

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

VOL. III

*PREFACE TO THE SECOND RE-PRINTED EDITION,
PREFACE TO THE RE-PRINTED EDITION, FOREWORD,
PREFACE, CONTENTS, AUTHOR'S NOTE, NOTES
ON PART XI, GENERAL DESCRIPTION,
ABBREVIATIONS, GLOSSARY AND
KEY TO FAMILIES.
FLORA: RANUNCULACEAE TO CAPRIFOLIACEAE*

REPRINTED UNDER THE AUTHORITY
OF THE GOVERNMENT OF INDIA

BOTANICAL SURVEY OF INDIA
CALCUTTA

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PREFACE TO THE SECOND REPRINTED EDITION

The 'Flora of the Presidency of Madras' by J. S. Gamble was published in its first edition from 1915 to 1935. When the Botanical Survey of India was revived in 1954, one of the first proposals received from numerous individuals and universities was that this Flora, which had been out of print for many years, should again be made available to students.

In answer to such requests this Flora was reprinted in 1957, and the book at once found great favour with botanists and students; the handy format and the very low price of the book were some of the factors that made it attractive to students. This reprinted edition was soon exhausted, and the demand for copies of the same has been mounting with the passing of time.

The present edition is a reprint of that of 1957; the format and style are exactly the same in both editions, the pagination remains unaltered. As a measure of long-range economy this present edition is being brought out by off-set process which will at the same time guarantee the accuracy of this as compared with the first reprinted edition.

No changes have been made in the nomenclature of plants listed in this Flora. The Botanical Survey of India is now busily engaged in the preparation of check-lists of all the plant names included in Gamble's and other Floras, a very important preliminary towards the final revision of all our provincial Floras.

Botanical Survey of India,
14, Madan Street, Calcutta, 1967.

H. SANTAPAU, S.J

PREFACE TO REPRINTED EDITION

When the Botanical Survey of India was reorganised in 1954 the Government of India decided on the advice of the eminent Botanists of the country that the important Floras of the country which had gone out of print should be reprinted in order to provide immediate facilities of work on Systematic Botany of Phanerogams by students and Botanists of the country. The reprints are now being issued accordingly.

One particular point needs a special mention here. The Government of India, while recognising fully the need for bringing the Floras of the country upto date after a thorough revision, cannot overlook the fact that such work is possible only on an extensive and thorough exploration of both regions already explored and those hitherto unexplored and a proper rating of the information thus obtained with the materials in the already published Floras. For this reason alone, there is ample justification for a reprint of the old Floras; the present effort is therefore the starting point in the greater project of the review of the Flora of our country. It is hoped that these publications should thus meet the long-felt requirement of the Botanists of the country.

Owing to the necessity to conform to certain printing stipulations and using the same size of paper for all the reprinted Floras, the paginations in the reprinted volumes differ from the original. But the index, which is correspondingly corrected, would, it is hoped, enable reference without inconvenience.

The corrections mentioned in the corrigenda have been incorporated and some of the printing mistakes in the original flora have been corrected in this publication.

The reprint is being bound in three volumes as suggested in the original publication.

14, Madan Street,
Calcutta, 1957.

J. C. SEN GUPTA
Chief Botanist
Botanical Survey of India.

FLORA
OF THE
PRESIDENCY OF MADRAS

BY
C. E. C. FISCHER,
LATE OF THE INDIAN FOREST DEPARTMENT

PART VIII
ULMACEAE TO XYRIDACEAE.

PUBLISHED UNDER THE AUTHORITY
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1956

INTRODUCTION TO PART VIII.

IN the introduction to Part VII it was my sad duty to record the death of Mr. J. S. Gamble, C.I.E., F.R.S., the author of Parts I—VII of the 'Flora of Madras.' The publication of Part VIII by another author requires a few words of explanation.

The Secretary of State for India in Council, realising the importance of having the Flora completed, requested me to find someone competent to carry on Mr. Gamble's work, and I was fortunately able to recommend that the task should be entrusted to Mr. C. E. C. Fischer, late of the Indian Forest Service, and now Assistant for India on the Staff of the Royal Botanic Gardens, Kew.

The present part comprises the Natural Families *Ulmaceae* to *Xyridaceae*, and follows the style of the earlier parts written by Mr. Gamble, with whom Mr. Fischer had the opportunity of working at Kew in connection with Part VII.

ARTHUR W. HILL.

ROYAL BOTANIC GARDENS, KEW;
May, 1928.

FLORA OF MADRAS

Family CXXXVI. ULMACEAE.

Trees or shrubs. *Leaves* simple, alternate, bifarious, gland-dotted; stipules lateral or intrapetiolar. *Flowers* usually bisexual or polygamous, small, in axillary clusters or cymes, the ♀ sometimes solitary. *Perianth* calycine, usually 4—5-merous, polyphyllous or gamophyllous. *Stamens* as many or twice as many as the perianth-lobes; anthers erect in bud, dehiscing laterally. *Ovary* of 2 carpels, rarely 2-celled; ovules 1 in each cell, pendulous; stigmas 2, bifid, the branches stigmatic on the inner sides; pistillode in ♂ usually present. *Fruit* indehiscent, a nut drupe or samara. *Seed* with thin testa; albumen 0 or scanty; embryo straight or curved; cotyledons flat or folded.

- Flowers in clusters appearing before the leaves; fruit a samara.....1. **Holoptelea.**
Flowers on the young shoots persistent; fruit a drupe:—
Flowers polygamous; perianth-lobes imbricate:—
Stipules free.....2. **Celtis.**
Stipules sheathing the bud, caducous.....3. **Gironniera.**
Flowers usually dioecious; perianth-lobes induplicate-valvate.....4. **Trema.**

1. **Holoptelea**, Planch.

Deciduous tree. *Leaves* alternate, distichous, entire, penninerved; stipules lateral, scarious. *Flowers* polygamous or hermaphrodite, in fascicles at the scars of the previous year's shoots, which are scaly but leafless. *Perianth* simple, calycine, 4—8-partite; lobes imbricate, often unequal. *Stamens* 4—8; filaments erect; anthers hairy. *Ovary* stipitate, compressed; ovule solitary, pendulous; style short, bifid, the arms stigmatose. *Fruit* dry, indehiscent, samaroid, flat, the wing ovate reticulate, membranous. *Seed* flat; albumen 0; cotyledons longitudinally folded; radicle small, superior.

HOLOPTELEA INTEGRIFOLIA, Planch.; F. B. I. v. 481; Wt. Ic. t. 1968.

Ulmus integrifolia, Roxb. Cor. Pl. t. 78; Bedd. Fl. t. 310.

N. Circars, in deciduous forests, common; occasional in forests in the hills of the Deccan and E. slopes of W. Gháts; low levels in Travancore.

A large deciduous tree. Bark whitish-grey with an offensive smell when freshly cut; wood light yellowish-grey, moderately hard, little used except as fuel. Vern. *Hind.* Papri; *Ur.* Daurango; *Tel.* Thapasi, Nauli; *Tam.* Aya, Ayil, Tambachi; *Mal.* Aval; *Kan.* Thavasai.

2. **Celtis**, Linn.

Trees or shrubs, sometimes evergreen. *Leaves* alternate, entire or serrate, 3-ribbed at base; stipules lateral, free. *Flowers* small

polygamous, cymose, ♂ and ♀ usually at the base of the shoots, ♀ in upper axils. *Calyx*-lobes 4 or 5, imbricate. *Petals* 0. *Stamens* 4 or 5, inserted round a woolly torus. *Ovary* sessile; ovule pendulous; style-arms simple or lobed. *Fruit* a small ovoid or globose drupe; endocarp hard, smooth or rugose. *Seed* with membranous testa; albumen scanty or 0; embryo curved; cotyledons broad, inflexed flat or replicate, surrounding the upcurved radicle.

Leaves with one or more strong primary nerves above the basal ribs, membranous, very oblique, usually sharply serrate nearly to the base, acutely acuminate or caudate

1. *tetrandra*.

Leaves without strong primary nerves above the basal ribs:—

Twigs reddish-brown, lenticellate; mature leaves chartaceous or subcoriaceous, reticulations coarse, indistinct; pubescence ferruginous; sepals eciliate

2. *cinnamomea*.

Twigs grey-brown, not lenticellate; mature leaves rigidly coriaceous, reticulations fine, distinct; pubescence grey; sepals ciliate.....3. *Wightii*.

1. *CELTIS TETRANDBRA*, Roxb.; F. B. I. v. 482. *C. scrotina*, Planch. Wt. Ic. t. 1970.

All forest Districts from 2,500—7,500 ft. The Nilgiri Elm. A handsome medium-sized tree. Bark grey; wood greyish-white, not hard; not used in South India. Vern. *Tel.* Jabjabal; *Tam.* Kuyiya; *Bad.* Aduva; *Pul.* Oma.

2. *CELTIS CINNAMOMEA*, Lindl.; F. B. I. v. 482. *C. trinervia*, Bedd. Fl. t. 312 (not of Roxb.).

All forest Districts from 500—4,500 ft.; common in dry forests and also at low elevations in evergreen forests; Rampa (Gamble).

A small tree. Bark pale green, covered with small lenticels; wood dull white with a small dark hard core, with a disgusting smell when freshly cut; not used except medicinally. Vern. *Tel.* Koti-bira, Yemika-bira, Kaki-mushti; *Tam.* Kalluviri, Pinari, Kodalmuriki; *Mal.* Butha.

3. *CELTIS WIGHTII*, Planch.; F. B. I. v. 483; Wt. Ic. t. 1969.

In the same localities as the last species; very similar to it and not easily distinguished from it. The same vernacular names apply.

3. *Gironniera*, Gaud.

Evergreen, unarmed trees or shrubs. *Leaves* alternate, pinnately-nerved, entire; stipules sheathing the buds, deciduous. *Flowers* dioecious, in axillary cymes or the ♀ solitary. *Perianth* simple, calycine, 5-partite, obtuse in ♂, narrower and acute in ♀. *Stamens* 5, filaments erect. *Pistillode* a tuft of hairs. *Ovary* glabrous; style central with 2 filiform, brown-tomentose arms. *Drupe* ovoid, slightly compressed, stoutly beaked, about .75 in. long including the beak. *Seed* subglobose; albumen 0, scanty or copious; embryo contorted.

GIRONNIERA RETICULATA, Thw.; F. B. I. v. 486; Bedd. Fl. t. 313.

E. and W. Ghats up to 3,000 ft. Coorg, Mysore (Meebold), hills of Vellore and Trichinopoly (Barber) and of Tinnevely and Travancore (Beddome). Not common.

A very large timber tree with buttressed base. Wood red-brown, hard, heavy, valuable for engineering (Beddome), planking, rafters, etc. Vern. *Tam.* Koditani.

4. *Trema*, Lour.

Small trees. *Leaves* alternate, serrate, oblique and 3-ribbed at the base; stipules lateral, caducous. *Flowers* dioecious, monoecious or polygamous, in axillary cymes. *Perianth* simple, calycine, 4–5-partite, induplicate-valvate or subimbricate, minute in the males. *Stamens* 4–5, erect in bud; pistillode small. *Ovary* sessile; style central with 2 linear arms. *Drupe* ovoid or subglobose, usually tipped by the style. *Seed* small, testa membranous; albumen fleshy; cotyledons narrow; radicle ascending.

TREMA ORIENTALIS, Bl.: F. B. I. v. 484. *Celtis orientalis*, L.; Wt. Ic. t. 602 and 603. *Sponia Wightii*, Planch.; Wt. Ic. t. 1971; Bedd. Fl. t. 311.

Common in all districts in dry and evergreen forests from near sea-level to 8,000 ft. The Charcoal Tree.

A small rapid-growing tree, quickly appearing in forest clearings. Bark greyish-brown with numerous lenticels; wood light reddish-grey, soft, excellent for charcoal for gun-powder, otherwise useless. The tree is useful for the rapid reclothing of cut-over areas and as a shade-plant. Vern. *Ur.* Jivani; *Tel.* Gada-nelli; *Tam.* Ambaratthi, Oman, Mudalei, Mini, Yerralai; *Mal.* Ratthi, Arni, Amathalai; *Kan.* Gurklu; *Bad.* Womai.

Family CXXXVII. CANNABINACEAE.

Shrubs or herbs, sometimes climbing, often aromatic. *Leaves* opposite and alternate, palmately nerved or palmately compound; stipules free, persistent. *Flowers* dioecious, axillary, males cymose or paniced, females in small cymes or heads with large bracts. *Perianth* inferior, 5-sepalous, imbricate in the males, reduced and entire in the females. *Stamens* 5, erect in bud. *Pistillode* 0. *Ovary* sessile, 1-celled, 1-ovuled; stigmas 2, large, feathery. *Fruit* an achene. *Seed* pendulous; embryo curved or spiral.

Cannabis, Tourn.

Erect herbs. *Leaves* usually opposite below and alternate above, upper palmately 3–1 foliate, passing into bracts, lower 3–8 foliate, serrate. ♂ *flowers* in short pendulous cymose panicles; ♀ crowded with leafy bracts, perianth 0 or hyaline. *Style* arms 2, filiform, caducous. *Achene* compressed, crustaceous. *Seed* flattened, albumen unilateral.

CANNABIS SATIVA, Linn.; F. B. I. v. 487.

Not indigenous but occasionally cultivated. Pulneys (Bourne). The Hemp Plant.

A large aromatic resinous herb. Not grown for its fibre in tropical regions but as the source of the drugs *Ganja* and *Bhang*.

Vern. *Hind.* Ganja, Bhang, Charas, Siddhi; *Tel.* Ganjari-chettu, Ganja-chettu, Bangi-aku; *Tam.* Ganja-chedi; *Mal.* Kancháva-chetti; *Kan.* Bhangígida.

Family CXXXVIII. MORACEAE.

Trees, shrubs or herbs, often with milky juice. *Leaves* usually alternate, rarely opposite, simple, frequently dotted (cystoliths); stipules deciduous, often sheathing and leaving an annular scar. *Flowers* small, monoecious or dioecious, usually cymose but sometimes becoming capitate or spiciform, the ♀ sometimes solitary. *Perianth* single, calycine, usually 4-merous, free or connate, often accrescent in fruit. *Stamens* isomerous and opposite the sepals or reduced in number. *Ovary* superior, 1-celled; styles 1 or 2, simple or 2-partite; ovule solitary, pendulous. *Fruit* an achene or drupe or sub-2-valvate, often aggregate into fleshy pseudocarps or anthocarps. *Embryo* usually curved; cotyledons often unequal, the larger unfolding the smaller.

Thorny trees or shrubs:—

Leaves more or less toothed; base narrowed, emarginate, upper surface minutely pustular; ♀ flowers solitary with accrescent, foliaceous sepals; fruit simple, ultimately valvate.....1. **Phyllochlamys**.

Leaves quite entire; base not emarginate, usually narrowed into the petiole, not pustular; ♀ flowers capitate, sepals connate into a fleshy head; fruit a fleshy anthocarp with several immersed achenes.....2. **Plecosperrnum**.

Thornless trees, shrubs or herbs:—

Plants with milky juice:—

♂ flowers in pedunculate heads; stamens inflexed in bud, anthers reversed.....3. **Streblus**.

♂ flowers on the interior or exterior surface of a receptacle; stamens and anthers straight in bud:—

All the flowers crowded on the inner surface of a fleshy receptacle with a small mouth more or less completely closed by bracts.....4. **Ficus**.

♂ flowers crowded on the exterior surface of a fleshy receptacle:—

♂ flowers crowded on the upper surface of a disciform receptacle, ♀ solitary.....5. **Antiaris**.

All the flowers crowded around an oblong or globose receptacle

6. **Artocarpus**.

Plants with watery juice:—

Trees; flowers spicate or subcapitate; ♀ perianth fleshy..... **Morus**.

Herbs; flowers crowded on the upper surface of a flat receptacle; ♀ sunk in the receptacle.....7. **Dorstenia**.

1. **Phyllochlamys**, Bureau.

Thorny small trees or shrubs with milky juice. *Leaves* alternate, usually toothed, penninerved. *Flowers* dioecious, axillary, ♂ sessile in short bracteate spikes or heads; ♀ solitary, long-peduncled. *Perianth* of 3—4 sepals, imbricate, accrescent and foliaceous in ♀. *Stamens* 4. *Pistillode* dilated at the apex. *Ovary* 1-celled, 1-ovuled; style 2-partite. *Fruit* obliquely ovoid or globose, included in the persistent perianth; pericarp sub-fleshy below, thin above and finally 2-valved. *Seed* oblique, testa membranous; albumen 0; embryo large, subglobose, one cotyledon larger and unfolding, the other.

PHYLLOCHLAMYS SPINOSA, Bur.; F. B. l. v. 488. *Epicarpurus spinosus*, Wt. Ic. 1962 (upper and right-hand figures).

Circars; Cuddapah (Beddome); Coromandel (Macé); Courtallam (Wight, Beddome); Travancore (M. Rama Rao). Not common.

A small evergreen gnarled tree or large shrub; spines terminating the branchlets, strong, sometimes leafy. Vern. *Tel.* Sukali.

2. *Plecosperrum*, Tréc.

Thorny small trees or shrubs with milky juice. *Leaves* quite entire, penninerved. *Flowers* dioecious, both sexes in axillary, 1—3-nate, pedunculate heads. *Perianths* of ♂ 4-lobed, concave, imbricate, of ♀ fleshy, 4-toothed, connate into a fleshy head. *Stamens* 4. *Pistillode* minute, hairy. *Ovary* straight, sunk deep in the fleshy head with the long, simple style protruding. *Fruit* an irregularly-shaped anthocarp enclosing a few coriaceous achenes adnate to the perianths. *Albumen* 0; embryo large, subglobose; one cotyledon larger, enfolding the other.

PLECOSPERMUM SPINOSUM, Tréc.: F. B. I. v. 491; Wt. Ic. t. 1963.

Common in the drier districts, and in the Nilgiri, Anamalai and N. Coimbatore Hills up to about 4,000 ft.

A large rambling shrub often climbing by means of its thorns, which are stout, long and straight or shorter and deflexed or slightly curved. Bark thin, orange-coloured; wood greyish-white with a small, very hard, bright orange-yellow heart-wood which gives a yellow dye. Vern. *Ur.* Bana-bana; *Tel.* Koriti, Kodiari, Daya-mulla; *Tam.* Achingudi, Daiyal; *Kan.* Bendaka.

3. *Streblus*, Lour.

Trees or shrubs with milky juice. *Leaves* alternate, penninerved or sub-3-ribbed, usually very scabrid; stipules small, ensiform. *Flowers* dioecious, rarely monoecious, axillary, ♂ in peduncled heads or spikes, ♀ solitary or 2—4 together, peduncled, bracteate at the base. *Perianth* of 4 imbricate sepals. *Stamens* 5. *Pistillode* dilated at the apex. *Ovary* straight, embraced by the sepals; style central with 2 very long arms. *Fruit* subglobose, pericarp thinly coriaceous, enclosed in the fleshy, persistent perianth. *Seed* globose; testa membranous; albumen 0; embryo globose, one cotyledon larger than and enfolding the other.

STREBLUS ASPER Lour.; F. B. I. v. 489. *Epicarpurus orientalis*, Bl.; Wt. Ic. t. 1961.

Common in all but the wettest tracts up to about 2,000 ft.

A small, often gnarled, evergreen tree with usually small, wedge-shaped leaves. Bark soft, light grey, irregularly ribbed; wood white, moderately hard, tough and elastic; very difficult to cut and little employed. The rough leaves are used to polish ivory and wood. Vern. *Ur.* Sahada; *Tel.* Pakki; *Tam.* Pura, Pirasu; *Mal.* Pareukeu, Parava; *Kan.* Mirli, Punjai.

4. *Ficus*, Linn.

Trees and shrubs, sometimes scandent, often epiphytic in early life. Juice always more or less milky. *Leaves* alternate, rarely opposite, usually entire but sometimes toothed or lobed; stipules sheathing the

bud, caducous and leaving annular scars. *Flowers* minute, inserted on the inner walls of a fleshy receptacle with an apical mouth which is more or less completely closed by small imbricating bracts, of four kinds: ♂, ♀, gall and neuter, which may all occur in a species or one or both of the last two may be wanting; variously arranged in the same or separate receptacles, often mixed with scales or hairs; when androgynous the fewer ♂ are usually segregated near the mouth. *Perianth* of ♂ 2—6-fid or partite, imbricate, of ♀ as in the male or reduced. *Stamens* usually 1 or 2, rarely 3—6, erect in bud. *Ovary* straight or oblique; style excentric; ovule solitary; pendulous; *Gall-flowers* similar to ♀ but the ovary containing the larva or pupa of an insect; neuter perianth usually 3-fid, without trace of sexual organs. *Fruit* an achene or fleshy, small, included in the accrescent, fleshy syncarp. *Albumen* scanty; embryo curved, cotyledons equal or unequal.

Leaves all alternate:—

Leaves neither scabrid nor hispid above:—

Erect trees though often epiphytic at first:—

Leaves with not more than 16 pairs of primary nerves:—

Receptacles sessile (rarely shortly pedunculate in 6. *Tjakela*, 7. *infectoria*, 10 *Arnottiana*):—

Leaves not caudate:—

Leaves pubescent or tomentose below, at least when young:—

Leaves persistently grey-tomentose below with a gland at the base of the midrib (sometimes concealed by the tomentum), elliptic-ovate, obovate or subrotund; apex rounded or bluntly apiculate; base rounded, emarginate or cordate, 2—7.5 in. long, 1.5—5 in. broad, 3—7-ribbed; primary nerves 5—8 pairs; receptacles in axillary pairs, subglobose, tomentose, .25—5 in. in diam.

1. *tomentosa*.

Leaves glabrescent, glandless:—

Leaves obtuse, elliptic to broadly ovate, base rounded, subcordate or slightly narrowed, 4—8.5 in. long, 2—5.5 in. broad, 3—7-ribbed, primary nerves 4—6 pairs; receptacles in axillary pairs, globose, puberulous, about .5 in. in diam. with 3 large rounded basal bracts, red when ripe.....2. *bengalensis*.

Leaves shortly abruptly acuminate, ovate to ovate-elliptic; base rounded, emarginate or cordate, 4—9.5 in. long, 2.5—6.5 in. broad, 3—5-ribbed; primary nerves 9—13 pairs, very prominent below, regular, parallel; receptacles in axillary pairs, oblong to subovate, about 1 in. long, nearly glabrous and orange-red when ripe

3. *mysorensis*.

Leaves glabrous:—

Petioles rarely over .5 in. long; leaves elliptic, ovate to obovate-rotund; apex rounded, slightly emarginate or bluntly apiculate; base narrowed, 1.5—4 in. long, .75—3 in. broad, 3-ribbed; primary nerves 5—6 pairs, appearing numerous because not much stronger than the secondary; receptacles in axillary pairs, depressed-globose, glabrous, about .3 in. in diam., yellowish or reddish when ripe

4. *retusa*.

Petioles 1 in. or more long:—

Basal bracts minute, scarious; leaves coriaceous, broadly ovate or ovate-lanceolate; apex acute or shortly bluntly cuspidate; base narrowed or rounded, 2—5.5 in. long, 1.3—3 in. broad; margin thick, cartilaginous, 3-ribbed; primary nerves 6—10 pairs (indistinct in fresh leaves), petioles 1.5—3 in. long; receptacles in axillary pairs, globose, about .5 in. in diam., smooth, purple when ripe.....5. *Tsiela*.

Basal bracts patent, not scarious:—

Receptacles 2—6 together on short tubercles in the axils of present or fallen leaves, basal bracts bifid; leaves coriaceous, very glossy above, oval or ovate; apex rounded, shortly abruptly acuminate; base rounded, rarely narrowed, 4—10 in. long, 1.75—5 in. broad, 3—5-ribbed, primary nerves 6—10 pairs, petioles 1.75—3 in. long; receptacles depressed-globose, .2 in. in diam., whitish-yellow and dotted when ripe, rarely very shortly peduncled.....6. *Tjakela*.

Receptacles in axillary pairs, not on tubercles, basal bracts entire; leaves membranous, not or hardly glossy, ovate or oblong-ovate; apex rather abruptly shortly acuminate; base usually rounded, emarginate or subcordate, 3—6 in. long, 1.5—3.5 in. broad, 3-ribbed; primary nerves 5—7 pairs; petioles 1.1—2.75 in. long; receptacles globose, .25 in. in diam., whitish flushed with red and dotted when ripe.....7. *infectoria*.

Leaves caudate:—

Petioles 1.25 in. or less long; leaves narrowed at base, narrow-elliptic to broad-ovate; apex shortly, acutely caudate, 2—5 in. long, .5—2.5 in. broad, the caudicle up to .6 in. long and often curved, 3—5-ribbed, primary nerves 6—9 pairs, fairly prominent, petioles .5—1.25 in. long; receptacles in axillary pairs, obovoid, smooth up to .25 in. in diam.

8. *Talboti*.

Petioles 2 in. or more long; leaves broad at base:—

Cusp of leaf 1—3.5 in. long; base usually truncate; primary nerves usually 8 pairs; coriaceous, ovate-rotund; apex narrow and caudate; cusp linear or linear-lanceolate, often curved; base sometimes rounded, very rarely narrowed, up to 11 in. long including the cusp, up to 6.5 in. broad, 5—7-ribbed; margins usually strongly waved; petioles slender, 2—5 in. long; receptacles in axillary pairs, depressed globose, smooth, .5 in. in diam., with 3 broad, spreading basal bracts, dark purple when ripe.....9. *religiosa*.

Cusp of leaf .5—1 in. long; base usually deeply cordate; primary nerves 5—7 pairs, broadly ovate; apex finely caudate; base seldom emarginate or truncate, never narrowed, up to 9 in. long, 3.5 in. broad, 7-ribbed; margins subundulate; petioles 2—3.5 in. long; receptacles sessile or very shortly peduncled in pairs or clusters on tubercles usually in the axils of fallen leaves, depressed-globose, .25—.5 in. in diam., purple with greenish dots when ripe

10. *Arnottiana*.

Receptacles distinctly peduncled:—

Receptacles axillary on the twigs:—

Petioles less than 1 in. long; leaves elliptic to oblanceolate; apex narrowed or rounded and narrowly, acutely caudate; base narrowed, rarely rounded, slightly inequilateral, 2.5—6.5 in. long, 1—2.75 in. broad, the cusp up to .6 in. long, 3—5-ribbed; primary nerves 5—10 pairs; receptacles in pairs, without basal bracts, sub-globose, smooth or slightly verrucose, glabrous, .25—1 in. in diam., peduncle up to .6 in. long.....11. *nervosa*.

Petioles more than 1 in. long:—

Receptacles solitary; leaves more or less scabrid below, rigid, coriaceous, elliptic to broad-ovate; apex rounded or shortly bluntly acuminate; base broad, rounded (rarely narrowed, and then the leaf is nearly obovate), 4—9 in. long, 3—4.5 in. broad, 3—5-ribbed; primary nerves 5—12 pairs; margins slightly recurved; petioles 1—2.5 in. long; receptacles pubescent-scabrid, subglobose, narrowed into a short stalk, about 1 in. in diam., with 3 broad-ovate basal bracts, yellow when ripe; peduncles about .8 in. long...12. *callosa*.

Receptacles twin; leaves not at all scabrid:—

Leaves minutely white-pubescent below, ovate-elliptic to broad-ovate; apex acute or acuminate; base more or less deeply cordate, up to 12 in. long and 9 in. broad, 3—7-ribbed; primary nerves 10—13 pairs, prominent below; petioles up to 4 in. long; receptacles

obovoid, pubescent, about .5 in. in diam., with 3 broadly triangular, densely hairy, sometimes bifid, spreading basal bracts

13. *Dalhousiae*.

Leaves glabrous below:—

Basal bracts 3, free or connate at base, persistent; leaves ovate, abruptly acuminate; base broad, truncate to slightly emarginate, or sometimes rounded and then suddenly contracted into the petiole, 6—12 in. long, 3—5 in. broad, 3-ribbed; primary nerves about 12 pairs, nearly horizontal; margin somewhat sinuate; petioles stout, 2—4.5 in. long; receptacles ovoid or slightly obovoid with several vertical ridges; umbilicus prominent, 1 in. long; peduncles stout, .2—75 in. long.....14. *Beddomei*.

Basal bracts 2, connate at base, caducous, leaving an annulus; leaves coriaceous, brownish below, elliptic-lanceolate to broadly elliptic; apex narrowed, obtuse; base narrowed, 3.5—5 in. long, 1.75—2.75 in. broad, 3-ribbed; primary nerves about 15 pairs; petioles stout, 2—3.5 in. long; receptacles subglobose, somewhat ribbed, dotted, about .6 in. long; peduncles stout, .5—75 in. long.....15. *Angladii*.

Receptacles on short, leafless branchlets from the main stem or larger branches:—

Leaves entire, elliptic-lanceolate, ovate or obovate-oblong, sometimes slightly inequilateral; apex narrowed, blunt or acute; base narrowed, obtuse or acute, glabrous, 2.75—6 in. long, 1.5—2.5 in. broad, 3-ribbed; primary nerves 4—8 pairs; secondary nerves irregular and indistinct; petioles .3—1.75 in. long; receptacles on scariously bracteolate, tubercled and warted branchlets, subglobose, smooth, about 1.25 in. in diam., reddish when ripe; peduncles up to .75 in. long...16. *glomerata*.

Leaves coarsely, remotely toothed, lanceolate or ovate to broadly elliptic, apex acute or acuminate; base subcuneate, rounded or emarginate, never cordate, puberulous on the nerves below, eventually glabrous above, minutely papillose below, 5—9 in. long, 3—4.5 in. broad, 3—5-ribbed; primary nerves 4—8 pairs; secondary nerves subregular, transverse between the primaries, distinct below; petioles 1.5—3.5 in. long; receptacles on tubercles on leafless branchlets, subglobose or pear-shaped, 1 in. or a little more in diam., reddish when ripe; peduncles 1—2.5 in. long.....17. *pomifera*.

Leaves with very many primary nerves:—

Receptacles over .5 in. in diam.; leaves elliptic to broadly ovate-elliptic, shortly abruptly acuminate or shortly caudate; base rounded or subacute, 2—4.5 in. long, .5—2 in. broad, indistinctly 3-ribbed; petioles .4—1 in. long; receptacles sessile in axillary pairs, globose, about .75 in. in diam.

18. *comosa*.

Receptacles less than .5 in. in diam.:—

Petioles 1—2.5 in. long; stipule single, subpersistent, about half the length of the leaf; leaves thick, leathery, oblong-elliptic, with a short abrupt caudicle; base rounded or narrowed, 3—12 in. long, 1.5—5.5 in. broad; 3—5-ribbed; midrib prominent, thick; receptacles sessile in axillary pairs, ovate-oblong, smooth, about .5 in. long, greenish-yellow when ripe.....*elastica*.

Petioles .4—1 in. long; stipules deciduous, about .5 in. long; leaves thinly coriaceous, ovate-elliptic, bluntly acuminate; base rounded or subacute, 2—4.5 in. long, 1—2 in. broad, 3-ribbed; receptacles sessile in axillary pairs, globose or ovoid, smooth, about .33 in. in diam., blood-red when ripe.....*Benjamina*.

Scandent shrubs:—

Leaves lanceolate; apex acuminate, base acute, 4.5—8 in. long, 1.5—2.5 in. broad, 3-ribbed, primary nerves 10—12 pairs, margins subundulate, petioles .5—1 in. long; receptacles in axillary pairs, globose, glabrous, .25—5 in. in diam.; basal bracts 3, deciduous, peduncles about .25 in. long

19. *travancorica*.

Leaves broadly ovate:—

Twigs nearly glabrous; leaves membranous, broadly ovate, sometimes inequilateral; apex shortly acuminate; base rounded or very shallowly cordate, pubescent or subglabrous below, 4—7 in. long, 2.5—4.5 in. broad, 3—5-ribbed; primary nerves 3—4 pairs; petiole glabrescent, .75—2.5 in. long; receptacles fascicled on the naked branches below the leaves, globose, pubescent or nearly glabrous, 1—2.5 in. in diam., without basal bracts, spotted when ripe; peduncles about .33 in. long, with several bracteoles at the base.....20. *macrocarpa*.

Twigs tomentose; leaves subcoriaceous, broadly ovate to rotund-ovate; apex usually shortly, abruptly caudate, base usually shallowly cordate, usually thinly tomentose below, 3.75—6.75 in. long, 2.5—5 in. broad, 3—5-ribbed; primary nerves 3—4 pairs; petioles rusty-tomentose, .75—2 in. long; receptacles in fascicles on tubercles on the branches or stem, subglobose, pubescent, 1—2 in. in diam., blotched; basal bracts 3, broadly ovate, caducous; peduncles stout, rusty-tomentose, up to .5 in. long

21. *guttata*.

Leaves more or less scabrid or hispid above (smooth in var. *cuspidifera* of 22. *gibbosa*):—

Leaves not semi-sagittate:—

Leaves acute or cuneate at base, very rarely rounded, usually inequilateral with one side more or less gibbous, elliptic-ovate to lanceolate or oblanceolate, very rarely nearly orbicular; apex obtuse, acute or cuspidate, minutely hispid below (glabrous on both sides in var. *cuspidifera*), 1.5—5.5 in. long; .6—3 in. broad, 3-ribbed; primary nerves 3—7 pairs; receptacles shortly peduncled in pairs or fascicled on the twigs, subglobose, scabrid, .2—3 in. in diam., yellow when ripe.....22. *gibbosa*.

Leaves not acute or cuneate at base:—

Weak shrubs, often creeping; leafy twigs pithy and more or less hollow; leaves very variable, entire or 2-many-lobed, outline from narrow-lanceolate to rotund-ovate; apex rounded or more or less acuminate, base rounded or cordate; both surfaces scabrous or the lower (sometimes the upper also), tomentose, 2—6.5 in. long, .5—2.5 in. broad, 3—5-ribbed; primary nerves 4—8 pairs, margins irregularly and coarsely toothed or repand; receptacles axillary, solitary, rarely twin, globose to elongate pear-shaped, umbilicus always prominent, more or less scabrid-hispid, .5—1 in. long, dark-orange when ripe; peduncles .5—1 in. long

23. *heterophylla*.

Erect shrubs or small trees; twigs soon woody and solid:—

All parts very scabrid; leaves elliptic, ovate or obovate, rarely 3—5-lobed, often inequilateral; apex rounded or acuminate; base rounded, rarely narrowed; upper surface with short, stiff hairs from bulbous bases, 2.5—7.5 in. long, 1.25—3.25 in. broad, 3-ribbed; primary nerves 3—5 pairs, prominent below, as are the ultimate reticulations; petioles .5—3.5 in. long; receptacles axillary, solitary, globose with a prominent umbilicus, scabrous-hispid, .5—1.75 in. in diam., yellow or purple with yellowish dots when ripe; peduncles .2—4 in. long

24. *asperrima*.

Shoots softly tomentose; leaves subscabrid-tomentose, orbicular-ovate, entire or obtusely 3—5-lobed, acute or apiculate, 1.5—5 in. in diam., 3-ribbed; primary nerves 3—6 pairs; petiole 1—2 in. long; receptacles axillary, solitary, subglobose to pyriform; base constricted, .5—1 in. in diam., yellow when ripe; peduncles .5—1 in. long.....25. *palmata*.

Leaves semi-sagittate, one side with a large 3—4-ribbed lobe, the other cuneate or with a small 1—2-ribbed lobe, elliptic to oblong-lanceolate; apex acuminate, 4—9 in. long, 1.5—3.5 in. broad; primary nerves 9—14 pairs; petioles scabrid, .2—6 in. long; receptacles shortly peduncled in pairs on usually leafless branchlets from the stem or larger branches, globose or pear-shaped, warted, hispid, often bearing irregular bracts on the sides, .4—7 in. in diam., reddish-brown when ripe.....26. *unia*.

Leaves opposite, very rarely alternate, membranous, elliptic-ovate, oblong, obovate or obovate-oblong; sometimes inequilateral; apex acute, acuminate or cuspidate; base cuneate, rounded or emarginate, both surfaces hispid-pubescent, up to 14 in.

long and 6 in. broad, 3—5-ribbed; primary nerves 5—6 pairs, some at least branching about halfway to the margin; secondary nerves regular and straight, petioles .5—2.5 in. long; receptacles fasciated on the stem or leafy branchlets, obovoid or turbinate, sometimes with scattered bracts on the sides, hispid, .5—1 in. in diam., yellowish when ripe; peduncles up to .6 in. long.....27. *hispidia*.

1. *FICUS TOMENTOSA*, Roxb.; F. B. I. v. 501; King Ann. Calc. i. t. 18 and 81g; Wt. Ic. t. 647.

In all districts from sea-level to 5,000 ft., usually in dry rocky places. Rampa Hills (Narayanswami).

A small or fairly large tree throwing out small aërial roots from the branches; often epiphytic. Bark greenish-white; wood white, useless. Vern. *Tel.* Jivi, Juvi, Kaljuvi; *Tam.* Ichchi, Kal-ichchi; *Mal.* Kal-al; *Kan.* Kallatti.

2. *FICUS BENGALENSIS*, Linn.; F. B. I. v. 499; King Ann. Calc. i. t. 13 and 81c. *Urostigma bengalense* Gasp.; Wt. Ic. t. 1989.

In all districts from sea-level to 4,000 ft. in deciduous and semi-evergreen forest. Much planted in avenues and for shade, for which purposes it is admirably suited. The Banyan.

A very large tree throwing out numerous large aërial roots from the main trunk and large branches, which descend to the soil and form supports, and are then capable of separate existence when severed from the parent tree. Held in reverence by the Hindus. Bark greyish-white; wood greyish-white, moderately hard, without heartwood, durable under water and used for well-curbs, also for tent and yoke poles. Vern. *Hind.* Bor, Bar, Ber; *Ur.* Boru; *Tel.* Mari, Pedda-mari; *Tam.* and *Mal.* Ala, Per-al; *Kan.* Alada.

3. *FICUS MYSORENSIS*, Heyne; F. B. I. v. 500; King Ann. Calc. i. t. 14 and 81d.

From Central Mysore southwards in moderately wet forests from 500—3,500 ft. Saklaspur (Barber, Meebold), Attapadi Valley (Fischer), Pulneys (Rodriguez).

A large, handsome, shady tree with few aërial roots; occasionally epiphytic. Sometimes planted in avenues. Wood soft, useless. Vern. *Tam.* Kal-ala, Sonnai-ala; *Kan.* Goni-mara.

Var. *pubescens*, Roth, has smaller leaves with fewer primary nerves, denser tomentum, which is a deep ferruginous red on the younger parts. In the same localities as the type but less frequent.

4. *FICUS RETUSA*, Linn.; F. B. I. v. 511; King Ann. Calc. i. t. 61 and 84p.

In all districts from sea-level to about 4,000 ft. Sometimes planted in avenues. Rampa Hills (V. Narayanswami), Ganjam (Barber).

A large, evergreen tree with few aërial roots; sometimes epiphytic. Bark brown, fairly smooth; wood light reddish-grey, moderately hard, one of the best of the fig woods. Vern. *Tel.* Juvi, Konda-juvi, Yerra-juvi; *Tam.* Pon-ichchi, Kal-ichchi, Kal-atthi; *Mal.* Ittiyal; *Kan.* Pilala, Kirugoli.

Var. *nitida*, Thunb.; F. B. I. v. 511; King Ann. Calc. i. t. 62; *Ficus nitida*, Roxb.; Wt. Ic. t. 642, is a similar tree with the leaves narrowed at the base. The range of the type.

5. *FICUS TSIELA*, Roxb.; F. B. I. v. 515; King Ann. Calc. i. t. 73, 74 and 84z2; Wt. Ic. t. 668; Bedd. Fl. t. 314.

From Kurnool southwards, in deciduous and evergreen forests from 1,000—3,500 ft. Frequently planted in avenues, and for shade.

A large, spreading tree with few or no aërial roots; often epiphytic. Bark greenish-grey, smooth; wood grey, soft to moderately hard. Vern. *Ur.* Jori; *Tel.* Pedda-juvi; *Tam.* Kal-ichchi; *Mal.* Kirgali; *Kan.* Billibasari.

6. *FICUS TJAKELA*, Burm.; F. B. I. v. 514; King Ann. Calc. i. t. 70 and 84x.

In the forests of the West Coast from sea-level to about 4,000 ft., extending to the Javadi Hills (Barber). Sometimes planted as a shade tree in coffee plantations.

A very tall tree without aërial roots. Bark dark-brown, rather rough; wood brown, soft. Vern. *Mal.* Kar-al; *Kan.* Karibasari.

7. *FICUS INFECTORIA*, Roxb.; F. B. I. v. 515; King Ann. Calc. i. t. 75 and 84y2; Wt. Ic. t. 665.

In all districts from near sea-level to 7,000 ft. Not common wild, but frequently planted near and in villages.

A large deciduous tree without aërial roots; frequently epiphytic. Bark greenish-grey, smooth; wood grey, moderately hard. Vern. *Hind.* Pakri; *Ur.* Pakodo; *Tel.* Jati, juvi; *Tam.* Malai-ichchi; *Mal.* Cherla; *Kan.* Basari.

Var. *Lambertiana*, Miq.; F. B. I. v. 516; King Ann. Calc. i. t. 76, has leaves with bases broad, rounded, emarginate or subcordate, rarely narrowed; receptacles 3—4 in. in diam. on pubescent peduncles 2—3 in. long.

Var. *Wightiana*, Wall.; F. B. I. v. 516; King Ann. Calc. i. t. 77, has smaller leaves narrowed at the base; receptacles large in proportion to the leaves, on glabrous or pubescent peduncles about 2 in. long.

8. *FICUS TALBOTI*, King Ann. Calc. i. 51, t. 63 and 84q; F. B. I. v. 512.

In the evergreen forests of the W. Ghâts from 500—4,500 ft. Not common.

A large, evergreen tree with few or no aërial roots; usually epiphytic in youth. Bark green, very smooth; wood very white when fresh, turning yellow; useless. Vern. *Tam.* Itthi, Kal-ithi.

9. *FICUS RELIGIOSA*, Linn.; F. B. I. v. 513; King Ann. Calc. i. t. 67A and 84u; Bedd. Fl. t. 314. *Urostigma religiosum*, Gasp.; Wt. Ic. t. 1967.

Not wild in Southern India, except, possibly, in the North East bordering on the Central Provinces, but widely planted on village sites and in avenues. The Pipul Tree.

A large tree with few or no aërial roots; often epiphytic. Venerated by the Hindus. Bark grey, smooth; wood whitish, moderately hard, used for packing-cases. Vern. *Hind.* Pipal; *Ur.* Jori, Usto; *Tel.* Rai, Ragi, Ravi; *Tam.* Arasa, Arasu; *Mal.* Arasu, Arci-al; *Kan.* Arali.

10. *FICUS ARNOTTIANA*, Miq.; F. B. I. v. 513; King Ann. Calc. i. t. 68 and 84v.

In all districts in rocky places in the hills, up to 4,500 ft.

A small tree or large shrub without aërial roots. Bark pale, smooth; wood white, useless. Vern. *Tel.* Kondaravi; *Tam.* Kal-arasu; *Mal.* Ama-kanniyan; *Kan.* Kadarasai.

Var. *courtallensis*, King Ann. Calc. i. 56, t. 68B; F. B. I. v. 514, with smaller and less cordate leaves.

11. *FICUS NERVOSA*, Roth; F. B. I. v. 512; King Ann. Calc. i. t. 65. *Ficus angustifolia*, Roxb.; Wt. Ic. t. 660.

In the hills of most districts except the driest, from 200—4,500 ft. Rampa Hills (Gamble), Vizagapatam Hills (A. W. Lushington). Usually found near streams.

A moderate-sized to large tree. Bark brown mottled white; wood white, soft. Vern. *Tam.* Nir-al; *Mal.* Eechamaram.

Var. *minor*, King, with all parts smaller and more puberulous. Nilgiri Hills (Gamble).

12. *FICUS CALLOSA*, Willd.; F. B. I. v. 516; King Ann. Calc. i. t. 84v2 and 85.

In evergreen and secondary forests in the W. Ghâts from sea-level to 2,500 ft.

A large tree with verrucose, canescent twigs. Bark grey, smooth; wood white, useless. Vern. *Tam.* Koli-al.

13. *FICUS DALHOUSIAE*, Miq.; F. B. I. v. 499; King Ann. Calc. i. t. 11 and 81a.

In hill forests from Cuddapah southwards from near sea-level to 4,500 ft.

A small tree usually growing in rocky ravines. Vern. *Tam.* Pei-al, Kal-al; *Mal.* Kalalai.

14. *FICUS BEDDOMEI*, King Ann. Calc. i. 26, t. 24 and 81m; F. B. I. v. 502.

In the evergreen forests of the W. Ghâts from 1,000—5,000 ft. Nilgiris (Gamble), Anamalais (Barber, Fischer), Travancore (Bourdillon), Tinnevely (Beddome).

A large tree, often epiphytic in youth. Bark pale-brown, smooth; wood white, useless. Vern. *Mal.* Thavatta-al.

15. *FICUS ANGLADEI*, C. Fischer in Kew Bull. 1925, 332.

In the lower Pulney Hills at about 2,700 ft. (Anglade, Saulière). A tree.

16. *FICUS GLOMERATA*, Roxb. Cor. Pl. ii, t. 123; F. B. I. v. 535; King Ann. Calc. i. t. 218A; Wt. Ic. t. 667; Brand. For. Fl. t. 49.

Common in all districts from sea-level to about 6,000 ft. in evergreen forests, and near streams in deciduous forests.

A large, deciduous tree with few and short aërial roots. Bark grey- to reddish-brown; wood greyish-brown, soft. Vern. *Ur.* Dimiri; *Tel.* Atti; *Tam.* Arthi; *Mal.* Atthi, Atthi-al; *Kan.* Atti.

17. *FICUS POMIFERA*, Wall.; F. B. I. v. 535; King Ann. Calc. i. t. 215. Rampa Hills in the Godavari District at 2,000 ft. (Gamble). Not hitherto found elsewhere in Southern India.

A medium-sized tree. Bark grey; wood soft, spongy.

18. *FICUS COMOSA*, Roxb. Cor. Pl. ii, t. 125; Wt. Ic. t. 658. *Ficus Benjamina*, Linn., var. *comosa*, Kurz; F. B. I. v. 508; King Ann. Calc. i. t. 52b.
 Vantala in the Vizagapatam Hills at 4,000 ft. (A. W. Lushington). Not found wild, hitherto, elsewhere in Southern India, but sometimes planted.
 A large, handsome tree. Bark grey, smooth; wood grey, moderately hard.
19. *FICUS TRAVANCORICA*, King Ann. Calc. i. 28, t. 26 and 82o; F. B. I. v. 503.
 In the hill tracts of N. Travancore and the Anamalais (Barber), in the Coimbatore District from 3,000—5,000 ft., in evergreen forest.
 A straggling or scandent shrub (middle-sized tree, *vide* Meebold).
20. *FICUS MACROCARPA*, Wight; F. B. I. v. 534; King Ann. Calc. i. t. 208. *Pogonotrophe macrocarpa*, Miq.; Wt. Ic. t. 1965.
 In the evergreen forests of the Nilgiri and Pulney Hills from 4,000—5,000 ft.
 A scandent shrub.
21. *FICUS GUTTATA*, Kurz; F. B. I. v. 534; King Ann. Calc. i. t. 209. *Covellia guttata*, Wt. Ic. t. 1966.
 In evergreen forest in the W. Gháts from 3,500—7,200 ft.
 A scandent shrub, often creeping over rocks. Very like the last.
22. *FICUS GIBBOSA*, Bl., var. *PARASITICA*, Koen.; F. B. I. v. 497; King Ann. Calc. i. t. 2ba. *Ficus ampelos*, Roxb.; Wt. Ic. t. 652.
 Common in all districts from sea-level to about 6,000 ft.
 A fair-sized tree; usually epiphytic at first, often embracing other trees, and eventually completely surrounding and killing them. Bark greyish- or yellowish-green; wood brownish-grey, soft, useless. Vern. *Ur.* Korotosani; *Tel.* Konda-juvi, Pakki; *Tam.* Kal-itthi, Kal-perukam; *Mal.* Itthi, Kal-itthi; *Kan.* God-dumide.
 Var. *cuspidifera*, Miq.; King Ann. Calc. i. t. 2a, with the leaves elongate and gradually narrowed to the apex; less scabrid, sometimes quite smooth on both surfaces. Range of the type.
 Var. *tuberculata*, Roxb.; King Ann. Calc. i. t. 2ba. *Ficus tuberculata*, Roxb.; Wt. Ic. t. 651; with narrower leaves which are sometimes irregularly serrate. Rare.
23. *FICUS HETEROPHYLLA*, Linn. f.; F. B. I. v. 518; King Ann. Calc. i. t. 94. *Ficus repens*, Roxb.; Wt. Ic. t. 636. *Ficus scabrella*, Roxb.; Wt. Ic. t. 661.
 In all districts from sea-level to about 3,000 ft., usually near water.
 A weak, very variable shrub, creeping or erect. Vern. *Ur.* Gonthi-sahada; *Tel.* Buroni; *Tam.* Kodi-atthi.
24. *FICUS ASPERRIMA*, Roxb.; F. B. I. v. 522; King Ann. Calc. i. t. 100; Wt. Ic. t. 633.
 In all hilly tracts up to 4,500 ft., and down to sea-level on the West Coast. The Sand-paper Tree.
 A small or medium-sized tree without aërial roots. Bark pale,

- smooth; wood whitish, soft, useless; leaves used as sand-paper in sandalwood carving. Vern. *Ur.* Korotosano; *Tel.* Karakaboddu; *Tam.* Irambarattam, Maramthinni-Atthi; *Mal.* Theragam; *Kan.* Garagatti.
25. *FICUS PALMATA*, Forsk.; F. B. I. v. 530; King Ann. Calc. i. t. 185. *Ficus virgata*, Roxb.; Wt. Ic. t. 649.
Simli in the Vizagapatam Hills at 3,000 ft. (A. W. Lushington); not reported from elsewhere in Southern India.
A bush or small tree. Bark grey, smooth; wood white, even-grained, moderately hard.
26. *FICUS CUNIA*, Ham.; F. B. I. v. 523; King Ann. Calc. i. t. 126; Wt. Ic. t. 648; *Ficus conglomerata*, Roxb.; Wt. Ic. t. 669.
In the hills of the Godavari and Ganjam Districts (Barber). Rare.
A small or medium-sized tree without aërial roots; the leaves are very distinctive. Bark thick, reddish-brown, rough; wood greyish-brown, moderately hard, useless. Vern. *Ur.* Godima; *Tel.* Bommamari.
27. *FICUS HISPIDA*, Linn. f.; F. B. I. v. 522; King Ann. Calc. i. t. 154 and 155. *Ficus oppositifolia*, Roxb. Cor. Pl. ii. t. 124; Wt. Ic. t. 638. *Ficus daemonum*, Koen.; Wt. Ic. t. 641.
Common in all districts in evergreen forests and elsewhere in damp localities from sea-level to about 4,000 ft.
A small, weak tree, generally with hollow internodes, all parts very hispid; without aërial roots. Bark grey, rough; wood dirty-grey, soft, useless. Vern. *Hind.* Kagsha; *Ur.* Bhai-dimiri; *Tel.* Brammadi, Boddamari, Bemmadu, Bommamedi; *Tam.* Pei-atthi, Chona-atthi, Pollapararakam; *Mal.* Erumanakku, Parakam; *Kan.* Kad-Atthi.
- Ficus elastica*, Roxb.; F. B. I. v. 508; King Ann. Calc. i. t. 54; Wt. Ic. t. 663.
A large tree occasionally planted. The sap yields indian-rubber. The Rubber Fig.
- Ficus Benjamina*, Linn.; F. B. I. v. 508; King Ann. Calc. i. t. 52A and 83h.
A large, handsome tree with numerous aërial roots. Often planted in avenues and as an ornamental tree. The Java Fig.
- Ficus pumila*, Linn.; King Ann. Calc. i. t. 158, is a scandent or creeping shrub with dimorphic leaves, grown ornamentally on walls.

5. *Antiaris*, Leschen.

Gigantic trees. Leaves alternate, bifarious, penninerved; stipules small, connate, caducous. Flowers monoecious; ♂ crowded on the surface of an axillary, pedunculate receptacle, surrounded by confluent, imbricating bracts, with 3—4 spatulate, imbricate sepals; ♀ minute, solitary in an involucre of many confluent bracts, without perianth. Stamens 3—8. Pistillode 0. Ovary adnate to the involucre; ovule pendulous; style-arms 2, subulate, recurved. Fruit fleshy, the pericarp confluent with the receptacle. Seed exalbuminous, testa hard; embryo subglobose; cotyledons equal; radicle small, superior.

ANTIARIS TOXICARIA, Leschen.; F. B. I. v. 537. *A. saccidora*, Dalz.; Wt. Ic. t. 1958. *A. innoxia*, Bl.; Bedd. Fl. t. 307.

Evergreen forests of the West Coast up to 2,000 ft. The Upas Tree.

The largest tree of South India, attaining 250 ft. in height (Beddome). Bark brownish-grey, smooth, inner bark fibrous, making good cordage and also used in sections for making into sacks; wood white, soft, perishable. The milky juice is poisonous, but not so virulent in the Indian examples as in the Malayan. Vern. *Tam.* Aranthelli, Mara-uri; *Mal.* Arei-anjili, Aranjelli.

6. *Artocarpus*, Forst.

Trees. *Leaves* alternate, coriaceous, entire, lobed or pinnatifid, penninerved. *Flowers* monoecious, crowded on globose, oblong or cylindrical, solitary, usually axillary receptacles. *Perianth* in ♂ 2-4-lobed or -partite, in ♀ tubular and confluent below with the receptacle. *Stamen* 1. *Pistillode* 0. *Ovary* straight; ovule pendulous; style exerted; stigma undivided. *Fruit* a large, fleshy, globose or oblong receptacle covered with the enlarged fleshy anthocarps, which are smooth, tubercled or spiny according as they are completely or partially connate and have flat or attenuate apices. *Seed* with a membranous testa; exalbuminous; embryo straight or incurved; cotyledons fleshy, equal or unequal; radicle short, superior.

Quite glabrous; leaves oblong to obovate-oblong, base acute, entire (of young plants occasionally 3-lobed), dark-green and glossy above; lateral nerves 7-8 pairs, 4.5-7 in. long, 2-3.5 in. wide; stipules 2-3 in. long, spathaceous; fruit tubercled, oblong or cylindrical, 12-24 in. long.....1. *integrifolia*.

Branchlets, leaves below and stipules pubescent or hairy; leaves not acute at base, entire (of young plants often more or less pinnatifid), not dark green nor glossy above; lateral nerves 8-12 pairs; stipules not spathaceous:—

Evergreen; young parts strigose with tawny hairs; leaves broadly ovate, obovate or elliptic, subacute or very shortly acuminate, base rounded or somewhat narrowed; tawny hairy on the midrib above and the nerves below, 5-12 in. long, 3-6 in. wide; stipules yellow-hairy; fruit spinous, oblong or cylindrical, 2-3 in. long.....2. *hirsuta*.

Deciduous; young parts densely grey- or rusty-tomentose; leaves ovate or oblong, shortly, finely acuminate or cuspidate; base truncate or subcordate, densely grey-downy below and on the midrib above, 4-12 in. long, 2-8 in. wide; stipules small, grey-pubescent; fruit smooth, globose, 2-3 in. in diam

3. *Lakoocha*.

1. *ARTOCARPUS INTEGRIFOLIA*, Linn.; F. B. I. v. 541; Wt. Ic. t. 678; Roxb. Cor. Pl. t. 250.

Evergreen forests of the W. Gháts from 1,500-4,000 ft.; cultivated nearly everywhere. The Jack Tree.

A large evergreen tree. Bark black mottled green, smooth (deeply cleft when old); sapwood pale, heartwood bright yellow, darkening on exposure, moderately hard, does not warp or split, easily worked, used for carpentry. Vern. *Hind.* Kanthal; *Ur.* and *Tel.* Panása; *Tam.* and *Mal.* Pila, Pilavu; *Kan.* Alasa.

2. *ARTOCARPUS HIRSUTA*, Lamk.; F. B. I. v. 541; Wt. Ic. t. 1957; Bedd. Fl. t. 308; King Ann. Calc. ii. t. 5.

Evergreen forests of the West Coast from sea-level to 3,500 ft.; Coorg, Mysore (Meebold), Wynaad, Anamalais to Travancore. A very large evergreen tree. Bark grey, smooth; sapwood white; heartwood yellowish-brown, moderately hard, durable; seasons and polishes well, does not warp nor crack, not eaten by white ants; valuable for panelling, flooring and boat-building. Vern. *Tam.* Anjili, Pepla, Katupila, Tellai-kori mara; *Mal.* Aini, Ayani; *Kan.* Halasu.

3. *ARTOCARPUS LAKOOCHA*, Roxb.; F. B. I. v. 543; Wt. Ic. t. 681; King Ann. Calc. ii. t. 13.

Hill forests up to 3,500 ft.; Coorg, Mysore, West Coast, Ganjam (Gamble), Vizagapatam Hills (A. W. Lushington).

A large deciduous tree. Bark rough, dark-grey or purplish; sapwood large, white, soft and perishable; heartwood yellowish-brown, fairly hard, not eaten by white ants, used for house- and boat-building. Fruit edible, sometimes cultivated for that reason; wood and fruit yield a yellow dye. Vern. *Hind.* Dahu, Lakuch; *Tel.* Nakkarenu; *Mal.* Chima, Thitti-pilavu; *Kan.* Wonta.

7. *Dorstenia*, Linn.

Herbs or small shrubs. *Leaves* alternate or radical, entire or lobed; stipules lateral. *Flowers* monoecious, crowded on a flat, simple or lobed receptacle. *Perianth* of ♂ more or less connate and adnate to the receptacle, obscurely 2-lobed or toothed, of ♀ deeply immersed in the receptacle, mouth almost closed. *Stamens* 1—3, inflexed in bud. *Pistillode* 0. *Ovary* included; ovule pendulous; style excentric or lateral, with 2 subulate arms. *Fruit* a minute, crustaceous achene. *Albumen* 0; cotyledons subequal, contorted, embracing the upcurved radicle.

DORSTENIA INDICA, Wight; F. B. I. v. 494; Wt. Ic. t. 1964.

In the hills from the Nilgiris and Shevaroy's southwards; in cool and damp localities, from 1,800—6,000 ft.

A succulent herb 4—18 in. high. Leaves lanceolate, undulate to serrate, variable in size; receptacles peltate, obconic, with 5—12 linear arms.

Morus alba, Linn., the mulberry, is cultivated for its fruit, and with *M. indica*, Linn., for leaves for feeding silk-worms, in several localities. The two species are not easily separated, the chief points of distinction being the obovate ♀ sepals and the styles connate below in *M. indica*.

Family CXXXIX. URTICACEAE.

Herbs, shrubs or small trees, some with stinging hairs. *Leaves* opposite or alternate, 3-ribbed or penninerved, entire or lobed. *Flowers* small, greenish, monoecious or dioecious, in open or capitate cymes or spikes or aggregated on a fleshy receptacle, sometimes involucrate. *Perianth* of 4—5 (rarely 2—3) free or united sepals, usually united in ♀ and sometimes accrescent and fleshy in fruit. *Stamens* as many as the sepals, usually inflexed in bud with reversed anthers, later

elastically reflexed. *Pistillode* usually present, various. *Ovary* superior, 1-celled; style simple or 0; stigma papillose, plumose or penicillate; ovule single, basal, erect. *Fruit* a drupe or an achene, usually enclosed in and often adnate to the perianth. *Seed* with a membranous testa; embryo straight.

Plants with stinging hairs, at least on the inflorescence:—

Flowers clustered on cymes or spikes:—

Slender annual flexuous herbs; stipules small or 0; stinging hairs weak; flower clusters small.....1. *Fleurya*.

Coarse perennial erect herbs or undershrubs; stipules large, foliaceous; stinging hairs stout; flower clusters large.....2. *Girardinia*.

Flowers not clustered.....3. *Laportea*.

Plants without stinging hairs:—

Herbs or undershrubs:—

Flowers, at least ♀, aggregated on a fleshy receptacle:—

Normal leaves opposite; receptacles long-peduncled.....4. *Lecanthus*.

Normal leaves alternate; receptacles sessile or short-peduncled (long-peduncled in two species of *Elatostemma*):—

♂ and ♀ flowers aggregated on a fleshy receptacle.....5. *Elatostemma*.

♂ flowers cymose, ♀ aggregated on a fleshy receptacle.....6. *Procris*.

Flowers not aggregated on a fleshy receptacle:—

Flowers not enclosed in a campanulate involucre:—

Leaves stipulate:—

Flowers cymose; cystoliths of leaves linear:—

Leaves opposite, serrate.....7. *Pilea*.

Leaves alternate, entire.....8. *Pellionia*.

Flowers in sessile clusters; cystoliths of leaves punctiform:—

Leaves serrate; stigma ovate, persistent.....9. *Chamabaina*.

Leaves usually entire; stigma filiform, deciduous.....10. *Pouzolzia*.

Leaves exstipulate.....11. *Parietaria*.

Flowers enclosed in a campanulate involucre.....12. *Droguetia*.

Small trees or large shrubs:—

Inflorescence in clusters on long spikes; fruiting perianth dry...13. *Boehmeria*.

Inflorescence in clusters on short cymes or on panicles; fruiting perianth more or less fleshy:—

Leaves not white-tomentose below; stigma discoid, ciliate-fimbriate

.....14. *Villebrunea*.

Leaves white-tomentose below; stigma sessile, penicillate.....15. *Debregeasia*.

1. *Fleurya*, Gaud.

Annual herbs with stinging hairs. *Leaves* alternate, toothed, 3-ribbed, with linear cystoliths; stipules narrow, connate in pairs or 0. *Flowers* monoecious or dioecious, clustered on axillary, unisexual or androgynous, spikes or cymes. *Perianth* of ♂ of 4—5 ovate-lanceolate sepals, of ♀ of 4 sepals free or united into a 4-lobed cup. *Stamens* 4—5, inflexed in bud. *Pistillode* globose or clavate. *Ovary* oblique; style obliquely ovoid or linear, ultimately hooked with sometimes 2 basal arms. *Achene* oblique, compressed, membranous, exserted. *Seed* nearly exalbuminous; cotyledons broad.

FLEURYA INTERRUPTA, Gaud.; F. B. I. v. 548; Wt. Ic. t. 1975. *Urtica interrupta*, Linn.; Wt. Ic. t. 692.

In the hills, mainly south of Mysore, from 500—6,000 ft. Rampa Hills (V. Narayanswami).

A nettle-like herb with ovate, acuminate, coarsely-toothed leaves. Fruiting spikes sometimes a foot long.

2. *Girardinia*, Gaud.

Strong herbs or undershrubs with long stinging hairs. *Leaves* alternate, 3-ribbed, entire or lobed; stipules connate, foliaceous. *Flowers* monoecious or dioecious, clustered on simple or paniced spikes or heads, armed with numerous stinging hairs. *Perianth* of ♂ of 4—5 free, valvate sepals, of ♀ a 2—3-lobed, ventricose tube eventually split down one side. *Stamens* 4—5, inflexed in bud. *Pistillode* globose or cupular. *Ovary* straight, ovule erect; stigma subulate, papillose. *Achene* broad, compressed. *Seed* nearly exalbuminous; cotyledons broad.

Leaves entire or 3—7-lobed, margins inciso-serrate, acuminate, base narrowed, truncate or cordate, 3-ribbed, appressed hairy and with stout stinging hairs on the ribs and nerves; stipules 1.5—3 in. long, cordate at base; flowers dioecious in long simple or branched spikes, often very long in fruit.....1. *Leschenaultiana*.

Leaves 3—7-lobed, margins inciso-serrate, acuminate, base usually truncate or cordate, 3-ribbed, more or less appressed-hairy, with or without rather slender stinging hairs on the ribs and nerves; stipules 3—6 in. long, cordate or truncate at base; flowers monoecious, usually in simple spikes, ♀ usually aggregated in heads along the rhachis.....2. *zeylanica*.

1. GIRARDINIA LESCHENAULTIANA, Dcne.; Wt. Ic. tt. 1976. *Girardinia heterophylla*, Dcne., var. *palmata*, Gaud.; F. B. I. v. 551.

Mountains of the W. Ghâts from 4,000—7,000 ft. The Nilgiri Nettle.

A strong stinging-nettle, often growing gregariously near habitations.

2. GIRARDINIA ZEYLANICA, Dcne. *Girardinia heterophylla*, Dcne., var. *zeylanica*, Dcne.; F. B. I. v. 551. *Urtica heterophylla*, Wt. Ic. t. 687.

Hills of Southern India and on the West Coast from 1,000—5,000 ft. The Nilgiri Nettle.

A stinging-nettle not easily distinguished from the last species.

3. *Laportea*, Gaud.

Herbs, shrubs or trees with stinging (sometimes minute) hairs. *Leaves* alternate, entire or toothed, 3-ribbed or penninerved; stipules free or connate. *Flowers* monoecious or dioecious, in panicle, usually unisexual, cymes or racemes. *Perianth* of ♂ of 4—5 subvalvate sepals, of ♀ of 4 subequal segments or one outer smaller or absent. *Stamens* 4—5, inflexed in bud. *Pistillode* clavate or subglobose. *Ovary* eventually oblique; ovule erect; style linear, papillose on one side. *Achene* oblique, compressed, membranous or fleshy, seated on the perianth. *Seed* nearly exalbuminous; cotyledons broad.

Herbs; leaves broadly ovate to elliptic, acuminate; base usually rounded, rarely narrowed, 3-ribbed, 2.5—8 in. long, 1.5—5 in. wide, coarsely toothed, smooth, pubescent or scabrous, variable in the amount of stinging hairs on both surfaces; ♂ cymes slender, mostly axillary, ♀ cymes stout, subterminal, the pedicels broadly winged.....1. *terminalis*.

Soft stemmed shrubs or small trees; leaves narrow-lanceolate to broadly elliptic, shortly acuminate, base narrowed, rarely rounded, penninerved, 5—12 in. long, 2—5.5 in. wide, entire or crenulate in the upper half, glabrous or nearly so, shining above, the petioles sometimes with many stinging hairs; cymes axillary, pedicels of ♀ cylindrical.....2. *crenulata*.

1. LAPORTEA TERMINALIS, Wt. Ic. t. 1972; F. B. I. v. 549.
W. Gháts in evergreen forests, 5,000—7,000 ft.
A slender nettle. The sting is not very virulent.
2. LAPORTEA CRENULATA, Gaud.; F. B. I. v. 550; Bedd. Fl. t. 306.
Urtica crenulata, Roxb.; Wt. Ic. t. 686.
W. Gháts from 1,000—5,000 ft. Rampa Hills, 2,500 ft. (Gamble).
The Elephant Nettle, Fever Nettle, Devil Nettle.
A stout shrub or small tree. Bark white, smooth, very thin; wood pale-brown, very soft, useless; the fibre yields a strong, useful cordage. The sting of the hairs is very painful and lasting, particularly during the flowering season, when it may bring on violent sneezing and fever. Vern. Tam. Otta-pilavu; Mal. Ana-choriya.

4. *Lecanthus*, Wedd.

Herbs, more or less succulent; stems often decumbent and rooting at the base. *Leaves* in opposite, petioled, unequal pairs, subrotund, ovate or elliptic, acute; base 3-ribbed, narrowed, often oblique, serrate, or sometimes the small ones nearly entire, cystoliths linear; stipules small, scarious. *Flowers* monoecious or dioecious, crowded or solitary, axillary, long-peduncled, bracteate, saucer-shaped, unisexual or androgynous fleshy receptacles, the ♀ often mixed with sterile flowers. *Perianth* of ♂ of 4—5 (usually 4) free, equal, usually narrowly hooded sepals, of ♀ of 3—6 (usually 4) free unequal sepals, one larger than the others and usually more deeply and broadly hooded, of sterile flowers irregular, often with 8 segments in 2 series. *Stamens* 4—5 (usually 4). *Pistillode* 0. *Staminodes* in fertile ♀ 4, minute, quadrate. *Ovary* narrowly ellipsoid, shortly stipitate; stigma sessile, penicillate. *Achene* ellipsoid, muriculate. *Albumen* fleshy; cotyledons elliptic, radicle conical.

