

**FASCICLES
OF
FLORA OF INDIA**

FASCICLE II

CUCURBITACEAE

H. L. CHAKRAVARTY



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

EDITORIAL BOARD

DR S K JAIN	Chairman
DR N. C. NAIR	Member
DR M P. NAYAR	„
DR B D SHARMA	„
DR. V. S AGARWAL	„
DR. K THOTHATHRI	Secretary

**FASCICLES
OF
FLORA OF INDIA**

FASCICLE II

CUCURBITACEAE

H. L. CHAKRAVARTY



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

© Government of India 1982

Price :

Printed by the Reliance Printing Works, 93, Sarat Chatterjee Road, Chatterjee
Hat, Shibpur, Howrah-711102 and Published by the Director, Botanical
Survey of India, P.O. Botanic Garden, Howrah-711103.

CONTENTS

CUCURBITACEAE	1-126
(H. L. CHAKRAVARTY)	
INDEX TO SCIENTIFIC NAMES	127
INDEX TO LOCAL NAMES	133
AUTHOR'S NOTE ON THE FAMILY	136

Date of Publication : 16th December, 1982

CUCURBITACEAE†

Juss. Gen. Pl. : 393 (1789)

H. L. CHAKRAVARTY*

Scandent or prostrate herbs or undershrubs, rarely tree-like (*Dendrosicyos*) with watery juice, often scabrid. Leaves alternate, exstipulate, simple, palmately, palmately or pedately lobed, or compound, rarely pinnately divided or pinnately compound. Lamina variable in the same species or even in the same plant. Tendrils mostly present, solitary, lateral, spirally coiled, simple or divided. Inflorescence axillary, racemose, umbellate or solitary, clustered or paniculate. Flowers small or large, pentamerous, diclinous, in the same individual—monoecious (synoicous) or in different individuals-dioecious (heteroicous), rarely hermaphrodite. Sepals 5, tubular or campanulate, forming a hypanthium, free above the tube. Petals 5, inserted on the hypanthium (calyx tube) gamo- or polypetalous, white, yellow, greenish or rarely blue or red. Stamens basically 5, usually three, 2 two-celled, 1 one-celled, but sometimes 4, 2 or even 1; anthers erect, curved but very often variously conduplicate; pistillode present or not. Carpels 3, ovary inferior, 1-3 locular, usually 1-locular, ovules 1- ∞ , anatropous, often ovary triplacentaliferous with 2-seriate ovules; placenta parietal but sometimes intrude within the ovary chamber forming it spuriously 3-locular; style-1, stigmas as many as carpels, usually thick and forked; staminode present or not. Fruit a pepo, dehiscent or indehiscent, berry or capsule. Seeds usually many, often compressed, horizontal, erect or pendulous, tuberculate, rarely winged, marginate, exalbuminous, embryo straight, cotyledons foliaceous, radicle short.

110 genera and *ca.* 640 species distributed in the warmer parts of

† Editor for Fam. Cucurbitaceae : K. THOTHATHRI, Botanical Survey of India, Howrah-7111 03.

* 15/4, N. N. Ghosh Lane, P.O. Regent Park, Calcutta-7000 40. The work was carried out in the Central National Herbarium (CAL), Botanical Survey of India, Howrah 7111 03.

the world, most frequent in tropics and subtropics; very rare in temperate regions. 36 genera and *ca.* 100 species in India.

Notes : Stamens basically 5, each one thecous, bisporangiate. Gradual union of the monothealous adjacent stamens gives rise to usual three staminate androecium—one stamen remaining free. One vascular bundle is present in each monothealous stamen. In dithealous stamens 2 vascular bundles are present representing 2 simple stamens. Hence a 2-celled stamen of the cucurbits is homologous to a compound stamen and analogous to a normal stamen, identity being revealed by double vascular supply. Stages of union can be traced from *Fevillea*, *Alsomitra*, *Hemsideya*, *Zanonia*, *Actinostemma*, *Neoluffa* etc. showing tendency of union through *Cucumis*, *Luffa*, *Lagenaria* etc. where union is completed. In *Cyclanthera* the stamens are all united into a single column and with a horizontal disposition of the anther lobes [Chakravarty in *Lloydia* 21(2) : 49-87. 1958]. Various stages of union of the stamens and their orientation are extremely interesting in this family.

1a. Ovules horizontal or erect; female flowers usually solitary; stamens 3 :

2a. Ovules horizontal (Pendulous in *Herpetospermum*).

Stamens free

...1. Tribe **Cucumerinae**

2b. Ovules and seeds erect. Stamens free or united into an annular ring

...2. Tribe **Orthospermeae**

1 b. Ovules pendulous. Flowers small usually in panicles. Stamens 5

3. Tribe **Zanonieae**

1. Tribe. **Cucumerinae**

1a. Anther cells flexuous or conduplicate :

2a. Corolla rotate or if campanulate 5-partite to the base or free :

3a. Corolla lobes along their margins :

4a. Ovules 12, seeds usually 6, each with one abortive seed attached to its side. Calyx tube 7-10 cm long

...23. **Hodgsonia**

- 4b. Ovules and seeds numerous. Calyx tube less than 7 cm long ...35. *Trichosanthes*
- 3b. Corolla lobes entire :
- 5a. Calyx tube of the male flower elongate. Stamens inserted within and included in the calyx tube or nearly so :
- 6a. Petioles eglandular. Fruits not succulent :
- 7a. Tendrils divided. Fruits dehiscent by 3-valves :
- 8a. Calyx tube tubular. Fruits baccate; seeds many horizontal ...19. *Gymnopetalum*
- 8b. Calyx tube infundibuliform. Fruits fibrous; seeds 12-18, pendulous ...22. *Herpetospermum*
- 7b. Tendrils not divided. Fruits indehiscent.
...3. *Biswarea*
- 6b. Petioles biglandular at apex. Fruits succulent
...26. *Lagenaria*
- 5b. Calyx tube of the male flower short :
- 9a. Stamens 5, 4 arise in pairs, 1 away ...31. *Neoluffa*
- 9b. Stamens usually 3 (rarely 5 in *Luffa*) :
- 10a. Stamens inserted at the mouth of the calyx tube; filaments exerted; anthers free :
- 11a. Fruits dry, endocarp fibrous, dehiscent usually by stopple ...27. *Luffa*
- 11b. Fruits soft, endocarp fleshy; indehiscent
...2. *Benincasa*
- 10b. Stamens inserted below the mouth of the calyx tube; anthers more or less cohering :
- 12a. Calyx with 2-3 scales at its base. Male flowers with large enveloping bract ...29. *Momordica*

- 12b. Calyx without scales at the base ;
bracts absent :
 - 13a. Connectives produced beyond
the anther loculi. Tendrils
simple ...11. **Cucumis**
 - 13b. Connectives not produced.
Tendrils 2-3 fid ...8. **Citrullus**
- 2b. Corolla campanulate divided, not more than half way down :
 - 14a. Flowers white. Tendrils simple ... 9. **Coccinia**
 - 14b. Flowers yellow. Tendrils divided ...12. **Cucurbita**
- 1b. Anther-cells straight or curved, not conduplicate :
 - 15a. Flowers large (10-15 mm long), bright yellow ; male racemes
stout :
 - 16a. Leaf apex not caudate. Calyx tube short (1-4 mm long).
Seeds very many :
 - 17a. Anthers narrowly oblong. Leaves less than 15 cm
long, 5-10 cm broad, conspicuously punctate.
Fruits indehiscent ...34. **Thladiantha**
 - 17b. Anthers reniform. Leaves 15-27 cm long, 13-17
cm broad, not punctate. Fruits valvular
dehiscent ...24. **Indofevillea**
 - 16b. Leaf apex distinctly caudate. Calyx tube elongate
(1.5-2.0 cm long). Seeds 3-9 ...17. **Edgaria**
 - 15b. Flowers small (1-10 mm long), dull to greenish yellow, male
racemes, not stout :
 - 18a. Male flowers in racemes. Corolla subrotate ...5. **Bryonia**
 - 18b. Male flowers in fascicles. Corolla campanulate :
 - 19a. Flowers 5-10 mm long, greenish yellow :
 - 20a. Seeds narrowly ovate with prominent cen-
tral projections on both sides, margin
strongly belted without a partition wall
...6. **Bryonopsis**

20b. Seeds ovate without projections on the surface ; margin conspicuously belted with a partition wall ...16. **Diplocyclos**

19b. Flowers 1-4 mm long, dull yellow :

21a. Bracts not ciliated if any :

22a. Fruits not circumcised :

23a. Styler disc cup-shaped
...28. **Melothria**

23b. Styler disc obscure or absent :

24a. Fruits rostrate
...25. **Kedrostis**

24b. Fruits not rostrate
...7. **Cerasiocarpum**

22b. Fruits circumcised near the base
...10. **Corallocarpus**

21b. Bracts ciliated, resembling stipules at leaf-base :

25a. Seeds ovoid, much compressed or boat-shaped, 1-3 per fruit, black when dry
...4. **Blastania**

25b. Seeds asymmetrical, cissoid, broad at the middle, obliquely narrowed at both ends, 8-15 per fruit, light brown when dry
...14. **Dactyliandra**

2. Tribe : **Orthospermeae**

1a. Stamens 3, inserted on the calyx-tube ...15. **Dicaelospermum**

1b. Stamens united into a central column, pollen sac fusing into an annular ring
...13. **Cyclanthera**

3. Tribe : Zanonieae

1a. Ovules more than 1, usually many :

2a. Stamens 5 :

3a. Leaves not divided into separate leaflets :

4a. Fruits 12-14 mm long, circumcised. Leaves serrate ...1. *Actinostemma*

4b. Fruits 6-10 cm long, clavate. Leaves sub-entire ...36. *Zanonia*

3b. Leaves pedately or palmately divided into 3-7 leaflets :

5a. Fruits trigonous, obovoid ...18. *Gomphogyne*

5b. Fruits not trigonous :

6a. Fruits pea-like ; tendrils simple ...20. *Gynostemma*

6b. Fruits elongate, clavate ; tendrils simple or 2-fid :

7a. Seeds with a long wing attached at the apex ...30. *Neosalsmitra*

7b. Seeds with wing all round ...21. *Hemsleya*

2b. Stamens 3 ...32. *Schizopepon*

1b. Ovule solitary ...33. *Sechium*

1. ACTINOSTEMMA

Griff. Pl. Cantor. 24. t. 3. 1837 ; Benth. & Hook. f. Gen. Pl. 1 : 838. 1867 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 179. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 380. 1967.

Herbs scandent, slender, glabrous or shortly pubescent. Leaves cordate-hastate, entire or lobed. Tendrils bifid or rarely simple. Plants

monoecious, rarely dioecious. Male flowers racemose or paniculate, rarely solitary; calyx-tube (hypanthium) cupular; lobes linear-lanceolate; stamens 5, free, filaments short; anthers extrose, basifixed, subovate, 1-locular, longitudinally 1-cleft, connective thick; pistillode 0. Female flowers, solitary, fasciculate or racemose; calyx-tube flask-shaped; calyx as in the male; ovary ovoid, often verrucose, 1-locular; style short, thick; stigma 2, crescent-shaped; ovules 2-4, pendulous, sub-parietal; staminodes 3-5, glanduliform. Fruits ovoid, operculately dehiscent, apex conical, half superior, circumscise above the middle. Seeds 2-4, compressed, ovate, margin corrugate denticulate.

Distrib. : Species 7, mostly Chinese. 1 in India.

1. *Actinostemma tenerum* Griff. Pl. Cantor. 24. t. 3. 1837; Clarke in Hook. f. Fl. Brit. Ind. 2 : 633. 1879 (*excl. syn.*); Duthie, Fl. Upper Gang. Pl. 1 : 382. 1903 (Repr. ed. 1 : 351. 1960); Prain, Beng. Fl. 1 : 528. 1903 (Repr. ed. 1 : 385. 1963).

Figs: 1-17

Branches slender. Petioles filiform, puberulous, 1-3 mm long; lamina 4-8 × 2-4 cm, narrowly ovate, sagittately trilobed, minutely denticulate, emarginate, acuminate, upper surface indistinctly punctate-scabrid, Tendrils filiform. Male flowers many, 7-15 cm long, rachis linear, pedicels filiform, often aggregate, 1-5 mm long; sepals subulate, 1-nerved, 4-5 mm long; anthers 0.3-0.4 mm long, connective papillose. Female flowers solitary or fasciculate, *ca.* 2 cm long. Fruits 1.8-2.0 cm long, 1.2-1.3 cm thick. Seeds ashy, broadly ovate, 12-14 × 7-10 mm, 2-3 mm thick, reticulate.

Type : India : Khasia, *Griffith 2523* (K !).

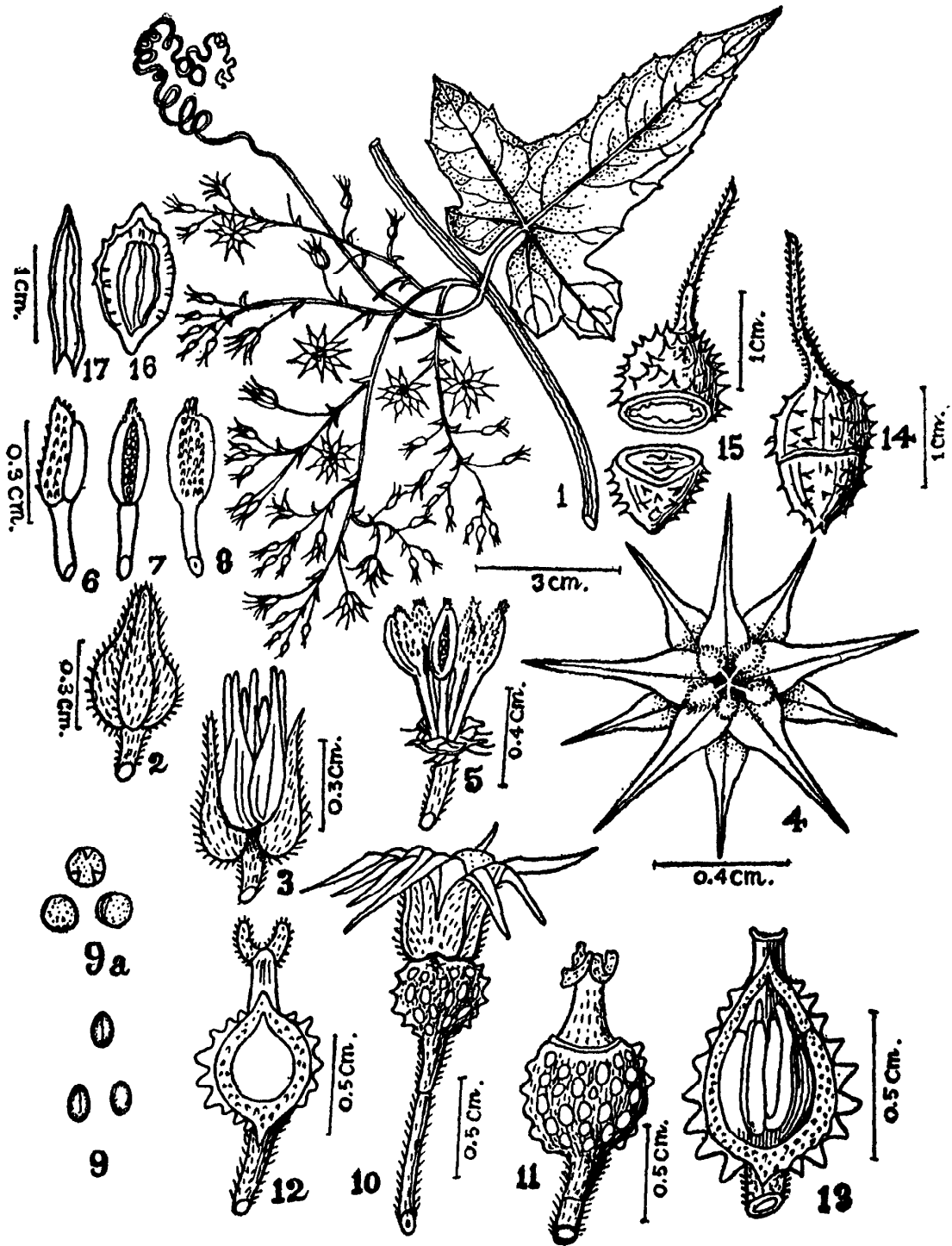
Fls. & Frts. : May-Oct.

Distrib. : INDIA : Assam, Uttar Pradesh; BANGLADESH, VIETNAM, LAOS, CAMBODIA.

Notes : Abruptly acuminate-caudate sepal and petal apices instantaneously distinguish the species from the rest of the Cucurbits.

2. BENINCASA

Savi. Bibl. Ital. 9 : 158. 1818; Benth. & Hook. f. Gen. Pl. 1 : 824.



Actinostemma tenerum Griff.

Figs. 1-17 : 1. A flowering branch. 2. A flower bud showing three sepals. 3. A flower bud at a later stage showing sepals and petals. 4. A male flower showing surface view. 5. Male flower, sepals and petals removed showing stamens. 6-8. Different views of stamens. 9-9a. Pollen grain (lateral and polar views). 10. Female flower. 11. Gynoecium. 12. L. S. of Gynoecium. 13. Same as 12, showing ovules. 14. A fruit. 15. T. S. of fruit. 16-17. Seeds (surface and lateral views).

1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 616. 1879; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 84. 1959; Hutchinson, Gen. Fl. Pl. 2 : 401. 1967.

Annual climber, softly hairy all over petiole. Lamina palmately 5-lobed. Tendrils 2-3-fid; probract opposite the tendril at the petiole base, ovate or elongate, \pm concave. Plants often monoecious or sub-hermaphrodite. Flowers large, yellow, axillary, solitary. Male flowers: Calyx tube broadly campanulate; lobes 5, sub-foliaceous, entire, lanceolate or 3-5-lobed, reflexed; corolla rotate, often 5-partite, lobes obovate, entire. Stamens 3, free, inserted at the calyx tube; filaments short; anthers exerted, thick, loculi sigmoid-flexuose, connective trilobed. Nectaries inside the calyx tube semi-globose, thick. Female flowers: Calyx and corolla as in the male. Staminodes 3. Ovary triplacentiferous; style thick, inserted on the disc, stigma 3, large undulate; ovules many horizontal. Fruits baccate, thick, hispid, glaucous, many-seeded, indehiscent. Seeds ovoid-oblong, compressed, margin tumid.

Distrib. : Species one. Cultivated in tropical and sub-tropical regions.

1. *Benincasa hispida* (Thunb.) Cogn. in DC. Monog. Phan. 3 : 513. 1881; Duthie, Fl. Upper Gang. Pl. 1 : 368. 1903 (Repr. ed. 1 : 338. 1960). *Cucurbita hispida* Thunb. Fl. Jap. 322. 1784. *Benincasa cerifera* Savi, Bibl. Ital. 9 : 158. 1818; Clarke in Hook. f. Fl. Brit. Ind. 2 : 616. 1879.

Gol-kaddu (Hindi); *Chal-kumra* (Beng.); *The White Gourd* (Eng.).

Stem branched, diffuse. Petioles hirsute, 5-20 cm long; lamina 10-25 cm long and as broad, reniform-rotund, deeply cordate, upper surface scabrous, lower shortly hispid, 5-7 lobes, margin sinuate, dentate; nerves hirsute at lower surface. Tendrils slender. Peduncles hirsute, male 5-15 cm long, female 2-4 cm long. Probracts foliaceous, ovate, 6-15 \times 5-10 mm. Calyx tube (male) densely villose, 12-15 mm broad; lobes lanceolate, 8-12 \times 3-5 mm. Petals spreading, obtuse, mucronate, 3-5 cm long. Filaments hispid, 2-3 mm long; anthers subtrilobate. Ovary ovoid or cylindrical, softly hairy, style 2-3 mm long. Fruits fleshy, hairy when

young, waxy bloom when mature Seeds compressed ovoid, yellowish white, distinctly marginate, 10-11 × 5-7 mm and *ca.* 2 mm thick.

Type : Japan, *Thunberg*, 22775 (UPS !).

Fls. & Frts. : June-Oct.

Distrib. : Cultivated in tropical and sub-tropical regions of India. Nowhere recorded occurring wild. It spreads widely over the far eastern regions of the world.

Uses : Fruits both young and ripe are used as vegetable. The pulp is made into suitable size and boiled in sugary syrup to prepare sweetmeat called 'Pithe' in northern India. The fruit is considered alterative stypitic, tonic, nutritive and diuretic. It is considered a specific for haemorrhages of internal organs and is regarded beneficial in Phthisis [Chakravarty in Ind. J. Agric. Sc. 16(1) : 42. 1946].

Chr. No. : 2n = 24 (McKay in Bot. Gaz. 89 : 416-417. 1930).

Pollen : 3-or 4-colpate, syncolpate, subspherical ($\pm 72 \mu m$), exine reticulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 149. 1974).

Notes : High temperature, especially in the drier area, hastens maturity of the fruits and helps copious formation of white waxy bloom. In open roofs of cots and cottages exposed to sunlight the fruits of white gourds develop quite vigorously and are hence grown in such situations all over rural India as a kitchen garden vegetable.

3. BISWAREA

Cogn. in Bull. Soc. Bot. Belg. 21(2) : 16. 1882; Chakravarty, in Rec. Bot. Surv. Ind. 17(1) : 64. 1959; Hutchinson, Gen. Fl. Pl. 2 : 403. 1967. *Warea* Clarke in J. Linn. Soc. 15 : 127. 1876 et in Hook. f. Fl. Brit. Ind. 2 : 612. 1879, non Nutt. 1834.

Extensively scandent herbs. Leaves lobed. Plants dioecious. Male flowers racemose, rarely solitary. Calyx tube narrow, cylindric, dilated above, broadly campanulate, usually 5-partite, lobes ovate, entire.

Stamens 3, included, inserted in the calyx tube, filaments short, free; anthers connate, one unilocular, others bilocular, loculi linear, connective narrow, not produced; pistillode subulate. Female flower solitary. Calyx as in the male; staminode 0. Ovary oblong, triplacentiterous; style filiform, elongate, stigma 3, dilated; ovules many, horizontal. Fruits oblong, trigonous, 6-ribbed, fibrous, 3-valved, many-seeded. Seeds ellipsoid, compressed, smooth.

Distrib. : Species 1; endemic.

1. *Biswarea tonglensis* (Clarke) Cogn. in Bull. Soc. bot. Belg. 21(2) : 16. 1882; Mizushima in H. Hara's Fl. F. Himal. 1 : 321. 1966, *Warea tonglensis* Clarke in Hook. f. Fl. Brit. Ind. 2 : 612. 1879; Cogn. in DC. Monog. Phan. 3 : 403. 1881,

Stem very slender, smooth. Petioles glabrous, 6-9 cm long; lamina 15-25 × 12-20 cm, ovate, base emarginate, upper surface sparsely pilose, lower smooth, often 5-7-lobed, lobes oblong lanceolate, acute. Tendrils glabrous. Male flowers : peduncle often in pairs, one 1-flowered, 10-15 cm long, other 4-8-flowered, subglabrous, 15-30 cm long; pedicels erect, ebracteate, 1-4 cm long. Calyx tube 3.0-3.5 cm long, broad at the middle. Petals acute, 3-5 × 1.5-2.5 cm. Staminal filaments filiform, glabrous, 4-5 mm long; anthers *ca.* 7 × 5 mm broad; pistillode 8-9 mm long, base 1.5-2.0 mm thick. Female flower : peduncle 7-10 cm long. Fruits 10-12 × 4.0-4.5 cm. Seeds many, brownish, oblong, 1.0-1.5 × 0.7-1.0 cm, muriculate.

Type : India : Darjeeling, Rungbee, *Clarke* 12183A (K !).

Fls. : June-Oct.; *Frts.* : Sept.-Oct.

Distrib. : INDIA : Sikkim, West Bengal, Assam, Manipur; endemic to the Eastern Himalayan ranges.

4. BLASTANIA

Kotschy & Peyr. Pl. Tinn. 15. 1865; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 174. 1959. *Ctenolepis* Hook. f. in Benth. & Hook. f. Gen. Pl. 1 : 832. 1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 629. 1879; Hutchinson, Gen. Fl. Pl. 2 : 388. 1967.

Herbs annual, scabrous, prostrate or scandent. Leaves digitately 3-5-lobed; bracts stipuliform, margin ciliate. Tendril simple. Plants

monoecious; flowers minute. Male flowers in racemes; calyx tube short campanulate; lobes 5, subulate; corolla 5-partite; stamens 3, inserted at the calyx tube, free; filaments remote, very short; anthers small, one unilocular, others bilocular, loculi erect, short, ovoid, didymous, connective not produced; pistillode 0. Female flowers solitary, in the same axils as the males, shortly pedunculate; calyx and corolla as in the male; staminode 0. Ovary ovoid, 2-3 placentiferous, disc 0; style columnar, short, stigma 2, rarely 3; ovules 2-3 horizontal. Fruits fleshy, globose or obliquely subquadrate, 1-3-seeded. Seeds ovoid, much compressed or boat-shaped, margin thick, acute or obtusely circumcinctus, testa smooth.

Distrib. : Species 2 in India.

Notes : Conspicuous ciliated stipule is a remarkable feature of this genus which differentiates it from the rest of the other Cucurbits.

1a. Leaves tripartite. Fruits globose or ellipsoid 1. *B. fimbristipula*

1b. Leaves 5-lobed. Fruits obreniform ...2. *B. garcinii*

1. *Blastania fimbristipula* (Fenzl.) Kotschy & Peyr. Pl. Tinn. 15 : t. 7. 1865. Cooke, Fl. Pres. Bomb. 1 : 541. 1903 (Repr. ed. 1 : 576. 1958). *Bryonia fimbristipula* Fenzl. Kotschy Iter Nub. no. 205. 231. 1841. *Ctenolepis cerasiformis* (Stocks) Naud. in Ann. Sc. Nat. ser. 5, 6 : 13. 1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 630. 1879.

Stem subfiliform. Petioles slender, shortly hirsute ultimately punctate and scabrous, 2-4 cm long. Lamina 4-10 cm long and as much broad; membranous, tripartite, both surfaces sparsely shortly villose-hirsute, ultimately white-punctate; segments ovate-oblong or lanceolate, acute, margin denticulate or crenulate lobate; lateral lobes often more or less bilobed, middle lobe longer, entire or trilobed, often long mucronate. Bracts orbicular, reniform, long ciliated, 7-12 mm long. Calyx tube 0.5-0.7 × 0.8-1.0 mm; lobes 0.5 mm long. Fruits sessile, red, globose or ellipsoid, often 2-seeded, 12-14 mm thick. Seeds grey or dusky, ovate-oblong, base subacute, one side much concave and the other convex, smooth, margin acute, *ca.* 9 mm long, *ca.* 6 mm broad, *ca.* 1.5 mm thick.

Type : Sudan : Nubia, Kotschy, 205 (CAL !).

Fls. : July-Sept.; *Frts.* : Aug.-Oct.

Distrib. : INDIA : Punjab, Haryana, Gujarat, Maharashtra, Rajasthan ;
BURMA, SRI LANKA, TROPICAL AFRICA, SOUTH AFRICA.

2. *B. garcinii* (Burm. f.) Cogn. in DC. Monog. Phan. 3 : 629. 1881 ;
Cooke, Fl. Pres. Bomb. 1 : 542. 1903 (Repr. ed. 1 : 576. 1958) ;
Duthie, Fl. Upper Gang. Pl. 1 : 379. 1903 (Repr. ed. 1 : 348. 1960) ;
Gamble, Fl. Pres. Madr. 3 : 540. 1919 (Repr. ed. 1 : 381. 1957).
Sicyos garcinii Burm. f. Fl. Ind. 211. 1768. *Ctenolepis garcinii* (Burm.
f.) Naud. in Ann. Sc. Nat. ser. 5, 6 : 13, 1867 ; Clarke in Hook. f.
Fl. Brit. Ind. 2 : 629. 1879.

Branches subfiliform. Petioles very slender, 1.5-3.0 cm long. Lamina
2.5-5.0 cm long and as broad, membranous, deeply 5-lobed, both surfaces
villose, ultimately punctate, lobes subequal, obovate, mostly acute, den-
tulate. Bracts ovate, subsessile, 4-7 mm long. Tendrils capillary, some-
what short, \pm puberulous. Male flowers : peduncle usually capillary, pub-
erulous, 0.5-1.0 cm long, subcapitately 3-4-flowered ; pedicels 1-2 mm long.
Flowers dull white, 1.0-1.5 mm broad ; fruiting peduncle filiform, 1-5 mm
long. Fruits reddish, inversely subreniform, smooth, 1-2-seeded, 4.6×0.7 -
1.0 cm. Seeds dark grey, oblong, base slightly attenuate, apex round, sul-
cate on one face, convex on the other, smooth, marginate, 6.8×3.4 mm,
1.0-1.5 mm thick.

Type : India, Madras, Tuticorin, *Garcin s. n.* (G 1).

Fls. : July-Sept. ; *Frts.* : Sept.-Dec.

Distrib. : INDIA : Panjab, Haryana, Uttar Pradesh, Gujarat, Maha-
rashtra, Madhya Pradesh, Andhra Pradesh, Orissa, Karnataka, Kerala,
Tamil Nadu ; SRI LANKA.

Uses : Roots, fruits and seeds are used in indigenous medicine
[Chakravarty in Ind. J. Agric. Sc. 16(1) : 80. 1946].

Chr. No. : $n = 12$ (Singh, A. K. in Curr. Sci. 43 : 460. 1974).

5. BRYONIA

L. Sp. Pl. 1012. 1753 ; Benth. & Hook. f. Gen. Pl. 1 : 829. 1867 ; Chakra-
varty in Rec. Bot. Surv. Ind. 17(1) : 131. 1959 ; Hutchinson, Gen. Fl. Pl.
2 : 400. 1967.

Herbs, perennate through tuberous roots. Stem annual scandent.

Leaves 5-angular or palmately 3-5-lobed. Tendrils simple. Plants dioecious, rarely monoecious; flowers white or yellow. Male flowers in racemes; calyx tube broadly campanulate; lobes 5, short, triangular; corolla subrotate, deeply 5-partite, lobes ovate. Stamens 3, free, inserted below the calyx tube, filaments very short; anthers broadly ovate, one unilocular, others bilocular, loculi linear, sigmoid-flexuose, connective broad, not produced; pistillode nil. Female flowers racemose or aggregate, rarely solitary. Calyx and Corolla as in the male; staminodes 3-5, sometimes obscure; ovary globose, triplacentiferous, few-ovuled; style slender, base naked, stigma 3, simple or bifid; ovules horizontal. Fruits baccate, spherical, indehiscent or rarely dehiscent, few-seeded. Seeds ovoid, compressed, sub-smooth, immarginate or very narrowly marginate.

Distrib. : Predominantly a mediterranean genus. Species 10; 2 in India.

Notes : The genus *Bryonia* was much confused with *Bryonopsis*. Indeed the entire material of *Bryonopsis lacinosa* (L.) Naud., a rather widely distributed species preserved in CAL and elsewhere in India was erroneously put as *Bryonia laciniosa* L. In *Bryonia* male flower is racemosely arranged whereas in *Bryonopsis* they are in fascicles.

1a. Female flowers in short corymbs, few-flowered. Lamina 5-lobed
...1. *B. dioica*

1b. Female flowers in elongate racemes, many-flowered. Lamina 5-7
palmatipartite ...2. *B. multiflora*

1. *Bryonia dioica* Jacq. Fl. Austr. 2 : t. 199. 1773.

White or Red Bryony.

Roots fleshy, white. Petioles 4-10 cm long. Lamina 6-12 cm long and as broad, ovate, 5-lobed, base emarginate, margin undulate-denticulate, lobes \pm triangular, acute. Tendrils slender. Male flowers; peduncle 10-15-flowered; pedicels filiform, spreading, 0.5-1.5 cm long; calyx tube 5-6 mm broad, 3-4 mm long; lobes 2-3 mm long; corolla bluish yellow, nerves reticulate greenish, lobes ovate, obtuse, 5-6 mm long. Staminal filaments 1.0-2.5 mm long; anthers 2-3 mm long. Female flowers corymbose; peduncle 4-7-flowered, 1-4 cm long; pedicels elongate, style not exerted. Fruits globose, greenish, ultimately red or yellow, wrinkled when dry, 8-10 mm diam. Seeds yellowish, finely rugulose, thinly marginate, 4.5-5.0 mm long, 3.5-4.0 mm broad and *ca.* 1.5 mm thick.

Type : Austria, *Jacquin s. n.* (W).

Fls. : May-Aug. *Frts.* : Aug.-Sept.

Distrib. : INDIA : Punjab, Uttar Pradesh, Maharashtra ; AFGHANISTAN, IRAN, IRAQ, TROPICAL AFRICA, EGYPT, SYRIA, PALESTINE. The distribution of *B. dioica* is interesting. Starting from the north-western corner of India it covers a zone across the Orient, Europe and North Africa ; absent in the rest of the world ; only Cucurbit found wild in the United Kingdom.

Uses : *Bryony* (root) is administered as *Tinctura Bryonia* against cough in pleurisy and Phthisis. In heavy dose it acts as a purgative (Brit. Pharm. Codex 230. 1934). The bruised root causes vesication of skin (Bailey, Stand. Cyclop. Hort. 1 : 583. 1933).

Chr. No. : $n = 10$ (McKay in Bot. Gaz. 89 : 416. 1930—Reported by Strassburger and Meurman).

2. *B. multiflora* Boiss. et Heldr. Diagn. Ser. 1. fasc. 10 : 8. 1849.

Stem slender. Petioles, 0.5-3.0 cm long. Lamina round, 3-10 cm long and almost as broad, 5-7 palmatipartite or sect, segments often ovate-oblong, lobed again. Tendrils filiform. Plants dioecious, rarely monoecious. Male flowers in racemes, 12-30-flowered, 10-25 cm long ; pedicels filiform, spreading, 10-15 mm long ; calyx-tube 7-8 mm broad ; lobes 1.5-2.0 mm long ; corolla subrotate, 5-partite, puberulous, lobes 4-5 mm long, ovate triangular, yellowish green, 5-nerved ; stamens 3, free, filaments villose 1.5-2.0 mm long ; anther *ca.* 4 mm long. Female flowers in racemes, peduncle 1-8 cm long, 4-25-flowered ; pedicels 2-6 mm long ; style sub-exserted, stigma 3, simple or bilobed. Fruits, 6-7 mm thick. Seeds yellow or dark brown, finely corrugate, obscurely margined, *ca.* 6.0 × 4.0-4.5 mm, *ca.* 2.5 mm thick.

Type : Palestina, *Boissier s. n.* (G).

Fls. : May-June ; *Frts.* : June-Aug.

Distrib. : INDIA : North-western India ; AFGHANISTAN, IRAN, PALESTINE, SYRIA, IRAQ, TURKEY, CYPRUS, LIBYA ; almost a similar pattern of distribution as *B. dioica* Jacq.

6. BRYONOPSIS

Arn. in Hook. J. Bot. 3 : 274. 1841 ; Chakravarty in Rec. Bot. Surv. Ind.

17(1) : 135. 1959. *Bryonia* sect. *Bryonopsis* Hook. f. in Benth. & Hook. Gen. Pl. 1 : 829. 1867 (non Blume 1826).

Herbs annual, more or less scabrous, scandent. Leaves deeply palmately 5-lobed. Tendrils bifid. Plants monoecious. Flowers small, greenish yellow, male and female fasciculate, often occurring together. Male flowers : calyx-tube broadly campanulate, lobes 5, narrow, short ; corolla broadly campanulate, 5-partite, lobes ovate, often reflexed. Stamens 3, free, inserted in the calyx-tube, filaments short ; anthers ovate, one unilocular, others bilocular, loculi linear, slightly flexuose, connective broad not produced ; pistillode 0. Female flowers perianth as in the male ; staminodes 3, short ; ovary globose or ovoid ; 3-placentiferous, few-ovuled ; style slender, base naked, stigma 3, papillose, deeply bilobed ; ovules horizontal. Fruits baccate, pulpy, few-seeded. Seed margin strongly belted, slightly scorbiculate at the middle.

Distrib. : A monotypic genus found in INDIA, BURMA, SRI LANKA, MALAYSIA, CHINA, AFRICA and AUSTRALIA.

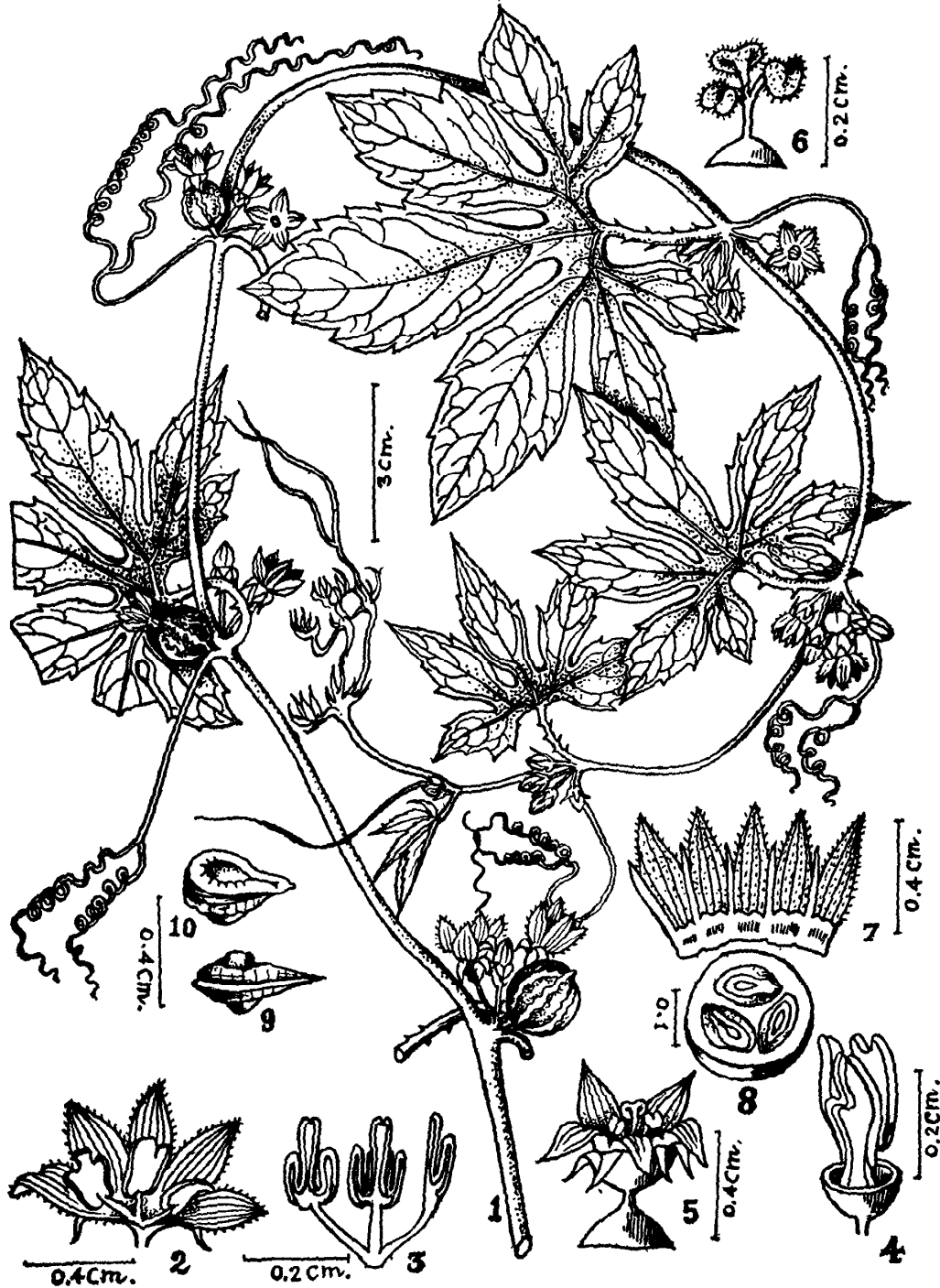
1. *Bryonopsis laciniosa* (L.) Naud. Ann. Sc. Nat. 4. Ser. 12 : 141. 1859 ; Duthie, Fl. Upper Gang. Pl. 1 : 381. 1903 (Repr. ed. 1 : 349. 1960) ; Prain, Beng. Pl. 1 : 526. 1903 (Repr. ed. 1 : 383. 1963) ; Gamble, Fl. Pres. Madr. 3 : 534. 1919 (Repr. ed. 1 : 377. 1957) ; Haines, Bot. Bih. Ori. 3 : 391. 1922 (Repr. ed. 2 : 408. 1961) ; Mizushima in H. Hara's Fl. E. Himal. 1 : 322. 1966. *Bryonia laciniosa* L. Sp. Pl. ed. 1 : 1013. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 622. 1879.

Figs. 1-10

Gargu-naru (Hindi) ; *Mala* (Beng.).

Stem slender, elongate. Petioles 3-6 cm long. Lamina 8-12 cm long and almost as much broad, deeply palmately 5-lobed, upper scabrous, lower smooth, margin denticulate or undulate or sub-crenulate. Male flower : peduncle 0.5-1.5 cm long ; calyx-tube 2-4 mm long, 3-6 mm broad ; lobes spreading, 0.5-1.0 mm long ; corolla greenish yellow, shortly papillose, 4-10 mm broad, segments ovate, acute. Staminal filament 1.0-1.5 mm long ; anthers ca. 2 mm long. Female flowers fasciculate, ovary globose. Fruits spherical, yellowish green, narrowly six striped, 12-17 mm thick. Seeds grey, belted, narrowly acute, attenuate with raised projections on both faces, ca. 5 mm long, 3 mm broad, 3.5-4.0 mm thick.

Type : Nechoemeka Hort. Malab. 8. t. 19.



Bryonopsis laciniosa (L.) Naud.

Figs. 1-10 : 1. Habit sketch with inflorescence and flowers. 2. A male flower showing dorsal view of the stamens. 3. Same as 2, showing ventral view. 4. Same as 2, perianth removed. 5. Upper part of a female flower, showing part of the ovary. 6. Same as 5, showing three stigmatic lobes. 7. Part of a flower to show calyx and corolla. 8. T. S. of ovary. 9. Seed, lateral view. 10. Same as 9, surface view with central projected portion removed.

Fls. : April-Aug. ; Frts. : July- Dec.

Distrib. : INDIA : Punjab, Rajasthan, Uttar Pradesh, Bihar, Orissa, West Bengal, Assam, Tripura, Maharashtra, Andhra Pradesh, Madhya Pradesh, Karnataka, Kerala, Tamil Nadu ; BURMA, SRI LANKA, MALAYSIA, CHINA, AFRICA, AUSTRALIA.

Uses : The plant is bitter and aperient and is considered to possess tonic properties (Dymock, Mat. Med. West. Ind. 346. 1885). It is used as a medicine by the Santals. The leaves are eaten as pot-herb [Chakravarty in Ind. J. Agric. Sc. 16(1) : 66. 1946].

Chr. No. : $2n = 24$ (McKay in Bot. Gaz, 89 : 416. 1930).

Notes : Lobations of the leaves varies from palmatifid to palmatifid partite. The lateral lobes may be deeply divided showing seven clear lobes.

7. CERASIOCARPUM

Hook. f. in Benth. et Hook. f. Gen. Pl. 1 : 832. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 628. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 167. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 388. 1967.

Herbs scandent, subglabrous. Leaves oblong triangular or hastate. Tendrils simple. Plants monoecious, flowers small, ebracteate, yellow. Male flowers racemose ; calyx-tube broadly campanulate, lobes 5, minute ; corolla rotate, 5-partite, lobes broadly ovate ; stamens 3, free, inserted at the throat of the calyx-tube, filaments very short ; anthers very short, patelliform, dorsifixed, one 1-locular, others 2-locular, loculi erect, connective not produced ; pistillode 0. Female flowers solitary, sometimes occurring in the same axil with the male ; calyx and corolla as in the male, staminode 0. Ovary ovoid, 2-3 placentiferous ; style columnar, disc at base 0, stigma trilobed ; ovules 2, rarely 3 in each chamber, horizontal. Fruits small, often transversely oblong, smooth, fleshy, indehiscent, 2-6-seeded. Seeds broadly ovoid, tumid, belted, testa crustaceous smooth.

Distrib. : A monotypic Indo-Malayan genus.

