Congr.* 54 : part III, 319. (abstr.)
- HOCHREUTNER, B. P. G. Revision du genere *Hibiscus*. *Ann. Cons. Jard. Bot. Geneve*, 4 : 23-91, 1900.
- Generes nouveaux et discutees de la famille des Malvacees. *Candollea* 2 : 79, 1924.
- HOOKE, J. D. *Flora of British India*, 1 : 334-344, 1874.
- HU, SHU-YING. *Flora of China*, Malvaceae. 41-60, 1955.
- JACQUIN, J. F. *Eclogae plantarum rariorum out minus cognitarum* 3 : 307, 1786-93.
- KANJILAL, U. N., P. C. KANJILAL AND C. S. DAS. *Flora of Assam*, 1 : 142-144, Assam, 1935.
- KUNTZE, O. *Plantarum nubicae.* 3 : 19, 1898.
- L'HERITIER DE BRUTELLE, C. L. *Stirpes novae etc.* 1 : 103, 1784.
- LINNAEUS, C. *Species plantarum. Berolini.* 683-697, 1753.
- Systema naturalis. Holmiae.* 10 : 1149, 1789.
- LINNAEUS, J. DE. *Supplementum plantarum systematis vegetabilium: Brunsvigae.* 308, 1781.
- MASTERS, M. T. Malvaceae, in *Hooker's Flora of British India*, 1 : 334-344, London, 1874.
- Malvaceae, in *Oliver's Flora of Tropical Africa*, 1 : 194-208, London, 1868.
- MEDICUS, F. C. *Ueber einige kunstliche Geschlechter aus der Malvenfamilie etc.* 1787.
- MOENCH, G. *Methodus plantas horti botanici et agri Marburgensis, e staminum situ describendi:* 613-621, 1794.
- MIQUEL, F. A. G. *Flora Indiae Batavae*, 1 : 153-161, Amsterdam, 1859.
- OLIVER, D. *Flora of tropical Africa*, 1 : 194-208, London, 1868.
- PRAIN, D. *Bengal plants*, 1 : 262-269, Calcutta, 1903.
- RAIZADA, M. B. AND D. CHATTERJEE. Correct identity of *Hibiscus tortuosus*. *Sci. & Cult.* 26 : 46-47, 1960.
- RAKSHIT, S. C. AND B. C. KUNDU. New species and varieties of *Hibiscus*. *Sci. & Cult.* 27 : 192-94, 1961.
- RAMA, RAO. *Flora Travancore*, 40-43, Trivandrum, 1914.
- ROXBURGH, W. *Hortus Bengalensis*, 51-52, Serampore, 1814.
- Flora Indica*, 3 : 522-30, Serampore, 1832.
- SANTAPAU, H. *Flora of Khandala. Rec. bot. Surv. India.* 16 : 22, 1953.
- Flora of Purandhar*, 25-26, New Delhi, 1957.
- The flora of Saurashtra*, 1962.
- SMITH, W. W. *Plantarum novarum herberis horti regii conservatarum. Kew Bull.* 193, 1912.
- SWEET, R. *The florists' guide and cultivation directory.* 2 : 51, 1827-30.
- THWAITES, G. H. K. *Enumeratis plantarum zeylanicae.* 26 : 401, London, 1864.
- TRIMEN, H. *A hand-book of the flora of Ceylon.* 1 : 151-57, London, 1893.
- WESTER, P. J. New varieties of roselle. *Philipp. agric. Rev.* 7 : 266-69, 1914.
- WIGHT, R. *Icones plantarum Indiae Orientalis.* Madras, 1840.
- AND G. A. WALKER-ARNOTT. *Prodromus florae peninsulae Indiae Orientalis.* 1 : 48-52, London, 1834.
- WILLDENOW, C. L. *Species plantarum. Berolini.* 3 : 733-840, 1801.
- Enumeratio plantarum horti regii botanici Berolinensis etc.* 2 : 720-738, 1809.
- WOODROW, G. M. The flora of Western India. *J. Bombay Nat. Hist. Soc.* 11 : 118-130, 1897.