LECANTHUS WIGHTII, Wedd.; F. B. I. v. 559. *Elatostemma ovatum*, Wt. Ic. t. 1985.

In moist and shady places in the hills from 4,000—7,000 ft. Mahendragiri (Fischer), Mysore, Nilgiris, Anamalais (Fischer), Pulneys (Bourne).

A variable herb, 2—18 in. high. Leaves and capitula equally variable in size (up to 6 in. long and 5 in. diam. respectively). ♂ flowers with slender pedicels 3 times longer than the calyx, ♀ sessile and pedicelled up to the length of the longest sepal in the same capitulum.

5. *Elatostemma*, Forst.

Herbs or undershrubs. *Leaves* alternate or sometimes with a small or minute leaf subopposite to the normal one, distichous, sessile or shortly petioled, usually inequilateral and more or less oblique, 3-ribbed from the base or a little above it; stipules lateral or intrapetiolar. *Flowers* minute, monoecious or dioecious, crowded on sessile or peduncled, 1-sexual, usually involucrate receptacles, the outer bracts often spurred, their bases free or more or less confluent into a fleshy

circular or lobed disk, the florets often in clusters in the heads and mixed with bracteoles. *Perianth* of ♂ of 4—5 free sepals, 2 or more usually tuberculate or spurred on the back, of ♀ of 3—5 free, persistent sepals, usually minute or shorter than the ovary. *Stamens* 4—5, inflexed in bud. *Pistillode* minute. *Ovary* straight; ovule erect; stigma sessile, penicillate. *Achene* minute, ellipsoid or fusiform, usually ribbed. *Seed* usually exalbuminous; testa membranous; cotyledons ovate or semiterete.

Normal leaves alternate without (very rarely with) subopposite small ones:—

♂ receptacles sessile or very shortly peduncled (unknown in *E. cuneatum*):—

Large herbs, usually over 1 ft. high; leaves acuminate or caudate:—

Leaves with large conspicuous cystoliths:—

Leaves sessile or shortly petioled, obliquely lanceolate, oblanceolate or oblong, caudate, coarsely sharply serrate from the base or just above; base inequilateral, narrowed or the lower side rounded, 1.3—6 in. long, .5—2.2 in. wide, glabrous or with scattered hairs above, more or less pilose on the nerves below; lateral ribs rather indistinct, the lower one arched, cystoliths abundant, obscure below; stipules lanceolate, acute, glabrous; receptacles sessile or very shortly peduncled, solitary or 2—3 in an axil.....1. *sessile*.

Leaves subsessile, very variable, linear, linear-lanceolate or obliquely lanceolate, acuminate or caudate; base acute, nearly equilateral, .8—7 in. long, .1—2 in. wide; margins entire (in the narrow forms) or coarsely, subacutely serrate in the upper half, the inner margin often toothed for a shorter distance than the outer, glabrous above, glabrous or hairy on the nerves below; lateral ribs distinct, the lower nearly straight; cystoliths crowded and conspicuous; stipules lanceolate, usually hairy; receptacles sessile, small, solitary or crowded in the axils.....2. *lineolatum*.

Leaves without cystoliths or cystoliths minute and inconspicuous, subsessile, obliquely oblong or oblong-lanceolate, caudate, coarsely crenate-toothed in the upper two-thirds, usually over a greater distance on the outer side; base acute or subacute, ribs distinct, 1.5—6 in. long, .4—1.5 in. wide, quite glabrous; receptacles sessile, small, solitary.....3. *acuminatum*.

Dwarf herbs, 3—8 in. high, more or less pubescent; leaves sessile or shortly petioled, falcately cuneate or hatchet-shaped; apex rounded or subacute, base inequilateral, subauricled on the lower side, very rarely with a minute opposite leaf, the uppermost 3—5 leaves coarsely crenate above the middle, .5—1.3 in. long, .4—7.5 in wide, those below much smaller and often entire; cystoliths numerous on both sides; receptacles solitary; ♀ bracts confluent below into a fleshy disk, the tips produced beyond the florets, acute, ciliate.....4. *cuneatum*.

♂ receptacles long-peduncled; leaves sessile, subfalcately oblong-lanceolate, subcaudately acuminate, coarsely subserrately toothed from above the lower one-third, usually for a shorter distance on the upper margin; base inequilateral, subacute, sometimes subauricled, 2—7 in. long, .6—1 in. wide, the lowest much reduced; ribs distinct, rather broad; cystoliths numerous; stipules short, broad; receptacles solitary or twin; sometimes the 2 sexes from the same axil, ♂ with a long, succulent peduncle, 1—1.8 in. long, glabrous, up to .4 in. in diam. with rounded membranous bracts; ♀ sessile, much smaller, silvery.....5. *Wightii*.

Normal leaves subtended by small filiform, linear, lanceolate or oblong, subopposite, usually deflexed, very small ones, very variable, sessile or shortly petioled, subfalcately lanceolate or ovate, acuminate or the lower rounded; base inequilateral, acute or subauricled on the lower side, .4—3.5 in. long, .2—1.3 in. wide, crenate-serrate in the upper half or sometimes with only 2 teeth on either side of the apical one; glabrous, ribs distinct, rather broad; cystoliths numerous above, obscure below; ♂ receptacles very long- or short-peduncled, the outer bracts usually horned; ♀ smaller, sessile.....6. *surculosum*.

1. *ELATOSTEMMA SESSILE*, Forst.; F. B. I. v. 563.

W. Gháts in evergreen woods, 5,000—7,000 ft.

A herb 1—2 ft. high, usually prostrate and rooting below.

Var. *cuspidata*, Wedd.; F. B. I. v. 564. *E. cuspidata*, Wight Ic. t. 1983 (not 2091, fig. 1). Leaves glabrous or setose above, pubescent on the nerves beneath.

Var. *pubescens*, Hook. f.; F. B. I. v. 564. Stem and leaves more or less substrigosely tomentose.

2. ELATOSTEMMA LINEOLATUM, Wt. Ic. t. 1984 and 2091, fig. 1; F. B. I. v. 565.

W. Gháts in evergreen forests from 1,800—7,500 ft. Vizagapatam Hills at 4,000 ft. (A. W. Lushington).

A herb or undershrub, very variable in foliage and habit.

Var. *falcigera*, Thw. Branchlets more or less fuscous or tawny-tomentose; leaves falcately linear-lanceolate, entire or with one or two teeth.

Var. *linearis*, Thw. Leaves linear, entire or with 1—2 large teeth, ribs and nerves obscure.

3. ELATOSTEMMA ACUMINATUM, Brongn.; F. B. I. v. 566.

Nilgiri and Anamalai (Beddome, Fischer) Hills at about 4,000 ft. Rare.

A much branched undershrub, woody below.

4. ELATOSTEMMA CUNEATUM, Wt. Ic. t. 2091, fig. 3; F. B. I. v. 568.

Rampa District at 2,000 ft. on Peddakonda near Maradumalli (V. Narayanswami). The only record for the area.

A small, slender herb.

5. ELATOSTEMMA WIGHTII, Hook. f.; F. B. I. v. 570.

At Avalanche in the Nilgiri Hills (Wight), Anamalai Hills (Beddome).

A succulent herb.

6. ELATOSTEMMA SURCULOSUM, Wt. Ic. t. 2091, fig. 4; F. B. I. v. 572.

W. Gháts in evergreen forests, 5,000—7,000 ft.

A small rather succulent herb, often growing on rocks and tree-trunks in cool, shady places.

6. Procris, Juss.

Succulent herbs or shrubs. Leaves alternate or, as in *Elatostemma*, with a very small leaf opposite or subopposite to the normal one; base unequal, cystoliths linear. Flowers monoecious, axillary, mostly in the axils of fallen leaves, ♂ in small cymes or clusters, ♀ aggregated on a fleshy, peduncled receptacle. Perianth of ♂ 5-partite, lobes ovate, fleshy, of ♀ of 3—5 obovate, cucullate, fleshy sepals. Stamens 5. Staminodes 0. Pistillode rudimentary, globose or obovate. Ovary ovate; stigma sessile. Achene ovate or ellipsoid, subacute, striolate. Embryo turbinate; albumen 0 or scanty; cotyledons broadly elliptic; radicle long, conical.

PROCRIS WIGHTIANA, Wall. ex Wedd. *P. laevigata*, Bl. in part; F. B. I. v. 575.

W. Gháts and hills of the Carnatic in evergreen forest and in cool moist places from 4,000—6,500 ft.

A succulent, branched herb. Normal leaves shortly petioled, lanceolate or oblanceolate, acuminate or caudate; base tapering,

2.5—7 in. long, .6—1.5 in. wide, crenate-serrate from a little above the base or higher, rarely nearly entire, quite glabrous, primary nerves 5—7 pairs, distinct. ♀ receptacles small, usually several in each axil.

7. *Pilea*, Lindl.

Herbs. *Leaves* in opposite equal or unequal pairs, 3-ribbed, serrate, usually with numerous, minute linear (in our species) cystoliths which look like appressed hairs when the leaf is dry; stipules connate, intrapetiolar. *Flowers* minute, monoecious or dioecious, in axillary, peduncled, dichotomous cymes; bracts small or 0. *Perianth* of ♂ of 2—4 free or connate sepals, often gibbous or spurred, of ♀ of 3 (rarely 4) unequal sepals, the dorsal longest, sometimes gibbous or spurred. *Stamens* 2—4. *Pistillode* minute, conic or oblong. *Staminodes* minute or 0. *Ovary* straight; ovule erect; stigma sessile, penicillate. *Achene* ovoid, oblong or suborbicular, compressed, smooth or granulate. *Seed* erect; albumen scanty; cotyledons broad.

Stipules caducous, small, ovate, acute; lateral ribs of nerves curved and more or less converging towards the apex:—

Lateral ribs of leaves evanescent before reaching the apex, primary nerves not numerous, nor regular and parallel; petioles glabrous; achenes smooth or very slightly granular:—

Leaves ovate or rotund-ovate, usually about 1 in. long (up to 2 in. long, 1.25 in. wide), acuminate; base subcordate, sharply, narrowly serrate to just below the apex; lateral ribs evanescent a short distance below the apex, quite glabrous, usually punctate below; petioles .3—1.25 in. long; cymes peduncled, open; sepals spurred; achenes ovoid, apex narrowed, smooth.....1. *Wightii*.

Leaves ovate-lanceolate to subrotund, 1—6 in. long, terminating in a narrow, entire cusp; base never emarginate; lateral ribs evanescent about $\frac{1}{4}$ of the way up; marginal teeth broad, blunt or subacute; upper surface with scattered hairs, not punctate below; petioles .4—3.2 in. long; cymes peduncled, open, sepals rounded, not spurred; achenes suborbicular, apex rounded, smooth or slightly granular.....2. *Kingii*.

Leaves narrowly lanceolate to broadly ovate, sometimes falcate, acuminate or finely caudate, 2.25—10 in. long, .75—4.25 in. wide, sharply serrate; lateral ribs prolonged right into the apex; primary nerves numerous, regular, nearly straight, parallel between the ribs; petioles 1.3—5 in. long, often hairy at least just below the blade; cymes peduncled, open; achenes granular.....3. *trinervia*.

Stipules subsistent, large, linear-oblong to oblong, 1 in. long or more; apex rounded; leaves elliptic, acuminate, 3—5 in. long, 1.5—2.5 in. wide; lateral ribs nearly straight, not converging towards the apex, crenate-serrate; petioles 1.3—1.75 in. long; peduncles short, cymes shorter than the petioles, aggregated; achenes smooth.....4. *stipulosa*.

1. *PILEA WIGHTII*, Wedd.; F. B. I. v. 554. *P. radicans*, Wt. Ic. t. 1974.

Evergreen forests of the W. Gháts, 4,000—7,500 ft.

A flaccid herb.

2. *PILEA KINGII*; C. Fischer in Kew Bull. 1927, 76. *P. Wightii*; Wedd var. *macrophylla*, Hook. f.; F. B. I. v. 555.

Evergreen forests of the W. Gháts, 5,000—7,000 ft.

A glabrous herb similar to the last species but more robust.

3. *PILEA TRINERVIA*, Wt. Ic. t. 1973; F. B. I. v. 557.

Evergreen forests of the W. Gháts, 2,000—8,000 ft. Kollimalais of Trichinopoly District (Barber).

A robust succulent herb up to 7 ft. high with swollen internodes.

4. *PILEA STIPULOSA*, Miq.; F. B. I. v. 555.

Pulney Hills; Gundattu Shola (Bourne).

A stout herb at once recognized by the large stipules which, like the leaves, bear innumerable linear cystoliths, these, however, here are black (at least when dry).

Pilea microphylla, Liebm. *P. muscosa*, Lindl.; F. B. I. v. 551, the Gunpowder or Artillery Plant, is a small prostrate species with very small rotund or spatulate, entire leaves which is grown in borders in gardens and has run wild in many places. The ripe pollen is ejected in clouds when the plant is jolted.

8. *Pellionia*, Gaud.

Herbs. *Leaves* distichous, alternate or subopposite, but appearing alternate by the suppression or excessive reduction of one of each successive pair, inequilateral, entire or serrate, 3-ribbed or penninerved, with numerous linear cystoliths; stipules usually large. *Flowers* monoecious or dioecious, in open or contracted, sometimes capituliform, bracteate, peduncled, axillary cymes (not seated on a receptacle). *Perianth* of ♂ 5-partite, segments acute, with a membranous margin, mucronate on the back, of ♀ deeply 5-partite; segments equal or unequal, mucronate below the apex. *Stamens* 5. *Pistillode* conical. *Staminodes* 5, scale-like. *Ovary* elliptic. *Achene* broadly ovate, more or less compressed. *Seed* subexalbuminous; radicle conical.

PELLIONIA HEYNEANA, Wedd.; F. B. I. v. 561.

In evergreen woods in the W. Gháts, 1,500—6,000 ft.

A herb; stem woody and creeping below; the tips hairy. Leaves alternate or subopposite, with one of the pair very small, falcate, linear-lanceolate to broadly lanceolate, acuminate or caudate, base 3-ribbed, narrowed and unequally cordate, 2—9 in. long, .75—3.5 in. wide, quite glabrous or the ribs beneath pilose, quite entire; petiole short; stipules narrow-ensiform, aristate, up to .5 in. long. Peduncles short or long, glabrous or hairy.

9. *Chamabaina*, Wight.

Diffuse herbs. *Leaves* opposite, equal or nearly so, 3-ribbed, serrate; cystoliths punctiform; stipules paired, free, conspicuous, persistent, enclosing the young flower-clusters. *Flowers* monoecious (or dioecious?), in axillary, bracteolate clusters; ♂ shortly pedicelled in the upper axils, ♀ clusters dense. *Perianth* of ♂ valvately 4-lobed, lobes mucronate, hairy, of ♀ tubular, compressed, minutely 4-toothed, hirsute. *Stamens* 4. *Pistillode* rudimentary, clavate. *Ovary* included; ovule erect; stigma ovate, fimbriate, spreading. *Achene* compressed, ovate, acute, enclosed in the persistent perianth; pericarp crustaceous. *Seed* albuminous; cotyledons ovate.

CHAMABAINA CUSPIDATA, Wt, Ic. t. 1981; F. B. I. v. 580.

Nilgiri Hills at about 6,000 ft., in moist woods and on wet ground near streams; not common.

A small diffuse, pubescent herb. Leaves ovate to subrotund, acute, base rounded or acute, .3—1.25 in. long, .2—7 in. wide, bluntly or acutely serrate; stipules scarious, 4 to each node.

10. *Pouzolzia*, Gaud.

Herbs or undershrubs. *Leaves* alternate, opposite or ternate, 3-ribbed, usually entire, often reduced in size upwards and passing into bracts; cystoliths punctiform; stipules free, often persistent. *Flowers* minute, usually monoecious, in 1-sexual or androgynous, usually sessile clusters in the axils of the leaves or the bracts, never spicate, but sometimes appearing so by the reduction of the upper leaves; bracteoles small; florets pedicelled. *Perianth* of ♂ 4—5- (rarely 3-) partite or -lobed, the lobes either concave or transversely plicate and abruptly inflexed making the bud truncate, of ♀ tubular, mouth contracted, 2—4-toothed. *Stamens* 4—5 (rarely 3). *Pistillode* clavate or oblong. *Ovary* included; ovule erect; stigma filiform, jointed to the top of the ovary, deciduous. *Achene* enclosed in, but usually free from, the winged or wingless, persistent perianth. *Seed* with a membranous testa; albumen very scanty or 0; cotyledons ovate.

The species are, for the most part, very variable in habit, foliage, flowers and indumentum, so that their classification into species and varieties is a matter of considerable difficulty.

♂ perianth lobes convex or gibbous, buds rounded or acute:—

Leaves opposite or alternate, linear, lanceolate, elliptic, ovate-lanceolate or broadly ovate, apex blunt or acute, base narrowed or rounded and then abruptly, shortly acute, hoary-pubescent, hirsute or glabrate, .4—3.5 in. long, .2—1.5 in. wide, primary nerves 1 pair, lateral ribs not forked; flowers usually strigose, ♂ 4- (rarely 5-) merous; fruit 2—4-winged or not.....1. *indica*.

Lateral ribs of leaves forked, ♂ flowers 5-merous:—

Leaves alternate, ovate-lanceolate to rotund-ovate, acute or acuminate, base narrowed or rounded, .6—5.5 in. long, .2—2.3 in. wide, glabrous or pubescent above, and if the latter also on the sub-prominent ribs and nerves, pubescent or villous below; petioles .1—3 in. long; flowers in sessile clusters in the axils, strigose or hirsute usually with whitish hairs; fruit strigose, winged or not

2. *auriculata*.

Leaves opposite, lanceolate to rotund-ovate, acute or acuminate; base rounded, truncate or subcordate, .8—3 in. long, .4—1.8 in. wide, more or less pubescent above except on the impressed ribs and nerves, pubescent below, at least on the ribs and nerves; petioles up to .5 in. long; flowers axillary, cymose, hirsute; fruit smooth or strongly ribbed, not winged.....3. *cymosa*.

♂ perianth lobes plicate and abruptly inflexed at about the middle; buds truncate:—

Stems running out into terminal or axillary spikes:—

Spikes all axillary; leaves ternate, sessile, lanceolate, acuminate, base rounded or cordate, 2—7 in. long, .4—1.2 in. wide, glabrous; flowers in sessile clusters on solitary or binate, flexuous, bracteolate, scabrid-puberulous spikes up to 9 in. long; ♂ 4-merous, nearly glabrous; fruit winged or not.....4. *Meeboldii*.

Spikes terminal, sometimes also a few from the upper axils:—

Leaves ternate, opposite or alternate, linear to narrowly lanceolate, acute or acuminate; base rounded or narrowed, shortly petioled or sessile, up to 6 in. long, 1 in. wide, reduced upwards and merging into the floral bracts, glabrous or somewhat pubescent and usually hispidulous on the ribs below; flowers in the axils of leaves or bracts in sessile clusters; ♂ 5-merous, ciliate at the flexure, ♀ hirsute, fruit winged.....5. *pentandra*.

Leaves ternate, opposite or alternate, very variable in shape, size and indumentum, up to 6 or 7 in. long, reduced upwards and merging into the floral

bracts; flowers in sessile clusters in the axils of leaves or bracts; ♂ 3—4 (rarely 5-) merous; fruit winged or not.....6. *Wightii*.
 Stem not running out into a bracteate spike, upper leaves not reduced to bracts or markedly smaller; leaves very variable, from ovate to narrow-lanceolate, usually acuminate, base acute, rounded or subcordate, 3—5-ribbed, up to 7 in. long and 2.5 in. wide; flowers in sessile, axillary clusters; ♂ 5- (rarely 4-) merous; fruit winged or not.....7. *Bennettiana*.

1. *POUZOLZIA INDICA*, Gaud. ; F. B. I. v. 581 ; Wt. Ic. tt. 1980, fig. 1, 2100, fig. 40. *P. procumbens*, Wt. Ic. t. 2099, fig. 35. *P. diffusa*, Wt. Ic. t. 2099, fig. 36. *P. tetraptera*, Wt. Ic. t. 2100, fig. 42, excl. ♂ bud. *P. minor*, Wt. Ic. t. 2100, fig. 43. *P. pilosa*, Wt. Ic. t. 2101, fig. 46. *P. Johnsoniana*, Wt. Ic. t. 2101, fig. 47. *P. pyramidata*, Wt. Ic. t. 2101, fig. 48. *Urtica alienata*, Linn. ; Wt. Ic. t. 693. *U. tuberosa*, Roxb. ; Wt. Ic. t. 697.

In all districts, sea-level to 6,000 ft.

A very variable, slender, erect or procumbent, hirsute or pubescent herb.

2. *POUZOLZIA AURICULATA*, Wt. Ic. tt. 1980, fig. 2, 2099, fig. 37 ; F. B. I. v. 582. *P. rostrata*, Wt. Ic. tt. 1980, fig. 3, 2099, fig. 34. *P. rotundifolia*, Wt. Ic. t. 2098, fig. 31, excl. ♂ bud. *P. elliptica*, Wt. Ic. t. 2098, fig. 32. *P. bicuspidata*, Wt. Ic. t. 2098, fig. 33, excl. ♂ bud. *P. Rheedii*, Wt. Ic. t. 2099, fig. 38. *P. scabrida*, Wt. Ic. t. 2100, fig. 41. *Urtica vesicaria*, Roxb. ; Wt. Ic. t. 695.

In all districts, near sea-level to 6,500 ft.

A flaccid or stout, usually tall herb.

3. *POUZOLZIA CYMOSA*, Wt. Ic. t. 1979, fig. 2. *P. auriculata*, Wight, var. *cymosa*, Hook. f. ; F. B. I. v. 582.

In the Nilgiri, N. Coimbatore, Shevaroy and Kollimalai Hills, 4,000—6,000 ft.

A herb.

4. *POUZOLZIA MEEBOLDII* ; W. W. Smith et Rainas.

At Kavalay in Cochin (Meebold), Anamalais (Wight?), Peermade in Travancore (Venkoba Rao).

An erect undershrub.

5. *POUZOLZIA PENTANDRA*, Benn. ; F. B. I. v. 583 ; Wt. Ic. t. 2096, fig. 20. *Urtica pentandra*, Roxb. ; Wt. Ic. t. 696.

W. Gháts in Mysore (Meebold), S. Kanara, Nilgiri District, Palghat and N. Coimbatore (Fischer).

An erect, rigid herb, 2—3 ft. high. Apparently not common.

6. *POUZOLZIA WIGHTII*, Benn. ; F. B. I. v. 584 ; Wt. Ic. t. 2093, fig. 8. *P. ternata*, Wt. Ic. t. 2093, fig. 7. *P. concinna*, Wt. Ic. t. 2093, fig. 9. *P. ambigua*, Wt. Ic. t. 2095, fig. 19. *P. trialata*, Wt. Ic. t. 2096, fig. 22. *P. longifolia*, Wt. Ic. t. 2093, fig. 6.

All districts, about 1,000—7,000 ft.

A very variable, usually tall and robust herb, with many varieties, of which only the following seem to be really distinguishable from the type.

Var. *nilghirensis*, Hook. f. ; F. B. I. v. 584. *P. neilgherrensensis*, Wt. Ic. t. 2097, fig. 26. *P. ovata*, Wt. Ic. t. 2096, fig. 24. *P. oblongifolia*, Wt. Ic. t. 2096, fig. 25.

Stem harshly tomentose or scabrid; leaves coriaceous broadly ovate, elliptic or oblong-lanceolate, up to 6 in. long, 3 in. wide, scabrid above, tomentose below; ♂ sepals hirsute above the flexure. Range of the type.

Var. *Wallichiana*, Hook. f.; F. B. I. v. 584. *P. Wallichiana*, Wt. Ic. t. 2096, fig. 23.

Very like the last, but leaves usually narrower; floral leaves closer and longer; ♂ sepals glabrous. A very doubtfully valid variety. I have seen only two specimens collected by Wight in the Iyamalai Hills near Coimbatore.

Var. *Lawsoniana*, Fischer.

Stem terete and glabrous, rhachis of spike more or less quadrangular and hirsute; cauline leaves subrotund to elliptic, mucronate or acuminate, 1–6 in. long, .75–2.25 in. wide, glabrous; petioles .1–.5 in. long; floral leaves sessile, ovate-lanceolate to broadly cordate, glabrous; ♂ sepals glabrous.

Naduvattam in the Nilgiri Hills (Lawson, ex Herb. Gamble, No. 12933), Shevaroy's (Bourne), Anamalais (Beddome), Pulneys (Saulière, Bourne, Barber), Travancore (Barber).

Var. *scabra* Fischer. *P. scabra*, Wt. Ic. t. 2097, fig. 29; F. B. I. v. 584. *P. aspera*, Wt. Ic. t. 2095, fig. 18.

Everywhere scabrid; spikes sometimes axillary as well as terminal and sometimes paniced. W. Ghâts, 1,000–7,000 ft. Horsleykonda in the Chittoor District.

Var. *caudata* Fischer. *P. caudata*, Benn.; F. B. I. v. 585; Wt. Ic. t. 2097, fig. 27. *P. courtallensis*, Wt. Ic. t. 2093, fig. 10.

Stem slender, glabrous; cauline leaves lanceolate to ovate-lanceolate, acuminate, up to 6 in. long and 1.5 in. wide, sessile or nearly so, glabrous; spikes (sometimes paniced) slender, pubescent; bracts becoming very small, cordate, glabrous. ♂ sepals glabrous. W. Ghâts.

7. *POUZOLZIA BENNETTIANA*, Wt. Ic. t. 1978; F. B. I. v. 585. *P. heterocarpa*, Wt. Ic. t. 2094, fig. 14.

W. Ghâts.

An erect, variable herb with several fairly well-defined varieties.

Var. *macrophylla*, Hook. f.; F. B. I. v. 586.

Stems stout and, like the leaves below, tomentose or villous; leaves up to 8 in. long and 2.5 in. wide, scaberulous above; ♂ sepals villous above the flexure.

Var. *tomentosa*, Hook. f.; F. B. I. v. 586. *P. tomentosa*, Wt. Ic. t. 2094, fig. 11.

Everywhere villously tomentose; leaves up to 2.5 in. long and .8 in. wide.

Nilgiri and Pulney Hills above 6,000 ft.

Var. *Gardneri*, Hook. f.; F. B. I. v. 586. *P. Gardneri*, Wt. Ic. t. 2092, fig. 5.

Shrubby, prostrate or decumbent, sparsely hairy; branches, leaves above and ribs below dark brown when dry; leaves ternate or opposite; ♂ sepals more or less hispid above the flexure.

Nilgiri and Pulney (Fischer) Hills at high elevations; Mahendragiri in Ganjam (Fischer) at 4,500 ft.

Var. *ovalifolia*, Hook. f.; F. B. I. v. 586. *P. ovalifolia*, Wt. Ic. t. 2092, fig. 3.

Stem prostrate, slender, glabrous; leaves elliptic-ovate, up to 3 in. long, petioled, scaberulous above, smooth below; ♂ sepals glabrous.

Nilgiri, Pulney (Bourne) and Sirumalai (Bourne) Hills.

Var. *quadrialata*, Hook. f.; F. B. I. v. 586. *P. quadrialata*, Wt. Ic. t. 2094, fig. 12.

Stem prostrate or decumbent, woody below, tomentose above; leaves softly pubescent above, tomentose below, up to 3 in. long; ♂ sepals tomentose or villous above the flexure.

Var. *mysorensis*, Hook. f.; F. B. I. v. 586. *P. mysorensis*, Wt. Ic. t. 2092, fig. 4, excluding the magnified leaves.

Stem slender, 4-angled; leaves flaccid, long-petioled; ribs prominent; ♂ sepals quite glabrous.

Var. *acuta* Fischer. *P. acuta*, Wt. Ic. t. 2092, fig. 2. *P. heterocarpa*, Wt. var. Ic. t. 2094, fig. 13.

Erect; stems sparsely pubescent upwards; leaves ternate or opposite, elliptic, long-acuminate, up to 4 in. long and 1.5 in. wide, sparsely pubescent; ♂ sepals ciliate on the flexures.

11. *Parietaria*, Tourn.

Herbs, rarely undershrubs. *Leaves* alternate, 3-ribbed, entire, exstipulate, cystoliths globose. *Flowers* polygamous in bracteate, cymose clusters. *Perianth* of ♂ (appearing ♂ through the early fall of the stigma) of 3—4 valvate sepals, of ♀ tubular, 4-fid. *Stamens* 3—4, inflexed in bud. *Ovary* straight; ovule erect; stigma recurved, penicillate. *Achene* enclosed in the persistent perianth. *Seed* with copious albumen; cotyledons oblong.

PARIETARIA DEBILIS, Forst.; F. B. I. v. 593.

Nilgiri Hills in the sholas at high elevations.

A small, diffuse, flaccid, pubescent herb. *Leaves* broadly ovate or suborbicular, narrowed to a blunt apex, base rounded, .25—1 in. long; petioles .1—.5 in. long. *Flowers* minute, in 3—7-flowered, axillary cymes.

12. *Droguetia*, Gaud.

Slender herbs. *Leaves* alternate or opposite, serrate, cystoliths punctiform; stipules lateral, free. *Flowers* in small, androgynous or 1-sexual, axillary, campanulate, scabrid involucre. *Perianth* of ♂ tubular-clavate, 3—5-fid, of ♀ 0. *Stamen* 1. *Pistillode* 0. *Ovary* straight, woolly; ovule erect; stigma filiform, hispid, persistent. *Achene* ovoid, compressed, woolly. *Seed* with scanty or no albumen; cotyledons broad.

DROGUETIA DIFFUSA, Wedd.; F. B. I. v. 593. *Forskohlia urticoides*, Wt. Ic. t. 1982.

Nilgiri, Pulney and Travancore (Meebold) Hills in shady places, 6,000—7,000 ft.

A small, diffuse herb. Leaves opposite, ovate, acuminate, coarsely serrate, .5—2.3 in. long, .3—1.3 in. wide, hispidly hairy above and on the ribs and nerves below; petioles .2—1 in. long. Flowers minute, in 1- or more-flowered axillary involucre.

13. *Boehmeria*, Jacq.

Shrubs or small trees. Leaves opposite or alternate, toothed, 3-ribbed, cystoliths punctiform; stipules usually free. Flowers monoecious or dioecious, in 1-sexual (rarely androgynous) clusters sessile in the axils or in axillary spikes, racemes or panicles. Perianth of ♂ valvately 3—5-lobed or -partite, of ♀ tubular, 2—4-toothed, sometimes angled, winged or swollen. Stamens 3—5, inflexed in bud. Pistillode clavate or globose. Ovary included; ovule erect; stigma filiform, persistent. Achene at first closely invested by the perianth, later free. Seed albuminous; cotyledons ovate.

Leaves alternate, equal or alternately large and small, narrowly or broadly ovate, acuminate or finely caudate, base rounded or subacute, rarely subcordate, crenulate or serrulate, with small, bluntish teeth, sometimes nearly entire, 2—8 in. long, 1—4 in. wide, glabrous or rarely with a few hairs above, pubescent below; petioles .5—4 in. long; flowers in small axillary clusters.....1. *malabarica*. Leaves opposite, rarely alternate, subequal, very variable, suborbicular to ovate, acuminate or finely caudate, base rounded or cordate, coarsely, triangularly, acutely serrate with large teeth, 3—10 in. long, 1.5—8 in. wide, more or less hairy above, with hairs often with bulbous bases, pubescent below (tomentose in one variety); petioles up to 7 in. long; flowers in clusters on long axillary spikes
2. *platyphylla*.

1. *BOEHMERIA MALABARICA*, Wedd.; F. B. I. v. 575.

Evergreen forests of the W. Gháts, 1,000—4,000 ft.

A large shrub or small tree. Bark thin, greyish-brown.

2. *BOEHMERIA PLATYPHYLLA*, Don.; F. B. I. v. 578.

Hills of the Northern Circars, 2,000—4,000 ft. Darangabadi in Ganjam (Barber), Mahendragiri (Fischer), Rampa (Gamble, Narayanswami).

A spreading shrub.

Var. *tomentosa*, Wedd.; F. B. I. v. 578. Leaves softly tomentose or villous on both sides, the young shoots shaggy; spikes stout.

Endrika in the Vizagapatam Hills at 5,000 ft. (A. W. Lushington).

Var. *longissima*, Hook. f.; F. B. I. v. 579. *Splitgerbera macrostachya*, Wt. Ic. t. 1977.

Leaves ovate; spikes very long and fine, usually much longer than the leaves, up to 20 in. long, drooping. Clusters and spikes rarely androgynous.

B. nivea, Hook. & Arn.; F. B. I. v. 576. *Urtica tenacissima* Roxb.; Wt. Ic. t. 688.

A shrub cultivated ornamentally or for its fibre. The Rhea Plant.

Leaves orbicular or broadly ovate, acuminate, scabrid above, white with cobwebby pubescence below; flowers in clusters in axillary panicles.

14. *Villebrunea*, Gaud.

Trees or large shrubs. *Leaves* alternate, penninerved or 3—5-ribbed, entire or crenulate; cystoliths punctiform; stipules bifid. *Flowers* monoecious or dioecious, clustered, clusters axillary, sometimes in short cymes, or panicles, bracts minute. *Perianth* of ♂ 3—5 (usually 4-) fid, of ♀ tubular, ovoid, narrowed to a minute, toothed mouth. *Stamens* 3—5, usually 4. *Pistillode* obovate-clavate, pilose below. *Ovary* adnate to the perianth; ovule erect; stigma discoid, ciliate-fimbriate. *Achene* free or adnate to the perianth, embraced below by the marcescent, fleshy bracteoles. *Seed* amply albuminous; cotyledons broad.

VILLEBRUNEA INTEGRIFOLIA, Gaud., F. B. I. v. 589.

W. Gháts, 900—4,500 ft.

A small, evergreen tree. *Leaves* lanceolate or oblanceolate, acuminate or subcaudate, base narrowed, 2·5—10 in. long, 9—2·5 in. wide, penninerved, primary nerves 8—9 pairs, entire or somewhat crenulate, glabrous above, pubescent on the nerves below; petioles 25—1·25 in. long, usually pubescent. *Flowers* in globose clusters in shortly peduncled, dichotomous, hispid cymes, usually from the axils of fallen leaves.

15. *Debregeasia*, Gaud.

Trees or shrubs. *Leaves* alternate, 3-ribbed, serrate or entire, petioled, cystoliths punctiform; stipules connate, intrapetiolar, 2-fid. *Flowers* monoecious or dioecious, in dense, globose, paniced or spicate sessile clusters. *Perianth* of ♂ of 3—5, usually 4, valvate sepals, of ♀ tubular, ovoid or obovoid, mouth contracted and minutely toothed. *Stamens* 3—5, usually 4. *Pistillode* ellipsoid, glabrous or woolly at the base. *Ovary* straight, included; ovule erect; stigma sessile, penicillate. *Achene* at first adnate to the persistent, fleshy perianth. *Seed* with copious or scanty albumen; cotyledons short, broad.

Branchlets slender, pilose; leaves linear- to oblong-lanceolate, acute or acuminate, base rounded, 2—9 in. long, 4—2·5 in. wide, closely serrulate, rugose, pubescent or scabrid above, below white- or ashy-tomentose and lacunose and pilose on the ribs and nerves; petioles 3—1·2 in. long, pilose; flowers in small heads in short, dichotomous cymes from the axils along the branchlets.....1. *velutina*.

Branchlets thick, nearly glabrous; leaves rotund or sometimes rotund-ovate, apex suddenly and finely cuspidate, base rounded or subcordate, 4—9 in. in diam., quite entire, glabrescent and dark above, white or ashy tomentose below, primary nerves 3—4 pairs above the lateral ribs; petioles 1·7—9 in. long, thinly woolly or glabrous; flowers in larger heads in long-peduncled, paniced cymes from the axils of the terminal leaves; peduncles 2—4 in. long.....2. *ceylanica*.

1. DEBREGEASIA VELUTINA, Gaud.; F. B. I. v. 590. *Conocephalus niveus*, Wt. Ic. t. 1959.

W. Gháts, 1,000—6,000 ft.; fairly common.

A small tree, the branches rough with warty excrescences and the scars of fallen leaves. Bark greyish-brown; wood reddish-brown, used only for charcoal; the fibre useful for fishing-lines. Fruit yellow when ripe. Vern. *Tam.* Katunochchi.

2. *DEBREGEASIA CEYLANICA*, Hook. f.; F. B. I. v. 592.
Anaimalai Hills of Coimbatore (Fischer) and hills of Travancore
(Rama Rao, Venkoba Rao), 2,000—3,500 ft.
A small tree, very little known in South India.

Family CXL. CASUARINACEAE.

Trees or shrubs with cylindric, jointed branchlets. *Leaves* reduced to subulate scales, connate at the base to form short sheaths at the nodes. *Flowers* minute, monoecious or dioecious, ♂ in slender terminal spikes, ♀ in ovoid or globose bracteate and 2-bracteolate heads. *Perianth* of ♂ of 1—2 scarious sepals, of ♀ 0. *Stamen* 1, inflexed in bud; anther large. *Ovary* minute, 1-celled (or 2-celled with one suppressed); ovules 2, collateral; stigmas 2, long, filiform. *Carpophore* forming a cone with the achenes enclosed in the enlarged, coriaceous or woody bracteoles. *Seed* with a terminal wing, tipped by the style; albumen 0; embryo straight; cotyledons flat, equal; radicle very short, superior.

Casuarina, Forst.

The only genus with the characters of the family.

CASUARINA EQUISETIFOLIA, Forst.; F. B. I. v. 598.

Extensively planted on the sea-shore sands along both coasts and to a certain extent inland and up to about 4,000 ft. The *Casuarina* or Beefwood Tree.

A fast-growing, erect, tall tree. Bark brown, rough, fibrous, peeling in vertical stripes; wood yellowish-pink to reddish-brown, very hard; useful for scaffolding poles and an excellent fuel. Scales in whorls of 6—8, usually 7; teeth acute or setaceous; internodes rarely exceeding .25 in long, rather prominently ribbed. Valves of the cone pubescent outside. Vern. *Ur.* Jhabuko; *Tel.* Savuku, Chavukku; *Tam.* Chauku, Chavukku; *Mal.* Sampirani; *Kan.* Kasrike.

Other species, e.g. *C. quadrivalvis*, Labill., *C. suberosa*, Ott. & Diet., *C. glauca*, Sieb., have been planted in the Nilgiri Hills.

Family CXLI. SALICACEAE.

Trees or shrubs. *Leaves* alternate, simple, stipulate. *Flowers* dioecious (rarely monoecious), in close bracteate spikes (catkins), one flower to each bract, ebracteolate. *Perianth* 0. *Disk* cupular or of 1 or more scales or glands. *Stamens* 2 or more; filaments free or connate. *Ovary* sessile or stalked, 1-celled; ovules few-many, erect; style short or 0; stigmas short, notched or lobed. *Capsule* ovoid or lanceolate, 2—4-valved. *Seed* with a pencil of long, silky, deciduous hairs; albumen 0; cotyledons plano-convex; radicle short, inferior.

Salix, Linn.

Characters of the family. *Stamens* 2—12 (usually 2). *Disk* of 2 fleshy or glandular scales. *Ovules* 4—8.

SALIX TETRASPERMA, Roxb. Cor. Pl. t. 97; F. B. I. v. 626; Wt. Ic. t. 1954; Bedd. Fl. Syl. t. 302; Brand. For. Fl. t. 58. *S. ichnostachya*, Lindl.; F. B. I. v. 628; Wt. Ic. t. 1953.

In all Districts up to 8,000 ft.; usually near streams. The Indian Willow.

A small or fairly large tree. Bark rough with deep, vertical fissures, greyish-brown; wood red, soft, porous, not much used, makes good gunpowder-charcoal; the twigs are woven into baskets. Leaves linear- to ovate-lanceolate, acuminate, base narrowed or rounded, 2—6 in. long, 4—2.25 in. wide, entire or serrate; petioles up to 1 in. long. Flowers in lax or dense-flowered catkins, which are nearly glabrous, pubescent, villous or densely tomentose. Vern. *Hind.* Bains; *Ur.* Baisi; *Tam.* Vanji, Nirvanji; *Mal.* Vanji; *Kan.* Baiché.

Family CXLII. CERATOPHYLLACEAE.

Slender, submerged water-herbs. *Leaves* whorled, dichotomously cleft into filiform minutely-toothed lobes; stipules 0. *Flowers* minute, monoecious, solitary, axillary, sessile. *Perianth* (or involucre) of both sexes of 6—12 narrow subvalvate, 2-fid segments. *Stamens* 12—30; filaments very short; anthers erect, extrorse, connective truncate or 2—3-toothed at the apex. *Ovary* sessile, ovoid, 1-celled; ovule 1, pendulous, straight; style subulate, stigmatic on one side. *Fruit* a small coriaceous, ovoid or ellipsoid, somewhat compressed nutlet terminating in the persistent long style and furnished on either side with a long subulate spur projecting from a little above the base, sometimes narrowly winged. *Seed* exalbuminous; embryo straight; cotyledons thick; radicle short, inferior.

Ceratophyllum, Linn.

The only genus, with the characters of the family.

CERATOPHYLLUM DEMERSUM, Linn.; F. B. I. v. 639. *C. tuberculatum*, Cham.; Wt. Ic. t. 1948, fig. 3. *C. muricatum*, Cham.; Wt. Ic. t. 1948, figs. 1 and 2. *C. missionis*, Wall.; Wt. Ic. t. 1948, fig. 4.

In all Districts, in still water.

A fragile alga-like herb 6 in.—3 ft. long. *Leaves* 5—1 in. long. *Fruit* up to 2 in. long, smooth, muricate or minutely tubercled.

Family CXLIII. GNETACEAE.

Trees or shrubs, sometimes climbing; branches jointed at the nodes. *Leaves* opposite, large and green or minute and scale-like; stipules 0. *Flowers* monoecious or dioecious, in axillary or terminal bracteate spikes or cones. *Perianth* of ♂ tubular, entire or valvately 2—4-lobed or spathaceous, of ♀ 0. *Stamens* connate in a column; anthers 2—8, globose, 1—3 celled, sessile or subsessile on the apex of the column. *Ovule* naked, erect, with a styliform tube with a discoid

mouth. *Seed* dry or drupaceous; albumen copious or scanty; embryo straight; cotyledons appressed; radicle long, superior.

Gnetum, Linn.

Evergreen trees or climbing shrubs. *Leaves* large, entire, penninerved. *Flowers* monoecious, whorled in the axils of cupular bracts in solitary or paniced spikes. *Perianth* of ♂ narrowly clavate, entire or valvately 2-fid. *Staminal column* adnate to the base of the perianth, apex exserted; anthers of 2 distinct cells, sessile, opening by terminal slits. *Ovule* ovoid or globose; styliform tube exserted, mouth often toothed or fimbriate. *Seed* drupaceous.

GNETUM SCANDENS, Roxb.; F. B. I. v. 642. *G. funiculare*, B. Sm.; Wt. Ic. t. 1955.

In the Gháts of both sides of the Peninsula, 500—5,000 ft.

A large, robust climber. Bark thick, brown, rough with scales. Leaves ovate-oblong or elliptic, obtusely acuminate, shining, 3—7 in. long, 1.75—4 in. wide; petioles .3—.5 in. long. Fruit ellipsoid, pointed or blunt, 1—1.5 in. long, reddish-orange when ripe. Vern. Tam. Ana-pendu.

Family CXLIV. CONIFERAE.

Trees or shrubs; resin-canals in the wood frequent. *Leaves* usually alternate or fascicled, rarely opposite, usually rigid, linear or subulate, rarely broad. *Flowers* monoecious or dioecious, ♂ in deciduous catkins, ♀ solitary or in cones. *Perianth* absent in both sexes. ♂ of many 1- or more-celled anthers seated on the scales of the catkin, sessile or with connate filaments; ♀ of 1 or more naked sessile ovules seated on scales usually forming a cone, rarely solitary. *Seeds* often winged; albumen densely fleshy; embryo axile, straight; cotyledons 2 or more; radicle terete.

Podocarpus, L'Hérit.

Evergreen trees or shrubs. *Leaves* opposite or alternate, linear or broad with a midrib or with many parallel nerves. ♂ *flowers* solitary, fascicled or spicate, with imbricate bracts; anthers sessile, spirally crowded, 2-celled, connective with an apical claw or appendage. ♀ *flowers* solitary or few and spicate, bract fleshy, forming a peduncle to the fleshy ovuliferous scale to which the reflexed ovule is adnate. *Seed* small, globose or ovoid, seated on the enlarged fleshy scale and bract; cotyledons 2.

PODOCARPUS WALLICHIANA, Presl. *P. latifolia*, Wall. Pl. As. Rat. t. 30; F. B. I. v. 649; Bedd. Fl. Syl. t. 257.

W. Gháts from the Nilgiris southwards, 3,000—5,000 ft.

A tall evergreen, glabrous tree. Bark smooth, mottled brown and white; wood grey, aromatic, moderately hard. Leaves opposite or subopposite, coriaceous, lanceolate, tapering at both ends, 3—7 in. long, .75—2 in. wide; petiole very short, flat. *Seed*

solitary, ovoid, 1 in. long, seated on a fleshy receptacle. Vern.

Tam. Nirambali, Narambali; *Kad.* Karunthumbi.

Several conifers have been successfully planted in the Nilgiri and Pulney Hills, e.g. *Cupressus torulosa*, Don, *Pinus radiata (insignis)*, Don, *Cryptomeria japonica*, Don, *Callitris (Frenela) rhomboidea*, R. Br.

Family CXLV. CYCADACEAE.

Shrubs or small branchless but sometimes forked trees with a terminal crown of leaves, or stemless with the leaves arising from a tuberous simple or branched rootstock. *Leaves* in alternate series of short coriaceous scales and palm-like pinnate (rarely 2—3-pinnate) leaves with membranous or coriaceous leaflets, often spinous. *Flowers* dioecious, in both sexes naked on scales or modified leaves more or less arranged in cones. *Anthers* sessile and crowded on the undersides of fleshy flat or peltate scales, 1-celled. *Ovules* on the margins of carpellary leaves (*carpophylls*) crowded round the apex of the stem, or on flat or thickened peltate scales arranged in cones, large, sessile. *Seeds* large, drupaceous; albumen copious, fleshy or horny, with 1 or more embryonic cavities; embryo usually single by abortion, slender; radicle superior; cotyledons 2.

Cycas, Linn.

Shrubs or trees; trunk clothed with the woody bases of the petioles. *Leaves* pinnate, linear-oblong in outline; leaflets numerous linear, 1-nerved, quite entire, lower often reduced to spines. ♂ *cones* apparently terminal, peduncled; scales cuneate, closely imbricate, the apex often long-acuminate. *Anthers* ellipsoid in groups of 3—5. *Carpophylls* numerous, crowded round the apex of the stem, at first appressed into an apparently terminal cone, later spreading, elongate, flattened, expanded apically into an entire, crenate or pectinate blade, densely woolly. *Ovules* 1—5 on either side of the carpophyll below the blade, distant, alternate in notches along the margins. *Seeds* ellipsoid or globose.

Small palm-like trees. *Leaves* 5—9 ft. long; petioles 1.5—2 ft. long with short distant spines at right angles to the petioles or slightly deflexed, to near the glabrous base; leaflets 6—12 in. long, 3—5 in. wide, blunt or acute, not spinous-acuminate, margins flat; acumen of all the antheriferous scales upturned; blade of carpophyll ovate-lanceolate, long-acuminate, margins pectinate; ovules 3—5 on either side; seeds ovoid-oblong, 1—1.5 in. long.....1. *circinalis*.
Low shrubs, stem only a few inches high. *Leaves* about 3 ft. long; petioles about 6 in. long, the upper one-third with a few minute spines, base clothed with tufted tomentum; leaflets 4—7 in. long, about .15 in. wide, spinous-acuminate, margins strongly revolute; acumen of the antheriferous scales of the upper half of the cone strongly deflexed; blade of carpophyll usually narrow-lanceolate, long-acuminate; margins dentate-lobate; ovules 2 on either side; seeds globose, 1.5 in. in diam.....2. *Beddomei*.

1. *CYCAS CIRCINALIS*, Linn.; F. B. I. v. 656.

In all Districts in deciduous forests, sea-level to 4,000 ft.

A small evergreen palm-like tree up to 25 ft. high. Bark brown, smooth below, tessellated above by the small diamond-shaped

scars of fallen leaves. The leaves are used for plaiting into mats. Vern. *Ur.* Oruna, Rengua; *Tel.* Per-ita, Pairi-ita; *Tam.* Madana-kaman, Katu-thuvai; *Mud.* Pei-ithu; *Mal.* Kalanga, Intha. *Kan.* Goddu-ichel.

2. *CYCAS BEDDOMEI*, Dyer in Trans. Linn. Soc. ii, 5, 85, t. 17; F. B. I. v. 658.

So far only found in the hills of the Cuddapah District, 1,000—3,000 ft.

A small shrub. Bark brown, exfoliating in rectangular scales exposing a yellow under-surface. Vern. *Tel.* Perita.

C. Rumphii, Miq., much resembling *C. circinalis*, is grown in gardens.

MONOCOTYLEDONES.

Family CXLVI. HYDROCHARITACEAE.

Aquatic herbs, usually submerged. *Leaves* undivided. *Flowers* monoecious or dioecious, rarely 2-sexual, enclosed in an entire or 2-leaved spathe; ♂ 1-many, ♀ solitary. *Calyx* of 3 green or petaloid sepals. *Petals* membranous or 0. *Stamens* 3—12; anthers 2-celled. *Ovary* inferior, 1-celled, placentæ parietal, intruded and sometimes almost meeting; ovules numerous; styles or style-arms 3—12. *Fruit* globose or ovoid, membranous or fleshy, rarely dehiscent. *Seeds* exalbuminous; embryo various.

Fresh-water herbs; leaves tufted, whorled, opposite or alternate:—

Stems branched, leafy:—

Leaves mostly whorled; perianth double, styles undivided.....1. *Hydrilla*.

Leaves mostly alternate; perianth single; styles notched.....2. *Lagarosiphon*.

Stemless or with stolons, leaves tufted, radical:—

Leaves without a distinct petiole, linear, grass-like; flowers very slender; spathe not winged:—

Perianth single; peduncle of ♀ spathe spirally coiled.....3. *Vallisneria*.

Perianth double; peduncle not coiled.....4. *Blyxa*.

Leaves distinctly petioled, mostly broad, not grass-like; flowers large and broad; spathe winged.....5. *Ottelia*.

Salt-water herbs; leaves 2 at each node from the axil of a scarious or hyaline scale.....6. *Halophila*.

1. *Hydrilla*, Rich.

Submerged leafy fresh- or brackish-water herbs. *Leaves* short, 3—4-nately whorled or the lower opposite entire or toothed. *Flowers* monoecious or dioecious. ♂ flowers minute, shortly pedicelled, solitary in a sessile subglobose muricate spathe. *Sepals* 3, ovate to orbicular, concave, green. *Petals* 3, oblong or cuneiform. *Stamens* 3, anthers large, reniform. *Pistillode* minute. ♀ flowers sessile, solitary in a cylindric 2-toothed spathe, produced into a long filiform neck above the ovary. *Sepals* and *petals* as in the ♂, but narrower. *Ovary* shorter than the spathe, 1-celled; ovules many, anatropous; styles 2—3, linear, entire; stigmas fimbriate. *Fruit* subulate, smooth or muricate. *Seeds* 2—3, minute, oblong; testa shortly produced at both ends.

HYDRILLA VERTICILLATA, Royle; F. B. I. v. 659. *Serpicula verticillata*, Linn. f.; Roxb. Cor. Pl. t. 164.

In still waters in all Districts from the coast up to high levels.

A slender submerged weed up to 18 in. long, with fibrous roots.

2. Lagarosiphon, Harv.

Submerged fresh-water herbs. *Leaves* alternate or sometimes fascicled and subverticillate and the lower opposite, serrulate or entire. *Flowers* dioecious; ♂ minute, numerous in an axillary, sessile, ovoid, 2-fid spathe; ♀ solitary sessile in a narrow oblong spathe. *Sepals* 3, petaloid, broadly oblong, pink. *Petals* 3, rather shorter. *Stamens* 2 or 3, often with 2 or 3 staminodes added; filaments short, anthers ovate. *Pistillode* 0. *Staminodes* 0 in ♀. *Ovary* oblong, produced into a long filiform beak; ovules many, orthotropous; styles 3, notched, stout. *Fruit* ovoid, oblong or linear. *Seeds* numerous, testa with a mucous coat.

LAGAROSIPHON ALTERNIFOLIA, Druce. *L. Roxburghii*, Benth.; F. B. I. v. 659. *Vallisneria alternifolia*, Roxb.; Wt. III. t. 11.

In tanks in all Districts.

Very similar to the last species.

3. Vallisneria, Linn.

Submerged tufted, stemless, stoloniferous fresh-water herbs. *Leaves* very long, linear. *Flowers* dioecious; ♂ minute, very many together in a shortly peduncled, ovoid, 3-lobed spathe; ♀ solitary in a tubular 3-toothed spathe at the end of a very long filiform spirally coiled scape. *Sepals* 3. *Petals* 0. *Stamens* 1—3; anthers didymous. *Pistillode* 0. *Staminodes* in ♀ 3, 2-fid. *Ovary* narrow, not produced upwards; stigmas 3, broad, notched. *Fruit* linear, included in the spathe. *Seeds* numerous, oblong, testa membranous.

VALLISNERIA SPIRALIS, Linn.; F. B. I. v. 660; Wt. III. tt. 23 and 24.

A common weed rooting at the bottom of pools and tanks in all Districts.

4. Blyxa, Noronha ex Thouars.

Submerged stemless, tufted, scapigerous herbs. *Leaves* linear, acute, entire or minutely serrulate. *Flowers* dioecious or 2-sexual, on long or short scapes; ♂ pedicelled, several in a tubular 2-toothed spathe ♀ and ♀ sessile, solitary in a 2-toothed spathe. *Sepals* 3, linear. *Petals* 3, linear, longer. *Stamens* 3—9, 1 or more rudimentary; anthers narrow, erect. *Pistillodes* 3, slender. *Staminodes* in ♀ 0 or minute. *Ovary* very slender, beaked; style very short; stigmas 3, filiform. *Fruit* linear, very slender, included in the narrow, ribbed spathe. *Seeds* numerous, oblong; testa membranous, smooth, tubercled or echinate, often tailed at both ends.

Leaves as broad at the base as in the middle or broader:—

Flowers dioecious; stamens 8. Leaves 8—24 in. long, .25—5 in. wide. Fruit 2—4 in. long, about .15 in. wide. Seeds small, tubercled, shortly tailed at each end.....*l. octandra*.

Flowers 2-sexual; stamens 3:—

- Leaves 6—48 in. long, .12—5 in. wide. Fruit 2—3 in. long, about .1 in. wide. Seeds spinescent with a long tail at each end, sometimes .5 in. long, including the tails.....2. *echinosperma*.
 Leaves 3—24 in. long, .2—5 in. wide. Fruit 1.5—2 in. long, about .12 in. wide. Seeds smooth or obscurely tubercled, tailless.....3. *ceylanica*.
 Leaves narrowed from the middle downwards, 4—6 in. long, .12—4 in. wide. Flowers dioecious. Fruit 1—2 in. long, .12 in. wide. Seeds echinate with a short tail at each end.....4. *Talbotti*.

1. *BLYXA OCTANDRA*, Planch. *B. Roxburghii*, Rich.; F. B. I. v. 660. *Vallisneria octandra*, Roxb. Cor. Pl. t. 165.
In still waters in all Districts.
2. *BLYXA ECHINOSPERMA*, Hook. f.; F. B. I. v. 661.
In still water on the West Coast; S. Kanara (Barber), Cochin (Meebold).
3. *BLYXA CEYLANICA*, Hook. f.; F. B. I. v. 661.
In still water at Udumanparai, Anamalai Hills (Barber), Poombari Valley, Pulney Hills (Bourne).
4. *BLYXA TALBOTTI*, Hook. f.; F. B. I. v. 661.
In still water; Sadras, S. Kanara (Fischer), N. Malabar (Barber).

5. *Ottelia*, Pers.

Submerged fresh-water herbs. *Leaves* radical, crowded, the submerged ones usually different from and narrower than the floating; length of petiole depending on the depth of the water. *Flowers* 2-sexual, solitary, sessile in a tubular, long-peduncled spathe. *Sepals* 3, linear. *Petals* 3, larger. *Stamens* 6—15 in 3—5 whorls, often unequal, some often rudimentary; anthers erect. *Ovary* oblong or fusiform, beaked, sometimes almost 6-celled by the intrusion of the walls; ovules numerous, scattered on the placentæ and walls; styles 6—9, linear. *Fruit* oblong, enclosed in the spathe. *Seeds* numerous.

OTTELIA ALISMOIDES, Pers.; F. B. I. v. 662. *Damasonium indicum*, Willd.; Roxb. Cor. Pl. t. 185.

Common in tanks and sluggish streams in all Districts, sea-level to 3,500 ft.

A flaccid water-herb varying in height with the depth of the water. *Leaves* of 2 kinds; submerged shortly petioled and usually narrow or oblong and tapering to the base, the floating ones oblong or orbicular, cordate or rounded at the base and then narrowed into the angled petiole, up to 7 in. in diam., 7—11-nerved, margins undulate. *Spathe* 5—6-toothed, with 5—6 wavy crisped wings, attenuate or caudate at the base, 1—1.5 in. long, about .75 in. in diam. *Petals* obovate or orbicular with fleshy basal appendages, white. *Ovary* oblong, beaked; styles 2-fid. *Fruit* 6-valved. *Seeds* oblong with a pulpy testa. Vern. *Tel. Nir-veneki*.

6. *Halophila*, Thouars.

Submerged marine plants. *Leaves* in pairs at each node from the axil of a scarious or hyaline scale. *Flowers* solitary or 2 together in a sessile spathe of 2 bracts from between the petioles. *Sepals* 3.

Petals 0. *Stamens* 3; anthers nearly sessile, alternate with the sepals, linear-oblong. *Pistillode* 0. *Ovary* ovoid, long-beaked; ovules many on 2 parietal placentæ; styles 3, filiform, papillose all over. *Fruit* subglobose, beaked, included in the spathe. *Seeds* many, subglobose, testa membranous; embryo thick, with the spiral cotyledons in a cavity at the side.

HALOPHILA OVATA, Gaud.; F. B. I. v. 663.

Along the coast and in back-waters.

A slender, creeping herb. Leaves linear-oblong to ovate, penninerved, up to 3 in. long and .75 in. wide; petiole long, slender. ♂ flowers pedicelled; ♀ sessile. Sepals minute.

Family CXLVII. BURMANNIACEAE.

Small erect herbs. *Leaves* chiefly radical, linear, entire or reduced to scales or 0. *Flowers* 2-sexual, regular, solitary or spicate or racemose on one side of a forked cyme, each opposite a bract. *Perianth* superior, persistent, corolline, 6- or 3-lobed, lobes valvate. *Anthers* 3 or 6, included, 2-celled, sessile or subsessile on the perianth. *Ovary* inferior, 3-celled or 1-celled with 3 parietal placentæ; ovules numerous; style 1, short; stigmas various. *Fruit* capsular, sometimes dehiscent irregularly. *Seeds* numerous, minute, testa reticulate; albumen scanty; embryo minute.

Burmammia, Linn.

Annual herbs. *Leaves* ensiform, acuminate, radical, often reduced to scales or 0. *Flowers* 1, few or many, unilateral on the branches of a forked cyme. *Calyx-tube* winged or angled, wings narrow or orbiculate, 3-lobed. *Petals* smaller or 0. *Anthers* 3, sessile or subsessile, cells short, separated by a broad connective, dorsally crested. *Ovary* 3-celled; style 3-lobed.

Plant leafy, robust; radical leaves many, ensiform, acute, 1—3 in. long, .25—5 in. wide; flowers .5—75 in. long, secund on the branches of an erect, forked cyme

1. *disticha*.

Plant leafless or nearly so, slender; radical leaves, when present, scale-like, .2—7 in. long; flowers .25—5 in. long, solitary or 2—6 together.....2. *coelestis*.

1. BURMANNIA DISTICHA, Linn.; F. B. I. v. 664.

Vizagapatam District at Ventala, 4,500 ft. (A. W. Lushington).

Up to 18 in. high; leaves radical and clothing the stem, gradually reduced upwards to lanceolate bracts .65—1.5 in. long; flowers bright blue.

2. BURMANNIA COELESTIS, Don.; F. B. I. v. 665. *B. pusilla*, Thw.; F. B. I. 665. *B. candida*, Griff. MSS. ex Hook. f. F. B. I. v. 665.

Mahendragiri (Fischer) and on the West Coast from low elevations (Nedungayam in S. Malabar at 150 ft.—Fischer) up to about 7,000 ft. in the W. Ghâts from Mysore to Travancore.

A slender variable herb 3—15 in. high with 1—5 or 6 small blue flowers and with or without small ensiform radical leaves. The variation appears to be due greatly to the conditions under which it grows, especially the degree of moisture.

Family CXLVIII. ORCHIDACEAE.

Epiphytic or terrestrial herbs, rarely shrubby, sometimes scandent; often tuberous rooted; leafy or leafless. *Leaves* various. *Inflorescence* lateral or terminal. *Flowers* hermaphrodite, from minute to large and showy, solitary or more usually spicate or racemose, sometimes paniced. *Perianth* superior, irregular, of 6 free or variously combined segments in 2 alternating whorls. *Calyx* of 3 similar or dissimilar sepals, 1 dorsal and 2 lateral, the latter often united and forming a basal sac or spur (*mentum*). *Petals* 3, the 2 lateral alike, the third (*lip*) dissimilar. *Stamens* and *style* united into a long or short column opposite the lip, the top sometimes produced towards the lip in a beak (*rostellum*). *Anther* usually single (2 in *Paphiopedilum*) on the front, top or back of the column, 2- or 4-celled, pollengrains usually cohering in each cell into 1, 2 or 4 pairs of oblong, globose or pyriform, waxy or powdery masses (*pollinia*), which are free or adnate in pairs or fours, with or without a stalk (*caudicle*) to a gland. *Ovary* inferior, usually linear and twisted half a turn so that the lip appears inferior, 1-celled; ovules minute; stigma one or two viscid spots on the top or concave face of the column facing the lip and below the anther, sometimes stalked. *Capsule* usually opening by 3 or 6 longitudinal fissures, fruit rarely fleshy and indehiscent. *Seeds* very many, minute; testa lax, enclosing a homogeneous nucleus.

(This key is adapted for use only for the genera and species included in this flora.)

Epiphytic plants:—

Leaves equitant:—

Stem very short, leaves tufted; scape terminal; spike elongate, many-flowered
1. *Oberonia*.

Stem elongate, leaves imbricating throughout; spike short, terminal and lateral,
few-flowered.....37. *Podochilus*.

Leaves not equitant:—

Flowers 2 in. long or longer.....13. *Thunia*.

Flowers 1.5 in. long or shorter:—

Lip not spurred, though base sometimes saccate:—

Flowers with a mentum:—

Mentum formed by the lateral sepals and the foot of the column:—

Column short, straight, not winged:—

Rhizome long, annulate, stem nodose, bearing uninodal pseudobulbs
4. *Desmotrichum*.

Rhizome short, stemless with a single pseudobulb or pseudobulbs
plurinodal.....5. *Dendrobium*.

Column rather long, incurved, more or less winged

8. *Chrysoglossum*.

Mentum formed by the lip and the foot of the column...26. *Kingiella*.

Flowers without a mentum:—

Column with a distinct foot:—

Lip clawed, jointed to the foot and more or less mobile:—

Scape lateral, flowers not paniced:—

Sepals subequal.....6. *Bulbophyllum*.

Dorsal sepal much shorter than the lateral (rarely half as long)

7. *Cirrhopetalum*.

Scape terminal, flowers paniced.....23. *Polystachya*.

Lip sessile, not jointed or mobile:—

Pseudobulbs discoid; sepals connivent at the base, lateral, at least,
connate.....9. *Porpax*.

Pseudobulbs not discoid; sepals free.....10. *Eria*.

- Column without a foot:—
 Bracts imbricating, convolute, almost concealing the flowers
 17. *Pholidota*.
- Bracts not imbricate nor concealing the flowers:—
 Lip not lobed:—
 Leaves flat:—
 Scape terminal; column long.....3. *Liparis*.
 Scape lateral; column very short.....38. *Thelasia*.
 Leaves terete.....24. *Luisia*.
 Lip more or less 3-lobed:—
 Stem very short or 0; leaves basal or from the apex of a
 pseudobulb:—
 Flowers paniced.....15. *Josephia*.
 Flowers simply racemed:—
 Apex of leaves entire.....16. *Coelogyne*.
 Apex of leaves 2-lobed.....21. *Cymbidium*.
 Stem elongate; leaves distichous.....25. *Cottonia*.
- Lip-spurred:—
 Lip with a single conical or saccate spur:—
 Plant leafless, at least when flowering:—
 Column with a distinct foot bearing the lateral sepals
 28. *Chilochista*.
 Column without a foot.....35. *Taeniophyllum*.
 Plant leafy:—
 Foot of column distinct, usually long.....29. *Aerides*.
 Foot of column 0 or indistinct:—
 Spur vertically septate almost to the mouth.....33. *Sarcanthus*.
 Spur not septate:—
 Spur distant from the base of the lip.....27. *Rhynchostylis*.
 Spur at the base of the lip:—
 Mouth of the spur open:—
 Sepals and petals distinctly narrowed to the base...30. *Vanda*.
 Sepals and petals not distinctly narrowed to the base:—
 Slender plants; leaves not thickly coriaceous; spur as long
 as or longer than the rest of the lip.....31. *Saccolabium*.
 Robust plants; leaves thickly coriaceous; spur shorter than
 the rest of the lip.....32. *Acampe*.
 Mouth of the spur almost closed by a horizontal plate from
 the back wall.....34. *Cleisostoma*.
 Lip with 2 small collateral spurs.....36. *Diplocentrum*.
- Terrestrial plants:—
 Leafy plants:—
 Climbing, fleshy plants.....39. *Vanilla*.
 Not climbing plants:—
 Flowers without spur or mentum:—
 Inflorescence lateral from the stem:—
 Racemes few-flowered, flowers gibbously jug-shaped, yellow and red;
 column short, foot long.....12. *Acanthophippium*.
 Panicles many-flowered, flowers not gibbous nor jug-shaped, greenish-
 white; column long, foot short.....40. *Corymborchis*.
 Inflorescence terminal on the stem or direct from the rhizome or
 pseudobulb:—
 Lip superior:—
 Spike glabrous:—
 Column very short, entire.....2. *Microstylis*.
 Column long, margined or winged towards the apex.....3. *Liparis*.
 Spike glandular-pubescent.....48. *Hetaeria*.
 Lip inferior:—
 Spike conspicuously spirally twisted.....44. *Spiranthes*.
 Spike straight:—
 Leaf single, often appearing after the flowers:—
 Leaf narrow, flowers glandular-pubescent
 11. *Pachystoma*.