1. *Cerasiocarpum bennettii* (Miq.) Cogn. in DC. Monog. Phan. 3 : 729. 1881 ; Gamble, Fl. Pres. Madr. 3 : 541. 1919 (Repr. ed. 1 : 382.

1957). *Bryonopsis bennetti* Miq. Fl. Ind. Bat. 1 : 657. 1855. *Cera-siocarpum zeylanicum* (Thw.) Hook. f. in Gen. Pl. 1 : 832. 1862 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 629. 1879.

Stem slender. Petioles shortly pilose, 1.5-3.0 cm long. Lamina 6-15 × 3-7 cm, membranous, acute or acuminate, base emarginate, sub-entire or sinuate dentate, upper surface scabrid, lower glabrous and smooth. Tendrils filiform. Racemes lax, 6-40-flowered ; peduncle slender, sparsely pilose, 2-6 cm long ; pedicels 1-2 mm long ; calyx-tube subacute at base, lobes triangular, 0.3-0.5 mm long ; corolla lobes acute, pilose, ca. 2.0 × 1.5 mm. Staminal filaments long villose, ca. 0.5 mm long ; anthers ca. 1 mm long, connective villose. Female flowers solitary, rarely subracemose. Ovary glabrous, ca. 2 mm long ; style filiform, 3.0-3.5 mm long, stigma 1.0-1.5 mm broad. Fruiting peduncles 4-7 mm long. Fruits scarlet, smooth, 7-10 × 10-15 mm. Seeds grey, belted through the middle, 5-7 mm long, ca. 5 mm broad and 3 mm thick.

Type : Java, Banjoemas *Horsfield s. n.* (U).

Fls. : July-Aug. ; *Frts.* : Aug.-Sept.

Distrib. : INDIA : Commonly found in Peninsular India. SRI LANKA, BURMA, MALAYSIA.

8. CITRULLUS *nom. cons.*

Schrad. in Eckl. & Zeyh. Enum. Pl. Afr. austr. 2 : 279. 1836 ; Benth. & Hook. f. Gen. Pl. 1 : 826. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 620. 1879. *Colocynthis* P. Miller, Gard. Diot. Abr. ed. 4. 1754 ; Chakra-varty in Rec. Bot. Surv. Ind. 17(1) : 112. 1959.

Herbs annual or perennial, spreading. Leaves round or triangular-ovate, deeply 3-5-lobed, lobes lobulate or dissected. Tendrils 2-3-fid, sometimes simple. Plants monoecious or dioecious. Flowers solitary, rarely fasciculate. Male flowers : calyx-tube broadly campanulate, deeply 5-partite, lobes ovate-oblong, obtuse. Stamens 3, inserted at the base of the calyx-tube, filaments free, short. Anthers almost free, subtrilobed, one 1-locular, others bilocular, loculi linear sigmoid flexuose ; connective dilated, not produced, margined ; pistillode glanduliform. Female flowers : calyx as in the male ; staminodes 3, short, setiform or ligulate ; ovary

ovoid, triplacentiferous ; style short, columnar, stigma 3, thick, reniform, subtrilobed ; ovules numerous, horizontal. Fruits globose or oblong, fleshy or dry, indehiscent, many-seeded. Seeds oblong, compressed, smooth, marginate or immarginate.

Distrib. : Distributed in the Western Asia, Eastern Mediterranean region and tropical Africa. Species 4 ; 2 in India.

1a. Perennial. Leaves very scabrid. Fruits small, up to 7 cm in diameter
...1. *C. colocynthis*

1b. Annual. Leaves softy hairy or more or less scabrid. Fruits large, up to 25 cm in diameter
... 2. *C. lanatus*

1. *Citrullus colocynthis* (L.) Schrad. in *Linnaea* 12 : 414. 1838 ; Clarke in *Hook. f. Fl. Brit. Ind.* 3 : 620. 1879 ; Cooke, *Fl. Pres. Bomb.* 1 : 537. 1903 (Repr. ed. 1 : 571. 1958) ; Duthie, *Fl. Upper Gang. Pl.* 1 : 374. 1903 (Repr. ed. 1 : 344. 1960) ; Gamble, *Fl. Pres. Madr.* 3 : 536. 1919 (Repr. ed. 1 : 378. 1957) ; Haines, *Bot. Bih. Ori.* 3 : 393. 1922 (Repr. ed. 2 : 411. 1961). *Cucumis colocynthis* L. *Sp. Pl.* 1011, 1753.

Figs. 1-7

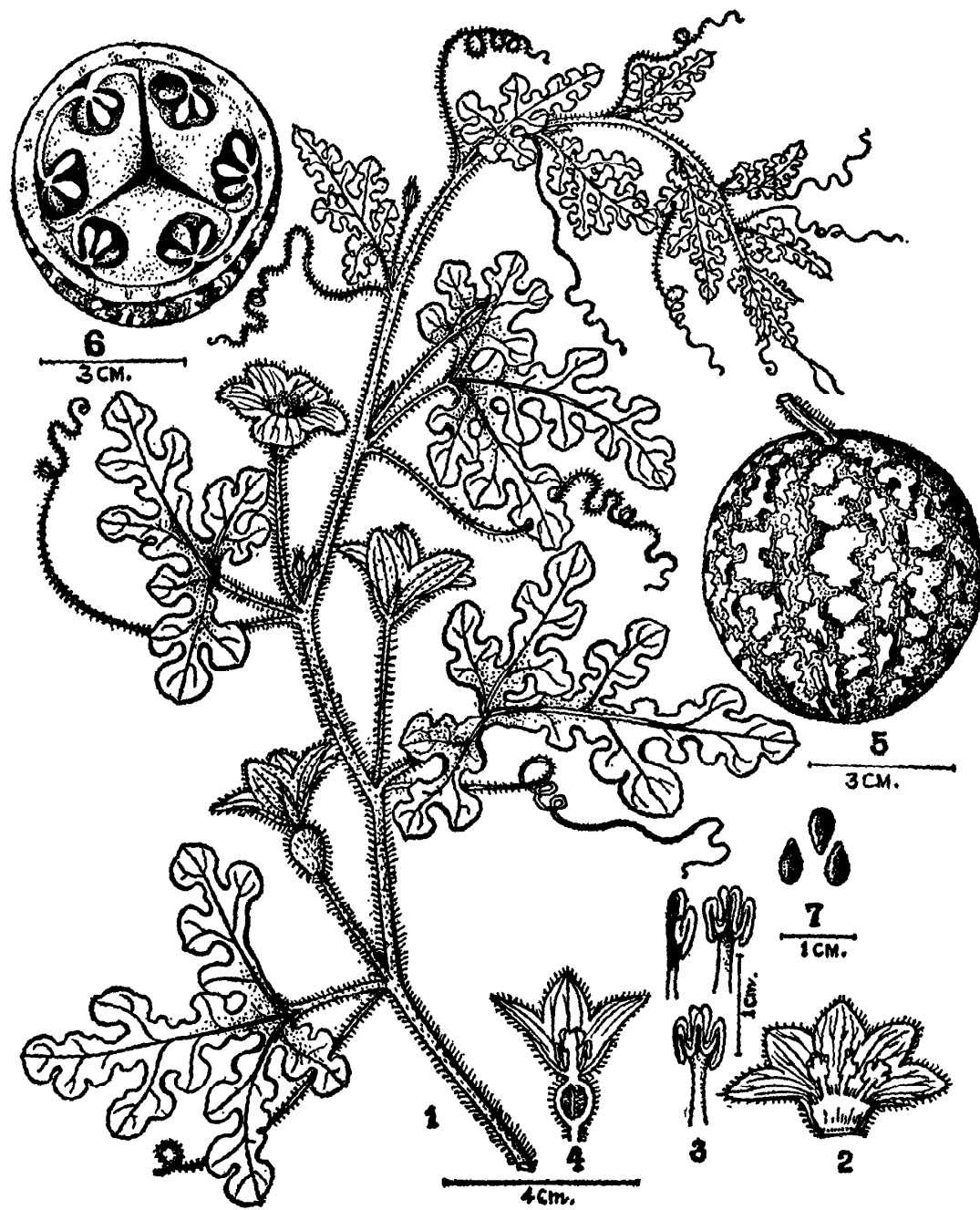
Indrayan (Hindi) ; Colocynth, Bitter apple.

Roots perennial. Stem diffuse, angular, hirsute. Petioles densely villose-hirsute. Lamina 5-12 × 3-8 cm, rigid, ovate, cordate, very scabrid, palmately 5-lobed or deeply 3-lobed, lobes obtuse or acute, sinuate-pinnatifid, terminal lobe large, margin crisped. Tendrils slender, short, sparsely villose-hirsute, bifid or simple. Male flowers : peduncles 4-5 mm long, villose hirsute ; calyx-tube broadly campanulate, hispid, 4-8 mm long ; lobes subulate, apex recurved, 2-3 mm long ; corolla pale yellow, lobes ovate, 4-6 × 2-3 mm, acute and mucronate. Ovary obovate, hirsute. Fruits globose, slightly depressed, 5-7 cm long and as much broad ; variegated green and white, glabrous and yellowish-white when ripe, pulp spongy and very bitter ; epicarp thin. Seeds ovate-oblong, yellowish brown, not margined, *ca.* 6 mm long, *ca.* 3 mm broad, *ca.* 1.5 mm thick.

Type : Sweden : Uppsala, *Linnaeus* 1152/1. (LINN).

Fls. : May-July ; *Frts.* : Aug.-Oct.

Distrib. : Plant prefers a dry sandy soil and is essentially a desert plant. INDIA : Punjab, Rajasthan, Bihar, Andhra Pradesh, Tamil Nadu ;



Citrullus colocynthis (L.) Schrad.

Figs. 1-7 : 1. Habit sketch showing a male and female flowers. 2. A male flower cut open to show stamens. 3. Stamens 3, two 2-celled, one 1-celled. 4. Female flower longitudinally cut, showing two staminodes. 5. A fruit just before fully mature. 6. T. S. of a fruit. 7. Seed.

AFGHANISTAN, IRAQ, IRAN, BURMA, SRI LANKA, AFRICA.

Uses : The pulp of Colocynth is a drastic hydragogue cathartic. In large dose it acts as a poison. A bitter amorphous alkaloid and resin are present in the pulp. Root is used as purgative and is beneficial in jaundice, rheumatism and urinary troubles (Chakravarty, Pl. W. Irq. 132. 1976).

Chr. No. : $n = 11$ [Chakravarty in Ind. J. Agric. Sc. 16(1) : 11. 1946].

Pollen : 3-colporate, circular (Erdtman, Pollen Morph. & Pl. Tax. 137. 1952).

2. *C. lanatus* (Thunb.) Matsumura & Nakai in Cat. Sem. et Spor. Hort. Bot. Univ. Imp. Tokyo 1916 : 30. 1916 ; Bhandari, Fl. Ind. Des. 163. 1978. *Momordica lanata* Thunb. Prodr. Pl. Cap. 13. 1800. *Citrullus vulgaris* (Schrad.) Schrad. in Eckl. et Zeyher, Enum. Pl. Afr. austr. 279. 1936.

Tarbuz (Hindi); *Tormuj* (Beng.); Water Melon.

Herbs, annual. Stem angular, villose. Petioles 6-12 cm long. Lamina 8-20 × 5-15 cm, triangular ovate, cordate, more or less scabrid, deeply trifid, segments pinnatifid, obovate, oblong, lanceolate or linear; terminal lobe acute, others round, rarely acute. Tendrils bifid. Bracts cochleariform, 8-10 × 3-4 mm. Male flowers : peduncles elongate, villous, 1-3 cm long; calyx-tube broadly campanulate, villous; lobes narrowly lanceolate; corolla greenish, villose; corolla lobes ovate-oblong, obtuse, 1.0-1.5 cm long, 3-4 mm broad. Female flowers : peduncles 2-6 cm long; calyx and corolla as in the male, ovary oblong; style 4-5 mm long. Fruits large, up to 25 cm in diameter, subglobose or ellipsoid, smooth, green or variegated, pulp sweet, red or yellow. Seeds black or red or of different shades.

1a. Fruit large and smooth ... var. *lanatus*

1b. Fruit small and sparingly spinous ... var. *fistulosus*

var. *lanatus*

Type : South Africa, Cape Province, *Thunberg, s. n.* (UPS).

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

Distrib. : Indigenous in tropical and west Africa ; in other warmer regions cultivated or spontaneous. INDIA : Punjab, Rajasthan, Uttar Pradesh, Bihar, West Bengal, Assam, Tripura, Maharashtra, Karnataka, Tamil Nadu, Andaman & Nicobar Islands ; cultivated all over the old and new world.

Uses : The seeds are considered to be cooling and diuretic. Juice of the fruit allays thirst and is believed antiseptic in typhus fever. Fruit is widely used as a sweet cooling repast during the summer. The seeds are used as cooling medicine. [Chakravarty in Ind. J. Agric. Sc. 16(1) : 57. 1946].

Chr. No. : $n = 11$ (McKay in Bot. Gaz. 89 : 416. 1930).

Pollen : 3-colporate, 50-62 μ exine reticulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 149. 1974).

Notes : Several cultivated forms of this species are met in India. The forms vary in size, shape, colour and sweetness of the pulp.

var. *fistulosus* (Stocks) Chakravarty *comb. nov.* *Citrullus fistulosus* Stocks in Hooker's Kew J. Bot. 3 : 74. t. 3. 1851. *Colocynthis citrullus* (L.) O. Kuntze var. *fistulosus* (Stocks) Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 116. 1959.

Tinda (Hindi).

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

Type : *n. v.*

Distrib. : INDIA : Punjab, Uttar Pradesh ; PAKISTAN.

Notes : Stem thick, leaves sparingly lobed, hispid hairy. Fruit round and almost the size of a cricket ball. Cultivated in many parts of Northern India and is extensively used as a vegetable.

9. COCCINIA

Wight & Arn. Prod. Fl. Ind. 1 : 347. 1834 ; Benth. & Hook. f. Gen.

Pl. 1 : 827, 1867 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 116-117. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 412, 1967. *Cephalandra* Schrad. in Eckl. & Zeyh. Enum. Pl. Afr. austr. 2 : 280, 1836 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 621, 1879.

Herbs prostrate or scandent, glabrous or scabrous, often with tuberous root. Leaves angular or lobed. Tendrils simple, rarely bifid. Plants dioecious, rarely monoecious. Flowers white, Male flowers solitary or racemose and subcorymbose ; calyx-tube short, campanulate or turbinate, teeth 5 ; corolla campanulate, shortly or acutely 5-lobed. Stamens 3, inserted at the base of the calyx-tube ; filaments connate into a central column, rarely free ; anthers connate or coherent, one unilocular, others bilocular or all three occasionally bilocular, loculi sigmoid-flexose ; connective narrow, not produced, pollen oblong ; pistillode nil. Female flowers solitary ; calyx and corolla as in the male ; staminodes 3, oblong or subulate. Ovary ovoid, oblong or linear, triplacentiferous ; style slender, stigma trilobed or tripartite ; ovules numerous, horizontal. Fruits ovoid or oblong, baccate, indehiscent, many-seeded. Seeds ovate, compressed, marginate, finely scorbiculate or smooth.

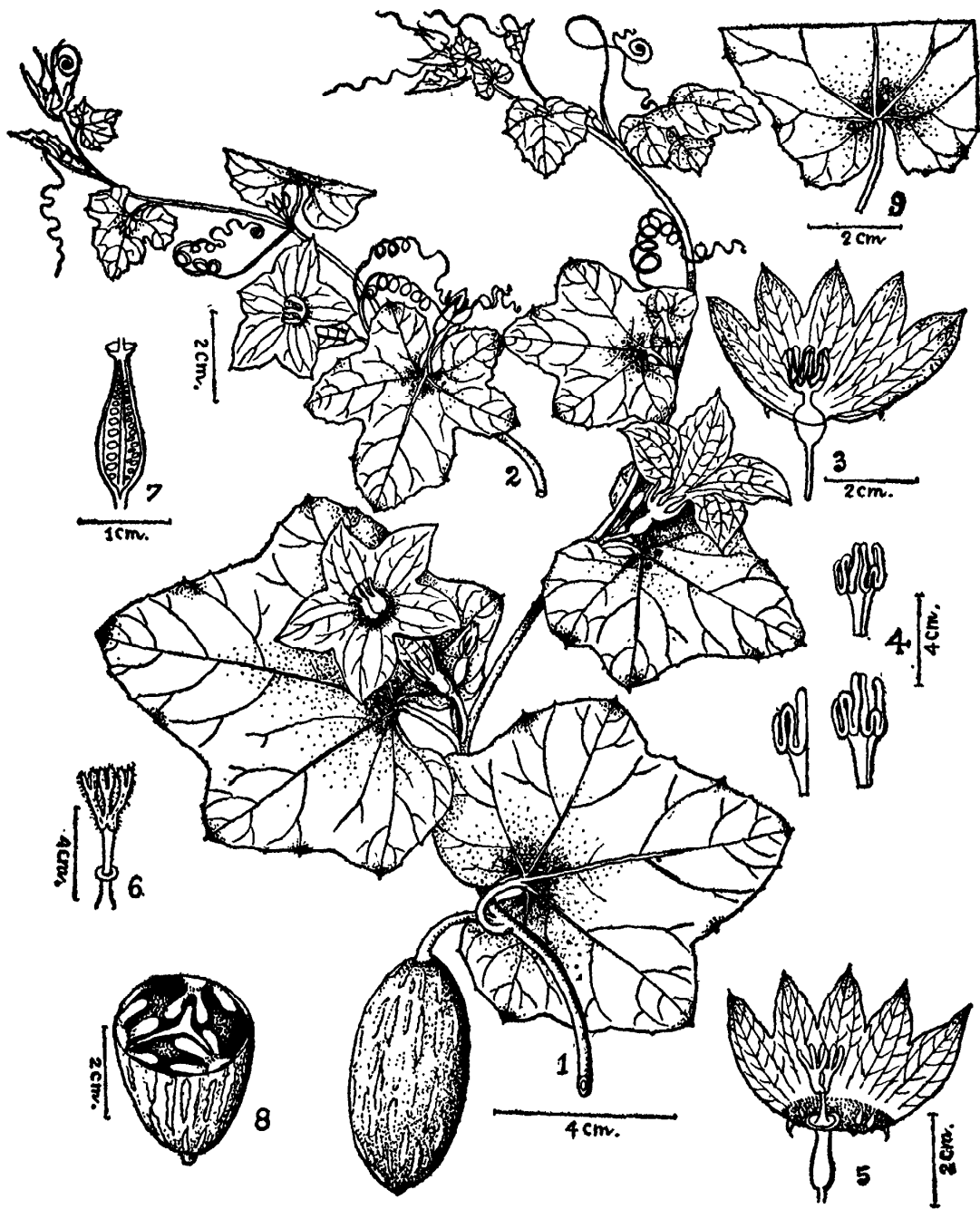
Distrib. : Species 13, mostly confined to tropical Africa ; only 1 in India.

1. *Coccinia grandis* (L.) Voigt. Hort Suburb. Calc. 59, 1845 ; Bhandari, Fl. Ind. Des. 163, 1978. *Bryonia grandis* L. Mant. Pl. 1 : 126, 1767. *C. indica* Wight & Arn. Prod. Fl. Ind. 1 : 347, 1834. *Cephalandra indica* Naud. Ann. Sc. Nat. Ser. 5, 5 : 16, 1859 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 621, 1879 (*Excl. syn.*) ; Kanjilal *et al.* Fl. Assam 2 : 329, 1938.

Figs. 1-9

Kundri, *Bhimb* (Hindi) ; *Ban-kundri* (Ori.) ; *Telakucha* (Beng.) ; *Bimbadhar* (Sans.).

Herbs scandent. Stem angular, glabrous. Petioles slender, 2-5 cm long. Lamina 5-10 cm long, entire to palmately lobed, a few glistering glands on the lower surface towards the base, minutely denticulate, main costa end in brow tips. Tendrils slender. Male flowers : peduncles sub-filiform, striate, 2-6 cm long ; calyx-tube campanulate, 4-5 mm long ; corolla white, 2.5-3.5 cm long ; staminal column 2-3 mm long, *ca.* 1 mm thick ; anthers 6-7 mm thick. Female flowers : peduncles slender, 1-3 cm long ; staminodes 3, subulate, *ca.* 3 mm long. Ovary 12-15 mm long.



Coccinia grandis (L.) Voigt.

Figs. 1-9 : 1. Habit sketch with flowers and a fruit. 2. Terminal part of a branch showing a male and female flower. 3. A male flower cut open. 4. Stamens 3, two 2-celled, one 1-celled. 5. A female flower with corolla cut open. 6. Upper part of the ovary showing three bilobed stigma. 7. L. S. of ovary. 8. T. S. of a fruit. 9. Basal part of a leaf, showing a few glands around the main ribs.

3-4 mm thick ; style slender, glabrous, 6-7 mm long ; stigma densely papillose, 5-6 mm long. Fruits subglabrous, round at both ends, 5.0 × 2.5 cm, pulp red, juicy. Seeds 6.7 × 2.5-4.0 mm, yellowish, oblong, apex round base with two deep marks.

Type : Ceylon (Sri Lanka), *Hermann. s. n.* (BM!).

Fls. : March-Oct. ; *Frts.* : Oct.-Dec.

Distrib. INDIA : Rajasthan, Uttar Pradesh, Bihar, West Bengal, Gujarat, Andhra Pradesh, Orissa, Tripura, Tamil Nadu, Kerala, Lakshadweep ; distributed in plains of India, ascending *ca.* 300 m in Peninsular India ; absent in the Eastern or Western Himalayan region ; BURMA, SRI LANKA, MALAYASIA, CHINA, JAPAN, AFRICA.

Uses : Tender shoots are used as vegetable. Roots, stems and leaves are used in indigenous medicine against skin diseases, bronchial catarrh, bronchitis and diabetes. Konam and Chopra however refuted its use against blood sugar (Rep. I.D.I. : 1920 ; Ind. J.M.R. 1925).

Chr. No. : $n = 12$; $2n = 24$ (Ayyangar, Tax. of Cucurbit. 602, 1967).

Pollen : 3-colporate, prolate (Nair & Kapoor in Glimp. Pl. Res. 2 : 153, 1974).

Notes : Variability in the lobation of the leaves is marked. Cogniaux (DC. Monog. Phan. 3 : 531, 1881) differentiates three varieties. 1. *genuina*—leaves entire or 5-angular. 2. *wightiana*—leaves deeply palmately 5-lobed, lobes oblong. 3. *alceaefolia*—leaves deeply lobed, palmately partite almost to the base. It is difficult to recognise them as varieties as in the same locality leaves varies from unlobed to lobed types. A cultivated variety locally known as '*Kundri*' is used as vegetable. The fruits are smaller and longer and more glossy than the species. But the floral or other vegetative characters being almost like the species, a varietal segregation is not justified. The vegetable is supposed to possess antidysentric properties for cure of bowel troubles for which purpose it is commonly used by the rural folks. $CaCo_3$ punctations on the upper surface of the leaves specially when mature and similar white scale like deposits on the lower main veins are also characteristics (Chakravarty in Philipp. J. Sc. 63 : 419, 420, 429, 1937 & Nature 162 : 576-77, 1948).

10. CORALLOCARPUS

Welw. ex Hook. f. in Benth. & Hook. f. Gen. Pl. 1 : 831. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 627. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 168. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 387. 1967.

Herbs scandent or sometimes prostrate, scabridulous or subtomentose, rarely shrubby erect. Leaves petiolate, rounded or subcordate, entire or more or less divided. Tendrils simple, bifid or 0. Flowers minute, yellowish green. Male flowers aggregated at the apex of a long peduncle, rarely racemose or fasciculate ; calyx-tube broadly campanulate, lobes 5, short ; corolla 5-partite, lobes ovate-oblong ; stamens 3, free, inserted on calyx-tube, filament very short ; anthers glabrous, one 1-locular, others 2-locular, loculi erect, connective often bifid, apex dilated or produced. Pistillode minute. Female flowers sessile or pedicellate, solitary or aggregate, rarely racemose. Calyx and corolla as in the male. Staminode 0 or minute. Ovary 2-3 locular, ovules few in each chamber, horizontal ; style erect ; stigma 3, rarely 2-4-lobed. Berry, fleshy, ovoid or ellipsoid, rarely globose, obtuse or rostrate, operculate dehiscent at base, lower part coriaceous, few-seeded. Seeds ovoid, tumid or subglobose.

Distrib. : Species 34 ; 4 in India.

1a. Lamina almost equal or broader than long. Male peduncles more than 3 cm ; female flowers pedunculate :

2a. Fruits ovoid-oblong, base truncate ... 3. *C. gracilipes*

2b. Fruits ovoid, base attenuate ... 2. *C. epigaeus*

1b. Lamina longer than broad. Male peduncles less than 3 cm ; female flowers sessile :

3a. Tendrils short. Female flowers fasciculate. Seeds grey
... 1. *C. conocarpus*

3b. Tendrils elongate. Female flowers solitary. Seeds black
... 4. *C. palmatus*

1. *Corallocarpus conocarpus* (Dalz. & Gibs.) Hook. f. in Gen. Pl. 1 : 831. 1862 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 628. 1879, *excl. syn.* ; Cooke, Fl. Pres. Bomb. 1 : 544. 1903 (Repr. ed. 1 : 579. 1958) ; Bhandari, Fl. Ind. Des. 164. 1978. *Aechmandra conocarpa* Dalz. & Gibs. Bomb. Fl. 100 : 1861.

Branches finely striate. Petioles rugulose, 1-3 cm. Lamina 5-7 × 4-6 cm (sometimes much smaller), both surfaces densely villose or hirsute, deeply palmately 3-5-lobed, lobes oblong lanceolate or linear, acute to finely acuminate-mucronate, margin entire, terminal lobe longer and constricted at base. Tendrils slender; short, glabrous. Male flowers in raceme; peduncles 1.5-3.0 cm long, slender, erect, glabrous, smooth, 6-15-flowered; pedicels filiform, recurved, 1-2 mm long. Female flowers sessile, fasciculate. Fruits 12-14 mm long, 5-6 mm thick, oblong, smooth, shortly sparsely pilose; beak thick, conical. Seeds grey, 3.5-4.0 mm long, *ca.* 2.5 mm broad, 1.7-1.8 mm thick, obovoid, turgid, slightly attenuate, entire, not winged, apex round, rugulose, slightly marginate.

Type : India, Gujarat, near Malpor & Gundar, *Dalzell*, 39 (K !).

Fls. : June-Aug. ; *Frts.* : July-Sept.

Distrib. : INDIA : Maharashtra, Rajasthan ; endemic.

2. *C. epigaeus* (Rottl. & Willd.) Hook. f. in *Gen. Pl.* 1 : 831. 1862 ; Clarke in Hook, f. *Fl. Brit. Ind.* 2 : 628. 1879 ; Cooke, *Fl. Pres. Bomb.* 1 : 543. 1903 (Repr. ed. 1 : 578. 1958) ; Duthie, *Fl. Upper Gang. Pl.* 1 : 380. 1903 (Repr. ed. 1 : 349. 1960) ; Gamble, *Fl. Pres. Madr.* 3 : 541. 1919 (Repr. ed. 1 : 382. 1957) ; Bhandari, *Fl. Ind. Des.* 165. 1978. *Bryonia epigaea* Rottl. & Willd. *Neue Schrift. Ges. Naturf. Freunde Berlin*, 4 : 223. 1803. *Rhynchocharpa epigaea* Naud. *Ann. Sc. Nat.* 4 Ser. 16 : 178. 1862.

Root napiform. Stem scandent, slender, glabrous, angular-sulcate. Lamina 2.0-4.5 × 2.5-5.0 cm, broadly suborbicular, densely villose, subhirsute, 3-5-lobed, lobes often lobulate, more or less obtuse. Tendrils subfiliform, glabrous. Male flowers : peduncle subcapitately 5-15-flowered, 4-6 cm long ; pedicels filiform, spreading, 1-2 mm long. Calyx-tube round, shortly sparsely pilose, 1.5 × 1.0 mm, lobes erect, subulate, 0.5 mm long ; corolla dirty green, spreading ; anthers ovoid, yellow, connective produced, divaricate, bifurcate. Female flowers often solitary, subnodding, pedunculate ; ovary triplacentiferous, base ventricose, sulcate, sub-fleshy, apex dilated, 5-12 mm long. Fruits red, ovoid, base, attenuate, glabrous, 5-8-seeded, 12-16 × 7-8 mm ; beak 5-6 mm long. Seeds *ca.* 3.5 × 2.0-2.3 mm, *ca.* 1.5 mm thick, yellow, turgid, entire, smooth, distinctly marginate.

Type : India : Peninsular India, Orientalis, *Rottler*, s. n. (K !).

Fls. : June-Aug. ; *Frts.* : Aug.-Oct.

Distrib. : INDIA : Punjab, Rajasthan, Uttar Pradesh, Bihar, West Bengal, Assam, Gujarat, Maharashtra, Andhra Pradesh, Madhya Pradesh, Karnataka, Tamil Nadu, Kerala ; BALUCHISTHAN.

Uses : The plant is valued as alterative tonic and is used in syphilitic and venereal complaints. It also finds application in chronic rheumatism and in dysentery of indigenous system of medicine [Chakravarty in Ind. J. Agric. Sc. 16(1) : 79. 1946].

3. *C. gracilipes* (Naud.) Cogn. in DC. Monog. Phan. 3 : 650. 1881 ; Gamble, Fl. Pres. Madr. 3 : 541. 1919 (Repr. ed. 1 : 382. 1958). *Rhynchocarpa epigaea* var. *gracilipes* Naud. Ann. Sc. Nat. 4. ser. 16 : 179. 1862.

Stem scandent, sulcate. Petioles 2-4 cm long. Lamina 2-3 × 3-4 cm, broadly suborbicular, villose-hirsute, usually trilobed to the middle, lobes divergent, broadly ovate, obtuse, denticulate, sinus obtuse, base broadly round, *ca.* 0.5 cm deep, 1.0-1.5 cm broad. Tendrils capillary, elongate. Male flowers : peduncles filiform, flexuose, glabrous, 4-9-flowered, 3-5 cm long ; pedicels capillary, shortly villose, 1-5 mm long ; calyx-tube base ventricose, apex constricted, 1 mm long and as much broad ; lobes erect, lanceolate, 1-5 mm long ; corolla yellowish-green, lobes ovate, acute, erect-spreading, *ca.* 1.5 mm long. Female flowers solitary, nodding, pedunculate ; ovary, base broadly dilated. Fruiting peduncles glabrous, smooth, 6-8 mm long. Fruits ovoid-oblong, base truncate, glabrous, smooth, 5-6-seeded, *ca.* 12 mm long, 6-7 mm thick ; beak slender, 3-4 mm long.

Type : India : Pondicherry, *Lepine*, *s. n.* (P 1).

Fls. : May-Aug. ; *Frts.* : June-Sept.

Distrib. : India, near Pondicherry ; endemic.

4. *C. palmatus* Cogn. in DC. Monog. Phan. 3 : 648. 1881 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 170. 1959.

Branches slender, striate. Petioles 1.0-2.5 cm long. Lamina 3-5 cm long and as broad, suborbicular or subtriangular, base subtruncate, scabrous, palmately 5-lobed ; lobes linear. Tendrils filiform, elongate. Male flowers : peduncles filiform, flexuose, 3-6-flowered, 0.5-1.5 cm long ; pedicels capillary, spreading, 1.0-1.5 mm long ; calyx-tube shortly villose, *ca.* 1 mm long ; lobes erect, narrowly triangular, 0.5-0.7 mm long ; corolla lobes

densely papillose, *ca.* 1 mm long. Female flowers sessile, often solitary. Fruits scarlet, 11-13 × 6-7 mm, beak thick, 5-6 mm long. Seeds *ca.* 4.0 × 2.5 mm, *ca.* 2 mm thick, black, turgid, base attenuate, apex round, finely marginate.

Type : India : Eastern India, *Hugel* 2749 (W).

Fls. : June-Aug. ; *Frts.* : July-Sept.

Distrib. : Eastern India ; endemic.

11. CUCUMIS

L. Sp. Pl. ed. 1 : 1011. 1753 ; Benth. & Hook. f. Gen. Pl. 1 : 826. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 619 : 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 100. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 402. 1967.

Herbs annual or perennial, climbing or trailing, scabrous. Leaves angular, dentate, palmately 3-7-lobed, rarely dissected. Tendrils simple. Plants monoecious, rarely dioecious. Flowers yellow, usually small. Male flowers in fascicles, rarely solitary. Calyx-tube campanulate or turbinate ; lobes 5, subulate, remote ; corolla rotate or subcampanulate, 5-partite, lobes oblong-ovate, acute ; stamens 3, free, inserted at the calyx-tube, filaments short (rarely absent) ; anthers oblong, one 1-locular, two 2-locular, loculi linear, flexuose or curved, rarely erect, connective produced papillose, sometimes bilobed or bifid. Nectary pulviniform, semiglobose, entire or 3-lobed ; pistillode short. Female flowers solitary, rarely fasciculate ; calyx and corolla as in the male ; staminodes 3, setiform or ligulate ; ovary globose, or subcylindric, 3-5 placentiferous ; style short, undivided, basal disc annular or shortly cup-shaped ; stigmas 3-5, obtuse, spherical or obovate, converging ; ovules numerous, horizontal. Fruits polymorphous, fleshy, often indehiscent, many-seeded, smooth, echinate or muriculate. Seeds ovate or oblong, compressed, smooth often immarginate.

Distrib. : Species about 25, cosmopolitan ; only 6 in India, some are cultivated.

1a. Fruits smooth or pubescent :

2a. Perennial. Leaves deeply 5-7-lobed ... 1. *C. callosus*

- 2b. Annual. Leaves angular or lobed :
 - 3a. Ovary softly hairy ; young fruits not tuberculate ... 3. *C. melo*
 - 3b. Ovary hispidulous ; young fruits tuberculate ... 5. *C. sativus*
- 1b. Fruits setose (bristly) or echinate :
 - 4a. Fruits setose (bristly) ... 6. *C. setosus*
 - 4b. Fruits echinate :
 - 5a. Leaves 2-4 cm long, Fruits round ... 4. *C. prophetarum*
 - 5b. Leaves over 4 cm long. Fruits oblong ... 2. *C. hystrix*

1. *Cucumis callosus* (Rottl.) Cogn. in Engl. Das Pflanzenr. 4. 275. 2 : 129. 1924 ; Bhandari, Fl. Ind. Des. 168. 1978. *Bryonia callosa* (*Collosa*) Rottl. Neue Schrift. Ges. Nat. Freunde Zu Berlin 4 : 210. 1803. *Cucumis trigonus* Roxb. Fl. Ind. 2 : 722. 1824 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 619. 1879.

Perennial. Stems 1.0-1.5 m, slender, angular, rough with short, rigid hairs. Petioles 2-6 cm long, slender, hispid. Lamina 3-6 cm long, suborbicular, base cordate, palmately 5-7-lobed, lobes round or ovate-oblong, often narrowed at the base, apex round, dentate or lobulate. Plants monoecious. Male flowers often solitary ; peduncles 0.5-1.0 cm long ; calyx-tube narrow campanulate, *ca.* 3 mm long ; lobes subulate, 1.5-2.0 mm long ; corolla yellow, 6-7 mm long, lobes ovate, oblong, acute ; staminal filament short ; anthers *ca.* 2 mm long, appendage of the connective shorter than anthers ; pistillode *ca.* 1 mm long. Female peduncles 2-3 cm long ; ovary densely hairy ; style 1.5-2.0 mm long ; stigmas converging, *ca.* 2.5 mm long. Fruits obovoid. Seeds *ca.* 5 × 2 mm, 1 mm thick, oblong, white.

Type : India, Madras, *Rottler s. n.* (K !).

Fls. : June-Aug. ; *Frts.* : July-Oct.

Distrib. : INDIA : Himachal Pradesh, Punjab, Rajasthan, Uttar Pradesh, Bihar, Orissa, West Bengal, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka, Kerala, Lakshadweep ; MALAYSIA, CHINA, NORTH AFRICA, AUSTRALIA.

Uses : Pulp of the fruit is bitter and is a drastic purgative. A decoction of the root having the same property is milder in action. The fruit is used as a substitute of *Colocynthis* (Chopra, *Indig. Drug. India* 121. 1931). The seeds are cooling and astringent and are useful in bilious disorders (Kirt. & Basu, *Med. Pl. Ind.* 2 : 1139. 1935).

Chr. No. : $n = 14$ (Singh, A. K. & R. P. Roy in *Carylogia* 27 : 153-160. 1974).

2. *C. hystrix* Chakravarty in *J. Bombay nat. Hist. Soc.* 50 : 896. 1952 et *Rec. Bot. Surv. Ind.* 17(1) : 110. 1959; Jeffrey *Cucur. E. Asia* 22. 1980.

Stems creeping, elongate, branched, angular-sulcate, pale-green, sparsely hirsute. Petioles 2-4 cm long, densely greenish hairy. Lamina 4-7 × 3.5-6.5 cm, ovate, slightly trilobed, both surfaces more or less hairy, margin minutely denticulate, base cordate or truncate, apex acute. Tendrils simple, shortly hirsute. Flowers not seen. Fruits oblong, echinate, 3.0-3.5 × 1.0-1.7 cm, prickle 1-2 mm long. Seeds 3.5-4.5 × 2 mm, *ca.* 0.2 mm thick, obovate, pale-yellow.

Type : India : Garo Hills, Tura mountain, *N. E. Parry* 859 (K !).

Fls. : May-Aug.; *Frts.* : June-Sept.

Distrib. : INDIA : Meghalaya, Assam, Mizoram.

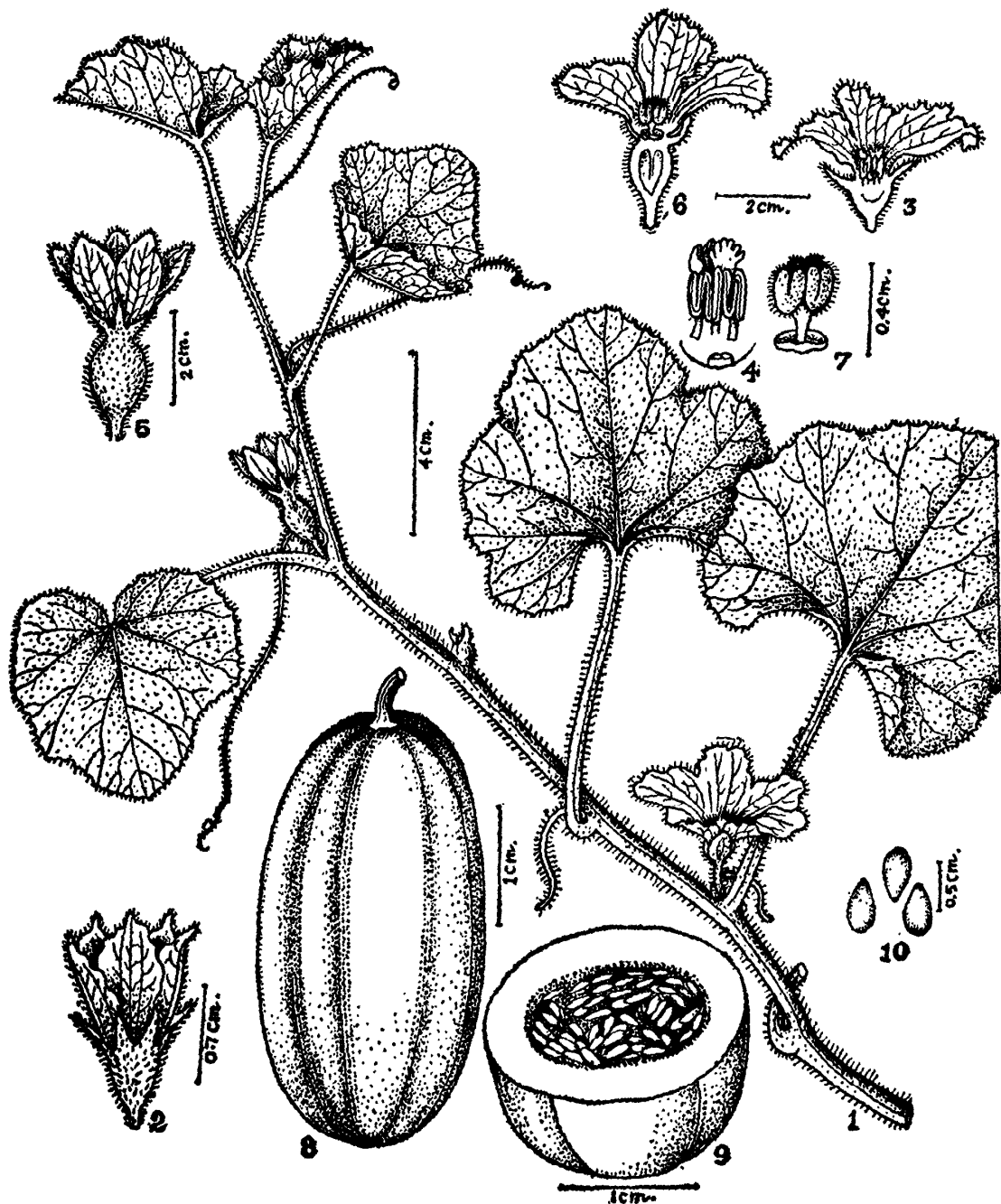
Notes : This species is distinct from the rest of its Indian allies except *Cucumis prophetarum* Linn. which is principally a species of the arid part of the Mediterranean region although it extends to Western India. Both have prickly fruits but *C. prophetarum* has much smaller, deeply lobed leaves and also a globose fruit.

3. *C. melo* L. *Sp. Pl. ed. 1* : 1011. 1753; Clarke in *Hook. f. Fl. Brit. Ind.* 2 : 620. 1879; Duthie, *Fl. Upper Gang. Pl.* 1 : 371. 1903 (Repr. ed. 1 : 340. 1960); Prain, *Beng. Pl.* 1 : 522. 1903 (Repr. ed. 1 : 381. 1963); Haines, *Bot. Bih. Ori.* 3 : 392. 1922 (Repr. ed. 2 : 410. 1961).

Figs. 1-10

Kharbuz (Hindi). Melon.

Robust annual. Stems prostrate, hirsute, elongate, angular, ultimately



Cucumis melo L.

Figs. 1-10 : 1. Habit. 2. A male flower. 3. Male flower spread open to show stamens. 4. Crested stamens. 5. A female flower. 6. Same as 5, split open to show style and stigma. 7. Top portion of ovary with stigmatic lobes. 8. A fruit. 9. A fruit shown transversely cut. 10. Seeds.

somewhat terete and glabrous. Petioles slender, robust, hispid, equal or longer than lamina. Lamina 8-15 cm long and as much broad, 5-angular or moderately 3-7-lobed, lobes, obtuse, suborbicular, denticulate, base cordate, villose or subhirsute. Male flowers fasciculate; peduncles slender, 0.5-3.0 cm long; calyx-tube narrow, campanulate, villose, 6-8 mm long; lobes subulate, erect or spreading; corolla *ca.* 2 cm long, lobes ovate-oblong, acute; staminal filaments very short; anthers 3-4 mm long, appendage of connective shorter than anthers; pistillode *ca.* 1 mm long. Female flowers: peduncles 1-2 cm long; ovary softly hairy, style 1-2 mm long, stigma connivent, *ca.* 2 mm long. Fruits edible, polymorphous. Seeds 10-12 × 5-7 mm, white, oblong, immarginate, apex obtuse, base subacute.

- 1a. Plants robust; found only under cultivation. Fruits polymorphous
... var. **melo**
- 1b. Plants slender; found only in wild state. Fruits oblong or turbinate
... var. **agrestis**

var. **melo** *C. melo* var. *culta* Kurz in Journ. As. Soc. Beng. 46(2) : 102. 1877.

Lecto-type : *Cucumis foliorum angulis rotundatis, pomis torulosis* L. Hort. Cliff. 451. 1738.

Fls. : May-July; *Frts.* : July-Oct.

Distrib. : Cultivated all over the temperate and tropical regions of the world.

Uses : Many forms of melons are cultivated in India differing in size, skin and pulp colour and taste. They are extensively used as desert fruits and are highly esteemed in summer months. They are sometimes eaten as vegetable when unripe. Melons of drier regions are sweeter and tastier than those of moisture situations. Seeds and pulp are considered diuretic and useful in chronic eczema (Kirt. & Basu 2 : 1141. 1935).