- Leaf cordate or orbicular, flowers glabrous
- Leaves 2 or more, appearing with the flowers:—
- Flowers 1 in. long or longer:—
- Flowers red, glabrous; lip triangular-ovate, disk with 3—5 lamellae.....19. *Arundina*.
- Flowers greenish, pubescent; lip narrowly oblong below, lanceolate above, base warted, not lamellate.....53. *Epipactis*.
- Flowers not more than .5 in. long:—
- Lip entire:—
- Scape from the rootstock, raceme decurved
- Scape terminating the leafy stem, raceme erect
- Lip lobed:—
- Lip saccate at the base:—
- Sepals connate to the middle in a tube
- Sepals free.....45. *Cheirostylis*.
- Lip not saccate at the base, T- or Y-shaped
59. *Disperia*.
- Flowers spurred or with a mentum:—
- Lip not large nor shoe-shaped:—
- Spur 0 or single:—
- Scape lateral:—
- Spur longer than the sepals, lip adnate to the top of the column
18. *Calanthe*.
- Spur 0 or shorter than the sepals, lip adnate to the base of the column:—
- Lateral sepals connate into a mentum with the base of the lip:—
- Column 2-auricled or lobed about the middle
8. *Chrysoglossum*.
- Column not auricled nor lobed.....14. *Tainia*.
- Lateral sepals free, not connate with the lip.....20. *Eulophia*.
- Raceme or spike terminal:—
- Lip superior.....41. *Tropidia*.
- Lip inferior:—
- Lip lobed:—
- Root not tuberous:—
- Lateral sepals free, spur exerted beyond the bases of the sepals.....42. *Anoechtochilus*.
- Lateral sepals connate, concealing the small spur
43. *Odontochilus*.
- Root of 1 or 2 simple or lobed tubers:—
- Sepals subequal and more or less connivent.....55. *Peristylus*.
- Sepals unequal, the lateral spreading or reflexed:—
- Flowers less than 1.3 in. in diameter, stigmas distinctly stalked.....54. *Habenaria*.
- Flowers 2 in. in diameter or more; stigma sessile
56. *Platanthera*.
- Lip entire, obcordate.....57. *Phyllophax*.
- Spurs 2 from the back of the superior lip.....58. *Satyrium*.
- Lip large, shoe-shaped.....60. *Paphiopedilum*.
- Leafless plants without chlorophyll:—
- Lip clawed.....49. *Aphyllorchis*.
- Lip sessile:—
- Lateral sepals connate.....51. *Didymoplexis*.
- Lateral sepals free.....52. *Epipogon*.

1. *Oberonia*, Lindl.

Small tufted epiphytes. *Leaves* distichous, equitant, coriaceous or fleshy, usually ensiform. *Flowers* minute in dense or interrupted

subcylindric spikes or racemes. *Sepals* subequal, ovate or oblong. *Petals* smaller. *Lip* sessile, concave, entire or 2—4-lobed, sometimes erose. *Column* very short. *Anther* terminal, incumbent; pollinia 4, waxy, cohering by a viscus.

Lip of corolla toothed. *Leaves* broadly ensiform, 3—8 in. long; *spikes* slender up to 12 in. long, *flowers* and *capsules* sessile; *lip* more or less quadrate, tip broadly 2-fid.....1. *iridifolia*, var. *denticulata*.

Lip not toothed, subentire or 3-lobed:—

Petals broad, elliptic-oblong or ovate:—

Lip truncate, not lobed. *Leaves* ensiform, acute, 1—2.5 in. long; *racemes* about twice as long; *flowers* numerous, sunk in pits in the rhachis; *sepals* and *petals* reflexed on the ovary; *lip* subquadrate with an obscure rounded auricle at each side of the base.....2. *Proudlockii*.

Lip obcordate or 3-lobed:—

Side lobes of *lip* undeveloped:—

Lip twice as long as the *sepals*, obcordate with rounded lobes separated by a narrow sinus, *side lobes* absent. *Leaves* narrow-ensiform, acute, or acuminate, 2—5.5 in. long; *racemes* slender, long; *flowers* pedicelled, usually whorled.....3. *verticillata*.

Lip only slightly longer than the *sepals*, oblong with 2 short, narrow, acute lobes separated by a broad sinus; *side lobes* small, rounded or tooth-like. *Leaves* broadly ensiform, acute, 1—3 in. long; *racemes* rather stout; *flowers* shortly pedicelled, not whorled.....4. *Falconeri*.

Side lobes of *lip* broad or long:—

Leaves 6—18 in. long, coriaceous, acuminate; *spike* dense-flowered, shorter than the *leaves*; *lip* broad, rounded, mid-lobe obcordate.....5. *ensiformis*.

Leaves 1—2 in. long, acuminate; *spike* dense-flowered, 2—3 in. long; *lip* erose, lateral lobes rounded, midlobe 2-fid.....6. *recurva*.

Petals linear:—

Lip quadrate, entire or obscurely lobed at the outer angles. *Leaves* linear-ensiform, obtuse, up to 6 in. long; *scape* about as long as the *leaves*, flattened, usually with a small adnate leaf about the middle; *flowers* shortly pedicelled, loosely imbricated.....7. *zeylanica*.

Lip distinctly lobed:—

Scape adnate to the upper leaf:—

Lip orbicular with a 2-lobed apical auricle. *Leaves* ensiform, up to 12 in. long, acute; *spike* stout, flattened, *flowers* sessile, densely imbricated; *lip* with a concave disk.....8. *Brunomiana*.

Lip with broad rounded lateral lobes and a short 2—3-fid midlobe. *Leaves* ensiform, up to 12 in. long; *scape* flat, very broad, adnate to the upper leaf to the top; *flowers* sessile, about 2 in. in diam. (the largest of the genus in India), densely imbricated.....9. *platycaulon*.

Scape not adnate to the upper leaf:—

Midlobe of *lip* much smaller than the lateral lobes, broad. *Leaves* ensiform, obtuse, 3—6 in. long; *scape* stout, flattened; *flowers* sessile, densely imbricated; *lip* broadly 3-lobed, crenate, gland-dotted.....10. *Lindleyana*.

Midlobe of *lip* much longer than the lateral, narrow. *Leaves* linear-oblong or narrow-ensiform, acute, 1.5—5 in. long; *scape* terete, *racemes* slender, longer than the *leaves*; *flowers* shortly pedicelled, whorled or loosely imbricated; lateral lobes of *lip* large, oblong or rounded; midlobe narrow with diverging lobes, sometimes minutely toothed at the ends

11. *Wightiana*.

1. OBERONIA IRIDIFOLIA, Lindl. var. DENTICULATA, Hook. f.; F. B. I. v. 676. *O. denticulata*, Wt. Ic. t. 1625.

W. Gháts; Rampa Hills (Gamble).

Flowers dull-orange.

2. OBERONIA PROUDLOCKII, King & Pantl.

Nilgiri Hills near Gudalur (Proudlock).

Flowers reddish-brown.

3. *OBERONIA VERTICILLATA*, Wt. Ic. t. 1626; F. B. I. v. 677.
W. Gháts; Salem Hills (Bourne).
Sepals pale-green, petals and lip dull-orange.
4. *OBERONIA FALCONERI*, Hook. f.; F. B. I. v. 678; Duthie Ann. Calc. ix. 2. t. 94.
Mysore Hills at 3,500 ft. (Meebold); Rampa Hills at 2,000 ft. (V. Narayanswami), Vizagapatam Hills at 2,400 ft. (A. W. Lushington).
Flowers greenish-yellow.
5. *OBERONIA ENSIFORMIS*, Lindl.; F. B. I. v. 679; King & Pantl. Ann. Calc. viii. t. 9.
W. Gháts; Rampa Hills (Gamble, V. Narayanswami), Vizagapatam Hills, 2,500—4,000 ft. (A. W. Lushington).
Flowers orange-yellow.
6. *OBERONIA RECURVA*, Lindl.; F. B. I. v. 680.
Travancore (M. Rama Rao).
Flowers green.
7. *OBERONIA ZEYLANICA*, Hook. f.; F. B. I. v. 680.
Anamalai Hills at 4,000 ft. (Fischer).
Flowers pale.
8. *OBERONIA BRUNONIANA*, Wt. Ic. t. 1622; F. B. I. v. 681.
W. Gháts.
Sepals and lip dark-brownish, petals pale-yellowish.
9. *OBERONIA PLATYCAULON*, Wt. Ic. t. 1623; F. B. I. v. 682.
Nilgiri and Pulney Hills.
Flowers whitish or pale-yellow.
10. *OBERONIA LINDLEYANA*, Wt. Ic. t. 1624; F. B. I. v. 681.
W. Gháts.
Flowers straw-coloured, lip dull-orange.
11. *OBERONIA WIGHTIANA*, Lindl.; F. B. I. v. 683; Wt. Ic. t. 1627. *O. Arnottiana*, Wt. Ic. t. 1628.
W. Gháts.
Flowers pale yellowish-green.

2. *Microstylis*, Nutt.

Terrestrial or epiphytic herbs, pseudo-bulbous or not. *Leaves* 1 or more, continuous with their sheaths. *Flowers* small, in terminal racemes, resupinate. *Sepals* spreading or recurved. *Petals* as long as but narrower than the sepals. *Lip* adnate to the base of the column, usually flat, sides often produced upwards beyond the column. *Column* very short with short spreading apical arms. *Anther* subterminal; pollinia 4.

Sides of lip produced upwards into large acute or obtuse auricles, apex notched. Herb 3—12 in. high; stem 1—3 in. long; leaves several, ovate or lanceolate, acute, 2—6 in. long; bracts shorter than the ovary.....1. *Wallichii*.
Sides of lip not produced upwards into auricles, apex pectinate:—

Lip obovate or reniform:—

- Stem stout, 3—6 in. long; root without pseudobulb; leaves 3—5, petioled, broadly ovate or elliptic, acute, 3—7 in. long.....2. *versicolor*.
Stem slender, short, root pseudobulbous; leaves 2, rarely 3, sessile or nearly so, ovate to lanceolate, acute or obtuse, 1—3 in. long; racemes dense-flowered
3. *densiflora*.

Lip widely fan-shaped. Stem stout or slender, 2—4 in. long; leaves 2—3, shortly petioled, broadly ovate or ovate-lanceolate, acute or acuminate, 1·5—4 in. long; flowers comparatively large; lip rather deeply pectinate.....4. *Stocksii*.

1. *MICROSTYLIS WALLICHI*, Lindl.; F. B. I. v. 686; Hook. f. Ann. Calc. v. t. 2; King & Pantl. Ann. Calc. viii. t. 18.
W. Gháts; Pykara, Nilgiris (Barber), Anamalais (Beddome).
A terrestrial herb; flowers purplish or yellowish.
2. *MICROSTYLIS VERSICOLOR*, Lindl. *M. Rheedii*, Wt. Ic. t. 902; F. B. I. v. 690.
W. Gháts from 6,000 ft. upwards.
A terrestrial herb; flowers greenish-yellow or purplish.
3. *MICROSTYLIS DENSIFLORA*, Fischer n. comb. *M. versicolor*, Wt. Ic. t. 901; F. B. I. v. 691. *M. luteola*, Wt. Ic. t. 1632; F. B. I. v. 691.
W. Gháts at high elevations.
Very like *M. versicolor*, Lindl., but smaller and more slender and the root always bulbous.
4. *MICROSTYLIS STOCKSII*, Hook. f.; F. B. I. v. 691.
W. Gháts at high elevations.
A terrestrial herb; flowers yellow.

3. *Liparis*, L. C. Rich.

Terrestrial or epiphytic herbs, often pseudobulbous. *Leaves* 1 or more, often jointed on the sheath or pseudobulb. *Flowers* small or minute, in terminal racemes, resupinate. *Sepals* spreading, recurved or revolute, margins often revolute. *Petals* as long, very slender. *Lip* adnate to the base of the column, usually broad, deflexed from a very short base, or recurved. *Column* long, usually incurved, margined or winged towards the tip. *Anther* terminal; pollinia 4.

Leaves membranous, continuous with the sheath or pseudobulb:—

Stems slender, short:—

Lip broad, entire:—

Lip orbicular-obovate, column short, thick. Leaves 2, ovate or ovate-lanceolate, acute, 4 in. long, 3 in. wide; scape and raceme up to 12 in. long; bracts lanceolate, acuminate, as long as the pedicel; lip shortly clawed, margin crenulate; column short, thick, with long, narrow, obtuse wings.....1. *platyphylla*.

Lip orbicular or orbicular-oblong; column long, slender, sigmoidally incurved:—

Leaves 2, ovate-lanceolate, acuminate, 1·5—2 in. long; scape and raceme 2—4 in. long; bracts lanceolate, $\frac{2}{3}$ the length of the pedicel and ovary; lip with 2 minute calli, margin entire; column very obscurely winged

2. *Wightiana*.

Leaves 2, ovate-lanceolate, acuminate, 1 in. long, .5 in. wide; scape and raceme slender, 2 in. long; bracts minute, $\frac{1}{3}$ length of pedicel and ovary; column very slender, arcuate, minutely winged.....3. *Beddomei*.

Lip cuneate, 2-lobed; leaves 2—3, ovate, acute, 1 in. long, .5—7 in. wide, they and the stem often purple; scape and raceme about 1·5 in. long; lip shortly clawed, with 2 basal tubercles, lobes oblong or lanceolate, obtuse; column slender, curved, with small obtuse wings.....4. *biloba*.

Stems stout, 2—5 in. long:—

Leaves 2—5, lanceolate or elliptic-lanceolate, acuminate, 2·5—5 in. long, .6—1·75 in. wide; stem slightly bulbous at the base; scape angular, with the raceme 4—10 in. long; flowers about .33 in. across; lip cuneately obovate or subquadrate, usually recurved, tip truncate or slightly obcordate

with a minute apiculus, with 2 basal calli; column incurved with 2 small rounded wings.....5. *nervosa*.

Leaves ovate or orbicular, lip not cuneate:—

Leaves 2—3, acute or acuminate, 2—7 in. long, 1·5—4 in. wide, base equilateral; scape and raceme 3—6 in. long; flowers about ·25 in. across; lip orbicular, recurved, crenulate, base contracted, 2-tubercled; column incurved with hooked wings.....6. *Walkeriae*.

Leaves 3—4, acute or acuminate, 2—7 in. long, 1·5—4·5 in. wide, base very oblique, one side rounded or auricled and the other acute; scape and raceme 4—9 in. long; flowers about ·33 in. across, lip orbicular-obovate, recurved, crenulate, base contracted and with 2 large tubercles; column very slender, curved, with rounded wings.....7. *atropurpurea*.

Leaves usually coriaceous, jointed on the sheath or pseudobulb:—

Leaf solitary on the pseudobulb:—

Leaf linear-lanceolate, acute, 2—4 in. long, 2—5 in. wide; scape and raceme 3—6 in. long; flowers about ·12 in. across; lip broadly oblong, recurved, rounded, entire or notched, base 2-auricled; column short, stout, obscurely winged.....8. *pusilla*.

Leaf elliptic- or linear-lanceolate, acute, 1·75—2 in. long, 1·5—2·5 in. wide; scape and raceme 1—2 in. long, flowers ·06 in. across; lip quadrately-oblong, recurved, truncate-crenate, base hardly auricled; column short, curved, obscurely winged.....9. *Duthiei*.

Leaves 2—4:—

Leaves 2; lip as long as the lateral sepals or nearly so:—

Leaves narrowly obovate-oblong or oblanceolate, acute or acuminate, 4—12 in. long, 1·7—1·25 in. wide; scape and raceme 6—10 in. long, naked below or with 1 or 2 ensiform bracts; flowers about ·08 in. across; lip broadly ovate, subacute, recurved; column with rounded, unappendaged wings.....10. *longipes*.

Leaves narrowly elliptic-lanceolate or oblanceolate, 2—5 in. long, 6—9 in. wide; scape and raceme 4—6 in. long, with several filiform bracts on the scape; pedicels recurved; flowers about ·15 in. across; lip orbicular-ovate, recurved, subacute, very obscurely 3-lobed; column short, incurved, unappendaged.....11. *viridiflora*.

Leaves 3—4; lip minute, much shorter than the sepals; pseudobulbs tufted, 0·5—1 in. long; leaves linear-lanceolate, acuminate, 1·3—5 in. long, 2—4 in. wide; scape and raceme up to 9 in. long, with many bracts about ·33 in. long on the scape; flowers 25—35 in. across; lip broadly ovate-oblong, basal lobes rounded, 2-tubercled, tip broad, rounded; column broadly winged, wings with a capillary tail.....12. *resupinata*.

1. *LIPARIS PLATYPHYLLA*, Ridl. ; F. B. I. v. 695.

Anamalai Hills, 3,500 ft. (Beddome).

A small terrestrial herb.

2. *LIPARIS WIGHTIANA*, Thw. ; F. B. I. v. 695. *L. atropurpurea*, Wt. Ic. t. 904.

Pulney Hills, 6,000 ft. (Wight, Anglade); Travancore (Beddome); High Wavy Mountains (Blatter & Hallberg).

A small, delicate, pseudobulbous, terrestrial herb; flowers white, lip dull-purple, or whole flower purple.

3. *LIPARIS BEDDOMEI*, Ridl. ; F. B. I. v. 695.

Shembaganur, Pulney Hills at 5,000 ft. (Beddome).

Lip green with a purple disk spot.

Very like and doubtfully separable from the last species.

4. *LIPARIS BILOBA*, Wt. Ic. t. 1633; F. B. I. v. 699.

Nilgiri Hills (Wight, King).

A small, pseudobulbous, terrestrial herb. The whole plant often purplish; flowers very dark purple.

5. LIPARIS NERVOSA, Lindl. *L. paradoxa*, Reichb. f.; F. B. I. v. 697 and vi. 181; King & Pantl. Ann. Calc. viii. t. 34.
Nilgiris and Anamalai Hills at 3,000 ft. (Beddome).
A pseudobulbous terrestrial herb 6—15 in. high; flowers green, tinged with pink or yellow-brown.
6. LIPARIS WALKERIAE, Grah.; F. B. I. v. 698.
W. Gháts, 6,000—7,500 ft.
A pseudobulbous, terrestrial herb; flowers pale- to dark-purple, lip with a yellowish margin.
7. LIPARIS ATROPURPUREA, Lindl.; F. B. I. v. 698. *L. olivacea*, Wt. Ic. t. 903. *L. Walkeriae*, Wt. Ic. t. 905.
W. Gháts at high elevations.
A pseudobulbous terrestrial herb; flowers dark vinous-purple.
8. LIPARIS PUSILLA, Ridl.; F. B. I. v. 701; King & Pantl. Ann. Calc. viii. t. 41.
Anamalai Hills (Beddome); Peermade in Travancore at 4,500 ft. (Meebold).
A small, pseudobulbous, epiphytic herb; flowers white.
9. LIPARIS DUTHIEI, Hook. f.; F. B. I. v. 701; King & Pantl. Ann. Calc. viii. t. 42.
Nilgiri Hills (Proudlock).
A very small, pseudobulbous, epiphytic herb; flowers yellowish.
10. LIPARIS LONGIPES, Lindl.; Wall. Pl. As. Rar. t. 196; F. B. I. v. 703; Wt. Ic. t. 906; King & Pantl. Ann. Calc. viii. t. 37.
Courtallam (Wight); Cochin (Johnson); Peermade at 4,500 ft. (Meebold); Shevaroy Hills (Bourne); Tinnevely Hills (Beddome); Coorg (Bourne).
A pseudobulbous, epiphytic herb; flowers white, lip yellow.
11. LIPARIS VIRIDIFLORA, Lindl.; F. B. I. v. 704; King & Pantl. Ann. Calc. viii. t. 47. *L. elliptica*, Wt. Ic. t. 1735.
Nilgiri Hills (Wight); Pulney Hills (Bourne); High Wavy Mountains (Blatter & Hallberg).
A pseudobulbous, epiphytic herb; flowers white, yellowish or green.
12. LIPARIS RESUPINATA, Ridl.; F. B. I. v. 705; King & Pantl. Ann. Calc. viii. t. 48.
Nilgiri Hills (Wight).
A small epiphytic herb; flowers yellow.

4. Desmotrichum, Blume.

Epiphytic herbs with annulate creeping rhizomes and pendulous nodose stems bearing narrowly fusiform uninodal pseudobulbs at irregular intervals. *Leaves* sessile, terminal on the pseudobulbs, solitary or paired. *Flowers* fugaceous, 1—3 together from near the base of the leaf. *Bracts* scarious. Lateral *sepals* adnate to the foot of the column to form a mentum. *Lip* narrowed at the base, lobed; apex expanded, more or less fimbriate or sinuate.

DESMOTRICHUM FIMBRIATUM, Blume. *Dendrobium Macraei*, Lindl.; F. B. I. v. 714; Ann. Calc., King & Pantl. viii. t. 86.

W. Gháts.

Stems smooth and polished, up to 3 ft. long; pseudobulbs 1—2.5 in. long, shining; leaves linear-oblong, obtuse, 2—8 in. long; flowers .75—1 in. long, white or pinkish and speckled with red, the midlobe of the lip greenish-yellow.

5. *Dendrobium*, Swartz.

Epiphytic herbs. Stems elongate nodose or of pseudobulbs; pseudobulbs basal or on the stem, uni- or pluri-nodal. *Leaves* sessile, never plicate; bases sheathing, arising from the top of the pseudobulb or from the nodes of the stem. *Flowers* solitary, fascicled or in racemes from the top of the pseudobulbs or axillary, often large. *Sepals* subequal, the lateral adnate to the foot of the column to form a mentum. *Petals* similar. *Lip* sessile, contracted at the base, rarely clawed, adnate to and incumbent on the foot of the column; side lobes, if present, embracing the column or spreading; terminal lobe various, its disk often lamellate. *Column* short, angled or 2-toothed at the top, foot usually long. *Anther* 2-celled: pollinia 4, free or nearly so, ovoid or oblong, compressed, waxy.

Stemless; leaves from the top of a uninodal pseudobulb:—

Pseudobulb ovoid, .5—.75 in. long; leaves usually 2, rather thick, oblong-lanceolate, acute, 2—3 in. long, .25—.7 in. wide; flowers 4—10 in a raceme from the top of the pseudobulb; scape slender, 1—3 in. long; bracts equalling the pedicel and ovary combined; lip suborbicular, 3-lobed, side lobes small, subacute, midlobe truncate or slightly emarginate, crenulate, disk 2-keeled; keels fleshy, apiculate.....1. *microbulbon*.

Pseudobulb ovoid, .25—.5 in. long; leaves 2—4, elliptic-lanceolate, obtuse or subacute, 1—2.5 in. long, .2—.5 in. wide; flowers 8—10 in a raceme; scape slender, 1.5—3 in. long from the top of the pseudobulb; bracts shorter than the pedicels; lip long-clawed, limb suborbicular, serrulate, side lobes small, midlobe rounded, disk with a broad, depressed, fleshy, truncate ridge

2. *nanum*.

Stems elongate, plurinodal; pseudobulbs 0 or on the stem; leaves from the nodes:—

Flowers in elongate, few- to many-flowered racemes:—

Racemes very slender, usually few-flowered:—

Rhizome small, stem flexuous; leaves linear-lanceolate, acute, 2—4 in. long; sheaths usually broad and lax; racemes mostly axillary, flexuous, usually longer than the leaves; flowers .5 in. long; side lobes of lip acute, midlobe rounded, crenate, disk with a channelled ridge ending in a fleshy callus

3. *Heyneanum*.

Rhizome slender, creeping; stem slender, straight; leaves narrowly linear, acute, 1—3 in. long; sheaths narrow, closely embracing the stem; racemes all terminal, usually straight and shorter than the leaves; flowers .3—.5 in. long; side lobes of lip small, spreading, midlobe oblong, crenate, disk flat

4. *graminifolium*.

Racemes stout, many-flowered:—

Leaves lanceolate or oblong-lanceolate, acute, 2—4 in. long, .25—.5 in. wide; flowering shoots leafless; racemes lateral and terminal; flowers 4—6 in. long; bracts ovate, acute, scarious; lateral sepals oblong-lanceolate, subacute, dorsal oblanceolate, obtuse, mentum acute, .2 in. long, lip flat, side lobes small, rounded, midlobe large, subquadrate, disk with a channelled ridge, pubescent.....5. *ovatum*.

Leaves lanceolate, acute, 3—4 in. long, .5 in. wide; flowering shoots leafless; racemes lateral and terminal; flowers about 1 in. long; bracts very small, lanceolate, scarious; lateral sepals lanceolate, acute, slightly falcate, dorsal

linear-lanceolate, acute, mentum acute, .33 in. long, lip flat, 3-lobed, side lobes obtuse, midlobe rhomboid-ovate, acute or apiculate, bearded at the base with yellow hairs.....6. *barbatulum*.

Flowers solitary, fascicled or in very short racemes:—

Flowers racemed:—

Stems pendulous, copiously branched, polished and shining, naked below; branchlets leafy; leaves narrowly linear-lanceolate, acute or subobtusely, 1—4.5 in. long, .2—5 in. wide; racemes terminal, rarely reaching 1 in. long, 2—3-flowered; bracts very small, scarious; flowers .25 in. long, sepals oblong-lanceolate, subacute, mentum minute, lip oblong, side lobes 0 or very narrow, midlobe ovate, entire, subacute.....7. *herbaceum*.

Stems simple, tufted; racemes lateral:—

Stems erect, clavate or swollen above:—

Stems clavate or narrowly fusiform, elongate; leaves elliptic-oblong to elliptic-lanceolate, acute, apex minutely obliquely bifid, 1.5—3.5 in. long, .4—1 in. wide; sheaths glabrous; flowers .3—4 in. long, crowded, capitate on a short lateral rhachis or in a subterminal raceme; peduncle short, sheathed; bracts as long as and sheathing the short pedicel and the ovary; sepals and petals subequal, concave, mentum urceolate, lip small, fleshy, concave, broad-triangular, 3-lobed, side lobes triangular, acute, erect, midlobe very small, truncate.....8. *bicameratum*.

Stems slender below, slightly swollen above; leaves coriaceous, linear-lanceolate to linear-oblong, acute or obtuse, more or less deeply cleft at the apex, 1—3 in. long, .2—4 in. wide; sheaths (at least the upper) nigro-hirsute; flowers .7—1.3 in. long, 2—4, in short leaf-opposed racemes; peduncle not sheathed; bracts minute, much shorter than the filiform pedicel; sepals and petals linear-lanceolate, acute, mentum conical, half as long as the sepals, lip fleshy, as long as the sepals, linear-oblong, side lobes small, midlobe elongate, margins crisped.....9. *nutans*.

Stems many, pendulous, terete, usually slender; leaves membranous, linear-lanceolate to ovate-lanceolate, acute, 2—4 in. long, .4—9 in. wide; flowers .7—1 in. long, in short 2—4-flowered lateral racemes; bracts small, ovate, scarious; pedicels long, slender; sepals and petals equal in length, acute, sepals oblong-lanceolate, petals linear-lanceolate, lip longer, ovate-oblong, long-clawed, finely pubescent, margins crenulate, side lobes small, rounded or nearly absent, mid-lobe quadrately ovate, obtuse...10. *macrostachyum*.

Flowers fascicled or solitary:—

Flowers 2—4 from a leaf-opposed tubercle bursting through the sheath below the mouth; stem pendulous, slender, leafy above the base; leaves rigidly papery, linear; apex oblique, obtuse, 3—5 in. long, .2—3.5 in. wide; sheaths tight, striate; flowers .3—4 in. long, excluding the ovary; pedicels slender, bracts small, cupular; petals as long as, but broader than the sepals, lip tongue-shaped, entire, acute, undulate.....11. *haemoglossum*.

Flowers not on tubercles:—

Lip narrower than long; stems subclavate, suberect, ribbed except the slender polished 1 or 2 lowest internodes; leaves narrowly oblong-lanceolate, apex oblique, subacute, 3—5 in. long, .5—9 in. wide; flowers 1—3 on a very short peduncle, axillary on the leafless stems, 1.2—1.4 in. long; sepals linear-oblong, acute, petals ovate-lanceolate, acuminate, mentum long, conical, truncate, lip ovate-lanceolate, acute, sides incurved at the base, disk pubescent.....12. *heterocarpum*.

Lip as broad as or broader than long:—

Stems slender, pendulous, leafy below the flowers, usually naked above; leaves lanceolate, acuminate, 2—4 in. long, .5—1.2 in. wide; flowers 2—3 on short peduncles from the node, 1—1.3 in. long; sepals oblong-lanceolate, subacute, petals broader, oblong, mentum conical, lip orbicular, cucullate, pubescent and ciliate, base tubular by the incurving sides.....13. *aphyllum*.

Stems subclavate, compressed, rather thick, decumbent, leafy throughout; leaves ovate-lanceolate, acuminate, 2.5—7 in. long, .5—1.75 in. wide; flowers 2—3 from the leaf axils, 1—1.3 in. long; sepals ovate, subacute, petals obovate, mentum short, obtuse, lip rhombic, pubescent, cross, side lobes small, incurved, midlobe broadly triangular...14. *aqueum*.

1. *DENDROBIUM MICROBULBON*, A. Rich.; F. B. I. v. 716. *D. humile*, Wt. Ic. t. 1643.
W. Gháts.
A small epiphyte 2—4 in. high; sepals and petals white, lip pink with darker veins.
2. *DENDROBIUM NANUM*, Hook. f.; F. B. I. v. 717.
Hills of Mysore and Coorg (Bourne), Nilgiris, Anamalais at 7,500 ft. (Fischer), Shevaroy's (Bourne), High Wavy Mountains (Blatter & Hallberg).
Very similar to the last species; "lip green, turning yellow with age, with 2 median pink-purple patches" (Bourne).
3. *DENDROBIUM HEYNEANUM*, Lindl.; F. B. I. v. 718; Wt. Ic. t. 909.
W. Gháts: Nilgiris, Bolampatti Hills at 4,800 ft. (Fischer), Courtallam (Wight), Tinnevely Hills (Barber).
Stem 4—8 in. high; flowers white.
4. *DENDROBIUM GRAMINIFOLIUM*, Wt. Ic. t. 1649; F. B. I. v. 718.
Anamalai (Beddome), Nilgiri (Wight), Travancore and Tinnevely Hills, near sea-level to 2,000 ft.
Very like the last species. Growing on rocks as well as on trees; flowers white.
5. *DENDROBIUM OVATUM*, Krzl. *D. chlorops*, Lindl.; F. B. I. v. 719. *D. barbatulum*, Wt. Ic. t. 910.
W. Gháts and the West Coast from 150—5,000 ft.
4—20 in. high, the stem sometimes very stout; flowers cream-coloured, lip greenish.
6. *DENDROBIUM BARBATULUM*, Lindl.; F. B. I. v. 719.
W. Gháts from Mysore to Travancore.
6—15 in. high; flowers white, often suffused with pink.
7. *DENDROBIUM HERBACEUM*, Lindl.; F. B. I. v. 719. *D. ramosissimum*, Wt. Ic. t. 1648.
W. Gháts from 2,000—4,000 ft.
Stems 2—3 ft. long; flowers yellow.
8. *DENDROBIUM BICAMERATUM*, Lindl.; F. B. I. v. 729; King & Pantl. Ann. Calc. viii, t. 56.
Mahendragiri in Ganjam at 4,500 ft. (Gamble).
Stems 3—18 in. long; flowers yellow, marked with red.
9. *DENDROBIUM NUTANS*, Lindl.; F. B. I. v. 734; Hook. f. Ann. Calc. v. t. 18. *D. Jerdonianum*, Wt. Ic. t. 1644; F. B. I. v. 734.
Throughout the W. Gháts, 2,000—6,000 ft.
Stems 5—18 in. long; flowers yellow.
Var. *rubrilabris*, Blatter. Flowers white; lip pink, spotted purple, mid-lobe very strongly crisped. High Wavy Mountains (Blatter and Hallberg).
10. *DENDROBIUM MACROSTACHYUM*, Lindl.; F. B. I. v. 735; Wt. Ic. t. 1647.
W. Coast and W. Gháts, up to 7,000 ft.
Leafy stems 1—2 ft. long, flowering stems often much longer; flowers pale-green or yellow often tinged with pink.
11. *DENDROBIUM HAEMOGLOSSUM*, Thw.; F. B. I. v. 727.
Malabar (Jerdon), Wynaad. Rare.
Stems 12—18 in. long; flowers yellow, tip tinged with dark red.

12. *DENDROBIUM HETEROCARPUM*, Wall. Pl. As. Rar. t. 196; F. B. I. v. 737. *D. aureum*, Lindl.; Wt. Ic. t. 1646.
W. Gháts from 3,000—5,500 ft.
Stems 9—18 in. long; flowers white or straw-coloured, disk of lip with 2 red or purple blotches.
13. *DENDROBIUM APHYLLUM*, Fischer n. comb. *D. Picardi*, Roxb.; F. B. I. v. 738; Wt. Ic. t. 908; King & Pantl. Ann. Calc. viii. t. 72. *Limodorum aphyllum*, Roxb.; Cor. Pl. t. 41.
Coromandel (Roxb.), Coorg (Lancaster).
Stems 2—3 ft. long; flowers pale-rose, the lip yellow.
14. *DENDROBIUM AQUEUM*, Lindl.; F. B. I. v. 739. *D. album*, Wt. Ic. t. 1645.
W. Gháts, 3,000—7,000 ft.
Stems 10—20 in. long; flowers white, the lip suffused with pale-yellow.

6. *Bulbophyllum*, Thouars.

Epiphytic herb with 1- (rarely 2-) leaved pseudobulbs on a creeping (rarely lacking) rhizome. *Scapes* from the rhizome, usually close to the pseudobulb. *Flowers* solitary, capitate, umbellate, spicate or racemose. *Sepals* subequal or the lateral slightly longer than the dorsal, not cohering together, adnate to the foot of the column. *Petals* usually distinctly smaller than the dorsal sepal. *Lip* usually tongue-shaped, sessile or clawed, jointed on the foot, mobile, usually small and much recurved. *Column* short, often 2-aristate at the top. *Anther* 2-celled, pollinia 4 (rarely 2).

Flowers umbellate:—

Rhizome stout, pseudobulbs broadly ovoid, .5—7 in. long; leaf elliptic-oblong, 1—3 in. long, obtuse, emarginate, narrowed into a short petiole; scape rather stout, sheaths 2—3; flowers 4—8, .6—75 in. long; sepals lanceolate, acuminate, dorsal $\frac{1}{2}$ shorter, petals elliptic-oblong, rounded, lip clawed, basal angles acute

1. *albidum*.

Rhizome stout; pseudobulbs distant, quadrangular ovoid, .75—1 in. long; leaf linear-oblong, obtuse, 3—4 in. long; scape slender, 3—4 in. long, 4—5-flowered; sepals narrow-lanceolate, long acuminate, .5—6 in. long, dorsal a little shorter, petals elliptic-oblong, about $\frac{1}{2}$ as long as the dorsal sepal.....2. *mysorensis*.

Flowers racemose:—

Lip glabrous with recurved lateral basal auricles:—

Flowers 1 in. or more long; sheaths and bracts large, coloured. Rhizome stout; pseudo-bulbs ovoid, 1—1.5 in. long; leaf oblong, obtuse, 2—7 in. long; scape stout, longer than the leaf; raceme few-flowered, drooping; sepals subequal, ovate-oblong, acuminate, petals very small, ovate, tipped with a capillary awn clavate at the tip, lip sessile, broad, papillose.....3. *fusco-purpureum*.

Flowers .4 in. or less long; sheaths and bracts small, hyaline. Rhizome stout, pseudobulbs ovoid, 1—2 in. long; leaf narrowly elliptic to broadly oblong, 2—6 in. long, rounded or subacute, base narrowed; scape stout, shorter or longer than the leaf; racemes many-flowered, erect; sepals oblong, dorsal broad-ovate, petals triangular-ovate, lip with entire or toothed auricles

4. *neilgherrensis*.

Lip linear-oblong fringed with long hairs, without auricles. Rhizome slender; pseudobulbs subglobose, .4—5 in. in diam.; leaf sessile, ovate-lanceolate, acute or obtuse, 1.5—2 in. long, base rounded; scape slender, very much longer than the leaf; bracts small, narrow; flowers 6—10, about .5 in. long; sepals subequal, linear-lanceolate, ciliate, petals very small, fringed.....5. *tremulum*.

1. *BULBOPHYLLUM ALBIDUM*, Hook. f.; F. B. I. v. 757. *Cirrhopetalum albidum*, Wt. Ic. t. 1653.
W. Gháts.
Flowers cream-coloured, freckled with pale-brown.
2. *BULBOPHYLLUM MYSORENSE*, J. J. Smith.
Hills of Mysore.
Flowers nearly white, the lip purple.
3. *BULBOPHYLLUM FUSCO-PURPUREUM*, Wt. Ic. t. 1651; F. B. I. v. 760.
W. Gháts.
Flowers dark purple.
4. *BULBOPHYLLUM NEILGHERRENSE*, Wt. Ic. t. 1650; F. B. I. v. 761.
W. Gháts.
Flowers brownish-yellow or greenish-purple.
5. *BULBOPHYLLUM TREMULUM*, Wt. Ic. t. 1749 (excluding insertion of scape on the apex of the pseudobulb); F. B. I. v. 763.
Coorg (Jerdon), Agalhatti in Mysore at 3,500 ft. (Meebold), Nilgiri and Anamalai Hills (Beddome).
Flowers yellow passing to purple at the tips, lip purple.

7. *Cirrhopetalum*, Lindl.

Epiphytic herbs with 1-leaved pseudobulbs from a usually creeping rhizome. *Scapes* from the rhizome close to the pseudobulb. *Flowers* umbelled or very shortly racemed. *Sepals* markedly unequal, dorsal concave, ovate, acute, lateral rarely less than twice as long, acuminate, twisted to bring the outer margins together and usually coherent, at least towards the apex even though separated below, bases adnate to the sides of the column or its foot. *Petals* shorter or longer than the dorsal sepal. *Lip* short, tongue-shaped, recurved, jointed to the foot and very mobile. *Column* very short, 2-aristate at the top, foot upcurved.

Flowers umbelled, rarely reduced to 1 or 2 flowers:—

Dorsal sepal and petals fimbriate. Rhizome short; pseudobulbs clustered, ovoid, angular, about .5 in. long; leafless when flowering; leaf oblong-lanceolate, acute, 3—5 in. long, scape slender, 2-8 in. long, sheaths 2—3; flowers numerous; lateral sepals linear, acute, 1—1.25 in. long, cohering, dorsal .25 in. long, ovate with a long tail, petals .12 in. long.....1. *fimbriatum*.

Dorsal sepal and petals glabrous, quite entire:—

Umbel reduced to 2 flowers. Rhizome slender, pseudobulbs distant, ovoid, .6 in. long; leaf linear-oblong, 1.5—2 in. long; scape slender, shorter than the leaf; pedicels long; lateral sepals ovate-oblong, subacute, .66 in. long, at first cohering, later separate, dorsal sepal suborbicular, .22 in. long, petals oblong, obtuse, as long as the dorsal sepal.....2. *aureum*.

Umbel more than 2-flowered:—

Lateral sepals linear-lanceolate, acuminate, .75—1 in. long. Rhizome slender; pseudobulbs distant, ovoid, .75—1 in. long; leaf linear-oblong, obtuse, 3—4 in. long; scape slender, 2—4 in. long, many-flowered; dorsal sepal ovate, acute, $\frac{1}{2}$ as long as the lateral, petals broadly oblong, shorter than the dorsal sepal.....3. *neilgherrense*.

Lateral sepals less than .6 in. long:—

Lateral sepals linear-oblong or falcate-lanceolate, .5 in. long, cohering throughout, puberulous near the base. Rhizome slender; pseudobulbs distant, ovoid, about .5 in. long; leaf linear-oblong, 1—3 in. long; scape very slender, 1—3 in. long; dorsal sepal broadly ovate, $\frac{1}{2}$ as long as the lateral, petals broadly oblong.....4. *Gamblei*.

Lateral sepals linear-lanceolate, .4 in. long, cohering above, free below. Pseudobulb ovoid, .3—4 in. long; dorsal sepal oblong, obtuse, nearly $\frac{1}{2}$ as long as the lateral, petals orbicular, oblong, obtuse, minute

5. *elegantulum*.

Flowers shortly racemed:—

Lateral sepals .5 in. long or less:—

Rhizome rather stout, pseudobulbs ovoid, .5—1 in. long; leaf oblong, obtuse or emarginate, 1—2.5 in. long; leaves with the flowers; scape slender, as long as or longer than the leaf, 6—8-flowered; sheaths 2—3; lateral sepals linear-lanceolate, acuminate, 2—3 times longer than the falcately ovate-lanceolate, long-acuminate dorsal, petals broadly oblong, obtuse, $\frac{1}{2}$ as long as the dorsal sepal.....6. *acutiflorum*.

Rhizome slender; pseudobulbs crowded, subglobose or broadly ovoid, .5 in. long; leafless when flowering (leaf unknown); scape slender 1—2.5 in. long, 6—10-flowered; sheaths 1—2; lateral sepals oblong, obtuse, in contact but not cohering, twice as long as the oblong, subacute dorsal, petals triangular, aristate, much shorter than the dorsal sepal.....7. *Proudlockii*.

Lateral sepals linear-lanceolate, cohering except at the base, 1—1.2 in. long. Rhizome very stout, slightly swollen at the nodes; pseudo-bulbs oblong or ovate-oblong, 1.75—2 in. long; leaf linear-oblong, obtuse, base attenuate, 5—6 in. long; scape 3—4 in. long, 6—7-flowered; dorsal sepal ovate-oblong, acute, minutely denticulate, .3 in. long, petals broadly ovate, subacute, erose, .15 in. long.....8. *nodosum*.

1. *CIRRHOPETALUM FIMBRIATUM*, Lindl. ; F. B. I. v. 774 ; Wt. Ic. t. 1655.
Coorg (Jerdon).
Flowers green or cream-coloured with darker lines and red cilia ; lip red.
2. *CIRRHOPETALUM AUREUM*, Hook. f. ; F. B. I. v. 777.
Wynaad (Jerdon).
Flowers golden-yellow.
3. *CIRRHOPETALUM NEILGHERRENSE*, Wt. Ic. t. 1654 ; F. B. I. v. 778.
Nilgiri (Wight, Gamble) and Anamalai Hills at 4,000—5,000 ft. (Beddome).
Flowers yellow, mottled with red.
4. *CIRRHOPETALUM GAMBLEI*, Hook. f. ; F. B. I. v. 778. *C. Thomsoni*, Hook. f. ; F. B. I. v. 778.
Nilgiri, Anamalai, Pulney Hills and High Wavy Mountains (Blatter & Hallberg).
Flowers yellow, variously tinged and mottled with red or purple.
5. *CIRRHOPETALUM ELEGANTULUM*, Rolfe.
Coorg.
Flowers yellow with maroon-purple stripes.
6. *CIRRHOPETALUM ACUTIFLORUM*, A. Rich. ; F. B. I. v. 779.
W. Gháts.
Flowers greenish-white or cream-coloured.
7. *CIRRHOPETALUM PROUDLOCKII*, King. & Pantl.
Nilgiri Hills, Gudalur Ghát at 4,000 ft. (Proudlock).
Flowers pale straw-coloured.
8. *CIRRHOPETALUM NODOSUM*, Rolfe.
Nilgiri Hills.
Flowers reddish-brown, densely speckled in a darker tint.

8. *Chrysoglossum*, Blume.

Terrestrial or epiphytic herbs. *Pseudobulbs* narrow or 0, 1-leaved. *Leaves* elliptic-lanceolate, plaited. *Scapes* lateral on the rhizome, long, erect, sheathed. *Flowers* laxly racemed. *Sepals* subequal, lateral connate with the base of the lip into a mentum. *Petals* subequal to the sepals. *Lip* erect, broadly 3-lobed, sometimes auriculate at the base; disk 3-lamellate. *Column* incurved, margins 2-auricled or -lobed about the middle; foot short. *Anther* 2-celled; pollinia 2, free.

Terrestrial; rhizome stout; leaf 6—14 in. long, 1.5—4 in. wide, acuminate, tapering into a 1—5 in. petiole which thickens into a narrow pseudobulb, 1—3 in. long; scape and raceme usually longer than the leaf, up to 20 in. long, many-flowered; sheaths loose, .5—1 in. long; bracts .5 in. long; flowers .75—1 in. long; sepals and petals oblong, falcate, subacute.....1. *maculatum*.
Epiphytic; rhizome slender; leaf 7 in. long, 2 in. wide, narrowed into the 3—4 in.-long petiole, which thickens into a narrow 1—1.5 in.-long pseudobulb; scape and raceme as long as the leaf, about 12-flowered; sheaths 3, loose; bracts linear, .5 in. long, longer than the pedicel and ovary; flowers about .33 in. long; sepals and petals obovate-lanceolate to lanceolate, acute, the petals broader...2. *Hallbergii*.

1. *CHRYSOGLOSSUM MACULATUM*, Hook. f.; F. B. I. vi. 784.

Pulney Hills (Bourne); Agastiarmalai in Tinnevely (Barber).

Flowers green with purple markings, lip white with purple spots.

2. *CHRYSOGLOSSUM HALLBERGII*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii, 519.

High Wavy Mountains (Blatter & Hallberg).

9. *Porpax*, Lindl.

Very small epiphytic herbs. *Pseudobulbs* subdiscoid or button-like, clothed with reticulate sheaths. *Leaves* 2, membranous. *Flowers* 1—3, subsessile on the top of the pseudobulb. *Sepals* connivent at the base, all connate into a tube or the dorsal free, lateral sepals oblique below and adnate to the long foot of the column. *Petals* small, free, usually shorter than the sepals. *Lip* sessile on the foot of the column, incumbent. *Column* short, wingless. *Pollinia* usually 8, attached in fours.

Pseudobulbs .75 in. in diam.; leaves caducous, broadly oblong, under 1 in. long; flowers solitary from between the leaves with sheaths and an orbicular parchment-like bract at the base, 4—5 in. long; sepals all connate into a 3-lobed subcampanulate tube, petals included, spathulate, lip panduriform, crenulate, shortly clawed, with a basal, erect, tooth-like process.....1. *reticulata*.
Pseudobulbs 4—6 in. in diam.; leaves persistent, suborbicular, 4—1.25 in. long, minutely ciliate; flowers 1—3 from between the leaves with many sheaths and a broad ciliate bract at the base, 2-lipped, .33 in. long; lateral sepals connate to above the middle, concave, pubescent, dorsal sepal nearly free, broadly oblong, petals linear-spathulate, very small, lip minute, shortly clawed, ovate-cordate, toothed, apiculate.....2. *Jerdoniana*.

1. *PORPAX RETICULATA*, Lindl. *Eria reticulata*, Benth.; F. B. I. v. 786.

Aggeianthus marchantioides, Wt. Ic. t. 1737.

Iyamalai Hills (Wight), Donipoya in South Malabar at 700 ft. (Fischer).

Pseudobulbs aggregated on wet rocks or on tree-trunks; flowers purple-brown.

2. PORPAX JERDONIANA, Reichb. *Eria Lichenora*, Lindl.; F. B. I. v. 787. *Lichenora jerdoniana*, Wt. Ic. t. 1738.

Bababudan Hills (Law), Hills of Malabar (Jerdon), Travancore (Johnson).

Pseudobulbs aggregated on branches of trees; flowers yellowish.

10. *Eria*, Lindl.

Epiphytic herbs, usually pseudobulbous. *Pseudobulbs* often elongate and stem-like. *Flowers* never very large nor bright coloured, 1 or 2 or racemed or spicate. *Sepals* free, adnate to the foot of the column to form a short or long and spur-like or saccate mentum. *Petals* subsimilar to the lateral sepals. *Lip* sessile on the foot, rarely shortly clawed, incumbent. *Column* short and straight or long and little curved. *Anther* imperfectly 4- or 8-celled; pollinia usually 8, pyriform.

Pseudobulbs simple, plant stemless or stems short, unjointed:—

Flowers solitary, .75—1 in. long. *Pseudobulbs* depressed-globose, enclosed in a net-like sac; leaves 2, oblong- or elliptic-lanceolate, acute, .75—3 in. long; scape slender, 1—1.75 in. long; bract below the flower suborbicular, strongly nerved, .33 in. long; lateral sepals falcate, acute, dorsal oblong-lanceolate, slightly longer, petals like the lateral sepals, lip as long as the lateral sepals, 3-lobed

1. *braccata*.

Flowers racemed:—

Small plants less than 4 in. high; leaves less than 3 in. long; scapes slender:—

Pseudobulbs globose or ovoid; flowers not secund, .1 in. or less long:—

Leafless when in flower (leaves unknown); scape capillary, flexuous, glabrous; bracts boat-shaped; lateral sepals decurved, bill-hook-shaped, obtuse, dorsal oblong, obtuse, slightly longer, petals linear-obovate, shorter than the lateral sepals, lip minute.....2. *exilis*.

Leafy when in flower; leaves oblong-lanceolate, acute, base attenuate, 1—2.5 in. long; scape not flexuous, brown-pubescent, as are the pedicels and ovaries; bracts oblong-lanceolate, acute; lateral sepals obliquely semi-ovate, subacute, dorsal lanceolate-oblong, subobtuse, petals linear-lanceolate, lip rhomboid-suborbicular.....3. *albiflora*.

Pseudobulbs depressed-ovoid; flowers secund, .25 in. or more long:—

Leaves 2, oblanceolate-oblong, subobtuse, 1—2.7 in. long; scape few-flowered, up to 5 in. long; bracts lanceolate; flowers under .3 in. long; sepals lanceolate, acute, dorsal slightly longer, petals subsimilar, lip very small, ovate-lanceolate.....4. *Dalzellii*.

Leaves 2—3, elliptic-lanceolate, obtuse or acute, 1—2.5 in. long; scape 2—6-flowered, often flexuous, up to 5 in. long; bracts ovate; flowers .4—6 in. long; sepals linear-lanceolate, acuminate, petals subsimilar, lip shortly clawed, ligulate.....5. *nana*.

Larger plants exceeding 4 in. high; leaves 4—8 in. long; scapes comparatively stout:—

Pseudobulbs ovoid, thick, 2—4 in. long; leaves 3—5, linear, elliptic- or oblong-lanceolate, acute; scapes 2—4 on a pseudo-bulb, 2—4 in. long, many-flowered, with the pedicels and flowers externally more or less fuliginose-pilose; flowers .25—3 in. long; lateral sepals and petals subequal, lanceolate, slightly falcate, dorsal sepal slightly longer, lip entire, ovate-subpanduriform, subacute.....6. *polystachya*.

Pseudobulbs thick, ovoid, 1—1.5 in. long; leaves 1—4, linear- to oblong-lanceolate, subacute or obtuse; scapes 4—5 in. long, many-flowered, slightly pubescent; flowers .5—7.5 in. long, glabrous; sepals lanceolate, dorsal a little longer, petals linear-lanceolate, about as long as the lateral sepals, lip ovate-subcordate, acute.....7. *pubescens*.

Pseudobulbs pluri-articular or developed into a plurinodal stem:—

Internodes 1 in. or less long:—

Stem 3—6 in. high from a creeping rootstock, slender below, clavate above; internodes .5—1 in. long; leaves 2—3 from the apex of the stem, linear-oblong, 1.5—5 in. long, obtuse or subacute; scape from between the leaves, slender, 1—1.5 in. long, 1—3-flowered; pedicels slender with 2—3 oblong bracteoles; flowers 4—5 in. long; sepals and petals subequal, lateral sepals triangular, slightly falcate, dorsal oblong, petals narrow-oblong, lip cuneately oblong, lobes obscure.....8. *pauciflora*.

Stem 2—3 ft. high, robust, terete; internodes about 1 in. long; leaves numerous from the upper nodes, narrowly elliptic-oblong, acuminate, 4—8 in. long; racemes axillary, as long as or longer than the leaves, many-flowered, rusty pubescent; bracts sub-orbicular, apiculate, .2 in. long; flowers .5—6 in. long, rusty-pubescent outside; sepals subequal, broadly elliptic, the lateral falcate, spreading, petals narrower, lip ovate-oblong, obtuse, side lobes small.....9. *bambusifolia*.

Internodes 2 in. or more long. Stems tufted, up to 8 in. long; leaves 3, oblong-lanceolate, acute, about 7 in. long and 1.75 in wide; peduncle from between the leaves up to 8.5 in. long; flowers 2-bracteate; bracts olive, oblong, acute, half amplexicaul; flowers about .6 in. long, dorsal sepal elliptic-oblong, lateral triangular-falcate from a broad base, petals falcate-oblong, lip much shorter than the sepals, broadly ovate, subequally 3-lobed, lobes slightly crisped, midlobe minutely white-puberulous.....10. *pseudoclavicaulis*.

1. *ERIA BRACCATA*, Lindl.; F. B. I. v. 787. *E. reticosa*, Wt. Ic. t. 1637; F. B. I. v. 787.

W. Gháts from the Bababudan to the Nilgiri Hills at about 6,000 ft.; High Wavy Mountains (Blatter & Hallberg).

Flowers white, lip edged with purple, column yellow.

2. *ERIA EXILIS*, Hook. f.; F. B. I. v. 788.

Travancore (Johnson).

A very small, delicate herb.

3. *ERIA ALBIFLORA*, Rolfe.

Nilgiri Hills.

Flowers pure white.

4. *ERIA DALZELII*, Lindl.; F. B. I. v. 789. *Dendrobium filiforme*, Wt. Ic. t. 1642 (central and top left-hand figs.).

W. Gháts.

Flowers white or yellowish.

Var. *fimbriata*, Hook. f.; F. B. I. v. 789.

Petals and sepals fringed with translucent gland-tipped hairs.

5. *ERIA NANA*, A. Rich.; F. B. I. v. 789. *Dendrobium filiforme*, Wt. Ic. t. 1642 (right-hand bottom fig.).

W. Gháts, 5,000—8,000 ft.

Flowers white.

6. *ERIA POLYSTACHYA*, A. Rich.; F. B. I. v. 792. *E. mysorensis*, Lindl.; F. B. I. v. 793. *E. pubescens*, Wt. Ic. t. 1635.

W. slopes of the Nilgiri Hills.

Flowers white.

7. *ERIA PUBESCENS*, Wt. Ic. t. 1634; F. B. I. v. 793.

W. slopes of the Nilgiri Hills (Wight, Barber).

Flowers white, tipped with pink.

8. *ERIA PAUCIFLORA*, Wt. Ic. t. 1636; F. B. I. v. 799.

Nilgiri, Anamalai (Davidson), Kollimalai (Barber), Tinnevelly

(Barber) Hills and High Wavy Mountains (Blatter & Hallberg).
Flowers pure white.

9. *ERIA BAMBUSIFOLIA*, Lindl.; F. B. I. v. 805; King & Pantl., Ann. Calc. viii, t. 163.

Mahendragiri in Ganjam at 4,500 ft. (Gamble).

Flowers pale-brown with darker markings, lip with 3 pale-green ridges, column yellow.

10. *ERIA PSEUDOCLOVICULIS*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii, 518.

High Wavy Mountains (Blatter & Hallberg).

Flowers white, tinged with pink.

11. *Pachystoma*, Blume.

Terrestrial herbs; rhizome nodose. *Leaves* 1 or 2, long, narrow, appearing after flowering-time. *Scape* pale, with many sheaths. *Flowers* racemed, pendulous, moderate-sized. *Sepals* and *petals* subequal, lateral sepals adnate to the base of the column. *Lip* sessile at the base of the footless column. *Column* slender, clavate upwards. *Anther* dorsal, 4-celled; pollinia 8, pyriform.

PACHYSTOMA SENILE, Reichb. f.; F. B. I. v. 812; King & Pantl. Ann. Calc. viii. t. 140. *Apturia Lindleyana*, Wt. Ic. t. 1662.

Western Gháts, 3,000—5,000 ft.

Leaf solitary; scape with raceme 8—30 in. long; sheaths 5—2 in. long; flowers about 5 in. long, glandular pubescent, white, greenish or pinkish; bracts scarious, longer than the flowers, strongly nerved.

12. *Acanthophippium*, Blume.

Terrestrial herbs with 2—9-leaved pseudobulbs. *Leaves* petioled, broad, plicate. *Flowers* few, large, on short, lateral racemes. *Sepals* broad, cohering into a ventricose tube with recurved tips, lateral adnate to the foot of the column to form a large, saccate mentum. *Petals* erect, narrow, included. *Lip* small, stipitate on the foot of the column, inflexed, lateral lobes broad, mid-lobe recurved, entire, disk with a complex callus. *Column* short, stout; foot very long, inflexed. *Anther* 2-celled; pollinia 8, erect, cohering by a granular mass.

ACANTHOPHIPPIUM BICOLOR, Lindl.; F. B. I. v. 815.

Nilgiri Hills (Proudlock); Machur Shola in the Lower Pulney Hills (Bourne); Shevaroy Hills (Bourne). Very rare.

A robust plant. Pseudobulb oblong-ovate, corrugated, 1—2 in. long, clothed in the remains of old leaves; stem 3—8 in. long; leaves 2 or 3, oblong-lanceolate, acuminate, tapering into a sheathing petiole, 6—18 in. long, 1.5—4.5 in. wide. *Scape* sheathed, 3—7-flowered; bracts ovate-lanceolate, 1 in. long; flowers 1.5 in. long, resembling broad gibbous-based jugs, yellow tipped or spotted with red; side lobes of lip hatchet-shaped, midlobe short, tongue-shaped, disk 3-keeled.

13. *Thunia*, Reichb. f.

Epiphytic or terrestrial herbs; stems not pseudobulbous, leafy with foliaceous sheaths below. *Leaves* distichous. *Flowers* in racemes terminating the stem, large; bracts large, scarious. *Sepals* erecto-patent, subequal, lanceolate, acute. *Petals* similar. *Lip* adnate to the base of the column, shortly spurred, side lobes short, embracing the column, midlobe fringed. *Anther* narrow, pendulous, incompletely 4-celled; pollinia 8, waxy, attached in fours to a granular membrane.

THUNIA VENOSA, Rolfe. *Phajus albus*, Lindl. *in part*; F. B. I. v. 818. Travancore (Calder and Ramaswami).

An epiphytic herb, stem 6—18 in. long; leaves linear-ensiform, 3—9 in. long; raceme drooping, 3—5 in. long; flowers few, white, 2 in. long; lip 1.2 in. long, side lobes involute, crisped, midlobe spreading, waved, often ciliate, palate with 5 longitudinal rows of long, erect, flat, purple papillæ which sometimes unite into membranes, column long, winged, broadening to the denticulate apex.

14. *Tainia*, Blume.

Terrestrial herbs with 1-leaved pseudobulbs. *Flowers* racemose, small or medium-sized. *Sepals* narrow, the lateral falcate, adnate to the saccate base of the lip to form a mentum or inserted above it. *Lip* adnate only by its base to the base of the slender column, hastately 3-lobed, rarely entire, disk lamellate. *Anther* with a simple or 2-lobed boss or 2-horned; pollinia 4 or 8, free or united by a viscus.

TAINIA BICORNIS, Benth.; F. B. I. v. 820. *Ainia latifolia* Wt. Ic. t. 914.

W. Ghâts, rare.

Pseudobulb fusiform, 1—3 in. long. Leaf terminal on the pseudobulb, oblong-lanceolate to broadly elliptic, acuminate, base rounded, 4—7 in. long, 1.5—3.5 in. wide; petiole as long or longer; scape lateral, usually longer than the leaf; bracts lanceolate, acuminate, about .75 in. long; flowers about 1 in. long, purplish or greenish with a reddish flush, lip and column yellow; sepals linear-lanceolate, acute, petals subequal, side lobes of lip small midlobe, broad, retuse, disk 3-lamellate, the middle one short, almost confined to the midlobe.

15. *Josephia*, Wight.

Practically stemless, tufted, epiphytic herbs with stout root-fibres. *Leaves* radical, coriaceous. *Flowers* small, on the branches of paniced spikes. *Sepals* subequal, concave, connivent. *Petals* as long but narrower. *Lip* erect, fleshy, adnate to the base of the column, concave, side lobes small, incurved, midlobe small, entire, papillose, with a basal callus uniting the side lobes. *Column* erect, broad, nearly as long as the sepals, shortly 2-winged upwards; foot 0. *Anther* acuminate, 2-celled; pollinia 4, oblong, parallel, subcaudate, attached to the rostellum by a viscus.

Leaves linear-oblong or lanceolate, subacute or obtuse, 2—5 in. long, .8—1.2 in. wide; petioles .5—2 in. long, plicate, moderately wide; scapes 3—12 in. long, slender; flowers white, tinged with purple.....1. *lanceolata*.
 Leaves broadly oblong or subrotund; apex rounded, 1.8—3.5 in. long, .9—1.5 in. wide; nearly sessile or petiole up to 1.5 in. long, plicate, wide; scapes 3—12 in. long, slender; flowers yellow with purple stripes.....2. *latifolia*.

1. JOSEPHIA LANCEOLATA, Wt. Ic. t. 1742; F. B. I. v. 823.

W. Gháts.

2. JOSEPHIA LATIFOLIA, Wt. Ic. t. 1743; F. B. I. v. 823.

W. Gháts.

The two are very doubtfully separable.

16. Coelogyne, Lindl.

Epiphytic herbs; rhizome creeping; pseudobulbs 2- (rarely 1-) leaved. *Leaves* coriaceous or thin and plaited. *Flowers* usually racemed, rarely 1 or 2; bracts long, sheathing. *Sepals* subequal, lateral more or less saccate at the base. *Petals* narrower. *Lip* sessile at the base of the column, erect and embracing it, base concave or saccate. *Column* long, erect, winged, apex hooded, membranous; foot 0. *Anther* more or less 2-celled; pollinia 4, cohering in pairs by a granular viscus.

Flowers solitary. Pseudobulbs crowded, ovoid, with loose fibrous sheaths at the base, .6—1.2 in. long; leaves 2, linear to narrowly oblong, acuminate, narrowed into a short petiole, 3—7 in. long, .2—5 in. wide; scape short, sheathed in large scarious imbricate bracts; flowers .6—7 in. long; lip oblong, lateral lobes small, acute, midlobe ovate.....1. *uniflora*.

Flowers racemed:—

Sheaths of the scape not becoming foliaceous:—

Lip 2-keeled:—

Sepals .4 in. long, lip as long or longer. Pseudobulbs crowded, narrowly conical, 1—1.5 in. long; leaves 2, linear to linear-oblong, acute, tapering into a channelled petiole, 4—6 in. long, .4—7 in. wide; scape short, tightly clasped at the base by the short sheaths; bracts large, persistent, scarious, ovate-lanceolate; lip with small, blunt side lobes, midlobe broadly obovate, rounded, apiculate or retuse, keels undulate.....2. *breviscapa*.

Sepals 1 in. long, lip shorter. Pseudobulbs ovoid, 1.25—3 in. long; leaves 2, oblong-lanceolate, acute, 6—8 in. long, 1—1.75 in. wide; bracts .75—1.25 in. long; lip with short triangular-ovate, blunt side lobes, midlobe, elliptic, subobtuse, keels entire.....3. *Mossiae*.

Lip 3-keeled. Pseudobulbs ovoid, about 1 in. long; leaves 2, lanceolate, acute, 4—6 in. long, .6 in. wide, petiole short, channelled; bracts narrow; lip with narrowly ovate, subfalcate side lobes, midlobe suborbicular, retuse or apiculate, keels undulate.....4. *angustifolia*.

Inner sheaths of scape more or less foliaceous:—

Pseudobulbs crowded, subglobose, under 1 in. long; leaves 2, hardly coriaceous, elliptic lanceolate, acute, 1.5—4 in. long, .3—5 in. wide; petiole channelled; scape slender, as long as or longer than the leaves, 2—3 flowered; bracts persistent, lanceolate, .5—6 in. long; flowers .6—7 in. long; lip with small oblong-falcate, obtuse side lobes, midlobe suborbicular; disk with 3 crenulate ridges.....5. *odoratissima*.

Pseudobulbs over 1 in. long; flowers 1 in. or more long:—

Midlobe of lip triangular-lanceolate, acute, keels 3—5, crenulate. Pseudobulbs crowded, ovoid, corrugated; leaves 2, lanceolate to broadly elliptic-oblong, acute, 1.5—5 in. long, .5—1.4 in. wide; petiole channelled; bracts persistent, broadly lanceolate up to 1.3 in. long; sepals elliptic-lanceolate, acute.....6. *nervosa*.

Midlobe of lip ovate-oblong or suborbicular, rounded, keels 3, entire, sometimes glandular towards the apex. Pseudobulbs crowded or distant, ovoid,

curved, not corrugate; leaves 2, oblong to lanceolate, acute or subacute, 3-5-12 in. long, 1-2 in. wide; petiole stout, channelled; bracts persistent, ovate-lanceolate, up to 1.5 in. long; sepals elliptic-oblong, rounded
7. *glandulosa*.

1. *COELOGYNE UNIFLORA*, Lindl.; F. B. I. v. 842; King & Pantl. Ann. Calc. viii. t. 192.
Nilgiri Hills (Proudlock).
Flowers pale ochraceous.
2. *COELOGYNE BREVISCAPA*, Lindl.; F. B. I. v. 833 (*in part*):
Mysore (Meebold), Nilgiri Hills (Wight, G. Thomson).
Flowers white.
3. *COELOGYNE MOSSIAE*, Rolfe.
Nilgiri and Pulney (Fyson, Anglade) Hills; 7,000-8,000 ft.
Flowers white.
4. *COELOGYNE ANGUSTIFOLIA*, Wt. Ic. t. 1641. *C. breviscapa*, Hook. f. (*not Lindl.*) F. B. I. v. 833 (*in part*).
Nilgiri Hills (Wight, Bourne).
Flowers white, tinged with yellow.
5. *COELOGYNE ODORATISSIMA*, Lindl.; F. B. I. v. 834; Wt. Ic. t. 1640.
Nilgiri Hills, 7,000-8,000 ft.
Often aggregated in very large patches; flowers white, tinged with yellow.
Var. *angustifolia*, Lindl. Pseudobulbs and leaves more slender; midlobe of lip elliptic, long acuminate. Nilgiri Hills.
6. *COELOGYNE NERVOSA*, A. Rich. *C. corrugata*, Wt. Ic. t. 1639; F. B. I. v. 835.
W. Gháts from Mysore to Tinnevely, 3,000-7,000 ft.
Flowers white, lip yellowish.
7. *COELOGYNE GLANDULOSA*, Lindl.; F. B. I. v. 835. *C. nervosa*, Wt. Ic. t. 1638.
W. Gháts.
Flowers white, lip white and yellowish-brown.

17. *Pholidota*, Lindl.

Epiphytic herbs; stem of single, often aggregated pseudobulbs or jointed and sometimes branching. *Leaves* in pairs or solitary. *Scape* terminal or from the base of the pseudobulb, usually drooping, often flexuous; bracts distichous, rigid. *Flowers* small, globose or subglobose. *Sepals* concave. *Petals* flat, broad or narrow. *Lip* sessile on the base of the column, erect, saccate, subentire or lobed. *Column* very short, apex hooded or winged; foot 0. *Anther* 2-celled, more or less globose; pollinia 4, waxy, subglobose or clavate, free or cohering in pairs by a viscus or membrane.

PHOLIDOTA IMBRICATA, Lindl.; F. B. I. v. 845; Wt. Ic. t. 907; King & Pantl. Ann. Calc. viii. t. 201.

E. and W. Gháts, 2,000-3,500 ft.

A pendent herb; pseudobulbs aggregated, narrowly ovate-cylindric, 1-2.5 in. long; leaf solitary, elliptic-lanceolate or oblanceolate, 4-14 in. long, 8-2.1 in. wide, acute, tapering into a short, stout petiole, 3-ribbed; scape arising from the top of

the pseudobulb; raceme drooping, with the scape up to 26 in. long; bracts persistent, convolute, subrotund, acute, pale-brown, striate, .33 in. long; flowers numerous, close-set, .25 in. long, white with a pinkish or yellowish-brown tinge; lateral sepals with a winged keel, dorsal orbicular, 3-nerved, petals linear-oblong, subacute, lip subequally 3-lobed, midlobe 2-lobulate with a broad sinus between.

18. *Calanthe*, Br.

Terrestrial herbs, often pseudobulbous with a short or tall, leafy stem. *Leaves* plaited. *Scape* axillary, terminal or lateral from a leafy pseudobulb. *Flowers* medium-sized, racemed. *Sepals* subequal, spreading, rarely connivent. *Petals* broad or narrow. *Lip* adnate to the top or base of the column, 3-lobed, midlobe often 2-fid, disk lamellate or tubercled, with or without a spur. *Column* long or short, obliquely truncate; foot 0. *Anther* conical or convex, 2-celled; pollinia 8, waxy, cohering in pairs by a granular viscus.

Stem short, stout; leaves elliptic-ovate to lanceolate, acuminate, 10—20 in. long, 3—6 in. wide, sessile, or base tapering into a usually short petiole, usually sparsely pubescent, at least below, sometimes glabrescent; scape lateral, stout, with the lax-flowered raceme up to 3 ft. long, sparsely puberulous; bracts large, ovate-lanceolate, herbaceous, puberulous; flowers puberulous, .75—1 in. long; lip hardly exceeding the sepals, side lobes short, falcate-oblong, mid-lobe much larger, broadly or cuneately reniform, spur linear-subspathulate, longer than the sepals.

1. *Masuca*.

Stem short; leaves elliptic-ovate to lanceolate, acuminate, 8—14 in. long, 3—5 in. wide, quite glabrous, tapering into a usually long petiole; scape stout, with the dense-flowered raceme up to 2 ft. long, sparsely puberulous; bracts large, ovate-lanceolate, puberulous; flowers puberulous, .5—8 in. long; lip longer than the sepals, side lobes large, oblong, obtuse, midlobe more or less deeply cleft into 2 oblong segments with an acute sinus, spur linear, slender, longer than the lip.

2. *veratrifolia*.

1. *CALANTHE MASUCA*, Lindl.; F. B. I. v. 850; King and Pantl. Ann. Calc. viii. t. 234.

W. Gháts, 3,000—6,000 ft.

Flowers usually pale- or dark-purple, sometimes pale-rose or white with a purple lip; lip always bright coloured.

2. *CALANTHE VERATRIFOLIA*, Br.; F. B. I. v. 851. *C. Perrottetii*, A. Rich.; Wt. Ic. t. 1664—5.

W. Gháts, 6,000—8,000 ft.

Flowers white or pale-like. Very like *C. Masuca*, but smaller and more slender.

19. *Arundina*, Blume.

Terrestrial erect plants; stem simple, rigid, terete, sheathed. *Leaves* distichous, narrow and grass-like. *Flowers* large in terminal, erect, stiff, simple or branched racemes or panicles. *Sepals* free, spreading, lanceolate, acuminate, flat, many-nerved. *Petals* broader, many-nerved. *Lip* large, broad, sessile on the base of the column and embracing it. *Column* long, slender, narrowly winged; foot 0. *Anther* 4-celled; pollinia 8, in 2 superposed rows attached by fours to one membrane.

ARUNDINA GRAMINIFOLIA, Hochr. *A. bambusifolia*, Lindl.; F. B. I. v. 857; Wt. Ic. t. 1661; King. & Pantl. Ann. Calc. viii. t. 156.

W. Gháts, 3,000—6,000 ft.

A stout, almost woody, reed-like plant reaching 5—6 ft. in height and 1 in. in diameter; leaves linear to linear-lanceolate, acute or acuminate, 5—10 in. long, 3—1 in. wide; flowers about 1.5 in. long, pinkish-purple; sepals lanceolate, petals shorter, rhomboid-elliptic, lip 3-lobed, mid-lobe more or less deeply bifid, crisped, with 3—5 lamellate nerves.

20. *Eulophia*, R. Br.

Quite glabrous terrestrial herbs; rhizome tuberous, rarely pseudobulbous. *Leaves* appearing with or after the flowers, usually plicate. *Scape* lateral, erect, sheathed. *Flowers* racemose, rarely paniced. *Sepals* and *petals* free, spreading, usually subequal. *Lip* adnate to the foot of the column, base saccate or spurred or forming a short mentum, lateral lobes erect, embracing the column, rarely 0, mid-lobe spreading or recurved, disk ridged or crested. *Column* short or long, top oblique, entire, rarely lobed, sometimes with winged or lobed margins; foot present or absent. *Anther* terminal, 2-celled; pollinia 2 or 4, sessile or attached by a short strap to a discoid gland.

Column not produced into a foot:—

Pseudobulbs large, emerging above ground:—

Leaves very narrow, grass-like, 1-ribbed; scapes often branched:—

Leaves 6—30 in. long, 2—8 in. wide, midrib stout; scape 1—3 ft. or more long; flowers 5—7 in. long; sepals linear-oblong, subacute or obtuse, petals elliptic, obtuse, lip obovate-oblong, as long as the sepals, side lobes small, disk with 5-crested nerves, spur short.....1. *epidendraea*.

Leaves 3—6 in. long, 2—4 in. wide, midrib not very stout; scape 1—2 ft. long; flowers 4—5 in. long; sepals lanceolate acuminate or elliptic-lanceolate acute, petals slightly broader, lip obovate-oblong, side lobes small, disk with 3—5 lamellate or crested nerves, fimbriate on the rounded lobe, spur short

2. *graminea*.

Leaves elliptic-lanceolate, acuminate, 3-ribbed, 6—10 in. long, 1.2—2.5 in. wide. Pseudobulbs fusiform, 2.6 in. long; scape stout, unbranched, with the raceme 2—3 ft. long; bracts linear-lanceolate; flowers 4—5 in. long; sepals lanceolate acute, petals broader, lip broader than long, side lobes short, obtuse, midlobe revolute, rounded, disk 2-lamellate at the base, spur a rounded 2-lobed sac.....3. *macrostachya*.

Roots tuberous, underground; leaves elliptic-lanceolate; scape unbranched:—

Lip longer than broad, its nerves fringed:—

Stem 3—6 in. long, sheathed; leaves 4—12 in. long, 1.5—2.5 in. wide; scape 8—15 in. long, with loose ochreate sheaths below; bracts conspicuous, linear acuminate, 3—5 in. long, flowers about 5 in. long; sepals linear-lanceolate, acute, petals broadly elliptic, lip broadly ovate, obtuse, side lobes 0

4. *ochreatea*.

Stem 4—6 in. long, sheathed; leaves 6—12 in. long, 1—3.5 in. wide; scape 1—3 ft. long, with large acuminate sheaths below; bracts up to 1.75 in. long; flowers 7—1 in. long; sepals linear-lanceolate, petals oblong-elliptic, shorter, obtuse or acute, lip obovate-oblong, side lobes small, rounded, mid-lobe oblong or obovate-oblong.....5. *herbacea*.

Lip broader than long; leaves 4—12 in. long, 5—1.5 in. wide; scape 1—3 ft. long; bracts ovate-lanceolate, acuminate; flowers 5—6 in. long; sepals and petals elliptic oblong, obtuse, side lobes of lip large, oblong, rounded, midlobe broadly subovate, or suborbicular, disk with 3 crested nerves.....6. *pratensis*.

Column produced into a foot:—

Root tuberous; leaves elliptic-lanceolate, acute, 10—15 in. long; scape 1—3 ft. long; bracts lanceolate, acute; flowers 9—1 in. long; sepals linear-oblong, acute, dorsal slightly narrower, petals oblong, obtuse, shorter and wider than the sepals, lip obovate-oblong, side lobes short, rounded, midlobe obovate-oblong, obtuse or retuse, crisped, disk with many crenulate or tubercled nerves...7. *nuda*.
 Root tuberous; leaves oblong-lanceolate, acute; scape rather slender, angular, sheathed, with the raceme 1—2 ft. long; bracts ovate-ensiform; flowers about 1 in. long; sepals acute, dorsal narrowly oblanceolate, lateral falcate-lanceolate, petals wider, oblong, obtuse, mentum conical, subacute, lip with the mentum as long as the petals, as broad as long, side lobes large, triangular-falcate, obtuse or subacute, midlobe tongue-shaped, half as long as the whole lip, slightly concave, rounded, disk with 3 tubercled crests.....8. *Cullenii*.

1. *EULOPHIA EPIDENDRAEA*, Fischer, n. comb. *E. virens*, R. Br.; F. B. I. vi. 1; Wt. Ic. t. 913. *Limodorum virens*, Sw.; Cor. Pl. i. t. 38.

In all districts from sea-level to 3,000 ft.

Flowers green, lip white, nerves and crests red.

2. *EULOPHIA GRAMINEA*, Lindl.; F. B. I. vi. 2; King & Pantl. Ann. Calc. viii. t. 238

Travancore (Wight, Bourdillon), Chingleput (Gamble), Cud-dapah Hills (Fischer), sea-level to 2,500 ft.

Very similar to the last in habit and coloration, but smaller in all respects.

3. *EULOPHIA MACROSTACHYA*, Lindl.; F. B. I. vi. 4; Wt. Ic. t. 1667—8. Nilgiris and Courtallam (Wight).

Flowers green, lip yellow with red stripes, spur green.

4. *EULOPHIA OCHREATA*, Lindl.; F. B. I. vi. 2.

Vizagapatam Hills at 3,300 ft. (A. W. Lushington).

5. *EULOPHIA HERBACEA*, Lindl.; F. B. I. vi. 2; Duthie Ann. Calc. ix. t. 106.

Bababudan Hills of Mysore (Law).

Flowers white with purple nerves.

6. *EULOPHIA PRATENSIS*, Lindl.; F. B. I. vi. 4. *E. ramentacea*, Wt. Ic. t. 1666.

W. Gháts.

Flowers yellow.

7. *EULOPHIA NUDA*, Lindl.; F. B. I. vi. 5; Hook. f. Ann. Calc. v. t. 47; King & Pantl. Ann. Calc. viii. t. 243. *Cyrtopera fusca*, Wt. Ic. t. 1690.

W. Gháts, 2,000—7,000 ft.; Vizagapatam Hills at 3,800 ft. (A. W. Lushington.)

Flowers greenish-purple, yellow and white.

8. *EULOPHIA CULLENII*, Fischer n. comb. *Cyrtopera Cullenii*, Wt. Ic. t. 1754; F. B. I. vi. 7 (under *E. flava*, Hook. f.).

Travancore (Cullen), Anamalai and Pulney (Bourne, Saulière and Anglade) Hills, 3,500—7,000 ft.

Flowers yellow (Wight) or purple (Anglade).

Var. *minor* with flowers 6 in. long. Pulney Hills at 6,000 ft. (Van Malderen).

21. *Cymbidium*, Swartz.

Epiphytic, rarely terrestrial herbs; stem short, rarely elongate and pseudobulbous; roots tufted. *Leaves* long, rarely short, narrow, coriaceous. *Scape* from the side of the stem, sheathed. *Flowers* often large, in erect or drooping, few- or many-flowered racemes. *Sepals* and *petals* subequal, free, erect or spreading. *Lip* sessile at the base of the column and embracing it with the erect side lobes, midlobe recurved, disk with 2 median ridges. *Column* long; foot 0. *Anther* 1- or imperfectly 2-celled; pollinia 2 deeply grooved or 4, sessile on a small or large, often strap-shaped gland.

Leaves linear-oblong, subacute, not notched, 24—30 in. long, .75—1 in. wide; scape and raceme 10—20 in. long, decurved from the base; flowers 1.25 in. across, ovary .5 in. long; lip as long as the sepals, side lobes narrow, midlobe oblong, obtuse, emarginate, much decurved, disk with 2 parallel continuous lamellae with clavate apices.....1. *pendulum*.

Leaves linear-oblong, obtuse, shortly obliquely notched, 12—22 in. long, .75—1.5 in. wide; scape and raceme 8—20 in. long, erect below, decurved above; flowers 1.5 in. across, ovary nearly 1 in. long; lip as long as the sepals, side lobes narrow, midlobe ovate-oblong, much decurved, disk with 2 lamellae, broken and discontinuous near the middle.....2. *aloifolium*.

1. *CYMBIDIUM PENDULUM*, Sw.; King & Pantl. Ann. Calc. viii. t. 251. *C. aloifolium*, Hook. f.; F. B. I. vi. 10 (in part). *Epidendrum pendulum*, Roxb. Cor. Pl. t. 44.

Hills of the Circars (Roxborough).

An epiphytic herb; flowers dark purple-brown, sepals and petals with yellow margins.

2. *CYMBIDIUM ALOIFOLIUM*, Sw.; F. B. I. vi. 10 (in part); Wt. Ic. t. 1687—8; King & Pantl. Ann. Calc. viii. t. 252. *C. bicolor*, Hook. f. F. B. I. vi. 11. *C. erectum*, Wt. Ic. t. 1753.

In all hilly tracts, 100—3,500 ft.

An epiphytic herb; flowers yellowish-red, or brownish-red.

22. *Geodorum*, Jackson.

Terrestrial herbs; rootstock tuberous. *Leaves* elliptic, acute, plicate. *Scape* from the rootstock, stout, erect, sheathed. *Flowers* crowded in decurved racemes; bracts narrow, membranous. *Sepals* and broader *petals* subequal in length, conniving or spreading. *Lip* sessile on the base or short foot of the column, entire, cymbiform, membranous, margins involute, disk with a basal forked callus and with or without ridges ending in calli. *Column* short, stout. *Anther* 2-celled, appendaged after dehiscence; pollinia 2, broad, sessile or subsessile on a broad strap or gland.

- GEODORUM DENSIFLORUM*, Schlechter. *G. purpureum*, R. Br.; F. B. I. vi. 16. *G. dilatatum*, R. Br.; F. B. I. vi. 17; Wt. Ic. t. 912. *Limodorum recurvum*, Roxb. Cor. Pl. t. 39.

In all districts, 200—3,000 ft.

A stout herb; leaves petioled, 4—10 in. long, 2—5 in. wide; scape with raceme up to 2 ft. long; flowers .4 in. long, pale-purple or rose, the lip with darker markings; sepals linear-oblong, acute, lip ventricose at the base, subpandurate, apex rounded,

emarginate or 2-fid, disk with a channelled ridge ending in raised calli or granulate.

23. *Polystachya*, Hooker.

Epiphytic herbs; caulescent or pseudobulbous. *Leaves* few, distichous. *Scape* terminal, sheathed. *Flowers* small, racemose or paniced. *Sepals* free, lateral triangular or triangular-ovate, adnate to the foot of the column. *Petals* much smaller, very narrow. *Lip* superior, clawed and jointed on the foot of the column, erect, 3-lobed, side lobes erect. *Column* short, broad; foot rather long. *Anther* 1- or sub 2-celled; pollinia 4, cohering or connate in pairs, attached to a very short strap or gland.

Pseudobulbs small; leaves 3—4, narrow-lanceolate, acute, 2—7 in. long, .3—1 in. wide; scape compressed; rhachis angular, glabrous or sparingly brown-pubescent; flowers .1 in. long; lateral sepals ovate-triangular, apiculate, lip suborbicular, side lobes obtuse, nearly as large as the semi-circular midlobe.....1. *Wightii*.
Pseudobulbs small; leaves 3—4, narrowly oblong or lanceolate, obtuse or subacute, 2—7 in. long, .5—1.1 in. wide; scape compressed; rhachis angular, glabrous or sparingly brown pubescent; flowers .1 in. long, lateral sepals broadly triangular-lanceolate from a broad base, acute or apiculate, lip broadly oblong, side lobes small, obtuse, midlobe much larger, tongue-shaped or broadly ovate-oblong, apex rounded or emarginate.....2. *purpurea*.

1. POLYSTACHYA WIGHTII, Reichb. f.; F. B. I. vi. 21. *P. luteola*, Wt. Ic. t. 1678.

W. Gháts, 2,000—4,500 ft. Not common.

Flowers yellow.

2. POLYSTACHYA PURPUREA, Wt. Ic. t. 1679; F. B. I. vi. 21.

W. Gháts, 3,000—4,000 ft. Not common.

Flowers purple or deep lilac.

24. *Luisia*, Gaud.

Tufted epiphytic herbs; stems terete, rigid, sheathed, usually erect. *Leaves* fleshy, elongate, terete, obtuse. *Flowers* small, spicate on a short, stout extra-axillary rhachis; bracts short, thick, imbricating, persistent. *Sepals* subequal or the decurved dorsal smaller. *Petals* equal to or longer than the lateral sepals, spreading. *Lip* sessile on the base of the column, basal portion flat or saccate, apical decurved, broad, ridged. *Column* very short, truncate. *Anther* 2-celled; pollinia 2, ovoid or subglobose; caudicle strap-like.

Stem 6—12 in. long, slender or rather thick; leaves spreading, green, spotted with purple, 3.5—7 in. long, .06—13 in. thick; flowers 2—3 in. long; sepals and petals subequal, narrow, lip longer, quadrate and subsaccate at the base, the apical portion rhomboid-ovate, apex entire.....1. *teretifolia*.
Stem 12 in. or more long, slender; leaves spreading, green, 3—7 in. long, sometimes very slender; flowers .5 in. long; petals much longer than the sepals, narrow, lip about as long as the petals, narrowly pandurate, convex, base broad, flat, 2-auricled, apex with 2 divergent lobules.....2. *tenuifolia*.

1. LUISIA TERETIFOLIA, Gaud.; F. B. I. vi. 22; King & Pantl. Ann. Calc. viii. t. 271. *Cymbidium tenuifolium*, Wt. Ic. t. 1689.

W. Gháts, 3,000—4,000 ft.; Vizagapatam Hills at 4,000 ft. (A.

W. Lushington).

Flowers greenish-yellow or pale-pink, lip purple.

2. *LUISIA TENUIFOLIA*, Bl.; F. B. I. vi. 24. *Cymbidium triste*, Wt. Ic. t. 911.

W. Gháts, Melpat in South Arcot (Barber), near sea-level to 4,000 ft.

Flowers yellowish with a purple tinge, lip dark purple with a white patch on either side, and pale purple lobes.

25. *Cottonia*, Wight.

Epiphytic herbs; stems leafy, emitting vermiform roots. *Leaves* coriaceous, narrow. *Flowers* in lateral short racemes; peduncles long, simple or branched. *Sepals* subequal, spreading. *Petals* narrower, spreading or reflexed. *Lip* sessile, not jointed, at the base of the column, flat, much longer than the sepals, subpandurate, 2-auricled at the base, side lobes indistinct, mid-lobe rounded, retuse. *Column* short; foot 0. *Anther* short, hemispheric, 2-celled; pollinia 2, pyriform, 2-cleft or 4 with the 2 smaller incumbent on the 2 larger; caudicle long, narrow; gland very small.

COTTONIA MACROSTACHYA, Wt. Ic. t. 1755; F. B. I. vi. 26.

Malabar near Tellicherry (Jerdon); Anamalais Hills at 2,600 ft. (Fischer); Travancore (Johnson, Calder and Ramaswami).

Stem stout, 4—8 in. long; internodes short; leaves strap-shaped, apex more or less unequally 2-lobed, 4—8 in. long, 3—8 in. wide, keeled below; scape slender, erect, up to 30 in. long, bracts minute; flowers somewhat like a humble-bee; sepals ovate-oblong, obtuse, about .25 in. long, petals oblanceolate, all greenish-yellow or orange veined with red, lip purple with a broad golden-villous margin; base with 3 calli, disk with a median pubescent callus.

26. *Kingiella*, Rolfe.

Epiphytic herbs; stems short, leafy. *Leaves* coriaceous, flat. *Scapes* lateral or axillary, simple or branched. *Sepals* and *petals* subequal or unequal, spreading. *Lip* with a saccate or spur-like mentum, 3-lobed, sessile on the foot of the column, side lobes usually with an awned plate, midlobe with a 2-awned plate. *Column* rather long, narrowly winged; foot usually long. *Anther* 2-celled; pollinia 2, sulcate or 2-partite; strap linear or spatulate; gland large or small.

KINGIELLA DECUMBENS, Rolfe. *Doritis Wightii*, Benth.; F. B. I. vi. 32; Hook. f. Ann. Calc. v. t. 59; King & Pantl. Ann. Calc. viii. t. 265.

Circars (Heyne); Quilon (Wight).

A pendulous herb; stem stout, hardly 1 in. long; leaves 1—4, oblong, usually slightly oblanceolate, obtuse; margins subundulate, 3—8 in. long, 9—2 in. wide; scape from the stem below the leaves, up to 16 in. long, slender; flowers small, pale-ochraceous marked with purple; sepals and petals subequal in length, obtuse, the petals broader, lip with a saccate mentum, side lobes large, oblong, obtuse, with a broad plate near the anterior margin, midlobe obovate, emarginate, with a ligulate, forked, 2-awned plate near the base.

27. *Rhynchostylis*, Blume.

Epiphytic herbs; stem stout, often woody, leafy. *Leaves* very thick, linear or oblong, apex 2-lobed. *Flowers* in erect or pendulous, many-flowered, cylindric, simple or branched racemes. *Sepals* broad, obtuse, spreading. *Petals* similar, smaller. *Lip* adnate to the foot of the column, spur forming a sac, often pubescent within, side lobes 0, epichyle dilated, erect or recurved on the outer rim of the spur. *Column* short, stout; foot short or 0. *Anther* rounded; pollinia 2; caudicle long, slender; gland oblong, small.

Stem 3—8 in. long, woody; leaves linear, deeply channelled, 6—20 in. long, .5—2 in. wide, apex subequally acutely 2-lobed or lobes very unequal, one rounded or acute, the other truncate; racemes simple, as long as the leaves; flowers .6 in. long; spur saccate, laterally flattened, parallel to the pedicel, epichyle flat, widened and cuneate or emarginate at the apex.....1. *retusa*.
Stem short; leaves oblong, flat, slightly keeled, 1.5—3 in. long, .6—1 in. wide; apex subequally bluntly 2-lobed; racemes simple or branched, 3—6 in. long; flowers .12 in. long; spur pouch-like, at right angles to the pedicel, epichyle narrow, channelled above and thickened into a vertical cone at the apex.....2. *latifolia*.

1. *RHYNCHOSTYLIS RETUSA*, Bl.; F. B. I. vi. 32; King & Pantl. Ann. Calc. viii. t. 284. *Saccolabium guttatum*, Wt. Ic. t. 1745—6.
Circars (Heyne, A. W. Lushington); Walaiyar (Wight); Malabar Coast (Barber).
Flowers pale pink spotted with darker pink, lip dark pink.
2. *RHYNCHOSTYLIS LATIFOLIA*, Fischer in Kew Bull. 1927. 358.
Mysore at Cardamonai (Barber).

28. *Chilochista*, Lindl.

Epiphytic herbs; stem very short, leafless, scaly; roots slender, long. *Racemes* erect. *Sepals* and *petals* similar, broad, spreading, the lateral sepals inserted on the apical portion of the foot; petals usually running down the foot. *Lip* movable on the foot, 3-lobed, spur saccate, side-lobes erect, midlobe very short, disk with a pubescent callus. *Column* short; foot broad. *Anther* 2-celled; pollinia 2, globose, deeply furrowed; caudicle short.

CHILOCHISTA PUSILLA, Schlechter. *C. usneoides*, Wt. Ic. t. 1741.
Sarcochilus Wightii, Hook. f.; F. B. I. vi. 37.
Cochin (Johnson); Nilgiris (Jerdon).

A small herb; roots green; scape and raceme 1.5—3 in. long; flowers about .2 in. long, white or creamy; ovary puberulous, spur short, broadly conical.

29. *Aerides*, Lour.

Epiphytic herbs; stem leafy, often woody. *Leaves* coriaceous, flat and channelled or terete. *Flowers* generally numerous, showy; in dense or lax spikes, racemes or panicles. *Sepals* and *petals* similar, lateral sepals and sometimes the petals adnate to the foot of the column. *Lip* more or less elastically inserted at the end of the foot, spurred, side lobes small or large, rarely 0, midlobe usually larger than the side lobes or smaller and incurved between them, spur usually curved forward and with calli within. *Column* short; foot usually

long. *Anther* 2-celled, beaked or not; *pollinia* 2, globose, sulcate; *caudicles* long or short.

Leaves terete, acute, 2—6 in. long, .1—2 in. diam. *Stems* rather slender, elongate; *flowers* few on a short, stout peduncle, .75 in. long; *sepals* obovate-oblong, obtuse, *petals* shorter and broader, side lobes of lip erect, about as long as the shortly cuneiform, fleshy, ridged midlobe, spur narrow, straight or slightly recurved

1. *cylindricum*.

Leaves flat, keeled:—

Side lobes of lip much narrower than the midlobe:—

Lip more than .5 in. long, horizontal or inflexed:—

Stems 1—3 in. long, very stout; *leaves* linear-oblong, channelled, apex unequally bluntly 2-lobed, 3—10 in. long, .5—1.2 in. wide; *flowers* in usually paniced racemes longer than the leaves; *bracts* minute; *sepals* obovate, .4 in. long, *petals* as long, narrower, lip quadrate-oblong, .6—8 in. long, side lobes small, rounded, midlobe retuse, spur rather large, strongly incurved

2. *maculosum*.

Stems 2—10 in. long, stout; *leaves* oblong or linear-oblong, apex unequally bluntly 2-lobed, 2.5—8 in. long, .6—1.75 in. wide; *flowers* usually in simple (sometimes branched) racemes longer than the leaves; *bracts* small; *sepals* oblong, obtuse, *petals* broader, lip nearly 1 in. long, geniculate incurved at the claw, side lobes oblique, small, midlobe over .5 in. long, ovate, subobtruse, somewhat 3-lobed, margin crenulate, with 2 fleshy calli at the base closing the mouth of the spur, spur strongly incurved, the apex often concealed beneath the reflexed edges of the lip.....3. *crispum*.

Lip about .3 in. long, deflexed. *Stem* 1—7 in. long, stout; *leaves* linear to linear-oblong, apex unequally bluntly 2-lobed, 2.5—10 in. long, .25—1 in. wide; *flowers* in simple or branched racemes, shorter or longer than the leaves; *bracts* minute; *sepals* suborbicular, *petals* narrower, side lobes of lip small, midlobe ovate, disk with 2 large basal calli, spur cylindric, obtuse, incurved

4. *ringens*.

Side lobes of the lip broad, midlobe narrowly lanceolate, acute, erose, incurved between the side lobes. *Stem* 3—12 in. long, stout; *leaves* linear-oblong or oblong-lanceolate, apex unequally bluntly 2-lobed, 5—10 in. long, .7—1.5 in. wide; *flowers* in usually simple racemes, as long as or longer than the leaves; *bracts* rather large; *lateral sepals* suborbicular, longer and wider than the dorsal sepal and the petals, lip about .5 in. long, longer than the lateral sepals, spur subacute, strongly incurved.....5. *odoratum*.

1. *AERIDES CYLINDRICUM*, Lindl.; F. B. I. vi. 44; Wt. Ic. t. 1744.

W. Gháts.

Flowers white or tinged with red, lip reddish, midlobe yellowish at the base (Wight).

2. *AERIDES MACULOSUM*, Lindl.; F. B. I. vi. 45. *Saccolabium speciosum*, Wt. Ic. tt. 1674—5.

W. Gháts, Ramandrug at 3,500 ft. (Gamble).

Flowers rose-coloured, lip darker.

3. *AERIDES CRISPUM*, Lindl.; F. B. I. vi. 45. *A. Lindleyanum*, Wt. Ic. tt. 1677.

Nilgiri and Pulney Hills, 3,000—6,000 ft.

Flowers sweet-smelling; pinkish white shaded with darker pink.

4. *AERIDES RINGENS*, Fischer n. comb. *A. radicosum*, A. Rich.; F. B. I. vi. 46. *A. lineare*, Hook. f.; F. B. I. vi. 47. *Saccolabium Wightianum*, Lindl.; Wt. Ic. t. 917. *S. rubrum*, Wt. Ic. t. 1673. *S. paniculatum*, Wt. Ic. t. 1676.

W. Gháts, 800—8,000 ft.

Often growing on rocks as well as epiphytic. Flowers from nearly white to deep rose-pink; leaves often mottled with purple.

5. *AERIDES ODORATUM*, Lour.: F. B. I. vi. 47; King & Pantl. Ann. Calc. viii. t. 282.

Circars (Heyne); Vizagapatam (Barber); Rampa Hills at 2,000 ft. (Narayanswami).

Flowers very fragrant; white spotted with pink.

30. *Vanda*, R. Br.

Epiphytic herbs or shrubs; stems often very long and scandent, leafy. *Leaves* very coriaceous or fleshy, flat, keeled or terete. *Flowers* in simple lax or dense racemes, usually showy and rather large. *Sepals* and *petals* subequal, spreading or incurved, narrowed to the base. *Lip* usually saccate or spurred, side lobes large or small, rarely 0, adnate to the foot of the column or to the sides of the sac or spur, midlobe fleshy, disk usually ridged or lamellate. *Column* short, stout; foot very short or 0. *Anther* 2-celled; rostellum small; pollinia 2, didymous, subglobose or obovoid; caudicle short or long and geniculate; gland usually large.

Leaves terete, slender, 3.5—8 in. long. *Stem* slender up to 8 ft. long; peduncles axillary, suberect, long; raceme 2—6-flowered; flowers 2.5—4 in. in diam.; sepals broadly oblong or obovate, blunt, lateral often with a short spur outside, below the apex, petals larger, subrotund, lip longer than the lateral sepals and with them adnate to the very short foot, side lobes large, elliptic, midlobe clawed, obovate, more or less deeply bifid, spur funnel-shaped.....1. *teres*.

Leaves flat or keeled, not terete:—

Leaves less than 10 in. long:—

Flowers less than 1 in. in diam. *Stems* stout, 3—6 in. long; leaves conduplicate, keeled, linear, apex unequally obtusely (rarely acutely) 2-lobed, 3—6 in. long, .4—7 in. wide; scapes few-flowered, axillary from the existing or fallen leaves, as long as or often longer than the leaves; bracts small; sepals broadly obovate, spreading, petals spathulate-oblong, lip adnate to the foot of the column, spur narrowly funnel-shaped, slightly curved at the lip, side lobes erect from the edges of the spur, midlobe obovoid, tip dilated, crenulate, truncate or retuse, disk 2-ridged; capsules 1—1.5 in. long.....2. *parviflora*.

Flowers more than 1 in. in diam.; capsules more than 1.5 in. long:—

Stem 2—4 ft. long, scandent; leaves flat or not strongly conduplicate, ovate or linear-oblong obtuse or subacute apex oblique and entire or emarginate, 2—4 in. long, .5—1.25 in. wide; scape leaf-opposed, robust, with the few to many-flowered raceme up to 20 in. long, erect; bracts persistent, ovate-cordate, acute, .3—4 in. long; flowers 1.25 in. in diam.; sepals and petals flat, spathulately oblong, obtuse, lip clawed, as long as the sepals, side lobes small, oblong, midlobe triangular-obovate, obtuse, somewhat 3-lobed, decurrent on the short, conical, acute spur; capsules 1.5—2 in. long.....3. *spathulata*.

Stem 1—2 ft. long, scandent; leaves conduplicate, keeled, linear-oblong, apex praemorse, 3-toothed, all teeth acute or 2-rounded, 3—8 in. long, .5—1.2 in. wide; scapes axillary, stout, with the raceme up to 10 in. long, 6—10-flowered; bracts suborbicular, 0.12 in. long; flowers 1.5—2 in. in diam.; sepals obovate, spreading, petals shorter, side lobes of lip erect, ovate, acute, midlobe twice as long, pandurate, dilated at the apex, lip 2-lobed, disk with fleshy ridges, spur straight, conical, obtuse; capsules 3—4 in. long

4. *tessellata*.

Leaves narrowly ligulate, unequally, acutely 2-lobed, more than 1 ft. long; scapes few-flowered; side lobes of lip subquadrate, midlobe broadly ovate, obtusely 2-lobed, disk with 2 thick ridges, pilose at the base of the ridges and side lobes, spur conical, column slender for the genus.....5. *Wightii*.

1. *VANDA TERES*, Lindl.; F. B. I. vi. 49; King & Pantl. Ann. Calc. t. 285.

- Vizagapatam Hills at 3,300 ft. (A. W. Lushington).
 Flowers white or rose, lip yellow or reddish-brown, spotted and lined with red and purplish-brown.
2. *VANDA PARVIFLORA*, Lindl. ; F. B. I. vi. 50 ; Wt. Ic. t. 1669 ; King & Pantl. Ann. Calc. viii. t. 286.
 In all Districts in hilly tracts, 1,000—4,000 ft.
 Flowers yellow, midlobe of lip lilac or whitish with lilac lines.
3. *VANDA SPATHULATA*, Spreng. ; F. B. I. vi. 50 ; Wt. Ic. t. 915.
 In most districts, about sea-level (Sriharikota in Nellore [Fischer]) to 3,000 ft. ; usually in rather dry tracts.
 Often starting terrestrially, and later attaching itself to shrubs and becoming entirely epiphytic. Leaves and scapes often marked with blood-red spots ; flowers golden-yellow.
4. *VANDA TESSELLATA*, Hook. *V. Roxburghii*, R. Br. ; F. B. I. vi. 52 ; Wt. Ic. t. 916 ; Duthie Ann. Calc. ix. t. 116. *Epidendrum tessellatum*, Roxb. Cor. Pl. t. 42.
 In all districts, about sea-level to 2,000 ft.
 Sepals and petals tessellated yellow with brown lines and white margins, lip bluish dotted with purple. Vern. Tel. Saga.
5. *VANDA WIGHTII*, Reichb. f. ; F. B. I. vi. 54.
 Nilgiri Hills (Wight).
 A little-known species.

31. *Saccolabium*, Blume.

Epiphytic herbs ; stems leafy. *Leaves* long, linear, sometimes terete. *Flowers* solitary or in simple or branched, few to many-flowered racemes, small or moderate-sized. *Sepals* and *petals* free, spreading, recurved or incurved. *Lip* spurred, 3-lobed, rarely entire, side lobes short, erect, midlobe fleshy, spur saccate, naked within, or with calli on the front wall only. *Column* short and broad ; foot 0 or indistinct. *Anther* 1- or imperfectly 2-celled ; pollinia 2, entire or 2-partite.

Leaves very slender, terete, 2—8 in. long. *Stem* slender, 3—18 in. long ; racemes lateral, up to 3 in. long ; bracts lanceolate, minute ; sepals linear, petals orbicular, all shorter than the cylindric, obtuse spur, limb of lip ovate, acute, deflexed, side lobes erect, rounded.....1. *filiforme*.

Leaves flat:—

Spur of lip 2—3 times longer than the sepals. *Stem* 2—8 in. long ; leaves linear-lanceolate, acuminate, narrowed at the base, 2—4 in. long, .3 in. wide, straight or falcate ; racemes slender, simple, 3—6 in. long ; bracts minute ; flowers .2 in. long ; sepals oblong obtuse, dorsal concave, petals slightly smaller, spur straight, slender, tubular acuminate, mouth oblique, side lobes of lip 0, midlobe minute, acute.....2. *gracile*.

Spur of lip shorter than the lateral sepals:—

Stem 1—7 in. long, slender ; leaves linear, subacute, 1—1.5 in. long, .2 in. wide ; racemes simple or branched, longer than the leaves ; bracts minute, lanceolate, longer than the pedicel and ovary ; flowers .06—1 in. long sepals ovate, petals linear, spur saccate or subglobose, side lobes of lip small, rounded, midlobe oblong, concave.....3. *Jerdonianum*.

Stem short, stout ; leaves linear, apex very unequally bluntly or subacutely 2-lobed, 2—10 in. long, .25—6 in. wide ; racemes lateral, short, stout ; bracts broadly ovate ; flowers 2—3 in. long ; sepals and petals oblong or obovate, strongly incurved, side lobes of lip very small, midlobe broadly ovate, concave, fimbriately crose.....4. *pulchellum*.

1. SACCOLABIUM FILIFORME, Lindl.; F. B. I. vi. 56. *Sarcanthus filiformis*, Wt. Ic. t. 1684. *S. roseus*, Wt. Ic. t. 1685.
Nilgiri (Wight), Anamalai (Cotton), Pulney (Bourne, Saulière) Hills, 3,000—8,000 ft., and High Wavy Mountains (Blatter & Hallberg).
Flowers rose or orange-yellow streaked with crimson, or brick-red with an orange lip (Blatter).
2. SACCOLABIUM GRACILE, Lindl.; F. B. I. vi. 57.
Anamalai Hills; High Wavy Mountains (Blatter & Hallberg).
Rare.
Flowers white.
3. SACCOLABIUM JERDONIANUM, Reichb. f.; F. B. I. vi. 59. *Taeniophyllum jerdonianum*, Wt. Ic. t. 1756.
Malabar (Jerdon); Travancore, Udambanshola at 5,000 ft. (Meebold); Tinnevelly at Naterikal (Barber).
Rare.
4. SACCOLABIUM PULCHELLUM, Fischer n. comb. *S. nilagiricum*, Hook. f.; F. B. I. vi. 60. *Vanda pulchella*, Wt. Ic. t. 1671.
Nilgiri Hills and Quilon (Wight); Travancore (Johnson); Pulney Hills at 6,000 ft. (Anglade, Bourne); Tinnevelly Hills (Barber); High Wavy Mountains (Blatter & Hallberg).
Flowers green or yellowish passing into white, dashed with purple.

32. *Acampe*, Lindl.

Epiphytic herbs; stems usually long and stout. *Leaves* thickly coriaceous, keeled, distichous, apex oblique. *Flowers* corymbose, often paniced, fleshy. *Sepals* and *petals* flat, subsimilar, the lateral sepals adnate to the usually small spur, dorsal sepal often slightly larger than the lateral. *Lip* upcurved, saccate or spurred, adnate to the column, often tubercled or pubescent within. *Column* short, thick; foot 0. *Anther* 2-celled; *pollinia* 2, waxy, globose; *caudicle* slender, longer than the *pollinia*; *gland* small, rotund.

Stem 12—18 in. long, stout; leaves strap-shaped; apex unequally bluntly 2-lobed, 4—9 in. long, .6—1.4 in. wide; peduncles supra-axillary, stout, with several cupular sheaths; flowers .3 in. long, paniced; panicles 1.5—5 in. long; sepals elliptic or obovate-oblong, petals obovate; side lobes of lip small, rounded; midlobe ovate, obtuse, papillose; spur a short rounded sac.....1. *Wightiana*.
Stem short, very stout; leaves narrowly strap-shaped, apex unequally 2-lobed with usually a mucro between, 6—8 in. long; scape 1.5—2 in. long; flowers crowded, .4 in. long; sepals and petals oblong, spur, saccate or shortly conical, hairy within, side lobes of lip very small, midlobe rhomboid with acute angles, papillose above.....2. *congesta*.

1. ACAMPE WIGHTIANA, Lindl. *Saccolabium Wightianum*, Hook. f.; F. B. I. vi. 62. *S. praemorsum*, Hook. f. vi. 62. *Vanda Wightiana*, Wt. Ic. t. 1670. *Epidendrum praemorsum*, Roxb.; Cor. Pl. t. 43.
W. Gháts (Wight); Circars (Roxburgh); Godavari District at Kota (Narayanswami).
Flowers yellow, barred with red; lip white with red stripes.

2. *ACAMPE CONGESTA*, Lindl. *Saccolabium congestum*, Hook. f.; F. B. I. vi. 63. *S. papillosum*, Wt. Ic. t. 1672.
Malabar (Wight).
Flowers white, tinged with yellow and purple.

33. *Sarcanthus*, Lindl.

Epiphytic herbs; stems usually elongate. *Leaves* fleshy, terete or flat. *Flowers* small in extra-axillary racemes or panicles. *Sepals* subequal. *Petals* rather smaller. *Lip* adnate to the base of the column or its foot, spur funnel-shaped, sometimes dilated near the mouth, divided by a longitudinal septum into 2 loculi for part of its length, usually with calli on both walls, side lobes small, midlobe small, triangular or hastate. *Column* short, stout; foot 0, short or long. *Anther* depressed, 2-celled; pollinia 2, bifid.

SARCANTHUS PENINSULARIS, Dalz.; F. B. I. vi. 67. *S. pauciflorus*, Wt. Ic. t. 1747.

W. Gháts.

Stem slender, pendulous, leafy, 10—12 in. long; leaves linear, straight or falcately curved, obtusely acuminate, narrowed at the base, 2.5—6 in. long, .2—3 in. wide; sheaths ribbed; racemes shorter than the leaves; flowers yellow with red margins, lip white or yellowish, the side lobes often purple, sepals elliptic, obtuse, 16 in. long, petals smaller, spathulate, side lobes of lip small, acute, midlobe incurved, acute, spur conical, subacute, dilated above.

34. *Cleisostoma*, Blume.

Epiphytic herbs; stems usually elongate, leafy. *Leaves* fleshy, flat or terete. *Flowers* in extra-axillary racemes or panicles. *Sepals* and *petals* subequal, rather small, spreading. *Lip* adnate to the foot of the column, usually upcurved, 3-lobed, or the side lobes indistinct, spurred, spur conical or saccate with a callus plate within on the back wall, side lobes of lip erect, midlobe spreading or recurved. *Column* short; foot very short. *Anther* 2-celled; pollinia 2.

Stem 1—2 ft. long, rather slender; leaves scattered, oblong, apex rounded, entire or notched, base cordate, 1—2 in. long, .4—6 in. wide; flowers .3 in. long, on a short, stout, leaf-opposed peduncle; sheaths cupular; bracts cymbiform; sepals and petals oblanceolate, obtuse, side lobes of lip rather large, crenulate, midlobe sub-3-lobed, with a fleshy callus or with 2 ridges on the disk.....1. *tenerum*.
Stem 1—2 in. long; leaves distichous, imbricate, linear, apex unequally bluntly 2-lobed, slightly narrowed at the base, 3—9 in. long, .6—1 in. wide; racemes rather stout, simple or branched, 2—5 in. long, sheaths cupular; bracts minute, lanceolate, acuminate; flowers .16 in. long; sepals and petals obovate, obtuse, side lobes of lip indistinct, midlobe orbicular-ovate, spur saccate, slightly inflated at the apex, with a callus plate on the back wall.....2. *Mannii*.

1. *CLEISOSTOMA TENERUM*, Hook. f.; F. B. I. vi. 73. *Oeceoclades tenera*, Wt. Ic. t. 1683.

Nilgiris: Sispara Ghát at 5,000 ft. (Gamble); Pulney Hills: Kodaikanal at 7,000 ft. (Anglade, Bourne); High Wavy Mountains (Blatter & Hallberg).

Flowers yellow or green with red nerves, lip white.

2. *CLEISOSTOMA MANNII*, Reichb. f. ; F. B. I. vi. 74 ; Hook. f. Ann. Calc. v. t. 86.

Vizagapatam: Palkonda Hills at 1,500 ft. (Gamble).
Flowers yellow flushed with red.

35. *Taeniophyllum*, Blume.

Small epiphytic herbs; stem very short or 0, usually leafless. *Flowers* very small, usually in short few to many-flowered spikes. *Sepals* and *petals* subequal, free or united at the base. *Lip* sessile, saccate or spurred, side lobes small, broad, midlobe more or less fleshy, spur naked within. *Column* very short, broad; foot 0. *Anther* 2-celled; pollinia 4; strap short or long; gland small or fairly large.

TAENIOPHYLLUM SCABERULUM, Hook. f. ; F. B. I. vi. 77.

Travancore at Kottayam (Johnson). Very rare.

Roots filiform; peduncle 5 in. long, scaberulous; bracts broadly ovate; flowers under 1 in. long; sepals, petals and lip united at the base, lip deeply saccate with a minute incurved lobe.

36. *Diplocentrum*, Lindl.

Epiphytic herbs; stem short, leafy. *Leaves* distichous, narrow, fleshy, subterete or complicate. *Scapes* lateral, simple or branched. *Flowers* rather small, in subspiciform racemes. *Sepals* and *petals* similar, the lateral sepals usually somewhat larger. *Lip* sessile, jointed on the base of the column, spreading, entire, with 2 short spurs, epichyle fleshy. *Column* very short, truncate, 2-auricled; foot 0. *Anther* 2-celled; pollinia 2, ovoid, sulcate or 2-partite; caudicle broad; gland broad.

Stem 2—6 in. long; leaves linear, keeled, apex unequally bluntly 2-lobed, 3—6 in. long, 2—35 in. wide; panicles 5—10 in. long; lateral sepals ovate, slightly falcate, lip with 2 short narrowly conical incurved parallel spurs, epichyle oblong, rounded, disk with a median thick fleshy ridge forking near the apex

1. *recurvum*.

Stem 2—6 in. long; leaves linear, apex unequally bluntly 2-lobed, 2—6 in. long, 2—6 in. wide; panicles 5—10 in. long; lateral sepals broadly ovate, lip with 2 very short saccate-oblong, straight, slightly divergent spurs, epichyle lanceolate truncate, disk naked, somewhat thickened at base on either side.....2. *congestum*.

1. *DIPLOCENTRUM RECURVUM*, Lindl. ; F. B. I. vi. 78 ; Wt. Ic. t. 1680. *D. longifolium*, Wt. Ic. t. 1681.

Hills of South India from Horsleykonda (Gamble, Fischer) and Nundidroog to Tinnevely and Travancore.

Flowers pink and brownish tinged with pink.

2. *DIPLOCENTRUM CONGESTUM*, Wt. Ic. t. 1682 ; F. B. I. vi. 78.

Western Gháts, not common.

Flowers coloured as those of the last species.

37. *Podochilus*, Blume.

Small epiphytic herbs; stems tufted. *Leaves* many, distichous, small, flat or equitant and laterally compressed. *Peduncles* terminal or leaf-opposed. *Flowers* small or minute, racemed or spicate. Lateral *sepals* adnate to the foot of the column and forming a mentum. *Petals*

free, broad or narrow. *Lip* jointed to the foot, clawed or not, entire or somewhat 3-lobed, erect with a basal appendage. *Column* short; foot well developed; rostellum bifid or 2-partite. *Anther* erect; pollinia 4; caudicle widened upwards; gland small.

PODOCHILUS FALCATUS, Lindl.; F. B. I. vi. 80. *P. malabaricus*, Wt. Ic. t. 1748, fig. 2; F. B. I. vi. 80.

Wynaad (Drew, Barber); Malabar (Jerdon); Kavalay in Cochin at 2,000 ft. (Meebold); Travancore (Johnson).

Stem 3—12 in. long, fleshy; leaves broadly ensiform, obtuse, .5 in. long, imbricating and covering all the stem except the base; spikes slender, terminal, or terminal and lateral up to 1.5 in. long; bracts ovate-lanceolate, acuminate; flowers 5—12, white tipped with pink; lateral sepals ovate-lanceolate, dorsal, and petals lanceolate, mentum small, lip ovate-lanceolate, constricted in the middle, obtuse.

38. *Thelasia*, Blume.

Small epiphytic herbs; pseudobulbous with 1 or 2 leaves or with short compressed stems and several leaves. *Leaves* jointed on the sheath. *Scape* from the base of the pseudobulb or lateral on the stem, with 1—3 sheaths. *Flowers* very small, spicate. *Sepals* and *petals* similar, the latter smaller. *Lip* sessile on the base of the column, entire. *Column* very short; foot 0. *Anther* 2—4-celled; pollinia 8 in 2 groups of 4, minute, globose; caudicles long, filiform; gland small.

THELASIS PYGMAEA, Lindl.; F. B. I. vi. 86; King & Pantl. Ann. Calc. viii. t. 331. *Euproboscis pygmaea*, Griff.; Wt. Ic. t. 1732.

Malabar (Jerdon); Anamalai Hills: Karanir at 1,900 ft. (Fischer). Pseudobulb globose, 3—5 in. in diam.; leaves 1—2, linear, .8—2.5 in. long, .1 in. wide; scape slender, up to 3 in. long, straight or curved; sheaths up to .3 in. long; bracts ovate, acuminate; flowers hardly .1 in. long, greenish; dorsal sepal ovate-lanceolate, lateral linear-oblong, lip ovate, acute, contracted towards the tip.

39. *Vanilla*, Swartz.

Stout, terrestrial climbing, branched herbs; branches emitting adventitious roots; leafy or leafless. *Leaves* when present coriaceous or fleshy. *Racemes* usually axillary, sessile or peduncled. *Flowers* large. *Sepals* and *petals* subequal, spreading. *Lip* adnate by a claw to the base of the column and embracing it in its concave limb, entire or 3-lobed. *Column* elongate; foot 0. *Anther* incumbent, cells separate; pollen granular. *Capsule* long, fleshy, 1-celled.

Stem very thick; internodes 3—4 in. long; abortive leaves lanceolate, acuminate, .5—1.5 in. long; bracts ovate, acute, .25—4 in. long; flowers 2 in. long; sepals and petals oblong-lanceolate, subobovate, petals slightly the wider, undulate, lip entire, ovate-oblong, subacute, undulate, disk with 2 median puberulous lines

1. *Walkeria*.

Stem thick; internodes 2—4 in. long; leafless; bracts broadly ovate, subacute, about .2 in. long; flowers 1 in. or less long; sepals and petals oblong-lanceolate, subacute, lip 3-lobed, side lobes broad, rounded, midlobe rotund-ovate, subacute, disk with a median hirsute line and two densely retrorsely barbate crests

2. *Wightiana*.

1. VANILLA WALKERIAE, Wt. Ic. t. 932; F. B. I. vi. 90.
Travancore near Quilon (Wight); Jirganhalli in North Coimbatore at 3,000 ft. (Fischer).
Flowers white. Vern. *Kan.* Gundunallai.
2. VANILLA WIGHTIANA, Lindl.; F. B. I. vi. 90. *V. aphylla*, Wt. Ic. t. 931.
Travancore (Wight, Calder and Ramaswami).
Flowers white.

40. *Corymborchis*, Thouars.

Tall terrestrial, rigid, leafy herbs. *Leaves* broad, plaited. *Flowers* in axillary, sessile, spreading panicles. *Sepals* and *petals* subequal, linear or spatulate, at first cohering in a tube with spreading tips. *Lip* erect from the base of the column, linear, channelled, tip expanded and recurved. *Column* elongate, terete; apex clavate and 2-lobed or -auricled; rostellum at length 2-fid, foot 0. *Anther* narrow, acuminate, about as long as the rostellum, 2-celled; pollinia 2, clavate; caudicle subulate; gland peltate.

CORYMBORCHIS VERATRIFOLIA, Bl. *Corymbis veratrifolia*, Reichb. f.; F. B. I. vi. 91; King & Pantl. Ann. Calc. viii. t. 354.

Nilgiris (Thomson); Courtallam (Wight); Tinnevely District at Kannikatti (Barber); Cuddapa District (Beddome).

Stem up to 4 ft. high; leaves elliptic-lanceolate, caudate-acuminate, nearly sessile on the sheaths, 12—18 in. long, 3—4 in. wide; panicles 4—6 in. long; flowers 1—1.25 in. long, greenish-white; sepals and petals linear-oblongate, lip linear with the end expanded into an orbicular, apiculate recurved lobe.

41. *Tropidia*, Lindl.

Terrestrial leafy herbs; stems often branched. *Leaves* membranous, sessile, subplicate. *Flowers* small, in axillary or terminal, sessile or peduncled spikes. *Sepals* and *petals* subequal, the lateral sepals more or less connate. *Lip* sessile on the base of the column and parallel to it, cymbiform or spurred, entire, tip acute or reflexed, disk lamellate. *Column* rather short; foot 0; rostellum long, at length 2-fid. *Anther* short, erect, 2-celled; pollinia 2, clavate, 2-cleft; caudicle short or long; gland small.

TROPIDIA ANGULOSA, Bl.; F. B. I. vi. 92; King & Pantl. Ann. Calc. viii. t. 365. *Govindooia nervosa*, Wt. Ic. t. 2090.

Bababudan Hills (Law); Courtallam (Wight).

Stem 8—12 in. long, sheathed below the leaves; leaves 2—3, elliptic to broadly ovate, acuminate, base rounded or cordate, 3—6 in. long, 1.5—3 in. wide; peduncles terminal, slender in flower, up to 2 in. long; spikes many-flowered, 1—2 in. long; bracts linear, slender, spreading, 4—7.5 in. long; flowers 5—7.5 in. long, white; lateral sepals lanceolate, acuminate, connate nearly to the apex, forming a mentum and enclosing the lip and spur, dorsal sepal narrower, petals ovate-lanceolate, lip oblong, obtuse, spur cylindrical.

42. *Anoechtochilus*, Blume.

Terrestrial leafy herbs; stems creeping below. *Leaves* petioled, ovate or lanceolate, often coloured. *Flowers* moderate-sized in erect spikes. *Sepals* and *petals* free, the dorsal sepal forming a hood with the petals, the lateral spreading. *Lip* adnate to the base of the column, base spurred, side lobes small, midlobe contracted above the spur into an entire, toothed or pectinate claw, apex expanded into 2—4 wing-like lobes, spur exerted beyond the bases of the lateral sepals with 2 calli within. *Column* short, with 2 appendages in front which plunge into the spur; foot 0. *Anther* 2-celled; pollinia 2; caudicle long or short.

ANOECHTOCHILUS ELATIOR, Lindl.; F. B. I. vi. 95.

W. Gháts in or near evergreen forests, 3,000—6,000 ft.

Stem up to 8 in. long; leaves orbicular-ovate, acute, base rounded, 1—3 in. long, often velvety dark-green with golden nerves; petiole above the loose short sheath, 3—5 in. long; scape slender, glandular pubescent, as are the spike, bracts, pedicels and ovaries, up to 12 in. long, with 2—3 lanceolate sheaths; spike short, 2—12-flowered; bracts ovate-lanceolate, 5 in long; flowers pink; lip as long as the sepals, claw fimbriate, terminal lobes oblong, shorter than the claw, spur funnel-shaped, acute; appendage of column large, didymous, hatchet-shaped.

43. *Odontochilus*, Blume.

Terrestrial leafy herbs; stem creeping below. *Leaves* petioled. *Flowers* terminal, solitary, or on a few- to many-flowered spike. Dorsal *sepal* forming a hood with the petals, lateral more or less connate at the base and concealing the spur. *Lip* adnate to the base of the column, contracted beyond the spur or sac into a claw, apex lobed. *Column* short; foot 0. *Anther* 2-celled, pointed; pollinia 2, rarely 4.

ODONTOCHILUS ROTUNDIFOLIUS, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxii, 521.

High Wavy Mountains in evergreen forest (Blatter & Hallberg). Stem nodose, 6 in. high, hairy with hairs from bulbous bases; leaves few, almost orbicular, mucronate, up to 4 in. in diam.; petiole about as long, amplexicaul; flower solitary, about 4 in. long; sepals erect, oblong, petals shorter, oblong, acuminate, subfalcate, lip with a minute subsaccate spur, claw broad, entire, limb with 2 rounded side lobes and a clawed apical bifid lobe.

44. *Spiranthes*, L. C. Rich.

Terrestrial herbs; roots fibrous or tuberous; stems erect, leafy, or the flowering leafless. *Leaves* usually narrow. *Flowers* small, in erect, secund, often twisted, many-flowered spikes. *Sepals* subequal, free, the lateral gibbous at the base, and inserted obliquely on the ovary, more or less cohering with the similar petals in an erect hood. *Lip* erect, sessile or clawed, entire or 3-lobed, base concave, disk bearing calli or lamellæ. *Column* short, terete, base often decurrent on the ovary; foot 0. *Anther* erect, 2-celled; pollinia 2, 2-partite, pendulous.

SPIRANTHES SINENSIS, Ames. *S. australis*, Lindl.; F. B. I. vi. 102; Wt. Ic. t. 1724 (middle and right-hand figures); King & Pantl. Ann. Calc. viii. t. 369.

In the hills, 5,000—8,000 ft., in open dry grass-lands and in swampy places.

6—18 in. high; leaves 4—5, usually clustered near the base of the stem, linear-lanceolate to oblanceolate, obtuse or acute, 1.5—5 in. long, .2—.5 in. wide, shortly sheathing, sometimes distinctly petioled; flowers .1—.2 in. long, white or pink, in glandular-pubescent spikes 1.5—9 in. long; rhachis spirally twisted; sepals ovate-oblong, petals linear, lip sessile, 3-lobed, dilated at base and apex, base subsaccate, 2-glandular, apex subquadrate, truncate, retuse, crenulate.

Var. *Wightiana*, Lindl.; F. B. I. vi. 102; Wt. Ic. t. 1724 (left-hand figure). Stout, sheaths many, almost imbricating; flowers in a dense cylindrical spike.

Nilgiri Hills.

45. *Cheirostylis*, Blume.

Small leafy terrestrial herbs; stems decumbent and succulent at the base. *Leaves* membranous, petioled. *Flowers* small, few, racemed. *Sepals* united to the middle into a ventricose tube. *Petals* shorter, narrow. *Lip* inserted at the base of the column, erect, base saccate or cymbiform, sac with contained calli or setae, epichyle shortly clawed, apex dilated, 2-lobed, margin entire, toothed or fimbriate. *Column* short, with 2 appendages in front; foot 0; rostellum 2-cleft. *Anther* erect, 2-celled; pollinia 2, 2-partite; caudicle short; gland oblong.

CHEIROSTYLIS FLABELLATA, Wt.; F. B. I. vi. 105. *Monochilis flabellatum*, Wt. Ic. t. 1727.

Nilgiri and Pulney Hills at 6,000 ft. and upwards, growing in the humus of shady woods.

A delicate plant 4—9 in. high, probably saprophytic; leaves 4—5, thin, ovate or subrotund, acute, base rounded or subcordate, 3-ribbed, .5—1 in. long, brown tinged with red; sheaths hyaline, truncate, inflated; scape slender, glandular-pubescent; sheaths few, loose, acuminate; racemes short; flowers white, glandular-pubescent, less than .5 in. long; sepals ovate-oblong, petals linear-oblong, lip with a short saccate claw, limb spreading, suborbicular, deeply 2-lobed, the lobes sub 5-fid.

46. *Zeuxine*, Lindl.

Terrestrial herbs; stems creeping below. *Leaves* membranous. *Flowers* small in terminal racemes or spikes. *Sepals* subequal, lateral, free, enfolding the base of the lip, dorsal concave, cohering with the petals in a hood. *Lip* adnate to the base of the column, saccate or cymbiform, with a sessile or clawed entire or 2-lobed limb. *Column* short, with or without 2 processes in front; foot 0. *Anther* membranous, cells 2, contiguous; pollinia 2, pyriform with a common caudicle; gland oblong.

Leaves linear, acuminate, clasping, .75—3 in. long, .08—25 in. wide, sessile or truncate on the sheaths. Stem passing into the peduncle; leaves many passing gradually into linear bracts; racemes dense-flowered, .5—3 in. long; lateral sepals obliquely ovate-oblong, dorsal ovate, petals falcately oblong, lip not longer than the sepals, claw dilated, limb semiorbicular, sac small.....1. *strateumatica*.

Leaves ovate:—

Stem short; leaves few, ovate or ovate-oblong, acute, base rounded, .8—1.75 in. long, .3—6 in. wide, shortly petioled; sheaths short, hyaline, inflated; scape with few-flowered glandular-pubescent spike 4—10 in. long, slender, pubescent; sheaths 2—3, distant, lanceolate; sepals oblong, pubescent, lip twice as long as the sepals, basal sac with 2 spurs within, claw gradually dilated into the deeply 2-lobed, obovate-cuneate limb, lobes crenulate or coarsely toothed

2. *longilabris*.

Stem short; leaves few, ovate or ovate-lanceolate, acute, base rounded, .9—1.75 in. long, .5—75 in. wide; petiole short; sheaths hyaline, inflated; scape slender, pubescent, with the many-flowered, glandular pubescent spike 5—10 in. long; sheaths 2—3, distant, lanceolate, convolute, acuminate; bracts linear-lanceolate, acuminate, as long as the pubescent ovary; dorsal sepal saccate at base, lateral slightly shorter, ovate-lanceolate, lip lightly longer than the dorsal sepal, basal sac naked within, limb sessile, of 2 orbicular entire wings separated by a shallow apical sinus.....3. *Blatteri*.

1. ZEUXINE STRATEUMATICA, Schltr. *Z. sulcata*, Lindl.; F. B. I. vi. 106; King & Pantl. Ann. Calc. viii. t. 381. *Z. brevifolia*, Wt. Ic. t. 1725. *Z. robusta*, Wt. Ic. t. 1726.

Ganjam (Barber); Mysore (Jerdon); Walaiyar at 800 ft. (Fischer).

Stem 2—12 in. long; flowers white.

2. ZEUXINE LONGILABRIS, Benth.; F. B. I. vi. 107. *Monochilus affine*, Lindl.; Wt. Ic. t. 1728.

W. Gháts from the low country (Bourdillon) to 4,000 ft. (Fischer). High Wavy Mountains (Blatter & Hallberg).

Stem under 2 in. long; flowers white or (Blatter) olive with lip white and column orange.

3. ZEUXINE BLATTERI, Fischer in K.B. 1928 ined.

High Wavy Mountains in damp forest (Blatter & Hallberg).

Stem 3—6 in. long, rooting; sepals greenish with pale tips, petals pale pink, sac of lip orange, the limb white.

47. *Goodyera*, R. Br.

Terrestrial leafy herbs; roots fibrous, stem creeping below. *Leaves* petioled, often coloured. *Flowers* small, in terminal, sometimes twisted spikes. *Sepals* subequal, dorsal erect, concave, forming a hood with the narrow petals, lateral sepals free, erect or spreading. *Lip* inferior, sessile on the base of the column, base cymbiform or saccate, often setose within, limb entire, narrowed or acute at the apex. *Column* usually short, top cupular; foot 0. *Anther* 2-celled, cells distinct; pollinia 2, granular, pendulous; caudicle present or absent.

GOODYERA PROCERA, Hook.; F. B. I. vi. 111; Wt. Ic. t. 1729; King & Pantl. Ann. Calc. viii. t. 378.

West Coast and W. Gháts; Seshachalam Hills in the Cuddapah District at 2,500 ft. (Fischer).

Plant up to 30 in. high; leaves lanceolate, acute or obtuse, base narrowed, 1.5—8 in. long, 1—2.5 in. wide; petiole stout, 1—2 in.

long; sheath short, loose; spike 2—9 in. long, dense-flowered; bracts lanceolate, acuminate, 3 in. long, as long as the white, fragrant flowers; sepals broadly ovate, petals spathulate, lip saccate, sac softly setose within, and with 2 large calli, limb recurved, truncate.

48. *Hetaeria*, Blume.

Leafy terrestrial herbs; stem creeping below. *Leaves* petioled. *Flowers* small, in terminal, many flowered spikes, not inverted. *Sepals* free, the dorsal forming a hood with the narrower petals, the lateral embracing the base of the lip. *Lip* superior, adnate to the sides of the column, base cymbiform or subsaccate, warted within, limb usually small. *Column* short, with 2 parallel processes below; rostellum 2-toothed; foot 0. *Anther* short, 2-celled; pollinia 2, 2-lobed.

HETAERIA OVALIFOLIA, Benth.; F. B. I. vi. 115. *Goodyera ovalifolia*, Wt. Ic. t. 1730.

Couytallam in dense forest (Wight).

Whole plant 1—2 ft. high; leaves membranous, broadly elliptic, acute, base rounded, 3- or 5-ribbed, 2—4 in. long, .75—2 in. wide, often tinged with purple; petiole .5—8 in. long; sheath short, loose; scape pubescent; sheaths several, lanceolate, acuminate; spike slender, 3—4.5 in. long; rhachis, pedicels and ovaries glandular-pubescent; bracts linear-lanceolate, acuminate, .25—3 in. long; flowers white tinged with pink; sepals broadly ovate, petals obovate-oblong, lip saccate, obtusely 3-toothed, nerves with toothed calli near the base.

49. *Aphyllorchis*, Blume.

Terrestrial leafless herbs; stem simple, sheathed. *Flowers* moderate-sized, in terminal lax racemes or spikes. *Sepals* and *petals* subequal, the latter narrower. *Lip* sessile or shortly clawed on the base of the column, oblong, entire or 3-lobed. *Column* rather long; foot 0. *Anther* 2-celled, cells contiguous; pollinia 2, 2-lobed.

APHYLLORCHIS MONTANA, Reichb. f.; F. B. I. vi. 116; King & Pantl. Ann. Calc. viii. t. 349.

Mysore at Cadamanay (Barber); Anamalai Hills; Karianshola in dense evergreen forest at 2,500 ft. (Fischer).

A saprophytic, chlorophyllless plant up to 2 ft. high; sheaths near the base of the stem tubular, loose and close together, becoming smaller, lanceolate, more compact and distant upwards; racemes 4—8 in. long; flowers about .75 in. long, straw-coloured with purple tips; sepals and petals linear-oblong, obtuse, lip narrowly obovate-oblong, narrowed towards the obtuse apex, side lobes rounded at base, claw subsaccate, short, broad, with 2 linear calli.

50. *Nervilia*, Comm. ex Gaud.

Terrestrial tuberous 1-leaved herbs. *Leaf* appearing after the flowers, broadly cordate to orbicular, plicate. *Flowers* solitary or few

to many, racemose. *Sepals* and *petals* subequal, narrow. *Lip* inferior, adnate to the base of the column, sessile or almost clawed, entire, 2-fid or 3-lobed, sometimes slightly saccate at the base. *Column* elongate, broadening upwards; foot 0. *Anther* substipitate; pollinia 2, 2-fid, or 4, powdery; caudicle and gland absent.

Scape 1—3-flowered:—

Lip entire, apex emarginate, base slightly saccate. Leaf lying flat on the ground, broadly ovate or suborbicular, obtuse, acute or shortly acuminate, base cordate, many-ribbed, 2—4 in. long, dark-green mottled with purplish-brown, more or less coarsely hairy; scape 3—6 in. long; sheaths 2—3, tubular; flowers 2 or 3, about .65 in. long; sepals and petals linear-lanceolate, acuminate...1. *plicata*. Lip obovate, obtuse, 3-lobed about the middle, midlobe emarginate, crisped, not saccate. Leaf unknown; flowers 2, about .9 in. long; sepals and petals narrowly oblanceolate, acuminate.....2. *biflora*.

Scape many-flowered:—

Leaf orbicular, apex cuneate, base cordate, 7—9 ribbed, margin entire, 1.5—2.5 in. diam.; sepals and petals oblong-lanceolate, acuminate, about .6 in. long, lip 3-lobed about the middle, not saccate, side lobes small, rounded, midlobe ovate-oblong, subobtuse, crenulate, glabrous.....3. *carinata*.

Leaf orbicular or subreniform, cuspidate, base cordate, 13- or more-ribbed, margin waved, almost coarsely dentate, 4—10 in. diam; petiole 4—8 in. long; flowers about .66 in. long; sepals linear-lanceolate, acute, petals narrower, obtuse, lip 3-lobed about the middle, side lobes obtuse, midlobe ovate, acute, crisped, hairy.....4. *Aragoana*.

1. *NERVILIA PPLICATA*, Schltr. *Pogonia plicata*, Lindl.; F. B. I. vi. 119; King & Pantl. Ann. Calc. viii. t. 358.

Rampa Hills at 1,500—2,000 ft. (Narayanswami); Mysore: Chikkenhalli at 3,000 ft. (Meebold); Travancore (Calder & Ramaswami).

Sepals and petals yellowish-green, lip lilac with a yellow median line and a basal green spot.

2. *NERVILIA BIFLORA*, Schltr. *Pogonia biflora*, Wt. Ic. t. 1758; F. B. I. vi. 119. Wynaad (Jerdon).

Sepals and petals white, lip pale pink.

3. *NERVILIA CARINATA*, Schltr. *Pogonia carinata*, Lindl.; F. B. I. vi. 121; Hook. f. Ann. Calc. v. t. 94; Duthie Ann. Calc. ix. t. 124.

Mysore (Stocks); Pulney Hills (Bourne); Cochin (Wight).

Sepals and petals pale green, lip pale greenish-yellow with purple veins and spots.

4. *NERVILIA ARAGOANA*, Gaud. *Pogonia flabelliformis*, Lindl.; F. B. I. vi. 121; Duthie Ann. Calc. ix. t. 125. *P. carinata*, Wt. Ic. t. 1720.

Rampa Hills (Ramaswami); Pulney Hills (Bourne); Travancore (Calder & Ramaswami).

Sepals and petals pale green veined with purple, lip white, veined with purple, tinged with yellow near the base.

51. *Didymoplexis*, Griffith.