Chr. No. : $n = 12$ [Chakravarty in Ind. J. Agric. Sc. 16(1) : 11. 1946].

Pollen : 3-zonoporate and rarely 4-zonoporate, oblate to suboblate

(Erdtman, Pollen Morph. & Pl. Tax. 137. 1952), faintly reticulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 153. 1974).

Notes : Roxburgh's *Cucumis momordica* and *C. utilissima* (Hort. Beng. 3 : 720-721. 1814) merged under *Cucumis melo* Linn. in Index Kewensis (1 : 664-665. 1895) have been recorded by Duthie & Fuller (Field & Gard. Crops 2 : 50. t. 49. 1882) as distinct varieties of *C. melo* Linn. Watt (Dict. Econ. Prod. 2 : 630-631. 1889) also supported Duthie and Fuller's view. The varieties *momordica* and *utilissima* cannot taxonomically be accepted because two distinct varieties namely *culta* (Kurz l. c.) representing the cultivated variety with forms and var. *agrestis* Naud. (Ann. Sc. Nat. 4. ser. 11 : 73. 1859 & 12 : 110. 1859) representing the wild form have been validly published.

Due to free intervarietal hybridization, many cultivated varietal forms of melons have been raised. The author has described 21 such forms from Iraq alone (Chakravarty, Monog. Cucurbit. Iraq. Tech. Bull. no. 133 : 86-102. 1966).

var. *agrestis* (Naud. Ann. Sc. Nat. 4. ser. 11 : 73. 1859 & 12 : 110. 1859 ; Cooke, Fl. Pres. Bomb. 1 : 535. 1903 (Repr. ed. 1 : 569. 1958). *Cucumis pubescens* Willd. Sp. Pl. 4 : 614. 1805 ; Gamble, Fl. Pres. Madr. 3 : 535. 1919 (Repr. ed. 1 : 378. 1957).

Type : India : Sikkim, Gangachora, *Buchanan-Hamilton* in Wall Num. List. No. 6726 (K).

Fls. : June-Aug. ; *Frts.* : July-Sept.

Distrib. & Notes : Found wild practically all over India—in the areas recorded under var. *melo (culta)*. Var. *melo* and var. *agrestis* are practically indistinguishable from herbarium sheets, because the mature fruits of the former alone are the identifying features. Vegetative characters or flowers, both male and female without any mature fruit, are indiscernible. The fruits of var. *agrestis* are much smaller and inedible ; the leaves too are somewhat smaller.

4. *C. prophetarum* L. Cent. I, Pl. 33. 1755 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 619. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 536. 1903 (Repr. ed. 1 : 570. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 373. 1903 (Repr. ed. 1 : 342. 1960) ; Gamble, Fl. Pres. Madr. 3 : 535. 1919 (Repr. ed. 1 : 378. 1957) ; Bhandari, Fl. Ind. Des. 169. 1978.

Perennial, stems brittle, whitish when dry, angular sulcate. Petioles

2-4 cm, fragile, hirsute. Lamina 2-4 cm long and as much broad, suborbicular, base truncate, margin crisped, scabrous, rigid, 3-5-lobed, lobes subobtusate, dentate or lobulate. Tendrils filiform. Male flowers solitary or fasciculate; peduncles filiform, villose-hirsute, 1-5 mm long; calyx-tube subcylindric, 4×2 mm, lobes linear, *ca.* 3 mm long; corolla 3-4 mm long, lobes ovate-oblong; filament filiform, 1 mm long; anthers oblong, *ca.* 2.5 mm long, connective appendix glabrous, *ca.* 0.7 mm long, apex glandular. Female flowers: peduncles 2-3 cm long; ovary minutely muriculate. Fruits sparsely echinate, longitudinally striped green and white, 3-4 cm long. Seeds $4.0-4.5 \times 2.0$ mm, 1 mm thick, pale ashy, oblong, immarginate.

Type : Israel, *Hasselquist* (LINN 1152/4).

Fls. : April-May; *Frts.* : Aug.-Oct.

Distrib. : INDIA : Rajasthan, Gujarat, Maharashtra, Karnataka, Tamil Nadu; NORTH AFRICA, ISRAEL, EUROPE.

Uses : The plant is emetic and purgative. It is toxic to animals.

5. *C. sativus* L. Sp. Pl. ed. 1 : 1012. 1753; Clarke in Hook. f. Fl. Brit. Ind. 2 : 630. 1879; Duthie, Fl. Upper Gang. Pl. 1 : 374. 1903 (Repr. ed. 1 : 343. 1960); Prain, Beng. Pl. 1 : 523. 1903 (Repr. ed. 1 : 381. 1963); Haines, Bot. Bih. Ori. 3 : 392. 1922 (Repr. ed. 2 : 410. 1961); Kanjilal, Fl. Assam 2 : 332. 1938; Mizushima in H. Hara's Fl. E. Himal. 1 : 322. 1966.

Khira (Hindi); *Sasa*, *Khira* (Beng.); *Kaknai* (Or.); Cucumber, *Cherkin*.

Annual, stems prostrate, hirsute. Petioles 8-20 cm long, robust, elongate, hispid. Lamina 12-18 cm long and broad, broadly cordate-ovate, villose-hispid, pedately 5-7-nerved, palmately 3-5-lobed, lobes triangular, dentate, acute. Plants monoecious. Male flowers fasciculate, peduncles slender, 0.5-2.0 cm long; calyx-tube narrow campanulate, villose-hirsute, 8-10 mm long; lobes subulate, spreading; corolla 2-3 cm long, lobes acute; staminal filaments very short; anthers 3-4 mm long, appendix of connective *ca.* 1 mm long. Female flowers solitary or fasciculate, peduncle robust, 1-2 cm long; ovary often fusiform, muricate, aculeate, tumid; hairs rigid, pungent. Fruits oblong, yellowish green, glabrous. Seeds $8-10 \times 3-5$ mm, whitish, oblong, both ends subacute.

- 1a. Leave 3-5-lobed. Ovary usually 3-placentiferous. Fruits oblong,
obscurely trigonous or cylindric ... var. *sativus*
- 1b. Leaves 7-9-lobed. Ovary often 5-placentiferous. Fruits ovoid-oblong
... var. *sikkimensis*

var. *sativus*

Lecto-type : *Cucumis foliorum angulis rectis, pomis oblongis scabris*.
Linn. Hort. Cliff. 451. 1738.

Fls. : May-Aug. ; *Frts.* : July-Oct.

Distrib. : Cultivated all over India, and in all tropical and sub-tropical regions.

Uses : The fruits are much used during summer as a cooling food all over India. They are used as salads and for cooking in curries. The tender fruits are preferred for pickling. The seeds are reported to have cooling, tonic and diuretic properties. Kernels of the seeds are used in confectionery.

Chr. No. : $n = 7$ (McKay in Bot. Gaz. 89 : 416. 1930).

Pollen : 3-porate, semi-spheric, reticulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 155. 1974).

Notes : There are two primary varieties or forms of this species, one—a creeping plant cultivated in the fields during the hot season, another—a climber cultivated near the home-steads during the rains. The hot weather form bears small greenish or blackish, egg-shaped fruits. It is sown in February to March in any soil, preferably a rich one. The other rainy season form is the most common and is universally eaten by all classes of people. It bears larger fruits. There are two types of this form, the one having dark-green fruits and the other of cream colour ; both when fully grown turn rusty brown.

var. *sikkimensis* Hook. f. in Bot. Mag. t. 6206. 1876 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 106. 1959.

Holo-type : From a plant cultivated at Kew (K 1).

Fls. : June-Aug. ; *Frts.* : July-Sept.

Distrib. : INDIA : Sikkim ; NEPAL.

6. *C. setosus* Cogn. in DC. Monog. Phan. 3 : 491. 1881 ; Chakravarty in Rec Bot. Surv. Ind. 17(1) : 106. 1959.

Annual climber. Stems slender. Petioles 2-4 cm long, villose-hirsute. Lamina 4-6 cm long and almost as much broad, membranous, ovate-triangular, undivided or slightly trilobed, base slightly emarginate, pubescent, scabrous, lobes triangular, acute, margin denticulate. Tendrils sparsely villose-hirsute. Plants monoecious. Male flowers fasciculate or sub-solitary ; peduncles filiform, sparsely villose, 5-12 mm long ; calyx-tube narrowly campanulate, villose-hispid, *ca.* 3 mm long, apex *ca.* 2 mm broad ; lobes subulate, erect ; corolla sparsely villose, lobes 4 × 2 mm, oblong, obtuse ; staminal filament *ca.* 0.5 mm long, anther oblong, ciliate, *ca.* 1.5 mm long, connective-appendix compressed, sparsely papillose, *ca.* 3 mm long ; ovary oblong, villose. Fruits 22-25 × 10-12 mm, oblong, sparsely long setose. Seeds 4.0 × 2.2 mm, straw-coloured, smooth, faintly margined.

Type : India Orientalis, *Ritchie* 321 (E !).

Fls. : Sept. ; *Frts.* : Oct.

Distrib. : INDIA : Maharashtra ; endemic.

Notes : Only 2-sheets are so far available. Cogniaux *l.c.* described the species from the only sheet present at Edinburg Herbarium (*Ritchie*, 321). A second (*Witt.* no. 191 A. 5. D, 25/10/12 Herb. CAL.) sheet which was wrongly identified as *Mukia leiosperma* Thw. belongs to this species.

12. CUCURBITA

L. Sp. Pl. ed. 1 : 1010. 1753 ; Benth. & Hook. Gen. Pl. 1 : 828. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 621. 1879 ; Chakravarty in Rec. Bot. Surv., Ind. 17(1) : 120. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 410. 1967.

Herbs, annual or perennial. Stems angular or grooved, scabrous. Leaves lobed, base cordate. Tendrils two to many-fid. Plants monoecious. Flowers large, yellow. Male flowers solitary or fasciculate ; calyx-tube campanulate, 5-lobed, lobe-apex recurved ; stamens 3, inserted in the calyx-tube, filaments free ; anthers linear, connate in a column, one

unilocular, others bilocular, loculi elongate, sigmoid-flexuose, connective not produced, pollen large globose; pistillode nil. Female flower solitary, shortly pedunculate; calyx and corolla as in the male; staminodes 3, short, triangular; ovary oblong, 3-5-placentiferous, style short, thick, stigma 3-5-lobed or bifurcate, papillose, ovules numerous, horizontal. Fruits fleshy, many-seeded, indehiscent. Seeds ovate or oblong, complanate, smooth, margined or rarely without margin.

Distrib. : Species 21, cosmopolitan. Only 4 in India.

Notes : Inconspicuous, club-shaped, glandular hairs are present on the lower surface of the leaves (Chakravarty in Philipp. J. Sc. 63 : 409-431. 1937).

The fruits of *Cucurbita* are called pumpkin, squashes and vegetable marrows. The terms squashes and pumpkins are much confused. In Europe the large varieties of *Cucurbita maxima* Duch. are usually termed pumpkins but in America they are known as squashes. In India all the three species—*C. maxima*, *C. moschata* and *C. pepo* go as *Kumra* or *Mitha Kadu*. By squashes in western countries are meant the tender or growing fruits of *Cucurbita* which are much relished. Usually no tender fruit is commercially sold in India as squash. In India, *Sechium edule*—an introduced plant especially grown in Eastern Himalaya or other hilly regions is known as *squash*—a contradistinction for the squashes of western countries.

1a. Plants annual. Seeds whitish-yellow or yellow :

2a. Leaves chartaceous. Calyx not foliaceous :

3a. Leaves with acute lobes. Peduncles 5-angular. Corolla narrowed at base with erect lobes ... 4. *C. pepo*

3b. Leaves with rounded lobes. Peduncle terete. Corolla lobes curved outwards ... 2. *C. maxima*

2b. Leaves soft. Calyx usually foliaceous ... 3. *C. moschata*

1b. Plants perennial. Seeds black to faintly yellowish ... 1. *C. ficifolia*

1. *Cucurbita ficifolia* Bouche in Verh. der. Ver. des Gartenb. Berlin 12 : 205. 1837.

Perennial, large, extensive climber. Stems prostrate, angular with

marginate surface. Petioles 6-8 cm long, slender with spinules. Lamina 7-8 × 6-8 cm, ovate to suborbicular, 3-5-lobed, lobes obtuse to rounded margin dentate, base cordate, basal sinus ca. 1 cm deep, scabrous-hairy. Tendrils branched with villose hairs. Plants monoecious. Flowers solitary. Male flowers 6-8 cm long, peduncle 3-6 cm long, angular, hairy; calyx-tube short-campanulate, subulate, hairy; corolla ca. 5.0 × 3.5 cm, campanulate, lobes acute to acuminate. Female flower solitary, large, calyx and corolla as in the male. Fruits ca. 30 cm long, oblong, green with white patches, flesh white. Ripe seeds ca. 16-20 × 10-13 mm, broadly ovate, marginate, black to yellowish in colour.

Type : n. v.

Fls. & Frts. : December.

Distrib. : INDIA : Meghalaya; MEXICO, CENTRAL AMERICA, NORTHERN SOUTH AMERICA. Restricted to the highland.

Notes : Found in east Asia; but usually cultivated in all warm countries for its ornamental water melon-like fruits. It grows on red soil and the taste is like other 'Kumra' after cooking. This is recently introduced in Meghalaya.

2. *C. maxima* Duch. ex Lam. *Encycl.* 2 : 151. 1786; Clarke in Hook. f. *Fl. Brit. Ind.* 2 : 622. 1879; Cooke, *Fl. Pres. Bomb.* 1 : 547. 1903 (Repr. ed. 1 : 582. 1958); Duthie, *Fl. Upper Gang. Pl.* 1 : 377. 1903 (Repr. ed. 1 : 346. 1960); Prain, *Beng. Pl.* 1 : 524. 1903 (Repr. ed. 1 : 382. 1963); Gamble, *Fl. Pres. Madr.* 3 : 543. 1919 (Repr. ed. 1 : 383. 1957); Haines, *Bot. Bih. Ori.* 3 : 379. 1922 (Repr. ed. 2 : 417. 1961).

Mitha-Kumra (Beng.); *Lal-Kumra* (Hindi); *Parangikayi* (Tam.); *Lal-dudiya*, *Lal-bhopli* (Mar.).

Annual herb, prostrate. Stems cylindrical, elongate, grooved. Petioles 5-19 cm long, hairy. Lamina ca. 6-19 × 7-30 cm, more or less reniform with 5-rounded shallow lobes, coarsely hairy, margin minutely dentate. Tendrils 2-6-fid. Male flowers : peduncles 10-17 cm long, calyx-tube club-shaped, 5-10 mm long, lobes 5, linear, hairy; corolla 4-7 cm long, campanulate, lobes 5, reflexed, yellow. Stamens 3, filaments thick, glanduliform, 5-8 mm long; anthers 13-17 mm long. Female flowers : peduncles 5-7 cm long, solitary. Fruits usually large and of various forms; pulp ± fibrous. Seeds 20-24 × 12-14 mm, ovate, obscurely marginate, white or yellowish.

Type : From a cultivated plant (not found); Neotype : *melo-pepo fructu maximo albo* Tournefort, Inst. 1 : 106. t. 34. 1700.

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

Distrib. : Cultivated throughout India and all tropical and temperate regions of the world.

Uses : All parts of the plant are edible. Tender shoots and leaves are used as pot-herb or as salads. The seeds are anthelmintic, diuretic and tonic. Fruit pulp is said to be useful in burns and boils (Kirt. & Basu, Med. Pl. Ind. 2 : 1155. 1935). The plant produces the largest known cucurbitaceous fruits. The seeds are used medicinally; oil is said to be a nervine tonic. There are several varieties of this plant grown commonly in gardens as a rainy season vegetable. The young fruit resembles the Vegetable Marrow (*C. pepo* Linn.) in flavour but the full grown fruit is much liked [Chakravarty in Ind. J. Agric. Sc. 16(1) : 6. 1946].

Chr. No. : $n = 20$; $2n = 40$ [Bhaduri & Bose in J. Genetics 48(2) : 237-256. 1947; Pearson *et al.* in Proc. Amer. Soc. Hort. Sci. 57 : 310. 1951].

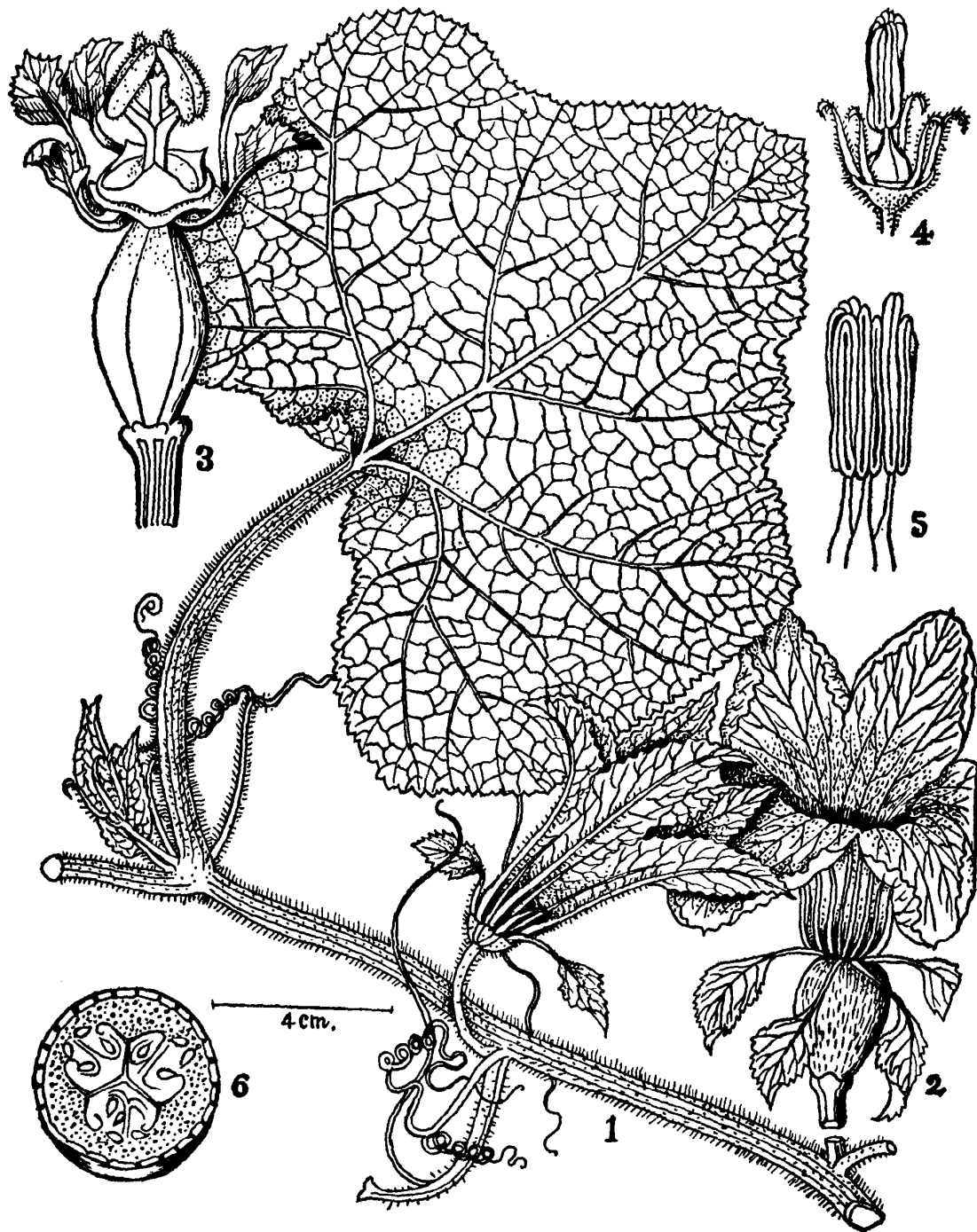
Pollen : Pentoporate, spheroidal; exine spiny, tips pointed (Nair & Kapoor in Glimp. Pl. Res. 2 : 156. 1974).

3. *C. moschata* (Duch. ex Lam.) Duch. ex Poir. Dict. Sci. Nat. 8 : 234. 1818; Clarke in Hook. f. Fl. Brit. Ind. 2 : 622. 1879; Maheshwari, Fl. Delhi, 172 : 1963. *C. pepo* var. *moschata* Duch. ex Lam. Encycl. 2 : 152. 1786.

Figs. 1-6

Kumra (Beng.); *Lal-Kumra* & *Mitha-lau* (Assam); *Mitha-kadu* & *Kadu*, *Sitaphal* (Hindi); *Kali-dudhi* (Mar.); *Crooknecked squashes* (Eng.).

Annual herb, prostrate. Stems 2-3 m long, internode 10 cm long. Petioles 8-19 cm long with pungent hairs. Lamina 16 × 24 cm, soft, 5-6-lobed, lobes acute or rarely obtuse, often with whitish blotches on the upper surface. Tendrils many-fid. Male flower solitary; calyx-tube 5-6 mm long, lobes 3, linear, very often leafy; corolla 8 × 6 cm, campanulate, lobes acute, reflexed, pale-yellow; stamens 3, filaments swollen at the base, glanduliform, 5-8 mm long, anthers *ca.* 15 mm long. Female



Cucurbita moschata (Duch. ex Lam.) Duch ex Poir.

Figs. 1-6 : 1. Habit sketch showing a male flower. 2. A female flower shown detached from no. 1. 3. A female flower, with petals removed. 4. A male flower with corolla lobes removed. 5. Stamens (3)—convoluted. 6. T. S. of ovary.

flower solitary, large ; calyx lobes, 2.5-2.8 cm long ; corolla as in the male. Fruiting peduncles stout, 5-7 cm long, angled. Fruits various, usually oblong and constricted at the middle. Seeds *ca.* 12-13 × 7-8 mm, distinctly marginate, yellow.

Type : From a cultivated plant, possibly grown from seeds from Martinique (not found).

Fls. : March-June ; *Frts.* : Oct.-Dec.

Distrib. : Cultivated throughout India and all tropical and subtropical regions.

Uses : Two primary forms, one smooth fruited but mottled brown and yellow and the other having fruits torulose or fluted with 15-30 ridges are grown. The yellow flesh of the fruit is cooked and eaten as vegetable [Chakravarty in Ind. J. Agric. Sc. 16(1) : 62. 1946].

Chr. No. : n = 24 (McKay in Bot. Gaz. 89 : 416. 1930).

4. *C. pepo* L. Sp. Pl. 1010. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 622. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 547. 1903 (Repr. ed. 1 : 582. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 377. 1903 (Repr. ed. 1 : 346. 1960) ; Prain, Beng. Pl. 1 : 524. 1903 (Repr. ed. 1 : 382. 1963) ; Haines, Bot. Bih. Ori. 3 : 398. 1922 (Repr. ed. 2 : 416. 1961) ; Kanjilal *et al.* Fl. Assam 2 : 332. 1938.

Kadmiah, *Kumra*, *Keala* (Hindi) ; *Kumra* (Beng.) ; *Kumbala* (Kan.) ; *Kohala* (Mar.) ; Pumpkin, vegetable marrow.

Annual ; stems long, prostrate or rarely short, angular, sulcate. Petioles 6-9 cm long, with rigid pungent hairs below. Lamina 8-10 × 9-10 cm, 5-lobed, lobes obtuse or acute ; sinus obtuse, *ca.* 7 cm broad and *ca.* 2 cm deep, margin dentate, base cordate, upper surface scabrous, lower with glandular club-shaped hairs. Tendrils branched. Plants monoecious. Flowers solitary. Male flowers *ca.* 5-6 cm long, peduncles 3-6 cm long, 5-angular ; calyx-tube obscurely 5-angled ; corolla 5 × 3 cm, campanulate, lobes erect, acute, yellow ; stamens 3, filaments swollen below, *ca.* 15 mm long ; anthers conical, *ca.* 10 mm long. Fruits variable, small or large, pulp fibrous. Seeds whitish yellow, 7-25 mm long, broadly or narrowly ovate, marginate.

Lecto-type : *Zuccha major rotunda* Cordus, Hist. Pl. : 117. 1561.

Fls. & Frts. : Rainy season.

Distrib. : The pumpkin or vegetable marrow is cultivated throughout India and tropical and temperate parts of the world.

Uses : Many forms are found ; some having fantastic shapes and colouration of fruits considered attractive for horticultural purposes as ornamental plants. The common form is var. *ovigera* Alef. with pear-shaped or oblong fruits (Firminger, Man. Gard. Ind. 155. 1947). '*Chappan Kadu*' or '*Vilayeti Kadu*' grown in Punjab is quick growing and early yielding. They are preferred as vegetable before they are fully ripe (Parewal, Veg. Gard. Pun. 71. 1944). The seeds are edible. The cold drawn oil from the seeds is used for edible purposes and the lower grades as illuminant (Jamieson, Veg. Fat. & Oil. 249. 1943). The fresh seeds are anthelmintic and useful as taenicide. The fruit is eaten in curry. The young tops of the tender shoots are also used as vegetable.

Chr. No. : $n = 12$ (McKay in Bot. Gaz. 89 : 416. 1930).

Pollen : Pentocolporate, exine bears 4 types of excrescences namely, clavate, hooked, baculate and spinate (Nair & Kapoor in Glimp. Pl. Res. 2 : 157. 1974).

Notes : Two primary varieties—var. *melopepo* Alef. and var. *ovigera* Alef. with a number of cultivated forms have been described by Bailey [Gentes Herb. 2(2) : 81. 1929].

13. CYCLANTHERA

Schrad. Index Sem. Hort. Gotting. 1831 et in Linnaea 8 : Litt. Ber. : 23. 1831 ; Benth. & Hook. Gen. Pl. 1 : 836. 1867 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 178. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 418. 1967.

Herbs annual, climbing, glabrous or pubescent with perennial root-stalk. Leaves entire, lobed or pedately 5-7-foliate. Tendrils simple or 2-many-fid. Plants monoecious. Flowers often minute yellowish green or white. Male flowers racemose or paniculate ; calyx-tube pateriform or cupular, 5-toothed ; corolla 5-partite, rotate, lobes ovate, often acute ; stamens united into a central column and pollen sac fusing into an annular ring ; pistillode 0. Female flower solitary ; calyx and corolla as in the male ; staminode 0 ; ovary oblique-ovoid, rostrate, 1-5-locular, mostly

trilocular and often each loculi divided by septum into small compartments with one ovule in each, ovules erect or ascending; style short, stigma large. Fruits obliquely ovoid, gibbous, subfleshy, spinose, 1-many-seeded, dehisce elastically leaving a central column with placenta. Seeds flattened, angular, apex or base often bifid or bicuspidate; testa crustaceous, smooth.

Distrib. : Principally a genus of tropical America. 1 species in India.

Notes : Stamens are basically three, but are found in a single annular ring with two theca placed one above the other, partition wall between being almost or completely disappeared. A tilt from vertical to horizontal position is finally established [Chakravarty in Lloydia 21(2) : 70-73, 1953].

1. *Cyclanthera pedata* (L.) Schrad. in Linnaea 8. Litt. Ber. : 23. 1881 ; Jeffrey in Kew Bull. 34(4) : 796. 1980 ; Mizushima in H. Hara's Fl. E. Himal. 1 : 322. 1966. *Momordica pedata* L. Sp. Pl. 1 : 1009. 1753.

Stems robust, smooth. Petioles 5-15 cm long, sulcate; lamina pedati-partite, terminal lobe 7-16 × 2-6 cm, lateral ones smaller, often 2-3-lobed, punctate-scabrid. Tendrils branched, sulcate, glabrous. Male flowers in panicle; peduncles 10-20 cm long, 25-50-flowered; pedicels 4-10 mm long, fasciculate, filiform; calyx-tube 3-4 mm broad, lobes 2.5-7.5 mm, spreading; corolla yellow, lobes 1.5-2.0 × 2.0-2.5 mm, broadly ovate-triangular, acute, apex papillose; staminal filaments fused into a single column surmounted by a single anther in the form of a disc. Female flower solitary; peduncle 1-3 mm long; calyx and corolla as in the male; ovary oblique-oblong, attenuate, rostrate at apex; style 0.5-0.7 mm long; stigma sublobulate. Fruits 5-7 × 2.5-3.0 cm, slightly gibbous, oblong, often sparsely echinate, bilocular, 8-10-seeded. Seeds 10-12 × 7-8 mm, dusky, subquadrate, base truncate, apex appendiculate, margin muricate.

Lectotype : *Momordica fructa striato laevi*, p. 754. t. 41 in Feuillee, J. Obs. 2. 1714.

Fls. : Aug.-Oct.; *Frts.* : Sept.-Nov.

Distrib. : A native of South American Andes, from Bolivia to Panama and extends to Central America. An exotic species, seems

gaining ground in the Eastern and Western Himalayan ranges. INDIA : Meghalaya, Uttar Pradesh ; SOUTH AND CENTRAL AMERICA.

Uses : The young shoots are used as vegetable. It is cultivated as a pot-herb in the Himalayan regions where it is grown as a kitchen garden plant.

Chr. No. : $n = 16$ [Chakravarty in Ind. J. Agric. Sc. 16(1) : 11. 1946].

14. DACTYLIANDRA

(Hook. f.) Hook. f. in Oliver, Fl. Trop. Afr. 2 : 557. 1871 ; Hutchinson, Gen. Fl. Pl. 2 : 392. 1967. *Bryonia* subgen. *Dactyliandra* Hook. f. in Benth. & Hook. f. Gen. Pl. 1 : 829. 1867.

Annual climbers. Stems herbaceous, 5-angled. Petioles angled. Lamina digitately 3-5-lobed, deeply sinuate-cordate at base, punctate on both surfaces, margin denticulate or serrate. Tendrils simple, glabrous or scabrid at the base. Bract stipuliform, dentate. Plants monoecious. Male flowers on slender axillary peduncles ; pedicels erect, calyx-teeth rotate ; corolla white, rotate ; stamens 3, two 2-theous, one 1-theous, filaments long, attached at bottom of hypanthium, connective not produced. Female flowers pedicillate, corolla a little longer than in male, staminodes 3, disc 3-lobed, ovary constricted into a terete column, tricarpellary, 1-celled, style glabrous, stigma 3-lobed. Fruits globose. Seeds compressed and angled, asymmetrical, obscurely corrugated or not.

Distrib. : Mainly an African genus. One species recorded in India.

1. *Dactyliandra welwitschii* Hook. f. in Oliver's Fl. Trop. Afr. 2 : 557. 1871 ; Bhandari, Fl. Ind. Des. 170. 1978.

'*Badi Aukh phootani Bel*' (Raj.).

Extensive climbers, scabrid. Petioles as long as the lamina. Lamina $8 \times 4-6$ cm, lobed, basal lobes oblique. Bracts cordate, dentate, caducous. Male flowers : pedicels 1.0-1.5 cm, filiform ; calyx-teeth $1.0-1.6 \times 0.8-1.2$ mm, ovate-oblong, obtuse ; corolla lobes *ca.* 2.0×1.2 mm, ovate-oblong ; stamens 3. Female flowers usually in fascicles of 3 ; calyx shorter but corolla longer than in male ; ovary ellipsoid. Fruits 1.0-1.4 cm diam., ellipsoid to globose, with greyish blotches. Seeds 8-15, asymmetrical, cissoid, 6×3 mm, broad and acutely angled at the middle, obliquely

narrowed at ends, distal end truncate, margined at base, obscurely corrugated, light brown.

Type : Mossambique, *Welwitsch* 832 (BM !).

Fls. : Aug.-Oct. ; *Frts.* : Sept.-Nov.

Distrib. : INDIA : Gujarat, Rajasthan ; ANGOLA, SOUTH-WEST AFRICA. South-West Africa to Western India. Usually on sandy-loam soil, along hedges, often associated with *Blastania fimbristipula* (Fenzl.) Kotschy & Peyr.

15. DICAELOSPERMUM

Clarke in Hook. f. Fl. Brit. Ind. 2 : 630. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 177. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 394. 1967.

Herbs scandent, scabrous, slender. Leaves ovate, cordate or sub-hastate. Tendrils simple. Plants monoecious. Flowers minute, shortly pedunculate, white, male and female clustered in same axil ; Male flowers : calyx-tube short, lobes 5, dentiform ; corolla deeply 5-partite, lobes entire, ovate-triangular ; stamens 3, inserted at calyx-tube, filaments short, anthers oblong, one unilocular, others bilocular, loculi erect, connective narrow, apex more or less produced ; pistillode glanduliform. Female flowers somewhat smaller than male ; calyx and corolla as in male ; ovary oblong, narrowed at ends, sparsely hairy. Fruits dry, depressed globose, unilocular, three-seeded. Seeds erect, inserted at the base.

Distrib. : A monotypic Indian genus.

1. *Dicaelospermum ritchiei* Clarke in Hook. f. Fl. Brit. Ind. 2 : 630. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 545. 1903 (Repr. ed. 1 : 580. 1958).

Stems villose. Petioles 4-5 cm long, echinate ; lamina 6-9 cm long, membranous, slightly trilobed, denticulate. Tendrils slender, sparsely hirsute. Male flowers : peduncle 2-5 mm long, filiform ; calyx-tube hirsute, 2.0 × 1.5 mm, teeth *ca.* 1 mm long, subulate ; corolla 1.5 mm long, lobes spreading ; anthers 1.3-1.5 × 0.3 mm, shortly ciliate. Female flowers : peduncles very short, calyx and corolla as in male ; style 0.3-0.4 mm long, inserted at disc. Fruits 4-4 × 7-8 mm, umbilicate at apex, red when ripe. Seeds broadly ovoid, compressed, slightly beaked, longitudi-

nally ridged, $4.5 \times 2.5-3$ mm, ca. 6 mm thick, whitish brown, cavities three, central with embryo, laterals empty.

Type : Bombay, Belgaum, *Ritchie* 316 (K!).

Fls. : July-Sept. ; *Frts.* : Oct.-Nov.

Distrib. : INDIA : Karnataka, Maharashtra, Punjab, Tamil Nadu ; endemic.

Notes : The characteristic three chambered seeds with a solid three-ribbed ridge-cell in the middle and two empty cells on either side distinguishes the species from other Cucurbit species.

16. DIPLOCYCLOS

(Endl.) Post & Kuntze, *Lexic.* 178. 1903 ; Jeffrey in *Kew Bull.* 15 : 354. 1962 ; Hutchinson, *Gen. Fl. Pl.* 2 : 402. 1967. *Bryonia* sect. *Diplocyclos* Endl. *Prodr. Fl. Norfolk. Isl.* 68 : 1833.

Glabrous herbs. Leaves palmately 3-5-lobed. Tendrils usually bifid. Plants monoecious. Flowers small, yellowish ; male and female together in axillary fascicle. Male flowers : calyx-tube broadly campanulate, lobes 5, narrow, short ; corolla campanulate, 5-partite ; stamens 3, free, inserted in the calyx-tube, one 1-locular, others 2-locular, loculi linear, slightly flexuous. Female flowers : calyx and corolla as in male, ovary 3-placentiferous, style slender, stigma 3, 2-lobed ; staminode 3, small. Fruits baccate, globose or ovoid, vertically lined or variegated, small. Seeds ovate, attenuate at base, conspicuously belted with a partition wall the central portion surrounded by belt somewhat raised on both sides.

Distrib. : A genus mostly African. One species in India.

1. *Diplocyclos palmatus* (L.) Jeffrey in *Kew Bull.* 15(3) : 352. 1962 ; Deb *et. al.* in *Bull. Bot. Soc. Beng.* 22(2) : 190. 1968. *Bryonia palmata* L. *Sp. Pl.* 1 : 1012. 1753 *excl. syn.*

Bon-kakra (Hindi).

Climbing herbs. Petioles 2.0-3.5 cm long. Lamina three lobed, lobes obtuse, margin mostly entire, rarely dentate, base broadly sinuate, upper surface punctated. Tendrils bifurcate. Plants monoecious. Flowers small, fasciculate. Male flowers : calyx-tube broadly campanulate, with a nectar within, 5-lobed, short ; corolla campanulate, 5-partite ; stamens 3,

anther-loculi linear, slightly flexuous. Female flowers : calyx and corolla as in the male, staminodes 3, ovary with 3-placentas ; stigmas 3, bilobed, ovules few, horizontal. Fruits 1.0-1.5 cm in diam., baccate globose or ovoid. Seeds $7 \times 3.5-4.0$ mm, ovate, broad, attenuate, *ca.* 2 mm thick, conspicuously belted with a partition wall slightly raised all round the belt and the central portion surrounded by the belt somewhat raised on both the sides.

Type : Ceylon, *Hermann s. n.* (BM !).

Fls. & Frts. : Dec.-Jan.

Distrib. : INDIA : Karnataka, Madhya Pradesh, Rajasthan and Uttar Pradesh ; SRI LANKA.

Notes : The species is closely allied to *Bryonopsis laciniosa* mainly in seed characters. In *B. laciniosa* the seeds are narrowly ovate and attenuate. The central partition wall is very conspicuous in *B. laciniosa* but is inconspicuous here.

17. EDGARIA

Clarke in J. Linn. Soc. 15 : 113. 1876 & in Hook. f. Fl. Brit. Ind. 2 : 631. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 130. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 389. 1967.

Herbs scandant. Leaves ovate, deeply cordate, entire. Tendrils bifid. Plants dioecious. Flowers yellow. Male flowers racemose, or rarely solitary ; calyx-tube elongate, narrowly infundibuliform ; lobes 5, filiform ; corolla subrotate, deeply 5-partite ; lobes obovate, entire ; stamens 3, included, inserted at the calyx-tube, filaments free, short ; anthers connate, one unilocular, others bilocular, loculi erect, connective apex narrow, not produced ; pistillode subulate. Female flower solitary ; calyx and corolla as in male ; staminodes nil ; ovary narrow, ovoid, trilocular, loculi 1-3-ovuled, horizontal or pendulous, style filiform, elongate ; stigmas 3, oblong, bifid. Fruits broadly fusiform, trigonous, trilocular, dry, fibrous, deeply trivalved. Seeds pendulous, subquadrate, compressed, base sub-trilobed, slightly corrugate.

Distrib. : A monotypic genus confined to Eastern Himalaya.

1. *Edgaria darjeelingensis* Clarke in J. Linn. Soc. 15 : 113. 1876 & in Hook. f. Fl. Brit. Ind. 2 : 631. 1879 ; Mizushima in H. Hara's Fl. E. Himal. 1 : 322. 1966.

Stems slender. Petioles 4-6 cm slender, densely villose. Lamina 8-12 × 6-10 cm, acute or shortly acuminate, margin entire or slightly undulate-denticulate, basal sinus somewhat round, 2.0-2.5 cm deep. Tendrils somewhat robust. Male flowers : peduncles slender, subglabrous, 10-16-flowered, 12-15 cm long ; pedicels spreading, 5-8 mm long, subfiliform, glabrous ; calyx-tube 1.5-2.0 cm long, glabrous, lobes *ca.* 3 mm long, spreading ; *ca.* 2 cm long, subglabrous ; staminal filaments 0.5 mm long ; anther-head oblong, *ca.* 5 mm long ; pistillode 3-4 mm. Fruiting peduncles 1-10 cm long, thick, trigonous, glabrous. Fruits 6-7 × 3-4 cm, glabrous or rarely pilose. Seeds *ca.* 13-14 × 9 mm and *ca.* 2 mm thick.

Type : Darjeeling, C. B. Clarke 26857 A & C. (K!).

Fls. : Aug.-Sept. ; *Frts.* : Sept.-Nov.

Distrib. : INDIA : Sikkim, West Bengal ; endemic.

Chr. No. : $n = 10$. India : West Bengal, Darjeeling, 2250 m. CBLH. 11903 [IOPB. chromosome no. report. Taxon 23 (5 & 6) : 811. 1974].

Notes : This species is often confused in the herbarium with *Herpetospermum pedunculatum* but its narrow and glabrous calyx-tube with filiform lobes distinguish it.

18. GOMPHOGYNE

Griff. Pl. Cantor. 26 : t. 4. 1837 in adnot. ; Benth. & Hook. f. Gen. Pl. 1 : 838. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 632. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 184. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 380. 1967.

Herbs weak, scandent. Leaves petiolate, pedate, leaflets 5-7, lanceolate, serrate. Tendrils simple or bifid. Plants monoecious. Flowers minute, greenish. Male flowers racemose ; calyx rotate, 5-partite, lobes oblong, short ; corolla rotate, 5-partite, lobes lanceolate, caudate acuminate ; stamens 5, united at base ; anthers subglobose, unilocular, loculi erect, longitudinally dehiscent, connective thick, not produced ; pistillode 0. Female flowers paniculate or fasciculate ; calyx and corolla as in male ; staminodes nil ; ovary turbinate or subclavate, unilocular ; styles 3, stigma bifid ; ovule often 3, pendulous. Fruit subtrigonous-campanuliform, apex truncate and plain, style persistent, coronate, apex dehiscent, often 1-3-seeded. Seeds ellipsoid, compressed, rugose, margin sub-dentate.

Distrib. : Principally an Indo-Malayan genus with 3 species. 2 species in India.

1a. Fruits small (0.8-1.5 cm long), 1-3-seeded, seeds oblong, 7-12 mm long ... 1. *G. cissiformis*

1b. Fruits large (4.5-5.0 cm long), many-seeded, seeds irregularly obovate, 9-11 mm long ... 2. *G. macrocarpa*

1. *Gomphogyne cissiformis* Griff. Pl. Contor. 26 : t. 4. 1837 in adnot. ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 632. 1879 ; Mizushima in H. Hara's Fl. E. Himal. 1 : 322. 1966.

Branches slender. Petioles 3-6 cm long, glabrous ; petiolules 3-7 mm long ; lamina membranous, acute or acuminate, crenate-dentate, middle leaflets 4-6 × 1-2 cm ; lateral leaflets shorter. Tendrils filiform, glabrous. Male racemes simple or branched, main rachis 10-30 cm long, flexuous, glabrous ; pedicels 1-3 mm long, capillary, often fasciculate ; calyx lobes 1.0-1.5 mm long, narrow, acute ; corolla lobes 2.5-3.0 × 1 mm, trinerved, margin entire. Female flowers in axillary fascicles or panicles, 5-12 cm long ; pedicels filiform, bracteolate, subulate, elongate, often tendrillar. Fruiting peduncles long. Fruits truncate, brown, costate, 8-15 × 7-12 mm ; 1-3-seeded. Seeds 7-12 × 3.5-4 mm, oblong-quadrate, sparsely tuberculate, dark-grey, truncate, base somewhat pointed.

1a. Fruiting peduncles long ; fruits glabrous

... var. *cissiformis*

1b. Fruiting peduncles short ; fruits tomentose

... var. *villosa*

var. *cissiformis*

Type : Upper Garhwal, *Madden s. n.* (K !).

Fls. : Sept.-Oct. ; *Frts.* : Oct.-Nov.

Distrib. : INDIA : Arunachal Pradesh, Himachal Pradesh, Sikkim, Uttar Pradesh, West Bengal ; MALESIA, PHILIPPINES, EASTERN CHINA.

var. *villosa* Cogn. in DC. Monog. Phan. 3 : 925. 1881 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 186. 1959.

Type : Sikkim, Lachoong, *Hooker f. s. n.* (K !, P !).

Distrib. : INDIA : Sikkim.

Notes : A large number of minute flowers borne on much slender long inflorescences and truncate ribbed fruits are distinguishing features of the species.

2. *G. macrocarpa* Cogn. in Engl. Das Pflanzenr. 4 : 40. 1916. Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 187. 1959; Deb & Dutta in Bull. Bot. Soc. Beng. 19 : 37. 1965.

Branches slender. Petioles 3-6 cm long, petiolules 3-5 mm long; lamina membranous, \pm glabrous, acute, crenate-dentate, middle leaflets 4-6 \times 1.0-1.8 cm, lateral leaflets shorter. Tendrils filiform. Male racemes ca. 30 cm long, simple; flowers ca. 8-10 mm across; calyx rotate, 5-partite; corolla rotate, 5-partite, lobes lanceolate, caudate; stamens 5, united at the base; anthers subglobose, unilocular, loculi erect, connectives short, not produced, pistillode 0. Female flowers fasciculate; calyx and corolla as in the male; staminodes 0. Ovary sub-clavate, ovules many; styles 3, stigma bifid. Fruit 4.5-5.0 \times 2.2-2.6 cm, subcylindric, many-seeded, yellow. Seeds 9-11 \times 7-8 mm, and 3-4 mm thick; irregularly obovate, both faces minutely tuberculate, base acute, apex \pm round.