Slender saprophytic, leafless, tuberous, terrestrial herbs; rhizome fleshy. *Scape* simple; flexuous; raceme few-flowered; pedicels greatly elongated in fruit. *Sepals* and *petals* connate into a 2-lipped tube, the dorsal sepal and the petals forming a 3-fid upper lip, the lateral

sepals a 2-fid or entire lower lip and forming a mentum with the foot of the column. *Lip* inserted on the foot of the column, short, broad, entire, base and disk with small calli. *Column* long, broadened upwards into 2 narrow wings and 2-toothed; foot distinct. *Anther* low, shortly stipitate; pollinia 4, reniform; caudicle and gland absent.

DIDYMOPLEXIS PALLENS, Griff.; F. B. I. vi. 122; King & Pantl. Ann. Calc. viii. t. 346. *Apetalon minutum*, Wt. Ic. t. 1758.

Coorg at Sultan's Battery (Jerdon). Rare.

Stem 4—6 in. long; sheaths loose; raceme terminal, 4—8-flowered; flowers dull yellowish-white, .33 in. diam.; lip stipitate, membranous, transversely or obcuneately oblong, disk papillose.

52. Epipogon, Gmelin.

Saprophytic, leafless, brownish, terrestrial herbs; roots tuberous or coralloid; stem erect, sheathed. *Flowers* laxly racemed. *Sepals* and *petals* subequal, narrow, free, erect or spreading. *Lip* sessile at the base of the column, broad, entire or 3-lobed, spurred, disk with rows of papillæ. *Column* short; foot 0. *Anther* thick, dorsally 2-celled; pollinia 2, each with a long, filiform caudicle; gland small.

EPIPOGON NUTANS, Reichb. f.; F. B. I. vi. 124; King & Pantl. Ann. Calc. viii. t. 335. *Podanthera pallida*, Wt. Ic. t. 1759.

Coorg (Jerdon, Barber); Bolampatti Hills at 4,500 ft. (Fischer); Anamalai Hills (Barber); Pulney Hills at 5,000 ft. (Anglade).

10—24 in. high; root an oblong tuber; stem whitish- or pale-brown; sheaths short, inflated, truncate; raceme terminal, few- to many-flowered; bracts large, membranous, oblong, acute; flowers pale yellow or pinkish-white, speckled and stained with pink; sepals and petals narrowly lanceolate, .5—·7 in. long, lip entire; disk with 2 or 3 glandular ridges.

53. Epipactis, Adans.

Terrestrial, leafy herbs. *Leaves* sessile, plaited. *Flowers* racemose; bracts large, leafy. *Sepals* and *petals* broad, acuminate, strongly nerved. *Lip* sessile on the base of the column, hypochile concave or saccate, epichile contracted at the base, entire. *Column* long or short; foot 0. *Anther* erect, obtuse, 2-celled, cells contiguous; pollinia 2, 2-partite; gland globos.

EPIPACTIS CONSIMILIS, Wall.; F. B. I. vi. 126; King & Pantl. Ann. Calc. viii. t. 364.

Nilgiri Hills at Deva Shola (Lawson). Rare.

Stem 1—2 ft. high; leaves elliptic or lanceolate, obtuse or acuminate, 3—7 in. long, 1—2 in. wide, smaller upwards and passing into the large foliaceous bracts; rhachis of lax-flowered raceme pubescent; flowers, sometimes appearing solitary owing to the leaf-like appearance of the bracts, 1—1.5 in. diam.; lateral sepals falcate ovate, acute, lip nearly as long as the sepals, hypochile trough-shaped, warted within, epichile contracted at the base, then broadly lanceolate, acuminate. Sepals and petals lavender with white hairs without, green striped with brown within, hypochile purple, epichile pale brown, the apex white.

54. *Habenaria*, Willd.

Terrestrial, erect, usually leafy, unbranched herbs; roots of simple or lobed tubers and fleshy radical fibres. *Leaves* 2-many, not plaited, radical or cauline, scattered or clustered. *Flowers* 1-very many, usually terminal in spikes or racemes. *Sepals* unequal, the lateral often much larger, deflexed, dorsal oblong or ovate, more or less arched. *Petals* simple and subequal to the sepals or 2- (rarely 3-) lobed or -partite, segments often filiform. *Lip* entire, 3-lobed or 3-partite. *Spur* long, sometimes very long. *Column* erect, short; foot 0. *Anther* 2-celled, cells parallel or diverging, forming with the sides of the rostellum channels or tubes for the caudicles of the pollinia; pollinia 2, granular, with long or short caudicles and exerted, naked glands. *Stigma* 2-lobed or extended into 2 short or elongate, often clavate, papillose processes.

Petals 2-lobed or -partite:—

Stem leafy upwards:—

Petals entire at the base, 2-lobed above:—

Petals bearded, lip longer than the sepals:—

Plant 10—18 in. high; leaves 5—6 in the middle third of the stem, erect, ovate to narrow-lanceolate, acuminate, 1—3.5 in. long, .3—8 in. wide; raceme few-flowered; bracts foliaceous, sheathing; flowers about .8 in. long (excluding the spur and ovary); sepals ovate, acute or acuminate, lateral falcate, petals broader, pubescent, upper lobe much the longer, tips filiform, sinus not very deep, rounded, lip scabrid-pilose, linear at base, then 3-furcate, segments subulate, spur as long as the ovary

1. *barbata*.

Plant 10—18 in. high; leaves 3—5 in the middle third of the stem, erect, ovate- or elliptic-lanceolate, acute or acuminate, 1.5—3.5 in. long, .5—9 in. wide; raceme 5—10 flowered; bracts sheathing; flowers about 1.3 in. long (excluding the spur and ovary); sepals ovate-lanceolate, acuminate or caudate, petals longer, villose, lobes linear, elongate divaricate, sinus deep, lip glabrous, ligulate at base, then 3-furcate, segments linear, spur slender, as long as the ovary.....2. *Elwesii*.

Petals glabrous, lip not longer than the sepals. Stem 1—2 ft. high; leaves erect, linear-lanceolate, setaceously acuminate, 1—4 in. long, .2—4 in. wide; raceme few- and distant-flowered; bracts large, cymbiform, setaceously acuminate; flowers subsecund; lateral sepals broadly ovate, obtuse, petals longer than the dorsal sepal, upper lobe filiform, twice as long as the subulate lower, lip 3-lobed, lobes broad, fleshy, obtuse, lateral divergent, spur clavate at the apex, slightly shorter than the ovary.....3. *acuminata*.

Petals 2-partite almost to the base:—

Stem 10—18 in. high; leaves oblong- or lanceolate-elliptic, acute narrowed to the base, 2.5—8 in. long, 1—2 in. wide; racemes up to 1 ft. long, many-flowered; bracts sheathing, much shorter than the beaked ovary; lateral sepals ovate-falcate, acute, lobes of the petals elongate-filiform, divaricate, lip 3-partite, segments elongate-filiform, lateral much the longer, all the filiform appendages fantastically contorted, spur much curved, shorter than the ovary, tip slightly clavate, subacute; anther-cells very large

4. *multicaudata*.

Stem 10—18 in. high; leaves ovate-lanceolate, 1—4.5 in. long, .5—1.3 in. wide, acute or acuminate, base narrowed; raceme cylindric, many-flowered, up to 6 in. long; bracts foliaceous, sheathing, as long as the whole flower; sepals ovate, acute, lateral narrower, subfalcate lobes of petals erect, the lower filiform, lip 3-partite, linear, spur about as long as the ovary...5. *digitata*.

Stem leafy only at or near the base:—

Plant 3—10 in. high; leaves 1 or 2, sessile, broadly ovate or suborbicular, obtuse or acute, base cordate, .5—2.5 in. long; scape usually naked, 1—4-flowered; bracts ovate, much shorter than the shortly pedicelled ovary; sepals

ovate, lateral oblique, acute, upper segment of the petals suborbicular, lower elongate-filiform, lip 3-partite, segments subequal, lateral filiform, median linear-lanceolate, spur slender, curved clavate at the tip, longer than the ovary.....6. *grandiflora*.

Plant 2—10 in. high; leaves usually 3 or more, linear to linear-oblong, rarely ovate, narrowed to the sheath, sometimes complicate, 1—4.5 in. long, .2—1 in. wide; scape naked or with 1—2 sheaths, 1—4-flowered; bracts much shorter than the long-pedicelled ovary; sepals ovate, lateral slightly narrower, subfalcate, acute, upper lobe of petal obliquely ovate, acuminate, lower linear, longer, lip 3-partite, lateral segments linear, median shorter and broader, spur slender, curved, much longer than the ovary.....7. *variflora*.

Petals entire:—

Bracts much smaller than the leaves, not concealing the buds:—

Midlobe of the lip entire, lobes not tailed:—

Side lobes of lip broad, midlobe narrower:—

Lip not or hardly longer than the lateral sepals:—

Side lobes of lip longer than or nearly as long as the midlobe, toothed or fimbriate:—

Spur not longer than the ovary:—

Sepals and petals puberulous:—

Stem 3—8 in. high, rather stout; leaves several in the lower third elliptic to broadly ovate, acute, apiculate, base broad, 1.2—3 in. long, .4—1.1 in. wide, decreasing upwards into loose, lanceolate, acuminate sheaths; raceme dense-flowered, 1.5—3 in. long; flowers scurfily pubescent within; lateral sepals obliquely ovate, petals shorter, broader, gibbous, lip cuneately obovate, midlobe linear, side lobes broad, fimbriate, spur shorter than the ovary.....8. *cephalotes*.

Stem up to 8 in. high, rather stout; leaves 3—4 in the lower third, lanceolate, acute, 1.5—2 in. long, decreasing into a few acute sheaths below the flowers; raceme about 2 in. long, lax-flowered; bracts lanceolate, acuminate, as long as the ovary; sepals ovate, acute, petals lanceolate, acute, crenulate-denticulate, lateral lobes of lip angulate, fimbriolate, median ligulate-lanceolate, slightly longer, spur subclavate, slightly shorter than the ovary.....9. *denticulata*.

Sepals and petals quite glabrous. Stem 4—8 in. high, slender; leaves 3—5, near the base, linear to linear-oblong, acute or acuminate, 2—4 in. long, .2—1.5 in. wide; racemes 2—4 in. long, few- and lax-flowered, usually flexuous; sheaths clasping; flowers glabrous; lateral sepals ovate-oblong, subfalcate, acute, lip as broad as long, midlobe linear-lanceolate, side lobes cuneate-rhomboid, obliquely truncate, apical margin undulate or denticulate, spur equalling or shorter than the ovary.....10. *suaveolens*.

Spur much longer than the ovary:—

Ovary under 1 in. long, curved:—

Stem short, rather slender; sheaths lanceolate; leaves often subradical, elliptic to oblong-lanceolate, acute, 1—4 in. long, .3—6 in. wide; spike few- and lax-flowered; bracts lanceolate, usually shorter than the ovary; lip triangular-cuneate, side lobes lanceolate, deeply toothed on the outer margin, midlobe ligulate.....11. *Richardiana*.

Stem short, rather stout; sheaths ovate; leaves ovate-lanceolate, acute, 2—3 in. long, .5—1 in. wide; spike many- and dense-flowered; bracts broad, sheathing, as long as the ovary; lip obcordate, side lobes semi-ovate, fimbriate, midlobe ligulate, usually short.....12. *fimbriata*.

Ovary over 1 in. long, straight, long-beaked. Stem 4—16 in. high; leaves cauline, linear-oblong or lanceolate, obtuse, acute or acuminate, 2—6 in. long, .4—1 in. wide; spike 2—8-flowered; bracts shorter than the ovary; lateral sepals ovate, subacute, petals lanceolate or linear-oblong, lip 3-partite, side lobes recurved-cuneate,

apex obliquely truncate, crenate or fimbriate, midlobe linear, slightly shorter, spur twice as long as the sessile ovary, stout, apex clavate.....13. *longicornu*.

Side lobes of the lip much shorter than the midlobe, entire. Leaves 3—6, appressed to the earth, sessile, broadly elliptic or orbicular, rounded or orbicular, rounded or acute, 1.5—5 in. long; scape 4—18 in. long; stout; sheaths many, lanceolate, acuminate; spike dense-flowered; bracts much shorter than the long-beaked ovary; sepals broadly-oblong, petals linear, side lobes of lip small, rounded, midlobe lanceolate, spur slender, clavate at the tip, longer than the ovary

14. *platyphylla*.

Lip distinctly longer than the lateral sepals:—

Lip not exceeding .5 in. Leaves radical, horizontal, lanceolate- to oblong-elliptic, acute or obtuse, 1.5—6 in. long, .6—1.5 in. wide; scape 4—20 in. long; sheaths scarious, linear-lanceolate, acuminate; spike lax-flowered; bracts about half as long as the beaked ovary; sepals ovate, petals narrowly lanceolate, lip flabelliform, side lobes semi-ovate, entire or crenulate, midlobe linear, spur slender, as long as or a little longer than the ovary.....15. *plantaginea*.

Lip .7 in. or more long, spur very much longer than the ovary:—

Plant 8—30 in. high; leaves subradical, oblong to elliptic-lanceolate, acute, 1.5—6 in. long, .4—1.3 in. wide; scape with several large, convolute, acuminate sheaths; flowers 1—4; bracts convolute, sheathing the pedicels with the ovaries usually entirely exerted; lateral sepals obliquely ovate, petals linear-oblong, lip .8—1.1 in. long, puberulous, side lobes divaricate, cuneate, apex obliquely truncate, crenate or denticulate, midlobe linear, spur long, slender above, thickened from the middle to the subacute apex, reaching 5.5 in. long

16. *longicalcarata*.

Plant 4—18 in. high; leaves subradical or cauline, linear to elliptic-lanceolate, obtuse or acute, 1.5—5 in. long, .4—1 in. wide; scape with several lanceolate, finely acuminate sheaths; flowers 1—7; bracts lanceolate finely acuminate, shorter than the sessile, beaked ovary; lateral sepals ovate, petals lanceolate, acute, lip .7—9 in. long, glabrous, side lobes rhomboid-cuneate, apex oblique, fimbriate, midlobe linear, spur long, very variable, slender or rather stout, thickened to the blunt apex, reaching 5 in. long.....17. *decipiens*.

Side lobes of lip filiform or linear, midlobe as broad or broader:—

Stem 2—3 ft. high, sheathed below, leafy above; sheaths below the spike bract-like, lanceolate, caudate; leaves oblong or oblong-lanceolate, finely acuminate, 2.5—6 in. long, .7—1.3 in. wide; spike 4—8 in. long, many-flowered; bracts 1—1.5 in. long, linear-lanceolate, setaceously acuminate, exceeding the body of the ovary without the beak; lateral sepals very gibbous, hatchet-shaped, shortly beaked, nearly .5 in. long, with several arched nerves, dorsal orbicular, hooded, shortly beaked, lip linear at base, then 3-lobed, side lobes filiform, midlobe shorter, linear, spur long, slender, incurved; beak of ovary slender, as long as or longer than the body.....18. *commelinifolia*.

Lateral sepals not gibbous, nerves straight or nearly so; ovary not or very shortly beaked:—

Stem leafy upwards:—

Bracts not cucullate; flowers not or hardly secund. Stem 6—18 in. high; leaves linear to elliptic, acuminate, very narrowly margined, 1—5 in. long, .3—8 in. wide; spike cylindrical, many-flowered, up to 4 in. long; bracts lanceolate, as long as or longer than the ovary; perianth puberulous, sepals broadly oblong, petals triangular-ovate, lip as long as the sepals, wedge-shaped, basal half entire, 3-lobed beyond the middle, lobes linear-lanceolate, outer margins of lateral lobes usually denticulate, spur as long as or slightly longer than the incurved, shortly beaked ovary.....19. *elliptica*.

Bracts cucullate; flowers secund. Plant 4—15 in. high; leaves subimbricate sheathing, ovate to linear, acute, .75—2.5 in. long; spike 2—4 in. long; bracts cymbiform, acuminate, sheathing the flowers, lower 1 in. long, smaller upwards; sepals subequal, obtuse, petals as long, narrower, lip as long, 3-partite, side lobes linear, obtuse, usually shorter than the broader midlobe, spur subclavate, as long as or shorter than the beakless ovary.....20. *Heyneana*.

Leaves radical or clustered at the middle or near the base of the stem :—
Leaves 3 or more, clustered at the middle or near the base of the stem :—

Leaves clustered near the middle of the stem, narrowed to the base :—

Robust plants attaining over 3 ft. in height; sheaths above the leaves many, erect, lanceolate; leaves elliptic-lanceolate to oblanceolate, acute or acuminate, 3—10 in. long, .7—2.5 in. wide; spike cylindric, up to 12 in. long, bracts linear-lanceolate, setaceously acuminate, as long as or longer than the ovary; sepals subequal, ovate-oblong, obtuse, petals as long, lip much longer, side lobes narrow, longer than the linear, obtuse midlobe, spur slender, incurved, usually shorter than the ovary.....21. *affinis*.

Slender or robust plants 1—2 ft. high; sheaths above the leaves few, lanceolate, acuminate; leaves elliptic-lanceolate to oblanceolate, acute or acuminate 3—9 in. long, .9—2.75 in. wide; spike elongate, up to 18 in. long, lax-flowered; bracts ovate-lanceolate, acuminate, usually shorter than the ovary; sepals subequal, lateral ovate, obtuse, petals as large, lip as long as or slightly longer than the sepals, side lobes linear-oblong, incurved, as long as or shorter than the ovate-oblong fleshy midlobe, spur slender, incurved, rather longer than the ovary, apex thickened, acute.....22. *ovalifolia*.

Leaves clustered near the base of the stem, not narrowed to the base :—

Plant 3—12 in. high, rather stout; leaves oblong or linear-oblong, obtuse or acute, 1.75—5 in. long, .4—1.1 in. wide; margins yellow, sheaths lanceolate, acuminate, margined; spike 2—6 in. long, many-flowered; bracts lanceolate, ciliolate, finely acuminate, as long as or longer than the ovary; sepals subequal, lateral oblong-lanceolate, .25 in. long, petals ovate-falcate, lip longer than the sepals, side lobes linear, slender, longer than the linear, obtuse midlobe, spur stout, as long as or shorter than the curved ovary, apex inflated.....23. *marginata*.

Plant 3—15 in. high, slender; leaves linear to linear-lanceolate, acute or acuminate, not margined, 1—4 in. long, .2—5 in. wide; sheaths small, linear, acuminate; spike slender, 2—5 in. long, dense- or lax-flowered; bracts ovate-lanceolate, acute, eciliolate, much shorter than the ovary; lateral sepals broadly oblong, .15 in. long, dorsal and broadly obliquely ovate petals shorter, lip slightly longer than the sepals, lobes slender, subequal, spur slender, as long as the ovary, slightly thickened below

24. *viridiflora*.

Leaves 2, rarely 3, radical :—

Plant 6—21 in. high; stem with many ovate-lanceolate, acuminate, imbricate or subimbricate sheaths; leaves fleshy, broadly ovate to orbicular, sometimes broader than long, rounded or acute, base cordate, 1—4.5 in. long; spike 2—12 in. long, many-flowered; bracts ovate, acuminate, as long as the ovary; sepals subequal, lateral ovate-oblong, obtuse, lip as long as the sepals, lobes linear-lanceolate, subequal or the lateral slightly shorter, spur as long as the beaked ovary.....25. *crassifolia*.

Plant 3—10 in. high; stem slender with distant, short, lanceolate, acute or acuminate sheaths; leaves appressed to the ground, orbicular, rounded or acute, base cordate, .75—2 in. in diam, the pair unequal in size; spike 1.5—4 in. long; bracts ovate, acuminate, shorter than

the ovary; sepals ovate, acute, petals linear, subfalcate, acute, as long as the lateral sepals, lip longer than the sepals, lobes filiform, lateral longer, usually spreading, spur about as long as the ovary, inflated, acute.....26. *diphylla*.

Midlobe of the lip 2-lobed, all the lobes with long filiform tails. Plant 2—21 in. high, leafy near the base; leaves oblong-lanceolate, acute, narrowed to the base, 1.5—6 in. long, .4—1.5 in. wide; spike dense-flowered, 2—4 in. long; bracts ovate-lanceolate, acuminate, about half as long as the ovary; lateral sepals obliquely ovate, dorsal and linear petals shorter, lip 3 times as long as the lateral sepals, side lobes cuneiform, midlobe flabelliform, the 2 segments semi-ovate, with a small mucro in the sinus, outer margin of all 4 segments toothed with the inner angle of each caudate, spur slender, incurved, apex clavate, longer than the beaked ovary.....27. *crinifera*.

Bracts large, foliaceous, imbricating, almost concealing the flowers. Plant 8—30 in. high, very stout; leaves imbricating, ovate or ovate-lanceolate, acute, amplexicaul, 1—3.5 in. long, .5—1 in. wide, gradually passing into the broadly ovate, cymbiform bracts; spike 3—8 in. long; bracts longer than and completely concealing the ovary and spur; sepals erect, ovate-oblong, obtuse, concave, .5—7 in. long, petals as long, linear, obtuse lip as long, coriaceous, 3-lobed, cuneately obovate, obtuse, claw geniculate, side lobes linear-oblong, obtuse, incurved, shorter than the triangular-ovate midlobe, spur subclavate, about as long as the ovary.....28. *Perrottetiana*.

1. *HABENARIA BARBATA*, Wight; F. B. I. vi. 133. *Ate virens*, Lindl.; Wt. Ic. t. 928.

W. Gháts; Venkatagiri Drug in Cuddapah.
Flowers white.

2. *HABENARIA ELWESII*, Hook. f.

Nilgiris (Proudlock); Mysore at Cadamany near Saklaspur (Barber).
Flowers white.

3. *HABENARIA ACUMINATA*, Thw.; F. B. I. vi. 133.

Anamalai Hills at 5,000 ft. and Peermade in Travancore at 4,000 ft. (Beddome).
Sepals and petals yellowish-green, lip purple, petals sometimes purple.

4. *HABENARIA MULTICAUDATA*, Sedgw.

Nilgiri Hills; Anamalai Hills in Karianshola at 2,200 ft. (Beddome, Fischer).
Flowers greenish-white, lip and spur brownish.

5. *HABENARIA DIGITATA*, Lindl.; F. B. I. vi. 134; Hook. f. Ann. Calc. v. t. 95. *H. trinervia*, Wt. Ic. t. 1701.

Hill tracts from the Godavari District and Mysore to Tinnevely, 2,000—6,000 ft.
Flowers green.

Var. *foliosa*, Hook. f.; F. B. I. vi. 135. *H. foliosa*, A. Rich.; Wt. Ic. t. 1700. Smaller; leaves shorter and broader, imbricating; raceme dense-flowered; segments of lip filiform; bracts shorter.

Nilgiri Hills at 7,000—8,000 ft.

Var. *travancorica*, Fischer. *H. travancorica*, Hook. f.; F. B. I. vi. 135. Leaves ovate-oblong; flowers much smaller; sepals pubescent within.

Pulney Hills, 4,000—7,000 ft.

Var. *Gibsoni*, Fischer. *H. Gibsoni*, Hook. f.; F. B. I. vi. 135. More robust; leaves longer and narrower; flowers much larger, fewer; no ligule in the mouth of the spur.

Mysore (Law).

6. *HABENARIA GRANDIFLORA*, Lindl.; F. B. I. vi. 136.
Bababudan (Law) and Shevaroy (Perrottet) Hills.
Flowers white.
7. *HABENARIA RARIFLORA*, A. Rich.; F. B. I. vi. 136; Wt. Ic. t. 924.
W. Gháts, 2,000—6,000 ft.; Horsleykonda at 4,100 ft. (Fischer);
Kollimalai Hills (Barber).
Flowers white.
8. *HABENARIA CEPHALOTES*, Lindl.; F. B. I. vi. 139; Wt. Ic. t. 1711.
Nilgiri Hills at high elevations.
Flowers white.
9. *HABENARIA DENTICULATA*, Reichb. f.
Nilgiri Hills. Very rare.
10. *HABENARIA SUAVEOLENS*, Dalz.; F. B. I. vi. 140.
Bababudan Hills (Law).
Flowers white, fragrant.
11. *HABENARIA RICHARDIANA*, Wt. Ic. t. 1713; F. B. I. vi. 139.
Nilgiri and Anamalai Hills.
Flowers white.
12. *HABENARIA FIMBRIATA*, Wt. Ic. t. 1712. *H. polyodon*, Hook. f.;
F. B. I. vi. 139.
Nilgiri Hills (Wight, Gamble), 5,000—7,000 ft.
Flowers white.
13. *HABENARIA LONGICORNU*, Lindl.; F. B. I. vi. 139. *H. montana*,
A. Rich.; Wt. Ic. t. 927, fig. 1, and t. 1714, centre fig. only.
W. Gháts from Mysore to Travancore, 3,000—6,500 ft.;
Horsleykonda at 4,100 ft. (Fischer); Kollimalai Hills (Barber).
Flowers white.
14. *HABENARIA PLATYPHYLLA*, Spreng.; F. B. I. vi. 140; Wt. Ic. t. 1709.
Orchis plantaginea, Roxb. Cor. Pl. t. 37.
In all Districts, near sea-level to 3,500 ft.
Flowers white.
15. *HABENARIA PLANTAGINEA*, Lindl.; F. B. I. vi. 141; Wt. Ic. t. 1710;
Duthie Ann. Calc. ix. t. 132.
In all Districts, 800—4,000 ft.
Flowers white.
16. *HABENARIA LONGICALCARATA*, A. Rich.; F. B. I. vi. 141; Wt. Ic.
t. 925.
Throughout the W. Gháts; Ramandrug in the Bellary District
(A. W. Lushington).
Flowers white, spur green.
17. *HABENARIA DECIPIENS*, Wight; F. B. I. iv. 197. *H. longicalcarata*,
Hook. f. (not of A. Rich.) in part; F. B. I. vi. 141. *H. montana*,
Wt. Ic. t. 927 and t. 1714, all but the centre fig.
W. Gháts from the Nilgiri to the Tinnevelly Hills, 4,000—7,000
ft., Shevaroy Hills (Bourne).
Flowers white.

18. *HABENARIA COMMELINIFOLIA*, Wall.; F. B. I. vi. 143; Duthie Ann. Calc. ix. t. 134.
Bababudan Hills (Law).
Flowers white.
19. *HABENARIA ELLIPTICA*, Wt. Ic. t. 1706; F. B. I. vi. 147.
Pulney Hills, 7,000—8,000 ft.
Flowers greenish-white.
20. *HABENARIA HEYNEANA*, Lindl.; F. B. I. vi. 148; Wt. Ic. t. 923. *H. subpubens*, A. Rich.; F. B. I. vi. 148.
W. Gháts in grasslands, 5,500—8,000 ft.; Shevaroy Hills (Bourne).
Flowers greenish-yellow.
21. *HABENARIA AFFINIS*, Wt. Ic. t. 1707; F. B. I. vi. 149.
Nilgiri and Anamalai Hills; Rampa Hills (V. Narayanswami), 2,000—4,000 ft.
Flowers green.
22. *HABENARIA OVALIFOLIA*, Wt. Ic. t. 1708; F. B. I. vi. 149.
W. Gháts, 2,000—4,000 ft.
Flowers pale-green.
23. *HABENARIA MARGINATA*, Coleb; F. B. I. vi. 150; Duthie Ann. Calc. ix. t. 136.
W. Gháts 1,500—3,000 ft.; Nallamalai Hills at 1,500 ft. (Fischer).
Flowers yellow.
24. *HABENARIA VIRIDIFLORA*, R. Br.; F. B. I. vi. 150; Wt. Ic. t. 1705.
Low country, often in rice-fields.
Flowers green.
25. *HABENARIA CRASSIFOLIA*, A. Rich.; F. B. I. vi. 151. *Platanthera brachyphylla*, Lindl.; Wt. Ic. t. 1694.
Nilgiri and Pulney Hills, 6,000—7,000 ft.
Flowers greenish-white, spur green.
26. *HABENARIA DIPHYLLA*, Dalz.; F. B. I. vi. 151; Duthie Ann. Calc. ix. t. 137. *H. Jerdoniana*, Wt. Ic. t. 1715.
W. Coast from Kanara to Travancore at low elevations.
Flowers greenish-white.
27. *HABENARIA CRINIFERA*, Lindl.; F. B. I. vi. 142; Wt. Ic. t. 926.
W. Gháts below 4,000 ft.
Flowers white.
28. *HABENARIA PERROTTETIANA*, A. Rich.; F. B. I. vi. 164. *Platanthera lutea*, Wt. Ic. t. 919.
W. Gháts, 5,500—7,500 ft.
Flowers yellow.

55. *Peristylus*, Blume.

Terrestrial erect, usually leafy, unbranched herbs; roots of simple or lobed tubers and fleshy, radical fibres. *Leaves* not plaited. *Flowers* usually small, in terminal spikes or racemes. *Sepals* and *petals* subequal, more or less connivent, the dorsal sepal forming a hood with the petals, the lateral sepals usually erect. *Lip* entire or 3-lobed. *Spur* usually very short, often scrotiform. *Column* very short; foot 0. *Anther* erect, 2-celled, cells parallel, adnate to the column and not

forming channels or tubes for the caudicles; pollinia 2; caudicles short; glands naked, exserted. *Stigma* sessile.

Leaves scattered or imbricate on the stem, not clustered:—

Spur equalling or longer than the sepals:—

Plant 8—24 in. high, usually rather stout; leaves lanceolate or ovate-lanceolate, acute or acuminate, 1—3 in. long, .2—75 in. wide; spike 2—10 in. long, usually dense-flowered; lateral sepals linear, obtuse, petals as long, elliptic, obtuse, lip with a concave claw, side lobes filiform, recurved over the flower, longer than the sepals and the linear or triangular obtuse midlobe, spur stout, clavate, incurved.....1. *Richardianus*.

Plant 4—20 in. high, usually slender; leaves confined to the lower half or two-thirds of the stem, reduced to small sheaths above, lanceolate or linear-lanceolate, obtuse, acute or acuminate, 1—4 in. long, 15—7 in. wide; spike narrow, 1—6 in. long, lax-flowered; lateral sepals linear, obtuse, petals triangular-ovate or oblong, obtuse, lip excavate at base, side lobes subulate, as long as or slightly longer than the sepals, spreading, longer than the broader, obtuse midlobe, spur slender, straight, not thickened below

2. *stenostachyus*.

Spur much shorter than the sepals:—

Lip 3-partite nearly to the base, side lobes filiform:—

Plant 4—12 in. high; stem with a few loose, subcucullate sheaths below; leaves ovate to lanceolate, acute or acuminate, .9—2.3 in. long, .2—6 in. wide; bracts ovate-lanceolate, as long as or longer than the flowers; lateral sepals linear, obtuse, petals as long, oblong-lanceolate, obtuse, lip to end of the midlobe as long as the sepals, side lobes filiform, much longer than the linear, obtuse midlobe, spur small, globose or ellipsoid

3. *brachyphyllus*.

Plant 6—24 in. high; stem leafy to the base or only in the upper half with loose sheaths below; leaves ovate to elliptic-lanceolate, acute or acuminate, .8—3 in. long, .3—7 in. wide; bracts lanceolate, acuminate, usually shorter than the flowers; sepals linear-lanceolate, petals as long, ovate-oblong, lip to end of midlobe shorter than the sepals, side lobes filiform, much longer than the ligulate, obtuse midlobe, spur saccate, obtuse

4. *lanceifolius*.

Lip entire in the lower half, 3-cleft beyond the middle. Plant 6—18 in. high; stem leafy, often flexuous; leaves elliptic to linear-lanceolate, obtuse, acute or acuminate, 1—2.75 in. long, .2—6 in. wide; spike slender, 2—10 in. long, spirally twisted; flowers secund; bracts narrowly lanceolate, finely acuminate, equalling or exceeding the very small flowers; lateral sepals linear, obtuse, falcate, petals as long, linear or ovate-oblong, lip rather longer than broad, lobes linear, lateral acute, spreading narrower than the obtuse midlobe, spur very small, globose.....5. *spiralis*.

Leaves clustered about the middle of the stem:—

Side lobes of lip filiform. Plant 7—18 in. high, very slender; stem above the leaves naked or with very few slender short sheaths; leaves thinly membranous, 3—6, elliptic-ovate to narrowly lanceolate, acute or acuminate, narrowed into the loose sheath, 1.3—4 in. long, .4—1.1 in. wide; spike very slender, 2—6 in. long; flowers distant; bracts lanceolate, as long as or shorter than the ovaries; sepals linear, obtuse, petals as long, oblong, lip much longer than the sepals, midlobe ligulate, obtuse, spur clavate, equalling or shorter than the sepals

6. *aristatus*.

Side lobes of lip not filiform:—

Spur equalling or exceeding the sepals, clavate. Plant 6—18 in. high; stem slender, with several loose sheaths below the leaves; leaves broadly obovate or elliptic or lanceolate, obtuse, acute or acuminate, narrowed to the sheath and usually shortly petiolate, 2—6 in. long, .5—1.6 in. wide; spike narrow, twisted, 2—6 in. long; bracts ovate-lanceolate, acuminate, shorter or longer than the ovary; flowers very small; sepals oblong, obtuse, petals obliquely ovate, obtuse, lip longer than the sepals, obtusely 3-lobed, lobes shallow or deep, subequal, linear-oblong.....7. *Stocksii*.

Spur shorter than the sepals, globose or subglobose:—

Plant 1—3 ft. high; stem usually very stout; leaves oblong- or elliptic-lanceolate, acute, narrowed into the broad sheath, 2.5—10 in. long, 1.25—3.25 in. wide; spike 4—12 in. long, very dense-flowered; bracts linear-lanceolate, equalling or exceeding the ovaries; sepals linear to ovate-oblong, obtuse, petals gibbously ovate, lip as long as the sepals, 3-lobed, lobes various, spur minute.....8. *goodyeroides*.

Plant 12—30 in. high; stem rather stout; leaves linear- to oblong-lanceolate, acute, base narrowed into the sheath, 4—9 in. long, 1.1—3.6 in. wide; spike narrow, 4—9 in. long, many-flowered; bracts lanceolate, acuminate, as long as or longer than the very small flowers; sepals oblong, obtuse, petals obliquely orbicular, lip shorter than the sepals, broad, entire or very shortly 3-lobed, spur very small.....9. *plantagineus*.

1. PERISTYLUS RICHARDIANUS, Wt. Ic. t. 1697. *Habenaria bicornuta*, Hook. f.; F. B. I. vi. 156.
Nilgiri and Pulney Hills, 5,500—7,500 ft.
Flowers greenish-white.
2. PERISTYLUS STENOSTACHYUS, Krzl. *Habenaria stenostachya*, Benth.; F. B. I. vi. 156. *H. peristylodes*, Wt. Ic. t. 1702.
Bababudan and Pulney Hills; High Wavy Mountains (Blatter & Hallberg).
Flowers white.
3. PERISTYLUS BRACHYPHYLLUS, A. Rich. *Habenaria malabarica*, Hook. f.; F. B. I. vi. 159.
Bababudan and Nilgiri Hills.
4. PERISTYLUS LANCIFOLIUS, A. Rich. *P. robustior*, Wt. Ic. t. 1699. *Habenaria robustior*, Hook. f.; F. B. I. vi. 160.
W. Gháts, 6,000—7,000 ft.
Flowers white or pinkish-white.
5. PERISTYLUS SPIRALIS, A. Rich.; Wt. Ic. t. 1696. *Habenaria torta*, Hook. f.; F. B. I. vi. 159.
Bababudan and Nilgiri Hills, 5,000—7,500 ft.; Travancore (Johnson).
Flowers greenish-white.
6. PERISTYLUS ARISTATUS, Lindl. *P. exilis*, Wt. Ic. t. 1698. *Habenaria aristata*, Hook. f.; F. B. I. vi. 158; King & Pantl. Ann. Calc. viii. t. 409.
W. Gháts up to 7,000 ft.
Flowers green.
7. PERISTYLUS STOCKSII, Krzl. *Habenaria Stocksii*, Hook. f.; F. B. I. vi. 158.
Mysore (Stocks).
Flowers yellowish.
8. PERISTYLUS GOODYEROIDES, Lindl. *Habenaria goodyeroides*, Don.; F. B. I. vi. 161; King & Pantl. Ann. Calc. viii. t. 430.
W. Gháts, 2,000—4,000 ft.
Flowers greenish-white.
9. PERISTYLUS PLANTAGINEUS, Lindl.; Wt. Ic. t. 921. *Habenaria Wightii*, Trim.; F. B. I. vi. 162. Rampa Hills (V. Narayanswami); Anamalai Hills, 2,000—2,300 ft. (Fischer); Travancore (M. Rama Rao); Malabar.
Flowers white.

56. *Platanthera*, L. C. Rich.

Terrestrial, erect, unbranched, leafy herbs; roots of ovoid-globose, rarely lobed tubers. *Leaves* not plaited. *Flowers* small or large in lax or dense terminal spikes or racemes. *Sepals* unequal, lateral spreading or reflexed, dorsal forming a hood with the narrower petals. *Lip* entire or 3-lobed, spur short or long. *Column* very short, with a warty protuberance on either side; foot 0. *Anther* erect, 2-celled, cells parallel or divergent, adnate to the sides of the rostellum, broad; pollinia 2, granular, widely separated; caudicles short or long, glands naked, exserted. *Stigmas* sessile or sessile, more or less confluent, often pulvinate.

PLATANTHERA SUSANNAE, Lindl.; Wt. Ic. t. 920. *Habenaria Susannae*, R. Br.; F. B. I. vi. 137; Duthie Ann. Calc. ix. t. 129.

Widely distributed from Ganjam to the South, 300—6,000 ft., but never common or gregarious.

A stout herb 1.5—4 ft. high; leafy up to the inflorescence; leaves ovate-oblong to oblong-lanceolate, acute or acuminate, 2—8 in. long, 1.3—2.6 in. wide, decreasing into the large leafy bracts; flowers 3—6, white, fragrant, 2—3 in. in diam.; lateral sepals obliquely subquadrately oblong, dorsal shorter, broadly rhomboid, petals linear, acute, lip as long as the lateral sepals, side lobes cuneately flabellate, deeply pectinate, midlobe linear acute or spatulate, subacute, spur slender, 3.5—5 in. long.

57. *Phyllomphax*, Schlechter.

Terrestrial, erect, unbranched, leafy herbs; roots tuberous. *Leaves* not plaited. *Flowers* medium-sized, in the axils of sheathing leaves. *Sepals* and *petals* subequal, petals entire. *Lip* broad, entire, petaloid, spur short, conical. *Column* short; foot 0; rostellum more or less 2-toothed. *Anther* erect, 2-celled; pollinia 2, granular. *Stigmas* sessile, concave.

PHYLLOMPHAX OBCORDATA, Schltr. *Habenaria galeandra*, Benth.; F. B. I. vi. 163. *Platanthera iantha*, Wt. Ic. t. 1692. *P. affinis*, Wt. Ic. t. 1693.

W. Gháts, 6,000—8,000 ft.; common in grass-lands.

Plant 5—15 in. high, very variable, slender or robust; leafy throughout, or leaves reduced to sheaths below the middle; leaves broadly ovate to lanceolate, acute, amplexicaul, .6—2.3 in. long, .2—1.1 in. wide, usually imbricating but sometimes scattered; bracts leaf-like and but little smaller; flowers white with the lip spotted with purple or the whole flower pale to deep lilac, more or less puberulous; sepals and petals erect, arching over the column, lateral sepals somewhat gibbous, lip much larger, obcordate, truncate or emarginate and with or without a terminal cusp, margins more or less crenulate.

There are 3 or 4 varieties, but they run into one another. The best defined is—

Var. *iantha*, Hook. f. (not of Wight), with much larger flowers, and the lip usually deeply emarginate without a cusp.

58. *Satyrium*, Swartz.

Terrestrial, erect, leafy, unbranched herbs; roots tuberous. *Leaves* not plaited. *Sepals* and *petals* subequal, free, spreading or deflexed. *Lip* superior, sessile at the base of the column, erect, hooded, broad, 2-spurred or -saccate behind. *Column* erect, terete; foot 0. *Anther* dorsal, cells subparallel; pollinia 2, caudicles recurved; glands large, naked. *Stigma* terminal, broad, concave, or forming with the rostellum a 2-lipped body.

SATYRIUM NEPALENSE, Don.; F. B. I. vi. 168; King & Pantl. Ann. Calc. viii. t. 444. *S. Perrottetianum*, A. Rich.; Wt. Ic. t. 1716. *S. albiflorum*, A. Rich.; Wt. Ic. t. 1717. *S. Wightianum*, Lindl.; Wt. Ic. t. 1718.

In hilly tracts from the Bababudan Hills southwards, 4,000—8,000 ft., in grassy, often marshy land.

Plant 6—30 in. high; stem usually stout, sheathed above; leaves few, very variable, lanceolate, ovate, oblong or suborbicular, acute, 2—8 in. long, 8—4.4 in. wide; spikes usually dense and many-flowered, 1—8 in. long; bracts much larger than the flowers, oblong or lanceolate; flowers white to dark pink fragrant; lip broadly oblong, concave, strongly keeled behind, variable in size in relation to the sepals and petals, spurs variable in length and thickness, about as long as the ovary.

There are several not very well defined varieties.

59. *Disperis*, Swartz.

Small, terrestrial, unbranched herbs; roots tuberous. *Leaves* 1 or more, sessile, cordate. *Flowers* solitary or in few-flowered racemes, terminal. *Sepals* dissimilar, dorsal very narrow, cohering with the petals into a subglobose hood, lateral spreading or deflexed, free or connate at the base, often subsaccate. *Lip* adnate to the column to above the anther. *Column* short, terete below; foot 0. *Anther* oblong, completely 2-celled; pollinia 2, coarsely granular, cuneiform; caudicles rather long, usually twisted; glands large, naked. *Stigmas* on a transverse hyaline membrane, the ends of which form tubular, usually twisted processes sheathing the caudicles and glands.

Plant 2—15 in. high; stem slender or rather stout, usually flaccid, with 1 or 2 basal sheaths; leaves 1—3, ovate to suborbicular, acute, base amplexicaul, 3—1.6 in. long; flowers 1—4; bracts like the leaves, but smaller; lateral sepals oblong, united at the base, concave, each with a fovea near the base, petals demi-lunate, lip T- or Y-shaped, the vertical limb incurved with a dilated conical tip, arms falcately recurved over the anther; caudicles and their tubes twisted

1. *neilgherrensis*.
Plant 2—4 in. high; stem slender, with a single basal sheath; leaf solitary, rarely 2, rotund-cordate, subacute, amplexicaul, 3—7 in. long; flowers 1—3; bracts like the leaves, but smaller; lateral sepals spreading, broadly falcate-ovate, not concave, each with a small saccate spur near the base, petals broadly demi-lunate, lip with the midlobe 3-lobed, side lobes channelled below, strongly recurved; caudicles and their tubes not twisted.....2. *monophylla*.

1. *DISPERIS NEILGHERRENSIS*, Wt. Ic. t. 1719; F. B. I. vi. 169. *D. zeylanica*, Trim.; F. B. I. vi. 169.

W. Gháts; 4,500—8,400 ft.

Flowers white or reddish with crimson spots.

2. *DISPERIS MONOPHYLLA*, Blatter in Journ. Bomb. Nat. Hist. Soc. 1928 ined.

High Wavy Mountains (Blatter & Hallberg).
Flowers greenish, white at base, veins purple.

60. *Paphiopedilum*, Pfitzer.

Terrestrial, rarely epiphytic herbs. *Leaves* coriaceous, plicate before expansion, oblong or lorate, keeled below, sulcate above. *Flowers* solitary or few, terminal, large. *Sepals* and *petals* free or lateral connate. *Lip* sessile, side lobes small, spreading or inflexed, midlobe large, saccate, inflated oblong or helmet-shaped. *Column* short, stout; foot 0. *Anthers* 2, subglobose; pollinia 2, granular. *Stigma* disciform, deflexed, concealed with the anthers beneath a large disciform staminode.

PAPHIOPEDILUM DRURYI, Pfitz. *Cypripedium Drurii*, Bedd. Ic. Pl. Ind. Or. t. 112; F. B. I. vi. 172.

Travancore Hills, 5,000—6,000 ft.

Terrestrial herb with thick succulent root-fibres; leaves radical, thickly coriaceous, ligulate, apex oblique, subacute, 7—12 in. long, about 1.5 in. wide; scape 7—12 in. long, purple-pubescent; bract sheathing, ovate acute, about one-third the length of the ovary; flower solitary, about 3 in. in diam., yellowish-green streaked and blotched with reddish-purple, warts and hairs black; dorsal sepal broadly ovate, ciliolate, arched, petals linear-oblong, warted and hirsute towards the base, lip helmet-shaped, as long as the petals.

Family CXLIX. ZINGIBERACEAE.

Perennial herbs, often very large; usually with fleshy rhizomes and thick roots. *Leaves* usually vaginate, the sheaths usually ligulate. *Flowers* moderate- to large-sized, often showy, usually zygomorphic and bracteate, trimerous. *Calyx* tubular or spathaceous, 3-lobed or -toothed, often colourless. *Corolla* funnel-shaped below, 3-lobed above, the dorsal segment usually somewhat cucullate, generally differing from and often larger than the other two. *Stamens* only one (the dorsal of the inner whorl) perfect, the other two combined in a petaliferous lip usually embracing the fertile one; the outer whorl absent or represented by 1, 2 or 3 staminodes more or less petaloid or reduced to teeth. *Anther* of fertile stamen 2-celled, introrse; connective often produced or variously appendaged. *Ovary* inferior, usually 3-, rarely 1—2- or more-celled; style long and delicate, often lying in a groove in the stamen; stigma usually funnel-shaped. *Ovules* numerous. *Fruit* usually capsular but sometimes dehiscent late, or indehiscent or breaking up irregularly. *Seeds* more or less arillate, sometimes aromatic, ellipsoid or variously angled; perisperm large and mealy enclosing the endosperm. *Embryo* straight, cylindrical or clavate.

Ovary 1-celled, placentas 3, parietal.....1. *Globba*.

Ovary 3-celled, placentas axile:—

Lateral staminodes large and broad:—

Connective of anther spurred at the base; spike crowned by a coma; corolla-tube funnel-shaped.....2. *Curcuma*.

Connective of anther not spurred; spike not crowned by a coma; corolla-tube long and slender:—

Stem absent or very short; filament of anther short, its connective broad and crested.....3. *Kaempferia*.

Stem tall, leafy; filament of anther long, its connective narrow and not crested.....4. *Hedychium*.

Lateral staminodes small and narrow or absent:—

Flowers in dense cone-like spikes:—

Leafy stem straight; filament of anther narrow, free from the connective, anther terminal:—

Filament of anther arcuate, its cells diverging above, connective dilated and crested or 2-lobed, not produced into a beak.....5. *Amomum*.

Filament of anther straight, its cells parallel, connective not crested, produced into a long beak.....6. *Zingiber*.

Leafy stem spirally twisted; filament of anther adnate to the connective, broad and petaloid, anther adnate to its middle.....7. *Costus*.

Flowers in lax spikes, racemes or panicles:—

Scapes leafless, arising direct from the rootstock.....8. *Elettaria*.

Inflorescence terminal on the leafy stem.....9. *Alpinia*.

1. *Globba*, Linn.

Erect herbs, rhizome creeping. *Leaves* oblong, oblong-lanceolate, elliptic or linear-lanceolate. *Flowers* in terminal spikes or panicles, the buds sometimes replaced by bulbils. *Calyx* funnel-shaped, 3-lobed. *Corolla-tube* slender, longer than the calyx, lobes ovate, subequal. *Lateral staminodes* petaloid, lip deflexed. *Stamen* with a long 2-appendaged filament; anther oblong, connective produced beyond the cells, simple, winged or spurred. *Ovary* 1-celled; placentas 3, parietal; style filiform, lying in the groove of the anther, stigma turbinate. *Fruit* a globose or subglobose, tardily dehiscent capsule. *Seeds* ovoid, often tomentose, aril small, white, lacerate.

Anther not winged; bracts deciduous:—

Stems 1—3 ft. high; leaves oblong or elliptic-oblong, subcaudate, glabrous, 8—10 in. long, 2—4 in. wide; panicles narrow, lowest branches 3-flowered, bulbils never present; corolla-tube about twice the length of the calyx, petals broadly ovate, longer than the staminodes, lip obovate as long as the petals, shallowly 2-lobed; ovary and capsule verrucose.....1. *orixensis*.

Stems 1—3 ft. high; leaves linear- to elliptic- or oblong-lanceolate, usually conspicuously and finely caudate, pubescent below, 5—12 in. long, 1—3 in. wide, panicles narrow, lowest branches 4—6-flowered, a few bulbils sometimes present in the lower axils; calyx, corolla and the back of the anthers covered with darker globose glands, corolla-tube thrice the length of the calyx, petals ovate, shorter than the lanceolate staminodes, lip twice the length of the corolla, very deeply bifid, segments narrow; ovary and capsule smooth.....2. *ophioglossa*.

Anther furnished with spreading bifid wings; bracts persistent; stem 1—2 ft. high; leaves oblong to elliptic-lanceolate, caudate, pubescent below, 3—10 in. long, 1—2.5 in. wide; spikes simple, the flowers in the axils of oblong, acute bracts 5—1 in. long, usually replaced by bulbils in the lower axils; calyx, corolla and the back of the anther covered with globose darker glands, corolla-tube thrice the length of the calyx, petals shorter than the oblong staminodes, lip small, deeply bifid; ovary and capsule smooth.....3. *bulbifera*.

1. *GLOBBA ORIXENSIS*, Roxb.; F. B. I. vi. 201; Roxb. Cor. Pl. t. 229.

Hills of the Northern Circars (Roxburgh); Mohiri Hills, Ganjam (Fischer).

Flowers orange-yellow.

2. *GLOBBA OPHIOGLOSSA*, Wt. Ic. t. 2002; F. B. I. vi. 202.
In damp localities from the Rampa Hills (Ramaswami, Narayan-
swami) to Travancore, 2,000—4,000 ft.
Flowers pale to deep-yellow.
3. *GLOBBA BULBIFERA*, Roxb.; F. B. I. vi. 206; *G. marantina*, Wt. Ic.
t. 2001.
In all districts in damp woods, 300—4,000 ft.
Flowers yellow.

2. *Curcuma*, Linn.

Stemless herbs; rootstock tuberous, often with accessory stipitate tubers. *Leaves* usually oblong or broadly lanceolate, rarely narrow, often very large. *Flowers* in a dense, bracteate, strobiliform spike terminating in a coma of larger, usually coloured, sterile bracts, the fertile bracts forming pouches enclosing 2—7 bracteate flowers that develop in succession; peduncle clothed in appressed bracts. *Calyx* short, cylindric, usually minutely toothed. *Corolla* funnel-shaped, lobes 3, ovate or narrowly oblong, the upper one longer and hooded. Lateral *staminodes* petaloid, oblong, connate with the short, broad filament of the fertile stamen. *Lip* broad, entire or 2-lobed. *Anther* not crested, cells contiguous, usually spurred at the base. *Ovary* 3-celled; ovules many, axile; style filiform; stigma 2-lipped, lips ciliate. *Fruit* a tardily dehiscent, globose, 3-valved capsule. *Seeds* ovoid or oblong, usually arillate.

- Flowering spike lateral, apart from and appearing usually before the leaves:—
Plant small, with the leaves rarely attaining 18 in. in height, often only 2 in. high before the leaves appear; rootstock small, white inside, root-fibres numerous, terminating in small tubers; leaves lanceolate or oblong-lanceolate, shortly petioled, 6—10 in. long, 1.5—2.5 in. wide; spike dense; fertile bracts oblong-lanceolate, acute, 1—1.5 in. long, pale yellowish-green; coma dense, pink; flowers bright yellow; lip broadly ovate or suborbicular.....1. *neilgherrensis*.
Larger plants attaining 3 ft. in height in leaf; rootstock large of large palmately branched tubers, yellow inside:—
Fleshy fibres ending in smaller tubers in addition to the large ones; leaves oblong-lanceolate, finely acuminate, 1—2 ft. long; petioles long; fertile bracts ovate, recurved, cymbiform, 1.5 in. long, green tinged with red, of the coma crimson or purple; flowers yellow; lip suborbicular, obscurely 3-lobed, .5 in. wide.....2. *Zoodaria*.
Root-fibres not ending in small tubers; leaves elliptic- or lanceolate-oblong, caudate-acuminate, 1—2 ft. long; petioles as long or longer; bracts ovate, recurved, cymbiform, obtuse, fertile pale-green, of the coma more or less tinged with red or pink; flowers pink; lip yellow, obovate, subentire or obscurely 3-lobed.....3. *aromatica*.
- Flowering spike rising in the centre of a previously formed tuft of leaves:—
Rootstock small with small almond-like tubers, white inside, at the ends of fleshy fibres, no sessile tubers:—
Flowers yellow; leaves lanceolate-oblong, acuminate, tapering to the base, with the petiole reaching over 2 ft. long, 4—6 in. wide; fertile bracts obovate-lanceolate, acute, green with a pink tip, 1.25—1.75 in. long; of the coma oblong-lanceolate, lower purple-edged, upper more or less uniformly mauve-purple.....4. *pseudomontana*.
Flowers purple; leaves broadly elliptic, deltoid-acuminate, base rounded or subcordate, 6—12 in. long, 3—5 in. wide; petioles as long; fertile bracts ovate, obtuse, saccate, 1 in. long, purple; of the coma numerous, oblong-purple; lip obovate, 2-fid, margins crisped.....5. *decipiens*.

Rootstock large, tubers sessile, cylindrical, yellow inside:—

Tubers aromatic:—

Tubers pale-yellow within; leafy tuft 2—3 ft. high; leaves oblong-lanceolate, tapering at both ends, up to 18 in. long and 6 in. wide; petiole as long; fertile bracts about 1 in. long, pale-green; of coma tinged with pink; flowers white or pale-yellow; lip semi-elliptic 3-lobed, midlobe emarginate

6. *Amada*.

Tubers bright-yellow within; leafy tuft 4—5 ft. high; leaves oblong, caudate-acuminate, tapering to the base, up to 18 in. long and 8 in. wide; fertile bracts about 1.5 in. long, pale-green; of the coma tinged with pink; flowers pale-yellow; lip obovate subentire.....7. *longa*.

Tubers not aromatic, pale-yellow within; leafy tuft 2—3 ft. high; leaves oblong, acute, tapering to the base, up to 12 in. long and 8 in. wide; petiole about as long; fertile bracts about 1.5 in. long, pale green; of coma pink; flowers pale-yellow; lip suborbicular, entire, slightly notched, margins undulate

8. *montana*.

1. *CURCUMA NEILGHERRENSIS*, Wt. Ic. t. 2006; F. B. I. vi. 210.
W. Gháts at high elevations.
2. *CURCUMA ZEODARIA*, Rosc.; F. B. I. vi. 210. *C. Zerumbet*, Roxb. Cor. Pl. t. 201.
Cultivated in all districts. Vern. *Tel.* Kuchur, Kichchiliggaddala; *Tam.* Kichchilik-kishangu; *Mal.* Kach-churi-kishanna.
3. *CURCUMA AROMATICA*, Salisb.; F. B. I. vi. 210; Wt. Ic. t. 2005.
Wild on the W. Coast, frequently cultivated elsewhere. The Wild Turmeric. Vern. *Tel.* Kasturi-pasupa; *Tam.* Kasturimanjal; *Mal.* Kattu-mannar; *Kan.* Kasturi-arishina.
4. *CURCUMA PSEUDOMONTANA*, Grah. *C. montana*, Rosc.; F. B. I. vi. 214 *in part*.
Tekkadi forests of the Anamalai Hills at 2,000 ft. (Fischer).
5. *CURCUMA DECIPIENS*, Dalz.; F. B. I. vi. 215.
W. Gháts.
6. *CURCUMA AMADA*, Roxb.; F. B. I. vi. 213.
Cultivated. The Mango-ginger plant. Vern. *Tel.* Mamidiállam.
7. *CURCUMA LONGA*, Linn.; F. B. I. vi. 214.
Cultivated. The Turmeric. Vern. *Tel.* Pasupu; *Tam.* Manjal; *Mal.* Mannal, Marinalu; *Kan.* Arishina.
8. *CURCUMA MONTANA*, Rosc.; F. B. I. vi. 214 *in part*; Roxb. Cor. Pl. t. 151.
Circars (Roxb.).

3. *Kaempferia*, Linn.

Herbs, rootstock often tuberous; stems 0 or very short. *Leaves* few. *Flowers* spicate, scape radical or terminating a leafy stem. *Calyx* short, cylindrical, usually splitting down one side. *Corolla-tube* long, lobes 3, equal. *Staminodes* broad, petaloid. *Stamen* short, arcuate; anther 2-celled, on a wide connective produced above into a petaloid crest, not spurred. *Lip* broad, usually 2-fid. *Ovary* 3-celled; ovules many, axile; style long, filiform; stigma turbinate. *Fruit* an oblong capsule. *Seeds* subglobose, aril small, lacerate.

Stemless; leaves 2, spread flat on the ground, orbicular to rotund-ovate, 2.5—6 in. long, 2—6 in. wide; petioles short, channelled; flowers 6—12 from between the leaves; bracts lanceolate, short; calyx as long as the outer bracts, corolla-tube 1 in. long, lobes shorter; lateral staminodes cuneate-obovate; lip longer

than the corolla-tube, obovate; deeply 2-lobed; connective of anther produced into a quadrate, 2-lobed appendage.....1. *Galanga*.
Stemless; leaves few, erect, oblong, acuminate, up to 12 in. long and 4 in. wide, variegated green above, tinged with purple below; flowers appearing before the leaves on a short, crowded, radical spike; bracts oblong acute, outer short, inner 2—3 in. long; calyx nearly as long as the corolla-tube, minutely toothed, corolla-tube 2—3 in. long, lobes linear, nearly as long as the tube; staminodes oblong, acute, 1.5—2 in. long; lip shorter, 2-fid, segments suborbicular; crest of anther deeply 2-fid.....2. *rotunda*.

1. *KAEMPFERIA GALANGA*, Linn.; F. B. I. vi. 219; Wt. Ic. t. 899.
W. coast at low elevations (Wight).
Flowers fragrant; white with a purple or lilac spot on each side of the lip.
2. *KAEMPFERIA ROTUNDA*, Linn.; F. B. I. vi. 222; Wt. Ic. t. 2029.
W. coast near Trevandrum (Wight). Often cultivated and doubtfully wild.
Flowers fragrant; white, the lip purple or lilac.

4. *Hedychium*, Koenig.

Herbs, often very tall, rootstock tuberous; stem leafy. *Leaves* ditichous, oblong or lanceolate. *Flowers* in terminal, often contracted and more or less strobiliform spikes; bracts coriaceous, 1- or more-flowered. *Calyx* tubular, more or less 3-toothed, often split down one side. *Corolla-tube* long, slender, segments equal, linear. Lateral *staminodes* petaloid. Filament of *stamen* slender; anther-cells contiguous, connective not produced or appendaged. *Lip* large, bifid. *Ovary* 3-celled; ovules many, axile; style long, filiform; stigma subglobose. *Fruit* a globose, 3-valved capsule. *Seeds* many, small, aril lacerate.

Lip broad, lobes rounded:—

- Lip* orbicular-obcordate, base suddenly narrowed. Robust plant 3—6 ft. high; leaves linear- to oblong-lanceolate, acuminate, up to 18 in. long and 4 in. wide, usually appressed-silky below, ligule large; spike usually dense-flowered, sometimes lax; bracts usually imbricate, 3—4-flowered, ovate, obtuse, usually glabrous or nearly so; calyx cylindrical, shorter than the bract, glabrous, corolla-tube up to 2.5 in. long; staminodes oblong or oblanceolate; stamen shorter than the lip.....1. *coronaria*.
- Lip* obcordate, narrowed to the base into a distinct claw. Robust plant up to 8 ft. high; leaves lanceolate, up to 14 in. long and 3 in. wide, caudate, glabrous or pubescent along the midrib below and at the mouth of the sheath, ligule large; spike dense-flowered; bracts imbricate, 3—4-flowered, large, oblong, obtuse, more or less villous at the apex and pubescent on the back; calyx as long as or slightly longer than the bract, apex puberulous, corolla-tube up to 3 in. long; staminodes narrowly oblanceolate, often notched at the apex; stamen longer than the lip.....2. *flavescens*.
- Lip* narrow, deeply lobed, lobes acuminate. Robust plant up to 6 ft. high; leaves elliptic-oblong or oblong-lanceolate, up to 18 in. long and 5 in. wide, finely acuminate or caudate, silky-pubescent below; ligule short; spike long, lax-flowered; bracts 1-flowered, oblong or oblong-lanceolate, subacute, glabrous; calyx twice as long as the bract, up to 1.5 in. long, corolla-tube less than twice as long as the calyx; staminodes narrow; anther as long as or shorter than the lip...3. *venustum*.

1. *HEDYCHIMUM CORONARIUM*, Koen.; F. B. I. vi. 225; Wt. Ic. t. 2010.
In moist localities in the hills, 2,000—5,000 ft.
Flowers fragrant, pure-white or tinged with yellow.

2. *HEDYCHIMUM FLAVESCENS*, Carey; Wt. Ic. t. 2008/9. *H. coronarium*, Koen. var. *flavescens*, Carey. F. B. I. vi. 226.

Hills of the W. Gháts; Kollimalais; Bison Hill in the Godavari District (Barber).

Flowers sulphur-yellow. Vern. *Kan.* Hallushulli-gidda.

Var. *chrysoleucum*, Hook. Lip narrower; flowers white with yellow bases.

3. *HEDYCHIMUM VENUSTUM*, Wt. Ic. t. 2012; F. B. I. vi. 226. *H. cernuum*, Wt. Ic. t. 2011.

W. Gháts, 3,000—5,000 ft.

Flowers white.

5. *Amomum*, Linn.

Herbs, sometimes very tall; rootstock perennial, stem leafy. *Leaves* usually oblong-lanceolate. *Spikes* usually produced directly from the rootstock, very rarely terminating the stem; bracts imbricate. *Calyx* cylindrical, 3-toothed. *Corolla-tube* cylindrical, usually shorter than the calyx, lobes 3, oblong or linear-oblong, the upper one often broader and more convex. *Lateral staminodes* 0 or minute. *Lip* broad or ligulate. *Stamen* with a short arcuate filament; anther-cells divaricate, sometimes hairy, often with a petaloid crest. *Ovary* 3-celled; ovules many, axile; style filiform; stigma small, subglobose or infundibuliform or large and dorsally gibbous. *Fruit* indehiscent or bursting irregularly, rarely baccate, smooth, winged or echinate, sometimes beaked. *Seeds* globose, truncate, angular or ellipsoid.

Anther not crested. Leafy stem up to 10 ft. high; leaves sessile or shortly petioled, oblong- to linear-lanceolate, acuminate, up to 3 ft. long and 7 in. wide, glabrous or minutely puberulous below, especially on the midrib; ligule linear-oblong, about 1 in. long; peduncle erect from the rootstock, up to 3 ft. long, its bracts oblong or linear-oblong, up to 9 in. long, obtuse; spike globose, apex truncate; floral bracts bright red, outer up to 3 in. long, overtopping the flowers, inner shorter; fruit triangular-ovoid, smooth.....1. *involucratum*.

Anther crested:—

Spike 1—3-flowered, ellipsoid; peduncle rarely 8 in. long. Leafy stem up to 4.5 ft. high; leaves long-petioled, oblong-lanceolate or lanceolate, shortly acuminate, base attenuate, up to 20 in. long and 5 in. wide, silvery-silky below; ligule 1.3 in. long, 2-lobed; bracts about 1.2 in. long, oblong, retuse; calyx longer, lobes of corolla oblong, obtuse; lip orbicular, clawed; anther-crest subunulate; capsule globose, smooth, about 1 in. in diam.....2. *hypoleucum*.

Spike many-flowered:—

Leaves silky-tomentose beneath. Leafy stem 4—5 ft. high; leaves lanceolate or linear-lanceolate, acuminate, base attenuate, up to 2 ft. long and 4 in. wide; petioles 1—7 in. long; ligule linear, subacute, 1—1.5 in. long; exterior bracts few, oblong, glabrous, 1—1.6 in. long; calyx hardly more than half as long, corolla lobes linear-oblong; lip obovate; anther-crest small, orbicular; ovary glabrous; capsule 9-ribbed, echinate.....3. *microstephanum*.

Leaves glabrous or nearly so beneath:—

Lip elliptic, entire, emarginate, pubescent above; anther-crest quadrate, short, crenulate. Leafy stem up to 6 ft. high; leaves lanceolate or linear-lanceolate, finely acuminate or subcaudate, base acute, up to 16 in. long, 1—3 in. wide, subsessile or very shortly petioled; spikes oblong, dense-flowered; peduncle stout with many broadly ovate bracts 6—1 in. long embracing it; outer bracts of the spike oblong-lanceolate, deep pink, about 1 in. long, margins of bracts of the spike usually villous; calyx shorter, corolla-lobes oblong or elliptic; ovary glabrous muricate; capsule globose, densely echinate, 1.2 in. in diam., chestnut coloured.....4. *cannaecarpum*.

Lip broadly obovate, deeply 3-lobed, midlobe emarginate, glabrous; anther-crest lunate, rather large, entire. Leafy stem up to 5 ft. high; leaves elliptic or oblong-lanceolate, finely acuminate or caudate, 7—16 in. long, 1—4 in. wide, shortly petioled; spikes at first subglobose and dense-flowered; peduncles up to 6 in. long, rather slender with many loose, pink, oblong bracts 6—1 in. long embracing it, rachis silky; bracts of the spike glabrous, floral bracts thin, tubular, 2—3-lobed; calyx slightly longer; corolla-lobes ovate; ovary glabrous, warted; capsules subtrigonus-globose, apex slightly concave and smooth, about 1 in. in diam., sides densely echinate

5. *muricatum*.

1. AMOMUM INVOLUCRATUM, Benth.; F. B. I. vi. 233.
Anamalai Hills at 4,000 ft. (Fischer).
Flowers ochraceous, lip striped pink.
2. AMOMUM HYPOLEUCUM, Thw.; F. B. I. vi. 240.
Anamalai Hills, 1,800—3,500 ft. (Beddome).
Flowers white, lip with a yellow disk, tinged with red.
3. AMOMUM MICROSTEPHANUM, Baker; F. B. I. vi. 239.
Kalianapandal in the Anamalai Hills at 2,300 ft. (Fischer).
Flowers white.
4. AMOMUM CANNAECARPUM, Benth.; F. B. I. vi. 240. *Elettaria cannaecarpa*, Wt. Ic. t. 2007.
W. Gháts, 4,000—6,000 ft.
Flowers yellow.
5. AMOMUM MURICATUM, Beddome.
Anamalai Hills, 2,000—3,000 ft. (Beddome).
Flowers white to yellowish, lip yellow with a broad band of red spots, anther-crest yellow.

6. Zingiber, Adans.

Perennial herbs; rootstock horizontal, tuberous, usually aromatic; stem leafy. *Leaves* linear to oblong-lanceolate with stem-clasping sheaths. *Flowers* in spikes; scape radicle or terminating the leafy stem; bracts persistent, usually 1-flowered. *Calyx* cylindrical, shortly 3-lobed. *Corolla-tube* cylindrical; lobes lanceolate, the upper concave. *Lateral staminodes* 0 or adnate to the lip. *Perfect stamen* with a short filament; anther-cells contiguous, produced into a narrow beak as long as the loculi. *Ovary* 3-celled; ovules many, axile; style filiform; stigma small, subglobose. *Fruit* an oblong, tardily dehiscent capsule. *Seeds* large, globose, arillate.

Spikes produced direct from the rootstock, short and dense; peduncle 0 or short:—
Ligule of leaf membranous, .75 in. or more long. Leafy stem 3—5 ft. high; leaves oblong or oblong-lanceolate, acuminate, sessile, up to 16 in. long and 3.5 in. wide, more or less pubescent below; spikes oblong, dense, about 3 in. long, shortly peduncled; bracts red, exterior ones broadly ovate, interior linear-lanceolate, more or less hairy; lip 3-lobed, midlobe oblong-cuneate, 3-lobulate, margins recurved, crisped, lateral lobes short, broad.....1. *roseum*.