Neotype : NEFA, Tirap F. D., Langsang, Kothang, Deb 26151A (CAL !).

Fls. : July-Aug. ; *Frts.* : Aug.-Sept.

Distrib. : INDIA : Arunachal Pradesh, Assam ; endemic.

19. GYMNOPETALUM

Arn. in Hook. J. Bot. 3 : 278. 1841 ; Benth. & Hook. f. Gen. Pl. 1 : 822. 1867 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 56. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 404. 1967.

Herbs slender, scandent or spreading, pubescent or scabrous. Leaves entire, 5-angular or deeply 5-lobed. Tendrils usually 2-fid. Plants monoecious or dioecious. Flowers white or yellow. Male flowers racemose or solitary; calyx-tube elongate, tubular, upper ventricose, lobes 5, subulate; corolla rotate, deeply 5-partite, lobes oblong or obovate; stamens 3, included, inserted at the middle of the calyx-tube, filaments short, free, anthers connate, one 1-locular, others bi-locular, loculi linear, longitudinally conduplicate, flexuose, connective narrow, not produced, pollen

Distrib. : An Indo-Malayan genus with 9 species. Only 3 occur in India.

Plants dioecious. Flowers yellow, male in racemes ... **3. G. wightii**

Plants monoecious. Flowers white, male usually solitary :

2a. Leaves undivided or lobed up to the middle. Seeds dusky, distinctly marginate ... **1. G. cochinchinense**

2b. Leaves divided up to base, 5-lobed. Seeds blackish, obscurely marginate ... **2. G. quinquelobum**

Gymnopetalum cochinchinense (Lour.) Kurz in J. As. Soc. Beng. 40 : 57. 1871 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 611. 1879 ; Prain, Beng. Pl. 1 : 518. 1903 (Repr. ed. 1 : 377. 1963) ; Haines, Bot. Bih. Or. 3 : 389. 1922 (Repr. ed. 2 : 406. 1961). *Bryonia cochinchinensis* Lour. Fl. Cochinch. 595. 1790.

Climbing herbs. Stems 1.5-2.0 m long, scandent. Petioles 2.5-4.0 cm long, slender ; lamina 4-6 × 3-5 cm, ovate, shortly lobed, villose-hirsute, somewhat undulate and minutely denticulate. Tendrils filiform, usually simple. Male flower either solitary, or in racemes of 3-8 flowers, pedicel 3-15 mm long ; pedicels 1-3 mm long ; bracts ± lacinate ; calyx-tube sub-cylindric, 2.5-3.0 × 3-4 mm, lobes 5-6 mm long, spreading ; corolla lobes white, 2.5-3.0 × 10-12 mm, spreading, oblong-ovate ; staminal filaments ca. 0.5 mm long, anthers both ends acute, ca. 7 mm long, 2 mm thick. Female flowers : peduncles 1-4 cm long. Fruits ca. 2-3 cm, red, angular, ovoid-oblong, apex produced, sharply 10-lobed. Seeds compressed, 7-8 mm long, ca. 3 mm broad, ca. 1.5 mm thick, dusky, distinctly marginate.

Type : Cochinchina (Vietnam), *Loureiro* s. n. (K !).

Fls. : Aug.-Oct. ; *Frts.* : Sept.-Nov.

Distrib. : INDIA : Andhra Pradesh, Arunachal Pradesh, Bihar, Assam, Manipur, Meghalaya, Nicobar island, Sikkim, Tripura, Uttar Pradesh, West Bengal ; BURMA, SRI LANKA, MALAYSIA, INDO-CHINA, PHILIPPINES.

Uses : The fruit is said to be poisonous. The decoction of the root is taken as an antidote to poisoning by ripe fruits and against tetanus after a miscarriage. Leaf-juice is given in ophthalmia. Powdered tuberous root is externally used in Chotanagpur in aches and atrophy of limbs (Burkill, Dict. Econ. Pr. 1 : 1118. 1935 ; Kirt. & Basu, Ind. Med. Pl. 2 : 1116, 1935).

Notes : The fruits resemble *Luffa amara* Wall. but turn bright scarlet when ripe and the seeds are embeded within dark-green pulp.

2. *G. quinquelobum* Miq. Fl. Ind. Bat. 1(1) : 681. 1855 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 611. 1879. *G. heterophyllum* Kurz in Trim. J. Bot. 326. 1875.

Herbs annual. Stems subglabrous, 1.0-1.5 m long. Petioles 3-6 cm long, slender. Lamina 4-6 cm long, and as broad, suborbicular, 5-lobed, lobes ovate, oblong, acute, base constricted, margin undulate, denticulate, three intermediate lobes more or less trilobed, two lateral ones somewhat subbifid. Tendrils simple or bifid. Male flower white, solitary, 1.0-1.5 cm long ; peduncles robust, striate ; bracts oblong, serrate ; calyx-tube 26-28 × 4-5 mm, lobes entire or 2-3 dentate, 5-7 × 1-2 mm ; corolla lobes 20-23 × 8-11 mm, spreading, oblong, trinerved, acute. Staminal filaments 1.5-2.0 mm long, glabrous ; anthers 7 × 3 mm. Female flower solitary, axillary ; peduncles 1-2 cm long ; calyx and corolla as in the male ; ovary acute hairy. Fruits intensely scarlet, 4-6 × 1.5-2.0 cm, oblong, fusiform. Seeds 6.0 × 3.5 mm, ca. 2.5 mm thick, blackish, thinly rugulose, obscurely marginate.

Type : Java, Soerkarta, *Horsfield s. n.* (BM, K, L).

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

Distrib. : INDIA : Andaman and Nicobar Islands ; BURMA, INDONESIA, MALAYSIA.

Notes : Leaves greatly vary from shallow to deeply lobed. The lobes may be ovate or much linear and hence sometimes present confusion in identity.

3. *G. wightii* Arn. in Hook. J. Bot. 3 : 278. 1841 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 611. 1879 ; Gamble, Fl. Pres. Madr. 3 : 530. 1919 (Repr. ed. 1 : 374. 1957).

Stems slender, sulcate. Petiole 2-4 cm long, very slender, densely villose hirsute. Lamina 7-11 × 5-8 cm, entire or angularly lobed, denticulate, basal lobes round, 1-2 cm deep. Tendrils subfiliform, elongate, striate, shortly hirsute. Male flowers : peduncles 5-8 cm long, subfiliform, apex 5-15-flowered, pedicels 5-22 mm long, *ca.* 2.5 mm thick, erect, filiform, shortly villose ; calyx lobes spreading, *ca.* 3 mm long, sparsely pillose ; corolla lobes yellow, *ca.* 6 × 2.5-3.0 mm, oblong, acute, shortly papillose ; staminal filament *ca.* 0.5 mm long ; anthers *ca.* 3.5 mm long, *ca.* 1.5 mm thick ; pistillode one, 3-4 mm long. Fruiting peduncles 2-3 cm long. Fruits *ca.* 5 × 2 cm, red, oblong, both ends attenuated. Seeds *ca.* 6.5-7 mm long, apex *ca.* 2.5 mm and base *ca.* 3.5 mm broad, *ca.* 2.5 mm thick, dark, oblong, base abruptly compressed.

Type : Ceylon (Sri Lanka), *Wight* 1146 (K !).

Fls. : Sept.-Oct. ; *Frts.* : Oct.-Nov.

Distrib. : INDIA : Karnataka, Kerala, Tamil Nadu, Uttar Pradesh ; SRI LANKA.

20. GYNOSTEMMA

Bl. Bijdr. 23 : 1825 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 633. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 187. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 414. 1967.

Herbs, perennial, scandent, glabrous or puberulous. Leaves pedately 3-7-foliolate, rarely simple, lamina ovate-lanceolate. Tendrils bifid or rarely simple. Plants dioecious, rarely monoecious. Flowers minute, white or greenish, paniculate ; panicles diffuse axillary or terminal. Male flowers : pedicels articulate, base bracteolate ; calyx rotate, 5-partite, lobes short ; corolla rotate, 5-partite, lobes lanceolate-subulate or ovate-oblong ; stamens 5, inserted deep in the calyx-tube, filaments short, base connate, apex divergent ; anthers ovate, bilocular, loculi erect, connective narrow, not produced, pollen smooth, globose ; pistillode 0. Female flowers : calyx and corolla as in the male ; staminode 0 ; ovary spherical, 2-3-celled ; style 2-3, united at the base, apex bifid ; ovules 2 in each cell, pendulous. Fruits globose, umbonate, indehiscent, 1-3-seeded. Seeds broadly ovoid, not winged, verrucose or submuricate.

Distrib. : Principally an Indo-Malayan genus ; only 2 species occur in India.

Leaves 3-foliolate ; seeds pale ashy, sub-muricate ... 1. *G. laxa*

Leaves usually pedately 5-7-foliolate ; seeds subtrigonus, yellowish, verrucose ... 2. *G. pedata*

1. *Gynostemma laxa* (Wall.) Cogn. in DC. Monog. Phan. 3 : 914. 1881.
Zanonia laxa Wall. Pl. As. Rar. 2 : 29. 1831.

Stems glabrous. Petioles 2-4 cm, slender, striate, glabrous ; lamina trifoliolate, 5-10 × 2-4 cm, oblong-lanceolate, shortly acuminate ; lateral leaflet 4-7 × 2.0-3.5 cm, rounded or slightly cordate. Tendrils slender, bifid. Male flower : peduncles 10-30 cm long, slender, flexuose, sulcate ; branches divaricate, diffuse, branchlets 2-10 cm long ; pedicels 3-7 mm, capillary, erect, bracteolate at base, bracteoles subulate, 0.5-2.0 mm long ; calyx lobes 0.3 mm long, narrow, triangular, acute ; corolla lobes 3.0 × 0.3 mm, one-nerved, entire. Fruits yellowish-green, smooth, 6-8 mm thick. Seeds 4 × 3 mm, pale ashy, almost compressed, slightly marginate, apex subacute, base round, submuricate.

Type : Silhet, *Fr. De Silva*—Wall. Cat. 3727 (K—W !).

Fls. : Aug.-Oct. ; *Frts.* : Sept.-Oct.

Distrib. : Distributed over Eastern Himalaya. INDIA : Assam, Meghalaya, Nagaland, Sikkim, West Bengal ; NEPAL, BURMA, SRI LANKA, MALESIA, CHINA.

Notes : *Gynostemma laxa* seems to be a trifoliolate form of *G. pedata*. Specimens with unifoliolate leaves [Assam, *Bor* 16334 (DD)] and specimens with unifoliolate and trifoliolate leaves in same branch [Burma, *Mac Gregor* 734 (CAL)] have been observed. I agree with the observation made by C. E. C. Fischer on the herbarium sheet (*G. laxa*) No. 2512 (DD) collected by R. N. Parker on 27. I. 1927 '*Gynostemma pedata* Bl. I can find no real difference between this and *G. laxa* (Wall.) Cogn.' Some of the specimens in Herb. Kew quoted by Cogniaux in his monograph have 3 and 5 leaflets or 5 and 7 leaflets on the same stem. Other differences mentioned also are not constant.

2. *G. pedata* Bl. Bijdr. 23. 1825 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 633. 1879 ; Prain, Beng. Pl. 1 : 528, 1903 (Repr. ed. 1 : 385. 1963) ; Gamble, Fl. Pres. Madr. 3 : 542. 1919 (Repr. ed. 1 : 383. 1957) ; Kanjilal *et. al.* Fl. Assam 2 : 331. 1938.

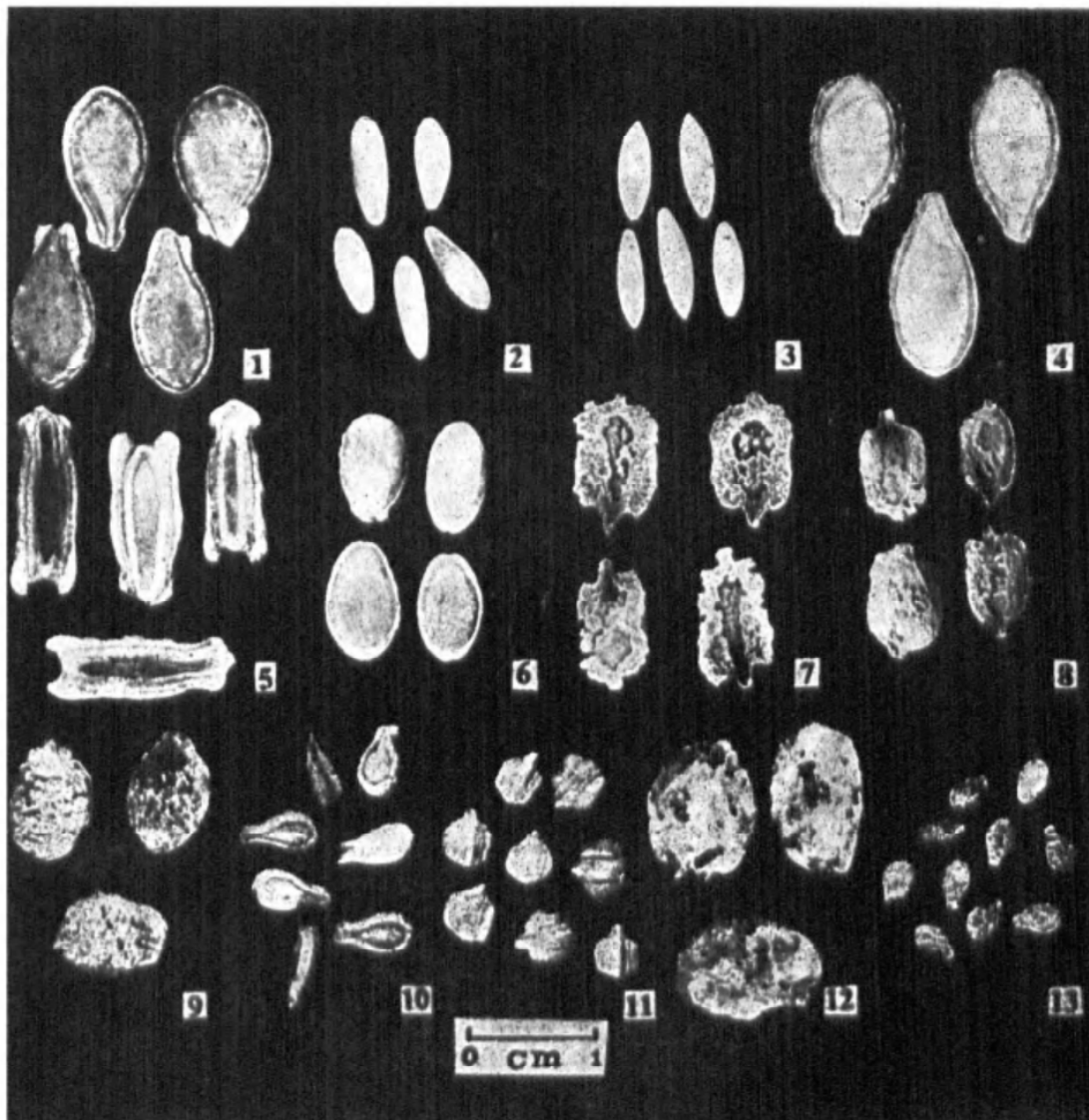


Plate I : Figs. 1—13 : Seeds of 1. *Benincasa hispida*, 2. *Cucumis melo*, 3. *Cucumis sativus*, 4. *Cucurbita maxima*, 5. *Lagenaria siceraria*, 6. *Luffa cylindrica*, 7. *Momordica charantia* (Karala), 8. *Momordica charantia* var. *muricata* (Uchchhe), 9. *Biswarea tonglensis*, 10. *Bryonopsis laciniosa*, 11. *Dicaelospermum ritchiei*, 12. *Edgaria darjeelingensis*, 13. *Gynostemma pedata*.

Stems slender. Petioles 3-7 cm long, striate, petiolules 1-4 mm long, divergent; lamina 5-7-foliate, 4-14 × 2-5 cm, ovate-oblong, crenulate-dentate, acute, lateral leaflets shorter, outermost leaflets very short. Tendrils slender, sulcate, ± puberulous, bifid or rarely simple. Plants dioecious. Male flowers in panicles; peduncles flexuose, sulcate, branched from base to apex; rachis 10-30 cm long or longer; branches divaricate with branchlets, 5-15 cm long; pedicels 1-4 mm long, capillary, flexuose, bracteolate, bracteoles 1-2 mm long, subulate; calyx lobes 0.5 mm long, triangular, acute; corolla lobes 2.0-2.5 × 0.5 mm, lanceolate, long subulate, uninnerved, margin ciliate-denticulate. Fruits *ca.* 7-9 mm thick, glabrous, olive-coloured. Seeds *ca.* 2.5-3.5 × 2.5-3.0 mm, 1.0-1.5 mm thick, subtrigonus, yellowish, verrucose.

Type : Java, *Blume s. n.* (L).

Fls. : July-Oct.; *Frts.* : Sept.-Oct.

Distrib. : The species has a wide range of distribution mainly towards the East and Far East countries. It is conspicuously absent in the drier regions of India. INDIA : Arunachal Pradesh, Assam, Himachal Pradesh, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal; NEPAL, BURMA, CHINA, MALAYSIA, INDO-CHINA, JAPAN, PHILIPPINES, FORMOSA.

Notes : This species has been put as a synonym of *Gynostemma pentaphylla* (Thunb.) Makino by Hara (Fl. E. Himal. 1 : 323. 1966) which is enlisted by Kew as a different species found in Japan (*Index Kewensis* suppl. 3 : 1901-5).

21. HEMSLEYA

Cogn. in Hook. Icon. Pl. t. 1822. 1889 et. in Bull. Herb. Boiss. 1 : 612. 1893; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 198. 1959; Hutchinson, Gen. Fl. Pl. 2 : 382. 1967.

Herbs scandent, almost glabrous. Leaves pedately 3-7-foliate, rarely simple. Tendrils often bifid. Plants dioecious. Flowers paniculate, peduncles and pedicels capillary. Male flowers : calyx-tube rotate; lobes 5, oblong or lanceolate. Corolla rotate, finely membranous, deeply 5-partite, lobes oblong or ovate; stamens 5, free, filaments very short; anthers minute, oblong or subglobose, unilocular at length, recurved; pistillode 0. Female flowers : calyx lobes triangular-subulate; corolla

lobes oblong, acute; ovary clavate-cylindric, style three, very short, distant, stigma bipartite, linear, ovules numerous, pendulous. Fruits broadly clavate, terete, apex broadly truncate-trivalved, polyspermous. Seeds pendulous, narrowly ovate, much compressed, wings finely membranous surrounding the seed.

Distrib. : Species 7; principally a Chinese genus. Only 1 species in India.

1. *Hemsleya graciliflora* (Harms) Cogn. in Engl. Das Pflanzenr. 4. 275. 1 : 24. 1916. *Alsomitra graciliflora* Harms in Engler's Bot. Jahrb. 29 : 602. 1901.

Branches deeply sulcate. Petioles 3-5 cm long, petiolules 4-7 mm long; lamina often pedately 7-foliolate, eglandular, finely membranous, oblong or oblanceolate, mucronate, crenulate-serrate, middle leaflet 5-8 × 2.0-3.5 cm, lateral ones shorter, the outer ones oblique. Tendrils filiform, often bifid. Male flowers in panicles; peduncles 15-30 cm long; pedicels 3-7 mm long, capillary, glabrous; calyx lobes triangular, *ca.* 2.5 mm long, 1-nerved; corolla lobes spreading, 4.0-4.5 × 2.5-3.0 mm, obovate; staminal filaments *ca.* 0.6 mm long; anthers 0.4-0.5 mm long. Female flowers in lax racemes. Fruiting pedicels capillary. Fruits attenuate *ca.* 2 cm long, upper portion 8-10 mm thick. Seeds *ca.* 4 × 2.0-2.5 mm, smooth, base deeply bifid, apex subrounded, wings transparent.

Types : China, Szechuan, *Rosthorn* 3134, 3136 (B).

Fls. : Aug.-Dec.; *Frts.* : Nov.-March.

Distrib. : An Indo-Chinese species, confined to limited localities of North-eastern region of India. INDIA : Arunachal Pradesh, Nagaland; CHINA.

Notes : This plant with its connate stamens forms a connecting link with *Gynostemma*.

22. HERPETOSPERMUM

Benth. & Hook. f. Gen. Pl. 1 : 834. 1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 613. 1879; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 68. 1959; Hutchinson, Gen. Fl. Pl. 2 : 403. 1967.

Herbs scandent. Leaves long petioled, ovate, entire or shortly lobed.

Tendrils bifid. Plants dioecious. Male flowers racemose, rarely solitary; calyx-tube infundibuliform above, tubular below, lobes 5, subulate, elongate; corolla broadly campanulate, almost 5-partite, lobes entire; stamens 3, included, inserted at the calyx-tube, filaments free, short; anthers connate, one unilocular, two bilocular, loculi linear, longitudinally triplicate, connective narrow, not produced; pistillode subulate or conical. Female flower solitary; calyx and corolla as in the male; staminode 0, or 3-subulate; ovary oblong, trilocular, triplacentiferous, ovules 4-6 in each loculus; style filiform, elongate; stigmas 3, ovate or oblong; ovules pendulous. Fruits fibrous, deeply 3-valved. Seeds pendulous, oblong or obovate, compressed, subsmooth, emarginate.

Distrib. : Indo-Chinese genus. Species 2, only 1 in India.

1. ***Herpetospermum pedunculatum*** (Ser. ex DC.) Baill. Hist. Pl. 8 : 445. 1886; Mizushima in H. Hara's Fl. E. Himal. 1 : 323. 1966. *Bryonia pedunculosa* Ser. ex DC. Prodr. 3 : 306. 1828.

Stems slender. Petioles 6-10 cm long. Lamina 12-16 × 9-12 cm, caudate-acuminate, crenate-dentate. Tendrils subglabrous. Male flowers : peduncles 10-16 cm, often in pairs; pedicels 2-6 cm long, erect, sparsely villose, calyx-tube 2.5 cm long, at apex 8-9 mm and at base 2 mm broad; lobes 9-10 mm long, erect; corolla lobes 20-22 × 12-14 mm, elliptic, acute, glabrous inside, outer finely punctate-glandular. Staminal filaments 2-3 mm long, filiform; anthers 5-6 mm long; pistillode linear-subulate, acute, 4-5 mm long. Fruiting peduncles 1-2 cm long, robust. Fruits 7-8 × 3-4 cm, trigonous, irregularly sinuate-cordate, thinly covered with long hairs, trivalved to the base. Seeds *ca.* 12 × 4.5-5 mm, *ca.* 3 mm thick, pale-grey, oblong, base truncate and apiculate, apex obscurely trilobed.

Type : Nepal, Wallich s. n. (G—DC !).

Fls. & Frts. : Aug.-Oct.

Distrib. : Mostly found in Eastern and Western Himalayas. INDIA : Assam, Himachal Pradesh, Manipur, Nagaland, Sikkim, Uttar Pradesh, West Bengal; NEPAL, TIBET, CHINA.

Notes : This species is frequently confused with *Edgaria darjeelingensis* Clarke as the external appearance and habitat of these two species are much alike. By the conduplicate anther-loculi, pendulous ovule, broader and hairy calyx-tube, *H. pedunculatum* can be disting-

uished from *Edgaria*. *E. darjeelingensis* never occurs in Western Himalaya but *H. pedunculatum* occurs both in the Eastern and Western Himalayas and has a much wider habitat than *E. darjeelingensis*. The recent collection of specimens of *Herpetospermum* from S. E. Tibet by Sherriff & Taylor at an elevation of 2900 m is interesting. The altitudinal range is between 1220 m and 2900 m. The plant is common between 2130 m and 2750 m.

23. HODGSONIA

Hook. f. & Thomson in Proc. Linn. Soc. 2 : 257. 1853 ; Benth. & Hook. f. Gen. Pl. 1 : 816. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 606. 1879 ; Kundu in J. Bombay nat. Hist. Soc. 43 : 363. 1943 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 27. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 407. 1967.

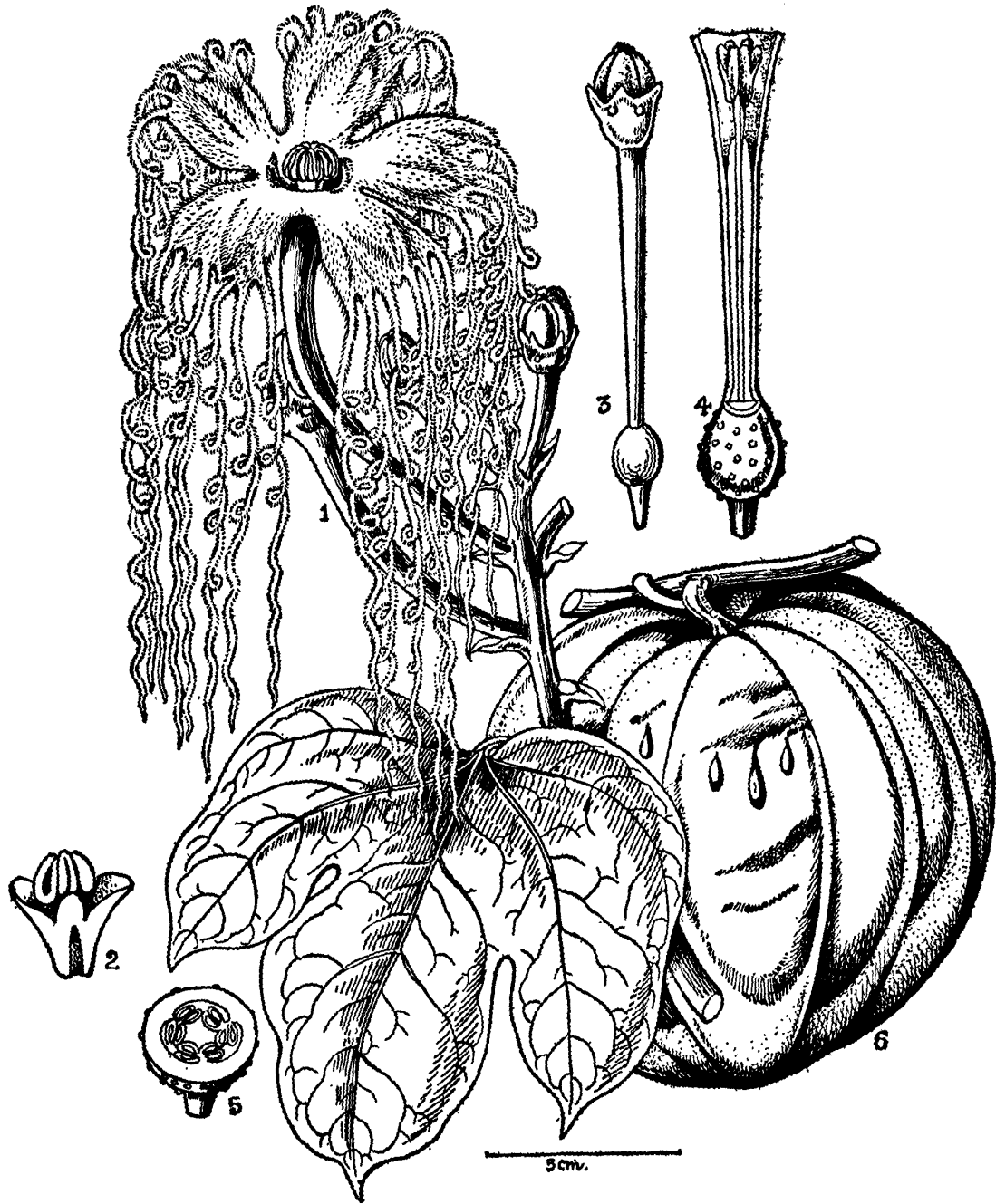
Large climbers. Plants dioecious. Male flowers in racemes ; calyx-tube elongate, slender, mouth shortly campanulate, sepals pentagonous, short ; corolla rotate, 5-partite, connate at the base, segments obtuse, truncate, long, fimbriate. Stamens 3, filaments inconspicuous ; anthers exserted, connate, linear, one 1-locular, two 2-locular, conduplicate. Female flower solitary ; calyx and corolla as in the male ; ovary globose, one locular ; style long ; stigma 3-lobed, lobes 2-fid, exserted ; ovules 12, placenta 3, parietal with pairs of ovules attached on each side, horizontal. Fruit large, depressed, 12-grooved. Perfect seeds usually 6, each having a rudimentary or barren seed attached to its side. Seeds flat, ellipsoid.

Distrib. : Principally an Indo-Malayan genus. Species 2, of which 1 occurs in India.

1. *Hodgsonia macrocarpa* (Bl.) Cogn. in DC. Monog. Phan. 3 : 349. 1881 ; Mizushima in H. Hara's Fl. E. Himal. 1 : 323. 1966. *Trichosanthes macrocarpa* Bl. Bijdr. 935. 1826. *Hodgsonia heteroclita* Hook. f. & Thomson in Proc. Linn. Soc. 2 : 257. 1853 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 606. 1879 ; Kanjilal *et. al.* Fl. Assam 2 : 326. 1938.

Figs. 1-6.

Gulur (Beng.) ; *Thebou-lata* (Asm.) ; *Kathior-pat* (Lep.) ; *Kha-um* (Lus.) ; *Thi-be* (Garo) ; *Hantharang-phar* (Mik.) ; *Mei-soh-myntar* (Khasi) ; *Kathai* (Mani.) ; *Darsani* & *Ghinphal* (Nep.).



Hodgsonia macrocarpa (Bl.) Cogn.

Figs. 1-6 : 1. A flowering branch. 2. A male flower, petals removed. 3. A female flower bud. 4. Same as 3, perianth tube longitudinally cut. 5. T. S. of ovary. 6. A fruit.

Stems robust, branched, 20-30 m long, angular, glabrous. Petioles 5-8 cm long, robust, striate. Lamina 15-20 cm long and as broad, 3-5-lobed, lobes more or less deep, acuminate, both surfaces glabrous, truncate or emarginate at base, nerves robust, lower prominently reticulate,

occasionally glandular at base. Tendrils robust, terete, glabrous, usually bifid. Male flowers : peduncles 15-30 cm long, generally thick, striate ; pedicels 0.5-1.0 cm long, bracts fleshy, oblong lanceolate ; calyx-tube 8-10 × 7-9 cm ; corolla 5 cm long, lobes 3-nerved, yellow outside, white inside, fimbriate ; fringes up to 15 cm long. Female flowers : peduncles thick, short. Fruits 7-12 × 10-16 cm, reddish-brown, tomentose. Seeds *ca.* 3-7 × 3 cm, 1-1.5 cm thick.

Type : Java, Mt. Salak, *Blume* (L).

Fls. : Feb.-March ; *Frts.* : July-Aug.

Distrib. : Tropical Eastern Himalayan region. INDIA : Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura, West Bengal ; BURMA, MALAYSIA, CHINA.

Uses : Silkworms are fed on the leaves. The oil from the seeds is used as a substitute for coconut oil for cooking in Malaya. It is used as a medicinal oil in Borneo (Fl. Assam 2 : 326. 1938 ; Burkill Dict. Econ. Prod. 1 : 1179. 1935 ; Georgi & Teik in Malay Agric. J. 17 : 392. 1929).

24. INDOFEVILLEA

Chatterjee in Kew Bull. 119-121. 1947 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 129. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 383. 1967.

Woody climber. Leaves petiolate, lamina ovate, cordate, margin entire. Tendrils lateral, apex bifid. Plants dioecious. Male flowers only known, all parts minutely puberulous ; peduncle elongate ; pedicels short ; sepals acute, longer than petals ; pistillode nil ; stamens 5, free, anthers reniform, subsessile, unilocular. Fruits indehiscent. Seeds compressed, ovate.

Distrib. : 1 species in Assam.

Notes : This endemic species has close affinity towards *Thladiantha* but differs from it in having sepals longer than petals, floral scales 0 ; anthers free, subsessile, reniform and hastate, pistillode 0 and fruit much larger.

1. *Indofevillea khasiana* Chatterjee in Kew Bull. 119 : 1947 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 129. 1959.

Rampant climbers. Stems sulcate, scabrid. Petioles 1.5-8.0 cm, stout, long, densely puberulous. Lamina 21-27 × 13-17.5 cm, broadly ovate, cordate, shortly acuminate, margin entire, veins scabrid. Tendrils 20-30 cm long, bifid at apex. Inflorescence *ca.* 17 cm long, axillary, branched, corymbose. Bracts 5-9 mm, linear, acuminate; bracteoles 2-3 mm long. Male flowers: sepals 5, free, *ca.* 6 mm long, ovate, lanceolate, longer than petals; petals 5, free, *ca.* 4 mm long, ovate, lanceolate, distinctly 3-5-nerved; stamens 5, free, four associated in two pairs (but not united), subsessile; anthers unilocular, reniform, hairy; pistillodes 0. Female flowers not seen. Young fruits *ca.* 10.0 × 3.5 cm, oblong, mature fruits *ca.* 30 cm long, 3-6 clustered on a long stalk, fleshy, indehiscent, rind woody. Seeds 3.5-4.0 × 2 cm, ovoid, compressed, faintly marginate.

Type : Khasia, *G. Mann* s. n. (K! CAL!).

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

Distrib. : INDIA : Arunachal Pradesh, Assam; endemic

25. KEDROSTIS

Medik. Phil. Bot. 2 : 69. 1791; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 165. 1959; Hutchinson, Gen. Fl. Pl. 2 : 386. 1967. *Rhynchosarpha* Schrad. in Linnaea 12 : 403. 1838; Clarke in Hook. f. Fl. Brit. Ind. 2 : 627. 1879.

Herbs scandent or prostrate, glabrous, pilose or scabrous, sometimes subcarnose, root perennial. Leaves dentate, lobate or partite. Tendrils simple or rarely bifid. Plants monoecious, rarely dioecious. Flowers small or minute, yellow or greenish. Male flowers racemose or subcorymbose; calyx-tube campanulate, sepals 5; corolla rotate, 5-partite, segments ovate-oblong; stamens 3, rarely 5, inserted at the calyx-tube, filaments short; anthers one 1-locular, others 2-locular (or 5, all one-locular), free or shortly coherent, loculi erect or more or less curved, connective often produced beyond the loculi, simple or bifid; pistillode 0 or glanduliform if present. Female flowers solitary or aggregate, shortly pedunculate, perianth like the male; staminode 0 or 3, short; ovary often ovoid, rostrate, 2-3 placentiferous; stylar disc 0 or obscure; stigma 2 or 3, broad or narrow; ovules few, horizontal. Fruits baccate, ovoid or flask-shaped, rostrate, often few-seeded. Seeds tumid, marginate, testa crustaceous, often smooth.

Distrib. : A predominantly tropical African genus. Species 27. Only 1 found in India.

1. *Kedrostis rostrata* (Rottl.) Cogn. in DC. Monog. Phan. 3 : 636. 1881 ; Cooke, Fl. Pres. Bomb. 1 : 543. 1903 (Repr. ed. 1 : 577. 1958) ; Gamble, Fl. Pres. Madr. 3 : 540. 1919 (Repr. ed. 1 : 381. 1957). *Bryonia rostrata* Rottl. Neue Schrift. Ges. Freunde Berlin 4 : 212. 1803, *Rhynchocharpa foetida* Clarke in Hook. f. Fl. Brit. Ind. 2 : 627. 1879 non Schrad.

Stems scandent, 0.5-1.0 m, sparsely pilose. Petioles 1-2.5 cm long, slender, densely-villose. Lamina 2-4 cm long and as broad, cordate-suborbicular, obtuse, base deeply emarginate, entire or denticulate. Tendrils filiform, short, subglabrous. Plants monoecious. Male flowers : peduncles 0.5-1.5 cm long, filiform, subglabrous, 2-flowered ; pedicels 2-10 mm, capillary, bracteolate ; calyx-tube ca. 2.0×1.5 mm, hemispherical, apex constricted, sepals 0.5 mm long, subulate ; petals 4 mm long, oblong-lanceolate, acute, yellow ; anthers suborbicular, connectives shortly produced. Female flowers : peduncles 1-7 mm long. Fruits $12-22 \times 8-12$ mm, subcarnose, deep red, bilocular, ovoid, 6-10-seeded, beak sublinear, 5-10 mm long. Seeds $4-5 \times 3.0-4.5$ mm, 1.0-1.5 mm thick, turgid, obovate-ovoid, finely granular, base protruding bilobed, subwinged, marginate.

Type : INDIA : Madras, *Rottler*, Wall. Num-List No. 6701 A & B (K!).

Fls. : Sept.-Nov. ; *Frts.* : Oct.-Dec.

Distrib. : An interesting and rare species confined to central western and southern India and is conspicuously absent in the eastern region. Leaving a wide gap between, it occurs again in Burma (Minbu and Ava). It, therefore, shows an interesting disjunct pattern of distribution. INDIA : Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra, Tamil Nadu ; BURMA.

Uses : The root has a sweet mucilagenous taste and is used as a demulcent in piles and asthma. The fruit is slightly sweetish and mucilagenous and is prescribed internally in electuary in cases of piles. Fruits and leaves are used as vegetable [Chakravarty in Ind. J. Agric. Sc. 16(1) : 76. 1946 ; Kirt. & Basu, Ind. Med. Pl. 2 : 1165. 1935].

26. LAGENARIA

Ser. Mem. Soc. Geneve 3(1) : 25. t. 2. 1825 ; Benth. & Hook. f. Gen. Pl.

1 : 823. 1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 613. 1879; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 66. 1959; Hutchinson, Gen. Fl. Pl. 2 : 405. 1967.

Herbs annual, scandent, softly pubescent. Leaves suborbicular-cordate, petiole apex biglandular. Tendrils bifid. Plants monoecious. Flower solitary, large, white. Male flowers long pedunculate; calyx-tube narrow, campanulate or infundibuliform, sepals 5, small, remote, petals 5, free, oblong-obovate, retuse; stamens 3, inserted at the calyx-tube, filaments free; anthers included, free or slightly coalescent, oblong, one 1-locular, two 2-locular, loculi sigmoid flexuose, contiguous or separate, connective narrow or dilated, not produced, papillose, papilla turgid, greenish-grey, oblong, pointed. Female flowers: calyx-tube cup-shaped; calyx and corolla like the male; staminodes 3, obsolete; ovary ovoid or cylindrical, triplacentiferous; style thick, short; stigmas 3, bilobed, thick; ovules numerous, horizontal. Fruits indehiscent, very fleshy. Seeds many, obovate, compressed, more or less distinctly marginate, apex truncate.

Distrib. : Species 6; cultivated in tropical countries. Only 1 species in India.

1. *Lagenaria siceraria* (Molina) Standl. in Publ. Field Mus. Nat. Hist. Chicago, Bor. Ser. 3 : 435. 1930; Mizushima in H. Hara's Fl. E. Himal. 1 : 323. 1966. *Cucurbita siceraria* Molina, Sagg. Storia Nat. Chile 133. 1782. *Lagenaria vulgaris* Seringe in Mem. Soc. Phys. Hist. Nat. Geneve 3(1) : 25. 1825; Clarke in Hook. f. Fl. Brit. Ind. 3 : 613. 1879.

Lauki, Kadu (Hindi); *Lau, Ladu* (Beng.).

Stems thick. Petioles 5-30 cm long, thick, subcylindric, often hollow, biglandular at apex. Lamina 10-40 cm long and as broad, soft, cordate, denticulate, orbiculate, angular or shortly trilobed, apex acute or shortly acuminate, basal sinus broad and deep, 5-7-nerved, pedate, lower veins prominent. Male flowers: peduncles as long as the petiole. Calyx-tube of the male flower 2-3 cm long, sepals narrow; petals 3-4 × 2-3 cm, tomentose, apex more or less emarginate, 5-nerved; staminal filaments 3-4 mm long, anthers glossy, 8-10 mm long. Female flowers: peduncles shorter than male; calyx-tube 2-3 mm long, ovary long, villose. Fruits variously shaped, greenish-yellow. Seeds 7-20 mm long, white, obovate-oblong or triangular, apex truncate or bidentate, rarely round.

Type : Sweden, Uppsala, Linn. 1151/1 (LINN).

Fls. & Frts. : Rainy as well as winter season.

Distrib. : Cultivated widely in the warmer parts of India. INDIA : Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Manipur, Punjab, Sikkim, Tamil Nadu, Tripura, West Bengal, Uttar Pradesh ; BURMA, MALAYSIA, CHINA, JAPAN, AFRICA.

Uses : Young and tender fruits are used as vegetable. The hard fruit-shells when ripe are used as bottles, bowls, laddles, pipes, blowing horns, snuff boxes. The shells are also used for musical instruments like *Sitar* and *Bina*. The fruit-pulp is considered emetic and purgative. It is cooling, diuretic and antibilious and is applied externally in delirium. Fruit-juice has various applications in indigenous medicine against pimples, rheumatism etc.

Chr. No. : $2n = 22$ [Keraudren in Mem. Mus. Nat. Hist. 16(2) : 145. 1968].

Pollen : 3-colporate, subcircular (Erdtman, Pollen Morph. & Pl. Tax. 137. 1952), exine granulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 161. 1974).

Notes : Two bilateral secretory glands at the juncture of petiole and the blade clearly differentiate the species from all other Cucurbits (Chakravarty in Philipp. J. Sc. 63 : 409-431. 1937). The occurrence of wild *Lagenaria* in West Africa clearly indicates its African origin.

27. LUFFA

Miller, Gard. Dict. Abridg. ed. 4. 1754 ; Benth. & Hook. f. Gen. Pl. 1 : 823. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 614. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 72. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 400. 1967.

Herbs annual, scandent, glabrous or pubescent. Petioles eglandular. Lamina sometimes gland-dotted. Tendrils bi- or multiferous. Probracts at leaf-axils often scaly or glandular. Plants monoecious. Male flowers in racemes ; peduncles long, often bracteate ; flowers rarely small and generally other than white, usually yellow ; calyx-tube campanulate or turbinate, lobes 5, triangular or lanceolate ; petals 5, free, spreading, obovate or obovate, entire or eroded ; stamens 3, rarely 4 or 5 inserted at the calyx-tube, free ; anthers exerted, oblong or dilated, one 1-locular, others 2-locular or all unilocular when stamens 5, loculus linear, sigmoid-flexuose, connective dilated ; pistillode glanduliform or 0. Female flowers

solitary; calyx-tube shortly produced above the ovary; staminodes 3, rarely 4-5, thick; ovary elongate, sulcate, angular or cylindric, 3-placentiferous; style columnar, stigmas 3, bilobed; ovules numerous, horizontal. Fruits dry, oblong or cylindric, terete or acutely costate, smooth or echinate, generally fibrous inside, trilocular, usually with a stopple, apex usually operculately dehiscent, many-seeded. Seeds oblong, compressed.

Distrib. : A cosmopolitan genus. Out of 9 species, 7 occur in India.

1a. Roots not tuberous :

2a. Stamens 5 :

3a. Male flowers clustered in the axil. Fruits spinous
... 4. *L. graveolens*

3b. Male flowers on long peduncles. Fruits smooth
... 2. *L. cylindrica*

2b. Stamens 3 :

4a. Fruits not angled :

5a. Fruits densely covered with bristles. Filaments united
... 3. *L. echinata*

5b. Fruits spinous, densely woolly. Filaments free
... 7. *L. umbellata*

4b. Fruits angled, elongate, 10-angled :

6a. Sepals keeled. Fruits clavate-oblong, 15-30 × 6-10 cm; seeds black, verrucose ... 1. *L. acutangula*

6b. Sepals not keeled. Fruits oblong-ellipsoidal, 5-8 × 3.0-3.5 cm; seeds shining black, smooth
... 5. *L. hermaphrodita*

1b. Roots tuberous ... 6. *L. tuberosa*

1. *Luffa acutangula* (L.) Roxb. Hort. Beng. 70 : 1814 & Fl. Ind. 3 : 713. 1832; Clarke in Hook. f. Fl. Brit. Ind. 2 : 615. 1879; Cooke. Fl. Pres. Bomb. 1 : 532. 1903 (Repr. ed. 1 : 566. 1958); Duthie, Fl. Upper Gang. Pl. 1 : 367. 1903 (Repr. ed. 1 : 337. 1960); Prain, Beng. Pl. 1 : 520. 1903 (Repr. ed. 1 : 379. 1963); Gamble, Fl. Pres. Madr. 3 : 533. 1919 (Repr. ed. 1 : 377. 1957); Haines, Bot. Bih. Or. 3 : 396. 1922 (Repr. ed. 2 : 414. 1961); Kanjilal *et. al.* Fl. Assam 2 : 331. 1938. *Cucumis acutangula* L. Sp. Pl. 1 : 1011. 1753,



Luffa acutangula (Linn.) Roxb.