Ligule of leaf coriaceous, less than .5 in. long:—

Leafy stem 4—5 ft. high; leaves nearly sessile, oblong-lanceolate, acuminate, 6—12 in. long, 2—3 in. wide, pubescent beneath; spikes ovate or subglobose, practically sessile; bracts linear-oblong or lanceolate, green streaked with red, inner 2-rid; lip 3-lobed, midlobe rotund-ovate or subovate, scarcely emarginate, lateral small, rounded; capsule ellipsoid, about .8 in. long.....2. *Nimmonii*.
Leafy stem 4—6 ft. high; leaves lanceolate to oblong-lanceolate, acuminate, shortly petioled, 6—18 in. long, 1—4 in. wide, pubescent beneath; spikes

oblong or subglobose, shortly peduncled; bracts green, outer ovate, inner lanceolate; lip 3-lobed, midlobe obovate, emarginate, lateral small, acute; capsule ellipsoid, 1 in. long.....3. *Wightianum*.

Spikes terminating elongate peduncles sheathed by scarious bracts :—

Leaves linear, sessile, gradually acuminate, 5—13 in. long, 4—1 in. wide, glabrous; spikes oblong-cylindric, 1.5—3 in. long, peduncles slender; sheathing scales glabrous, about 1 in. long; lip 3-lobed, midlobe oblong-obovate, lateral short, ovate, obtuse.....4. *officinale*.

Leaves lanceolate or oblong-lanceolate, usually more than 1 in. wide :—

Leaves glabrous beneath or nearly so, oblong-lanceolate or oblanceolate, acuminate, sessile, 6—13 in. long, 2—3 in. wide; spikes oblong, peduncle 6—18 in. long; sheathing scales long, obtuse; bracts obovate-oblong or obovate, rounded, green in flower with a pale margin dotted with dark linear glands, red in fruit; lip shorter than the corolla-lobes, 3-lobed, lobes obtuse, midlobe longest; capsules ellipsoid, 1 in. long.....5. *Zerumbet*.

Leaves pubescent beneath :—

Leafy stem up to 20 in. high; leaves sessile, linear-to oblong-lanceolate, acuminate, 5—12 in. long, 1—2.5 in. wide; spike cylindric 6—12 in. long, peduncle about as long; sheathing scales large, oblong; bracts obovate, acute, reddish, about 1.25 in. long; lip obovate, 3-lobed, midlobe rounded, emarginate, lateral small, obtuse; capsules obovoid, .5 in. long, pubescent, red, seeds dark-purple with a large white aril.....6. *macrostachyum*.

Leafy stem 4—6 ft. high, root yellowish inside, aromatic, tasting of camphor; leaves subsessile, oblong-lanceolate, acute or acuminate, 6—14 in. long, 1—3 in. wide, sometimes almost hairy beneath; sheathing scales numerous, pubescent or subvillous at least above and along the edges; spikes dense, fusiform or oblong-ellipsoid, 3—6 in. long; peduncles 4—12 in. long; bracts broadly ovate, 1—1.5 in. long, subacute, bright red or greenish-red, pubescent, margins narrowly membranous; lip 3-lobed, midlobe suborbicular, deeply 2-lobed, margins crisped, lateral small, oblong, acute or obtuse; capsules subglobose, .66 in. long, seeds very many, small, purple.....7. *Casumunar*.

1. ZINGIBER ROSEUM, Rosc. ; F. B. I. vi. 244. *Amomum roseum*, Roxb. Cor. Pl. t. 126.
N. Circars (Roxburgh); Dummakonda in the Rampa Hills at 3,500 ft. (V. Narayanswami).
Flowers bright- or pale-red, lip whitish, sometimes with reddish markings. Vern. *Tel.* Bumma-kachikai.
2. ZINGIBER NIMMONII, Dalz. ; F. B. I. vi. 244.
Bababudan Hills (Law).
Flowers reddish-yellow, lip yellow.
3. ZINGIBER WIGHTIANUM, Thw. ; F. B. I. vi. 244. *Z. squarrosum*, Wt. Ic. t. 2004.
W. Gháts, 2,000—3,000 ft., Bison Hill in the Godavari District (Barber).
Flowers pale-yellow. Vern. *Mal.* Malai-inchi.
4. ZINGIBER OFFICINALE, Rosc. ; F. B. I. vi. 246.
Wildly cultivated. Run wild in places in the W. Gháts.
The Ginger plant.
Flowers greenish-yellow, lip dark purple, often spotted with yellow. The plant rarely flowers. Vern. *Hind.* Adrak; *Ur.* Adroko; *Tel.* Allamu; *Tam.* Shukku, Inchi; *Mal.* Adrakam; *Kan.* Alla.
5. ZINGIBER ZERUMBET, Sm. ; F. B. I. vi. 247.
W. Gháts, 2,000—3,000 ft. Also widely cultivated.
Flowers pale sulphur-yellow, lip darker. Vern. *Hind.* Maha-bari, Kachur.

6. ZINGIBER MACROSTACHYUM, Dalz. ; F. B. I. vi. 247.

W. Gháts.

Flowers white or greenish-white, lip pale-yellow striped purple.

7. ZINGIBER CASUMUNAR, Roxb. ; F. B. I. vi. 248.

W. and E. Gháts. Also widely cultivated,

Flowers whitish, lip yellowish-white. Vern. *Hind.* Banada ; *Ur.* Ban-oda ; *Tel.* Karu-pasapu ; *Mal.* Kat-inchi ; *Kan.* Agalesunthi.

7. Costus, Linn.

Herbs with a tuberous, horizontal rootstock ; stem long, leafy. *Leaves* oblong ; sheaths broad. *Flowers* in dense globose or ovoid, usually terminal, spikes, rarely direct from the rootstock. *Calyx* short, funnel-shaped, teeth 3, ovate. *Corolla-tube* short or long, lobes large, oblong, subequal. Lateral *staminodes* 0 or minute. *Lip* large, obovate or orbicular, margins incurved. *Stamen* with a broad filament forming an oblong petaloid process with the connective ; anther median on the process, with 2 linear, contiguous cells. *Ovary* 3-celled, ovules many, axile ; style filiform ; stigma with a crescent-shaped depression, margin ciliate. *Fruit* a globose or ovoid, tardily-dehiscing capsule. *Seeds* ovoid or subglobose, aril short.

COSTUS SPECIOSUS, Sm. ; F. B. I. vi. 249 ; Wt. Ic. t. 2014.

In all Districts in moist localities ; near sea-level to 3,000 ft.

A succulent herb attaining 8—9 ft. in height ; stems spirally twisted so that the leaves appear spirally arranged ; leaves oblong, oblong-lanceolate or oblanceolate-oblong, acute or acuminate, often cuspidate, 5—12 in. long, 2—3 in. wide, glabrous above, silky-pubescent beneath ; flowers white in very dense spikes ; bracts ovate, .75—1.25 in. long, bright red ; lip suborbicular, 2 in. or more in diam., often with a yellow centre. Vern. *Tel.* Bommakachika ; *Tam.* Kottam ; *Mal.* Anakuva ; *Kan.* Changalakoshta.

8. Elettaria, Maton.

Perennial herbs ; rootstock thick, horizontal ; leafy stem tall. *Leaves* distichous. *Flowers* in elongate, flexuous panicles direct from the rootstock, shortly pedicelled ; bracts 2—7-flowered ; bracteoles membranous, tubular. *Calyx* membranous, tubular, shortly 3-lobed. *Corolla-tube* cylindrical, midlobe oblong, convex, lateral narrower. Lateral *staminodes* represented by small, erect teeth. *Lip* oblong-obovate, base cuneate. *Stamen* with a short filament ; anther not crested, its cells contiguous. *Ovary* 3-celled ; ovules many, axile ; style filiform ; stigma small, funnel-shaped, ciliate. *Fruit* a subglobose, coriaceous, indehiscent capsule. *Seeds* obovoid, angular by compression, aromatic, aril 0.

ELETTARIA CARDAMOMUM, Maton ; F. B. I. vi. 251. *Alpinia Cardamomum*, Roxb. Cor. Pl. t. 226.

W. Gháts, wild and cultivated ; 2,500—4,500 ft. The Cardamom.

Leafy stem 6—10 ft. high ; leaves linear-lanceolate, acuminate, sessile or very shortly petioled, glabrous above, softly pubescent beneath, 1—2 ft. long, 2—3 in. wide ; panicles several, up to

about 2 ft. long, erect or prostrate; bracts 6—7-flowered, linear-oblong, obtuse, about 1.5 in. long; calyx .5 in. long, corolla-tube white, shortly exerted, lobes .5 in. long; lip longer, white striped with violet; capsule subtrigonal, about .4 in. long, striate. Vern. *Tel.* Elaki; *Tam.* Elam, Anchi; *Mal.* Elattari; *Kan.* Elakki.

Var. *major*, Thw.; F. B. I. vi. 251. More robust; leaves broader; bracts more distant, 2—4-flowered; capsule 1 in. or more long. In the same localities.

The seeds of both used as condiments and medicinally.

9. *Alpinia*, Linn.

Perennial herbs; rootstock horizontal; leafy stem tall. *Leaves* oblong or lanceolate. *Flowers* in usually terminal spikes, racemes or panicles; bracteoles large, sometimes enveloping the bud. *Calyx* laxly tubular, shortly 3-toothed. *Corolla*-tube cylindrical, usually not exceeding the calyx, lobes oblong or linear-oblong, the upper one usually broader and more convex. *Lateral staminodes* 0 or minute. *Lip* spreading, often orbicular with incurved margins, sometimes with 2 subulate processes at the base of the claw. *Stamen* with a flattened filament; anther usually without crest, cells diverging at the apex. *Ovary* 3-celled; ovules few or many in each cell, axile; style filiform; stigma subglobose. *Fruit* dry or fleshy, globose, usually indehiscent. *Seeds* globose or angular by compression, often aromatic, aril membranous.

Flowers paniced; buds not enclosed in large bracteoles:—

Ovary glabrous. Leafy stem 6—7 ft. high; leaves oblong-lanceolate, glabrous, acuminate, up to 30 in. long and 6 in. wide, very shortly petioled, ligule short, rounded, ciliate; flowers in open panicles up to 13 in. long, rhachis puberulous; lip orbicular-spathulate, apex shortly 2-lobed, claw slender with 2 subulate glands at the base; capsule about .6 in. diam., orange-red.....1. *Galanga*.

Ovary pilose:—

Leafy stem 3—6 ft. high; leaves linear- or lanceolate-oblong, acuminate, cuspidate, glabrous, 8—18 in. long, 2—4 in. wide; panicle copiously compound, 6—12 in. long, rhachis pubescent or tomentose, floral bracts small, ovate, cupular; flowers small; lip obovate-cuneate or suborbicular, emarginate, slightly over 1 in. long, claw with 2 linear-subulate glands at the base; capsule .66 in. diam., black.....2. *Allughas*.

Leafy stem 2—4 ft. high; leaves linear-lanceolate or linear, finely acuminate, 6—15 in. long, 1—2 in. wide; panicle narrow, dense-flowered, rarely more than 4 in. long, rhachis pubescent; floral bracts small, ovate; lip obovate or oblong, 1—1.5 in. long; capsule red.....3. *calcarata*.

Flowers in simple racemes; bud enclosed in large membranous bracteoles. Leafy stem 6—10 ft. high; leaves shortly petioled, narrowly oblong or oblong-lanceolate, acuminate, up to 3 ft. long and 8 in. wide, glabrous above, pubescent beneath, the margins often densely villous; raceme up to 1 ft. long, rhachis fulvous-hairy; bracts large, white, petaloid; flowers 2—2.5 in. long; lip ovate, 2 in. long; ovary densely pubescent; capsule 1 in. diam., yellow.....4. *malaccensis*.

1. *ALPINIA GALANGA*, Sw.; F. B. I. vi. 253. *Alpinia Rheedii*; Wt. Ic. t. 2026.

W. Gháts. Often cultivated.

Flowers greenish-white, lip veined with red. Vern. *Tel.* Peddadam-pa-rashtrakam; *Tam.* Pera rattai; *Mal.* Peraratta; *Kan.* Dumpa-rasmi.

2. ALPINIA ALLUGHAS, Rosc. ; F. B. I. vi. 253.
W. Gháts, up to 4,000 ft.
Flowers pink.
3. ALPINIA CALCARATA, Rosc. ; F. B. I. vi. 254 ; Wt. Ic. t. 2028.
W. Gháts. Often cultivated.
Flowers white, lip variegated with red and yellow.
4. ALPINIA MALACCENSIS, Rosc. ; F. B. I. vi. 255.
Vizagapatam Hills (A. W. Lushington) ; 3,000—7,000 ft.
Flowers white, lip yellow, variegated with red.

Family CL. MARANTACEAE.

Perennial herbs or shrubs. *Leaves* distichous, closely parallel-penniveined, inequilateral, petioled, sheathed ; ligule usually very small, rarely conspicuous or quite absent. *Flowers* very irregular and asymmetric, in spikes or panicles ; bracts distichous ; usually 2-flowered. *Sepals* 3, free, usually equal. *Corolla* tubular below, tube usually long, 3-lobed above. *Androecium* tubular below. *Staminodes* 3—5, the outer sometimes wanting ; one of the inner 3 contracted above and furnished on one side with a hooded appendage (the *cucullum*), another broadened and often hardened (the *labellum*). Perfect *stamen* in the inner whorl, broad, petaloid with a 1-celled anther. *Ovary* inferior, 3-celled, or 1—2-celled by suppression ; ovules solitary in each cell. *Fruit* dry or fleshy, dehiscent or indehiscent. *Seeds* 1—3, usually arillate.

Ovary 3-celled:—

Stems tall, leafy ; flowers in dichotomously branched panicles terminal on the stem.....1. **Schumannianthus.**

Stemless herbs ; flowers in dense ellipsoid or capitate spikes arising direct from the rootstock or borne laterally on a petiole:—

Spike radical, ellipsoid ; bracts imbricate.....2. **Stachyphrynium.**

Spike capitate, lateral from a petiole ; bracts not imbricate.....3. **Phrynium.**

Ovary 1-celled.....**Maranta.**

1. Schumannianthus, Gagnepain.

Erect herbs or shrubs ; stems branching dichotomously. *Leaves* oblong or oblong-lanceolate ; ligule very short. *Panicle* lax-flowered, flowers in pairs ; bracts long, narrow, firm. *Sepals* ovate-lanceolate. *Staminal tube* elongate ; exterior staminodes petaloid, obovate, interior smaller. *Anther* with a petaloid appendage. *Fruit* a 3-coccus (or 2-coccus by abortion) subpyriform capsule. *Seeds* subglobose.

SCHUMANNIANTHUS VIRGATUS, Rolfe. *Clinogyne virgata*, Benth. ; F. B. I. vi. 258. *Maranta virgata*, Wall. ; Wt. Ic. t. 2015.

W. Gháts in evergreen forests, 300—4,000 ft.

Stems 6—12 ft. high, bamboo-like ; joints knotted ; leaves acuminate, often shortly cuspidate, base rounded, 4—20 in. long, 1.5—6 in. wide, glabrous except sometimes for a band of hairs on the sheath and the 5—1 in. long petiole ; panicle effuse, up to 20 in. long and wide ; bracts narrowly oblong, 1—3.5 in. long ; flowers white, about 3 in. long, pedicel about as long ; ovary villous ; capsule 3—4 in. long. Vern. Tam. Periya-kuhai-valai.

2. *Stachyphrynium*, K. Schumann.

Stemless herbs; rootstock usually creeping. *Leaves* broad, radical; petioles long, sheathing, simulating stems. *Flowers* in simple, subsessile or peduncled spikes direct from the rootstock. *Sepals* narrow. *Corolla*-tube usually longer than the sepals, lobes oblong or lanceolate. Outer *staminodes* petaloid, obovate, clawed; labellum truncate or shortly toothed; cucullum short, unappendaged. *Stamen* petaloid, anther-cell adnate to its margin. *Ovary* 3-celled, 1 ovule in each cell. *Capsule* 3-seeded or 2-seeded by abortion. *Seeds* smooth, aril 2-lobed, lobes linear.

STACHYPHRYNIUM SPICATUM, K. Schum. *Phrynium spicatum*, Roxb.; F. B. I. vi. 259.

Yeddicarra forests in Malabar (Beddome). Rare.

Leaves 2—4, oblong, caudate-acuminate or cuspidate, base rounded, 5—10 in. long, 1.5—3 in. wide; petiole slender, much longer than the blade, callous below the blade, pilose; flowers white, in narrow spikes 1—1.5 in. long; bracts ovate, 5—7.5 in. long; staminal appendage rather large; fruit 3-seeded, seeds triquetrous, brown.

3. *Phrynium*, Willdenow.

Stemless herbs; rootstock usually creeping. *Leaves* broad, long petioled. *Flowers* in dense capitate spikes borne laterally on the petioles. *Sepals* subovate-oblong, equal. *Corolla*-tube usually slightly longer than the sepals, rarely shorter, lobes oblong. Exterior *staminodes* petaloid, obovate unequal; labellum usually very short; cucullum short, with a pendulous appendage. Perfect *stamen* with a small 1-celled anther, the filament adnate to the smaller exterior staminode. *Ovary* 3-celled. *Capsule* 3-celled and 3-seeded, or 1- or 2-seeded by abortion. Seeds subglobose.

Inner bracts of the spike broad upwards, breaking up into fibrillae at the apex. Erect herbs 2—5 ft. high; leaf single or 2, oblong or oblong-lanceolate, cuspidate, base rounded or cuneate, 4—12 in. long, 2—8 in. wide; petioles 2—3 ft. long; spike sessile on the petiole above the middle, 1.5—2 in. in diam., outer bracts 2 or 3 at the base of the spike, large rigid with an incurved scarious tip; lobes of the corolla longer than the tube, ovary silky-hairy; capsule subturbinate-trigonal, 4 in. long, chestnut.....1. *capitatum*.

Inner bracts of the spike tapering to an entire, acute, hardened tip. Erect herbs 2—5 ft. high; leaf single or 2, oblong or ovate-oblong, cuspidate, base rounded or abruptly cuneate, 5—20 in. long, 3.5—8 in. wide; petiole with sheath much longer than the blade; spike sessile on the petiole well above the middle, often close to the blade, 1.5—2 in. in diam.; outer bracts at the base of the spike 5, oblong, spinulose-apiculate; lobes of the corolla shorter than the tube, ovary glabrous or apex puberulous; capsule broadly oblong 4—5 in. long, pale.....2. *parviflorum*.

1. PHRYNIUM CAPITATUM, Willd.; F. B. I. vi. 258; Wt. Ic. t. 2016.

W. Ghâts at low elevations.

Flowers purple.

- 2 PHRYNIUM PARVIFLORUM, Roxb.; F. B. I. vi. 259.

Vizagapatam Hills at 3,500 ft. (A. W. Lushington); Bison Hill in the Godavari District (Barber).

Flowers white tipped with yellow.

MARANTA ARUNDINACEA, Linn., the Arrowroot, is occasionally cultivated. Vern. *Hind.* Tikhor ; *Tel.* Palaguntha ; *Tam.* Arurutuk-kilangu, Kuva mavu ; *Kan.* Tavaksha.

Family CLI. CANNACEAE.

Erect perennial, leafy herbs. *Leaves* large, penninerved. *Flowers* in terminal spikes or panicles, asymmetric, usually brightly coloured. *Sepals* 3, free, imbricate, subequal or one smaller, herbaceous or petaloid. *Corolla* of 3 petals more or less tubular below, one always smaller. *Androecium* tubular below, partly adnate to the corolla-tube, of 1—5 members, one bearing a single anther-cell on the margin of a petaloid stamen, the staminodes petaloid, the one opposite the fertile stamen recurved (*labellum*), the others usually erect. *Ovary* inferior, 3-celled ; ovules many ; style flattened ; stigma terminal. *Fruit* a globose or ellipsoid, 3-celled capsule.

Canna, Linn.

The only genus with the characters of the family.

CANNA ORIENTALIS, Rosc. *C. indica*, Linn., var. *orientalis*, Baker ; F. B. I. vi. 260.

In most Districts but not common.

An erect herb up to 4 ft. high ; flowers bright red, the labellum and style often yellow with red streaks, petals and staminodes linear or linear-lanceolate, acute ; capsule globose or ellipsoid, echinate.

Canna indica, Linn., and its varieties are cultivated in gardens.

Family CLII. MUSACEAE.

Perennial herbs, shrubs or trees. *Leaves* distichous or spirally arranged, blade large or gigantic ; petiole above the sheath large. *Flowers* in simple or paniced spikes, zygomorphic, usually hermaphrodite but sometimes monoecious, sessile or shortly, rarely long, petioled ; bracts sometimes brightly coloured. Outer and inner *perianth* usually both petaloid, free or variously united. Fertile *stamens* 5, rarely 6, free, the 6th usually converted into a staminode ; anthers linear, 2-celled. *Ovary* inferior, 3-celled ; ovules 1-several in each cell, basal or axile ; style simple ; stigma simple or 3—6-lobed. *Fruit* baccate or capsular. *Seeds* hard, sometimes arillate.

Musa, Linn.

Erect herbs, shrubs or trees, the stems composed of convolute leaf-sheaths. *Leaves* spirally arranged, very large, oblong. *Flowers* monoecious, on stout, elongate, bracteate spikes. ♂ above, ♀ below ; bracts spirally arranged, large, ovate or orbicular. *Sepals* and 2 *petals* usually connate into a 3—5-lobed tube split down one side, remaining petal opposite the split, free, as long as the calyx, embracing the base

of the stamens and style. *Stamens* 5 (rarely 6) perfect, 6th usually rudimentary or absent; filaments erect, stoutly filiform; anthers erect. *Ovary* many-ovuled; style filiform; stigma subglobose, 3—6-lobed. *Fruit* baccate, large, oblong. *Seeds* subglobose or angled by compression, embedded in pulp.

Plant 10—12 ft. high, stem 7—8 ft. in circumference at the base and narrowed to 3 ft. below the leaves, not stoloniferous, dying after flowering; leaves oblong, narrowed to the base, 5—10 ft. long, 2—3 ft. wide, petiole short; spikes ultimately drooping, up to 4 ft. long; bracts very many, orbicular, up to 1 ft. long, dull claret-brown, many-flowered; flowers in 2 dense rows; fruit oblong, 3 in. long, several in a cluster, edible but insipid; seeds subglobose or angled by compression, black or brown.....1. *superba*.

Plant 3—5 ft. high, 3—4 in. diam., stoloniferous, root perennial; leaves linear-oblong, up to 4.5 ft. long and 1 ft. wide, petiole 1—2 ft. long; spikes erect or somewhat bent over, up to 18 in. long; bracts few, lanceolate- to ovate-oblong, 3—6 in. long, bright lilac or pink, 3—4-flowered, the lowest 4 or 5 only fertile; fruit linear-oblong, 4—5-angled, 2—4 in a cluster, 3—4 in. long, inedible; seeds black, tuberculate.....2. *rosacea*.

1. *MUSA SUPERBA*, Roxb. Cor. Pl. t. 223; F. B. I. vi. 261; Wt. Ic. t. 2017.

W. Gháts. on rocky hill-sides, 1,000—5,000 ft.
The Wild Plantain.

2. *MUSA ROSACEA*, Jacq.; F. B. I. vi. 263.
Rampa Hills (Gamble).

MUSA PARADISIACA, Linn. *M. sapientum*, Linn.; F. B. I. vi. 262; Roxb. Cor. Pl. t. 275. The Plantain or Banana Tree; is extensively cultivated. *Musa textilis*, L. Née. Manilla Hemp, is occasionally cultivated for its fibre.

Ravenala madagascarensis, Sonn. The Traveller's Tree, with large plantain-like leaves forming a fan-like head, is grown ornamentally in gardens.

Family CLIII. BROMELIACEAE.

Herbs, rarely shrubby or arboreous, often epiphytic. *Leaves* usually in clustered, radical, spirally arranged rosettes, base amplexicaul and sheathing. *Flowers* 2-sexual, usually from the centre of the rosette, terminal, sessile in heads, spikes, racemes or panicles; often with brilliantly coloured bracts below the flowers which pass into the floral bracts and sometimes with a terminal crown of foliage leaves above. *Sepals* 3, free or connate, herbaceous or coriaceous. *Petals* 3, free or half or wholly connate into a tube, often with 2 scales at the base within. *Stamens* 6, all free or connate or one whorl free and one whorl connate; anthers introrse. *Ovary* inferior, half inferior or superior, 3-celled; ovules usually many in each cell; style with 3 stigmas or stigmatic branches. *Fruit* baccate, sometimes combined into a syncarp, sometimes dehiscent. *Embryo* small, in a small pocket or fork of the mealy albumen.

There are no indigenous genera of this family but *Ananas sativus*, Schult., the Pine Apple, is cultivated in some localities. Vern. Tel. Anasa-pandu; Tam. Anashap-pazham; Mal. Annanas; Kan. Ananasu-hannu.

Family CLIV. HAEMODORACEAE.

Perennial herbs; rootstock short, tuberous. *Leaves* usually radical, distichous, narrow. *Flowers* 2-sexual, regular, in terminal spikes, racemes or panicles. *Perianth* petaloid, 2-seriate, lobes 6, free or more or less connate, imbricate or induplicate-valvate. *Stamens* 6 and opposite to the perianth-lobes or more or less adnate to them or fewer; anthers erect or versatile, 2-celled, opening by a slit, rarely by a pore. *Ovary* inferior, subinferior or superior, 3-celled, sometimes imperfectly so; ovules 1—several in the angle of each cell; style filiform, rarely short or wanting; stigma simple or notched. *Fruit* a superior or nearly superior capsule or an inferior berry. *Seeds* various; embryo small, partially enclosed in the fleshy albumen.

Filaments united into a ring closing the mouth of the perianth.....1. **Peliosanthes.**
 Filaments free, short.....2. **Ophiopogon.**

1. **Peliosanthes**, Andr.

Rootstock horizontal. *Leaves* radical, linear or lanceolate, subplicately nerved. *Scape* erect; bracts scarious. *Flowers* small, racemed. *Perianth* broadly campanulate, tube short, lobes spreading. *Stamens* 6; filaments very short; anthers sub-sessile. *Ovary* inferior, the top free, conical, 3-celled; ovules 2 or more in each cell; stigma subsessile, 3-lobed. *Fruit* a berry. *Seeds* few, bursting through the pericarp during ripening and resting on the base of the withered perianth; embryo in the base of the hard fleshy albumen.

Leaves narrowly elliptic-lanceolate or oblanceolate, acuminate, base tapering, glabrous, pale when dry 4—9 in. long, .6—1.6 in. wide; petiole slender, 2.5—12 in. long, pale when dry; raceme slender, rarely as long as the leaves and petioles; bracts ovate, .1—2.5 in. long; flowers numerous, about .2 in. in diam.; berry subglobose, about .3 in. long.....1. *neilgherrensis*.
Leaves lanceolate or oblanceolate, acute or acuminate, base tapering, glabrous, dark when dry, 7—14 in. long, 1—5.3 in. wide; petiole rather stout, 9—20 in. long, dark when dry; raceme moderately slender, usually as long as the petioles; bracts ovate or linear-lanceolate, .2—5 in. long; flowers numerous, about .25 in. in diam.; berry subglobose, about .5 in. long.....2. *courtallensis*.

1. **PELIOSANTHES NEILGHERRENSIS**, Wt. Ic. t. 2052; F. B. I. vi. 266.

W. Gháts, from the Nilgiri Hills southwards, in dense evergreen forests, 2,000—6,500 ft.

Flowers greenish- to dark-purple; berries blue.

2. **PELIOSANTHES COURTALLENSIS**, Wt. Ic. t. 2051; F. B. I. vi. 266.

In the same situations as the last species.

Flowers blue-purple (Jerdon). Very similar to the last species and doubtfully separable though more robust.

2. **Ophiopogon**, Ker-Gawl.

Small, scapigerous herbs; stem short from a short rootstock or elongate and subscandent. *Leaves* radical, linear or lanceolate. *Scape* leafy or naked; bracts scarious. *Flowers* racemed, usually many-flowered. *Perianth* segments spreading. *Stamens* 6, on the bases of the perianth-segments; filaments erect; anthers basifixed. *Ovary* inferior,

3-celled, crown flat or depressed; ovules 2 in each cell, collateral, erect; style columnar; stigma 3-toothed. *Fruit* indehiscent. *Seeds* few, testa fleshy or succulent, like those of *Peliosanthes*.

OPHIOPOGON INTERMEDIUS, Don; F. B. I. vi. 269. *O. indicus*, Wt. Ic. t. 2050.

W. Gháts, 3,500—7,300 ft.; Sirumalais and Kollimalais (Jacob); Mahendragiri Hill in the Ganjam District at 4,500 ft. (Fischer and Gage); Vizagapatam District at Endrika, 3,000 ft. (A. W. Lushington).

Leaves narrowly linear, obtuse, acute or acuminate, tapering to the base, 4—24 in. long, .1—.5 in. wide; flowers white, about .3 in. diam.; seeds subglobose.

Var. *pauciflorus*, Hook. f.; F. B. I. vi. 269, with 5 or fewer flowers in the raceme.

Var. *gracilipes*, Hook. f.; F. B. I. vi. 269, with very narrow leaves tapering to an almost filamentous base.

Family CLV. AMARYLLIDACEAE.

Perennial herbs, sometimes large, woody shrubs; rootstock a bulb, corm or tuber, rarely an erect stock. *Leaves* radical or clustered at the apex of a more or less well-developed caudex. *Scape* naked (in the Indian genera) or bracteate. *Flowers* few (in the Indian genera) and umbelled, rarely solitary or many and paniced, usually 2-sexual, regular or somewhat zygomorphic, often showy; bracts membranous or coloured, seldom herbaceous (in Indian genera), the outer 1—3 forming an involucre under the umbel. *Perianth* superior, tube 0, short or long, limb 6-lobed or -partite, sometimes with a corona at the mouth. *Stamens* 6, on the base of the perianth segments, rarely epigynous; filaments free or connate by the corona; anthers erect or versatile. *Ovary* inferior, 3-celled; ovules many, 2-seriate in the inner angles of the cells; style stout or slender; stigma simple or 3-cleft. *Fruit* usually loculicidally capsular, sometimes fleshy. *Seeds* few or many; albumen fleshy, enclosing the small embryo.

Leaves all radical from the rootstock, never on a well-developed caudex; flowers not paniced:—

Leaves rigid and usually plicate; scape short, sometimes subterranean; flowers rather small, usually yellow:—

Ovary not or hardly produced upwards into a rostrum:—

Leaves sessile, narrowly linear, not plicate; fruit circumsciss near the apex
1. *Hypoxis*.

Leaves petioled, lanceolate or linear-lanceolate, rarely linear, more or less plicate; fruit indehiscent.....2. *Molineria*.

Ovary produced upwards into a filamentous rostrum.....3. *Curculigo*.

Leaves flat, usually succulent, never plicate; scape usually stout and elongate with 1—3 membranous involucreal bracts at the apex; flowers in umbels, rarely solitary, usually showy, not yellow:—

Stamens not united by a membranous corona:—

Flower solitary.....*Zephyranthes*.

Flowers 2 or more.....4. *Crinum*.

Stamens united by a membranous corona.....5. *Pancreatum*.

Leaves clustered at the top of a more or less well-developed caudex; flowers panicked on a gigantic, woody scape:—

Perianth shortly tubular below; stamens exerted; style filiform..... *Agave*.
 Perianth divided to the base; stamens included; filaments and style swollen at the base or below the middle..... *Furcraea*.

1. *Hypoxis*, Linn.

Small herbs; rootstock tuberous or a coated corm. *Leaves* sessile, strongly nerved. *Flowers* solitary, racemed or umbelled. *Perianth* rotate, 6-partite, persistent. *Stamens* 6; filaments erect; anthers erect, dorsifixed. *Ovary* 3-celled; style short, columnar; stigmas 3, erect, stout, distinct or connate. *Capsule* circumsciss below the apex or 3-valved. *Seeds* subglobose, testa crustaceous, shining, beaked at the hilum.

HYPOXIS AUREA, Lour.; F. B. I. vi. 277.

Anamalai Hills at 3,000—4,000 ft. (Beddome); Pulney Hills at Kodaikanal (Bourne).

3—15 in. high; rootstock subglobose or elongate and erect, crowned with the fibrous remains of the old leaves; leaves sheathing below, acute, 4—14 in. long, 1—25 in. wide, pilose or glabrescent; scapes 1—4, filiform, 1—4 in. long, 1—2-flowered, glabrous or more or less pilose; flowers 3—5 in. long; the ovary quite evident below the acute, yellow perianth-lobes, ovary and perianth pilose without; capsule cylindric-turbinat, crowned by the enlarged perianth, circumsciss.

2. *Molineria*, Callo.

Perennial herbs; rootstock tuberous. *Leaves* petioled, lanceolate, plicate. *Flowers* sometimes polygamous, racemed or sometimes aggregated in dense capitula. *Perianth* sessile or almost so on the inferior ovary, segments oblong. *Stamens* 6; filaments erect; anthers basifixed. *Ovary* 3-celled; ovules many in each cell; style subulate; stigma capitate, oblong-trigonous. *Fruit* a berry crowned by the enlarged, persistent perianth. *Seeds* globose, black, opaque.

MOLINERIA FINLAYSONIANA, Baker. *Curculigo Finlaysoniana*, Wall.; F. B. I. vi. 279. *Hypoxis latifolia*, Wt. Ic. t. 2044. *H. trichocarpa* and *H. leptostachya*, Wt. Ic. t. 2045. *H. pauciflora* and *H. brachystachya*, Wt. Ic. t. 2046.

W. Gháts, 400—6,000 ft.; Mahendragiri Hills in the Ganjam District at 4,500 ft. (Fischer and Gage).

Tuber elongate, oblong-cylindric; root-fibres numerous, elongate; leaves lanceolate, acute to finely acuminate, base tapering, 5—20 in. long, 5—2 in. wide, pilose or glabrescent; petiole slender, widened at the base, 2.5—13 in. long, sometimes very short; flowers usually numerous in bracteate racemes, yellow, often the upper ♂ without or with a more or less developed style, perianth-lobes obtuse; filaments filiform; anthers deeply linear-hastate; rachis of scape linear-lanceolate bracts and ovary fulvous-pilose; berry cylindric or fusiform.

3. *Curculigo*, Gaertn.

Stemless herb; rootstock more or less tuberous, sub-oblong, thick, crowned with the remains of old leaves. *Leaves* radical, narrow, more or less pilose, sessile or petioled, prominently nerved and plicate. *Flowers* solitary or racemed on usually a very short scape among the leaves and often subterranean. *Perianth* superior, 6-partite of the base. *Stamens* 6, on the base of the perianth segments; filaments filiform; anthers linear or lanceolate, base sagittate, basifixed. *Ovary* inferior, hidden among the leaves, often subterranean, 3-celled, always produced upwards into a filiform rostrum which pushes the perianth above ground; ovules 12—24 in each cell; style columnar-filiform; stigmas 3, free or connate. *Fruit* indehiscent, more or less succulent. *Seeds* subglobose; testa black, shining, striate, beaked at the hilum.

CURCULIGO ORCHOIDES, Gaertn.; F. B. 1. vi. 279; Roxb. Cor. Pl. t. 13; *C. malabarica* and *C. brevifolia*, Wt. Ic. t. 2043.

In all Districts, near sea-level up to 7,500 ft.

Rootstock elongate, up to 1 ft. long; leaves very variable, narrowly linear to lanceolate, acute, sessile or tapering into a short or long petiole, glabrous or more or less whitish pilose, 1.5—21 in. long, .2—1.5 in. wide, often viviparous at the tips; scape usually very short and hidden among the bases of the leaves underground, only the perianths rising not far above ground and appearing solitary; perianth about .5 in. long, more or less pilose; ovary usually below ground; produced into a filamentous pilose rostrum .5—1.6 in. long; fruit subulate to ovate, .5—1 in. long; seeds few to many. Vern. *Tel.* Nalla-tadi.

4. *Crinum*, Linn.

Stout herbs; rootstock bulbous. *Leaves* fleshy, elongate, lorate or ensiform. *Scape* solid. *Flowers* large, in umbels subtended by 2 spathaceous bracts, bracteoles linear. *Perianth* funnel- or salver-shaped, tube long, straight or upcurved, lobes 6, linear to oblong. *Stamens* 6, on the throat of the perianth; filaments free, filiform, erect, spreading or declinate; anthers linear, dorsifixed, versatile. *Ovary* 3-celled; ovules few or many in each cell; style filiform; stigma minute. *Fruit* large, subglobose, breaking up irregularly. *Seeds* few, large, testa thick; albumen copious.

Perianth salver-shaped, erect, lobes linear:—

Bulb 2—4 in. in diam., narrowed into a neck 4—12 in. long; leaves linear-lanceolate, shortly acuminate, 20—30 in. long, 5—7 in. wide, margins smooth; scape 1.5—3 ft. long, up to 1 in. in diam. at the base, 15—50-flowered; bracts 3—4 in. long; pedicels .2—1 in. long; perianth-tube 3—4 in. long, slender, lobes about 2 in. long; filaments shorter than the perianth-lobes; fruit 1—2 in. in diam.....1. *asiaticum*.

Bulb ovoid, 2—3 in. in diam., neck 2—6 in. long; leaves linear, deeply channelled, obtuse, 2—3 ft. long, .75—2 in. wide, margins smooth; scapes from the outer leaf-axils, 1—2.5 ft. long, 6—12-flowered; bracts 1.5—3 in. long; pedicels very short; perianth-tube 2.5—4 in. long, slender, lobes 3—4 in. long; filaments rather shorter than the perianth-lobes; fruit 1—1.5 in. in diam.....2. *defixum*.

Perianth funnel-shaped, drooping, lobes lanceolate or oblanceolate, 3—4 in. long, .75—1 in. wide, appendaged at the cuspidate apex. Bulb subglobose, 5—6 in. in diam., neck stout; leaves lorate, thin, 2—4 ft. long, 3—5 in. wide, margins slightly

scabrid; scape 2—3 ft. long, stout, 8—20-flowered; bracts 3—4 in. long; pedicels very short; perianth-tube 3—6 in. long; filaments much shorter than the perianth-lobes; fruit 1.5—2.5 in. in diam.....3. *latifolium*.

1. CRINUM ASIATICUM, Linn.; F. B. I. vi. 280. *C. toxicarium*, Roxb.; Wt. Ic. t. 2021—22.

In all Districts, up to 4,000 ft. Often cultivated.

Flowers white, stamens reddish.

2. CRINUM DEFIXUM, Ker; F. B. I. vi. 281.

In all districts; along streams and backwaters, up to 3,000 ft.

Flowers white, stamens bright red.

var. *ensifolium*, Baker; *C. ensifolium*, Roxb.; F. B. I. vi. 281.

Leaves ensiform, gradually acuminate.

3. CRINUM LATIFOLIUM, Linn.; F. B. I. vi. 283; Wt. Ic. t. 2019-20.

In all Districts, up to 6,000 ft.

Flowers white tinged with rose or purple.

5. *Pancratium*, Linn.

Herbs; rootstock a coated bulb. *Leaves* linear or lanceolate, often bifarious. *Flowers* large, solitary or umbelled on a solid scape, sessile or pedicelled, subtended by 1—4 membranous spathes; bracts linear, hyaline. *Perianth* funnel-shaped, tube short or long, lobes 6, narrow. *Stamens* 6, on the throat of the perianth; filaments filiform, united below by a coronal membrane into a toothed or lobed cup; anthers oblong or linear, dorsifixed, versatile. *Ovary* 3-celled; ovules many and 2-seriate in each cell; style filiform; stigma small, capitate. *Capsule* large, subglobose, triangular, loculicidal. *Seeds* many, angled; testa lax, black.

Scapes 2- or more-flowered:—

Filaments much longer than the teeth of the staminal-cup and the anthers. Bulb globose 1.5—2 in. in diam., neck short, long or 0; leaves thin, linear or linear-lanceolate; umbel 2—8-flowered; spathes 2; pedicels short; perianth-tube 1.5—3 in. long, lobes linear, .75—1 in. long; staminal cup with bifid teeth between the filaments.....1. *triflorum*.

Filaments hardly longer than the teeth of the staminal-cup, shorter than the anthers. Bulb globose, neck usually long, cylindric; leaves thin, linear or linear-lanceolate, narrowed towards the base; scape slender, 2—4-flowered; spathe single, sometimes deeply bifid; perianth-tube 2—4 in. long, lobes linear, 1 in. long; staminal-cup as long as the lobes, 12-toothed.....2. *parvum*.

Scape 1- (rarely 2-) flowered. Bulb globose, 1.5—2 in. in diam.; leaves narrowly lanceolate; scape shorter than the leaves; spathe single; perianth-tube 2—6 in. long, slender, lobes linear-lanceolate, 2 in. long; staminal-cup 1 in. long, 2-toothed between the filaments.....3. *longiflorum*.

1. PANCRATIUM TRIFLORUM, Roxb.; F. B. I. vi. 285. *P. verecundum*, Wt. Ic. t. 2023; F. B. I. vi. 286.

In all Districts, up to 2,000 ft.

Flowers pure white, fragrant.

2. PANCRATIUM PARVUM, Dalz.; F. B. I. vi. 286.

Bababudan Hills (Law).

Flowers white.

3. PANCRATIUM LONGIFLORUM, Roxb.; F. B. I. vi. 286.

Vizagapatam District (Barber).

Perianth-tube pale-green, lobes white.

Zephyranthes carinata, Herbert, The Pink Lily, is an escape from gardens in the Hills, and *Z. tubispatha*, Herbert; F. B. I. vi. 277, a similar escape in the plains.

The following have been planted for fibre or as hedge or ornamental plants: *Agave americana*, Linn.; F. B. I. vi. 277, *A. Vera-Cruz*, Mill., *A. Cantala*, Roxb., *A. sisalana*, Perr. (Sisal Hemp), *A. Wightii*, Drum. & Prain; Wt. Ic. t. 2024 under *A. vivipara*, and *A. sp. ?*; also *Furcraea gigantea*, Vent., and another species. (For an account of these 2 genera as represented in India see 'Notes on Agave and Furcraea in India,' J. R. Drummond and D. Prain, Bengal Agric. Series, Bull. 8, 1905.)

Family CLVI. TACCACEAE.

Perennial herbs; rootstock tuberous or creeping. *Leaves* radical, entire and costate or pinnately lobed or lacinate and penninerved. *Flowers* 2-sexual, regular, umbelled on a naked scape with an involucre of 2—12 spathaceous bracts and long, filiform bracteoles. *Perianth* superior, urceolate or subcampanulate, 6-lobed in 2 series. *Stamens* 6, included, on the tube or the base of the perianth-lobes; filaments very short, dilated or laterally appendaged at the base, dilated into a hood above the anthers with 2 ribs or horns on the inner face; anthers sessile within the hood. *Ovary* inferior, 1-celled; ovules many on 3 parietal placentas; style short, included; stigmas 3, often petaloid, broad and 2-lobed, reflexed like an umbrella over the style. *Fruit* baccate, or at length 3-valved, 3—6-ribbed. *Seeds* numerous, ovoid, striate; albumen hard; embryo minute.

Tacca, Forst.

Characters of the Family, fruit a berry.

TACCA PINNATIFIDA, FORST.; F. B. I. vi. 287.

Goonsur in Ganjam; Rampa Hill (Ramaswami); Bison Hill in the Godavari District (Barber) Nallamalais; Mysore at Ananthapura (Meebold). Sometimes cultivated.

Rootstock globose, up to 1 ft. in diam.; leaves circular in outline, 1—3 ft. in diam., 3-partite, the segments variously and unequally pinnate; petioles 1—3 ft. long; scape longer than the petioles, terete, hollow, striate; flowers 10—40, pedicelled, drooping; bracts 6—12, oblong-lanceolate, acuminate, about 1 in. long, greenish striped with purple; bracteoles 3—5 in. long; perianth fleshy, subglobose, 6—7 in. in diam., greenish, lobes margined with purple; berry subglobose, about 1 in. long, 6-ribbed, yellow.

Family CLVII. DIOSCOREACEAE.

Climbing, rarely erect, herbs or shrubs; rootstock tuberous or with a hard rhizome and tuberous roots. *Leaves* opposite or alternate (sometimes both on the same plant), simple, lobed or digitately 3—9-foliate, palmiribbed and reticulately veined; petioles often angular and twisted at the base. *Flowers* regular, small or minute, usually monoecious or dioecious, rarely hermaphrodite, in spikes, racemes or panicles. *Perianth*

tubular, urceolate or rotate, 6-cleft, often shortly connate below. *Stamens* of ♂ 3 or 6, or 3 perfect with 3 alternating staminodes, inserted at the base of the perianth or on its lobes; anthers small. *Pistillode* sometimes present. *Staminodes* of ♀ 6, 3 or 0. *Ovary* inferior, 3-quetrous, usually 3-celled; ovules 2 superposed in each cell; styles 3, short; stigmas entire or 2-fid, recurved. *Fruit* a berry or a 3-valved capsule. *Seeds* flat or subglobose, winged or not; embryo small, included in the usually hard albumen.

Climbing plants; flowers 1-sexual; fruit a 3-winged capsule.....1. *Dioscorea*.
Erect plants; flowers 2-sexual; fruit an unwinged berry.....2. *Trichopus*.

1. *Dioscorea*, Linn.

Climbing herbs. *Flowers* 1-sexual, rarely abnormally 2-sexual. ♂ *perianth* with 6 short lobes. *Stamens* 6 or 3 alternating with staminodes. *Pistillode* thick and fleshy or 0. ♀ *perianth* with 6 free small segments. *Staminodes* 6, 3 or 0. *Ovary* inferior, 3-quetrous, 3-celled; styles 3, short. *Fruit* a loculicidal, flattened, 3-winged capsule. *Seeds* always 2 in each cell, compressed, with a large membranous wing; albumen compressed, fleshy or hard, 2-laminate; embryo between the blades; cotyledons suborbicular.

(The following key and most of the information on the species of *Dioscorea* have been generously supplied by Mr. J. H. Burkill, F.L.S.; they have appeared in part in the 'Journ. As. Soc. Beng.' n.s. x (1914), 6.)

Stems twining to the left; capsules reflexed upwards:—

Leaves simple:—

Tubers numerous, edible, stalked, protected by root-fibres generally bearing spines up to .5 in. long; stem prickly; leaves orbicular or reniform, acuminate or cuspidate, base cordate, 2—5 in. long; petioles about as long; ♂ spikes 6—18 in. long; flowers erect, with a disk within the 6 perfect stamens; capsule oblong, slightly narrowed below, apex retuse; seeds broadly winged all round.....1. *esculenta*.

Tubers single or at most 2—3, without defined stalk, inedible or very inferior as food, root-fibres not spinous; stem unarmed, bearing warted bulbils in the leaf-axils; leaves broadly ovate to suborbicular, acuminate, cuspidate or caudate, base cordate, 2—8 in. long; petioles usually somewhat shorter; ♂ spikes very slender, 1—4 in. long, close or scattered on long, pendulous, axillary panicles; flowers pendulous without disk within the 6 perfect stamens; capsule quadrately oblong, slightly widened upwards, .6—1 in. long; seeds winged at the base only.....2. *bulbifera*.

Leaves compound, upper sometimes simple; seeds winged at the base only:—

Fertile stamens 6. Root tuberous, lobed; stems more or less prickly; leaves 3-foliolate; petiole 2—9 in. long, sometimes prickly, glabrous or finely pubescent; leaflets broadly cuneate-obovate, cuspidately caudate-acuminate, base tapering, the lateral very oblique, sometimes shortly 2-lobed, sometimes gibbous and broader than long, 3—13 in. long, 1.7—6 in. wide, glabrous or finely pubescent below; petiolules .1—.75 in. long; ♂ flowers in dense cylindrical spikes clustered along a more or less prickly long, pubescent or villous rachis. ♀ in solitary, distant spikes; capsule quadrately oblong, ends truncately rounded, smooth, 2 in. long, 1 in. wide.....3. *hispida*.

Fertile stamens 3, staminodes 3:—

Many of the upper leaves simple, white tomentose. Tubers elongate; stems slender, often prickly towards the base, tomentose above; leaves mostly 3-foliolate, occasionally 5—6-foliolate below; petioles 1.5—5.5 in. long; leaflets variable, terminal elliptic or obovate, lateral often very gibbous, all acuminate.

cuspidate or rounded, base acute, the simple leaves ovate- or orbicular-cordate, 1.5—7 in. long 1—4 in. wide; all densely white-tomentose below; ♂ spikes short, 1—3 together on a slender tomentose panicle, ♀ in simple or branched racemes up to 1 ft. long; capsules cuneately oblong, up to 1.1 in. long, downy, eventually glabrescent.....4. *tomentosa*.

Rarely a few of the uppermost leaves simple, rusty-hairy:—

Leaflets 3—5. Tubers oblong or very diverse in different varieties; stem slender, prickly towards the base, glabrous, often bearing axillary bulbils; petioles 2—5 in. long; the simple leaves orbicular or rotund-ovate, cuspidate; leaflets elliptic, lanceolate, ovate or obovate, abruptly cuspidate, base attenuate, lateral often gibbous, glabrous or rusty-pubescent below, 2.5—7 in. long, 1—4 in. wide; ♂ flowers in small racemes on long, slender axillary or terminal panicles, ♀ in slender, elongate, 1—3-nate racemes; capsules oblong, glabrous, up to 1 in. long.....5. *pentaphylla*.

Leaflets 5—7, rarely 3 near the tips, coarse. Tuber single, stem slender, sparsely prickly, hirsute, at length glabrescent; petioles up to 10 in. long; leaflets obovate or elliptic, acuminate, base acute, lateral asymmetric, smaller and wider in proportion, up to 10 in. long and 4 in. wide, pubescent below; ♂ flowers in 1—2-nate spikes on long racemes, spikes long, rusty-tomentose.....6. *Kalkapershadii*.

Stems twining to the right; leaves simple; capsules facing forwards; seeds broadly winged all round:—

Stems glabrous:—

Stems neither winged nor conspicuously angled; axis of the ♂ spikes not zig-zag:—

Leaves coriaceous, elliptic, oblong or ovate, acuminate or cuspidate, base cuneate or rounded, 2—6 in. long, .75—2.75 in. wide; petioles .75—1.75 in. long; spikes simple, solitary or twin, slender; capsules subquadrate or rather broader than long, apex and base retuse, 1.5—2.2 in. wide

7. *spicata*.

Leaves not coriaceous:—

Veins of leaves not prominent, though usually distinct:—

Bases of leaves acute or rounded, very rarely cordate. Tubers deep underground; stem slender, unarmed, not bulbiferous; leaves lanceolate to elliptic-oblong, ovate or suborbicular, acuminate or obtuse, with a well-defined cartilaginous margin, 2—5 in. long, .5—3.5 in. wide; petioles .6—1.6 in. long; ♂ spikes fascicled on a long, slender rhachis, ♀ flowers distant in solitary or fascicled spikes; capsules suborbicular or broader than long, apex retuse or sub-bilobed, .5—1 in. long, 1—1.5 in. wide.....8. *oppositifolia*.

Bases of leaves cordate or truncately cordate:—

♂ spikes simple, 1—4-nate. Stem slender, pale; leaves ovate, acuminate, 2—3.5 in. long, 1—2 in. wide; petioles .8—1.8 in. long; rhachis of ♂ spike capillary up to 3 in. long.....9. *Wightii*.

♂ spikes paniced, very rarely simple:—

Stem woody, often prickly below, arising from a hard woody knot 3—4 in. diam. which below gives forth 1—3 or sometimes more tubers; leaves ovate-hastate, sometimes nearly orbicular, those near the apex often with a rounded base, apex acuminate, up to 5 in. long, secondary nerves irregular; petioles long; capsules subquadrate or orbiculate, .6—8 in. long, 1—1.5 in. wide.....10. *glabra*.

Stem woody, stout, often prickly below, the tubers growing out direct from the base of the stem; leaves suborbicular, broadly ovate or subreniform, abruptly acuminate or cuspidate, up to 6 in. long and 6.5 in. wide, secondary nerves regular and nearly parallel, petioles up to 5 in. long; capsules broadly obovate, apex emarginate, up to 1.5 in. wide.....11. *Wallichii*.

Veins of leaves prominent:—

Stem unarmed, smooth, enlarged into a small rhizome emitting long fleshy tuber-bearing fibres; leaves variable, usually ovate or ovate-lanceolate, apex tapering to an acute point, base deeply to shallowly cordate, 7—9-ribbed, 1.5—4 in. long, .7—2 in. wide, veins rather regular, close and parallel; petioles .5—1.6 in. long; ♂ spikes 1—3-nate in the

axils or on leafless axillary shoots; capsules suborbicular, slightly broader than long, 1—1.5 in. wide.....12. *belophylla*.
Stem terete, glabrous, unarmed; leaves mostly alternate, elliptic or oblong, acuminate, mucronate, base narrowed or rounded, 3-ribbed, up to 5 in. long and 2.6 in. wide, veins irregular, distant; petioles up to 1.5 in. long; ♂ spikes short, fascicled in long panicles, ♀ spikes short, solitary, usually simple; capsules transversely oblong, apex retuse, 1—1.25 in. diam.....13. *intermedia*.

Stems winged or regularly angled; axis of ♂ spikes zig-zag:—

Whole plant reddish when dry; stems angled, sometimes subulate, unarmed; tubers long-stalked, deep underground; leaves ovate or lanceolate, acuminate, truncately to deeply cordate, 1.75—4.5 in. long, .75—2 in. wide, secondary nerves close, rather regular and subparallel, petioles 1—2.5 in. long; ♂ spikes short, 1—4-nate or subverticillate on slender axillary branchlets; capsules reniform, retuse, .8—1 in. long, 1—1.6 in. wide.....14. *Hamiltonii*.
Plant not conspicuously reddish when dry; stems 4—5- (sometimes 6—8- at the base) winged, wings sometimes reduced to ribs, usually with scattered broad-based prickles; tubers shallow or deep underground, but without long stalks; leaves usually broadly ovate or subrotund, suddenly cuspidate, sometimes rounded, base cordate with a broad sinus, upper smaller and narrower, 2.5—8.5 in. long, 1.5—5 in. wide; petioles 1.5—4.5 in. long; rachis of ♂ spike winged, ♂ spikes 1—3-nate or subverticillate on axillary branchlets; capsules broadly obcordate, 1—1.5 in. wide.....15. *alata*.

Stems densely pubescent, unarmed, woody, directly producing a long cylindric tuber; leaves broadly ovate or suborbicular, acuminate or cuspidate, base cordate, 3—7-in. long, 2.25—4 in. wide, pubescent at least on the nerves below; petioles 1—2.25 in. long, pubescent; ♂ spikes pubescent, 1—3-nate on axillary panicles up to 14 in. long; capsules subcordate; .5—7 in. long, 1 in. wide, rarely quite glabrous.....16. *anguina*.

1. *DIOSCOREA ESCULENTA*, Burk. *D. spinosa*, Roxb.; F. B. I. vi. 291. *D. fasciculata*, Roxb.; F. B. I. vi. 296.

Cultivated on the E. and W. Coasts; probably nowhere truly wild but occurring as an escape. Very variable under cultivation when it often loses the spines on the roots. Vern. *Tel.* Tivvi tige, Tippa tige; *Tam.* Musilam valli kilangu, siruvalli kilangu; *Mal.* Mullu kilangu, Cheru kilangu.

2. *DIOSCOREA BULBIFERA*, Linn.; Wt. Ic. t. 878. *D. sativa*, Thunb. non Linn.; F. B. I. vi. 295.

Wild on the W. Coast, in Coimbatore and along the whole of the E. Coast Districts. Cultivated in many localities. Vern. *Hind.* Karukanda; *Tam.* Pannu kilangu; *Kan.* Heggenasu.

Var. *vera*, Pr. & Burk. Tubers and bulbils small, acrid (wild).

Var. *sativa*, Pr. & Burk. Tubers almost entirely absent, bulbils large and edible (cultivated).

3. *DIOSCOREA HISPIDA*, Dennst. *D. daemonia*, Roxb.; F. B. I. vi. 289; Wt. Ic. t. 811.

W. and E. Coast Districts, up to 1,000 ft.; Anamalai Hills (Wight, Beddome); Hyderabad State (Heyne).

One of the most important natural famine foods. Vern. *Tel.* Tella gini-geddala, Puli-dumpa; *Tam.* Pei-perendai; *Mal.* Podava-kilangu.

4. *DIOSCOREA TOMENTOSA*, Heyne; F. B. I. vi. 289.

In all Districts, up to 4,000 ft. Very common.

Flowers purplish. Vern. *Tel.* Burdi gaddi, Tegadumpa, Nalla

- tiga, Nadang, Adavi-denda-tiga; *Tam.* Nalveli-kilangu, Shaval-kilangu; *Mal.* Inthi-kachchil, Núli, Chávú, Píndi.
5. *DIOSCOREA PENTAPHYLLA*, Linn.; F. B. I. vi. 289; Wt. Ic. t. 814.
In all districts, up to 4,000 ft.
Flowers greenish, fragrant. Vern. *Tel.* Duka-pendalam, Moyakku-pendalam, Pendi-muka-tiga, Adavi-ginusu-tiga; *Tam.* Chedukundi, Vallai-kodi; *Mal.* Núran, Chaval, Korna-pídan.
Var. *Linnaei*, Pr. & Burk. Tuber elongate, white, edible; leaves shining.
Var. *Rheedei*, Pr. & Burk. Tuber elongate, white, edible; leaves dark when dry, bulbils much elongated.
Var. *communis*, Pr. & Burk. Tuber short, inedible; leaves rusty-pubescent.
6. *DIOSCOREA KALKAPERSHADII*, Pr. & Burk.
Shevaroy Hills (Perrottet).
Capsules unknown. Perhaps only a coarse variety of *D. pentaphylla*, L.
7. *DIOSCOREA SPICATA*, Roth; F. B. I. vi. 291.
Travancore and Tinnevely Hills, 3,000—5,000 ft.
Vern. *Mal.* Atthi-kilangu, Kavalai.
8. *DIOSCOREA OPPOSITIFOLIA*, Linn.; F. B. I. vi. 292; Wt. Ic. t. 813.
In all districts, 500—5,000 ft.
Vern. *Tel.* Yella-gadda; *Tam.* Kavala-kodi, Thavaikachchu; *Mal.* Kanji; *Kan.* Bellarai.
Var. *Linnaei*, Pr. & Burk. Leaves lanceolate or ovate; axis of ♂ inflorescence usually brown-pubescent.
Var. *dukhunensis*, Pr. & Burk. Leaves ovate; axis of ♂ inflorescence glabrous or nearly so.
9. *DIOSCOREA WIGHTII*, Hook. f.; F. B. I. vi. 291.
Courtallam (Wight).
♀ flowers and capsules unknown.
10. *DIOSCOREA GLABRA*, Roxb.; F. B. I. vi. 294.
Godavari District (Barber).
11. *DIOSCOREA WALLICHII*, Hook. f.; F. B. I. vi. 295. *D. aculeata*, Linn.; F. B. I. vi. 296; Wt. Ic. t. 2060 (excluding the mature fruit).
W. Coast and Gháts; N. Circars; Mysore at Chickenhalli at 3,000 ft. (Meebold).
Vern. *Tel.* Cheranga; *Mal.* Vara-kilanga, Katta-kilanga, Váli.
12. *DIOSCOREA BELOPHYLLA*, Voight.
W. Gháts, on the crests.
13. *DIOSCOREA INTERMEDIA*, Thw.; F. B. I. vi. 297.
Malabar (Barber); Travancore (Bourdillon).
14. *DIOSCOREA HAMILTONII*, Hook. f.; F. B. I. vi. 295.
W. Coast and Gháts, up to 4,000 ft.
Tubers eaten. Vern. *Mal.* Veünti.
15. *DIOSCOREA ALATA*, LINN.; F. B. I. vi. 296; Wt. Ic. t. 810. *D. globosa*, Roxb.; F. B. I. vi. 296; Wt. Ic. t. 812.
Widely cultivated; nowhere truly wild. Vern. *Tel.* Pendalam, Dukka-pendalam, Kavili-gadda; *Tam.* Mullu-valli, Siru-valli,

Vettilai-valli, Atthi-kavali, Eyamichavali, Kappa-kavali, Kappan-kachchil; *Mal.* Kachchil-kilangu, Thamban; *Kan.* Tuna-genasu.
16. *DIOSCOREA ANGUINA*, Roxb.; *F. B. I.* vi. 293.

Rampa Hills at 2,500 ft. (Ramaswami, Narayanswami); Travancore (Calder and Ramaswami).

Tubers edible, but not much sought after.

2. *Trichopus*, Gaertn.

Small, erect, perennial herbs; stem short. *Leaves* terminal, 3—7-costate, petioled. *Flowers* small, bisexual, fascicled at the base of the leaves. *Perianth* campanulate, subequally 6-lobed. *Stamens* 6, on the base of the perianth-lobes; anthers subsessile, short and broad, connective produced. *Ovary* inferior, 3-celled; ovules 2-superposed in each cell; style very short; stigmas 3, short, reflexed, bifid. *Fruit* 3-winged, indehiscent. *Seeds* oblong, dorsally grooved; embryo minute in a cartilaginous albumen.

TRICHOPUS ZEYLANICUS, Gaertn.; *F. B. I.* vi. 297. *Trichopodium zeylanicum*, Bedd. *Ic. Pl. Or.* t. 290.

Tinnevely and Travancore Hills.

Stems several from a nodose rhizome, slender, 1—5 in. long; leaves ovate-lanceolate to broadly triangular-ovate, apex acute and minutely apiculate, obtuse or rounded, base more or less deeply cordate with a wide sinus, 2.5—5.5 in. long, 1.3—3 in. wide; petioles 1—2.75 in. wide; flowers 4 or 5 together; perianth dark-brown, lobes lanceolate, acute; pedicels slender, 1 in. long, lengthening and thickening below the ellipsoid, .5—.75 in. long fruit.

Family CLVIII. ROXBURGHACEAE.

Erect or climbing herbs; rootstock tuberous or creeping. *Leaves* alternate, opposite or whorled, simple, petioled, 3- or more-ribbed, cross-nervules parallel. *Flowers* regular, 2-sexual on axillary peduncles. *Perianth* superior or half-superior, in 2 whorls of 2 subequal, free or more or less connate segments each. *Stamens* 4, on the base of the perianth-segments or subhypogynous; anthers dorsifixed. *Ovary* 1-celled; ovules 2 or more, erect from the base or pendulous from the apex, anatropous; stigmas 1—3, subsessile. *Fruit* a 2-valved capsule. *Seeds* oblong, testa coriaceous; embryo long, albumen hard.

Stemona, Lour.

Stem erect or twining; root tuberous. *Leaves* ovate or lanceolate, 3—13-ribbed. *Flowers* rather large, solitary or few subracemose. *Perianth* segments lanceolate, many-nerved. *Stamens* subhypogynous; filaments more or less connate into a ring; anthers erect, linear, connective produced into a very long linear appendage. *Ovary* free, compressed; ovules 2 or more, erect; stigma small, pointed. *Capsule* ovoid or oblong, compressed. *Seeds* ovoid or oblong, terete, grooved, beaked.

STEMONA TUBEROSA, Lour.; F. B. I. vi. 298. *Roxburghia gloriosoides*, Jones; Roxb. Cor. Pl. t. 32. *R. Viridiflora*, Sm.; Wall. Pl. As. Rar. t. 282.

N. Circars as far south as Kambakkam Hill in the Chingleput District, 300—4,000 ft.

Stems twining; leaves membranous, opposite, rarely alternate, ovate, cuspidate to caudate, base truncately to deeply-caudate with rounded lobes, rarely abruptly cuneate, 7—13-ribbed, up to 10.5 in. long and 6 in. wide, cross-nervules straight, very close, petioles up to 3.5 in. long; flowers 1—3, 1—2 in. long, segments acuminate, greenish with purple nerves; stamens large, filaments red, stout, deeply grooved in front with crenulate margins, connective green; capsule ovoid-oblong, 1.5 in. long, 5—8-seeded. Vern. Tel. Kanipu tige, Ijedigadda.

Var. *minor*, Fischer. *S. minor*, Hook. f.; F. B. I. vi. 298 *Roxburghia gloriosoides*, Wt. Ic. t. 2061. All parts smaller; leaves not caudate, base narrowed or rounded, rarely more than 7-ribbed; flowers rarely exceeding 1 in. long, segments usually acute.

Family CLIX. LILIACEAE.

Herbs, sometimes climbing, rarely shrubby or arboreous with secondary growth in thickness; roots fibrous or tuberous or a creeping rhizome, or bulbs or corms. *Leaves* various, cauline or radical, sometimes functionally replaced by cladodes, sometimes fleshy, usually parallel-veined. *Flowers* usually regular and 2-sexual, axillary or terminal, solitary, twin, spicate, umbelled, racemose, fascicled or paniced. *Perianth* inferior, free from the ovary, herbaceous or petaloid, 6- (rarely 4- or 8-) merous in 2 series, imbricate, rarely valvate, in bud. *Stamens* 6, rarely 3 or less, hypogynous or on the perianth lobes; filaments free or connate; anthers oblong or linear, often versatile. *Ovary* superior, 3-celled; ovules 2 or more in the inner angles of each cell, anatropous, rarely orthotropous; style usually simple, rarely 3, usually long, rarely short or 0. *Fruit* a berry or capsule, usually 3-celled, rarely 1-celled. *Seeds* globose or flattened; embryo small, terete, surrounded by the horny or fleshy albumen.

Leaves minute, often spinescent scales, bearing axillary tufts of needle-like or slightly flattened cladodes.....1. **Asparagus.**

Leaves well developed:—

Climbing plants:—

Leaves not ending in a tendril; flowers small, whitish or greenish...2. **Smilax.**

Leaves ending in a tendril; flowers large, yellow and red.....3. **Gloriosa.**

Erect undershrubs or herbs:—

Leaves very thick, cartilaginous or fleshy:—

Margins of leaves not spinous; perianth narrowly tubular, divided into linear segments for at least half its length, white or cream-coloured

4. **Sansevieria.**

Margins of leaves spinous; perianth tubular, shortly toothed, reddish-yellow and green.....5. **Aloe.**

Leaves not very thick, neither cartilaginous nor fleshy:—

Undershrubs or stout herbs with a definite above-ground leafy stem:—

Flowers less than 2 in. long:—

Leaves sheathing at the base:—

Perianth segments connate below in a tube.....6. **Dracaena.**

- Perianth segments free to the base.....7. *Dianella*.
 Leaves sessile or shortly petioled, not sheathing.....8. *Disporum*.
 Flowers trumpet-shaped, at least 5 in. long.....9. *Lilium*.
 Herbs without distinct above-ground stems:—
 Flowers in heads or umbels sheathed by 1 or more spathes..... *Allium*.
 Flowers racemose or fascicled in racemes:—
 Rootstock small with fleshy or tuberous roots:—
 Leaves semi-terete, fistular.....10. *Asphodelus*.
 Leaves flat, not fistular.....11. *Chlorophytum*.
 Rootstock a bulb or corm:—
 Flowers several to many, racemose on a simple, naked scape:—
 Flowers distant, usually appearing before the leaves, dingy-brown,
 .5 in. or more long, pedicels 1 in. long; seeds compressed...12. *Urginea*.
 Flowers close, appearing with the leaves, greenish-purple, .25 in. or
 less long, pedicels under 1 in. long; seeds subglobose.....13. *Scilla*.
 Flowers solitary or few corymbose; scape with a few leaves...14. *Iphigenia*.

1. *Asparagus*, Linn.

Scandent or erect undershrubs, rarely herbs; rootstock stout, creeping, sometimes bearing tubers. *Leaves* reduced to minute, often spinescent, scales which bear in their axils tufts of more or less leaf-like acicular, triquetrous or flattened cladodes. *Flowers* small or minute, 2- (rarely 1-) sexual, regular, axillary, solitary, fascicled, umbelled or racemed; pedicels jointed. *Perianth* petaloid, campanulate, 6-partite. *Stamens* 6, on the bases of the perianth-segments; filaments free; anthers oblong. *Ovary* 3-celled, 3-gonous; ovules 2 or more in each cell; style 1, columnar; stigmas 3. *Fruit* a globose, pulpy berry. *Seeds* 1—6, testa black, brittle; embryo dorsal.

Flowers solitary, clustered or umbelled, not racemed:—

Leaves not spinescent. Stem slender, unarmed, terete, striate; branchlets sulcate; cladodes 3—6-nate, firm, up to 2 in. long; flowers in dense clusters, pedicels up to .5 in. long, jointed below the middle.....1. *Rottleri*.

Leaves distinctly spinous:—

Stem erect, tall, smooth; branchlets grooved; spines straight, long; cladodes 6—12-nate, triquetrous, acuminate, .16—35 in. long; flowers 1—2 together, pedicels jointed above the middle.....2. *Fysoni*.

Stem scandent, slender, terete, smooth; branchlets grooved; spines short, recurved; cladodes 6—15-nate, terete, mucronate, .16—25 in. long; flowers solitary or few and umbelled, pedicels jointed in the middle.....3. *asiaticus*.

Flowers racemed:—

Cladodes triquetrous or very slightly compressed:—

Cladodes 2—6-nate, falcate-divaricate, sometimes slightly compressed, .5—1.5 in. long. Stem scandent, woody; branchlets angular; spines strong, long, straight or decurved; racemes solitary or fascicled, simple or branched, many- or few-flowered, 1—3 in. long; bracts minute; pedicels slender, jointed at the middle
4. *racemosus*.

Cladodes 3—6-nate, stout, acuminate, spreading, .25—35 in. long; bracts comparatively large. Otherwise as *racemosus*.....5. *laevissimus*.

Cladodes flat, falcate-ensiform, 2—6-nate, acute or acuminate, .35—1 in. long. Stem subs scandent, terete, smooth; branchlets angled; spines short; racemes often fascicled, 1—3 in. long; pedicels jointed at the middle.....6. *gonocladus*.

1. *ASPARAGUS ROTTLEI*, Baker; F. B. I. vi. 315.

Precise locality not known; probably South India (Rottler).

2. *ASPARAGUS FYSONI*, Macbride; *A. subulatus*, Steud.; F. B. I. vi. 315.
A. asiaticus, Wt. Ic. t. 2055.

Nilgiri, Anamalai and Pulney Hills, 4,000—8,000 ft.

3. *ASPARAGUS ASIATICUS*, Linn.; F. B. I. vi. 316.
Bellary District (Beddome); also Rottler without precise locality.
4. *ASPARAGUS RACEMOSUS*, Willd.; F. B. I. vi. 316; Wt. Ic. t. 2056.
In all Districts, sea-level to 4,500 ft. Very common. Vern. *Ur.* Mohajolo; *Tel.* *Pilli-gaddalu*, *Toalla-gaddalu*; *Tam.* *Ammakodi*, *Kadumulla*, *Nili-chedi*.
5. *ASPARAGUS LAEVISSIMUS*, Steud.; F. B. I. vi. 317.
Nilgiri Hills at about 6,000 ft.
Hardly more than a variety of *A. racemosus*, Willd.
6. *ASPARAGUS GONOCADOS*, Baker; F. B. I. vi. 318.
W. Ghats, 4,000—6,000 ft.

2. *Smilax*, Linn.

Climbing shrubs (rarely erect herbs); stem often prickly. *Leaves* alternate, rarely opposite, 3—9-ribbed, reticularly veined; petioles usually short, generally bearing a tendril on either side above the base, often dilated into a narrow or broad sheath. *Flowers* dioecious, umbellate. *Perianth* of 6, free, subequal segments. *Stamens* in ♂ 6 or more on the base of the perianth-segments; filaments free, erect; anther oblong, didymous or the cells separated by the forking of the connective. *Pistillode* 0. *Staminodes* in ♀ 3 or 6, filiform. *Ovary* 3-celled, 3-gonous: ovules 1—2 in each cell, orthotropous, pendulous; style short or 0; stigmas 3; stout, recurved. *Fruit* a globose berry. *Seeds* solitary or more often 2, rarely 3, hemispheric; embryo small; albumen horny.

Umbels sessile on an axillary peduncle 2—6 in. long, sometimes forming a terminal panicle by the suppression of the upper leaves. Branches rather slender, armed or not; leaves ovate-deltoid, hastate-lanceolate or broadly cordate, sometimes a little broader than long, acute or acuminate, base more or less deeply cordate, 5—9-ribbed, margins and veins below sometimes prickly, 1.6—4.5 in. long, 1—3.2 in. wide; petioles .5—1 in. long, sometimes armed, hardly sheathed at the very base; tendrils from near the base.....1. *aspera*.

Umbels not sessile:—

Umbels 1—3 on an axillary peduncle; sheath of petiole narrow not auricled:—

Branches rather stout, more or less angled, armed or not; leaves very variable; lanceolate, elliptic, broadly oblong or orbicular, acute or abruptly cuspidate, base narrowed, rounded or cordate, 3—7 or 9-ribbed, up to 14 in. diam.; petioles up to 2 in. long.....2. *zeylanica*.

Branches rather stout, terete, very sparsely or not armed; leaves broadly ovate or suborbicular, apex rounded or bluntly cuspidate, young sometimes acuminate, base rounded or shallowly cordate, 5—7-ribbed, up to 5 in. long; petioles up to 1.75 in. long.....3. *Wightii*.

Umbels many, alternate or verticillate on an axillary peduncle. Branches stout, armed or not; leaves elliptic, ovate or very broadly oblong, apex rounded, sometimes reflexe, or with a short hard cusp, base rounded or subcordate, 3—7-ribbed, 4—7 in. long, 2—6 in. wide; petioles up to 2 in. long, broadly sheathed for about half their length, the sheath auricled, often amplexicaul, at the base...4. *prolifera*.

1. *SMILAX ASPERA*, Lindl.; F. B. I. vi. 306. *S. maculata*, Roxb., Wt. Ic. t. 2059.
W. Ghats, 4,000—7,000 ft.; Vizagapatam District at Ventala, 4,000 ft. (A. W. Lushington).
Leaves often blotched with white.

2. *SMILAX ZEYLANICA*, Linn.; F. B. I. vi. 309. *S. macrophylla*, Roxb.; F. B. I. vi. 310. *S. ovalifolia*, Roxb.; Wt. Ic. t. 809.
In all Districts, near sea-level to 6,000 ft. Vern. *Tel.* Kondagurvatiga; *Tam.* Kattu-kodi.
3. *SMILAX WIGHTII*, A. DC.; F. B. I. vi. 310. *S. zeylanica*, Wt. Ic. t. 2057-8.
Nilgiri and Anamalai Hills, 4,000—8,000 ft.
Doubtfully distinct from the last species.
4. *SMILAX PROLIFERA*; Roxb.; F. B. I. vi. 312.
In all Districts, from 2,500 ft. upwards. Vern. *Ur.* Mitri; *Kan.* Nirubetta.

3. *Gloriosa*, Linn.

Climbing herbs, stems leafy; rootstock tuberous, naked. *Leaves* alternate, opposite or ternately whorled, midrib prominent, tip elongate, spiral, functioning as a tendril. *Flowers* large, axillary, usually solitary; pedicels reflexed near the tip. *Perianth* petaloid, persistent; segments 6, free, spreading or reflexed, narrow, margins usually undulate. *Stamens* 6, hypogynous; filaments filiform; anthers linear, dorsifixed, versatile, extrorse. *Ovary* 3-celled; ovules many in each cell; style filiform, sharply deflexed; apex 3-fid, segments subulate, stigmatose within. *Fruit* a large, coriaceous, septicidal capsule. *Seeds* subglobose; testa spongy; embryo cylindric.

GLORIOSA SUPERBA, Linn.; F. B. I. vi. 358; Wt. Ic. t. 2047.

In all Districts; sea-level to 7,000 ft. Common, often climbing on hedge-row plants.

Stem herbaceous, up to 20 ft. long; tubers cylindric, large, simple or forked, white; leaves linear- to ovate-lanceolate, apex tapering, base rounded or cordate, 3—7.5 in. long (excluding the coiled, tendril-like tip), 1.5—2 in. wide, sessile or nearly so; pedicels rather stout, up to 7 in. long; perianth-segments linear, acute, margins crisply waved, up to 3.5 in. long, at first greenish, then yellow, passing through orange and scarlet to crimson; capsules linear-oblong, up to 2.7 in. long. The Glory Lily. The tubers are poisonous. Vern. *Hind.* Karihari; *Ur.* Meheria-phulo, Agni-sikha; *Tel.* Adivi-nabhi, Kalappa-gadda, Potti-dumpa, Ganjeri; *Tam.* Kalap-paik-kilangu, Kannuvelli; *Mal.* Mettonni.

4. *Sansevieria*, Thunb.

Stout, usually fleshy herbs: rootstock short, often stoloniferous, or a creeping rhizome. *Leaves* narrow, cartilaginous or fleshy, flat or terete, nerves immersed. *Flowers* racemed on a stout scape. *Perianth-tube* slender, lobes 6, long, narrow. *Stamens* 6, on the perianth-tube; filaments filiform; anthers dorsifixed. *Ovary* attached by a broad base, 3-celled; ovules solitary in each cell, erect; style filiform; stigma simple. *Fruit* membranous, indehiscent, pericarp evanescent. *Seeds* 1—3, large, globose, fleshy, ripening outside the pericarp.

SANSEVIERIA ROXBURGHIANA, Schult. f.; F. B. I. vi. 271. *S. zeylanica*, Roxb. Cor. Pl. t. 184.

In all Districts except the W. Coast; sea-level to 3,500 ft.

Stemless; rootstock creeping; leaves linear; deeply concave-channelled, rounded or obtusely keeled on the back, tapering to a stout, subulate point, 65—2 ft. long, green transversely marked with a number of darker bars, edges often whitish when old; scape 1—2.5 ft. high, raceme 1—1.5 ft. long; bracts membranous; flowers about 4 in a cluster, 6—8 in. long, white, pedicels jointed near the middle; seeds .25 in. diam. The Bow-string Hemp. Vern. *Hind.* Marúl; *Tel.* Chamakada-nar, Sagal; *Tam.* Marul, Mottamanji.

5. *Aloe*, Linn.

Dwarf plants, less often arboreous. *Leaves* fleshy, forming rosettes or 2-ranked, usually spinose-dentate. *Flowers* in terminal, simple or branched racemes. *Perianth*-segments united into a cylindric or campanulate, sometimes curved tube, the 6 tips usually free. *Stamens* 6, as long as or longer than the perianth; filaments inserted in a pit in the connective. *Fruit* a loculicidal capsule.

ALOE VERA, Linn.

Introduced and run wild, especially in hedge-rows, in the drier localities, up to 2,500 ft. The Barbados Aloes.

Leaves dense, aggregated, ensiform, 1—2 ft. long, 2—4 in. wide, with horny prickles on the margins; scape 2—3 ft. long; perianth reddish-yellow and green, cylindric, .75—1 in. long. Vern. *Tam.* Kathalai.

6. *Dracaena*, Linn.

Shrubs, sometimes climbing, or small trees. *Leaves* alternate or crowded and subterminal, sessile or petioled, either with strong ribs or with many fine parallel nerves. *Flowers* in terminal, rarely also axillary, racemes, panicles, heads or umbels; bracts small. *Perianth* tubular, campanulate or funnel-shaped, cleft into 6 narrow lobes. *Stamens* 6, at the base of the perianth; filaments filiform; anthers versatile. *Ovary* 3-celled; ovules solitary in each cell, erect; style filiform; stigma capitate. *Fruit* a globose, didymous or 3-lobed berry. *Seeds* globose or angular; testa thickened; embryo small; albumen horny.

DRACAENA TERNIFLORA, Roxb.; F. B. I. vi. 328. *D. terminalis*, Wt. Ic. t. 2054.

W. Gháts, 250—4,000 ft.: Rampa Hills, 2,000—3,000 ft. (Gamble, Narayanaswami).

A straggling shrub, stems slender, sometimes rooting near the base; leaves elliptic-lanceolate, acute or acuminate, narrowed to the base, 4—9 in. long, 1.4—2.5 in. wide; petioles 1—3 in. long, with widened, amplexicaul base; raceme sometimes branched, usually shorter than the leaves; flowers 1—3 together, 6—9 in. long, cleft about half way, white; pedicels short, jointed below the flower; berry red, 1—3-seeded; seeds .2—3 in. diam.

7. *Dianella*, Lam.

Herbs, often stout, usually branched and stoloniferous. *Leaves* rigid, distichous, sometimes rosulate, often equitant. *Flowers* in cymose

panicles, nodding; pedicels jointed at the top. *Perianth* marcescent, 6-partite; segments spreading. *Stamens* 6, hypogynous or the 3 inner on the bases of the perianth-segments; filaments much thickened; anthers basifixed, reflexed, opening by terminal pores or short slits. *Ovary* 3-celled; ovules 4—8 in each cell; style filiform; stigma minute. *Fruit* a globose berry. *Seeds* few, ovoid or compressed; testa black, shining; albumen fleshy.

DIANELLA ENSIFOLIA, Red. ; F. B. I. vi. 337 ; Wt. Ic. t. 2053.

Anamalai, Pulney and Tinnevelly Hills, 3,000—4,000 ft., in evergreen forest.

A stout herb up to 3 ft. high; leaves equitant, linear-ensiform, 1—3 ft. long, 7—1 in. wide; sheath acutely keeled, keel and margins smooth or scabrid; panicle 1—2 ft. long, scape slender, angled and sulcate; flowers white, greenish or bluish, 25—35 in. long; berry 3—4 in. diam., cobalt-blue or dark-purple.

8. *Disporum*, Salisb.

Erect herbs, sometimes stout; stems angular, leafy; rootstock creeping. *Leaves* alternate or sometimes opposite, sessile or shortly petioled, strongly nerved, almost ribbed. *Flowers* in terminal or rarely also axillary, few-flowered umbels. *Perianth* petaloid, campanulate, deciduous, 6-partite, segments erect, their bases saccate or spurred. *Stamens* 6, hypogynous; filaments erect, usually flattened; anthers dorsifixed, extrorse. *Ovary* 3-celled; ovules 2—6 in each cell; style long or short; stigmas 3, short. *Fruit* a pisiform berry. *Seeds* few, subglobose; testa brown; albumen horny; embryo small.

Perianth-segments spurred at the base; segments lanceolate, acute, minutely ciliate. *Leaves* oblong-lanceolate, acuminate, base rounded, 2—4 in. long, 75—1.5 in. wide; flowers in sessile or shortly peduncled umbels, 5—7 in. long, white, greenish or purplish.....1. *calcaratum*.

Perianth segments not spurred at the base, saccate or subsaccate:—

Umbels usually peduncled, peduncles up to 6 in. long; fruiting pedicels 1—1.4 in. long. *Leaves* narrow to ovate-lanceolate, acuminate, base rounded, sessile or shortly petioled, 2.5—4 in. long, 6—1.75 in. wide; *perianth-segments* spatulate or lanceolate, acute or acuminate, white or dull purple, 8—9 in. long...2. *pullum*.

Umbels sessile, very rarely very shortly peduncled; fruiting pedicels 7—9 in. long. *Leaves* ovate to suborbicular, acuminate, base rounded, 1.5—4.8 in. long, 75—2.7 in. wide; petioles 12—3 in. long, rarely 0; flowers white, segments broadly oblong, acute or acuminate, 3—6 in. long.....3. *Leschenaultianum*.

1. *DISPORUM CALCARATUM*, D. Don; F. B. I. vi. 359.

Vizagapatam District at Lochili, 4,000 ft. (A. W. Lushington).

2. *DISPORUM PULLUM*, Salisb.; F. B. I. vi. 360. *Uvularia umbellata*, Wall. Pl. As. Rar. t. 269.

Vizagapatam District at Antala, 1,500 ft. (Gamble); Godavari District at Ethakonda, 3,000 ft. (Narayanswami).

3. *DISPORUM LESCHENAUULTIANUM*, D. Don; F. B. I. vi. 360; Wt. Ic. t. 2048; *D. mysorensis*, Wt. Ic. t. 2049.

W. Gháts, 3,000—7,500 ft.

Var. *angustifolium*. *Leaves* linear-lanceolate, caudate-acuminate, base acute, 3—5.5 in. long, 5—1.2 in. wide, scabrid on the nerves beneath.

Nilgiri Hills at Coonoor (Prain).

(All these are very closely allied and may be geographical races rather than separable species.)

9. *Lilium*, Linn.

Tall, unbranched, leafy herbs; root bulbous. *Leaves* few or many, often verticillate. *Flowers* usually very large, axillary or terminal, solitary or 2 or several umbelled or racemed. *Perianth* petaloid, funnel-shaped, 6-partite, usually narrowly nectariferous at the base. *Stamens* 6, hypogynous; filaments long, filamentous or slightly flattened; anthers dorsifixed, versatile. *Ovary* sessile, cylindrical, 3-celled; ovules many in each cell, horizontal; style long; stigma globose, sub-3-lobed, rarely 3-fid. *Fruit* a coriaceous, erect, loculicidal, 3-valved, usually 6-angled capsule. *Seeds* vertically compressed; testa pale, membranous.

LILIMUM NEILGHERRENSE, Wt. Ic. t. 2031—2; F. B. I. vi. 350. *L. tubiflorum*, Wt. Ic. t. 2033—4. *L. Wallichianum*, Wt. Ic. t. 2035.

Mysore (Lobb); Nilgiri and Pulney Hills; Billigiri Rangan Hills (Fischer); Anamalai Hills (Fischer); Tinnevely Hills; 5,000—8,000 ft.

Stem up to 3 ft. high; leaves sessile, linear to elliptic-lanceolate, acute, tip callous, strongly nerved, 2.5—6 in. long, .3—1.2 in. wide; flowers 1—3 together, terminal or in the upper axils, 6—10 in. long, white; apex of segments shortly callous, puberulous. The Nilgiri Lily.

10. *Asphodelus*, Linn.

Annual or perennial herbs; root-fibres slender or fleshy. *Leaves* radical, linear, triquetrous or terete and fistular. *Flowers* in simple or paniced racemes, solitary in the axils of small scarious bracts. *Perianth* petaloid, segments 6, free or shortly connate below. *Stamens* 6, hypogynous; filaments dilated below and embracing the ovary; anthers versatile, dorsifixed, filament inserted in a pit. *Ovary* sessile, globose, 3-celled; ovules 2 in each cell, collateral; style filiform; stigma sub-3-lobed. *Fruit* a loculicidal, 3-valved capsule. *Seeds* 1—2 in each cell, triquetrous; testa crustaceous, black; embryo nearly as long as the cartilaginous albumen.

ASPHODELUS TENUIFOLIUS, Cav.; F. B. I. vi. 332. *A. parviflorus*, Wt. Ic. t. 2062.

A weed of fields and gardens. Rare in S. India. Bangalore (Bourne).

Annual; leaves terete, fistular, very slender, acute, 6—12 in. long, base sheathing, glabrous or minutely puberulous; scapes several, 1—2 ft. long, glabrous or sparsely minutely puberulous; flowers white, distant, .15—2 in. long; pedicels jointed at or below the middle; capsule .15—2 in. in diam., valves transversely wrinkled; seeds sharply 3-angled.

11. *Chlorophytum*, Ker.

Perennial herbs; roots fascicled, often thick, fleshy and tuber-like. *Leaves* radical, clustered, linear or lorate, sometimes broad. *Flowers*

racemose on simple or branched scapes, usually fascicled in the axils of small scarious or large membranous bracts. *Perianth* petaloid, white, marcescent, rarely deciduous; segments 6, free, 3—9-nerved. *Stamens* 6, all hypogynous or the 3 inner shortly adnate to their perianth-segments, included; filaments filiform, often widened above the middle; anthers versatile, linear or oblong, filaments inserted in a small dorsal pit. *Ovary* sessile or subsessile, globose, 3-celled; ovules 4 or more in each cell; style filiform; stigma small. *Fruit* a coriaceous or fleshy, truncate or emarginate, 3-winged or sharply 3-angled, loculicidal, 3-valved capsule. *Seeds* discoid; testa black; embryo rather large, often curved; albumen copious, hard.

Flowers in simple or shortly branched, dense-flowered racemes:—

Leaves narrow-lanceolate or oblanceolate, narrowed into a petiole:—

Scape 2—6 in. long. Collar rather stout; leaves oblanceolate, acuminate, 6—18 in. long (including the broad petiole), 1—2.2 in. wide; bracts longer than the small flowers; pedicels short, jointed near the tip; capsules elliptic-oblong, apex retuse, sharply triquetrous, .5 in. long.....1. *Heynei*.

Scape 1—2 ft. long:—

Anthers longer than the glabrous filaments. Leaves narrow, lanceolate or oblanceolate, acuminate, 6—24 in. long (including the petiole), 1—2.5 in. wide; scape naked, usually as long as the leaves; pedicels jointed usually below the middle; perianth-segments 3—5 in. long; capsules depressed-globose, .25—3 in. diam.....2. *arundinaceum*.

Anthers shorter than the papillose filaments. Leaves narrowly oblanceolate, usually recurved, acuminate, 12—18 in. long, 1—2 in. wide; scape usually longer than the leaves with 2—3 sheaths; pedicels jointed usually above the middle; perianth-segments .25—3.3 in. long; capsules globose, emarginate, .25—3 in. diam.....3. *glaucum*.

Leaves linear or lorate, not or rarely narrowed into a petiole:—

Leaves falcate; filaments glabrous:—

Scape usually longer than the leaves; perianth-segments 7—9-nerved, .5—6.6 in. long. Root-fibres long, cylindrical, tuber-like; leaves sessile, usually ensiform, 8—24 in. long, .6—1.5 in. wide, margins usually crisped; scape 6—36 in. long; pedicels jointed at or below the middle; anthers as long as the filaments; capsules orbicular, retuse, 3—5 in. long, 4—6-seeded.....4. *tuberosum*.

Scape shorter than the leaves; perianth-segments 3-nerved, .3 in. long. Root-fibres short or long, fleshy or not; leaves ensiform, 6—12 in. long, .7—1 in. wide; pedicels jointed at or above the middle; anthers shorter than the filaments; capsules broadly obcordate, .25—3 in. across, 2—5-seeded.

5. *malabaricum*.

Leaves not falcate; filaments papillose. Root-fibres cylindrical, often tuber-like; leaves linear, 7—18 in. long, .5—1 in. wide, slightly narrowed at the base; scape as long or longer, naked; pedicels jointed about the middle; perianth-segments 3—5-nerved, .33—5 in. long; anthers longer than the filaments; capsules obcordate, .33 in. wide, 3—4-seeded.....6. *attenuatum*.

Flowers in simple or branched racemes, remotely scattered, solitary or in pairs:—

Leaves elliptic-lanceolate, acute, 1—2 ft. long, 1—3.5 in. wide; scape tall, paniculately branched. Root-fibres tuber-like; flowers in distant pairs; pedicels jointed at about the middle; perianth-segments .33 in. long; capsules reniform, apex 2-lobed, .33 in. across, cells 1-seeded; seeds evenly orbicular in outline

7. *orchidastrium*.

Leaves subdistichous, grass-like, 6—24 in. long; .12—5 in. wide; scape filiform, flexuous, 1—12 in. long; flowers distant; pedicels jointed at about the middle, slender; perianth-segments .15—2 in. long; capsules subrotund to oblong .25—3.5 in. long, cells 1—4-seeded; seeds irregularly angled.....8. *loxum*.

1. CHLOROPHYTUM HEYNEI, Baker. *C. Heyneanum*, Wall.; F. B. I. vi. 333.

W. Gháts.

2. *CHLOROPHYTUM ARUNDINACEUM*, Baker; F. B. I. vi. 333.
Godavari District (Bourne); Rampa Hills at 1,000 ft. (Narayan-swami); Nilgiri Hills, Karkur Ghát.
3. *CHLOROPHYTUM GLAUCUM*, Dalz.; F. B. I. vi. 334.
Bababudan Hills (Law). Rare.
4. *CHLOROPHYTUM TUBEROSUM*, Baker; F. B. I. vi. 334. *Phalangium tuberosum*, Wt. Ic. t. 2036.
In all Districts, up to 4,500 ft. Vern. Tel. Kushelli.
5. *CHLOROPHYTUM MALABARICUM*, Baker; F. B. I. vi. 335.
W. Gháts, 3,000—6,500 ft.
6. *CHLOROPHYTUM ATTENUATUM*, Baker; F. B. I. vi. 335. *Phalangium attenuatum*, Wt. Ic. t. 2037.
W. Gháts, 1,400—7,000 ft.
7. *CHLOROPHYTUM ORCHIDASTRUM*, Lindl.; F. B. I. vi. 336. *Phalangium oligospermum*, Wt. Ic. t. 2038.
W. Gháts, up to 3,000 ft.; Rampa Hills (Ramaswami).
8. *CHLOROPHYTUM LAXUM*, R. Br.; F. B. I. vi. 336. *Phalangium parviflorum*, Wt. Ic. t. 2039.
W. Gháts, 800—6,000 ft.; Vizagapatam District at Endrika, 5,000 ft. (A. W. Lushington).

12. *Urginea*, Steinh.

Bulbous, scapigerous herbs. *Leaves* narrow. *Flowers* racemed, bracteate, often appearing before the leaves. *Perianth* petaloid, 6-partite, campanulate or tubular. *Stamens* 6, at the base of the perianth-segments, included; filaments filiform, sometimes flattened below; anthers linear or oblong, versatile. *Ovary* sessile, 3-celled; ovules numerous in each cell; style filiform, sometimes geniculate; stigma capitate, 3-grooved. *Fruit* an oblong, ellipsoid or globose, 3-quetrous, loculicidal, 3-valved capsule. *Seeds* numerous, flat; testa black, membranous; embryo rather large; albumen fleshy.

Flowers appearing usually before the leaves:—

Bulb ovoid, 2—4 in. long; leaves linear-lorate, acute, 6—18 in. long; .5—1.1 in. wide; scape erect, stout, brittle, 12—30 in. long; perianth-segments linear-oblong, .5—.75 in. long; pedicels .5—1 in. long; capsules ellipsoid, .5—.75 in. long

1. *indica*.
Bulb globose, 1.5 in. diam.; leaves linear, 4—12 in. long, .2—.5 in. wide; scape slender, 6—18 in. long, flowers drooping; perianth-segments narrowly linear-oblong, .25—.4 in. long, tips of all or the inner 3 often puberulous; pedicels filiform, .4—1.5 in. long; capsules ellipsoid, .4—.5 in. long.

2. *coromandeliana*.
Flowers appearing with the leaves. Bulb ellipsoid, 1 in. diam.; leaves linear, 3—6 in. long, up to 2 in. wide, sometimes filiform; scape as long or longer; perianth segments linear-oblong, .2 in. long; pedicels .15—.25 in. long; capsules subglobose; .3 in. diam.

1. *URGINEA INDICA*, Kunth; F. B. I. vi. 347.
Coimbatore District, 1,000—1,500 ft. (Fischer).
Flowers dingy-brown.
2. *URGINEA COROMANDELIANA*, Hook. f.; F. B. I. vi. 347. *U. Wightiana*, Hook. f.; F. B. I. vi. 347. *U. indica*, Wt. Ic. t. 2063.
Central and Eastern Districts in fairly dry localities, sea-level to 3,500 ft.
Flowers dull-green and purplish.

3. *URGINEA CONGESTA*, Wt. Ic. t. 2064 (left-hand fig.); F. B. I. vi. 348.
Sea-coast (Wight).
Flowers white and purplish.

13. *Scilla*, Linn.

Scapigerous herbs; bulb tunicate. *Leaves* radical, linear, lorate or lanceolate. *Flowers* racemed, bracts small; pedicels inarticulate. *Perianth* petaloid, persistent, 6-partite, stellate or campanulate; segments often recurved; *Stamens* 6, perigynous; filaments usually filiform; anthers ovate or oblong, versatile. *Ovary* sessile or shortly stipitate, 3-celled; ovules 1—2-several in each cell; style filiform; stigma small, capitate. *Fruit* a globose or ovoid, membranous, loculicidal, 3-valved capsule. *Seeds* obovoid or globose, never flat, testa thin, black; embryo shorter than the firm albumen.

SCILLA INDICA, Baker; F. B. I. vi. 348. *Ledebouria hyacinthina*, Roth; Wt. Ic. t. 2040. *Barnardia indica*, Wt. Ic. t. 2041.

In all but the West Coast Districts, sea-level to 4,000 ft.

Bulb ovoid or globose, .5—1.5 in. diam., leaves linear, oblong or lanceolate, obtuse or acute, narrowed into a sheathing petiole, rather fleshy, obtusely keeled on the back, 1.5—7 in. long, .3—1 in. wide, dark-green above, often blotched with black, paler and glaucous below; scape 2—6 in. long; flowers greenish-purple, usually dense; perianth-segments linear-oblong, .15—.25 in. long; capsules subglobose, .2—.3 in. diam. Indian Squill. Vern. *Tel.* Adavi-tellagadda; *Tam.* Narivengayam.

14. *Iphigenia*, Kunth.

Erect herbs; stem slender; root a tunicate corm. *Leaves* few, cauline, scattered, narrow. *Flowers* small, erect, solitary or few, corymbose. *Perianth* petaloid, 6-partite; segments stellately spreading or recurved, clawed, deciduous. *Stamens* 6, hypogynous; filaments short, flat; anthers oblong, versatile, introrsely attached. *Ovary* sessile, 3-celled; ovules numerous in each cell; styles 3, minute, connate at the base, stigmatose within. *Fruit* a loculicidal, 3-valved capsule. *Seeds* subglobose; testa thin, brown; embryo small; albumen fleshy.

IPHIGENIA INDICA, Kunth; F. B. I. vi. 357. *Anguillaria indica*, R. Br. Wall. Pl. As. Rar. t. 259.

In all Districts except in the wettest localities, sea-level to 7,000 ft. Corm subglobose, .4—.75 in. diam.; stem 3—10 in. high; leaves sessile, linear, 3—9 in. long, filiform to .28 in. wide, acuminate; flowers dark-purple, sometimes almost black; perianth-segments linear-subulate to linear-spathulate; filaments sometimes papillose; capsule oblong-ellipsoid, .5—7 in. long. Vern. *Tam.* Nirpanai.

Allium Cepa, Linn.; F. B. I. vi. 337, the Onion, *A. sativum*, Linn.; F. B. I. vi. 337, the Garlic and other species of the genus are cultivated for their edible bulbs.

Yucca gloriosa, Linn., Adam's Needle or the Egg Plant, is cultivated for its fibre for carpet and mat making.

Family CLX. PONTEDERIACEAE.

Fresh-water and marsh herbs, rooting in mud and erect or floating. *Leaves* erect or floating, parallel-nerved. *Flowers* 2-sexual, irregular, in spikes or racemes or subumbellate, arising from the sheath of the uppermost leaf; bracts sheathing, irregular. *Perianth* inferior, petaloid, unequally or subequally 6-fid or -partite. *Stamens* 1-6, inserted at the base of the perianth, equal or one longer; anthers erect or versatile. *Ovary* superior, free, 3-celled or 1-celled with 3 parietal placentas; ovules 1-many on each placenta; style slender; stigma subentire or lobed. *Fruit* a membranous, loculicidal, 3-valved capsule. *Seeds* small, ovoid or ellipsoid; embryo cylindrical; albumen horny or floury.

Petioles not enlarged to form floats; perianth-segments free; one anther longer than the rest, its filament horned on one side.....1. **Monochoria**.
Some, at least, of the petioles enlarged to form floats; perianth distinctly tubular below; anthers equal, filaments not horned.....2. **Eichhornia**.

1. **Monochoria**, Presl.

Fresh-water and marsh herbs; rootstock short or creeping. *Leaves* radical and solitary at the top of the emerging stem or branches. *Perianth* campanulate, tube 0. *Stamens* 6, one usually longer than the rest with its filament horned on one side; anthers basifixed, dehiscing by a terminal, ultimately elongate slit. *Ovary* 3-celled; ovules many in each cell; style filiform; stigma minutely 3-lobed. *Capsules* oblong. *Seeds* many, ovoid, many-ribbed.

Rootstock elongate, creeping; leaves hastate, sagittate or cordate, nerves very close and numerous, acute or acuminate, 3-8 in. long, .75-6 in. wide; petioles up to 2 ft. long, of the floral leaves tumid above and embracing spathe-like the short, stout peduncle; flowers crowded, racemose or subumbellate; perianth-segments obovate, .66 in. long, large anther .2 in. long; pedicels .5-1.2 in. long

1. *hastaeifolia*.

Rootstock short, suberect; leaves ovate or subreniform, nerves not very close or very numerous, acute or acuminate, base rounded or cordate, 2-6 in. long, 1-6 in. wide; petioles up to 21 in. long, the flowering channelled above and embracing spathe-like the elongate peduncles; flowers spicately racemose; perianth-segments narrowly obovate, .5 in. long, large anther .12-.15 in. long; pedicels .4 in. or less long.....2. *vaginalis*.

1. **MONOCHORIA HASTAEFOLIA**, Presl.; F. B. I. vi. 362. *Pontederia hastata*, Roxb. Cor. Pl. t. 111.

In the E. Districts, sometimes in brackish water, at low elevations.

Flowers brilliant purplish blue. Vern. Tel. Nir-tamara.

2. **MONOCHORIA VAGINALIS**, Presl.; F. B. I. vi. 363. *Pontederia vaginalis*, Roxb. Cor. Pl. t. 110.

In all Districts, sea-level to 3,000 ft.

Flowers blue, usually spotted with red. Vern. Tel. Nir-Kancha.

Var. *plantaginea*, Solms-Laub.; F. B. I. vi. 363. Smaller, often only 3-4 in. high; leaves linear or narrowly ovate, racemes few-flowered.

2. **Eichhornia**, Kunth.

Water plants, rooting in mud or free floating and rooting at the nodes. *Leaves* erect or floating, obovate, rotund or cordate, rarely

lanceolate. *Flowers* in simple, rarely paniculate, sub-spicate racemes from the sheath of the leaf. *Perianth* funnel-shaped, tube short or long, limb irregular, often 2-lipped. *Stamens* 6, declinate, irregularly inserted, upper included; anthers subequal. *Ovary* sessile, 3-celled; ovules many in each cell; style filiform; stigma slightly swollen or shortly 3-6-lobed. *Capsule* ovoid-oblong or linear. *Seeds* ovoid, many-ribbed.

EICHHORNIA CRASSIPES, Solms.

A beautiful introduced American plant which is gradually spreading in waterways and lakes. It has become a very serious pest in Bengal and Burma. The Water Hyacinth. Leaves in a rosette, spoon- or paddle-shaped, apex rounded, 2-8 in. diam.; petioles usually turbinate swollen to form floats, up to 10 in. long; scape erect from the centre of the rosette, 6-10 in. long; flowers violet-blue, 1-1.3 in. long.

Family CLXI. XYRIDACEAE.

Erect tufted, reed-like, scapigerous herbs. *Leaves* radical, elongate, linear or subulate; sheaths short. *Scape* simple, usually naked. *Flowers* 2-sexual, sessile in the axis of rigid, brown imbricating bracts forming a terminal head or spike; bracts orbicular or obovate, coriaceous, persistent. *Perianth* inferior, 2-seriate. *Sepals* 3, deciduous, 2 lateral small, scarious, like bracteoles, narrow, arched, keeled or winged, dorsal sepeloid, broader, arching over the corolla, sometimes absent. *Petals* 3, marcescent, yellow, clawed, claws more or less connate into a tube below. *Stamens* 3 perfect, shorter than the petals and attached near their bases; anthers sagittate. *Staminodes* 3 alternating with the petals, filiform, sometimes 0. *Ovary* superior, free, 1- or incompletely 3-celled, placenta 3, basal, confluent or parietal; ovules many on each placenta; style 3-fid; stigmas capitate or dilated. *Fruit* a loculicidal, 3-valved capsule, or splitting lid-like round the top. *Seeds* numerous, minute, linear or ellipsoid, strongly ribbed; embryo minute, albumen floury.

Xyris, Linn.

Leaves linear, caespitose or distichous. *Scape* naked or with a single leaf. *Flowers* in globose or ovoid, rarely hemispheric or shortly cylindrical heads, opening one at a time; bracts usually obtuse and rigid. *Dorsal sepal* broad, more or less distinctly 3-nerved. *Corolla*-tube short or long, lobes ovate. *Staminodes* usually 3, rarely 0, between the corolla-lobes, shortly filiform, bearded or with an aborted anther.

Comparatively robust herbs, 10-38 in. high; leaves distinctly flat, .1 in. or more wide; scapes strongly ridged or flat and 2-edged:—

Leaves obtuse or acute, 5-12 in. long, .1-27 in. wide, not margined or scabrid; scape usually longer, 6-20 in. long, terete, strongly ridged, not scabrid; heads subglobose or ellipsoid, .4-1 in. long; bracts orbicular or cuneately obovate, usually broader than long, dark red-brown, margins entire, glabrous and scarious; lateral sepals linear-spathulate, smooth.....l. *indica*.
Leaves often twisted, rigid, pungently acute, 5-20 in. long, .1-25 in. wide, margined, margins usually minutely scabrid; scape longer, up to 38 in. long, flat and sharply 2-edged, edges minutely scabrid; heads ovoid or ellipsoid-

cylindric, 4—9 in. long; bracts orbicular, brown, margins minutely denticulate or ciliate; lateral sepals ovate-lanceolate, keel spinulose.....2. *complanata*.
 Comparatively slender herbs, 2·5—14 in. high, rarely up to 22 in. high; leaves very narrow, rarely as much as ·1 in. wide; scapes terete, not distinctly ribbed:—
 Leaves 2—9 in. long, ·03—1 in., rarely up to ·17 in. wide, acute, often pungent, not papillose; scape usually much longer, striate, sometimes flattish and slightly 2-ribbed, up to 22 in. long; heads globose or ovoid, ·25—·3 in. long; bracts broadly oblong, obtuse, usually dorsally keeled towards the apex, dark-brown; lateral sepals oblanceolate, acuminate.....3. *schoenoides*.
 Leaves 2—9 in. long, ·03—·07 in. wide, acuminate, minutely papillose; scape as long or a little longer, rarely more than 12 in. long, finely striate, often minutely papillose; heads globose or ovoid, ·2—·5 in. long; bracts orbicular, shining, chestnut-brown, the margins yellowish-brown, apex usually with an acute green tip; lateral sepals oblanceolate, acuminate, keeled, hyaline...4. *pauciflora*.

1. XYRIS INDICA, Linn.; F. B. I. vi. 364.

In marshy localities on the W. Coast.

2. XYRIS COMPLANATA, R. Br. X. *anceps*, Hook. f. non Lam.; F. B. I. vi. 364.

In swampy localities, Quilon (Wight, Rama Row); Malabar-Wynaad at Muthanga, 2,600 ft. (Fischer).

3. XYRIS SCHOENOIDES, Mart.; F. B. I. vi. 365.

In marshy localities, W. Gháts, 4,000—7,000 ft.; Vizagapatam District at Ventala, 4,500 ft. (A. W. Lushington).

4. XYRIS PAUCIFLORA, Willd.; F. B. I. vi. 365.

In marshy localities in all Districts, sea-level to 2,000 ft.

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

PART IX
COMMELINACEAE TO CYPERACEAE

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

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CALCUTTA

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INTRODUCTION TO PART IX.

THE present part has been reduced in length so as to close it with the *Cyperaceae*. A full part would have included the first quarter or so of the *Gramineae*, and this would have entailed considerable delay, as the key to the genera, which must find place at the beginning, can be compiled only when the whole family has been reviewed. For this reason it has been deemed advisable to divide the last two parts into three more or less equal ones, of which this is the first. The remaining ones will comprise the family *Gramineae*, the index and other appendices.

The Supplementary Note, dealing with points in Part VIII which required explanation, appeared as No. VI in the 'Kew Bulletin' for 1928, p. 281.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS, KEW :
January, 1931.

FLORA OF MADRAS.

Family CLXII. COMMELINACEAE.

Prostrate or erect herbs, rarely climbing, very rarely shrubby. *Leaves* alternate, with a strong midrib and many slender, parallel nerves, bases usually sheathing. *Inflorescence* various, often cymose and scorpioid, sometimes paniced. *Flowers* usually 2-sexual, more or less irregular, often enclosed in spathe-like bracts. *Perianth* inferior, 6-partite, 2-seriate; 3 outer segments herbaceous (*sepals*), often persistent, 3 inner petaloid (*petals*), free or united into a tube below, spreading above, marcescent. *Stamens* 6, adnate to the base of the perianth, all perfect or 2 or more reduced to staminodes; filaments often bearded with jointed hairs; anthers oblong or globose, often dissimilar. *Ovary* superior, 2—3-celled; ovules 1—several in the inner angle of each cell, orthotropous; style terminal, stigma small. *Fruit* a loculicidal capsule or indehiscent. *Seeds* angled; testa smooth or rugose; embryo minute; albumen floury.

- Fruit indehiscent, fragile, blue.....1. **Pollia**.
Fruit loculicidally 2—3-valved:—
Fertile stamens 3, staminodes 1—3:—
Cymes 1—2, arising from a spathaceous bract.....2. **Commelina**.
Cymes paniced, not arising from a spathaceous bract.....3. **Aneilema**,
Fertile stamens 6, staminodes 0:—
Cymes not paniced; capsules 3-celled:—
Cymes scorpioid, formed by biseriate, foliaceous bracteoles.....4. **Cyanotis**.
Cymes not scorpioid, not enclosed in biseriate bracteoles...5. **Belosynapsis**.
Cymes paniced; capsules 2-celled.....6. **Floscopa**.

1. **Pollia**, Thunb.

Large erect, sparsely branched herbs. *Leaves* lanceolate. *Cymes* in a terminal, sometimes also axillary, panicle. *Sepals* 3, free. *Petals* 3, free, smaller, subequal. *Stamens* 6 or 3 with 3 staminodes; filaments naked; anthers oblong, sterile anthers triangular-lanceolate-hastate. *Ovary* sessile, 3-celled; ovules 2—10 in each cell. *Fruit* globose or ovoid. *Seeds* 2-seriate, dorsally or laterally compressed, smooth; testa firm.

POLLIA SORZOGONENSIS, Endl. var. INDICA, C. B. Clarke; F. B. I. vi. 368.

Coorg (Hohenacker); S. Kanara (Mecbold); Wynaad at 3,000 ft. (Gamble); Anamalai and Tinnevelly Hills (Beddome) Godavari District at Ethakonda, 2,800 ft. (V. Narayanswami).

Stem, stout, viscid; leaves linear- or elliptic-lanceolate, caudate-acuminate, base narrowed or rounded, 3.75—10 in. long, 1.2—3 in. wide, puberulous when young, glabrescent; petioles of lower leaves up to .5 in. long, with loose puberulous sheaths up to 1.5 in. long, upper leaves practically sessile and sheathless; panicle

viscidly pubescent; bracts oblong persistent; petals white or pale pink; stamens 3 perfect; fruit globose, blue, .25 in. diam., cells many-seeded.

2. *Commelina*, Linn.

Herbs, usually slender and creeping below; sometimes tuberous. *Leaves* with usually lax sheaths, sessile or petioled. *Flowers* in usually 2-fid cymes emerging one at a time from a terminal complicate, cucullate or funnel-shaped spathiform bract, the flowers of the upper cyme usually small and deciduous, of the lower fertile; fruiting pedicels and capsules retracted within the bract. *Sepals* 3, membranous, the 2 inner often connate at the base. *Petals* 3, longer, 2 of them usually larger and long-clawed, the 3rd sometimes absent. *Stamens* 3 perfect and 2—3 imperfect; filaments filiform, often spirally coiled; anthers oblong, one usually larger than the rest, the imperfect often cruciform. *Ovary* 3- (rarely 2-) celled, 2 anticous cells 1—2 ovuled, the posticous, when present, 1-ovuled or empty. *Fruit* a loculicidal capsule, the posticous cell sometimes indehiscent, sometimes absent, or the 2 anticous cells empty, indehiscent and connate as a ligulate body from which the posticous falls away. *Seeds* cylindric, ellipsoid, subglobose or angled; testa smooth, rugose, reticulate, pitted or grooved.

The 2 anticous cells of the ovary 2-ovuled, the posticous 1-ovuled or obsolete:—

Spathes complicate, margins free or connate only at the very base:—

Capsules 3-celled:—

Posticous cell of the capsule keeled:—

Spathes sessile or nearly so, falcate, acute, base cordate, .25—4 in. long, pubescent, ciliate; seeds transversely grooved, puberulous, black. Stem erect, slender, 8—16 in. high; leaves linear, acute, 1—3 in. long, .1—1.5 in. wide; sheaths .5 in. long or less, margins glabrous or ciliate

1. *subulata*.

Spathes distinctly peduncled; seeds not grooved:—

Seed tuberculate and reticulate, oblong-cylindric, dark brown. Stem diffuse, subscentent, 2—3 ft. high, sometimes more; leaves lanceolate or ovate-lanceolate, acute or acuminate, glabrous or puberulous, 1.25—3 in. long, .4—75 in. wide; sheaths loose, .75 in. or more long, glabrous, margins usually ciliate; peduncles .5—75 in. long; spathes ovate or ovate-lanceolate, acute or acuminate, base rounded or cordate, .75—1.3 in. long.....2. *nudiflora*.

Seeds smooth, truncate at one end:—

Branches of cymes equal, usually 1—2-flowered, flowers small, polygamous; seeds ovoid or subglobose, black powdered with white, with a whitish membranous appendage at one end. Stems slender, decumbent, internodes long; leaves linear to linear-lanceolate; spathes ovate- or narrow-lanceolate, short and acute or acuminate or long and finely or subobtusely caudate-acuminate, base rounded, more or less cordate, sometimes strongly auriculate; .8—2.5 in. long; peduncles .3—2.2 in. long.....3. *salicifolia*.

Branches of cymes usually unequal, upper 2—4 lower usually 1—2-flowered; seeds cylindric, subacute or rounded at one end, not appendaged. Stem much-branched; leaves narrow-lanceolate, subacute, 1—3 in. long, .4—7 in. wide; sheaths .5 in. long, base broad, ciliate; peduncles .5—1.5 in. long; spathes ovate-lanceolate, base rounded and cordate, .5—1.3 in. long, glabrous, scabrid or hispid

4. *Hasskartii*.

Posticous cell of capsule not keeled:—

Whole plant hirsute (rarely glabrescent); stems erect, usually branched from the base, 3—18 in. high, slender; leaves linear to linear-lanceolate, obtuse, acute or acuminate, peduncles .5—2 in. long; spathes lanceolate

or linear-lanceolate, acuminate, base shallowly cordate, nerves slightly curved, .6—1.6 in. long.....5. *hirsuta*.
 Glabrous or nearly so; stems erect or caespitose, branched, 5—20 in. high, slender; leaves linear to oblong, obtuse or acute, .6—3 in. long, .2—5 in. wide; sheaths short, margins ciliate; peduncles slender, .5—3 in. long, usually scabrous-pubescent; spathes ovate-lanceolate, acuminate, base deeply cordate, nerves strongly arched, .5—9 in. long, margins usually ciliate

6. *glabra*.

Capsules 2-celled, rarely the posticous cell present and empty or with an imperfect seed :—

Spathes broad, base not auricled :—

Leaves linear- to elliptic-lanceolate, acute or acuminate, base narrowed, 1.5—3 in. long, .5—75 in. wide; sheaths .4—1 in. long, narrowed to the blade, usually hirsute at the mouth; peduncles .75—1.75 in. long; spathes ovate-lanceolate, acuminate, base rounded or cordate, .8—1.7 in. long; capsule slightly constricted at the middle, tip bicuspidate; seeds 4 (sometimes 2 wanting), reticulately pitted.....7. *clavata*.

Leaves ovate-lanceolate, acuminate, base rounded and then narrowed into a short petiole, 2—5 in. long, .9—2 in. wide; sheaths .6—1 in. long, mouth usually minutely pubescent; peduncles .5—75 in. long; spathes ovate, acute, base truncately rounded; .7—1 in. long, capsules oblong, obtuse; seeds obscurely undulate-rugose.....8. *persicariaefolia*.

Spathes narrowly ovate-lanceolate, acute or caudate-acuminate, base distinctly sagittate-auricled, .5—1.6 in. long. Stem slender, .5—3 ft. long; leaves linear or linear-lanceolate, sometimes falcate, acute or subobtuse, 1—3 in. long, .12—5 in. wide; peduncles slender, .3—1.5 in. long; flowers small; seeds pale with a white appendage at each end.....9. *attenuata*.

Spathes funnel-shaped or cucullate :—

Leaves ovate or ovate-lanceolate :—

Leaves ovate, oblong or suborbicular, obtuse or acute, base contracted into a petiole, often inequilateral, .75—3.6 in. long, .6—1.7 in. wide, pubescent or villous; petioles up to .5 in. long, rarely 0; sheaths short or long, like the petioles pubescent or villous and the margins strongly ciliate with rufous hairs. Stem 2—3 ft. long, branched, diffuse; peduncles very short or 0; spathes 1—3 together, auricled on one side, pubescent or hirsute, .4—7 in. long; capsules pyriform; seeds closely pitted.....10. *benghalensis*.

Leaves ovate or ovate-lanceolate, acute or acuminate, base rounded or subcordate, sessile, 1—2.4 in. long, glabrous, margins often crisped; sheaths .4—8 in. long, mouth minutely ciliate; peduncles .4—6 in. long, sulcate and angled, thickened and puberulous at the apex; spathes ovate-falcate, acute, base rounded, .6—1 in. long, puberulous; capsules quadrate, margined, either 3-celled and 5-seeded or 2-celled and 4-seeded; seeds oblong, curved, with 4—7 transverse ridges.....11. *Jacobi*.

Leaves linear or linear-oblong, obtuse or subacute, narrowed at the base, 1—2 in. long, .25—5 in. wide, margins usually undulate or crenulate. Stems diffuse, short or long; sheaths .3—5 in. long, ciliate; peduncles .25—4 in. long; spathes broadly ovate, acute, base usually truncate, sparsely hairy with long slender hairs, .4—5 in. long; seeds orange-brown.....12. *Forskala*.

All the cells of the ovary 1-ovuled :—

Capsules 3-celled :—

Capsules subequally 3-valved, seeds free in the cells :—

Spathes sessile or nearly so :—

Leaves lanceolate or elliptic-lanceolate, acute or caudate-acuminate, base narrowed, glabrous, scabrous or villous, 2.2—8 in. long, .6—2 in. wide, sessile or shortly petioled; sheaths up to 1 in. long, mouth bearded with long, sometimes rufous, hairs. Stem stout, 2—3 ft. high; spathes sessile, solitary or crowded in terminal heads, funnel-shaped, acute, .75—1 in. long, glabrous, subcabrid or glandular-hirsute with red hairs, usually filled with a clear glutinous fluid; capsules trigonous-obovoid; seeds oblong or ellipsoid, smooth, lead-coloured.....13. *obliqua*.

Leaves linear or linear-lanceolate, obtuse, acute or acuminate, base narrowed, sessile, glabrous or minutely puberulous, 2—6 in. long, .2—5 in. wide. Stem slender, 9—24 in. high; sheaths .5—1 in. long, glabrous or

minutely puberulous, mouth glabrous or ciliate; spathes usually very shortly peduncled, cucullate, acute, base truncate, 6—8 in. long, pubescent and often setose.....14. *undulata* var. *setosa*.

Spathes distinctly peduncled, shortly cucullate, ovate, acute or acuminate, base broadly rhomboid, .75—1.3 in. long, scabridly pubescent; peduncles .3—8 in. long. Stem stout, branched; leaves elliptic to broadly lanceolate, acuminate, base usually cuneate, 2—6 in. long, 1—1.75 in. wide, glabrous or nearly so; capsules quadrate-oblong; seeds ellipsoid, dull black

15. *paleata*.

Capsules 2-valved; seeds adnate to the cells, broadly ellipsoid, ashy. Stem stout, 1—2 ft. high, hairy or glabrate; leaves narrowly lanceolate, acuminate, scaberulous, puberulous or hirsute, 2—6 in. long, .25—1 in. wide; sheaths .5—1 in. long, ciliate; spathes sessile or nearly so, solitary or clustered, cucullate, broadly cordate, acute, recurved, about .75 in. long and broad, glabrous or pubescent.....16. *Kurzii*.

Capsule 2-celled. Stem slender, up to 18 in. long; leaves linear-lanceolate, acute or subobtuse, base narrowed, 1—3 in. long, .2—4 in. wide, glabrous or with deciduous hairs; sheaths .4—8 in. long, often rather inflated, glabrous or minutely puberulous; peduncles short; spathes cucullate, ovate, acute, truncate on one margin, hooked on the other, glabrous or hairy, .5—7 in. long; seeds ellipsoid, smooth.....17. *ensifolia*.

1. *COMMELINA SUBULATA*, Roth; F. B. I. vi. 369.
Hills of the Deccan; 3,000—4,000 ft.
Flowers orange-purple, drying violet.
2. *COMMELINA NUDIFLORA*, Linn.; F. B. I. vi. 369.
In all Districts, up to 4,500 ft.
Flowers blue, sometimes very pale.
3. *COMMELINA SALICIFOLIA*, Roxb.; F. B. I. vi. 370; Clarke Comm. Beng. t. 2.
N. Circars; W. Gháts; 100—7,000 ft.
Flowers dark-blue.
4. *COMMELINA HASSKARLII*, Clarke Comm. Beng. t. 3; F. B. I. vi. 370.
Deccan and W. Gháts at low elevations.
5. *COMMELINA HIRSUTA*, Clarke; F. B. I. vi. 371. *Heterocarpus hirsutus*, Wt. Ic. t. 2067.
Nilgiri and Pulney Hills; 6,000—8,000 ft.
Flowers yellow, drying deep-blue.
6. *COMMELINA GLABRA*, Clarke; F. B. I. vi. 371. *Heterocarpus glaber*, Wt. Ic. t. 2067.
In the Central Districts; 600—3,000 ft.
Flowers yellow.
7. *COMMELINA CLAVATA*, Clarke Comm. Beng. t. 5; F. B. I. vi. 371.
In all Districts; sea-level to 7,000 ft.
Flowers lilac.
Var. *Hohenackeri*, Clarke; F. B. I. vi. 371. Leaves oblong, sub-acute, spathes smaller, tip acuminate.
8. *COMMELINA PERSICARIAEFOLIA*, Wight; F. B. I. vi. 372.
Anamalais at 2,000 ft. (Fischer); Dindigul (Wight); Pulney Hills (Bourne, Saulière); Mangalore (Meebold).
9. *COMMELINA ATTENUATA*, Koen.; F. B. I. vi. 372.
E. Districts from the Nallamalais to Salem District, Mysore and Quilon. On sea-shore sands and up to 3,000 ft.
Flowers small, blue.

10. *COMMELINA BENGHALENSIS*, Linn.; F. B. I. vi. 370; Wt. Ic. t. 2065; Clarke Comm. Beng. t. 4.
In all Districts except in the wettest localities; sea-level to 4,000 ft.
Flowers blue. The lower nodes sometimes develop naked underground shoots bearing smaller white flowers which ripen large seeds underground, whereas perfect seeds are often not developed in the normal flowers. Vern. Tam. Adutinnathalai.
11. *COMMELINA JACOBII*, Fischer in Kew Bull. 1928, 277.
Salem District at Buddireddipatti (K. C. Jacob) and Coimbatore District at the Agricultural College farm (K. C. Jacob); about 1,300 ft.
Flowers blue.
12. *COMMELINA FORSKALAEI*, Vahl; F. B. I. vi. 371.
In dry tracts from Mysore to Cape Comorin.
Flowers blue.
13. *COMMELINA OBLIQUA*, Ham.; F. B. I. vi. 372; Clarke Comm. Beng. t. 9. *C. polyspatha*, Wt. Ic. t. 2066.
In all Districts, up to 3,000 ft.
Flowers blue.
14. *COMMELINA UNDULATA*, R. Br. var. *SETOSA*, Clarke; F. B. I. vi. 373.
E. Districts from Anantapur to Tinnevely and Travancore (M. Rama Rao); sea-level to 4,000 ft.
Flowers blue.
15. *COMMELINA PALEATA*, Hassk.; F. B. I. vi. 372.
Bababudans (Law); Coimbatore District at 600 ft. (Fischer); Pulneys at 1,600 ft. (Rodriguez); Courtallam.
Flowers blue.
16. *COMMELINA KURZII*, Clarke Comm. Beng. t. 8; F. B. I. vi. 373.
Deccan from Kurnool and Mysore to Coimbatore; 1,000—4,000 ft.
Flowers blue.
Var. *glochidea*, Clarke; F. B. I. vi. 374. Leaves elliptic-lanceolate, shorter, laxly pilose, scabrid or nearly glabrous.
17. *COMMELINA ENSIFOLIA*, R. Br.; F. B. I. vi. 374.
E. Districts from Bellary to Tinnevely; sea-level to 4,000 ft.
Commelina coelestis, Willd.; F. B. I. vi. 369, is an escape from cultivation round about Ootacamund, where it is becoming established. It is a stout plant 2—3 ft. high with large lanceolate, sessile leaves; peduncled, shortly cucullate spathes which are ovate- to rotund-lanceolate, 1—1.5 in. long and beautiful large deep-blue flowers.

3. *Aneilema*, R. Brown.

Herbs; roots often tuberous. Leaves usually alternate, sometimes all radical. Flowers in axillary and terminal panicles, seldom solitary or a few fascicled, bracteate and bracteolate, bracts not spathaceous. Sepals 3, free, membranous. Petals 3, free, subequal. Stamens 2 or 3 with perfect anthers; filaments naked or bearded; anthers oblong, one usually larger or smaller. Staminodes 2—4, rarely 0, with imperfect, rarely polliniferous, and minute, anthers. Ovary sessile, 2- or 3-celled;

ovules 1—2-many in each cell; style slender, naked or bearded; stigma minute. *Fruit* a loculicidal capsule. *Seeds* 1 or more in each cell; testa hard, rugose, pitted or smooth.

Cells of ovary 2-many-ovuled:—

Seeds 1-seriate in each cell:—

Cells of the ovary 3—many-ovuled; of the capsule 1—many-seeded:—

Flowers paniced on a radical or subradical, rarely leafy scape:—

Roots fibrous; leaves rosulate, broadly ensiform, acute or acuminate, 2—9 in. long, 6—1.6 in. wide, margins crisped; scape erect, branched from near its base, up to 9 in. long; panicle spreading, lax-flowered; bracts small, not sheathing.....1. *glaucum*.

Roots of fascicled, elongate tubers; leaves radical, linear-ensiform, acuminate, 2.5—10 in. long, 3—5 in. wide; scape erect, up to 20 in. long; panicle elongate, narrow; bracts large, sheathing.....2. *scapiflorum*.

Flowering stem leafy:—

Flowers corymbose or paniced:—

Leaves ovate-lanceolate or elliptic-oblong, acute or acuminate, base rounded or cordate, 4—6 in. (lower sometimes 12 in.) long, 1.2—2.3 in. wide, margins white, undulate. Root of slender tubers; stem 3—4 ft. high; panicles stout, dichotomously branched; capsule subglobose; seeds reticulate, glandular-pubescent.....3. *lineolatum*.

Leaves usually narrow, margins not white nor undulate; capsules narrowly ellipsoid:—

Leaves narrowly lanceolate, rarely ovate-lanceolate, acuminate, rarely acute, base cuneate, rounded or cordate, 2—9 in. long, .5—1.6 in. wide; sheaths .5—1.25 in. long; panicles terminal and from the 1 or 2 uppermost axils, sessile or nearly so; seeds not glandular

4. *zeylanicum* var. *longicapsa*.

Leaves .25—5 in. wide; sheaths .6 in. or less long; panicles on terminal peduncles:—

Stems erect; leaves narrowed or rounded at the base; mouth of sheath oblique:—

Roots tuberous; stems subsolitary; leaves linear, usually complicate, often recurved, obtuse or acute, 2—4 in. long, .25—4 in wide; panicle spreading; bracts oblong or the lower 1 or 2 foliaceous; seeds subcubical, dark-brown, obscurely scabrid or pitted.....5. *esculentum*.

Roots fibrous; stems few-many, branching from the base; leaves linear-oblong to ovate-lanceolate, usually flat, acute or obtuse, 1—3 in. long, 3—5 in. wide; panicles sparingly dichotomously branched usually few-flowered; bracts ovate or orbicular, cucullate; seeds subcubical, dark-brown, minutely striate.....6. *dimorphum*.

Stems decumbent, usually dwarf; roots fibrous; leaves oblong, sometimes the lower narrowly lanceolate, acute, base cordate and amplexicaul, .5—1.5 in. long, 3—5 in. wide, ribbed when dry; mouth of sheath straight; panicles branched, few-flowered, terminal and from the upper axils; bracts minute, ovate, amplexicaul; seeds minute, angular or cubical, straw-coloured.....7. *spiratum*.

Cymes 1—3 (rarely 4- or 5-) flowered, axillary. Roots fibrous; stems decumbent and rooting at the nodes, villous on one side; leaves sessile, ovate, acute or subacute, base usually cordate, .5—2 in. long, .25—6.5 in. wide, more or less hairy; sheaths short, usually hairy; fruiting pedicels usually decurved; seeds cubical, black, nearly smooth.....8. *pauciflorum*.

Cells of the ovary 2- (rarely 3-) ovuled; of the capsule 2- (rarely 3-) seeded:—

Flowers in subglobose or subcorymbose cymes at the ends of the branches of the panicle; scars on the rachis not or obscurely raised. Root fibrous; stem subsimple or branched from the base, branches usually weak and procumbent, often rooting at the nodes; leaves linear or linear lanceolate, acute or acuminate, base narrowed, rounded or cordate, 1.5—5 in. long, .25—5 in. wide; sheaths open, margins strongly ciliate; panicles terminal, rarely axillary.....9. *nudiflorum*.

Flowers in lax panicles; scars on the rhachis usually prominently raised:—
 Roots tuberous; stems 1—2 ft. high; leaves tufted at the base and a few cauline, linear, acute or acuminate, 3—12 in. long, .25—6 in. wide; sheaths long, ciliate; bracts ovate, acute, membranous; fertile stamens 2; filaments bearded, twice as long as the 3 naked staminodes, rudimentary stamen bearded; seeds obscurely rugose.....10. *sinicum*.
 Roots fibrous; stems 1—3.5 ft. high; leaves linear, finely acuminate, striate, lowest 10—18 in., upper 2—5 in. long, .3—6 in. wide; sheaths glabrous or villous with long hairs; bracts broadly ovate, acute, base cordate; fertile stamens 3; filaments bearded, as long as the 3 bearded staminodes, no rudimentary stamen; seeds rough or echinulate

11. *giganteum*.

Seeds 2-seriate in each cell:—

Flowers axillary, solitary or few clustered; pedicels jointed:—

Leaves oblong or ovate-oblong, acute or subobtuse, base cordate, subamplexicaul, .5—1 in. long, .2—5 in. wide, glabrous or nearly so. Stems 4—8 in. long, rooting at the lower nodes, usually villous on one side, leafy; pedicels 1—7 together, .25—75 in. long, jointed usually well below the middle, erect in fruit; capsules broadly oblong, obtuse, mucronate, .12—16 in. long; seeds angular, rugose, straw-coloured.....12. *ochraceum*.

Leaves linear to linear-lanceolate, finely acuminate, base broad, 1—2.5 in. long, .2—5 in. wide, pubescent, conspicuously striate, margins undulate. Stems erect, 6—16 in. long, pubescent, villous or nearly glabrous, leafy; pedicels 1—5 from the upper leaf-sheaths, .75—2 in. long, jointed at the middle, with 2 minute, scarious bracteoles at the joints, puberulous below the joint, glabrous above; capsules oblong-trigonous, long-cuspidate with the style, .25—3 in. long; seeds angular, smooth or slightly pitted

13. *lanuginosum*.

Flowers terminal, paniced; pedicels not jointed:—

Stems much branched, 6—12 in. high; leaves linear to linear-lanceolate, obtuse or acute, base rounded or shallowly cordate, 1—3 in. long, .1—25 in. wide; panicles much dichotomously branched, branches slender flexuous; bracts persistent, ochreate; filaments all bearded; capsules linear-oblong, .17—2 in. long; seeds 15—16 in each cells, minutely tessellate...14. *Koenigii*.
 Stems tufted, 1.5—8 (rarely —12) in. high, sheathed at the base with broad, scarious sheaths; leaves filiform, narrowly linear or subulate-semiterete, acute and often apiculate, 1—6.5 in. long, up to .08, rarely .1, in. wide; panicles branched, spreading branches capillary, few-flowered; bracts minute, ochreate, apiculate; filaments all naked; capsules subglobose, .08—12 in. long; seeds 6—8 in each cell, smooth.....15. *paniculatum*.

Cells of the ovary 1-ovuled; of the capsule 1-seeded or empty:—

Capsules glabrous; bracts not funnel-shaped:—

Leaves linear, sessile, acuminate, 1.5—8 in. long, .2—4 in. wide; flowers solitary or 2—6 fascicled in the axils of persistent, usually distant, bracts. Root of stout, almost fleshy, fibres; stems 6—18 in. long, flaccid, often rooting at the lower nodes; bracts narrowly oblong, obtuse, sheathing, strongly ribbed, .3—6 in. long; pedicels slender, usually 2-jointed, with a scarious, sheathing bracteole at the lower or only joint; capsule globose, cuspidate, .15 in. long; seeds hemispheric, rugose.....16. *vaginatum*.

Leaves broad, petioled, aggregated and enlarging upwards; flowers in terminal panicles; bracts caducous:—

Panicles lax, peduncled, much exceeding the uppermost leaves; fruiting pedicels erect. Roots fibrous; stem stout, creeping and rooting, then erect, 6—36 in. high; leaves elliptic-lanceolate, acuminate, base narrowed into a short petiole, glabrous or scaberulous, 2.5—7 in. long, .8—1.75 in. wide; sheaths .5—1.6 in. long, glabrous or puberulous, mouth usually ciliate; fertile stamens 3; capsule globose, .16 in. diam.; seeds hemispheric, rugose

17. *montanum*.

Panicles short, subsessile, pyramidal, much shorter than the uppermost leaves; fruiting pedicels decurved. Roots long fibrous; stem stout, erect, 8—36 in. long; leaves broadly elliptic or elliptic-lanceolate, acuminate or caudate-acuminate, base narrowed into the petiole, puberulous or

glabrescent, 3—6.5 in. long, 1—2 in. wide; sheaths glabrous or pubescent, mouth usually ciliate, .6—1.3 in. long; fertile stamens 2; capsules globose, 2—2.5 in. diam.; seeds reticulate.....18. *ovalifolium*.

Capsules globose, pubescent, .12—1.5 in. long; bracts persistent, funnel-shaped. Roots fibrous; stem stout, 2—3 ft. high, puberulous, sometimes decumbent and rooting at the lower nodes; leaves scattered, usually distant, not enlarging upwards, lanceolate or oblong-lanceolate, acuminate, base rounded and then narrowed into a petiole, 3—7 in. long, .75—1.75 in. wide, hispid above, glabrous below; sheaths loose, .6—1.2 in. long, viscid or hispid, mouth long-ciliate; panicles with long, slender peduncles and branches; seeds plano-convex, glaucous, black, rugose.....19. *scaberrimum*.