Figs. 1-7 : 1. Habit sketch with flowers. 2. Part of stem and a leaf with a glandular fleshy probract. 3. A male flower cut open to show 3-stamens. 4. A female flower longitudinally cut to show style and stigma. 5. Fruit. 6. T. S. of a fruit. 7. Seeds.

Extensive climbers. Petioles 8-12 cm long, scabrous. Lamina 15-20 cm long and as broad, palmately 5-7-angled or suboblanceolate. Tendrils subhispid, often trifid. Flowers pale-yellow, male and female in the same axil. Male flowers : peduncles usually 10-15 cm long, 17-20-flowered at the apex ; pedicels 1-4 cm long ; probract* 3-7 × 2-4 mm ; fleshy green, ovate with 3-10 glistening glands on the upper surface ; calyx-tube campanulate, pentagonous ; lobes lanceolate, carinate ; petals 2.0 × 2.0-2.5 cm, obcordate ; stamens 3, 1 unilocular, 2 bilocular, filaments 3-4 mm long, bearded at base. Female flowers : peduncles 5-10 cm long ; ovary elongate, tetraangular, apex constricted. Fruits 15-30 × 6-10 cm, angular, clavate-oblong, acutely 10-angled, apex obtuse or slightly acute, not warty. Seeds 11-12 × 7-8 mm, *ca.* 2 mm thick, ovate, compressed, black.

Fruits 15-30 × 6-10 cm, angular, clavate-oblong, apex obtuse or slightly acute ... var. **acutangula**

Fruits 5-6 × 3.0-3.5 cm, obovoid, both ends conical ... var. **amara**

var. **acutangula**

Type : Neotype—Linn. 1152/7 (K!).

Fls. : June-Sept. ; *Frts.* : July-Oct.

Distrib. : Extensively cultivated in the tropics. INDIA : Andhra Pradesh, Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal ; BURMA, SRI LANKA, MALAYSIA, INDONESIA, CHINA, SOUTH AFRICA.

Uses : Ridged or angular Gourd is a popular vegetable and is eaten when tender ; on ripening it becomes fibrous and unpalatable. The leaves are used as poultice in leprosy and in splenitis. In granular conjunctivitis leaf-juice is considered useful. Ripe seeds are bitter and possess emetic and purgative properties. Oil extracted from the seeds, is toxic [Chakravarty in Ind. J. Agric. Sc. 16(1) : 38. 1946].

Chr. No. : $2n = 26$ (McKay in Bot. Gaz. 89 : 416. 1930).

Pollen : 3-colporate, syncolporate, subspheric (Nair & Kapoor in Glimp. Pl. Res. 2 : 164. 1974) ; $P = E = 85-90 \mu m$ [Keraudren in Mem. Mus. Hist. Nat. 16(2) : 154. 1968].

*Fleshy probract with secreting glands attracts ants and insects and probably helps pollination. Secreting substances help exudation of catabolic toxic elements [Chakravarty in Philipp. J. Sc. 63(4) : 1937 & Nature 162 : 576. 1948].

Notes : Several varieties of this species varying in size and taste are cultivated in India. IARI has developed a rather long fruited commercial variety called Pusa Nasdar which grows well in dry area (Chakravarty, Pl. With. Irq. 337. 1976).

var. *amara* (Roxb.) Clarke in Hook. f. Fl. Brit. Ind. 2 : 615. 1879. *Luffa amara* Roxb. Fl. Ind. 3 : 715. 1832.

Karui-taroi (Hindi); *Tita-jhinga* (Beng.); *Ram-turai* (Mar.).

Lectotype : Roxb. Ic. t. 460 (K !).

Fls. : June-July; *Frts.* : Aug.-Oct.

Distrib. : INDIA : Himachal Pradesh, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu.

Uses : Every part of this plant is remarkably bitter and the fruit is violently cathartic and emetic. For causing vomiting and purging the juice from the fruit is considered very effective [Chakravarty in Ind. J. Agric. sc. 16 (1) : 38-39. 1946; With. Ind. 6 : 179. 1962]. The fibrovascular network of the ripe fruit produce a good bath-sponge for scrubbing and cleansing skin. Sponge industry has developed much from *Luffa* in Japan.

2. *L. cylindrica* (L.) M. Roem. Fam. 2 : 63. 1846. *Momordica cylindrica* L. Sp. Pl. ed. 1 : 1009. 1753. *Luffa aegyptiaca* Mill. Dict. ed. 4 : 500. 1785; Clarké in Hook. f. Fl. Brit. Ind. 2 : 614. 1879; Cooke, Fl. Pres. Bomb. 1 : 532. 1903 (Repr. ed. 1 : 565. 1958).

Ghia-torui (Hindi); *Dhundul* (Beng.); *Ghiyatori-bhol* (Asm.); *Ghosale* (Mar.).

An extensive climber. Stems glabrous. Petioles 10-12 cm long, stout, scabrous. Lamina 15-25 cm long and as broad, palmately 5-lobed. Tendrils trifold. Probract 3-7 × 2-4 mm, fleshy, ovate with 3-7 glistening glands on the upper surface. Flowers bright yellow, male and female often in the same axil. Male flowers : peduncles 10-15 cm long, 15-20-flowered; pedicels 1-2 cm long; calyx-tube short, broadly campanulate; lobes 2-3 × 1-1.5 cm, oblong-cuneiform, apex round; stamens* 3, one 1-locular, 2 bilocular or 5 unilocular; filaments 6-8 mm long, shortly villose

*Anther-cells may remain free from one another or may remain in 2+2+1 position, hence stamens may be five, each one locular or three, two 2-locular and one 1-locular.

at base. Female flowers : peduncles 2-10 cm long, ovary cylindrical, softly hairy. Fruits 15-50 × 6-10 cm, not angular, fusiform, obtuse, strongly fibrous inside. Seeds *ca.* 12 × 8-9 mm, 2.0-2.5 mm thick, ovate, smooth, usually black, margin slightly winged.

Type : Hort. Acad. Lugd.-Bat. Cat. 482. 1687.

Fls. : June-Sept. ; *Frts.* : Oct.-Dec.

Distrib. : Cultivated and wild in tropical countries.

Uses : Tender fruits of sponge Gourd are used as vegetable though inferior to *L. acutangula*. The fibrovascular bundles of ripe fruits produce the best kind of bath-sponge. The seeds are said to be emetic and cathartic like *L. acutangula* [Ind. J. Agric. Sc. 16 (1) : 36. 1946].

Chr. No. : $n = 12$ [IOPB Chromosome no. report, CBLH. 20027—Taxon 26(4) : 450. 1977].

Pollen : 3-colporate, subcircular, $P = E = 80-84 \mu m$ [Keraudren in Mem. Mus. Hist. Nat. 16(2) : 155. 1968] ; Surface reticulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 164. 1974).

Notes : This species has a great affinity to *L. acutangula* (L.) Roxb. both in respect of shape and size of the lamina with dotted glands and the petals, and has very striking resemblance with reference to the small glandular fleshy probract (Chakravarty in Philipp. J. Sc. 63 : 424. 1937).

3. *L. echinata* Roxb. Fl. Ind. 3 : 716. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 615. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 533. 1903 (Repr. ed. 1 : 567. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 367. 1903 (Repr. ed. 1 : 337. 1960) ; Prain, Beng. Pl. 1 : 520. 1903 (Repr. ed. 1 : 379. 1963) ; Haines, Bot. Bih. Or. 3 : 396. 1922 (Repr. ed. 2 : 413. 1961) ; Bhandari, Fl. Ind. Des. 172. 1978.

Bindaal (Beng.).

Stems elongate, sulcate, glabrous, smooth. Petioles 4-12 cm long, stout, puberulous. Lamina 4-10 × 5-11 cm, reniform-suborbicular, obscurely 5-angled or deeply 5-lobed, apex round, margin minutely denticulate, both surfaces scabrous. Tendrils glabrous or puberulous, bifid. Plants often dioecious. Flowers white. Male flowers : peduncles 7-15 cm, usually robust, 5-12-flowered ; pedicels 0.5-1.0 cm long ; calyx-tube subrotate, long villose, 3-4 mm broad, lobes 5-6 mm long, triangular, lanceolate ;

petals ovate, 10-12 mm long, obtuse, base villose; stamens 3, one unilocular, two bilocular, anthers entire or more or less bifid; filaments 3-9 mm long. Female flowers: peduncles 1-3 cm long. Fruits 4-7 mm long, ashy, ovoid, base dilated, densely covered with bristles. Seeds *ca.* 4.5 × 3.5 mm, *ca.* 2 mm thick, ovate, slightly verrucose, immarginate, black.

Male racemes longer than the leaves. Fruits densely covered with bristles ... var. *echinata*

Male racemes shorter than the leaves. Bristles of the fruits fewer or fruits glabrous ... var. *longistyla*

var. *echinata*

Lectotype: Roxb. Ic. 1694 (K!).

Fls.: Sept.-Nov.; *Frts.*: Oct.-Jan.

Distrib.: INDIA: Assam, Bihar, Gujarat, Himachal Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal; AFRICA.

Uses: Fruit is intensely bitter. It has purgative properties. It is reported to be used in dropsy, nephritis and in chronic bronchial troubles.

var. *longistyla* Clarke in Hook. f. Fl. Brit. Ind. 2: 615. 1879.

Type: Uttar Pradesh, Banda, *Edgeworth*, 3018 (K!).

Fls.: Aug.-Oct.; *Frts.*: Sept.-Nov.

Distrib.: INDIA: Uttar Pradesh.

4. *L. graveolens* Roxb. Fl. Ind. 3: 716. 1832; Clarke in Hook. f. Fl. Brit. Ind. 2: 614. 1879; Prain, Beng. Pl. 1: 520. 1903 (Repr. ed. 1: 378. 1963); Haines, Bot. Bih. Or. 3: 397. 1922 (Repr. ed. 2: 415. 1961).

Stems smooth. Petioles 4-7 cm long, robust. Lamina 4-12 cm long and broad, almost round, shortly obtuse, 5-lobed, acute and apiculate, denticulate, upper surface scabrid, lower smooth or puberulous on nerves. Tendrils 3-5-fid. Flowers axillary, bright yellow. Male flowers: peduncles usually 15-30 cm long, male flowers (or male and female flowers) often clustered in the axils; pedicels 2-3 cm long; calyx-tube 4 × 6 mm, broadly campanulate, shortly villose; lobes 5-6 mm long, lanceolate; petals 15-20 mm long, sub-ovate, acute; staminal filaments thick, *ca.* 2 mm long.

Female flowers : peduncles short, 1-flowered or sometimes 2-3-flowered, ovary not beaked. Fruits 4-6 × 2.5-3.0 cm, grey, ovoid, ecostate, shortly villose, sparsely shortly tubercular or spinous. Seeds *ca.* 6 × 4 mm, 1.5-2.0 mm thick, whitish or ashy, ovate-oblong, smooth, not margined.

Lectotype : Roxb. Ic. 1693 (K !).

Fls. : Aug. ; *Frts.* : Sept.

Distrib. : INDIA : Bihar, Maharashtra, Sikkim, West Bengal ; AUSTRALIA, INDONESIA.

5. *L. hermaphrodita* Singh & Bhandari in *Baileya* 11 (4) : 133. 1963.

Satputia (Beng. & Hindi).

An extensive climber. Stems sparsely pubescent, 5-angled. Tendrils 3-5-fid, one branch more strongly developed than the others, glabrous. Petioles 8-12 cm long. Lamina 6-12 cm long, reniform, both surfaces scabrous, 5-angular. Probracts 3.5 × 2.5 mm, ovate, with 3-5 glistening glands. Flowers yellow, bisexual on peduncles of two types, one bearing a single flower, 4-8 cm long, the other multiflowered, 6-15 cm long ; pedicels 5-10 mm calyx-tube 6-7 × 4 mm, triangular ; petals 9-11 × 7 mm, pubescent ; stamens 3, inserted on the calyx-tube, filaments *ca.* 2.8 mm long, anthers sigmoid ; ovules many, horizontal ; style short ; stigmas 3, bilobed. Fruits angular, 5-8 × 3.5-5.0 cm, oblong-ellipsoidal, obscurely 10-ribbed, smooth. Seeds 9-11 × 5-6 mm, *ca.* 1.5 mm thick, many, ovate, beaked, compressed, inconspicuously winged, smooth, shining black.

Type : Jodhpur, *Bhandari* 1527A (CAL !).

Fls. & *Frts.* : Aug.-Nov.

Distrib. : INDIA : Bihar, Rajasthan, West Bengal.

Uses : Cultivated for its esculent fruits, used as vegetable.

Notes : Singh and Bhandari's (*l. c.*) record of bisexual flowers in the species is interesting and deserves further studies as bisexual flower is practically absent in all the genera and in most of the species of Cucurbitaceae. Staminodes and pistillodes are however found in many flowers. In *Luffa*, presence of staminodes is recorded in *L. cylindrica* and *L. acutangula* and others. Whether pollen grains are present in the so-called stamens and even if present whether they are viable or not, deserves

experimentation. Genetical observations on the crossings of the *L. hermaphrodita* with *L. acutangula* have been made by Richharia (Curr. Sc. 17 : 359, 1948) and Singh *et al.* (Nature 161 : 775-776, 1948).

6. *L. tuberosa* Roxb. Fl. Ind. 3 : 717. 1832; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 81. 1959.

Perennial climbers. Roots tuberous. Stems slender, scandent, striate. Petioles 2-5 cm long. Lamina 2-4.5 × 2.5-5 cm, orbicular reniform, 5-7-lobed, margin entire. Tendrils simple, filiform. Plants monoecious. Male flowers : peduncles 0.5-3.0 cm long, filiform, puberulous, ebracteate with 2-5 flowers in racemes ; pedicels 3-12 mm long, erect ; calyx broadly campanulate, lobes 6-7 × 1.5 mm, lanceolate, acuminate ; corolla yellow, 10-12 mm long ; stamens 2, filaments compressed, 0.5-2.0 mm long ; anthers *ca.* 2 mm long, one bipartite the other tripartite. Female flowers : peduncles slender, 2-8 cm long, ebracteate, stigma 2 or 3, bipartite. Fruits angular, pyriform with 8 sharp ridges, 2-4 × 1.5 cm, attenuated at apex and base. Seeds 7 × 4.5 mm, 3 mm thick, broadly ovoid, not margined, smooth, blackish grey.

Type : E. India, Heyne—Wall. Num. List No. 6754B (K!).

Fls. : July-Aug. ; *Frts.* : Sept.-Oct.

Distrib. : Disjuncted distribution in Peninsular India and Tropical Africa is interesting. INDIA : Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra ; TROPICAL AFRICA.

Uses : The tender fruits are used as vegetable and as pickles. The roots are reported to be abortifacient (Ayyar & Sundararaj in Madr. Agric. J. 33 : 127. 1945 ; Dymock, Warden & Hooper, Pharm. Ind. 2 : 80. 1890).

Notes : This species has been removed to *Momordica* under *M. cymbalaria* Fenzl. by Clarke in Hooker's Flora of British India (2 : 618. 1879). Cogniaux as referred above named it as *M. tuberosa* (Roxb.) Cogn., based on Roxburgh's *Luffa tuberosa*. The fruit is a specific character in *Luffa* and there is no reason to shift this species to *Momordica* which has either muriculate or echinate fruits but never angular. Roxburgh's (Fl. Ind. *l. c.*) note in the original description is interesting. He stated that the fruit is exactly like *L. amara* Roxb. (= *L. acutangula* var. *amara*) but without the stopple. I have examined the fruits and

agree with Roxburgh. Moreover, the leaves of all the species of *Momordica* contain true cystoliths on the lower surface. Cystoliths are absent in this species. Foliaceous bracts which are a common feature in *Momordica* are also absent in it (Chakravarty *l. c.*).

7. *L. umbellata* (Klein) Roem. Fam. 2 : 63. 1846 ; Gamble, Fl. Pres. Madr. 3 : 533. 1919 (Repr. ed. 1 : 377. 1957). *Cucurbita umbellata* Klein in Willd. Sp. Pl. 4 : 608. 1805.

Stems elongate, sulcate, glabrous. Petioles 6-12 cm long, slender, glabrous or puberulous. Lamina 3-5 cm long and as broad, ovate-cordate, slightly 3-5-lobed, acute, subulate, dentate. Tendrils puberulous, bifid. Flowers white. Male flowers : peduncles 15-28 cm long, 4-10-flowered, usually slender, glabrous ; pedicels 0.5-2.0 cm long ; stamens 3, filaments of two, bifid below the anther. Female flowers : peduncles 0.5-1.0 cm long. Fruit (immature) short, ecostate, densely long spinous, spines densely woolly.

Type : Kerala, Mirittupadu, Klein 769 (W, K !).

Fls. : July-Sept. ; *Frts.* : Aug.-Oct.

Distrib. : INDIA : Kerala ; endemic.

28. MELOTHRIA

Linn. Sp. Pl. ed. 1 : 35. 1753 ; Benth. & Hook. f. Gen. Pl. 1 : 830. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 625. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 138. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 393. 1967. *Zehneria* Endl. Prodr. Fl. Norf. 69. 1833 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 624. 1879. *Mukia* Arn. in Hook. J. Bot. 3 : 271. 1841 ; Benth. & Hook. f. Gen. Pl. 1 : 829. 1867 ; Clarke *l. c.* 2 : 623. 1879.

Annual herbs scandent. Leaves entire or somewhat lobed, often membranous. Tendrils simple. Plants monoecious or rarely dioecious. Flowers small, yellow or white. Male flowers : racemose or corymbose, rarely fasciculate or solitary ; calyx-tube campanulate, lobes dentiform ; corolla deeply 5-partite ; stamens 3, filaments free ; anthers free, oblong or suborbicular, one unilocular, others bilocular, sometimes all bilocular, loculi erect, rarely curved ; pistillode globose or annular, rarely trilobed. Female flowers : solitary or fasciculate or subumbellate ; calyx and corolla as in the male ; staminodes 3 ; ovary tri-

placentiferous, style short, surrounded by an annular disc; stigmas 3; ovules horizontal. Fruits short, baccate. Seeds ovoid or globose, compressed, marginate, smooth.

Distrib. : The largest genus of the family with about 88 species; cosmopolitan. 12 species in India.

Notes : *Melothria* L. embraces *Mukia* Arn. and *Zehneria* Endl., as recorded by Cogniaux (in DC. Monog. Phan. 3 : 572. 1881), Cogniaux and Harms (Pflanzenr. 4. 275. 1 : 75. 1916), Muller und Pax [Pflanzenfam. 4(5) : 15. 1894]. These genera have the same nature and number of stamens though occasionally all the stamens are ditheous. But it is not a constant feature (Fl. Brit. Ind. l. c.). In *Melothria* like *Luffa*, *Coccinia*, etc. the stamens are in a state of evolutionary fluctuations between 2.5 and 3. Removal of *Melothria* as a whole from Asia-Africa Zone to America on the basis of the presence of three complete stamens is therefore difficult to accept [Jeffrey in Kew Bull. 15(3) : 337. 1962]. On examination of a large number of flowers of Indian *Melothria* particularly *M. heterophylla* it has been observed that the stamens are 2.5 or 3 in ± 50 per cent ratio. A fluctuating character should not be taken as a taxonomic stability; hence Linnaean *Melothria* is retained after the monographer Cogniaux as a more reliable entity with dilatation of characters to embrace the four aforesaid genera, under *Melothria* [Fl. Brit. Ind. 2 : 624. 1879; Chakravarty l. c. & Lloydia 21(2) : 49-87. 1958].

1a. Plants monoecious :

2a. Male flowers fascicled :

3a. Leaves not amplexicaul :

4a. Seeds smooth on their faces ... 6. *M. leiosperma*

4b. Seeds scorbiculate :

5a. Fruiting peduncles less than 8 mm long.
Seeds apiculate. Leaves very scabrous
... 8. *M. maderaspatana*

5b. Fruiting peduncles 8-15 mm long. Seeds not
apiculate. Leaves not scabrous, short hispid
on both surfaces ... 3. *M. assamica*

3b. Leaves amplexicaul ... 1. *M. amplexicaulis*

2b. Male flowers not fascicled :

6a. Male flowers subumbellate at the apex of the peduncle

7a. Fruits globose or rarely ellipsoid
... 10. *M. perpusilla*

7b. Fruits ellipsoid
... 9. *M. mucronata*

6b. Male flowers with long pedicels clustered in the axils or clustered on long racemes :

8a. Fruits globose, subquadrate, obtuse :

9a. Male pedicels clustered in the axils
... 5. *M. indica*

9b. Male pedicels in distant cluster on long racemes
... 7. *M. leucocarpa*

8b. Fruits fusiform, subtrigynous :

10a. Fruits ribbed, not beaked
... 12. *M. zeylanica*

10b. Fruits not ribbed, beaked
... 11. *M. ritchiei*

1b. Plants dioecious :

11a. Fruits angular
... 2. *M. angulata*

11b. Fruits not angular
... 4. *M. heterophylla*

1. *Melothria amplexicaulis* (Lam.) Cogn. in DC. Monog. Phan. 3 : 621. 1881 ; Gamble, Fl. Pres. Madr. 3 : 539. 1919 (Repr. ed. 1 : 380. 1957). *Bryonia amplexicaulis* Lam. Encyc. Meth. Bot. 1 : 496. 1783.

Stems scandent, sulcate, glabrous. Petioles 1-3 mm long. Lamina amplexicaul, 3-6 × 2-5 cm, coriaceous, ovate, entire or lobed, deeply cordate or sagittate, obtuse, mucronate, upper surface punctate and scabrous, lower glabrous, basal sinus very narrow, acute, 1-2 cm deep. Tendrils filiform, elongate, glabrous. Plants monoecious. Male flowers : subumbellate, peduncles usually slender, glabrous, 0.5-3.0 cm long, apex 8-20-flowered ; pedicels 1-4 mm long, erect, spreading ; calyx-tube *ca.* 2.5 mm long and as broad, campanulate, lobes 0.6-0.7 mm long, subulate. Female flowers : solitary, peduncle 1-5 mm long, filiform ; ovary ovoid-oblong, apex finely rostrate, glabrous. Fruits 1.5-2.0 × 1.0-1.5 cm, broadly ovoid, rostrate, often 3-4-seeded. Seeds 6-7 × 5-6 mm, 2-3 mm thick, grey, turgid, marginate, slightly tuberculate.

Type : India Orientalis, *Sonnerat s. n.* (P !).

Fls. : May-Aug. ; *Frts.* : July-Sept.

Distrib. : INDIA : Karnataka, Kerala, Maharashtra, Tamil Nadu ; endemic in South India.

2. *M. angulata* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 899. 1952 & Rec. Bot. Surv. Ind. 17(1) : 165. 1959. *Zehneria angulata* (Chakrav.) Ellis in Bull. Bot. Surv. Ind. 9 : 8. 1967.

Plants dioecious. Stems scandent, sulcate. Petioles 0.5-1.0 cm long, villose. Lamina 6-20 cm long, coriaceous, a few glands at the base, usually hastate, undivided or lobed, acute, deeply cordate, minutely denticulate, scabrous. Tendrils slender. Male flowers : subumbellate ; peduncles slender, 0.5-5.0 mm long, apex 7-25 flowered ; pedicels 2-8 mm long, semi-erect, filiform, receptacle campanulate, *ca.* 5 × 3 mm ; sepals 0.2-0.3 mm long, subulate ; corolla *ca.* 1.5 mm long, yellow, puberulous, lobes acute ; stamens 3, filaments slender, glabrous, *ca.* 3 mm long ; anthers suborbicular. Female flower : solitary ; peduncle 0.5-1.0 cm long, ovary angular, glabrous. Fruits 9-angular, 4-7 × 2.0-2.5 cm, many-seeded. Seeds 7.0-7.5 × 5.0-5.5 mm, oblong, 3.0-3.5 mm thick, turgid, strongly margined with a girdle.

Type : South India, Gomata, *Malcolmpeth* 81 (CAL. !).

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

Distrib. : INDIA : Karnataka, Tamil Nadu ; endemic to South India.

Notes : This species is close to *M. heterophylla* (Lour.) Cogn. in many respects, but can be easily distinguished by its 9-angular fruits and strongly margined rugose seeds.

3. *M. assamica* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 897. 1952 & Rec. Bot. Surv. Ind. 17(1) : 145. 1959.

Stems scandent, hispid. Petioles 2.0-2.5 cm long. Lamina 2-3 × 3-5 cm, ovate-cordate, 5-lobed, denticulate, hispid, basal sinus 10-15 mm deep. Tendrils 3-4 cm long, simple, slender, minutely hirsute. Plants monoecious. Peduncles short. Male and female flowers in different axils. Male pedicels 2-3 mm long; receptacle, 2.0-2.5 × 1.5 mm; sepals 1.0-1.5 mm long, erect, subulate; corolla 2.0-2.5 × 1 mm, yellow, lobes ovate-oblong; stamens 3, filaments 0.3-0.5 mm long; anthers oblong, ciliate, distinctly appendiculate, *ca.* 1.5 mm long, calyx and corolla of female flowers like the male; ovary oblong, style 1.2-1.4 mm long; stigma *ca.* 0.4 mm long, tripartite; stylar disc cupuliform, margin undulate, *ca.* 0.8 mm in diam. Fruiting peduncles 8-15 mm long. Fruits 10-12 × 6-8 mm, oblong, fleshy. Seeds *ca.* 4.5 × 2.5 mm, obovate-oblong, not turgid, rather flat, both surfaces indistinctly scorbiculate, prominently marginate, never apiculate.

Leaves not rigid, surface shortly hispid ... var. *assamica*

Leaves rigid, surface scabrid ... var. *scabra*

var. *assamica*

Type : Assam, Cachar, R. L. Keenan s. n. (K. !).

Fls. & Frts. : June-July.

Distrib. : INDIA : Assam ; endemic.

var. *scabra* Chakravarty, l. c. 17(1) : 145. 1959.

Type : Assam, Goalpara, Chirang Duar, King's Collector s. n. (CAL !).

Fls. & Frts. : July-Aug.

Distrib. : INDIA : Assam ; endemic.

4. *M. heterophylla* (Lour.) Cogn. in DC. Monog. Phan. 3 : 618. 1881 ;

Cooke, Fl. Pres. Bomb. 1 : 540. 1903 (Repr. ed. 1 : 575. 1958); Duthie, Fl. Upper Gang. Pl. 1 : 378. 1903 (Repr. ed. 1 : 347. 1960); Gamble, Fl. Pres. Madr. 3 : 539. 1919 (Repr. ed. 1 : 380. 1957); Haines, Bot. Bih. Or. 3 : 389. 1922 (Repr. ed. 2 : 407. 1961); Mizushima in H. Hara's Fl. E. Himal. 1 : 324. 1966. *Solena heterophylla* Lour. Fl. Cochinch. 1 : 514. 1790, *Zehneria umbellata* Thw. Enum. Pl. Zeyl. 125. 1853; Clarke in Hook. f. Fl. Brit. Ind. 2 : 625. 1879 (Part).

Ban-kundri (Hindi); *Karakia*, *Makirla* (Ori.); *Kundri* (Beng.); *Sohkhia-phlang* (Khasi).

Herbs scandent. Petioles 0.5-1.5 cm, scabrous. Lamina 6-20 cm long, (polymorphous), coriaceous, often with a few minute glands at the base, ovate, suborbicular, oblong or narrowly lanceolate, undivided or variously lobed or narrowly quinquelobed, often acute or acuminate, base emarginate, margin remotely denticulate, rarely entire, upper surface punctate, lower ashy glabrous. Tendrils glabrous. Male flowers: various, peduncles slender, 0.2-5.0 cm long, few to many-flowered; pedicels spreading, filiform, 2-8 cm long; calyx-tube campanulate, 5 × 3 mm, glabrous; lobes 0.2-0.3 mm long, subulate; corolla *ca.* 1.5 mm long, acute, lobes spreading, puberulous. Staminal filament *ca.* 3 mm long, slender, glabrous; anthers suborbicular, *ca.* 1.3 mm long, loculi arcuate, densely ciliate. Female flowers: solitary or with axillary male flowers; peduncles 0.5-1.0 cm long. Fruits 4-5 × 2.0-2.5 cm, brown, oblong, many-seeded. Seeds 5-7 × 4-5 mm, 2.5-4.0 mm thick, grey, subspherical, turgid, smooth, immarginate, base blunt or obtuse.

Type : Cochinchina (Vietnam), *Loureiro s. n.* (BM !).

Chr. No. : $n = 13$ (Sarkar, A. K. *et al.* in *Taxon* 22 : 653. 1973).

Notes : Cogniaux (*l. c.*) distinguished 12 forms of leaves in this species. The leaves are polymorphous and in fact, the range of leaf modification is wide. Not only the leaves vary, but the inflorescence too vary to a great extent starting from lax axillary umbels to condensed axillary umbels or umbels borne upon long or short axillary peduncles. Some specimens of Sikkim Himalaya show long filiform peduncle ending in umbels. It is an extremely heteromorphic species amongst the Cucurbits. This complex species may be fragmented into many varieties and forms.

Distrib. : INDIA : Widely distributed all over India. NEPAL, BURMA, PAKISTAN, BANGLADESH, SRI LANKA, MALAYSIA, CHINA.

Uses : The roots, leaves and stems are eaten. The root is consi-

dered stimulant, invigorating and purgative; it is used in gonorrhoea. The juice of the root is considered a remedy for spermatorrhoea. Both ripe and unripe fruits and roots are eaten [Chakravarty in Ind. J. Agri. Sc. 16(1) : 73. 1946].

5. *M. indica* Lour. Fl. Cochinch. 35. 1790; Clarke in Hook. f. Fl. Brit. Ind. 2 : 626. 1879; Prain, Beng. Pl. 1 : 526. 1903 (Repr. ed. 1 : 384. 1963); Mizushima in H. Hara's Fl. E. Himal. 1 : 324. 1966.

Scandent herbs. Stems subuliform, sulcate, glabrous. Petioles 1-3 cm long, slender, shortly villose-hirsute. Lamina 2-6 cm long and broad, ovate-deltoid or cordiform, undivided or trilobed, acute, entire or minutely denticulate, shortly villose, basal sinus acute, 0.5-1.0 cm deep. Tendrils short, simple. Plants monoecious. Male flowers: solitary or fasciculate, rarely in short racemes, 2-3-flowered; pedicels 1.0-2.5 cm long, filiform, glabrous; calyx-tube 1.5-2.0 × 2.0-2.5 mm, campanulate, obtuse; lobes 1-1.5 mm long, subulate, corolla 2.0-2.5 mm long, lobes ovate-oblong; staminal filaments 0.7-0.8 mm long, anthers 0.7-0.8 mm long erect, ciliate, apex produced. Female flowers: peduncles 0.5-2.0 cm long. Fruits 10-15 × 6-8 mm, ovoid, both ends obtuse, glabrous, finely reticulate, brownish. Seeds *ca.* 3.5-4.0 × 2.0 mm, oblong, base shortly attenuate, obscurely marginate, light-grey.

Type : Cochinchina (Vietnam), Tourane, *Loureiro s. n.* (BM), not found; *Neotype* : Vietnam, Hue, *Squires 14* (BM) (Jeffrey in Kew Bull. 34 : 795. 1980).

Fls. : Aug.-Nov.; *Frts.* : Sept.-Dec.

Distrib. : Hilly regions of Himalaya. INDIA : Assam, Nagaland, Sikkim, Uttar Pradesh, West Bengal; CHINA, MALAYSIA.

Uses : Leaf-juice is used in sores of thrush and in eye-diseases. The fruit possesses purgative properties (Burkill, in Dict. Econ. Prod. Mal. Pen. 2 : 1450. 1935).

6. *M. leiosperma* (Wt. & Arn.) Cogn. in DC. Monog. Phan. 3 : 622. 1881; Cooke, Fl. Pres. Bomb. 1 : 539. 1903 (Repr. ed. 1 : 573. 1958); Gamble, Fl. Pres. Madr. 3 : 539. 1919 (Repr. ed. 1 : 380. 1957). *Bryonia leiosperma* Wt. & Arn. Prodr. 1 : 345. 1834. *Mukia leiosperma* Wt. & Arn. in Ann. & Mag. Nat. Hist. 8 : 268. 1842; Clarke in Hook. f. Fl. Brit. Ind. 2 : 623. 1879.

Stems robust, angular-sulcate, villose. Petioles 1-5 cm long, robust, densely villose, subhirsute. Lamina 6-8 × 4-6 cm, subcoriaceous, ovate-

cordate, entire, angular or shortly lobed, acute, margin denticulate, densely villose. Tendrils more or less robust. Flowers both male and female fasciculate; pedicels very short; calyx-tube *ca.* 3.0 × 2.5 mm, long villose-subhirsute, lobes 3-4 mm long, erect, spreading; corolla *ca.* 4 mm long, puberulous; anthers *ca.* 2 mm long, oblong, ciliate, shortly appendiculate. Fruiting peduncles 2-6 mm long, thick. Fruits 10-13 mm, globose, glabrous, smooth. Seeds 5.5-6.0 × *ca.* 4 mm, 2 mm thick, ovoid, base slightly attenuate, smooth, turgid, ashy, distinctly marginate.

Type : Peninsula Indiae Orientalis, *Wight* 1126 (K!).

Fls. : July-Aug.; *Frts.* : Aug.-Sept.

Distrib. : An Indo-Chinese species. INDIA : Andhra Pradesh, Assam, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Sikkim, Tamil Nadu; BURMA, SRI LANKA, CHINA, FORMOSA.

7. ***M. leucocarpa*** (Blume) Cogn. in DC. Monog. Phan. 3 : 601. 1881; Prain, Beng. Pl. 1 : 526. 1903 (Repr. ed. 1 : 384. 1963). *Bryonia leucocarpa* Blume, Bijdr. 924. 1826. *Melothria odorata* Hook. f. & Thoms. ex Clarke in Hook. f. Fl. Brit. Ind. 2 : 626. 1879.

Stems slender, sulcate. Petioles 1-2 cm long, filiform. Lamina 6-11 × 4-7 cm, upper surface punctate scabrous, lower glabrous, basal sinus broadly round, 0.3-1.5 cm deep. Tendrils filiform, simple. Plants monoecious. Male flowers small, fasciculate; pedicels 1-3 cm long, capillary, glabrous; calyx-tube 2.0-2.5 × 1.5-2.0 mm, narrow, campanulate, lobes *ca.* 1 mm long, subulate; corolla 3-4 mm long, lobes ovate-oblong, acute; staminal filaments 0.3-0.5 mm long, thick, obconic; anthers *ca.* 1.2 mm long, oblong, connective narrow, apex shortly produced at length more or less bipartite. Female flowers : solitary; calyx and corolla as in the male. Fruiting peduncles capillary, 1-4 cm long. Fruits 7-10 mm thick, globose, mucronate, glabrous. Seeds 4.5-5.0 × 2.5-3.5 mm, oblong, grey or brown, compressed, smooth, obscurely marginate.

Lamina triangular-oblong, basal lobes rounded, base not divergent

... var. ***leucocarpa***

Lamina deeply trilobed, lobes lanceolate, base divergent

... var. ***triloba***

var. ***leucocarpa***

Type : Java, Mt. Salak, *Blume s. n.* (L.).

Fls. : Oct.-Nov. ; *Frts.* : Dec.-Jan.

Distrib. : Himalayan region. INDIA : Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Nagaland, Punjab, Sikkim, Uttar Pradesh, West Bengal ; BURMA, CHINA, MALAYSIA.

var. *triloba* Clarke in Hook. f. Fl. Brit. Ind. 2 : 626. 1879 ; Prain, Beng. Pl. 1 : 527. 1903 (Repr. ed. 1 : 384. 1963). *Melothria zehnerioides* Haines in J. As. Soc. Beng. 15(3) : 315. 1920.

Type : India, Goalpara, *Buchanan-Hamilton*—Wall. Num. List No. 6707 (K !).

Fls. : Sept.-Oct. ; *Frts.* : Oct.-Nov.

Distrib. : INDIA : Assam, Bihar.

8. *M. maderaspatana* (L.) Cogn. in DC. Monog. Phan. 3 : 623. 1881 ; Cooke, Fl. Pres. Bomb. 1 : 539. 1903 (Repr. ed. 1 : 573. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 379. 1903 (Repr. ed. 1 : 347. 1960) ; Gamble, Fl. Pres. Madr. 3 : 539. 1919 (Repr. ed. 1 : 380. 1957) ; Mizushima in H. Hara's Fl. E. Himal. 1 : 324. 1966. *Cucumis maderaspatana* L. Sp. Pl. ed. 1 : 1012. 1753. *Bryonia scabrella* L. f. Suppl. 424. 1781. *Mukia scabrella* (L. f.) Arn. in Hook. J. Bot. 3 : 276. 1841 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 623. 1879 *excl. syn.*

Bilari (Beng. & Hindi).

Annuals. Stems scandent, sulcate. Petioles 1-8 cm long. Lamina 4-15 × 3-13 cm, membranous, ovate, entire, angulate or 3-5-lobed, acute, minutely denticulate, upper surface scabrous, basal sinus 1-3 cm deep. Tendrils slender, elongate. Male flowers : pedicels short ; calyx-tube *ca.* 2.0 × 1.5 mm, villose-hirsute, base acute ; lobes 1.0-1.5 mm long, erect, subulate ; corolla 2-4 mm long, yellow, lobes ovate-oblong, apex round ; staminal filaments *ca.* 0.5 mm long, shortly pilose ; anthers oblong, ciliate, base bifid, distinctly appendiculate, *ca.* 1 mm long. Female flowers : solitary or sub-fasciculate ; fruiting peduncles almost absent. Fruits 7-12 mm thick, brownish yellow, globose, juicy, smooth and shining or sparsely white echinate. Seeds *ca.* 4.0 × 2.5 mm, 1.5 mm thick, grey, turgid, ovoid-oblong, prominently sorobicate, indistinctly marginate, base apiculate.

Type : N. W. India, *Royle s. n.* (K !, CAL !).

Fls. : July-Oct. ; *Frts.* : Sept.-Dec.

Distrib. : A widespread species, cosmopolitan in distribution. INDIA : Throughout India ; BURMA, MALAYSIA, AFRICA, PHILIPPINES, AUSTRALIA, NEW ZEALAND.

Uses : Tender shoots and bitter leaves are used as aperient and is prescribed in vertigo and biliousness. The root when masticated relieves toothache. It is also given in cough and is considered sudorific (Kirt. & Basu, Ind. Med. Pl. 2 : 1160. 1935).

Chr. No. : $n = 12$. India : West Bengal, Indian Botanic Garden, CBLH 12163 [Taxon, 23(5 & 6) : 811. 1974].

9. *M. mucronata* (Blume) Cogn. in DC. Monog. Phan. 3 : 608. 1861 ; Gamble, Fl. Pres. Madr. 3 : 538. 1919 (Repr. ed. 1 : 380. 1957). *Bryonia mucronata* Blume Bijdr. 923. 1826. *Bryonia mysorensis* Arn. in Hook. J. Bot. 3 : 275. 1841 ; *Zehneria bauriana* Clarke in Hook. f. Fl. Brit. Ind. 2 : 624. 1879 (*non* Endl.).

Stems scandent, sulcate. Petioles 1-3 cm long. Lamina 5-8 cm long and as broad, broadly ovate, undivided or 3-5-lobed, acute or acuminate, denticulate, scabrous, basal sinus 1-1.5 cm deep. Tendrils subfiliform, elongate, glabrous. Plants monoecious, sometimes apparently dioecious. Male flowers : peduncles 2-6 cm long, slender, sulcate, 10-30-flowered ; pedicels 3-8 mm long ; calyx-tube 1.5-2.0 × 2-3 mm, broad, campanulate, glabrous, lobes narrow, triangular, *ca.* 0.5 mm long ; corolla puberulous, 2.5 mm long, lobes ovate, acute ; staminal filaments *ca.* 2 mm long ; anthers 0.7-1.0 mm long, ovate, papillose. Female flower : solitary, axillary. Fruits 8-15 × 6-9 mm, ovoid-oblong, sometimes subglobose, both sides obtuse, mucronate at apex, finely reticulate. Seeds 3.0-4.5 × 2.5-3.0 mm, pale grey, obovate, oblong, base constricted, smooth, indistinctly marginate.

Leaves at lower surface glabrous. Female flower solitary

... var. **mucronata**

Leaves at lower surface hairy along the nerves. Female flowers borne on axillary umbels

... var. **umbellata**

var. **mucronata**

Type : Java, *Blume s. n.* (L.).

Fls. : Aug.-Oct. ; *Frts.* : Oct.-Dec.

Distrib. : INDIA : Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu ; CHINA, MALAYSIA.

Pollen : 3-colporate, subcircular ; P = 36 μ m ; E = 27-30 μ m [Kerudren in Mem. Mus. Hist. Nat. 16 (2) : 155. 1968].

var. *umbellata* Chakravarty in Rec. Bot. Surv. India 17 (1) : 150. 1959.

Type : South India, without precise locality, *Rodriguez*, 1955 (CAL !).

Fls. : July-Aug. ; *Frts.* : Sept.

Distrib. : INDIA : Tamil Nadu ; endemic.

10. *M. perpusilla* (Blume) Cogn. in DC. Monog. Phan. 3 : 607. 1881 ; Cooke, Fl. Pres. Bomb. 1 : 540. 1903 (Repr. ed. 1 : 574. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 378. 1903 (Repr. ed. 1 : 347. 1960) ; Gamble, Fl. Pres. Madr. 3 : 538. 1919 (Repr. ed. 1 : 380. 1957) ; Mizushima in H. Hara's Fl. E. Himal. 1 : 324. 1966. *Cucurbita perpusilla* Blume, Cat. Hort. Buitenz. 105. 1823. *Zehneria hookeriana* Arn. in Hook. J. Bot. 3 : 275. 1841 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 624. 1879.

Branches slender, sulcate. Petioles 2-5 cm long, glabrous. Lamina 5-9 \times 4-7 cm, ovate-cordate, undivided or angular, rarely 3-5-lobed, acute, undulate-denticulate, glabrous basal sinus 0.5-1.5 cm deep. Tendrils slender, elongate, glabrous. Inflorescence on long peduncle. Plants monoecious. Male flowers : peduncles 2-5 cm, slender, sulcate, glabrous, 6-20-flowered ; pedicels 1-6 mm long ; calyx-tube campanulate, 1.5 \times 1.5-2 mm, teeth recurved ; corolla lobes ovate-oblong, ca. 2 mm long, sub-acute ; staminal filaments ca. 2 mm long, slender, villose ; anthers 0.6-0.7 mm long, ovate, densely papillose. Female flowers : solitary or rarely subumbellate. Fruiting peduncles 0.5-1 cm long, filiform. Fruits 8-10 cm thick, globose, finely reticulate. Seeds 4.0-4.5 \times 2.5-3.0 mm, ca. 0.5 mm thick, ovate-oblong, base slightly attenuate, smooth, distinctly marginate, brown, compressed.

Leaves apex acute or mucronate, base not truncate ... var. *perpusilla*

Leaves apex acuminate, base truncate ... var. *subtruncata*

var. *perpusilla*

Type : Java, *Blume s. n.* (L.).

Fls. : June-Nov. ; *Frts.* : July-Dec.

Distrib. : INDIA : Andhra Pradesh, Arunachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Tamil Nadu, Uttar Pradesh, West Bengal ; BURMA, CHINA, JAPAN, MALAYSIA.

Uses : The root of the plant is used in combination with milk in fever and in diarrhoea (Kirt. & Basu, Ind. Med. Pl. 2 : 1162. 1935).

Notes : The species is much variable. The leaves in the typical form is shallow cordate and usually 5-lobed, margin conspicuously sharply dentate. In other forms the leaves are not so shallow cordate and dentation not very sharp. Inflorescence exhibits umbellate, subumbellate or simple racemes, usually borne on long slender peduncle. In some South Indian specimen condensed umbels often occur at the axils of the leaves.

var. *subtruncata* Cogn. in DC. Monog. Phan. 3 : 608. 1881 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 148. 1959.

Type : Peninsula Indiae Orientalis, *Wight* 1151 (K !).

Fls. : July-Oct. ; *Frts.* : Aug.-Nov.

Distrib. : Grows in hilly region. INDIA : Andhra Pradesh, Kerala, Sikkim, Tamil Nadu ; SRI LANKA, MALAYSIA.

11. *M. ritchiei* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 898. 1952 & Rec. Bot. Surv. Ind. 17(1) : 155. 1959.

Stems slender, pilose. Petioles 4-7 cm long, villose. Lamina 2-4 cm long and as broad, cordate, 5-angular, acute, base broadly emarginate, undulate denticulate. Tendrils simple, filiform, short, subglabrous. Plants monoecious. Male flowers : peduncles 1-2 mm long, flowers shortly pedicellate, fasciculate, upper flowers caducous, pedicels filiform, spreading, densely hirsute. Receptacle campanulate, *ca.* 2 × 1 mm, sparsely villose ; sepals 5, *ca.* 0.5 mm long, subulate ; petals *ca.* 3 mm long, dusky, spreading, oblong-ovate, acute ; staminal filaments *ca.* 0.5 mm long, glabrous ; anthers connate, one 1-locular, two 2-locular, erect, somewhat curved, *ca.* 1 mm long, connective broad, shortly produced. Female flowers solitary or few on the male axil ; peduncles 4-5 mm long ; ovary elongate-linear ; style short, disc cupuliform, white ; stigma 3-lobed. Fruits elongate-linear, dusky, rostrate, apex and base attenuate, sparsely hirsute. Seeds 2-3 × 1 mm, ovate-oblong, dusky, immarginate.

Type : India, Bombay Presidency, Savantvadi State, Ramghat, *Ritchiei* 67 (E !).

Fls. : June-July ; *Frts.* : July-Aug.

Distrib. : INDIA : Kerala, Maharashtra ; endemic in peninsular India.

Notes : This species is allied to *Melothria zeylanica* Clarke but can be distinguished from it by (i) shorter angular leaves with long petioles (ii) flowers in lax fascicles (iii) smaller male pedicels (iv) receptacle longer than broad (v) fruit shorter, linear, not ribbed (vi) seeds smaller.

12. *M. zeylanica* Clarke in Hook. f. Fl. Brit. Ind. 2 : 626. 1879 ; Gamble, Fl. Pres. Madr. 3 : 538. 1919 (Repr. ed. 1 : 380. 1957). *Melothria deltoidea* Thw. Enum. Pl. Zeyl. 124. 1858 (*non* Benth.).

Stems sulcate. Petioles 2-3 cm long, filiform, puberulous. Lamina 5-10 × 4-7 cm, usually undivided, acuminate, truncate or subround, minutely remotely denticulate, upper surface punctate-scabrous at nerves, minutely villose-hirsute, lower glabrous, smooth. Tendrils filiform, short, simple. Plants monoecious. Male flowers 1-2 cm long, fasciculate, pedicels capillary ; calyx-tube 3 mm long and almost as broad, broadly campanulate, base subtruncate, glabrous, lobes *ca.* 1 mm long, subulate ; corolla *ca.* 4 mm long, puberulous, lobes spreading, oblong-ovate, acute ; staminal filaments *ca.* 0.5 mm long, glabrous ; anthers *ca.* 1.2 × 1.0 mm, subquadrate, broad, loculi erect, ciliated, connective broad, shortly produced. Fruits 3-4 × 1.0-1.5 cm, oblong, both ends acute, longitudinally 6-costate, puberulous. Seeds 5-6 × 2.5-3.0 mm, ovate-oblong, base broad, 3-lobed, immarginate, compressed, grey.

Type : Ceylon (Sri Lanka), *Walker* 273 (K !).

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

Distrib. : Indo-Malayan species ; occurs in the hills of South India. INDIA : Karnataka, Tamil Nadu ; SRI LANKA, MALAYSIA, PHILIPPINES.

29. MOMORDICA

L. Sp. Pl. ed. 1 : 1009. 1753 ; Benth. & Hook. f. Gen. Pl. 1 : 825. 1867 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 86. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 399. 1967.

Herbs scandent or prostrate, annual or perennial, glabrous or pilose. Leaves entire, lobed or pedately 3-9-foliolate. Tendrils simple or bifid. Plants monoecious or dioecious. Flowers small or large, yellow or white,

often bracteate. Male flowers solitary or corymbose or racemose ; calyx-tube short, campanulate or cupulate or shortly infundibuliform, sometimes with 2-3 incurved oblong scales at the bottom ; lobes 5, round, ovate or lanceolate ; corolla rotate or broadly campanulate, often 5-partite to the base, rarely 5-lobed, lobes often obovate or oblong ; stamens 3, inserted at the mouth of the calyx-tube, filaments short, free ; anthers coherent first, ultimately free, one unilocular, others bilocular, loculi flexuose, rarely erect or curved, connectives not produced ; pistil-
 lode 0 or glanduliform. Female flowers solitary, perianth as in the male ; staminode 0 or glandular ; ovary oblong or fusiform, triplacenti-
 ferous ; style slender, stigmas 3, entire or bifid ; ovules numerous, hori-
 zontal. Fruits oblong, fusiform or cylindric, baccate, indehiscent or tri-
 valved, muricate or echinate, oligospermous or polyspermous. Seeds
 turgid or complanate, smooth or sculptured.

Distrib. : A cosmopolitan genus with about 60 species. 7 in India.
 A few species are cultivated for vegetable.

1a. Male peduncles 1-flowered :

2a. Plants monoecious :

3a. Bracts of male flowers about the middle or below the
 middle of the peduncle ... 2. *M. charantia*

3b. Bracts of male flowers at the apex of the peduncle
 ... 1. *M. balsamina*

2b. Plants dioecious :

4a. Sepals narrow, acute :

5a. Petioles eglandular ... 5. *M. dioica*

5b. Petioles 1-5 glandular :

6a. Lamina undivided
 ... 6. *M. macrophylla*

6b. Lamina 3-5-lobed
 ... 3. *M. cochinchinensis*

4b. Sepals ovate-oblong, obtuse ... 7. *M. subangulata*

1b. Male peduncles many-flowered : ... 4. *M. denudata*

1. *Momordica balsamina* L. Sp. Pl. ed. 1 : 1009. 1753 ; Clarke in
 Hook. f. Fl. Brit. Ind. 2 : 617. 1879 ; Cooke, Fl. Pres. Bomb. 1 :

529. 1903 (Repr. ed. 1 : 562. 1958); Duthie, Fl. Upper Gang. Pl. 1 : 370. 1903 (Repr. ed. 1 : 339. 1960); Bhandari, Fl. Ind. Des. 173. 1978.

Kurelo-jungro (Sind).

Stems 0.5-1.5 m long. Petioles 1-3 cm long, puberulous. Lamina 4-7 cm long and as broad, orbicular, glabrous, 3-5-lobed up to middle, lobes rhomboid, acute mucronate, deeply acute lobulate. Tendrils simple, filiform, glabrous. Plants monoecious. Male flowers solitary, peduncles subuliform, glabrous or puberulous, bracteate at apex, 3-7 cm long; bracts sessile, suborbicular-cordate, 6-12 mm long and as broad, often broader than long; sepals 5-6 × 3.0-3.5 mm, ovate, acuminate, pubescent; corolla 10-15 × 8-12 mm, slightly irregular, light yellow, base dark grey. Female flowers: peduncles 0.5-1.5 cm long; ovary fusiform, rostrate, verrucose. Fruit 2-6 × 1-2.5 cm, broadly ovoid, rostrate, tuberculate, fleshy. Seeds 10-11 × 6-7 mm and 2.0-2.5 mm thick, grey, ovate, compressed, slightly verrucose, margin subentire.

Type : South Africa, Naal river, *Burke* 81 (K!).

Fls. : Nov.; *Frts.* : Dec.

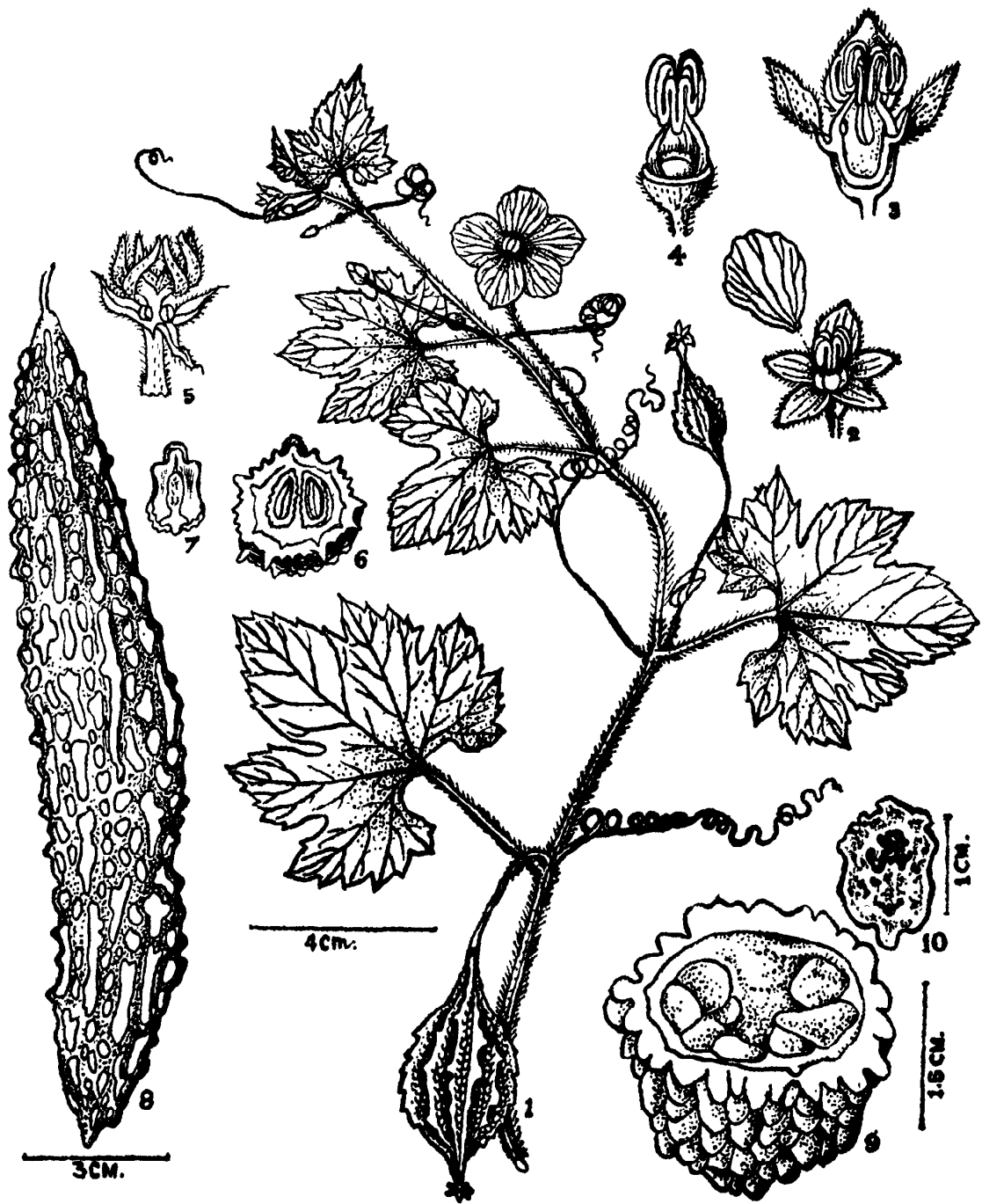
Distrib. : INDIA : Maharashtra, Punjab, Rajasthan, Uttar Pradesh; MALAYSIA, CHINA, POLYNESIA, AUSTRALIA, AFRICA, AMERICA.

Uses : Tender fruits of the plant are eaten as vegetable in stew or in pickled; they are also used to flavour food preparations. The plant is considered stomachic and tonic. Momordicine, an active cathartic principle, is present in the fruit. Infusion of the fruits is used against burns and haemorrhoids (Burkill, Dict. Econ. Prod. Mal. Pen. 1 : 1485. 1935).

Chr. No. : n = 11 [Chakravarty in Ind. J. Agric. Sc. 16(1) : 11. 1946].

2. *M. charantia* L. Sp. Pl. ed. 1 : 1009. 1753; Clarke in Hook. f. Fl. Brit. Ind. 2 : 616. 1879; Cooke, Fl. Pres. Bomb. 1 : 528. 1903 (Repr. ed. 1 : 562. 1958); Duthie, Fl. Upper Gang. Pl. 1 : 369. 1903 (Repr. ed. 1 : 338. 1960); Prain, Beng. Pl. 1 : 521. 1903 (Repr. ed. 1 : 380. 1963); Gamble, Fl. Pres. Madr. 3 : 532. 1919 (Repr. ed. 1 : 375. 1957); Haines, Bot. Bih. Or. 3 : 394. 1922 (Repr. ed. 2 : 412. 1961); Kanjilal *et al.* Fl. Assam 2 : 330. 1938; Mizushima in H. Hara's Fl. E. Himal. 1 : 324. 1966.

Karela (Hindi); *Karena* (Ori.); *Karala* (Beng.); *Pava-kai* (Tam.).



Momordica charantia Linn.

Figs. 1-7 : var. *muricata* (Uchchhe) : 1. Habit sketch. 2. A male flower. 3. Section of a male flower. 4. Male flower showing stamens. 5. Upper part of a female flower showing staminodes and stigmatic lobes. 6. T. S. of fruit. 7. A seed.

Figs. 8-10 : var. *charantia* (Karala) : 8. A fruit. 9. T. S. of the same. 10. A seed.

Stems branched, puberulous, 1-2 m long. Petioles subglabrous. Lamina 5-12 cm long and as broad, reniform or suborbicular, both surfaces glabrous, prominently nerved, 5-7-lobed, lobes ovate-oblong, base constricted, mucronate-dentate or lobulate. Tendrils simple, slender, pubescent. Plants monoecious. Male flowers solitary; peduncles slender, glabrous; bracts foliaceous, 5-15 mm long and as broad, reniform or orbicular-cordate, mucronate, entire, shortly pubescent; corolla 1.5-2.0 × 0.8-1.2 mm, slightly irregular, yellow, segments obovate, obtuse or emarginate. Female flowers: peduncles 5-10 cm long, often bracteate at base; ovary fusiform, rostrate, muriculate. Fruits 8-20 cm long, large, muricate-tuberculate, oblong, trivalved, dehiscent at apex. Seeds 13-16 × 7-9 mm, compressed, base and apex subtridentate, sculptured on surfaces.

Leaves prominently nerved. Fruits large, not tapering at both ends
... var. **charantia**

Leaves faintly nerved. Fruits small, tapering at both ends
... var. **muricata**

Figs. 8-10.

var. **charantia**

Karala (Beng.); **Carilla**.

Lectotype : From a plant cultivated at Hortecamp, Holland (BM!).

Fls. : June-Sept. ; **Frts.** : July-Oct.

Distrib. : An extensive species, cultivated and wild in tropical countries all over the world but dominates in the Indo-Malayan regions.

Uses : The fruit is much liked as vegetable all over India. It is also pickled. The fruits are considered tonic and curminative and are used against rheumatism, gout and diseases of liver and spleen. Fruits of wild forms are used as febrifuge. Many applications of the fruits are in practice in India. Abundant calcium oxalate and calcium carbonate crystals are present in the leaves mostly in the forms of cystoliths (Chakravarty in Philipp. J. Sc. 63 : 414-415. 1937).

Chr. No. : $2n = 22$ (McKay in Bot. Gaz. 89 : 416. 1930).

Pollen : 3-colporate, subtriangular, $p = 66-70 \mu m$; $E = 50-55 \mu m$; exine reticulate [Keraudrin in Mem. Mus. Hist. Nat. 16(2) : 158. 1968].

Notes : Two extensively cultivated varieties of this species differing in size and form of the fruit are found in India. The large fruited variety is called 'Karala' and the small fruited one 'Uchchhe' in vernacular (Chakravarty l. c.). Both are favourite Indian vegetables. The small fruited variety which is less bitter than the other is more esteemed because of its medicinal virtues. The fruit is very commonly eaten during an epidemic of small pox as it is supposed to have a preventive effect.

var. *muricata* (Willd.) Chakravarty *stat et comb. nov.* *M. muricata* Willd. Sp. Pl. 4 : 602. 1805 ; *M. charantia* L. var. δ L. Sp. Pl. ed. 1 : 1009. 1753.

Figs. 1-7.

Uchchhe (Beng.).

Type : Plate 10 in Rheede Hort. Mal. Ind. 8. 1688.

Fls. : July-Sept. ; *Frts* : Aug.-Oct.

Distrib. : Distribution as given in the typical variety. This variety dominates over the var. *charantia* in its widespread occurrence.

Notes : Unless a mature fruit is obtained it is hard to distinguish the two varieties. Var. *muricata* is much more common than the var. *charantia*. The lobation and size of the leaves vary much according to soil and ecological conditions. In dry regions they are very small and might be much dissected.

3. *M. cochinchinensis* (Lour.) Spreng. Syst. Veg. 3 : 14. 1826 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 618. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 530. 1903 (Repr. ed. 1 : 564. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 370. 1903 (Repr. ed. 1 : 340. 1960) ; Prain, Beng. Pl. 1 : 522. 1903 (Repr. ed. 1 : 380. 1963) ; Gamble, Fl. Pres. Madr. 3 : 532. 1919 (Repr. ed. 1 : 376. 1957) ; Kanjilal *et al.* Fl. Assam 2 : 330. 1938. *Muricia cochinchinensis* Lour. Fl. Cochinch. 2 : 596. 1790.

Golkakra (Beng.) ; *Bhat-karela* (Asm.) ; *Golkakra, Gangema* (Hindi) ; *Adavi-Kakra* (Tel.).

A strong climber. Roots tuberous, perennial. Stems robust, angular, smooth. Petioles 5-10 cm long, robust, 2-5 glandular. Lamina 12-20 cm long and as broad, broadly suborbicular, divided to the middle or almost to the base into 3 (rarely 5) lobes, base emarginate, with umbilicate glands, lobes ovate or oblong, lanceolate, divergent, entire or rarely undulate-denticulate. Tendrils robust, simple. Plants dioecious. Male flowers solitary, peduncles robust, bracteate, 6-15 cm long ; bracts 3,0-

3.5 × 4.5 cm, sessile, cucullate, orbicular-reniform, retuse, base shortly emarginate, outer surface villose, inner scabrous; calyx-lobes 14-16 × 6-7 mm, narrow, acute almost scabrous; corolla whitish yellow; lobes 5.0-6.0 × 1.5-2.5 cm, ovate-oblong; stamens 3, filament thick, with black and white marks, shining; disc glandular with two nectar pouches enclosed by lid. Female flowers: peduncles 5-15 cm long, bracteate at the middle, puberulous. Fruits 10-15 cm long, red, fleshy, ovoid, acute, densely aculeate. Seeds 26-28 × 19-29 mm and 5-6 mm thick, numerous, ashy grey, ovate, sculptured, undulate-sublobulate.

Type : Cochinchina (Viet-Nam), *Loureiro s. n.* (BM !).

Fls. : Aug.-Oct.; *Frts.* : Sept.-Nov.

Distrib. : An Indo-Malayan species, occurring in the Pacific Islands. INDIA : Andaman & Nicobar Island, Assam, Nagaland, Tamil Nadu, Uttar Pradesh, West Bengal; BURMA, MALAYSIA, CHINA, FORMOSA, PHILIPPINES.

Uses : The whole plant is considered stomachic and stimulant and is used in cough. The seeds of the species are used as aperient and in the treatment of ulcers, sores and obstruction of liver and spleen. The fruits and leaves are used as external applications in lumbago and ulceration. The plant is used as an alterative bitter drug (Burkill, Dict. Econ. Prod. Mal. Pen. 2 : 1486. 1935).

4. *M. denudata* (Thw.) Clarke in Hook. f. Fl. Brit. Ind. 2 : 618. 1879; Gamble, Fl. Pres. Madr. 3 : 532. 1919 (Repr. ed. 1 : 376. 1957). *Momordica dioica* var. *denudata* Thw. Enum. Pl. Zeyl. 126. 1859.

Stems slender, glabrous. Petioles 2-4 cm long, slender. Lamina 6-10 × 4-6 cm, ovate-oblong, 3-5 angular or lobed, acuminate, rarely obtuse, base deeply emarginate, margin minutely and remotely denticulate, glabrous and smooth. Tendrils filiform, glabrous, smooth, simple. Plants dioecious. Male flowers: peduncles 2-10 cm long, flexuose, 8-40-flowered; pedicels capillary, erect, glabrous, bracteolate, 4-18 mm long; bracteole 1-3 mm long, subulate; calyx-tube attenuate, lobes 3-4 × 1.5 mm, lanceolate, subulate; corolla lobes ca. 7 × 3 mm, ovate-oblong, acute, inner glabrous, outer villose; staminal filaments, short, anther subglobose, ca. 2 mm thick, coherent. Female flowers peduncles 3-6 cm long, minutely bracteolate. Fruits ca. 3 cm thick, subglobose, rostrate. Seeds 10 × 5.5 mm and 2.0-2.5 mm thick, yellow, ovate-oblong, sculptured, shortly attenuate, slightly undulate crenulate.

Type : Ceylon (Sri Lanka), *Thwaites 1615* (K !).

Fls. : Aug.-Nov. ; *Frts.* : Sept.-Nov.

Distrib. : INDIA : Kerala ; SRI LANKA.

5. *M. dioica* Roxb. ex Willd. Sp. Pl. 4 : 605. 1805 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 617. 1879 (*excl. syn.*) ; Cooke, Fl. Pres. Bomb. 1 : 529. 1903 (Repr. ed. 1 : 563. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 370. 1903 (Repr. ed. 1 : 339. 1960) ; Prain, Beng. Pl. 1 : 521. 1903 (Repr. ed. 1 : 380. 1963) ; Gamble, Fl. Pres. Madr. 3 : 523. 1919 (Repr. ed. 1 : 375. 1957) ; Kanjilal *et al.* Fl. Assam 2 : 330. 1938 ; Bhandari, Fl. Ind. Des. 174. 1978.

Kaksa (Hindi) ; *Kakrol*, *Ban-karela* (Beng.) ; *Kanchan-arak* (Santal) ; *Kartoli* (Maharashtra) ; *Agakral* (Tel.) ; *Karlikai* (Kan.) ; *Tholloopavail* (Tam).

Perennials, roots tuberous ; stems slender. Petioles 1-3 cm long. Lamina 4-10 × 3-8 cm, ovate, mucronate, base emarginate, smooth, entire or variously lobed undulate or minutely and remotely denticulate. Tendrils filiform, simple. Plants dioecious. Male flowers solitary, peduncles slender, 4-14 cm long, bracteate at apex ; bracts sessile, cucullate, occasionally ciliated, subglabrous ; sepals 5-7 × 1.5-2.0 mm, lanceolate-linear, acute, densely villose ; corolla 2.0-3.5 × 1.5-2.5 cm, yellow, lobes oblong, obtuse, veins black grey. Female flowers : peduncles ebracteate, 1.5-2.5 cm long (Sikkim Himalayan specimens have very long peduncles) ; ovary ovoid, oblong. Fruits 3-5 × 2.0-3.3 cm, ovoid. Seeds 6-7 × 5-6 mm, pale yellow, broadly ovoid, emarginate, slightly corrugate, seed-coat very brittle.

Type : Peninsular Indiae Orientalis, Nandaradah, *Rottler s. n.* (K!).

Fls. : June-Aug. ; *Frts.* : Sept.-Oct.

Distrib. : INDIA : Throughout India ; BURMA, SRI LANKA, CHINA.

Uses : The mucilagenous tuber is used medicinally against bleeding of piles. It is also used as expectorant. The root is used as a sedative in fevers (Kirt. & Basu, Ind. Med. Pl. 2 : 1135, 1935). The fruit is extensively used as a vegetable and has a pleasant taste being less bitter than *M. charantia*. The plant is widespread both wild and cultivated.

6. *M. macrophylla* Gage in Rec. Bot. Surv. Ind. 3 : 61. 1908 ; Craib in Kew Bull. 56. 1911 ; Chakravarty *l. c.* 17(1) : 94. 1959.

Branches angular-sulcate. Petioles 4-6 cm long, glandular at the middle, sulcate, pilose. Lamina 12-16 × 10-14 cm, cordate, shortly acuminate. Tendrils simple, glabrous, smooth. Plants dioecious. Male flowers solitary, 3-4-flowered, bracteate; bracts reniform, undivided, concave, 2-3 cm long and almost as broad; flowers included in the bract; sepals oblong-linear, acute; petals 2.0-3.5 × 1.5-2.0 cm, brownish yellow, base black, densely hairy above, acute; stamens 3, one 1-locular, two 2-locular, filaments black. Female flowers solitary, axillary, bracteolate at the middle of the peduncle, bracteole concave, acute, *ca.* 2 mm long and almost as broad; sepals as in the male; petals somewhat smaller than in the male, *ca.* 2 × 1 cm; ovary oblong, spinose. Fruits 10-12 × 6-8 cm, oblong, large, spinose. Seeds 2.0-2.5 × 1.5 cm, grey-black, large, oblong, deeply sculptured, margin undulate-uneven.

Type : Burma, Minbu, Pomin riverside, *Seikh Mokim* 253 (CAL !); Tenasserim, Taepo, *Gallathy* 80 (*Syntype*, CAL. !).

Fls. : May-July; *Frts.* : July-Aug.

Distrib. : INDIA : Assam; BURMA, MALAYSIA.

7. *M. subangulata* Blume, *Bijdr.* 928. 1826; Kurz in *J. As. Soc. Beng.* 46(2) : 102. 1877; Cooke, *Fl. Pres. Bomb.* 1 : 530. 1903 (Repr. ed. 1 : 563. 1958); Gamble, *Fl. Pres. Madr.* 3 : 532. 1919 (Repr. ed. 1 : 375. 1957).

Stems slender. Petioles 3-7 cm long, slender. Lamina 6-13 × 4-9 cm, somewhat membranous, ovate or angular, 3-5-lobed, acute or acuminate, base deeply emarginate, minutely and remotely denticulate. Tendrils subfiliform, glabrous, simple. Plants dioecious. Male flowers solitary, peduncles slender, shortly villose, apex bracteate, 5-13 cm long; bracts sessile, cucullate, suborbicular-reniform, subacute, base shortly emarginate, margin entire and shortly densely ciliate, calyx lobes 7-8 × 4 mm, ovate-oblong, obtuse, shortly densely villose; corolla 4-6 cm broad, yellow. Female flowers : peduncles 5-6 cm long, usually at base, minutely bracteate. Fruits 6-7 × 2-4 cm, ovoid, attenuated at base, softly densely echinate. Seeds 10-12 mm long and as broad, 4-6 mm thick, ashy, ovate-round, slightly verrucose.

Type : Java, Mt. Salak, *Blume* 769 (L—n. v.).

Fls. : June-Aug.; *Frts.* : July-Oct.

Distrib. : An Indo-Malayan species. INDIA : Karnataka, Maharashtra, Meghalaya, Sikkim; MALAYSIA.

30. NEOALSOMITRA

Hutchinson in Ann. Bot. (n. s.) 6 : 97. 1942; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 194. 1959; Hutchinson, Gen. Fl. Pl. 2 : 381. 1967. *Alsomitra* Roem. Syn. Fam. 2 : 117. 1846 *pro parte* (*non Zanonia* Sect. *Alsomitra* Blume); Benth. & Hook. f. Gen. Pl. 1 : 840. 1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 634. 1879.

Woody climbers, glabrous or pubescent. Leaves simple or often 3-5-foliolate. Lamina entire, base sometimes biglandular. Tendrils simple or bifid. Plants dioecious. Flowers small, white or greenish. Male flowers in panicles or in axillary lax racemes; peduncles and pedicels often capillary; calyx-tube cupular, lobes 5, oblong or oblong-lanceolate; corolla rotate, deeply 5-partite, lobes oblong, eroded; stamens 5, free, filaments short, base contiguous; anthers small, oblong, unilocular at length, recurved; pistillode 0. Female flowers in racemes. Ovary unilocular or imperfectly 3-locular, style rarely 4, conical, fleshy, stigma semilunar, ovule in each loculus numerous, pendulous, placenta 3, thick. Fruits clavate or cylindric, terete or subtrigonous, apex broadly truncate, trivalved. Seeds imbricate, compressed, with or without membranous wings, margin sinuate-tuberculate, testa brittle.

Distrib. : Total species 12; only one occurs in India.

1. *Neoalsomitra clavigera* (Wall.) Hutch. in Ann. Bot. (n. s.) 6 : 100. 1942. *Zanonia clavigera* Wall. Pl. Asiat. Rar. 2 : 28. 1831. *Alsomitra clavigera* Roem. Syn. Fam. 2 : 118. 1846; Clarke in Hook. f. Fl. Brit. Ind. 2 : 634. 1879.

Branches slender. Petioles 1.5-2.0 cm long, petiolules 5-7 mm long. Lamina 5-10 × 1.5-3.5 cm, trifoliolate, oblong-lanceolate, acuminate, entire; lateral leaflets asymmetrical, often uniglandular at base; middle leaflet 7-12 × 2-5 cm, acute. Tendrils glabrous, bifid. Male flowers: peduncles 12-30 cm long, branches 10-15 cm long, slender, many-flowered; pedicels 4-8 mm long, capillary, glabrous; calyx puberulous, lobes 1.5-2.0 mm long, lanceolate, linear; corolla 2.0-2.3 mm long, lobes ovate. Female flowers ovary clavate. Fruits 6.5-7.0 × 1.5-2.5 cm, yellow, subcylindric, smooth, clavate, apex truncate, base subround. Seeds 12-14 × 7-9 mm and 1.5-2.0 mm thick, dark-grey, almost star-shaped, base oblique-attenuate, central region like a curved funnel, surfaces rugulose, margin deeply toothed; wing oblique, brownish-white, translucent.

Seeds winged

... var. *clavigera*

Seeds without wing

... var. *hookeri*

var. *clavigera*.

Type : Bangladesh, Sylhet, *Fr De Silva* 203 (K-W 3725 ! BM !).

Fls. : Oct.-Nov. ; *Frts.* : Nov.-March.

Distrib. : An Indo-Malayan species. INDIA : Arunachal Pradesh, Assam, Meghalaya, Sikkim, West Bengal ; BANGLADESH, BURMA, MALAYSIA.

var. *hookeri* (Clarke) Chakravarty in *Rec. Bot. Surv. Ind.* 17(1) : 197. 1959. *Alsomitra clavigera* (Wall.) Roem. var. *hookeri* Clarke in *Hook. f. Fl. Brit. Ind.* 2 : 635. 1879.

Type : Khasia, *Hooker & Thomson s. n.* (K !).

Fls. : Sept.-Oct. ; *Frts.* : Oct.-Nov.

Distrib. : INDIA : Meghalaya ; endemic.

31. NEOLUFFA*

Chakravarty in *J. Bombay nat. Hist. Soc* 50 : 895. 1952 *et Rec. Bot. Surv. Ind.* 17(1) : 70. 1959 ; Hutchinson, *Gen. Fl. Pl.* 2 : 384. 1967.

Herbs scandent. Leaves cordate, eglandular. Tendrils usually bifid. Plants usually dioecious. Flowers yellow. Male clustered at the summit of long axillary racemes ; bracts small, foliaceous eglandular ; calyx-tube campanulate, non-turbinate, spreading ; petals free, spreading, ovate ; stamens 5, filaments free, four arising in pairs of two from a common point of attachment, the odd one remaining free, arranged as (1+1) + (1+1) + 1, all inserted at the base of the calyx-tube ; anthers 5, free, exerted, all one-locular, loculi sigmoid-flexuose, connective thick, granular.

Distrib. : 1 species in Eastern Himalaya.

Notes : The genus approaches *Luffa* in certain features but differs in having (i) leaves entire without punctation on the upper surface and tomentose lower surface (ii) petals constricted at the apex (iii) stamens one free and the rest four arising in two pairs.

*Assumed congeneric to *Straitia* Merr. (MS. Jeffrey, Cucurbitaceae E. Asia, R. B. G. Kew 26, 1960), found in Sumatra, a few thousand miles away from this Indian monotypic genus. In absence of any specimen of the latter genus in India treatment is left out for the present.

1. *Neoluffa sikkimensis* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 895. 1952 et Rec. Bot. Surv. Ind. 17(1) : 70. 1959.

Annual herbs. Stems 5-angular, rusty tomentose. Petioles 5-8 cm long, shortly tomentose. Lamina 7-15 cm long and broad, cordate, upper surface glabrous, lower felty tomentose, entire. Male flowers yellow, crowned at the long axillary peduncles; peduncle 11-19 cm long, 20-35-flowered; pedicels 1-2 cm long, bracts 7-15 mm, foliaceous; receptacle campanulate, 1.0-1.5 cm in diameter, tomentose; calyx-lobes acute, 3-5 mm long, incised; petals 8-10 × 3-4 mm, oblong-ovate, entire, acute; stamens free, inserted at the base of the calyx-tube, 1-2 mm long, filaments 0.5-1.0 mm long; anthers 1-locular, sinuate, connective broad, granular. Pollen globose. Female flowers not known.

Type : India, Sikkim Himalaya, King s. n. (CAL. !).

Fls. : May-June.

Distrib. : INDIA : Sikkim; endemic in Sikkim Himalaya.

Notes : This is an interesting species of Cucurbitaceae. The specimens were collected by George King as far back as 1876 from Sittong in the Eastern Himalaya near Mangpoo. No specimen of the female plant is available. The general appearance of the plant particularly the leaves show an illusive resemblance to *Argyreia* (Convolvulaceae). It shows a near approach to *Luffa*, hence the name *Neoluffa*, but certain dominant features like the inflorescence, the stamens and the leaves are at variance with *Luffa*. The female plant when procured will throw further light on its affinity. Clarke in 1895 seems to have examined the flowers and remarked on its affinity with *Luffa amara*, but expressed doubt as to its generic position.

32. SCHIZOPEPON

Maxim. Prin. Fl. Amur. 110. 1859; Benth. & Hook. f. Gen. Pl. 1 : 869. 1867; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 199. 1959 *descript. emend*; Hutchinson, Gen. Fl. Pl. 2 : 395. 1967.

Herbs slender, scandent, slightly pubescent. Leaves long petiolate, broadly ovate-cordate. Tendrils bifid. Flowers unisexual or hermaphrodite, minute, white; calyx-tube broadly campanulate, sub-pateriform, lobes 5, oblong; corolla rotate, deeply 5-partite, lobes short, oblong; stamens 3, free or united, inserted at the margin of the calyx-

tube, filaments free or connate; anthers short, one 1-locular, others bilocular, widely didymous, loculi erect, shortly oblong, connective produced or not; ovary broadly ovoid, trilocular; style thick, stigmas 3, apex bilobed, ovule in each locule solitary, rarely 2, pendulous. Fruits small, fleshy, indehiscent, ovoid, acute, septa soon disappear giving rise to one loculus, 1-3-seeded, trivalved from apex to base, valve involute and elastically dehiscent the seeds. Seeds ovate, margin thick crenulate.

Distrib. : Predominantly a Sino-Japanese genus. Species 7. Only 2 occur in India.

Anther-connective not produced ... 1. *S. dioicus*

Anther-connective produced ... 2. *S. wardii*

1. *Schizopepon dioicus* Cogn. in Hooker's Icon. Pl. 23 : t. 2224. 1892; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 201. 1959.

Stems scandent, sulcate, glabrous. Petioles 2-4 cm long. Lamina simple, 3.5-7.0 × 2.5-5.0 cm, broadly ovate-cordate, acuminate, minutely denticulate. Tendrils slender, almost silky brown, bifid. Plants dioecious. Flowers minute. Male flowers in axillary racemes or panicles, ebracteate; pedicels capillary, 6-10 mm long; calyx campanulate, 2.0-2.5 mm long and *ca.* 3 mm broad, lobes linear, subulate, *ca.* 1 mm long; corolla light yellow, partite up to middle, lobes 1.5-4.0 × 1 mm, oblong, lanceolate. Stamens 3, filaments short, united; anthers 0.5 mm long, free, connective not produced. Female flowers axillary, solitary or few, ovary ovoid, glabrous, trilocular, ovules solitary, pendulous; style 3-fid; staminode minute. Fruiting peduncles slender, solitary. Fruits ovoid or oblong-ovoid, slightly verrucose.

Type : China, Hupeh, Henry 4862 (K 1).

Fls. : Aug.; *Frts.* : Sept.-Oct.

Distrib. : An Indo-Chinese species. INDIA : Sikkim, West Bengal; BURMA, CHINA.

2. *S. wardii* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 900. 1952 et Rec. Bot. Surv. Ind. 17(1) : 202. 1959.

Stems scandent, sulcate, glabrous. Petioles 2.0-4.5 cm long, slender, sulcate. Lamina 7.0-8.5 × 4-5 cm, membranous, ovate-cordate, acuminate.

nate, remotely mucronulate-denticulate. Tendrils slender, 2- or 3-fid, glabrous. Plants dioecious. Male flowers in solitary and axillary racemes, 4-7 cm long, 8-15-flowered, ebracteate; pedicels 7-12 mm long, spreading, filiform. Receptacle 5-6 mm long, broadly campanulate; calyx lobes 2.0-2.5 × 0.3-0.4 mm, linear-lanceolate, subulate; corolla subrotate, yellow, lobes 7-9 × 1-2 mm, 6-nerved, linear, lanceolate, broad, acute; stamens 3, monadelphous; included, filaments *ca.* 1 mm long, attached at the receptacle base; anthers 3.0-3.5 mm long, connate, one 1-locular, others 2-locular, loculi erect; connective linear, conical, produced, minutely papillose, 1.5-2.0 mm long. Female flowers: not known.

Type : India, Assam, Delei Valley, F. Kingdon-Ward 8567 (K!).

Fls. : Aug.

Distrib. : INDIA : Assam; endemic.

Notes : The species has affinity towards *S. macranthus* Hand.-Mzt., but differs in the following characters—(i) leaves not lobed (ii) pedicels longer and (iii) connective produced beyond the loculi.

33. SECHIUM

P. Browne, Hist. Jam. 355. 1756; Benth. & Hook. Gen. Pl. 1 : 837. 1867; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 204. 1959; Hutchinson, Gen. Fl. Pl. 2 : 416. 1967. *Chocho* Adans. Fam. 2 : 500. 1763.

Climbers. Leaves membranous, deeply cordate, palmately angular or lobate. Tendrils 3-5-fid. Plants monoecious. Flowers small, whitish. Male flowers: racemose. Calyx-tube hemispherical, lobes 5; corolla rotate, deeply 5-partite, lobes ovate-lanceolate; stamens 3, inserted deep in the calyx-tube, filaments, connate into a column; anthers free, one unilocular, others bilocular, loculi sigmoid-flexuose; pistillode 0. Female flowers solitary or in pairs, often in the same axil of the male. Calyx and corolla as in the male; staminode 0; ovary obovoid, unilocular, often setose; style slender, stigma capitate, 5-6-lobed, lobes recurved, ovule one, pendulous. Fruit fleshy, often obovoid, sulcate, one-seeded. Seeds ovate, compressed, testa woody, smooth; cotyledons large.

Distrib. : A monotypic genus principally confined to tropical America. Introduced and cultivated in India.

1. *Sechium edule* (Jacq.) Sw. Fl. Ind. Occ. 2 : 1150. 1800; Kanjilal *et*

al. Fl. Assam. 2 : 332. 1938; Mizushima in H. Hara's Fl. E. Himal 1 : 325. 1966. *Sicyos edulis* Jacq. Enum. Pl. Carib. 32. 1760. *Chayota edulis* (Jacq.) Jacq. Sel. Stirp. Amer. 125, t. 245. 1780; *Sechium americana* Poir. in Lam. Encycl. Meth. Bot. 7 : 50. 1783.

Quash (Beng.); *Soh-kwash* (Khasi); *Seema-kattirikkai* (Tam.); *Seemabadane* (Kan.); *Chow-chow*, *Chayote* (Eng.).

Perennial climbers; root tuberous. Petioles 5-15 cm long, smooth; lamina 10-22 cm long and as much broad, basal sinus deeply emarginate, 3-5-angular or lobed. Tendrils sulcate, glabrous, 3-5-fid. Male flowers: peduncles 8-30 cm long, 10-30-flowered in fascicles, robust, striate; pedicels 1-6 mm long. Calyx-tube short, lobes 5-7 × 1.0-1.5 mm, elongate, subglabrous, 12-17 mm broad, divided up to base, triangular, spreading, sub-5-nerved; staminal column *ca.* 1 mm long; anthers *ca.* 2 mm long, suborbicular, spreading; ovary obovoid, 5-sulcate, hairy; style 2-3 mm long; stigma *ca.* 2 mm, broad. Fruits *ca.* 10 × 7 cm, green, deeply 5-sulcate, obovoid, sparsely spinulose, one-seeded.

Type : Cuba, *Jacquin* (not found); *Neotype* : Plate 163 in *Jacquin*, Sel. Stirp. Amer. 1763.

Fls. : Sept.-Dec.; *Frts* : Nov.-Jan.

Distrib. : Indigenous in tropical South America. Cultivated as vegetable in the hills of India. INDIA : Meghalaya, Sikkim, Uttar Pradesh, Himachal Pradesh, West Bengal, Karnataka, Maharashtra; SRI LANKA, MASCARENE ISLANDS, TROPICAL AMERICA.

Uses : The unripe fruits are used as a wholesome vegetable in winter especially in Sikkim Himalaya, Assam, Uttar Pradesh and South India (*Chakravarty, l. c.*). Large tuberous roots are also used as food and a digestible starch is found in them. Tender shoots are also used as vegetable.

Chr. No. : $n = 14$ [Verghese in Curr. Sci. 42(1) : 30. 1973.]

Pollen : Polycolporate, 8-9 colporate, oblate, 52-55 μ m, spiniferous (*Erdtman, Pollen Morph. & Pl. Tax.* 137. 1952).

34. THLADIANTHA

Bunge, Enum. Pl. Chin. bor. 29. 1834 et Mem. Sav. etr. St. Petersb. 2. 103. 1835; Clarke in Hook. f. Fl. Brit. Ind. 2 : 630. 1879; *Chakravarty*

in *Rec. Bot. Surv. Ind.* 17(1) : 125. 1959; Hutchinson, *Gen. Fl. Pl.* 2 : 384. 1967.

Scandent herbs with perennial tuberous roots. Leaves petiolate, entire, deeply cordate, lobed or palmately partite to trifoliate to heptafoliate denticulate, softly pubescent or nearly glabrous. Tendrils simple, rarely 2-fid. Plants dioecious. Male flowers racemose or cymose, rarely solitary. Calyx-tube shortly campanulate or subrotate at mouth, closed with 1-3 horizontal scales; sepals 5, elongate, linear or lanceolate; corolla campanulate, 5-partite, segments entire, often oblong, apex somewhat revolute; stamens 5, free, inserted at the margin of the calyx-tube, unequal, posterior one small, anterior four approximately equal, filaments recurved; anthers extrose, oblong, unilocular, more or less arcuate; pistillode glanduliform. Female flowers solitary or fasciculate; calyx and corolla with no scales; staminodes 5, elongate, linear, four of which approximately equal; ovary oblong, triplacentiferous; style columnar, trifid; stigmatic apex dilated or bifid; ovules numerous, horizontal. Fruits oblong, baccate, indehiscent, many-seeded; seeds small, ovoid, compressed, immarginate.

Distrib. : Principally a Sino-Malayan genus with about 24 species. 2 species in India.

Male racemes with prominent bract. Leaves simple ... 1. *T. cordifolia*

Male racemes without bract. Leaves simple, divided or compound
... 2. *T. hookeri*

1. *Thladiantha cordifolia* (Bl.) Cogn. in DC. Monog. Phan. 3 : 424. 1881; Jeffrey in Kew Bull. 14 : 461. 1960. *Luffa cordifolia* Bl. Bijdr. 929. 1826. *Thladiantha calcarata* Clarke in J. Linn. Soc. 15 : 126. 1876; Duthie, Fl. Upper Gang. Pl. 1 : 381. 1903 (Repr. ed. 1 : 350. 1960); Prain, Beng. Pl. 1 : 525. 1903 (Repr. ed. 1 : 383. 1963); Haines, Bot. Bih. Or. 3 : 398. 1922. (Repr. ed. 2 : 416. 1961); Kanjilal, *et al.* Fl. Assam 2 : 329. 1938; Mizushima in H. Hara's Fl. E. Himal. 1 : 325. 1966. *T. dubia* Hook. f. Bot. Mag. t. 5469. 1864; Clarke in Hook. f. Fl. Brit. Ind. 2 : 631. 1879.

Large climbers. Petiole 3-8 cm long, slender, villose. Lamina 7-14 × 5-10 cm, deeply cordate, ovate, undivided, denticulate, villose. Pedicels erect, crowded, 3-8 mm long; bracts 2.0-2.5 cm long, broadly ovate, imbricate, incised; calyx-tube 6-8 mm long, broadly campanulate, densely villose, lobes 8-10 × 1.0-1.5 mm, spreading, linear, villose; petals ca. 15 × 8-10 mm, yellow; staminal filament 2-3 mm long, anthers

3-4 mm long. Female flowers : peduncles one-flowered, slender, 2-4 cm long; ovary oblong villose; stigma reniform. Fruits oblong, longitudinally 12-15-nerved. Seeds 4.5-5.0 × 3.0-3.5 mm, ca. 2 mm thick, ovoid, base subacute, both surfaces rugose.

Leaves densely villose ... var. *cordifolia*

Leaves glabrous or subglabrous ... var. *subglabra*

var. *cordifolia*

Type : Java, *Blume* (L).

Fls. : May-July; *Frts.* : July-Oct.

Distrib. : An Indo-Chinese plant distributed from Eastern India to Burma to China. INDIA : Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura, West Bengal; BURMA, INDO-CHINA, CHINA, MALAYSIA.

Pollen : 3-colporate, subprolate, 52-55 μ m, reticulate (*Erdtman, Pollen Morph. & Pl. Tax.* 137. 1952).

Chr. No. : $n = 9$ [*Sinha, B.M.B. & G. K. Thakur, Proc. Ind. Sc. Cong.* 60(3) : 319. 1973].

var. *subglabra* Cogn. in DC. Monog. Phan. 3 : 424. 1881; *Chakravarty* in Rec. Bot. Surv. Ind. 17(1) : 127. 1959.

Type : India, Khasia, *Hooker & Thomson 2057* (K !).

Fls. : June-July; *Frts.* : Aug.-Sept.

Distrib. : INDIA : Meghalaya, Nagaland.

2. *T. hookeri* Clarke in Hook. f. Fl. Brit. Ind. 2 : 631. 1879; *Kanjilal et al. Fl. Assam* 2 : 330. 1938; *Chakravarty* in Rec. Bot. Surv. Ind. 17(1) : 127. 1959.

Large climbers. Stems angular-sulcate. Petioles 3-6 cm long, slender. Lamina 10-13 × 6-8 cm, simple or divided, membranous, acuminate, remotely denticulate, upper surface punctate, lower glabrous, 3-5-foliate; leaflets petiolate, lanceolate, intermediate leaflets 9-3 × 3.0-4.5 cm, lateral ones shorter, asymmetrical, auriculate. Tendrils filiform.

Male flowers . in racemes ; peduncles slender, 2-3 cm long, puberulous, 4-7-flowered ; pedicels 1-3 cm long, glabrous, ebracteate ; calyx-tube 3-4 × 1.5-2.0 mm, broadly campanulate, petals *ca.* 10-12 × 4 mm ; staminal filaments 2-4 mm long, slender, glabrous ; anthers *ca.* 2 mm long. Female flowers solitary or in few-flowered racemes ; pedicels 2-5 cm long, staminodes 5 ; ovary oblong-fusiform *ca.* 2 × 3 mm, brownish tomentose. Fruit oblong, both sides round, 3.0-3.5 cm long. Seeds 6.5 × 5.0 mm and 2.5 mm thick, ash-coloured, smooth, attenuate at base.

Leaves simple or divided ... var. *hookeri*

Leaves palmately compound ... var. *irregularis*

var. *hookeri*

Type : India, Khasia, Mamloo, *Hooker & Thomson 3 (K 1)*.

Fls. : May-June ; *Frts.* : June-July.

Distrib. : An Indo-Chinese plant distributed from North-eastern Himalaya to China. INDIA : Arunachal Pradesh, Manipur, Meghalaya, Nagaland ; BURMA, CHINA, MALAYSIA.

Notes : This is very variable species. The leaves show great variation from simple to divided and palmately 3-5-foliate forms. Most of the specimens of Assam have simple or divided leaves. Burmese and Chinese specimens have mostly compound leaves. The Chinese specimens have much narrower and longer leaflets. In the same branch simple and trifoliate compound leaves or trifoliate and quinquefoliate leaves are sometimes noticeable [Chakravarty in Notes R. B. G. Edin. 20(48) : 122. 1948].

var. *irregularis* *nom. nov.* *Hemsleya trifoliolata* Cogn. in Fedde Rept. 6 : 304. 1909. *Thladiantha pentadactyla* Cogn. in Englar's Das Pflanzen. 4. 275. 1 : 52. 1916. *T. heptadactyla* Cogn. l. c. 52. 1916. *T. hookeri* Clarke var. *palmatifolia* Chakravarty in Notes Roy. bot. Gard. Edinb. 20(48) : 122. 1948 *nom. illeg.*

Type : China, Yunnan, *Henry 12295D (ZT, B-n: v.)*.

Fls. : May-Aug. ; *Frts.* : June-Sept.

Distrib. : INDIA : Assam, Manipur, Meghalaya, Nagaland ; BURMA, CHINA.

Notes : Leaves are very variable, 3-, 5- and 7-foliate as observed in the same specimen (Chakravarty *l. c.* 122. 1948). Further, Cogniaux quoted the type specimen *Henry* 12295D (Herb. Berlin) for *Hemsleya trifoliolata* Cogn. and *Henry* 12295D (Herb. Zurich) for *Thladiantha pentadactyla* Cogn. Hence all the individuals are reduced to *T. hookeri* Clarke var. *irregularis*.

35. TRICHOSANTHES

L. Sp. Pl. ed. 1 : 1008. 1753 ; Benth. & Hook. f. Gen. Pl. 1 : 821. 1867 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 28. 1959 ; Hutchinson, Gen. Fl. Pl. 2 : 407. 1967.

Scandent herbs. Leaves entire or 3-9-lobed, denticulate. Tendrils simple or 2-5-fid. Plants dioecious, less frequently monoecious. Flowers white. Male flowers usually racemose, often bracteate ; calyx-tube cylindrical, dilated above, 5-lobed ; corolla 5-lobed, lobes oblong, fimbriate ; stamens 3, inserted in the calyx-tube, filaments very short ; anthers almost included, connate (free in *T. dioica*) one 1-locular, two 2-locular, loculi conduplicate, connective narrow, not produced. Female flowers solitary, calyx and corolla as in the male ; staminode 0 ; ovary inferior, ovoid or fusiform, 1-locular, placenta 3, parietal, ovules many, horizontal or semipendulous, style slender, stigmas 3, entire or bifid. Fruits fleshy, globose, ovoid or fusiform, indehiscent, many-seeded, usually smooth and glabrous. Seeds packed in pulp, ellipsoid, sometimes angular.

Distrib. : Principally an Indo-Malayan genus with about 44 species. 22 species occur in India.

1a. Leaves not felty tomentose :

2a. Male flowers in racemes ; anthers connate :

3a. Seeds much compressed :

4a. Leaves entire :

5a. Male racemes few-flowered ; calyx-teeth short
(0.5-1.0 mm long) ... 15. *T. nervifolia*

5b. Male racemes many-flowered ; calyx-teeth long
(2.0-2.5 mm long) ... 6. *T. cuspidata*

4b. Leaves lobed :

- 6a. Male racemes minutely bracteate or ebracteate :

 - 7a. Pedicels of male flowers shorter than flowers :
 - 8a. Leaves cordate :
 - 9a. Fruits up to 1.5 m long, twisted with white stripes
... 2. **T. anguina**
 - 9b. Fruits less than 0.5 m not long, not striped :
 - 10a. Fruits ovoid, conical, 5-6 cm long
... 5. **T. cucumerina**
 - 10b. Fruits linear-oblong, 14-18 cm long
... 13. **T. lobata**
 - 8b. Leaves ovate ... 10. **T. horsfieldii**
 - 7b. Pedicels of male flowers longer than flowers :
 - 11a. Leaves glabrous on both surfaces
... 18. **T. perrottetiana**
 - 11b. Leaves densely villose on lower surface
... 21. **T. villosula**

- 6b. Male racemes with large bracts :
 - 12a. Leaves at base truncate or narrowed :
 - 13a. Leaves ovate-oblong; bracts stalked, oblong, lanceolate
... 20. **T. truncata**
 - 13b. Leaves ovate; bracts sessile, ovate
... 16. **T. ovata**
 - 12b. Leaves at base deeply cordate :
 - 14a. Female flowers solitary, ebracteate :
 - 15a. Calyx segments entire :

- 16a. Leaves entire, ovate-triangular
... 4. **T. cordata**
- 16b. Leaves shortly lobed :
 - 17a. Leaves not hairy on upper surface
... 22. **T. wallichiana**
 - 17b. Leaves hairy on nerves on both surfaces
... 14. **T. majuscula**
- 15b. Calyx segments dentate or laciniate :
 - 18a. Calyx segments broader, shortly dentate
... 3. **T. bracteata**
 - 18b. Calyx segments deeply 3-5-lobed
... 11. **T. lepiniana**
- 14b. Female flowers in racemes, bracteate
... 1. **T. anamalaiensis**
- 3b. Seeds turgid with longitudinal belts :
 - 19a. Leaves trilobed (entire in var. *indivisa*) ; seeds drum-shaped
... 9. **T. himalensis**
 - 19b. Leaves not lobed ; seeds sub-quadrangular :
 - 20a. Male racemes bracteate
... 17. **T. ovigera**
 - 20b. Male racemes ebracteate
... 7. **T. dicaelosperma**
- 2b. Male flowers solitary or bijugate ; anthers free
... 8. **T. dioica**
- 1b. Leaves felty tomentose :
 - 21a. Calyx-tube 8-12 mm long
... 19. **T. tomentosa**
 - 21b. Calyx-tube 8-12 cm long
... 12. **T. listeri**

1. **Trichosanthes anamalaiensis** Bedd. in Madras J. Sci. Ser. 3. 1 : 47. 1864. *T. anamalayana* Bedd. in Trans. Linn. Soc. 25 : 217. 1865 ; Gamble, Fl. Pres. Madr. 3 : 530. 1919 (Repr. ed. 1 : 374. 1957).

Leaves 10-15 cm long and as broad, 3-5-lobed, upper surface very scabrous, lower pubescent, irregularly deeply serrate. Tendrils 2-3-fid. Flowers white, males in racemes with the calyx larger and more laciniate

than in female flower ; corolla hirsute within ; staminal filaments 3, rarely 4, free, inserted at the gibbous part of the tube, anthers coherent. Female flowers axillary, solitary or 2 together with lanceolate bract or more often racemose or subtended by large laciniate bract. Fruits globose.

Type : India, Anaimalai Mts. *Beddome* 3234 (BM !).

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

Distrib. : INDIA : Tamil Nadu ; endemic.

2. *T. anguina* L. Sp. Pl. ed. 1 : 1008. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 610. 1879 ; Duthie, Fl. Upper Gang. Pl. 1 : 364. 1903 (Repr. ed 1 : 333. 1960) ; Prain, Beng. Pl. 1 : 518. 1903 (Repr. ed. 1 : 377. 1963) ; Kanjilal *et al.* Fl. Assam 2 : 329. 1938. *Cucumis anguina* L. Syst. ed. 10 : 1279. 1759.

Chachinda (Hindi) ; *Chichinga* (Beng.) ; *Chichendara* (Ori.) ; *Padwal* (Mar.) ; *Padavali* (Guj.) ; *Lingapotla* (Tel.) ; *Pudal* (Tam.) ; *Galartori* (Punj.) ; *Snake gourd* (Eng.).

Annual. Stems slender, puberulous. Petioles 12-15 cm long, stout, striate, villose. Lamina 10-15 × 12-18 cm, orbicular-reniform, distantly denticulate, deeply 5-lobed. Tendrils 2-3-fid. Plants monoecious. Male flowers : peduncles 10-25 cm long, robust, 8-15-flowered ; pedicels 0.5-2.0 cm long, slender, minutely bracteate ; calyx-tube 2.5-3.0 cm long, subcylindric, teeth *ca.* 2 mm long, reflexed ; petals *ca.* 8-9 × 3 mm, oblong, 3-nerved ; staminal filaments slender, *ca.* 2 mm long ; anthers ovoid ; pistil-*lode* 15-17 mm long. Female flowers : peduncles 0.5-5.0 cm long, flowers solitary ; ovary narrowly fusiform. Fruits very long (up to 1.5 m). ~~Often~~ twisted, surface smooth, often 7-8 white stripes along the length. Seeds *ca.* 14-17 × 7-9 mm and *ca.* 3-5 mm thick, oblong, finely rugulose, undulate, apex round or obscurely truncate, base attenuate.

Type : *Lectotype-Trichosanthes pomis teretibus oblongis incurvis* L. Hort. Cliff. : 451. 1738.

Fls. : May-July ; *Frts.* : June-Aug.

Distrib. : Cultivated in India. INDIA : Assam, Bihar, Himachal Pradesh, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal ; MALAYSIA, E. AFRICA.

Uses : Snake gourd is largely used as a vegetable either boiled or

in curries. When ripe it turns brilliant orange in colour. The seeds are considered cooling [Chakravarty in Ind. J. Agric. Sc. 16(1) : 20. 1946].

Chr. No. : $n = 11$ (Banerji & Das in Ind. J. Agric. Sc. 7 : 497. 1937).

Pollen : 3-porate, pore annulate, oblate spheroidal, exine surface foveolate (Nair & Kapoor, Glimp. in Pl. Res. 2 : 172. 1974).

3. *T. bracteata* (Lamk.) Voigt Hort. Suburb. Calc. 58. 1845. *Modecca bracteata* Lamk. Encycl. Meth. Bot. 4 : 210. 1796. *Trichosanthes palmata* Roxb. Fl. Ind. 3 : 704. 1832; Clarke in Hook. f. Fl. Brit. Ind. 2 : 606. 1879.

Makal (Beng.); *Kavandala* (Mar.); *Avagude-hannu* (Kan.); *U-soh-lyn-shang* (Khasi); *Makirla* (Ori.); *Indrayan* (Hindi).

Stems robust, branched, sulcate. Petioles 3-10 cm long, striate. Lamina membranous, variable in size, broadly ovate, subentire or often deeply palmately 3-5-lobed, denticulate. Tendrils robust, 3-fid. Male flowers : peduncles 10-20 cm long, sulcate, puberulous, 5-10-flowered; pedicels thick, very short; bracts puberulous, 3-4 cm long; calyx-tube, 4-5 cm long, longitudinally striate, lobes erect, acuminate, 12-15 × 3-4 mm; staminal filament 1-2 mm long, villose; anthers head *ca.* 11 mm long, *ca.* 4 mm thick. Female flowers axillary, solitary. Fruiting peduncles 2-3 cm, thick, red with 10 longitudinal orange streaks. Seeds *ca.* 12 × 6 mm, and *ca.* 2 mm thick, many, ovate-oblong, both surfaces smooth, emarginate, base slightly attenuate, whitish.

Lower surface of the leaves glabrous ... var. **bracteata**

Lower surface of the leaves tomentose ... var. **tomentosa**

var. bracteata

Type : East Indies, *Sonnerat s. n.* (P-n. v.).

Fls. : July-Sept.; *Frts.* : Nov.-Dec.

Distrib. : An Indo-Malayan plant. INDIA : Throughout India; BURMA, MALAYSIA, CHINA, AUSTRALIA.

Uses : The fruits are poisonous and haemagglutinating. They are externally used in sores. The roots are similarly used in carbuncles and is said to be beneficial in the inflammation of the lungs.

Chr. No. : $n = 22$ [Thakur in Proc. Ind. Sci. Congr. 60(3) : 324. 1973].

var. *tomentosa* (Heyne ex Clarke) Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 47. 1959. *Trichosanthes palmata* Roxb. var. *tomentosa* Heyne ex Clarke in Fl. Brit. Ind. 2 : 607. 1879; Gamble, Fl. Pres. Madr. 3 : 530. 1919 (Repr. ed. 1 : 530. 1957); *T. burmensis* Kundu var. *alba* Kundu in J. Bombay nat. Hist. Soc. 43 : 381. 1943.

Type : Peninsula Indiae Orientalis, *Herb. Wight* 1134 (CAL !).

Fls. & Frts. : June-Sept.

Distrib. : INDIA : Andaman & Nicobar Islands, Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu, Tripura ; BURMA, JAVA.

4. *T. cordata* Roxb. [Wall. Num. List. No. 6686A] Fl. Ind. 3 : 703. 1832; Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879; Duthie, Fl. Upper Gang. Pl. 1 : 363. 1903 (Repr. ed. 1 : 333. 1960); Prain, Beng. Pl. 1 : 518. 1903 (Repr. ed. 1 : 377. 1963); Kanjilal *et al.* Fl. Assam 2 : 328. 1938. *T. microsiphon* Kurz in J. As. Soc. Beng. 2 : 308. 1872.

Figs. 1-2.

Bhoi-kumra (Beng.).

Root tuberous. Stems robust. Petioles 5-10 cm long, robust. Lamina 12-20 × 9-12 cm, membranous, entire, sublobate, broadly ovate cordate. Tendrils robust, sulcate, puberulous. Plants dioecious. Male flowers : peduncles 12-20 cm long, striate, 4-8-flowered; pedicels 1-2 mm long, thick; bracts *ca.* 4 × 1.0-1.5 cm, shortly and sparsely villose-hirsute; calyx-tube *ca.* 5 × 7 cm, attenuate, villose, lobes erect, *ca.* 1.5 × 2-3 mm, flexuose; petals papillose; staminal filament *ca.* 1 mm long, glabrous; anthers *ca.* 14 × 3-4 mm. Female flowers subsessile. Ovary oblong. Fruiting peduncles 1-2 cm long, robust. Fruit globose, red, smooth. Seeds very peculiar, 10-12 × 4-5 mm and 2-2.5 mm thick, transversely broad, belted at the middle, belt with raised margins.

Type : Eastern India, *Nees-Wall.* Num. List No. 6686A (K !, CAL !).

Fls. : June-Sept.; *Frts.* : Sept.-Dec.

Distrib. : An Indo-Malayan species. Grows in alluvial soil. INDIA : Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya,

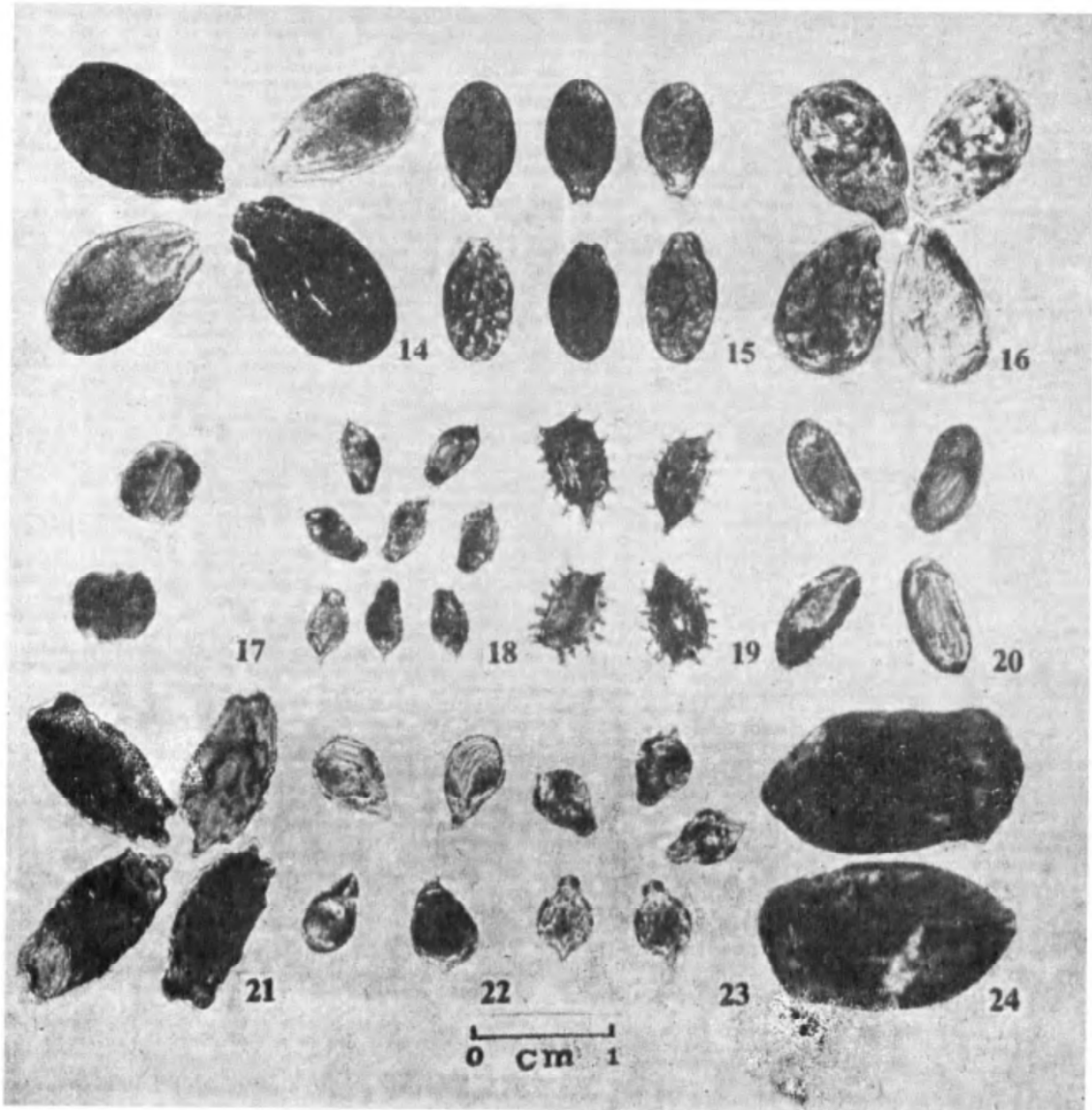
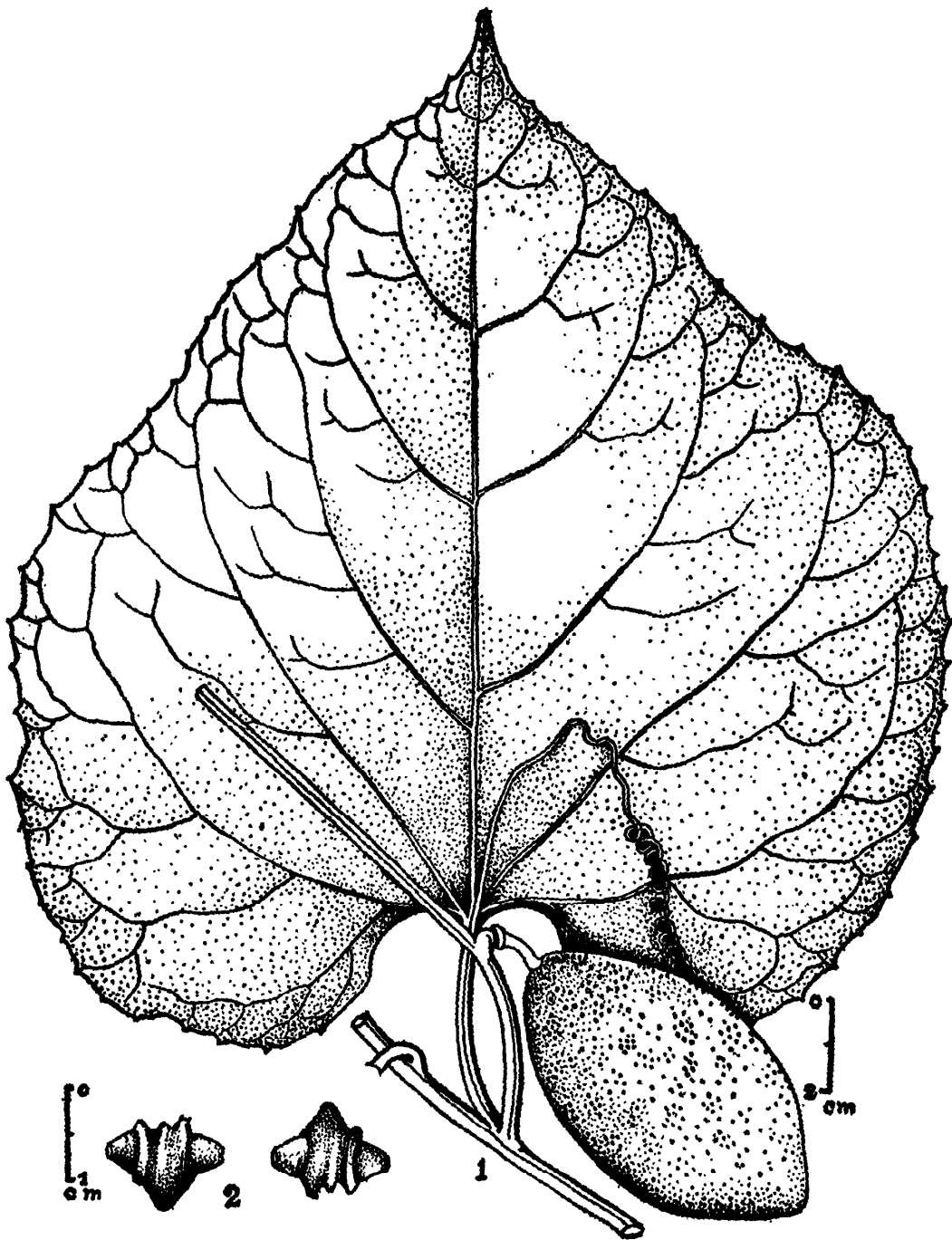


Plate II : Figs. 14—24 : Seeds of 14. *Citrullus vulgaris*. 15. *Luffa acutangula*.
 16. *Bryonia dioica*. 17. *Cerasiocarpum benetti*. 18. *Corallocarpus epigaeus*.
 19. *Gomphogyne cissiformis*. 20. *Gymnopetalum cochinchinensis*
 21. *Herpetospermum pedunculatum*. 22. *Kedrostis rostrata*.
 23. *Thladiantha calcarata* 24. *Trichosanthes bracteata*.



Trichosanthes cordata Roxb.

Figs. 1-2 : 1. Female plant with a fruit. 2. Seeds (two views).

Nagaland, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal;
BANGLADESH, BURMA, MALAYSIA, SINGAPORE, LAOS.

5. *T. cucumerina* L. Sp. Pl. ed. 1 : 1008. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 609. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 527. 1903 (Repr. ed. 1 : 560. 1958) ; Duthie, Fl. Upper Gang. Pl. 1 : 364. 1903 (Repr. ed. 1 : 333. 1960) ; Prain, Beng. Pl. 1 : 518. 1903 (Repr. ed. 1 : 377. 1963) ; Gamble, Fl. Pres. Madr. 3 : 529. 1919 (Repr. ed. 1 : 373. 1957) ; Haines, Bot. Bih. & Or. 3 : 388. 1922. (Repr. ed. 2 : 405. 1961) ; Mizushima in H. Hara's Fl. E. Himal. 1 : 325. 1966.

Ban-chichinga (Hindi) ; *Ban-patal* (Beng.) ; *Adavi-potla* (Tam.) ;
Patola (Mar.) ; *Ban-goalkakri* (Punj.) ; *Adavi-patla*, *Chedupotla* (Tel.).

Extensive climbers. Stems slender. Petioles 2-7 cm long. Lamina 7-10 × 8-12 cm, orbicular-reniform or broadly ovate, distantly denticulate, deeply 5-7-lobed. Tendrils slender, 2-3-fid. Male flowers : peduncles in pairs, the earlier 1-flowered, the later racemed, 8-15-flowered, minutely bracteate ; pedicels erect, 1-2 cm long, filiform ; calyx-tube dilated at apex, attenuate, 15-16 mm long, apex *ca.* 2.5 mm broad, lobes erect, spreading, *ca.* 1.5 mm long, staminal filaments *ca.* 1.5 mm long, slender, glabrous ; anther oblong, *ca.* 3 × 1.5 mm. Female flowers : peduncles 3-12 mm long ; ovary oblong, style 16-18 mm long, filiform. Fruits 5-6 × 3.5-4.0 cm, ovoid, conical, 8-10-seeded. Seeds *ca.* 11-12 × 6-6.5 mm and 4 mm thick, ovate-oblong, compressed, undulate, truncate, or slightly immarginate, base attenuate.

Type : Pada Valam in Rheede, Hort. Ind. Malab. 8 : 39. t 15. 1688.

Fls. : June-Aug. ; *Frts.* : Sept.-Oct.

Distrib. : An Indo-Malayan species. INDIA : Throughout India ; BANGLADESH, SRI LANKA, BURMA, MALAYSIA, AUSTRALIA.

Uses : The fruits are cooked and used as vegetable. Cathartic property is attributed to both root and fruit. Root is used as a cure for bronchitis, headache and boils. The leaves are used in biliousness and juice is considered emetic. The seeds possess anthelmintic and antifibrile properties. The seeds are haemagglutinating. The juice of the leaves and fruits is useful in congestion of the liver and bilious headache [Chakravarty in Ind. J. Agric. Sc. 16(1) : 18. 1946].

6. *T. cuspidata* Lam. Encycl. Meth. Bot. 1 : 190. 1789 ; Gamble, Fl. Pres. Madr. 3 : 529. 1919 (Repr. ed. 1 : 373. 1957).

Stems slender. Petioles *ca.* 0.5-1.0 cm, slender. Lamina 8-10 × 4-5 cm, narrow, thin, ovate-oblong, minutely and remotely denticulate. Tendrils slender, bifid. Male flowers : peduncles 4-7 cm long, slender, striate, glabrous, almost flowering from the base, usually geniculate, 10-30-flowered ; pedicels 2-6 mm long, spreading, filiform ; bracteole *ca.* 5 mm long ; calyx-tube filiform, 12-14 mm long, apex dilated, 0.3-0.5 mm broad ; staminal filament *ca.* 0.5 mm long ; anther heads oblong, linear *ca.* 3.5 × 1.0 mm. Female flower solitary, shortly pedunculate ; calyx-tube ± 5 mm long. Fruits glabrous, 5.0-7.5 cm thick, about twice as long as broad, acute.

Type : Scheru-padavalam in Rheede, Hort. Ind. Malab. 8 : 31. t. 16. 1688.

Fls. : Oct. ; *Frts.* : Nov.

Distrib. : INDIA : Kerala ; endemic in peninsular India.

Notes : This species has been reduced to *T. nervifolia* L. by Clarke in Hooker's Flora of British India. It can however be distinguished by its many-flowered geniculate male racemes which flower from near the base.

7. *T. dicaelosperma* Clarke in Hook. f. Fl. Brit. Ind. 2 : 609. 1879 ; Duthie, Fl. Upper Gang. Pl. 1 : 364. 1903 (Repr. ed. 1 : 333. 1960).

Stems slender, branched, angular-sulcate, puberulous. Petioles 3-8 cm long, very slender. Lamina 10-15 × 6-11 cm, entire, membranous, cordate-ovate, sparsely minutely denticulate, pubescent. Tendrils bifid. Plants dioecious. Male flowers : peduncles 5-7 cm long, slender, 7-10-flowered ; pedicels 0.5-2.0 cm long, spreading, subfiliform ; bracteoles *ca.* 0.5 mm long or absent ; calyx-tube 2.0-2.5 cm long, *ca.* 1 mm broad, sublinear, apex much dilated, lobes spreading, subulate, *ca.* 2 mm long ; anthers subglobose, *ca.* 3 mm thick. Female flowers axillary, solitary ; peduncles 2-3 cm long, ovary oblong, villose. Fruits with 10 longitudinal bands, 4-5 cm thick, pubescent. Seeds *ca.* 7-8 × 8-9 mm, *ca.* 3 mm thick, pale ashy, slightly rugulose, sub-quadrangular base appendiculate, testa thin, brittle.

Type : India, Khasia, J. D. Hooker & T. Thomson s. n. (K !, CAL !).

Fls. : Aug.-Sept. ; *Frts.* : Sept.-Oct.

Distrib. : INDIA : Meghalaya, Sikkim, Uttar Pradesh, West Bengal.

8. **T. dioica** Roxb. [Wall. Num. List No. 6692A, B, C. *nomen*] Fl. Ind. 3 : 701. 1832; Clarke in Hook. f. Fl. Brit. Ind. 2 : 609. 1879; Duthie, Fl. Upper Gang. Pl. 1 : 364. 1903 (Repr. ed. 1 : 333. 1960); Prain, Beng. Pl. 1 : 517. 1903 (Repr. ed. 1 : 377. 1963); Haines, Bot. Bih. & Or. 3 : 388. 1922 (Repr. ed. 2 : 406. 1961); Kanjilal *et al.* Fl. Assam 2 : 329. 1938.

Potol (Beng.); *Palwal* (Hindi); *Patal* (Ori.); *Putulika* (Sansk.); *Kom-mupotla* (Tel.); *Kombu-pudalai* (Tam.); *Kaadu-padavala* (Kan.); *Patolam* (Mal.).

Stems slender, branched, much scandent. Petioles 1-3 mm long, slender, striate, shortly villose-hirsute. Lamina 7-10 × 4-8 cm, cordate, ovate-oblong, acute, sinuate-dentate, rigid, sparsely scabrous, basal lobes narrow round, 1.5-2.0 cm deep. Tendrils slender, short. Plants dioecious. Male flowers : peduncles 2-3 cm long, paired, both 1-flowered, one short, one long, calyx-tube ± 4 cm long, subcylindric, linear; petals oblong, fimbriate; anthers free, subsessile, oblong, 3.5 × 1.5 mm. Female flowers : peduncles 2-4 mm long; flowers solitary; ovary oblong, villose. Fruits 5-12 × 2-6 cm, oblong, glabrous, smooth. Seeds 6-7 × 5-6 mm and *ca.* 5 mm thick, globose.

Leaves cordate, calyx-tube *ca.* 4 cm long ... var. **dioica**

Leaves sagittate, calyx-tube less than 4 cm var. **sagittifolia**

var. **dioica**

Type : Ic. Roxb. 1090 (K).

Fls. : April-July; *Frts.* : June-Sept.

Distrib. : Extensively cultivated throughout the warmer parts of India. Several cultivated forms differing in size, shape and markings of the fruit commonly grown.

Uses : The fruits and leaves are commonly used as vegetable in India. They are pickled and are also used in confectionary. The extract of the seeds possesses haemagglutinating activity [Chakravarty in Ind. J. Agric. Sc. 16(1) : 29. 1946].

Chr. No. : n = 11 (Banerji & Das in Ind. J. Agric. Sc. 7 : 497. 1937).

Pollen : 3-porate, pore annulate, oblate spheroidal, reticulate (Nair & Kapoor in Glimp. Pl. Res. 2 : 172. 1974).

var. sagittifolia Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 55. 1959.

Type : North-western India, indefinite locality, *Stewart* 1228 (E !).

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

Distrib. : INDIA : Punjab, Uttar Pradesh.

9. **T. himalensis** Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879 ; Duthie, Fl. Upper Gang. Pl. 1 : 363. 1903 (Repr. ed. 1 : 333. 1960) ; Mizushima in Hara's Fl. E. Himal. 1 : 325. 1966.

An extensive climber. Stems sulcate. Petioles 3-6 cm long. Lamina 10-15 cm long and as much as broad, suborbicular, palmately 3-5-lobed, lobes lanceolate, shortly acuminate, minutely denticulate. Tendrils stout, sulcate, shortly villose, bifid. Male flowers : peduncles 2-8 cm long, sulcate, apex 4-10-flowered ; pedicels 0.5-2.0 cm long, erect, villose ; bracts 0.5-1.0 cm long, long acuminate ; calyx-tube cylindric, 2.5 cm long, puberulous ; lobes reflexed, linear, subulate, 6-7 mm long ; staminal filaments *ca.* 3 mm long, slender, glabrous ; anthers *ca.* 3.0 × 1.5 mm. Female flowers : peduncle axillary, solitary, 2-3 cm long, ovary tapering at both ends, glabrous. Fruits 8-10 × 2.5-3.0 cm. Seeds 6-7 × 7-9 mm and *ca.* 5 mm thick, ashy brown, rugulose, drum-shaped, turgid, base attenuate.

1a. Leaves deeply palmately 3-5-lobed

2a. Lower surface of the leaf shortly villose ... var. **himalensis**

2b. Lower surface of the leaf glabrous or at nerves slightly hirsute ... var. **glabrior**

1b. Leaves entire or slightly trilobed ... var. **sikkimensis**

var. himalensis

Type : India, Sikkim, without precise locality, *Clarke s. n.* (K !).

Fls. : Aug.-Sept. ; *Frts.* : Sept.-Oct.

Distrib. : Indo-Malayan species. INDIA : Arunachal Pradesh, Assam, Sikkim, Uttar Pradesh, West Bengal ; BANGLADESH, CHINA, MALAYSIA.

var. glabrior Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 51. 1959.

Type : India, Khasia, *J. D. Hooker & T. Thomson* 9 (K !, CAL !).

Fls. : Aug.-Sept. ; *Frts.* : Sept.-Oct.

Distrib. : INDIA : Meghalaya ; endemic in Khasia hills.

var. *sikkimensis* (Kundu) Thoth. in Bull. Bot. Surv. India 2(1 & 2) : 169. 1960. *T. ovigera* Bl. var. *sikkimensis* Kundu in J. Bombay nat. Hist. Soc. 43 : 383. 1943. *T. himalensis* Clarke var. *indivisa* Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 51. 1959.

Type : India, Sikkim, Clarke 36925a (CAL !).

Fls. : Sept. ; *Frts.* : Dec.

Distrib. : Eastern Himalaya. INDIA : Arunachal Pradesh, Sikkim, West Bengal.

10. *T. horsfieldii* Miq. Fl. Ind. Bat. 1 : 677. 1855 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 37. 1959.

Stems slender, sulcate, puberulous. Petioles 2-3 cm, slender. Lamina ca. 10 × 8 cm, ovate, minutely denticulate, 3-5-lobed, obtuse. Tendrils slender, bifid. Plants monoecious. Male flowers : peduncles ca. 5-8 cm long, robust, striate, densely hairy, 8-10-flowered ; pedicels 0.5-1.5 cm long ; bracts 6-10 mm long, oblong-lanceolate, acute, entire, 3-nerved ; calyx-tube attenuate, 4.0-4.5 mm long ; lobes erect, acute, ca. 4 mm long ; petals ca. 8 × 3.5 mm, oblong, acute, puberulous, margin long-fimbriate ; staminal filaments slender ca. 2 mm long ; anthers ca. 7 × 3 mm ; pistilode setiform ca. 1.5 cm long. Female flowers : peduncles 1-2 cm long, robust, 3-6-flowered, pedicels 0.5-1.0 cm, long ; staminode 2-3 mm long, ligulate ; ovary shortly villose-glandular ; style 2.0-2.5 cm long, filiform. Fruit not known.

Type : Java, Priangan, *Horsfield* 15 (K !, BM, U).

Fls. : July-Sept.

Distrib. : An Indo-Malayan species. INDIA : Kerala ; MALAYSIA, BORNEO, JAVA.

11. *T. lepiniana* (Naud.) Cogn. in DC. Monog. Phan. 3 : 377. 1881 : Gamble, Fl. Pres. Madr. 3 : 530. 1919 (Repr. ed. 1 : 374. 1957) ; Mizushima in Hara's Fl. E. Himal. 1 : 325. 1966. *Involucraria lepiniana* Naud. in Huber, Cat. 11. 1868.

Stems robust, glabrous. Petioles 4-6 cm long, robust, glabrous.

Lamina 10-20 cm long and almost as broad, suborbicular, glabrous; shortly palmately 3-5-lobed. Plants dioecious. Male flowers: peduncles 15-20 cm long, robust, apex 5-10-flowered; bracts thinly membranous, attenuate, 2-3 cm long; pedicels spreading, thick, 2-5 mm long; calyx-tube 5-6 cm long, apex 12-14 mm broad, puberulous; lobes spreading 14-16 × 5 mm, lobes subulate; petals 2-3 cm long, ovate, deeply lacinate, lacinia long, fimbriate; staminal filaments thick, *ca.* 2 mm long; anther head *ca.* 13-14 × 4 mm. Female flowers: peduncles 2-4 cm long, ovary oblong, glabrous. Fruits 8 × 6 cm, ovoid, smooth, red. Seeds *ca.* 13-15 × 6-7 mm and *ca.* 2.5 mm thick, black, oblong, obscurely marginate, apex truncate, base attenuate, shortly rugulose.

Type : Peninsular India, Pondicherry, *Lepine s. n.* (P!).

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

Distrib. : Indo-Malayan species. INDIA : Nagaland, Sikkim, Tamil Nadu, West Bengal; MALAYSIA.

12. *T. listeri* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 895. 1952 & Rec. Bot. Surv. Ind. 17(1) : 56. 1959.

Stems somewhat robust. Petioles 3-6 cm long, cylindrical, hirsute. Lamina 6-8 × 4-5 cm, thick, undivided, ovate to lanceolate, deeply cordate, acute, minutely denticulate. Male flowers ebracteate, axillary, large; peduncles hirsute, 1.5-2.0 cm long, one-flowered; calyx-tube 8-12 cm long, shortly tomentose, linear, campanulate, lobes 5, *ca.* 5 mm long, acute; corolla partite to the base, margin long fimbriate, lobes *ca.* 4-5 × 1.5-2.0 cm, oblong-ovate, glabrous; stamens 3, one 1-locular, two 2-locular, inserted at the mouth of the calyx-tube; filaments 1.0-1.2 cm long; anthers sinuate, connective broad, rugulose, undulate, 4-5 cm long and broad. Female flowers and fruits not known.

Type : Chittagong Hill tracts, Bangladesh, *J. L. Lister* 349 (CAL!).

Fls. : March-April.

Distrib. : INDIA : West Bengal; BANGLADESH.

Notes : This species can easily be distinguished by its very thick tomentose and deeply cordate leaves and large flowers with very long calyx-tube.

13. *T. lobata* Roxb. Fl. Ind. 3 : 703. 1832; Kurz in J. As. Soc. Beng.

46(2) : 98. 1877 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 610. 1879 ; Kundu in J. Bombay nat. Hist. Soc. 43 : 373. 1943.

Ban-chichinga (Beng.) ; *Jungli-chichinda* (N. W. P.).

Stems slender, sulcate. Petioles 4-6 cm long, puberulous, slightly grooved. Lamina 6-7 cm long, membranous, suborbicular, base broadly cordate, 3-7-lobed, slightly puberulous on both surfaces. Tendrils 3-5-fid, divided about the middle. Male flowers in racemes, minutely bracteate ; peduncles 8-15 cm long, slender, puberulous, few-flowered at apex ; calyx-tube slightly expanded at the apex, puberulous. Female flowers solitary, axillary. Fruits 14-18 cm long, linear, oblong, attenuated at base and apex. Seeds *ca.* 10 × 6 mm, and 2.0-2.5 mm thick, flat, surface rugulose, margin denticulate, tubercled, truncate at the apex, much compressed at the base.

Lectotype : India, Ic. Roxb. 992 (K).

Fls. : Sept.-Nov. ; *Frts.* : Nov.-Dec.

Distrib. : INDIA : Andhra Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal.

Notes : This species is very closely allied to *Trichosanthes cucumerina* Linn. from which it differs in having much lobed leaves and larger and narrower fruits. It has been reduced by Cogniaux (DC. Monog. Phan. 3 : 358. 1881) and Gamble (Fl. Pres. Madr. 1 : 373. 1957—Repr. ed.) to *T. cucumerina* Linn. Clarke (Fl. Brit. Ind. l. c.) while admitting its affinity to *T. cucumerina* or to *T. anguina*, opines that the three species (*T. cucumerina*, *T. anguina* and *T. lobata*) are difficult to separate. The fruits are of primary importance for specific segregation. The fruit in *T. cucumerina* is smaller, ovoid and conical, in *T. lobata* larger and linear-oblong and in *T. anguina* it is very long (sometimes over 1.2 m), twisted and very succulent with 10 white streaks when green.

14. *T. majuscula* (Clarke) Kundu in J. Bot. 77 : 12. 1939. *T. multiloba* Miq. var. *majuscula* Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879. *T. wallichiana* (Ser.) Wight var. *majuscula* (Clarke) Cogn. in DC. Monog. Phan. 3 : 369. 1881.

Stems very stout, sulcate, glabrous. Petioles 6.0-6.5 cm long, very robust, striate. Lamina 20-23 × 22-25 cm, membranous, slightly hairy at nerves on upper surface, deeply palmately 5-lobed, irregularly crenulate. Tendrils very robust, woody, sulcate, slightly hairy, 3-fid. Male

flowers in racemes, rachis *ca.* 30 cm long, very stout and woody, many-flowered; peduncles *ca.* 9 cm long; bracts 3.5-4.5 cm long, oblong, finely serrate, multinerved; pedicels very stout, thick and woody; calyx-tube *ca.* 6 × 1 cm, attenuate from base to apex, lobes elongate, triangular-lanceolate, spreading, papillose, margin entire. Female flowers and fruits unknown.

Lectotype : India, Ic. Roxb. 992 (K).

Fls. : Aug.-Oct.

Distrib. : INDIA : Meghalaya ; endemic.

Notes : This species requires further examination. There is only one sheet at Kew Herbarium with no good flowers. The leaves are larger than in *T. wallichiana* proper, otherwise it closely agrees with that species. Further material when available may justify its position.

15. *T. nervifolia* L. Sp. Pl. ed. 1 : 1008. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 609. 1879 ; Cooke, Fl. Pres. Bomb. 1 : 526. 1903 (Repr. ed. 1 : 559. 1958) ; Gamble, Fl. Pres. Madr. 3 : 529. 1919 (Repr. ed. 1 : 373. 1957).

Potol (Beng.) ; *Palval* (Hindi) ; *Kommu-potta* (Tel.) ; *Kombu-pudalai* (Tam.) ; *Podla-kavi* (Kan.).

Perennial, stems slender, much-branched, glabrous. Petioles 1-2 cm long. Lamina *ca.* 6-10 × 2.5-6 cm, ovate-oblong, margin minutely denticulate, 3-nerved at the base. Tendrils slender, short, terete, bifid. Plants dioecious. Male flowers : peduncles 3-7 cm long, usually paired (one 1-flowered, the second one few-flowered), slender, sulcate, 2-7-flowered ; pedicels 0.5-2.0 cm long, erect ; calyx-tube 17-20 mm long, linear, apex dilated ; lobes erect ; staminal filaments short ; anther heads oblong, *ca.* 3 × 1.5 mm ; pistillode 5-6 mm long, setiform. Female flowers axillary on short peduncles ; calyx-tube 5 cm long, much produced above the ovary. Fruits *ca.* 9 × 5 cm, ovoid-oblong, acute at the base and apex. Seeds 1.0 × 0.8 cm, semi-ellipsoid, compressed, margin corrugate.

Lectotype : Rheede, Hort. Ind. Malab. 8 : t. 17. 1688.

Fls. : Nov. ; *Frts.* : Feb.

Distrib. : INDIA : Karnataka, Kerala, Tamil Nadu ; SRI LANKA. Endemic, confined to peninsular India and Sri Lanka.

Uses : It is credited for bitter tonic and febrifugal properties. The roots are used as purgative and fruits in toothache (Kirt. & Basu, Ind. Med. Pl. 2 : 1111. 1935 ; Nadkarni, Ind. Pl. & Drugs 1 : 1238. 1908).

16. *T. ovata* Cogn. in DC. Monog. Phan. 3 : 365. 1881 ; Kundu in J. Bombay nat. Hist. Soc. 43 : 376. 1943.

Stems somewhat robust, branched, angular-striate. Petioles 3-5 cm long, robust, striate, glabrous. Lamina 8-20 × 7-20 cm, subcoriaceous, broadly ovate, upper surface glandular-punctate, lower glabrous or slightly hairy at nerves, deeply palmately 3-9-lobed, 3-nerved at base. Tendrils slender, elongate, terete, glabrous. Male flowers : peduncles 10-15 cm long, robust, striate, glabrous, 6-10-flowered ; pedicel 1-2 mm long, slender, shortly villose ; bracts 12-15 × 8-10 mm, ovate, acute, base round, entire or slightly undulate ; calyx-tube linear, 7-9 × 1.5 mm, shortly tomentose, dilated above, lobes spreading or reflexed ; corolla shortly tomentose outside. Female flowers and fruits unknown.

Type : India, Sikkim, Thomson s. n. (L, LE).

Fls. : July-Sept.

Distrib. : INDIA : Sikkim ; endemic.

17. *T. ovigera* Blume, Bijdr. 934. 1826 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 51. 1959. *T. hearnii* King, Mat. Fl. Malay Penin. no. 10 : 28. 1908.

Stems slender. Petioles 3-5 cm. Lamina 10-15 × 7-12 cm, broadly ovate, deeply cordate, distantly denticulate ; unlobed or remotely shortly lobed, upper surface glabrous, lower densely villose, basal sinus narrowly round, 2-3 cm deep. Tendrils robust, short, bifid. Male flowers : peduncles 5-7 cm long, slender, sulcate, 4-6-flowered ; pedicels 5-7 mm long, erect ; bracts 5-8 mm long, villose, acute ; calyx-tube ca. 2.5 cm long, apex ca. 0.5 cm and base ca. 1.5 mm broad ; sub-cylindric, lobes spreading or reflexed, linear, subulate, 3-4 mm long ; staminal filaments filiform, ca. 2 mm long ; anthers ca. 4 × 2 mm. Female flowers : peduncles ca. 4 cm long, solitary, axillary, slender, shortly villose ; ovary ovoid-oblong. Fruits 4-5 cm long, thinly rugulose, masked with bands. Seeds 8 × 8-9 mm and ca. 2.5 mm thick, pale-grey, subquadrangular, base appendiculate, testa thin, brittle.

Type : Java, Mt. Salak, Blume s. n. (L, P !).

Fls. : Aug.-Sept. ; *Frts.* : Sept.-Oct.

Distrib. : An Indo-Malayan species. INDIA : Andaman & Nicobar Islands ; BURMA, MALAYSIA.

18. *T. perrottetiana* Cogn. in DC. Monog. Phan. 3 : 362. 1881 ; Gamble, Fl. Pres. Madr. 3 : 529. 1919 (Repr. ed. 1 : 373. 1957).

Stems moderately slender, branched, angular, glabrous or slightly puberulous. Petioles 5-7 cm long, slender, striate, subglabrous. Lamina 12-14 × 10-12 cm, ovate, suborbicular, subcoriaceous, margin distantly subulate, denticulate, base deeply cordate, usually nearly trilobed up to the middle. Tendrils 15-20 cm long, robust, elongate, 3-fid, 10-15-flowered ; pedicels 5-10 cm long, slender, erect ; bracts 3-5 mm long, subulate, caducous ; calyx-tube 1.5-2.0 cm long, sub-cylindric ; staminal filaments slender, *ca.* 2 mm long ; anther oblong, *ca.* 4 × 2 mm ; pistil-lode 5-6 mm long. Female flowers not known.

Type : India, Pondicherry, *Perrottet* 256 (G, K !, W).

Fls. : Nov.

Distrib. : INDIA : Pondicherry, Tamil Nadu ; endemic to South India.

19. *T. tomentosa* Chakravarty in J. Bombay nat. Hist. Soc. 50 : 894. 1952 & Rec. Bot. Surv. Ind. 17(1) : 56. 1959.

Stems robust, angular-sulcate, brownish-hirsute. Petioles 2-5 cm long, tomentose. Lamina *ca.* 10-20 × 6-10 cm, sparsely hirsute, lower surface densely felty tomentose with cupular glands, ovate-lanceolate, truncate or slightly cordate, obscurely serrate. Tendrils 5-15 cm long, robust, hirsute, simple or at base 4-5-fid. Female flowers : peduncles 2-4 cm long, axillary, solitary, one-flowered, tomentose ; calyx-tube 8-12 × 4-6 mm, tomentose, 5-lobed, lobes linear, 10-12 × 1.5-3.0 mm, tomentose outside ; petals 5, 10-15 mm long and broad, spathulate, clawed, margin fimbriate ; ovary oblong, densely and softly tomentose, and base more or less contracted ; style thick, 1.5-2.0 mm long, black when dry ; stigma 3-lobed, lobes linear, 2-3 mm long. Male flowers and fruits not known.

Type : India, Nagaland, Kohima to Nerhema *Watt* 11640 (CAL !).

Fls. : May-June.

Distrib. : INDIA : Nagaland ; endemic.

Notes : Four sheets of this species are present in CAL, all collected from Nagaland. This species can be easily distinguished from its allies by its densely tomentose leaves.

20. *T. truncata* Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879; Kanjilal et al. Fl. Assam 2 : 328. 1938.

Stems robust, elongate, angular-striate, glabrous, punctate. Petioles 4-6 cm long, robust, sulcate, glabrous. Lamina 13-16 × 6-8 cm, broad, glabrous, entire or rarely irregularly tricuspidate, ovate-oblong, acuminate, base round, margin usually entire, 3-nerved. Tendrils very slender, elongate, terete. Male flowers : peduncles ca. 20 cm long, 15-20-flowered; pedicels 1-3 mm long, puberulous; bracts 14-16 × 3-5 mm, acuminate, entire or often dentate, 3-nerved; calyx-tube 2-3 cm long, shortly tomentose, dilated, lobes 3-7 mm long, ca. 1.5 mm broad; corolla tomentose outside. Female flower solitary, axillary. Fruiting peduncles ca. 8 mm long. Fruits ca. 10 × 3-4 cm, oblong, epicarp tough. Seeds ca. 20 × 12 mm and ca. 3 mm thick, smooth, oblong-ovate, base truncate, apex obtuse.

Type : India, Khasia, *Hooker & Thomson* 1188 (K !).

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

Distrib. : INDIA : Andhra Pradesh, Arunachal Pradesh, Assam, Meghalaya, Sikkim, West Bengal; BURMA.

21. *T. villosula* Cogn. in DC. Monog. Phan. 3 : 362. 1881; Gamble, Fl. Pres. Madr. 3 : 529. 1919 (Repr. ed. 1 : 374. 1957). *T. villosula* Cogn. var. *nilgirrensis* Kundu in J. Bombay nat. Hist. Soc. 43 : 375. 1943.

Stems slender, elongate, angular-sulcate, villose. Petioles 3-6 cm long, slender, striate. Lamina 8-13 cm long and as much broad, suborbicular, base cordate, 5-lobed up to the middle, lobes ovate-oblong, acute or shortly acuminate, occasionally lobulate, sub-crenulate, denticulate. Tendrils robust, elongate, sulcate, 3-4-fid. Male flowers : peduncles 10-16 cm long, slender, sulcate, 10-20-flowered; pedicels 2-5 cm long, erect, spreading, subfiliform; bracts 1-2 mm long, subulate, caducous; calyx-tube 2.0-2.5 cm long, sub-cylindric; petals 12-13 × 3-4 mm, oblong-lanceolate, acuminate, fimbria elongate, branched; staminal filament 1.0-1.5 mm long; anthers sublinear, ca. 5 × 1.5 mm; pistillode 5-9 mm long. Female flower solitary. Fruiting peduncles ca. 1.5 cm long. Fruits 5.5-6.0 × 2-5 cm, ovoid, acuminate.

Type : India, Nilgiri Hills, *Hohenacker* 1507 (G !, K, BM).

Fls. : Nov.-Jan.; *Frts.* : Dec.-Feb.

Distrib. : INDIA : Andhra Pradesh, Karnataka, Kerala, Tamil Nadu ; endemic to South India.

22. *T. wallichiana* (Seringe) Wight in Ann. & Mag. Nat. Hist. 8 : 270. 1842 ; Kanjilal *et al.* Fl. Assam 2 : 327. 1938 ; Mizushima in Hara's Fl. E. Himal. 1 : 325. 1966. *Involucraria wallichiana* Seringe in Mem. Soc. Phys. Hist. Nat. Geneve 3(1) : 25, t. 5. 1825. *Trichosanthes multiloba* Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879. *T. palmata* Roxb. var. *scotanthus* Clarke in Hook. f. l. c. 607.

Indravani (Nep.) ; *Phan-sohlyushang* (Khasi).

Stems elongate, angular-sulcate. Petioles 3-10 cm, striate, shortly villose. Lamina 10-20 cm long and almost as broad, membranous with black-dotted glands at the base, suborbicular, deeply palmately 3-9-lobed, lobes oblong-lanceolate, margin denticulate or crenate-dentate. Tendrils 2-3-fid, robust. Plants dioecious. Male flowers : peduncles 15-35 cm long, robust, sulcate, puberulous, 6-12-flowered ; bracts 2-3 cm long, adpressed, broadly ovate ; pedicels thick, short ; calyx-tube 5-5.5 cm long, lobes 1-1.5 cm long ; petals 3-4 cm long, obovate, subglabrous, 3-nerved ; staminal filaments short ; anthers *ca.* 12-13 × 3 mm. Female flowers : peduncles 2-4 cm long ; ovary oblong, glabrous. Fruits 5-6 cm long, ovoid or oblong, apex acute. Seeds 15-18 mm long, margin more or less angular.

Type : Nepal, *Wallich s. n.* (G—DC !).

Fls. : July-Sept. ; *Frts.* : Sept.-Nov.

Distrib. : An Indo-Malayan species. INDIA : Bihar, Himachal Pradesh, Karnataka, Maharashtra, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal ; NEPAL, BURMA, MALAYSIA.

Uses : In Malaya the leaves are applied to the abdomen for miscarriage. The fruits are poisonous and the root contains an alkaloid (Burkill, Dict. Econ. Prod. Mal. Pen. 2 : 2179. 1935 ; Amarsingha *et al.* in Econ. Bot. 18 : 270. 1964).

Chr. No. : $n = 11$ [Saiju & Regmi in Taxon 26(2 & 3) : 265. 1977].

Notes : This species is very closely allied to *T. bracteata* (Lamk.) Voigt from which it can be separated by the membranous leaves with black-dotted glands at the base.

36. ZANONIA

L. Sp. Pl. ed. 1 : 1028. 1753 ; Benth. & Hook. f. Gen. Pl. 1 : 839.

1867; Clarke in Hook. f. Fl. Brit. Ind. 2 : 633. 1879; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 181. 1959; Hutchinson, Gen. Fl. Pl. 2 : 382. 1967.

Woody climbers, stems subglabrous. Leaves petiolate, undivided, entire. Tendrils simple or bifid. Plants dioecious. Flowers small, males arranged in lax pendulous panicles, females racemose. Male flowers : calyx-tube short, cupular, lobes 3, rarely 4, membranous, concave; petals 5, apex narrow and introflexed in bud; stamens 5, free, all of equal length, inserted on a fleshy disc, filaments short, thick; anthers transversely oblong, unilocular; pistillode 0. Female flowers : calyx and corolla as in the male; calyx-tube long, obconic; staminodes 5, very short, alternate with petals; ovary inferior, at first bilocular, ultimately unilocular; styles 3, spreading, apex bifid, ovules 2 or many in each locule pendulous, attached in 2 series to a fleshy parietal placenta. Capsules large, elongate-cylindric, clavate, 3-valved at the truncate apex. Seeds large, oblong, pendulous, compressed, surrounded by a large membranous wing.

Distrib. : A monotypic Indo-Malayan genus.

1. *Zanonia indica* L. Sp. Pl. ed. 2 : 1457. 1763; Clarke in Hook. f. Fl. Brit. Ind. 2 : 633. 1879; Cooke, Fl. Pres. Bomb. 1 : 546. 1903 (Repr. ed. 1 : 581. 1958); Gamble, Fl. Pres. Madr. 3 : 543. 1919 (Repr. ed. 1 : 383. 1957).

Figs. 1-6.

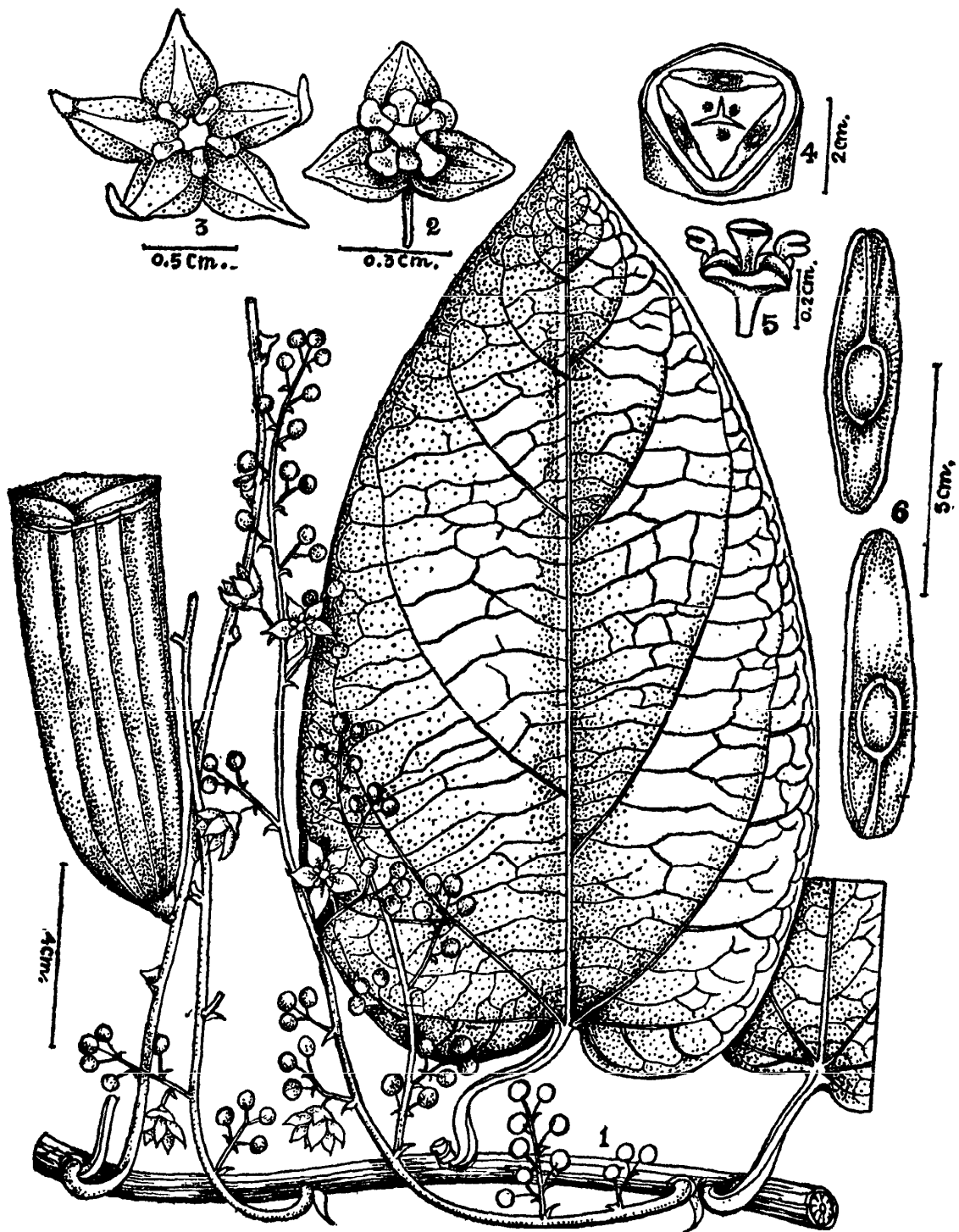
Stems robust, 10-15 m. Petioles 1.5-3.0 cm long. Lamina 8-20 × 5-12 cm (leaves larger in Kerala specimens), coriaceous, ovate-oblong, base almost rounded, apex acute, trinerved. Tendrils robust, elongate, glabrous. Male flowers : peduncles 10-40 cm long, slender; pedicels 4-5 mm long, 1.2-1.4 mm broad, thick, articulate at the middle; sepals 2 mm long, ovate, acute; petals 2.5-3.5 × 1.0-1.5 mm, oblong, obtuse, buff-coloured. Female flowers : peduncles 10-30 cm long, sparsely 5-10-flowered; pedicels thick, very short; sepals 3-4 mm long and almost as broad; petals 6-8 × 3-4 mm, broad at the base; ovary obconic-cylindric, 10-12 mm long. Fruits 6-10 × 2.5-3 cm, brownish, finely granulose, truncate. Seeds 2 × 1 cm, pale-yellow, smooth; wing yellowish, 5-6 × 1.3-1.5 cm, encloses the seed at the centre.

Branches glabrous or subglabrous

... var. **indica**

Branches densely pubescent

... var. **pubescens**



Zanonia indica Linn.

Figs. 1-6 : 1. A habit sketch with an inflorescence and mature fruit. 2. A male flower. 3. A female flower. 4. T. S. of a fruit. 5. Part of a male flower showing stamens. 6. Seeds (two views).

var. indica

Lectotype : Rheede, Hort. Ind. Malab. 8 : t. 49. 1688.

Fls. : Sept.-Dec. ; *Frts.* : Nov.-Jan.

Distrib. : Indo-Malayan species. INDIA : Andaman & Nicobar Islands, Kerala, Sikkim, Tamil Nadu, West Bengal ; BANGLADESH, BURMA, SRI LANKA, MALAYSIA.

Uses : The leaves are considered anti-inflammatory and antispasmodic. A decoction of the leaves is said to be useful to cure nerve irritation. Fruit possesses cathartic and antiseptic properties (Kirt. & Basu, Ind. Med. Pl. 2 : 1169. 1935 ; Chopra, Dict. Med. Pl. 549. 1958).

var. pubescens Cogn. in DC. Monog. Phan. 3 : 927. 1881 ; Chakravarty in Rec. Bot. Surv. Ind. 17(1) : 184. 1959.

Type : India, Khasia Hills, *Griffith* 2521 (K !, CAL !, P !).

Fls. : Oct.-Nov. ; *Frts.* : Nov.-Dec.

Distrib. : INDIA : Meghalaya ; MALAYSIA.

ACKNOWLEDGEMENT

Mr. C. Jeffrey, Royal Botanic Garden, Kew, deserves thanks for rendering help in the determination of typographic materials. Photos of type-sheets furnished by Kew were of invaluable help and Kew deserves grateful thanks on this count. Dr. D. K. Hore deserves my grateful thanks for rendering valuable help in the preparation of this work. Lastly I am thankful to Dr. G. G. Maiti for checking the proofs during its publication.

INDEX TO SCIENTIFIC NAMES

Actinostemma Griff.	2, 6	<i>mucronata</i> Bl.	84
tenerum Griff.	7, 8	multiflora Boiss.	14, 15
<i>Aechmandra conocarpa</i> Dalz. &		<i>mysorensis</i> Arn.	84
Gibs.	27	<i>palmata</i> L.	48
<i>Alsomitra</i> Roem.	2, 96	<i>pedunculosa</i> Ser. ex DC.	59
<i>graciliflora</i> Harms.	58	<i>rostrata</i> Rottl.	64
<i>clavigera</i> (Wall.) Roem.	96	<i>scabrella</i> Linn. f.	83
var. <i>hookeri</i> Clarke	97	Bryonopsis Arn.	4, 14, 15, 16
Argyreia Lour.	98	<i>bennettii</i> Miq.	19
Benincasa Savi	3, 7	laciniosa (L.) Naud.	14, 16, 17, 49
<i>cerifera</i> Savi	9	<i>Cephalandra</i> Schrad.	24
hispidula (Thunb.) Cogn.	9	<i>indica</i> (Wight & Arn.) Naud.	24
Biswarea Cogn.	3, 10	Cerasiocarpum Hook. f.	5, 18
tonglensis (Clarke) Cogn.	11	bennettii (Miq.) Cogn.	18
Blastania Kotschy & Peyr.	5, 11	<i>zeylanicum</i> (Thw.) Hook. f.	19
fimbristipula (Fenzl.)		<i>Chayota edulis</i> (Jacq.) Jacq.	101
Kotschy & Peyr.	12, 47	<i>Chocho</i> Adans.	100
garcinii (Burm. f.) Cogn.	12, 13	Citrullus Schrad.	4, 19
Bryonia Linn.	4, 13, 14, 16,	colocynthis (L.) Schrad.	20, 21
	46, 48	<i>fistulosus</i> Stocks	23
<i>amplexicaulis</i> Lam.	77	lanatus (Thunb.) Matsumura	20, 22
<i>callosa</i> [collosa] Rottl.	31	& Nakai	
<i>cochinchinensis</i> Lour.	53	var. fistulosus (Stocks)	22, 23
dioica Jacq.	14, 15	Chakrav.	
<i>epigaea</i> Rottl. & Willd.	28	var. lanatus	22
<i>fimbristipula</i> Fenzl.	12	<i>vulgaris</i> (Schrad.) Schrad.	22
<i>grandis</i> L.	24	Coccinia Wight & Arn.	4, 23
<i>laciniosa</i> L.	14, 16	grandis (L.) Voigt	24, 25
<i>leiosperma</i> Wt. & Arn.	81	var. <i>alceaefolia</i>	26
<i>leucocarpa</i> Bl.	82	var. <i>genuina</i>	26
		var. <i>wightiana</i>	26

<i>indica</i> Wight & Arn.	24	<i>sativus</i> Linn.	31, 36
<i>Colocynthis</i> P. Miller	19, 22, 32	var. <i>sativus</i>	37
<i>citrullus</i> (L.) O. Kuntze		var. <i>sikkimensis</i> Hk. f.	37
var. <i>fistulosus</i> (Stocks)		<i>setosus</i> Cogn.	31, 38
Chakrav.	23	<i>trigonus</i> Roxb.	31
Corallocarpus Welw. ex		<i>utilissima</i> Roxb.	35
Hook. f.	5, 27	Cucurbita L.	4, 38 , 39
<i>conocarpus</i> (Dalz. & Gibs.)		<i>ficifolia</i> Bouche	39
Hook. f.	27	<i>hispida</i> Thunb.	9
<i>epigaeus</i> (Rottl. & Willd.)		<i>maxima</i> Duch. ex Lam.	39, 40
Hook. f.	27, 28	<i>moschata</i> (Duch. ex Lam.)	
<i>gracilipes</i> (Naud.) Cogn.	27, 29	Duch. ex Poir.	39, 41 , 42
<i>palmatum</i> Cogn.	27, 29	<i>pepo</i> L.	39, 41, 43
<i>Ctenolepis</i> Hook. f.	11	var. <i>melo</i> <i>pepo</i> Alef.	44
<i>cerasiformis</i> (Stocks) Naud.	12	var. <i>moschata</i> Duch.	
<i>garcinii</i> (Burm. f.) Naud.	13	ex Lam.	41
Cucumerinae	2	var. <i>ovigera</i> Alef.	44
Cucumis L.	2, 4, 30	<i>purpusilla</i> Bl.	85
<i>anguina</i> L.	108	<i>siceraria</i> Molina	65
<i>acutangula</i> L.	67	<i>umbellata</i> Klein	75
<i>callosus</i> (Rottl.) Cogn.	30, 31	Dactyliandra (Hook. f.)	
<i>colocynthis</i> L.	20	Hook. f.	5, 46
<i>hystrix</i> Chakrav.	31, 32	<i>welwitschii</i> Hook. f.	46
<i>maderaspatana</i> L.	83	Dendrosicyos Balf. f.	1
<i>melo</i> L.	31, 32 , 33, 35	Dicaelospermum Clarke	5, 47
var. <i>agrestis</i> Naud.	34, 35	<i>ritchiei</i> Clarke	47
var. <i>culta</i> Kurz	34, 35	Diplocyclos (Endl.) Post &	
var. <i>melo</i>	34 , 35	Kuntze	5, 48
var. <i>momordica</i> Duthie &		<i>palmatum</i> (L.) Jeffrey	48
Fullar	35	Edgaria Clarke	4, 49 , 60
var. <i>utilissima</i> Duthie &		<i>darjeelingensis</i> Clarke	49 , 59, 60
Fullar	35	Fevillea Linn.	2
<i>momordica</i> Roxb.	35	Gomphogyne Griff.	6, 50
<i>prophetarum</i> Linn.	31, 32, 35		
<i>pubescens</i> Willd.	35		

cissiformis Griff.	51	<i>vulgaris</i> Ser.	65
var cissiformis	51	Luffa Miller	2, 3, 66, 70, 73, 74, 76, 97, 98
var. villosa Cogn.	51	acutangula (L.) Roxb.	67, 68, 71, 73, 74
macrocarpa Cogn.	51, 52	var. acutangula	69
Gymnopetalum Arn.	3, 52	<i>aegyptiaca</i> Mill.	70
cochinchinense (Lour.)		var. amara (Roxb.)	
Kurz	53	Clarke	69, 70, 74
<i>heterophyllum</i> Kurz	54	<i>amara</i> Roxb.	54, 70, 74, 98
quinquelobum Miq	53, 54	<i>cordifolia</i> Bl.	102
wightii Arn,	53, 54	cylindrica (L.) M. Roem.	67, 70, 73
Gymnostemma Bl.	6, 55, 58	<i>echinata</i> Roxb.	67, 71
laxa (Wall.) Cogn.	56	var. echinata	72
pedata Bl.	56	var. longistyla Clarke	72
<i>pentaphylla</i> (Thunb.)		graveolens Roxb.	67, 72
Makino	57	hermaphrodita Singh &	
Hemsleya Cogn.	2, 6, 57	Bhandari	67, 73, 74
graciliflora (Harms.)		tuberosa Roxb.	67, 74
Cogn.	58	umbellata (Klein) Roem.	67, 75
<i>trifoliolata</i> Cogn.	104, 105	Melothria Linn.	5, 75, 76
Herpetospermum Benth. &		amplexicaulis (Lam.)	
Hook. f.	3, 58, 60	Cogn.	76, 77
pedunculatum (Ser. ex DC.)		angulata Chakrav.	77, 78
Baill.	50, 59, 60	assamica Chakrav.	76, 79
Hodgsonia Hook. f. &		var. assamica	79
Thoms.	2, 60	var. scabra Chakrav.	79
<i>heteroclita</i> Hk. f. & Th.	60	<i>deltoidea</i> Thw.	87
macrocarpa (Bl.) Cogn.	60, 61	heterophylla (Lour.)	
Indofevillea Chatterjee	4, 62	Cogn.	76, 77, 79
khasiana Chatterjee	62	indica Lour.	77, 81
<i>Involucraria lepiniana</i> Naud.	116	leiosperma (Wt. & Arn.)	
<i>I. wallichiana</i> Ser.	123	Cogn.	76, 81
Kedrostis Medik.	5, 63		
rostrata (Rottl.) Cogn.	64		
Lagenaria Ser.	2, 3, 64, 66		
siceraria (Molina) Standl.	65		

leucocarpa (Bl.) Cogn.	77, 82	macrophylla Gage	88, 94
var. leucocarpa	82	<i>muricata</i> Willd.	92
var. triloba Cl.	82, 83	<i>pedata</i> L.	45
maderaspatana (L.) Cogn.	76, 83	subangulata Bl.	88, 95
mucronata (Bl.) Cogn.	77, 84	<i>tuberosa</i> (Roxb.) Cogn.	74
var. mucronata	84	<i>Mukia</i> Arn.	75, 76
var. umbellata Chakrav.	84, 85	<i>leiosperma</i> Thw.	38
odorata Hk. f. & Thoms.		<i>leiosperma</i> Wt. & Arn.	81
ex Clarke	82	<i>scabrella</i> (L. f.) Arn.	83
perpusilla (Bl.) Cogn.	77, 85	<i>Muricia cochinchinensis</i> Lour.	92
var. perpusilla	85	Neosalsomitra Hutch.	6, 96
var. subtruncata Cogn.	85, 86	<i>clavigera</i> (Wall.) Hutch.	96, 97
ritchiei Chakrav.	77, 86	var. clavigera	96, 97
<i>zehnerioides</i> Haines	83	var. hookeri (Clarke)	96, 97
zeylanica Clarke	77, 87	Neoluffa Chakrav.	2, 3, 97, 98
<i>Modecca bracteata</i> Lamk.	109	<i>sikkimensis</i> Chakrav.	98
Momordica Linn.	3, 74, 75, 87	Orthospermeae	2, 5
balsamina Linn.	88	<i>Rhynchocharpa</i> Schrad.	63
charantia Linn.	88, 89, 90, 94	<i>epigaea</i> (Rottl. & Willd.)	
var. β Linn.	92	Naud.	28
var. charantia	90, 91, 92	var. <i>gracilipes</i> Naud.	29
var. muricata (Willd.)		<i>foetida</i> Clarke	64
Chakrav.	91, 92	Schizopepon Maxim.	6, 98
cochinchinensis (Lour.)		dioicus Cogn.	99
Spreng.	88, 92	<i>macranthus</i> Hand. —Mzt.	100
<i>cylindrica</i> L.	70	wardii Chakrav.	99
<i>cymbalaria</i> Fenzl.	74	Sechium P. Br.	6, 100
denudata (Thw.) Clarke	88, 93	<i>americana</i> Poir.	101
dioica Roxb. ex Willd.	88, 93, 94	edule (Jacq.) Sw.	39, 100
var. denudata Thw.	93	<i>Sicyos edulis</i> Jacq.	101
ignata Thunb.	22	<i>S. garcinii</i> Burm. f.	13
		Siraitia Merr.	97
		<i>Solena heterophylla</i> Lour.	80

Thladiantha Bunge	4, 101	<i>hearnii</i> King	120
<i>calcarata</i> Clarke	102	himalensis Clarke	107, 115
cordifolia (Bl.) Cogn.	102	var. glabrior Clarke	115
var. cordifolia	103	var. himalensis	115
var. subglabra Cogn.	103	var. <i>indivisa</i> Chakrav.	116
<i>dubia</i> Hook. f.	102	var. sikkimensis	
<i>heptadactyla</i> Cogn.	104	(Kundu) Thoth.	115, 116
hookeri Clarke	102, 103 , 104	lobata Roxb.	106, 117 , 118
var. hookeri	104	<i>macrocarpa</i> Bl.	60
var. irregularis		majuscula (Clarke)	
Chakrav.	104 , 105	Kundu	107, 118
var. <i>palmatifolia</i>		<i>microsiphon</i> Kurz	110
Chakrav.	104	<i>multiloba</i> Clarke	123
<i>pentadactyla</i> Cogn.	104, 105	<i>multiloba</i> Miq.	
Trichosanthes Linn.	3, 105	var. <i>majuscula</i> Clarke	118
anamalaiensis Bedd.	107	nervifolia Linn.	105, 113, 119
<i>anomalayana</i> Bedd.	107	ovata Cogn.	106, 120
anguina Linn.	106, 108 , 118	ovigera Bl.	107, 120
bracteata (Lamk.)		var. <i>sikkimensis</i> Kundu	116
Voigt	107, 109 , 123	<i>palmata</i> Roxb.	109
var. bracteata	109	var. <i>tomentosa</i> Heyne	
var. tomentosa		ex Clarke	110
(Heyne ex Clarke)		var. <i>scotanthus</i> Clarke	123
Chakrav.	109, 110	perrottetiana Cogn.	106, 121
<i>burmensis</i> Kundu		tomentosa Chakrav.	107, 121
var. <i>alba</i> Kundu	110	truncata Clarke	106, 122
cordata Roxb.	107, 110 , 111	villosula Cogn.	106, 122
cucumerina Linn.		var. <i>nilgireensis</i> Kundu	122
	106, 112 , 118	wallichiana (Ser.)	
cuspidata Lam.	105, 112	Wt.	107, 119, 123
dicaelosperma Clarke		var. <i>majuscula</i>	
	107, 113	(Clarke) Cogn.	118
dioica Roxb.	105, 107, 114	Warea Clarke	10
var. dioica	114	<i>tonglensis</i> Clarke	11
var. sagittifolia		Zanonia Linn.	2, 6, 96, 123
Chakrav.	114, 115	sect. <i>alsomitra</i> Bl.	96

<i>clavigera</i> Wall.	96	Zanonieae	2, 6
<i>indica</i> Linn.	124, 125	<i>Zehneria</i> Endl.	75, 76
var. <i>indica</i>	124, 126	<i>angulata</i> (Chakrav.) Ellis	78
var. <i>pubescens</i>		<i>bauriana</i> Clarke	84
Cogn.	124, 126	<i>hookeriana</i> Arn.	85
<i>laxa</i> Wall.	56	<i>umbellata</i> Thw.	80

INDEX TO LOCAL NAMES

Adavi-kakra (Tel.)	92	Chedupotla (Tel.)	112
Adavi-patla (Tel.)	112	Chichendara (Ori.)	108
Adavi-potla (Tam.)	112	Chichinga (Beng.)	108
Agakral (Tel.)	94	Chow-chow (Eng.)	101
Angular-gourd (Eng.)	69	Colocynth (Eng.)	20, 22
Ara-torui (Hindi)	68	Crook necked squashes (Eng.)	41
Avagude-hannu (Kan.)	109	Cucumber (Eng.)	36
Badi Aukh phootani Bel (Raj.)	46	Darsani (Nep.)	60
Ban-chichinga (Beng. & Hindi)	112, 118	Dhundul (Beng.)	70
Ban-goalkakri (Punj.)	112	Galartori (Punj.)	108
Ban-karela (Beng.)	94	Gangema (Hindi)	92
Ban-kundri (Ori. & Hindi)	24, 80	Gargu-naru (Hindi)	16
Ban patal (Beng.)	112	Gherkin (Eng.)	36
Bhat-Karela (Asm.)	92	Ghia-torui (Hindi)	70
Bhimb (Hindi)	24	Ghinphal (Nep.)	66
Bhoi-kumra (Beng.)	110	Ghiyatori-bhol (Asm.)	70
Bilari (Beng. & Hindi)	83	Ghosale (Mar.)	70
Bimbadhar (Sans.)	24	Gol-kaddu (Hindi)	9
Bindaal (Beng.)	71	Golkakra (Beng. & Hindi)	92
Bitter apple (Eng.)	20	Gulur (Beng.)	60
Bon-Kakra (Hindi)	48	Hantharang-phar (Mik.)	60
Bryony (Eng.)	15	Indravani (Nep.)	123
Carilla (Eng.)	91	Indrayan (Hindi)	20, 109
Chachinda (Hindi)	108	Jhinga (Hindi, Beng. & Asm.)	68
Chal-kumra (Beng.)	9	Jungli-chichinda (N.W.P.)	118
Chapan-kadu (Punj.)	44	Kaadu-padavala (Kan.)	114
Chayote (Eng.)	101	Kadmeah (Hindi)	43

Kadu (Hindi)	41, 65	Lau (Beng.)	65
Kaknai (Ori.)	36	Lauki (Hindi)	65
Kakrol (Beng.)	94	Lingapotla (Tel.)	103
Kaksa (Hindi)	94	Makal (Beng.)	109
Kali-dudhi (Mar.)	41	Makiral (Ori.)	80, 109
Kanchan-arak (Santal.)	94	Mala (Beng.)	16
Karakia (Ori.)	80	Mei-soh-mynthar (Khasi)	60
Karala (Beng.)	89, 90, 91, 92	Melon (Eng.)	32, 34
Karela (Hindi)	89	Mitha-kadu (Hindi)	39, 41
Karena (Ori.)	89	Mitha-kumra (Beng.)	40
Karlikai (Kan.)	94	Mitha-lau (Asm.)	41
Kartoli (Maharashtra)	94	Padavali (Guj.)	103
Karui-tarai (Hindi)	70	Padwal (Mar.)	108
Kathai (Mani.)	60	Palval (Hindi)	119
Kathior-pat (Lep.)	60	Palwal (Hindi)	114
Kavandala (Mar.)	109	Parangikayi (Tam.)	40
Keala (Hindi)	43	Patal (Ori.)	114
Kharbuz (Hindi)	32	Patola (Mar.)	112
Kha-um (Lus.)	60	Patolam (Mal.)	114
Khira (Hindi & Beng.)	36	Pava-kai (Tam.)	89
Kohala (Mar.)	43	Phan-sohlyushang (Khasi)	123
Kombu-pudalai (Tam.)	114, 119	Podla-kavi (Kan.)	119
Kommupotla (Tel.)	114	Potol (Beng.)	114, 119
Kommu-potta (Tel.)	119	Pudal (Tam.)	108
Kumbala (Kan.)	43	Pumpkin (Eng.)	39, 43
Kumra (Beng. & Hindi)	39, 40, 41	Putulika (Sans.)	114
Kundri (Hindi & Beng.)	24, 26, 80	Quash (Eng. & Beng.)	39, 101
Kurelo-jangro (Sind.)	89	Ram-turai (Mar.)	70
Ladu (Beng.)	65	Red Bryony (Eng.)	14
Lal-bhopli (Mar.)	40	Ridged Gourd (Eng.)	69
Lal-dudiya (Mar.)	40	Sasa (Beng.)	36
Lal-kumra (Hindi & Asm.)	40, 41	Satputia (Beng. & Hindi)	73
		Seema-kattirikkai (Tam.)	101

Seeme-badane (Kan.)	101	Tinda (Hindi)	23
Sitaphal (Hindi)	41	Tita-jhinga (Beng.)	70
Sohkhia-Phlang (Khasi)	80	Tormuj (Beng.)	22
Soh-kwash (Khasi)	101	Uchchhe (Beng.)	90, 92
Snake gourd (Eng.)	103	U-sohlym-shang (Khasi)	109
Sponge gourd (Eng.)	71	Vegetable marrow (Eng.)	
Tarbuz (Hindi)	22		39, 41, 43
Telakucha (Beng.)	24	Vilayeti-kadu (Punj.)	44
Thebou-lata (Asm.)	60	Water Melon (Eng.)	22
Thi-be (Garo)	60	White Bryony (Eng.)	14
Tholloopavail (Tam.)	94	White gourd (Eng.)	9
Tincture Bryonia (Eng.)	15		

Author's note on the Family

The Cucurbits of India incorporated in this revision under the 'Flora Project' of the Botanical Survey cover about one hundred species embracing thirty-six genera within the present boundary of the Republic. Some species enlisted in the family-monograph [Chakravarty, Rec. B. S. I. 17(1) : 1959] have been omitted and a few added as the monograph was prepared upon the area-concept of Hooker's Flora of British India including therein Burma, Ceylon, Pakistan and Bangladesh. A good number of Cucurbits are cultivated for the purpose of vegetable production and a few for medicinal use. The wild species spread all over the country and some are confined to the Himalayan Ranges and a good number occurs in the plains. Strictly speaking, there is no pure aquatic species. *Cucumis prophetarum* and *Citrullus colocynthis* prefer drier soil, particularly the latter which is xerophytic. *Edgaria*, *Herpetospermum* and *Hemsleya* are interesting plants of the Himalaya, so also *Bryonia* which occurs only in the Western Himalaya. About twenty-five species are endemic either in the Sikkim Himalaya or in the Peninsular India. Both these zones are interesting on this account. The economic Cucurbits contributing the major production of our common vegetable are grown all over India. Bottle Gourd (*Lagenaria siceraria*), Ribbed Gourd (*Luffa acutangula*), White Gourd (*Benincasa hispida*), Cucumber (*Cucumis sativus*), Melons (*Cucumis melo*), Water Melons (*Citrullus lanatus*), Vegetable Marrow, Pumpkin (*Cucurbita* spp.), Bitter Gourd (*Momordica charantia*), Chow-chow (*Sechium edule*), Pointed Gourd (*Trichosanthes dioica*) are some of the most common vegetable of India which are being cultivated from the remote age of civilization and they developed many local varieties. Melons and Water Melons though generally treated under vegetable, strictly speaking, are exceptionally good summer desert fruits. Bryony and Colocynth are standard pharmacopoeial drugs.

Cucurbitaceae is a highly evolutionary group and vegetative characters are often deceptive in taxonomic analysis. Living floral material removes confusion of identity beyond all doubts.

FASCICLES OF FLORA OF INDIA

Family	Fascicle	Date of Publication
CORIARIACEAE	1	Oct. 1978
PAEONIACEAE	1	Oct. 1978
DILLENiaceae	2	May 1979
POACEAE (TRIBE GARNOTIEAE)	3	Nov. 1979
SIMAROUBACEAE	4	April 1980
BALANITACEAE	4	April 1980
ORCHIDACEAE (GENUS COELOGYNE)	5	June 1980
PITTOSPORACEAE	6	Nov. 1980
LILIACEAE (TRIBE SCILLEAE)	7	Feb. 1981
LEGUMINOSAE (GENUS DERRIS)	8	July 1982
ACERACEAE	9	Aug. 1982
ANNONACEAE (TRIBE UVARIEAE)	10	Sept. 1982