1. ANEILEMA GLAUCUM, Thw.; F. B. I. vi. 375.
Travancore and Tinnevely Hills; 3,000—5,000 ft.
Flowers pale pinkish-violet.
2. ANEILEMA SCAPIFLORUM, Wt. Ic. t. 2073; F. B. I. vi. 375; Clarke Comm. Beng. t. 14.
Coorg (Heyne); Nilambur (Bourne); Cochin and Courtallam (Wight).
Flowers blue-mauve.
3. ANEILEMA LINEOLATUM, Kunth; F. B. I. vi. 376; Clarke Comm. Beng. t. 15. *A. latifolium*, Wt. Ic. t. 2072.
W. Gháts; 1,500—4,000 ft.
Flowers blue.
4. ANEILEMA ZEYLANICUM, Clarke var. LONGICAPSA, Clarke; F. B. I. vi. 376.
W. Gháts; 4,000—6,000 ft.
Flowers white.
5. ANEILEMA ESCULENTUM, Wall., F. B. I. vi. 377.
In rice-fields near Madras (Heyne, Wight).
6. ANEILEMA DIMORPHUM, Dalz.; F. B. I. vi. 377. *A. paniculata*, Wt. Ic. t. 2075.
In all Districts, on sea-shore sands and up to 7,500 ft.
Flowers blue or white.
7. ANEILEMA SPIRATUM, R. Br.; F. B. I. vi. 377. *A. nanum*, Kunth; Wt. Ic. t. 2077; Clarke Comm. Beng. t. 18.
In all Districts; sea-level to 5,000 ft.
Flowers blue to rose-brown.
8. ANEILEMA PAUCIFLORUM, Wt. Ic. t. 2077; F. B. I. vi. 378.
W. Coast and Gháts; near sea-level to 3,000 ft.
Flowers brownish-yellow, drying blue.
9. ANEILEMA NUDIFLORUM, R. Br.; F. B. I. vi. 378; Clarke Comm. Beng. t. 21.
In all Districts, sea-level to 4,000 ft.
Flowers blue or purplish.
Var. *terminalis*, Clarke; F. B. I. vi. 379. *A. terminalis*, Wt. Ic. t. 2076. More robust, leaves up to 8 in. long and .75 in. wide.
10. ANEILEMA SINICUM, Lindl.; F. B. I. vi. 379. *A. secundum*, Wt. Ic. t. 2075.
W. Gháts; 3,000—5,000 ft.
Flowers blue.

11. ANEILEMA GIGANTEUM, R. Br.; F. B. I. vi. 379. *A. ensifolium*, Wt. Ic. t. 2074; Clarke Comm. Beng. t. 22.
W. Gháts; 1,000—2,000 ft.
Flowers blue.
12. ANEILEMA OCHRACEUM, Dalz.; F. B. I. vi. 380. *Dichaespermum repens*, Wt. Ic. t. 2078, fig. 3.
Coorg (Bourne); S. Kanara (Hohenacker); Quilon in damp sandy soil (Wight).
Flowers brownish-yellow.
13. ANEILEMA LANUGINOSUM, Wall.; F. B. I. vi. 380.
Bababudan and Brahmagiri Hills (Beddome); Nilgiri Hills; 4,000—6,000 ft.
Flowers salmon-yellow, drying blue.
14. ANEILEMA KOENIGII, Wall. F. B. I. vi. 381. *Dichaespermum lanceolatum*, Wt. Ic. t. 2078, fig. 1.
Nilgiris? (Adam); Mangalore (Hohenacker); Quilon, Courtallam at 500 ft. and Palamkotta (Wight); Red Hills (G. Thomson).
Flowers blue.
15. ANEILEMA PANICULATUM, Wall.; F. B. I. vi. 381. *Dichaespermum juncoides*, Wt. Ic. t. 2078, fig. 2.
W. Coast and Gháts; near sea-level to 4,000 ft.
Flowers blue.
16. ANEILEMA VAGINATUM, R. Br.; F. B. I. vi. 381; Wt. Ic. t. 2076; Clarke Comm. Beng. t. 23.
Low-lying tracts on both coasts, often on sea-shore sands.
Flowers blue.
17. ANEILEMA MONTANUM, Wight; F. B. I. vi. 381. *Dictyospermum montanum*, Wt. Ic. t. 2069.
W. Gháts; 1,000—5,000 ft.
Flowers blue.
18. ANEILEMA OVALIFOLIUM, Hook. f.; F. B. I. vi. 382. *Dictyospermum ovalifolium*, Wt. Ic. t. 2070.
W. Gháts from Mysore to Travancore; 3,000—4,000 ft.
19. ANEILEMA SCABERRIMUM, Kunth; F. B. I. vi. 382. *A. protensum*, Wall.; Clarke Comm. Beng. t. 24. *Dictyospermum protensum*, Wt. Ic. t. 2071.
W. Gháts from Coorg to Travancore; 500—6,000 ft.; Rampa Hills at Sesharayi, 2,000 ft. (V. Narayanswami).
Flowers white.

4. Cyanotis, Don.

Prostrate, creeping or erect terrestrial herbs; roots sometimes tuberous. *Leaves* sheathing. *Flowers* in axillary or terminal, usually scorpioid, cymes formed by imbricate, biseriate, secund, foliaceous bracteoles, usually the petals, stamens and style alone, rarely the whole flower, exposed. *Sepals* 3, subequal, free or connate below. *Petals* 3, subequal, often united into a tube below. *Stamens* 6, all perfect, subequal; filaments filiform, usually bearded, sometimes inflated towards the apex; anthers oblong. *Ovary* 3-celled; ovules 2 in each cell, collateral, one erect, the other pendulous; style linear, bearded or

naked, sometimes inflated below the apex; stigma minute, concave. *Fruit* a 3-celled, loculicidally 3-valved capsule. *Seeds* usually 2, casually 1 or 0, in each cell, superposed, cubical, cylindrical or pyramidal, usually rugose or pitted.

Cymes not enclosed in the leaf-sheaths:—

Valves of the capsule separating from a free, central, columnar, 3-toothed axis. Stem 3—12 in. long, decumbent and often rooting at the nodes, usually patently hirsute, sometimes nearly glabrous, often reddish; leaves linear-lanceolate or ensiform or oblong, acute, acuminate or obtuse and apiculate, more or less hairy, .7—2.5 in. long, .1—4 in. wide; peduncles .5—3 in. long, usually patently hairy; bract falcate, usually slightly longer than the cyme; bracteoles 2—3.5 in. long, ovate, falcate, acute, ciliate; filaments bearded; capsules hairy at the apex.....1. *papilionacea*.

Capsule without a free, central column after dehiscence:—

Not cottony- or silky-cobwebby:—

Bract much exceeding (usually at least twice) the cyme. Stem 6—18 in. long, glabrous or with spreading hairs, internodes usually long; leaves ovate-oblong, obtuse or subacute, base rounded or cordate, glabrous or with spreading hairs, ciliate, 1—3.7 in. long, .25—8 in. wide; peduncles 0—5 in. long; bract leaf-like, acute or acuminate, up to 2.8 in. long; cyme usually much recurved; bracteoles ovate, usually broad, falcate, .5 in. long, often very numerous, glabrous or ciliate with long hairs; filaments bearded, apex inflated; capsules nearly glabrous; seeds black, striate, with 2 large pits on 2 of their faces.....2. *cristata*.

Bracts shorter than or equalling the cyme, rarely slightly longer:—

Root fibres usually tuberous; stem strongly hirsute at the collar, 6—36 in. long, densely villous or almost glabrous; leaves linear to broadly ensiform, acute or acuminate, often slightly narrowed to the base, silky-villous, often purple beneath, 3—18 in. long, .2—1 in. wide, radical usually much longer than cauline; cymes usually long-peduncled, villous or densely hirsute, rarely nearly glabrous; bract ovate, acute, shorter than the cyme; bracteoles 4—6 in. long, falcate, ciliate; filaments densely bearded, inflated at the apex; capsules hairy upwards; seeds pyramidal, brown, obscurely rugose.....3. *tuberosa*.

Root-fibres not tuberous; collar not prominently hirsute:—

Leaves glabrous or sparsely pilose below, linear to narrowly lanceolate, acute or acuminate, radical leaves 4—18 in. long, .4—1.5 in. wide, cauline smaller, margins ciliate; sheaths broad, loose, pilose. Stem 2—3 ft. high, softly villous or pilose; cymes subcorymbose, usually several together from a large, lanceolate, falcately deflexed leaf; bracts ovate-lanceolate, as long as the cyme; bracteoles ovate, falcate, acute or acuminate, .5—7.5 in. long, glabrous, ciliate, sepals fulvous pilose; filaments bearded; capsules hirsute at the apex; seeds pyramidal, pitted.....4. *pilosa*.

Leaves silky-villous below; sheaths moderately loose, pilose, sometimes lanate. Stems 3—4 ft. high, silky or villous with spreading hairs; leaves all cauline, narrowly lanceolate, acuminate, the smallest sometimes ovate and obtuse, 1—6 in. long, .4—1.2 in. wide, ciliate; cymes terminal and in the upper axils, often sessile, bracteoles semi-elliptic, falcate or nearly straight, acute or acuminate, .4—5 in. long, more or less silky-villous, usually densely ciliate; sepals fulvous pilose; filaments bearded; capsules pilose; seeds usually rugose.....5. *villosa*.

Cottony- or silky-cobwebby:—

Suberect; stems 6—24 in. high, slender or robust, often decumbent and rooting below, more or less cottony-cobwebby; leaves very variable, narrowly linear to oblong obtuse, acute or acuminate, 1—12 in. long, .2—1 in. wide, more or less cottony-cobwebby; cymes subsessile or peduncled, terminal and axillary, often large and dense; bract short, rarely as long as the cyme; bracteoles falcately lanceolate, acuminate, .3 in. long, silky cobwebby; filaments bearded; capsules pilose; seeds narrowly cylindrical, obscurely pitted.....6. *arachnoidea*.

Stem slender, decumbent, 2—12 in. high, floccosely silky- or woolly-cobwebby; leaves broadly ovate to narrowly linear, usually obtuse, sometimes apiculate, 4—3 in. long, 2—5 in. wide, more or less silky-cobwebby or floccose, sometimes silvery-silky; cymes axillary and terminal; peduncles slender, 25—1.25 in. long, solitary or several together; bract narrowly lanceolate, sharply acuminate, falcate, longer than the slender cyme; bracteoles narrowly ovate, falcate, acute or acuminate, 2—3.5 in. long, more or less cobwebby or floccose; filaments bearded; capsules pilose at the apex; seeds oblong, faintly rugose.....7. *fasciculata*.

Cymes enclosed in the leaf-sheaths:—

Stem stout or slender, leafy, glabrous, prostrate or suberect, 6—30 in. long; leaves linear, glabrous or sparsely hairy, 1.5—8 in. long, 1—4 in. wide; sheaths short, inflated, quite glabrous or mouth ciliate; cymes reduced to axillary fascicles; bracteoles linear lanceolate, almost hidden, glabrous or minutely ciliate; filaments densely bearded, inflated at the apex; capsules beaked, glabrous; seeds shortly cylindrical, pitted.....8. *axillaris*.

Filaments naked; capsules 3-horned at the apex which is depressed between the horns; seeds subquadrate, smooth or obscurely pitted. Otherwise not differing from the last species.....9. *cucullata*.

1. CYANOTIS PAPILIONACEA, Schult. f.; F. B. I. vi. 384; Wt. Ic. t. 2089.
On both coasts from Mangalore and Madras southwards; Cuddapah, Anamalai and Pulney Hills; up to 3,000 ft.
Flowers blue, anthers violet.
Var. *vaginata*, Fischer n. comb. *C. vaginata*, Wt. Ic. t. 2088; F. B. I. vi. 385. Sheaths inflated; bracteoles transversely striate; seeds sub-tuberculately rugose.
2. CYANOTIS CRISTATA, Schult. f.; F. B. I. vi. 385; Wt. Ic. t. 2082; Clarke Comm. Beng. t. 36.
In all Districts; near sea-level to 5,000 ft.
Flowers blue. Vern. *Tel.* Netha Kina.
3. CYANOTIS TUBEROSA, Schult. f.; F. B. I. vi. 386. *Tradescantia tuberosa*, Roxb. Cor. Pl. t. 108.
In all Districts from Kurnool southwards; near sea-level to 7,000 ft.
Flowers blue or bluish-purple.
Var. *adscendens*, Clarke; F. B. I. vi. 386. *C. sarmentosa*, Wt. Ic. t. 2087. Smaller, more glabrous; branches rooting and proliferous at the nodes.
Bolampatti (Wight).
Flowers pale-rose.
4. CYANOTIS PILOSA, Schult. f.; F. B. I. vi. 387. *C. Wightii*, Clarke; F. B. I. vi. 386. *C. longifolia*, Wt. Ic. t. 2084.
W. Gháts; 4,000—7,000 ft.
Flowers blue.
5. CYANOTIS VILLOSA, Schult. f.; F. B. I. vi. 387. *C. lanceolata*, Wt. Ic. t. 2085.
W. Gháts; Shevaroy and Kollimalai Hills; 2,000—8,000 ft.
Flowers blue; stems and leaves often dark-purple.
6. CYANOTIS ARACHNOIDEA, Clarke; F. B. I. vi. 386. *C. pilosa*, Wt. Ic. t. 2083.
W. Gháts; Rampa, Shevaroy, Kollimalai, Sirumalai and Travancore Hills; 2,000—7,000 ft.
Flowers blue.

7. *CYANOTIS FASCICULATA*, Schult. f.; F. B. I. vi. 387; Wt. Ic. t. 2086.
C. rosea, Wt. Ic. t. 2086. *C. decumbens*, Wt. Ic. t. 2088.
 W. Gháts and all E. Districts; near sea-level to 6,000 ft.
 Flowers blue, purple or pink; beard of filaments often of two colours: blue and white.
 There are several not very well defined varieties, the most distinct being var. *glabrescens*, Clarke; F. B. I. vi. 388.
 Nearly glabrous; bracteoles woolly.
 Mysore State at Shimoga, 2,000—3,000 ft. (Meebold).
8. *CYANOTIS AXILLARIS*, Roem. & Sch.; F. B. I. vi. 388; Clarke Comm. Beng. t. 35. *Tradescantia axillaris*, Roxb. Cor. Pl. t. 107.
 In all Districts; near sea-level to 5,000 ft.
 Flowers blue or pink. Vern. *Tel.* Golla-gundi.
9. *CYANOTIS CUCULLATA*, Kunth; F. B. I. vi. 389.
 Bellary District.
 Flowers blue.

5. *Belosynapsis*, Hasskarl.

Prostrate or epiphytic herbs; roots fibrous; stem sometimes viviparous at the nodes. *Leaves* radical and cauline, sheathed, sometimes fleshy. *Flowers* small, terminal or subterminal, solitary or in few-flowered cymes; bracteoles 0. *Sepals* 3, subequal, free or very shortly united. *Petals* 3, subequal, free or united below. *Stamens* 6, all perfect; filaments bearded or naked; anthers oblong. *Ovary* 3-celled; ovules 2 in each cell, collateral, one erect, one pendulous; style filiform. *Fruit* a 3-celled, loculicidally 3-valved capsule. *Seeds* 2 in each cell, superposed, cylindrical.

Prostrate on rocks; stems and branches thick, somewhat fleshy, 3—12 in. long, rooting at the nodes, densely hairy, hairs turning brown on drying; leaves radical and cauline, rather fleshy, densely villous and ciliate, radical rosulate, elliptic, acuminate, base narrowed, 1.5—2.2 in. long, .5—.75 in. wide, cauline distichous, ovate or ovate-lanceolate, acute or acuminate, base usually cordately auriculate on one side, on erect shoots base usually equally rounded .5—2 in. long, .25—.75 in. wide, often bright red beneath, especially on the apical part; sheaths short, densely villous; flowers 4—8, racemed in pairs on a densely hairy peduncle, shortly pedicelled; bract short, hairy, elliptic-oblong; sepals with long, rufous hairs from bulbous bases; petals free; filaments bearded; capsules hairy; seeds subcubical or shortly cylindrical, obscurely pitted.....1. *kewensis*.
 Epiphytic, subscapigerous; flowering stems numerous, slender, 3—10 in. long, laxly pilose with rufous hairs, rooting below and viviparous at the apex; leaves radical and cauline, more or less pilose and ciliate with rufous hairs, radical linear or linear-lanceolate, acute or acuminate, base narrowed, 1—5 in. long, .2—4 in. wide, cauline ovate or elliptic, acute, .2—.75 in. long; flowers in 2—4-flowered umbels on capillary, pilose peduncles, 2-bracteate; sepals villous; petals connate to the middle; filaments naked; capsules rufous-hairy; seeds cylindrical, smooth.....2. *vivipara*.

1. *BELOSYNAPSIS KEWENSIS*, Hassk. *Cyanotis kewensis*, Clarke; F. B. I. vi. 388.
 Travancore on Myhendra Hill at 3,000 ft. (Beddome), "growing on rocks."
 Flowers blue or rose-purple with blue-hairy filaments.
2. *BELOSYNAPSIS VIVIPARA*, Fischer in Kew Bull. 1928, 254. *Cyanotis vivipara*, Dalz.; F. B. I. vi. 388.

Mysore at Manjerabad, 3,000 ft. (Meebold); Wynaad at 3,000 ft. (Lawson, Gamble); Anamalai Hills at 4,000 ft. (Beddome). Flowers white.

6. *Floscopa*, Loureiro.

Erect or subscandent herbs. *Leaves* lanceolate. *Flowers* in terminal or axillary thyrsoid panicles, cymes secund, not scorpioid; bracts minute. *Sepals* 3, free, oblong. *Petals* 3, free, obovate. *Stamens* 6, all perfect, rarely 1 imperfect; filaments glabrous. *Ovary* 2-celled; ovules 1 in each cell; style simple. *Fruit* a loculicidal 2-celled, crustaceous capsule. *Seeds* hemispheric.

FLOSCOPA SCANDENS, Lour.; F. B. I. vi. 390. *Tradescantia paniculata*, Roxb. Cor. Pl. t. 109. *Dithyrocarpus petiolatus*, Wt. Ic. t. 2079. *D. undulatus*, Wt. Ic. t. 2080. *D. Rothii*, Wt. Ic. t. 208. *D. paniculatus*, Kunth.; Clarke Comm. Beng. t. 34.

W. Gháts, 500—3,000 ft.; Rampa Hills at Sesharayi, 2,000 ft. (Narayanaswami).

Stem rather slender, rooting below, glabrous or pubescent; leaves elliptic-lanceolate, acuminate, much narrowed to the base, 1.5—4 in. long, .5—1 in. wide, scaberulous above; sheaths short, glabrous or villous, mouth fringed with long hairs; flowers pedicelled, lilac or pink; filaments purplish; capsules suborbicular; seeds dorsally transversely wrinkled. Vern. Tel. Konda-amadikada.

Family CLXIII. JUNCACEAE.

Erect, usually perennial herbs; stems tufted; rootstock usually creeping. *Leaves* very narrow, flat or terete, or reduced to sheaths. *Flowers* usually small, regular, 2-sexual, in axillary or terminal bracteate cymes. *Perianth* in 2 whorls, whitish and membranous or brown and scarious or coriaceous. *Stamens* 6, seldom 3, hypogynous or on the bases of the perianth-segments; anthers basifixed. *Ovary* superior, 1-celled or more or less completely 3-celled by the intrusion of the placentae; style filiform or short or 0; stigmas 3, filiform; ovules 3, basal, or many superimposed on 3 placentae. *Fruit* a 1- or more or less 3-celled, loculicidally 3-valved capsule. *Seeds* 3 or many; testa membranous, sometimes produced at each end; albumen dense; embryo small, cylindric.

Sheaths of leaves split down one side; ovules and seeds many.....1. *Juncus*.
Sheaths of leaves entire; ovules and seeds 3.....2. *Luzula*.

1. *Juncus*, Linn.

Glabrous herbs. *Perianth* with the midrib of the 3 outer segments keeled or thickened. *Ovary* and *capsule* 3-, rarely 1-celled; ovules and seeds numerous.

Leaves reduced to sheaths; cyme one to a stem and lateral on it. Stems terete, striate, usually glaucous, up to 4 ft. high; cataphyls up to 4 in. long, usually mucronate, often reddish-brown; cymes up to 2 in. long and broad; flowers distinctly pedicelled.....1. *glaucus*.

Leaves developed; cymes several to a stem, not lateral:—

Leaves flat, very slender, concave above, not hollow nor septate within, 1—4 in.

long; stems densely clustered, 1—12 in. long; flowers solitary or in few-flowered clusters; stamens usually 6, but some terminal cleistogamous with 3 stamens; ovary and oblong or obovate capsule, 3-celled.....2. *bufonius*. Leaves terete or compressed, hollow and distantly septate within, 1—many-tubular, 2—10 in. long, .06—12 in. wide; stems terete or compressed, smooth, 3—26 in. high; cymes irregularly compound, in 6—10-flowered heads, stamens 3, ovary and prismatic or conical, trigonous capsule 1-celled.....3. *prismatocarpus*.

1. *JUNCUS GLAUCUS*, Ehrh.; F. B. I. vi. 393.
Nilgiri and Pulney Hills; 6,000—7,500 ft.
2. *JUNCUS BUFONTUS*, Linn.; F. B. I. vi. 392; Fyson, Fl. Nilg. & Puln. iii. t. 540.
Nilgiri Hills at about 6,500 ft. (Fyson).
3. *JUNCUS PRISMATOCARPUS*, R. Br.; F. B. I. vi. 395.
W. Gháts, 3,500—7,500 ft.; Kollimalai Hills (K. C. Jacob); High Wavy Mountains (Blatter and Hallberg).

2. *Luzula*, D.C.

More or less hairy herbs with grass-like leaves. *Perianth* glutinous. *Capsule* 1-celled, loculicidally 3-valved. *Seeds* 3.

LUZULA CAMPESTRIS, D.C.; F. B. I. vi. 401.

Nilgiri and Pulney Hills; 7,000—8,000 ft.

An erect herb 5—18 in. high; leaves 1—15 in. long, .05—35 in. wide, usually densely ciliate; flowers in peduncled umbellate clusters of 6—10, sessile, bracts very short, scarious; capsule broadly oblong or subglobose, obtuse or mucronate.

Family CLXIV. PALMACEAE.

Shrubs or trees, sometimes climbing, rarely branched, often spiny. *Leaves* alternate, usually in a terminal crown, when mature usually palmate or pinnately divided, rarely simple or bipinnate; petiole sheathing. *Flowers* usually small, 1- or 2-sexual, monoecious or dioecious, sessile or sunk in the rachis of simple or branched spikes or panicles which are enclosed in 1-many sheathing spathes, ♂ and ♀ usually differing in form. *Perianth* of 6 segments in 2 whorls of 3, usually all free, dry or coriaceous, imbricate or valvate. *Stamens* 3, 6 or many. *Staminodes* often present in the ♀. *Ovary* superior, 1—3-celled or of 3 1-celled carpels; ovules 1—2 in each cell or carpel; stigmas 3, usually sessile. *Fruit* a 1—3-celled drupe or hard berry or of 1—3 carpels; pericarp smooth, rough or clothed in shining, downward-imbricating scales. *Seeds* erect or laterally attached; raphe usually branching all over the testa; albumen horny or bony, often ruminant; embryo small in a cavity near the surface of the albumen.

Stems not climbing by hooked spines; leaves in a terminal crown; fruit not scaly:—

Leaves compound:—

Leaves pinnate; leaflets linear or linear-lanceolate:—

None of the leaflets transformed into spines:—

Leaflets not auricled at the base:—

Apex of leaflets premorse; spadix inserted below the leaves:—

Stems 30—80 ft. high, over 6 in. diam.:—

Flowers not sunk in pits in the branches of the spadix, only ♀ flowers at the base.....1. *Arca*.

- Flowers sunk in pits in the branches of the spadix, both ♂ and ♀ flowers together at the base.....2. *Bentinckia*.
 Stems 15—25 ft. high, 2—3 in. diam.....3. *Pinanga*.
 Apex of leaflets acuminate, not premorse.....4. *Cocos*.
 Leaflets with two unequal auricles at the base.....5. *Arenga*.
 One or more of the lowest pairs of leaflets transformed into spines.....6. *Phoenix*.
 Leaves bipinnate; leaflets cuneate or fan-shaped.....7. *Caryota*.
 Leaves simple, circular or lunate in outline:—
 Leaf-blades 8—16 ft. diam.; spadix terminal, erect, 10—20 ft. long; fruit 1.5 in. diam.....8. *Corypha*.
 Leaf-blades 2—5 ft. diam.; spadices from among the leaves, 1—5 ft. long; fruit 6 in. diam.....9. *Borassus*.
 Stems climbing by hooked spines; leaves scattered; fruit scaly.....10. *Calamus*.

1. *Areca*, Linn.

Stem tall, slender, annulate. *Spadices* from the axils of fallen leaves below the crown, branched. ♂ *flowers* minute, numerous on the upper parts. *Petals* obliquely lanceolate, valvate. ♀ *flowers* much larger, few, at the bases of the branches. *Perianth* accrescent, segments orbicular, imbricate, the inner with acute, valvate tips. *Ovary* 1-celled; ovule single, basal, erect. *Fruit* ovoid or oblong. *Seed* truncate at the base; albumen ruminant; embryo basilar.

ARECA CATECHU, LINN.; F. B. I. vi. 405; Roxb. Cor. Pl. t. 75.

Cultivated in many localities; not known truly wild. The *Areca* or *Betul-nut Palm*.

A graceful tree reaching 100 ft. high, rarely over 1 ft. diam.; stem annulate with raised rings; leaves 4—6 ft. long, leaflets numerous, 1—2 ft. long, the upper confluent; spadix much branched; fruit 1.5—2 in. long, smooth, orange or scarlet. The seed is the well-known masticatory and is used in medicine. Vern. *Hind.* and *Ur.* Supāri; *Tel.* Poka-vakka; *Tam.* Kamugu, Pakku; *Mal.* Adakka, Kavugu; *Kan.* Adike.

2. *Bentinckia*, Berry

Stem slender, annulate. *Leaves* with the upper leaflets sometimes confluent. *Spadices* from the axils of fallen leaves below the crown, branched. *Spathes* many, the 2 lower short, incomplete, the upper 2-fid. *Flowers* minute, sunk in spirally arranged pits in the branches, 1, 2 or 3 together, the ♂ above and ♂ and ♀ together below, bracts forming a 2-lipped vertical mouth to each pit, bracteoles 2. ♂ *flowers* glumaceous. *Sepals* imbricate, connate below. *Petals* longer, valvate, connate into a stipes. *Stamens* 6. *Pistillode* conical. ♀ *flowers* large, ovoid. *Sepals* imbricate. *Petals* longer, valvate. *Staminodes* 6, minute. *Ovary* 3-celled; 1 ovule only developed. *Fruit* subspherical. *Seed* solitary, pendulous from the top of the cavity, sinuately grooved or ridged; albumen not ruminant.

BENTINCKIA CODDAPANNA, Berry; F. B. I. vi. 418.

Tinnevely and Travancore Hills; 2,500—6,000 ft.; abundant in its restricted locality. The *Hill Areca-nut*.

Stem smooth, grey, attaining 60 ft. high and 1 ft. diam.; leaves 3—5 ft. long; leaflets opposite, 2—2.5 ft. long, 1—1.5 in. wide, ribbed,

the ribs sometimes with a few paleæ; spadix 2 ft. long, 3 ft. wide, much branched, purple; ♂ flowers 12 in. diam., ♀ rather larger, opening after the fall of the ♂; fruit ovate-globose; 5—6.5 in. diam., bright-chocolate. Wood grey, not used. The terminal bud is edible. Vern. *Tam.* Vareikamugu; *Mal.* Kanthal, Kanthakamugu.

(This description and the information is mainly from Mr. T. F. Bourdillon's careful M.S. notes in the Kew Herbarium.)

3. *Pinanga*, Blume.

Stem rather short, slender, annulate. *Leaves* with the upper leaflets confluent. *Spadices* from the axils of fallen leaves below the crown. *Spathe* solitary. *Flowers* monoecious, 3 together, a ♀ between two ♂, the clusters in 2, 4 or 6 series. ♂ *flowers* obliquely triquetrous. *Sepals* keeled, not imbricate. *Petals* ovate or lanceolate, valvate. *Stamens* 6—many; anthers sessile, basifixed. ♀ *flowers* much smaller, ovoid or globose. *Sepals* and *petals* orbicular, imbricate. *Staminodes* often present. *Ovary* 1-celled; ovule solitary, basilar. *Fruit* ovoid or ellipsoid; pericarp fibrous. *Seed* ovoid or ellipsoid; albumen ruminate; embryo basilar.

PINANGA DICKSONII, Bl.; F. B. I. vi. 409.

Western Ghâts; 1,000—3,000 ft.

Stem smooth, green, up to 25 ft. high and 3 in. diam.; leaves 3—5 ft. long, leaflets 1—2 ft. long, 1 in. wide, premorse; spadix with 4—8 branches clothed with imbricating flowers; ♂ flowers with tapering petals; stamens 20—30; pistillode 0; ♀ flowers with reniform perianth-segments, staminodes 6, clavate, tips penicillate; fruit ellipsoid, 5—8 in. long, .35 in. diam. The fruit are sometimes used by the poor as a substitute for Betel-nut. Vern. *Mal.* Kanakamugu.

4. *Cocos*, Linn.

Stem tall, slender. *Leaves* pinnatisect; leaflets narrow. *Spadices* erect at first, later drooping, simply paniced; branches bearing scattered ♀ flowers, often between 2 ♂, towards their bases and ♂ only above. *Spathes* 2 or more, lower short, upper fusiform or clavate. ♂ *flowers* small. *Sepals* and *petals* valvate. *Stamens* 6, filaments subulate; anthers linear, erect. *Pistillode* minute or 0. ♀ *flowers* usually much larger, ovoid. *Perianth* greatly accrescent. *Sepals* 3, imbricate. *Petals* 3, shorter, convolute with imbricate tips. *Disc* annular or 0. *Ovary* 3-celled; ovule 1 in each cell; style short; stigmas 3, recurved. *Fruit* large, ovoid, terete or trigonous, 1-seeded; pericarp thick, fibrous; endocarp bony or stony with 3 basal pores. *Seed* cohering with the endocarp; albumen solid or hollow or lining the endocarp, not ruminate; embryo opposite one of the pores.

COCUS NUCIFERA, Linn.; F. B. I. vi. 482; Roxb. Cor. Pl. t. 73.

Much cultivated, especially along the coasts. Country of origin disputed. The Coconut Palm.

Stem slender, curved or straight, 40—80 ft. high, marked with ring-like leaf-scars; leaves 6—15 ft. long, leaflets numerous.

linear-lanceolate, 2—3 ft. long; petioles 3—5 ft. long, stout; spadix 4—6 ft. long; lower spathes 2—3 ft. long; fruit green or yellowish, 8—12 in. long, the cavity containing a potable milky fluid. Wood hard, red outside, reddish-brown and softer within, used for rafters. The leaves are plaited into mats and used for thatching, fencing, partitions, etc. Toddy is obtained by tapping the peduncles and is convertible into arrack and "jageri." The kernel of the fruit is edible and yields an edible and burning oil. The fibres of the pericarp are used for cordage and matting. Vern. *Hind.* Nariyal; *Ur.* Nodia; *Tel.* Kobari, Tenkai; *Tam.* Tenga, Thennei; *Mal.* Tenga; *Kan.* Tengina.

5. *Arenga*, Labill.

Stem stout, densely clothed above with the black fibrous remains of the leaf-sheaths. *Spadices* first from an upper leaf-axil and successively from lower ones, large, much branched; peduncle decurved, clothed by numerous imbricating spathes. *Flowers* monoecious, the sexes usually on separate spadices, rarely a ♀ between 2 ♂. ♂ *sepals* orbicular imbricate. *Petals* oblong, valvate. *Stamens* numerous. ♀ *flower* subglobose. *Sepals* accrescent. *Petals* triangular, valvate. *Staminodes* many or 0. *Ovary* globose, 3-celled; ovule 1 in each cell; stigmas conic. *Fruit* ovoid-globose, 2—3-seeded. *Seeds* compressed or plano-convex; albumen not ruminant; embryo dorsal.

ARENCA WIGHTII, Griff.; F. B. I. vi. 422.

W. Gháts; 500—3,000 ft. The Wild Coconut.

Stem smooth, grey, up to 30 ft. high and 1 ft. diam.; leaves 12—28 ft. long, leaflets dark green above, white beneath, linear-ensiform, the apical often confluent and obconic, 1—3.5 ft. long, .75—2 in. wide, apex narrowed, sometimes shortly, unequally 2-lobed, entire or toothed in the upper half, base 2-auricled, the lower lobe up to 2 in. long, obliquely overlying the midrib, the upper shorter; petiole 4—8 ft. long. ♂ and ♀ spadices separate, up to 4 ft. long; fruit depressed-globose, 1 in. long, 1.5 in. wide. Toddy is obtained by the hill-men by tapping the peduncle. Vern. *Tam.* Alam panci; *Mal.* Alathil tenga, Malam tengu.

6. *Phoenix*, Linn.

Low shrubs or trees up to 60 ft. high, dioecious; stems clothed completely or at least above with the persistent bases of the petioles, rarely branched. *Leaves* pinnate; leaflets linear, longitudinally folded and attached obliquely by their folded bases to the rachis, the lower ones usually transformed into spines. *Spadices* from the axils of the leaves, usually several, branched. *Spathes* simple, basilar, coriaceous. ♂ *calyx* cupular, 3-toothed. *Petals* 3, obliquely ovate, valvate. *Stamens* usually 6. *Pistillode* minute or 0. ♀ *flowers* globose. *Calyx* as in the ♂, accrescent. *Petals* rounded, imbricate, *Staminodes* 6, sometimes united into a 6-toothed cup. *Ovary* of 3 free carpels; ovule 1 in each, erect; stigmas sessile, uncinat. *Fruit* oblong, terete; pericarp fleshy. *Seed* oblong, ventrally grooved; albumen not or only slightly ruminant; embryo dorsal or subbasilar.

Stem 10—50 ft. high:—

Stem slender, 25—50 ft. high, clothed with the large persistent bases of the petioles; leaves 7—15 ft. long; leaflets fascicled, 2—4-farious, rigid, 6—18 in. long, .75—1 in. wide, a few at the base forming channelled triangular spines up to 4 in. long; spathes 12—16 in. long, almost woody, scurfy, separating into 2 boat-shaped valves; ♂ flowers .25—35 in. long, dense; ♀ smaller, distant; fruiting spadix 3 ft. long, much compressed, golden-orange; fruit oblong-ellipsoid, 1—1.25 in. long, orange-yellow.....1. *sylvestris*.

Stem stout, 10—20 ft. high, about 15 in. diam., clothed and appearing tessellated by the small, spirally-arranged leaf-sheaths; leaves 3—5 ft. long; leaflets fascicled, 4-farious, strict, shining, up to 12 in. long and .6 in. wide, a few basal forming channelled spines up to 3.5 in. long; spathes narrow, coriaceous, up to 8 in. long, fringed with brown wool on the keel; ♂ flowers .15—2 in. long, dense; ♀ distant; fruiting spadix about 2 ft. long; fruit oblong-ellipsoid, .4—5 in. long, brown.....2. *robusta*.

Stem .5—10 ft. high:—

Stem very short, thickly clothed and hidden by the old leaf-sheaths; leaves 3—5 ft. long, leaflets fascicled, more or less 4-farious, rigid shining, usually with an orange-red pulvinus at the junction with the rhachis, 3—8 in. long, .4—6 in. wide, several basal forming stout flat spines 2—3 in. long; fruit .5—75 in. long, at first green, black when ripe.....3. *farinifera*.

Stem usually well-developed, up to 10 ft. high, and 9 in. diam., densely covered with the bases of the petioles; leaves 4—8 ft. long, leaflets 8—20 in. long, .3—75 in. wide, pliable, fascicled, more or less 4-farious, not or hardly pulvinate at the insertion, a number of the lowest forming channelled spines 1—3 in. long; spathes 8 in. long, fringed on the margins; spadix much branched, in fruit 3—4 ft. long; ♂ flowers .2—25 in. long; fruit .5—6 in. long, at first orange, black when ripe.....4. *humilis* var. *pedunculata*.

1. PHOENIX SYLVESTRIS, Roxb.; F. B. I. vi. 425.

In all the drier Districts, cultivated and run wild; from sea-level to 3,500 ft.; often in dense thickets. The Wild Date-Palm.

The fruit is edible. The stem is much tapped for toddy. The leaves are plaited into mats. Vern. *Hind.* Khajur; *Ur.* Khejuri, Kojari; *Tel.* Pedda-ita; *Tam.* Icham; *Kan.* Ichal.

2. PHOENIX ROBUSTA, Hook. f.; F. B. I. vi. 427.

Ganjam District (Gamble), Ventala in the Vizagapatam District (A. W. Lushington), 300—5,000 ft.

3. PHOENIX FARINIFERA, Roxb. Cor. Pl. t. 74; F. B. I. vi. 426.

Coromandel, at low elevations not far from the sea.

The pulp of the fruit is sweet and mealy. The leaflets are woven into mats and the split petioles into baskets. The farinaceous pith is used by the poor for "kanji." Vern. *Tel.* Chittisita, Chiruta-ita; *Tam.* Ithi.

4. PHOENIX HUMILIS, Royle var. PEDUNCULATA, Becc.; F. B. I. vi. 427.

In all the hilly Districts; 500—7,000 ft.

The fruit is sweet and edible. The leaves are plaited into mats. Vern. *Ur.* Bukhorjuro, Kojiri; *Tel.* Konda-ita; *Tam.* Inji, Malai-icham.

7. *Caryota*, Linn.

Stem tall, annulate, naked or sheathed. Leaves few, very large, bipinnate; leaflets obliquely cuneate or fan-shaped, premorse or rounded at the apical margin. Spadices first from the upper leaf-sheaths and successively from lower ones, shortly peduncled, much

branched; branches slender, pendulous. *Spathes* 3—5. *Flowers* monoecious, solitary and ♂ or in groups of one ♀ between 2 ♂. ♂ *sepals* rounded imbricate. *Petals* linear-oblong, valvate. *Stamens* very many. ♀ *flowers* subglobose. *Sepals* as in the ♂. *Petals* rounded, valvate. *Staminodes* 6, 3 or 0. *Ovary* 3-celled; ovule 1 in each cell, erect. *Fruit* globose, 1—2-seeded. *Seeds* erect; albumen ruminant; embryo small.

CARYOTA URENS, Linn.; F. B. I. vi. 422.

In all Districts; from sea-level to 4,000 ft., scattered; sometimes cultivated. The Bastard Sago or Kitul Palm.

Stem up to 60 ft. high and 1.5 ft. diam., smooth, shining; leaves 18—20 ft. long, 10—12 ft. wide; pinnae 5—6 ft. long, curved, drooping; leaflets 4—8 in. long, broadly cuneate, obliquely truncate or rounded and serrate on the apical margin, the outer angle often caudate; spadix 10—12 ft. long; spathes 1.5 ft. long; flowers ternate, ♂ 5 in. long, ♀ longer; fruit globose, 6—7.5 in. long, reddish.

Wood brown with close black streaks, very hard, strong and durable; used for hut-building, agricultural implements and fencing. The fibre of the petioles is used for fishing-lines. The pith makes a good sago. Toddy, convertible into arrack, is obtained by tapping the peduncles. *Vern. Hind.* Mari; *Ur.* Solopo; *Tel.* Mari, Kondajivalaggu; *Tam.* Konda-panei, Thippilipanei; *Mal.* Iram-panei, Chunda-pana, kala-pana; *Kan.* Baini.

8. *Corypha*, Linn.

Stem tall, stout, dying after once flowering and fruiting. *Leaves* very large, circular or lunate in outline, flabellately multifid round the margin, the segments folded lengthwise; petioles stout, concave, spinous at the edges. *Spadix* large, terminal, erect, paniculate, pyramidal. *Spathes* many, tubular. *Flowers* small, bisexual. *Calyx* cupular, 3-fid. *Petals* 3, connate at the base, ovate, acute, imbricate or subvalvate. *Stamens* 6; filaments subulate; anthers dorsifixed. *Ovary* 3-lobed, 3-celled; ovule 1 in each cell, basilar erect; style short, stigma minute. *Fruit* of 1—3 fleshy, globose drupes with basilar style. *Seeds* globose or oblong, erect; albumen not ruminant; embryo spiral.

CORYPHA UMBRACULIFERA, Linn.; F. B. I. vi. 428.

Malabar; Travancore; doubtfully wild. The Talipot Palm.

Stem 30—80 ft. high, 2—3 ft. diam., annulate; leaves circular or sublunate, 8—16 ft. diam., cleft to the middle into 80—100 linear-lanceolate, acute or 2-fid lobes; petioles 5—10 ft. long, very stout, margins armed with short, compressed dark spines; spadix 10—20 ft. long; spathes pierced by the primary branches of the spadix; fruit globose, 1.5 in. diam., usually only 1 carpel developed with 2 abortive ones at its base; seeds smooth, polished, very hard.

Wood soft with a hard rind; not used. The leaves used for thatching. The pith is used for flour. A very ornamental tree, flowering, fruiting and then dying at about 40 years of age. *Vern. Mal.* Kodapana.

9. *Borassus*, Linn.

Stem tall, stout. *Leaves* simple, palmately fan-shaped, plicate, the margin multifid; petioles spinous. *Spadices* dioecious, large, simply branched; peduncles sheathed with open spathes. ♂ *flowers* small, mixed with scaly bracts, secund in 2 series in a small spikelet. *Sepals* 3, narrowly cuneate, imbricate. *Petals* 3, shorter, obovate-spathulate, imbricate. *Stamens* 6; anthers subsessile. *Pistillode* of 3 bristles. ♀ *flowers* larger, globose. *Perianth* fleshy, accrescent. *Sepals* reniform, imbricate. *Petals* smaller, convolute. *Staminodes* 6—9. *Ovary* globose, subtrigonal, entire or 3—4-partite, 3—4-celled; ovules basilar, erect; stigmas 3, sessile, recurved. *Fruit* a large subglobose drupe with 1—3 fibrous pyrenes; pericarp thinly fleshy. *Seed* oblong, top 3-lobed; testa adhering to the pyrene; albumen hollow, not ruminant; embryo subapical.

BORASSUS FLABELLIFER, Linn.; F. B. I. vi. 482. *B. flabelliformis*, Linn.; Roxb. Cor. Pl. tt. 71 and 72.

In most Districts, wild or cultivated; sea-level to 2,500 ft.

The Palmyra Palm.

Stem up to 100 ft. high and 3 ft. diam., greyish-black, swollen above the middle and again contracted above, when young clothed with the dry leaves or the bases of the petioles; leaves 2—5 ft. diam., approximately circular, the margins split into 60—80 linear-lanceolate, acuminate segments with spinulose margins; petioles 2—4 ft. long, stout, semiterete, the edges armed with hard, horny, spinescent serratures; ♂ *spadix* simply branched, ♀ simple; fruit 6—8 in. diam., seated on the greatly enlarged perianth.

Outer wood hard black, inner soft, light brown, handsomely streaked; much used for rafters, posts and fences, water pipes, troughs, etc. The leaves are used for thatch, fans, hats, basket work, etc. The pulp of the fruit is edible. The sap of the peduncle yields a toddy which is fermented into arrack or boiled down into "jageri." Vern. *Hind.* Tal, Tar; *Ur.* Talo; *Tel.* Tadu, Tadi; *Tam.* and *Mal.* Panei, Karrumpanei; *Kan.* Tali.

10. *Calamus*, Linn.

Scandent, occasionally erect, tufted shrubs armed with spines or prickles. *Leaves* pinnatisect, the rhachis often produced into a whip-like cirrus armed with claws; petiole and rhachis armed with spines or prickles; sheathes armed, produced into long or short ligules or ochrea and often bearing a lateral flagellum armed with claws; leaflets evenly or unevenly spaced along the rhachis, often varying in arrangement in different parts of the plant and of the rhachis in the same leaf. *Spadices* axillary, usually elongate and much branched, often produced into a flagellum armed with claws. *Spathes* tubular or open, sheathing the peduncle and the branches of the spadix and passing into bracts and bracteoles (*spathels* and *spathellules*). *Flowers* small, polygamodioecious, usually in distichous, often scorpioid spikelets, solitary or binate (♂, ♀ or both) in the bracteoles. *Calyx* cupular, 3-toothed.

Petals 3, usually free in ♂ and tubular below in ♀, valvate. *Stamens* 6, shortly connate at the base. *Staminodes* in ♀ forming a cup with 6 short teeth with abortive anthers. *Ovary* incompletely 3-celled, clothed with retrorse scales; ovules 3, basal, erect; style short or long; stigmas 3. *Fruit* globose or ellipsoid, style terminal; pericarp thin, clothed with appressed, closely imbricating, polished scales. *Seed* solitary, rarely 2—3 developed, subglobose or oblong; albumen sometimes ruminant; embryo ventral or basal.

(The parts differ in young and adult plants; the key applies only to adult forms. In some species some of the parts are unknown, the key, therefore, is tentative.)

Leaf not ending in a cirrus; sheaths usually flagelliferous; leaflets usually narrowly-linear or lanceolate:—

Leaflets fascicled at least near the base:—

Leaflets not fascicled in threes, very narrow; secondary spathes closely sheathing, not strongly clawed nor 2-keeled:—

Petioles with flat, black, seriate spines; basal part of rhachis channelled above, trigonous upwards, the flat lower surface armed throughout with solitary or ternate reflexed, straight spines; leaflets in opposite or nearly opposite distant groups of 2 or 3 on each side in the basal part, often more or less regular and equidistant upwards, narrowly lanceolate or ensiform, up to 28 in. long and 2 in. wide, with a few short, black bristles on the ribs on both surfaces, the margins ciliate throughout with similar bristles; primary spathes very long, tubular, armed with short black-tipped prickles; fruit obovoid, suddenly beaked, .75—1 in. long, scales broad, channelled in the middle, yellowish-brown with a dark brown margin.....1. *Thwaitesii* var. *canarana*.

Spines on the petioles not flat and black:—

Leaflets numerous in several planes pointing in different directions, distinctly grouped in fascicles of 2—4 (seldom of 5—6) on each side, those near the apex more regular, nearly equidistant and in one plane, narrowly lanceolate, up to 11 in. long and .8 in. wide, densely bristly on the margins and on the midrib above; rhachis nearly terete, armed below with solitary or ternate, needle-like, pale, spreading or deflexed spines up to 1.25 in. long; primary spathes tubular, clawed mainly on the back; fruit globose or slightly turbinate, distinctly beaked, .4 in. long, scales broad, not channelled, uniformly pale-straw coloured.....2. *viminalis* var. *fasciculata*.

Leaflets all in one plane, not numerous (not more than 35):—

Primary spathes coriaceous, not produced above the insertion of the partial inflorescence, closely sheathing, not expanded, smooth or sparingly spinous, with a lanceolate point at the apex, mouth bearded. Leaf-sheath densely armed with scattered, slender, needle-like spines from subtuberculiform bases, mouth very short, ochrea with numerous spiculae up to 2 in. long; rhachis acutely trigonous, at least near the base, armed below with a few very strong, solitary, pale spines; leaflets few, sometimes only 15, very distinctly fascicled, narrowly elongate-lanceolate, apex acuminate and bristle-spinous, sparingly bristly above, densely so on the margins, up to 11 in. long and 1 in. wide; fruit nearly globose, slightly turbinate, .3 in. long including the sudden beak, scales semi-circular, not channelled, pale-brown with a broad submarginal dark brown band.....3. *Brandisii*.

Primary spathes membranous, much longer than the partial inflorescence, loose and expanded flatly at least in the middle, the margins spinulose near the base; rhachis trigonous, the flat lower face bearing irregular weak claws; leaflets 20—30, distinctly grouped into 3—4 opposite fascicles 3—4 in. apart, each of 3—5 close-set leaflets, very narrowly oblanceolate, tip filamentous and shortly bristly on the margin, up to 8 in. long and .7 in. wide, more or less bristly on the ribs above and densely along the margins; fruit unknown.....4. *travancoricus*.

Leaflets in distant fascicles of 3, 2 opposed to 1, near the base of the leaf, upwards becoming regular in opposite distant pairs, elongate-lanceolate, apex acuminate, bristly penicillate, up to 20 in. long and 4 in. wide, ribs 5-7, the middle one hardly more prominent, without bristles or cilia; secondary spathes coriaceous, loose and widened at the mouth, flattened on one side near the base and strongly 2-keeled, armed with strong claws all round a little below the mouth; spathels usually armed with 1-3 claws; fruit ovoid or ellipsoid, .8 in. long including a rather long, stout beak and .4 in. wide, perianth pedicelliform, .15 in. long, scales narrowly triangular, faintly keeled along the middle, pale brown, slightly paler near the base.....5. *Rheedei*.

Leaflets not fascicled, more or less regularly equidistant:—

♀ spikelets inserted within their spathes:—

Rhachis of leaf trigonous, armed below in its lower half with straight, needle-like spines pointing in different directions; ochrea of leaf very large, usually over 4 in. long; leaflets linear-lanceolate, up to 20 in. long and .8 in. wide, apex usually bristly-penicillate, more or less bristly on the 3 ribs above, the margins very bristly-ciliate or almost smooth; primary spathes long, closely sheathing, the lowest flattened and acutely 2-edged, armed with scattered, straight, horizontal, usually short spines; fruit subovoid, .5 in. long including the sudden beak, scales broadly triangular, not channelled, orange-yellow with a broad chestnut submarginal band, their margins and apex pale and erose

6. *pseudo-tenuis*.

Rhachis of leaf trigonous in the upper part, terete or semi-terete in the basal half, armed with small, solitary, though often approximated, claws; leaflets numerous, rather distant, elongate-ensiform near the apex, lower ones lanceolate, up to 28 in. long and 3 in. wide, tapering into a long acuminate bristle-ciliate tip, with 3 or 5 distinct ribs which are remotely brown-bristly on both surfaces, margins remotely spinous-ciliate; secondary spathes unarmed; fruiting perianth pedicelliform; fruit globose, obpyriform or turbinate-globose, slightly tapering to a caudiculate base, apex flattish and mucronulate, about 1 in. long; scales broadly and rather acutely triangular, rather deeply channelled, shining, pale yellow with a narrow marginal dark line.....7. *Gamblei*.

♀ spikelets inserted at or well above the mouths of their spathes:—

Leaf-sheath and its spines glabrous:—

Spines of leaf-sheath tumescent above, hollowed below; ochrea short, truncate; petiole very short or obsolete; rhachis near the base flat and smooth above, channelled at the sides to receive the leaflets, trigonous upwards, armed below along the middle and occasionally along the sides with rather approximate, solitary, black-tipped claws; leaflets very numerous, narrowly lanceolate, apex very gradually acuminate, 1-ribbed, but with distinct primary nerves, the rib usually bearing scattered bristles on both surfaces, margins ciliate with spreading bristles, up to 12 in. long and .8 in. wide; primary spathes tubular, the lowest acutely 2-edged, smooth or armed at the sides with straight spines, the upper slightly widened upwards, flat at the base on the inner face, armed on the back with strongish claws; fruit globose or slightly longer than wide, .6 in. long, minutely apiculate, scales rhomboid, nearly as long as wide, very faintly channelled, light straw-coloured, the apex sometimes reddish-brown, the margins erose-toothed.....8. *Rotang*.

Spines of leaf-sheath needle-like; rhachis acutely trigonous, subregularly armed on the flat lower face with short, solitary claws; leaflets numerous, not very close-set, narrowly ensiform, apex gradually acuminate and bristly penicillate, 3-ribbed above, the ribs above bearing a few bristles with bulbous bases, up to 12 in. long and .5 in. wide, margins minutely appressed, bristly ciliate; upper primary spathes narrow-cylindric, loosely sheathing, sprinkled with short prickles; very young fruit almost at right angles to the spikelet, subglobose-ovate, broadly conical at the apex, .4 in. long, scales semicircular, slightly apiculate, not channelled, yellowish-brown at the base, chestnut apically, margins finely erose-toothed....9. *Hookerianus*.

Leaf-sheath and its flat, straight or slightly hooked spines greyish-brown scurfy; petiole green, up to 12 in. long; rhachis acutely trigonous, armed on the flat lower face with a single medial series of solitary claws; leaflets

numerous, narrowly ensiform, apex long acuminate, bristle-penicillate, distinctly 3-keeled above, naked or with a few long bristles on the ribs above, margins distinctly bristle-ciliate, up to 28 in. long (usually 15—20), 1—1.25 in. wide; lower primary spathes somewhat compressed and 2-keeled, armed with solitary, straight, short, broad-based spines, upper elongate, sometimes up to 18 in. long, almost polished, tubular, base long attenuate, more or less densely prickly on the outer side in the lower half and, like the lower, prickly all round in the apical part; fruiting perianth shortly pedicelliform; fruit nearly globose, .7 in. diam., very suddenly contracted into a short conic beak, terminated by the persistent stigmas; scales rhomboid, not channelled, black or chestnut-brown with a dark marginal band, distinctly erosely toothed.....10. *Huegelianus*.

Leaf-rhachis produced into a cirrus up to 3 ft. long armed with many strong, irregularly aggregated $\frac{1}{2}$ — $\frac{1}{4}$ -whorled claws; sheaths not flagel-liferous, more or less armed with very large laminar, elastic, elongate-triangular or sublanceolate spines up to 1.25 in. long, sometimes scattered but more often confluent and irregularly whorled at intervals of 1—2.25 in.; rhachis in lower portion biconvex, armed beneath with solitary strong claws, upwards 2-faced and smooth above, obsoletely angular beneath and armed with half-whorled strong claws; leaflets 28—30, very inequidistant, more or less geminate on each side, with irregular interspaces 6—10 in. long, broadly lanceolate, or elliptic-lanceolate, conspicuously concavo-convex, shortly acuminate, apex bristle-hispid, up to 16 in. long and 3 in. wide, 3—7-ribbed, margins appressedly bristly; primary spathes tubular, closely sheathing, the lower compressed with 2 acute spinous edges, the upper more cylindric, more or less armed on the outer side with robust sub-deflexed spines; fruit unknown.....11. *latifolius*.

1. CALAMUS THWAITESII, Becc. var. CANARANA, Becc.; Ann. Calc. xi. 138, t. 12. *C. Thwaitesii*, Becc.; F. B. I. vi. 441.
Along the W. coast at low elevations.
Erect or high climbing. Vern. *Mal.* Valia chural; *Kan.* Jed-dubetta.
2. CALAMUS VIMINALIS, Willd. var. FASCICULATA, Becc.; F. B. I. vi. 444; Ann. Calc. xi. t. 57.
Vizagapatam and Ganjam Districts; Rampa Hills (Gamble); 1,000—2,000 ft.
A moderate-sized climber. Canes straw-coloured, shining, vitreous.
3. CALAMUS BRANDISII, Becc.; F. B. I. vi. 448; Ann. Calc. xi. t. 102.
W. Gháts from Kanara to Tinnevelly.
A slender scandent shrub.
4. CALAMUS TRAVANCORICUS, Bedd.; F. B. I. vi. 452; Ann. Calc. xi. t. 121.
W. Gháts from Coorg (Bidie) to Tinnevelly, up to 3,500 ft.
A graceful, slender climber. Vern. *Mal.* Cheru churel.
5. CALAMUS RHEEDII, Griff.; F. B. I. vi. 452; Ann. Calc. xi. t. 226 III.
Hilly tracts from Malabar (Rheede) to Tinnevelly (Beddome).
Scandent. Vern. *Mal.* Katu churel.
6. CALAMUS PSEUDO-TENUIS, Becc.; F. B. I. vi. 445; Ann. Calc. xi. t. 69.
Throughout the W. Gháts; 1,000—5,000 ft.
A slender climber. Vern. *Kan.* Betta.
7. CALAMUS GAMBLEI, Becc.; F. B. I. vi. 453; Ann. Calc. t. 123.
Mukurti forests in the Nilgiris at 5,000 ft. (Gamble); Anaimalais

in S. Coimbatore; Udumbansholay in Travancore at 5,000 ft. (Meebold).

A moderate-sized shrub, probably scandent. Vern. *Tam.* Othaiyadi Perambu.

Var. *sphaerocarpa*, Becc. with spherical fruit.

Nilgiris in same locality as the type (Gamble).

8. *CALAMUS ROTANG*, Linn.; F. B. I. vi. 447; Ann. Calc. xi. t. 97.

In all the drier tracts; from sea-level to 1,500 ft.

A tall, slender climber. The cane is used for basket-making, but is too coarse for the best work. Vern. *Ur.* Betto; *Tel.* Bettam; *Tam.* Churel, Sothu Perambu.

9. *CALAMUS HOOKERIANUS*, Becc.; Ann. Calc. xi. 226, t. 70 and App. t. 14.

W. Gháts.

Probably a tall, slender climber.

10. *CALAMUS HUEGELIANUS*, Mart.; F. B. I. vi. 452; Ann. Calc. xi. t. 122.

Nilgiri, Anamalai and Tinnevely Hills, 4,000—6,000 ft.

A moderate-sized climber.

11. *CALAMUS LATIFOLIUS*, Roxb.; F. B. I. vi. 455; Ann. Calc. xi. t. 176.

Madgole Hills in the Vizagapatam District (A. W. Lushington); 3,000—4,000 ft.

A tall climber.

Family CLXV. PANDANACEAE.

Dioecious shrubs or small trees, sometimes scandent, often throwing out aerial roots which form struts. *Leaves* simple, narrow, acuminate, sessile, base sheathing, margins and keel beneath usually spinulose, usually arranged in tristichous spirals. *Spadices* axillary or terminal, simple or branched, clothed with leafy, sometimes coloured spathes. *Flowers* small, usually crowded or catkin-like; perianth usually absent. *Stamens* of ♂ flowers usually numerous; filaments free or connate; anthers erect, basifixed. *Pistillode* 0 or minute. *Staminodes* of ♀ flowers 0 or small. *Ovary* 1—many-celled, free or connate with those of adjoining flowers; ovules solitary and suberect or many and parietal; style short or 0, stigmas papillose. *Fruit* a globose or oblong syncarp of free or connate 1—many-celled woody or fleshy angular drupes or berries. Seeds minute, testa striate; albumen hard, fleshy; embryo minute.

Pandanus, Linn. f.

Characters of the family. *Inflorescence* capitate or spicate, simple or racemose; flowers sessile, crowded; perianth absent. *Stamens* numerous. *Staminodes* 0. *Ovules* solitary. *Fruit* usually solitary, forming a syncarp of free or connate drupes seated on a fleshy receptacle; the upper half of each carpel hollow or filled with a spongy pith-like tissue.

Ovary 5—12-celled. Leaves coriaceous, ensiform, caudate-acuminate, 3—5 ft. long, 1—2 in. wide, glossy green, margins with forward-pointing spinules, the keels with forward or backward-pointing spinules; spathes of the ♂ spadix lanceolate or linear-lanceolate, 5—24 in. long, the lower with a long flagellum, white, fragrant; ♂ spadix with numerous cylindric spikes 2—4 in. long; anthers .15—2 in. long; ♀ spadix solitary, 2 in. diam.; carpels confluent in groups of 4—10; syncarp 6—10 in. long, yellow or red; drupes of 5—12 carpels, carpels 2—3 in. long, turbinate, angular, apex rounded with a depressed centre.....1. *sectorius*.

Ovary 1-celled:—

Drupe club-shaped, nearly 2 in. long and .4 in. wide, connate to just below the broadly convexly pyramidal apex; style .8—1 in. wide, somewhat bilobed; anthers .08—1 in. long; lower ♂ spathe flagelliferous.....2. *canaranus*.

Drupe cylindric:—

Anthers .2 in. long. Leaves dark-green, 6—15 ft. long, 3—6 in. wide, margins and keel below armed with short, sharp, forward-pointing spinules, not conspicuously tessellated; ♂ spathes golden-yellow, unscented, the lower attaining 3 ft. long and 4 in. wide, produced into a spinulose 3-quetrous acumen, the margins not spinulose or only slightly so near the apex; syncarp subtrigono-oblong, 6—9 in. long, orange-red; drupes connate, obconic-cylindric, 1.2—1.6 in. long, .3—4 in. wide, apex convex, style 2—3-forked, spine-tipped

3. *furcatus*.

Anthers filamentous, .5—6 in. long. Leaves chartaceous, up to 8 ft. long, 1—1.75 in. wide, margins and keel (sometimes 2-keeled) beneath ascendingly spinulose, glaucescent below, conspicuously tessellated by the raised longitudinal veins and transverse venules; ♂ spathes boat-shaped, lower flagelliferous, margins spinulose throughout or only in the upper half; syncarp oblong-rotund, up to 5 in. long; drupes connate, slightly narrowed to the base, 1.6 in. long, .25 in. wide, free apex pentagonal-pyramidal, terminated by the entire subsapinescent subulate style.....4. *Thwaitesii*.

1. **PANDANUS TECTORIUS**, Soland. *P. fascicularis*, Lam.; F. B. I. vi. 485. *P. odoratissimus*, Roxb. Cor. Pl. t. 94—96.

In all Districts, especially near the coast. Often planted as a hedge. The Screw Pine.

A branched shrub or small tree up to 25 ft. high. The leaves are used for mat- and umbrella-making and their fibres for cordage and fishing-lines; the roots are used in basket- and brush-making; an aromatic medicinal oil is distilled from the spathes; the floral leaves are eaten. Vern. *Hind.* Keora; *Ur.* Khia; *Tel.* Mogali; *Tam.* and *Mal.* Kaitha; *Kan.* Kaida.

2. **PANDANUS CANARANUS**, Warb.

Near Mangalore (Hohenacker).

Little is known of this plant; it appears to be that figured by Rheede in Hort. Malab. ii, t. 7 and called Perin-Kaida Taddi.

3. **PANDANUS FURCATUS**, Roxb.; F. B. I. vi. 484.

Cochin (Gamble); Travancore (Lawson, Barber).

A gregarious tree up to 40 ft. high. Appears to be the plant figured in Rheede's Hort. Malab. ii. t. 8 and called Kaida Tejerria.

4. **PANDANUS THWAITESII**, Mart.

At Bantwal in S. Kanara (Hohenacker); near Aiyankavu in Travancore at 1,000 ft. (Bourdillon).

A common undershrub in evergreen forest with very fragrant white flowers (Bourdillon).

Family CLXVI. TYPHACEAE.

Aquatic or marsh herbs with perennial, creeping rhizome clothed with distichous scales. Leaves distichous, linear, erect or floating, sheathing below. *Flowers* monoecious, minute, in terminal superposed dense cylindrical spikes, the upper spike ♂, the lower of ♀ flowers often intermixed with slender clavate bracts, sterile ♀ flowers or simple or branched hairs; perianth 0. *Stamens* 2—7, usually 3, rarely 1; filaments usually connate, tip of connective thickened, sometimes produced; anthers 4-celled, erect, basifixed. *Ovary* borne on a slender, usually densely hairy gynophore or in the axis of a membranous spatulate bract, 1-celled, fusiform, narrowed into a slender persistent style; stigma filiform or clavate; ovule solitary, pendulous from near the apex. Sterile ♀ flowers on a long axis with a clavate pistillode. *Fruit* minute, membranous or drupaceous, fusiform, detached with the hairy gynophore, dehiscent by an apical lid. *Seed* often adnate to the wall; albumen fleshy or floury; embryo axile, cylindrical.

Typha, Linn.

The only genus; characters of the family.

TYPHA ANGUSTATA, Bory & Chaub.; F. B. I. vi. 489.

In all districts from sea-level to 2,500 ft. The Reed Mace or Bulrush.

A robust plant up to 10 ft. high occurring in marshes. Leaves up to 8 ft. long, 2—1 in. wide, semi-terete above the sheath; ♂ and ♀ spikes separated by a considerable interval, up to 12 in. long, .25—9 in. diam., brown, ♂ paler and more slender, ♀ flowers mixed with clavate sterile pistillodes. Vern. *Tel.* Jambu; *Tam.* Sambu.

Family CLXVII. ARACEAE.

Herbs or shrubs or small trees, sometimes climbing by aerial roots; rhizomatous or tuberous; juice often acrid, sometimes milky. *Leaves* in herbaceous species solitary, clustered or radical, in shrubby and arboreal species alternate, often fleshy or coriaceous, simple, entire or lobed, or variously compound, often appearing at different times from the inflorescence; petioles sheathing. *Flowers* hermaphrodite, monoecious or dioecious, sessile or shortly pedicelled on a spadix which is more or less enclosed in a spathe, neutrals often present; perianth 0 or of scales. *Anthers* 4—8 in ♀ flowers, 1—many in the male, usually opening by a terminal pore. *Ovary* entire, rarely lobed, 1—3, rarely more, -celled; style 0, short or long; ovules 1—many in each cell. *Fruit* usually baccate, free or confluent. *Seeds* 1—many, usually embedded in mucilaginous pulp; albumen 0 or copious; embryo axile or in exalbuminous seeds thick with the plumule in a lateral slit.

Floating herb; leaves in a close spiral, cuneate.....1. *Pistia*.
Terrestrial or marsh plants, rooting in soil or epiphytic; leaves not in a close spiral:—

Erect, not scandent plants; no adventitious aerial roots:—

Quite unarmed:—

Marsh plants; rootstock creeping, not tuberous:—

Leaves not distichous; spadix enclosed in a chamber in the spathe; flowers monoecious:—

Leaves usually grass-like; ovaries few in a single whorl...2. *Cryptocoryne*.

Leaves broad; ovaries numerous in several cycles.....3. *Lagenandra*.

Leaves distichous; spadix free; flowers hermaphrodite.....4. *Acorus*.

Terrestrial or epiphytic plants; roots tuberous, rarely creeping:—

Leaves simple though often deeply lobed:—

Terrestrial, not bearing leafless bulbiferous shoots:—

Small plants; leaves rarely over 7 in. long:—

Leaves ovate-hastate or sagittate, not peltate:—

Spadix usually exerted from the spathe; ovules 1—2

5. *Typhonium*.

Spadix included in the spathe; ovules many...6. *Theriophonum*.

Leaves suborbicular, peltate.....7. *Ariopsis*.

Robust herbs or shrubs; leaves ovate-cordate, rarely under 7 in. long:—

Ovules many, parietal; leaves peltate.....8. *Colocasia*.

Ovules few, basal; leaves peltate or not.....9. *Alocasia*.

Epiphytic or in pockets on bare rock; bearing leafless bulbiferous shoots; rarely flowering.....10. *Romusatia*.

Leaves compound:—

Leaflets pedately or radially arranged.....11. *Arisaema*.

Leaves 3-partite, each division again variously cut:—

Spadix with a barren appendage.....12. *Amorphophallus*.

Spadix without a barren appendage:—

Flowers monoecious, ♂ and ♀ inflorescences separated by a belt of large clavate neuters.....13. *Pisonium*.

Flowers hermaphrodite.....14. *Anaphyllum*.

Thorny marsh plants.....15. *Lasia*.

Scandent shrubs with adventitious aerial roots:—

Leaves ovate to suborbicular; flowers monoecious:—

Leaves entire; petioles winged throughout; ovule solitary.....16. *Scindapsus*.

Leaves usually perforate or more or less pinnatifid, rarely entire; petioles not winged; ovules many.....17. *Rhaphidophora*.

Leaves linear to oblong-lanceolate, entire; flowers hermaphrodite...18. *Pothos*.

1. *Pistia*, Linn.

A small, floating, gregarious, stoloniferous herb; roots of tufted fibres. Leaves sessile in a close spiral, together forming a cup. Spathe small, shortly peduncled, shortly tubular below, opening out into an ovate, concave limb. Spadix adnate to the back of the tube of the spathe, free above. ♂ flowers in a whorl of a few connate stamens beneath the apex of the spadix. Neuters few, minute, confluent in a ring below the ♂. ♀ flowers solitary. Perianth 0. Ovary 1-celled, obliquely adnate to the spadix, the apex free and forming a conical style; stigma discoid; ovules many, crowded on a parietal or subbasal placenta, orthotropous. Berry ovoid; pericarp thin. Seeds few to many, oblong or obovoid; albumen copious, floury; embryo minute, cuneiform.

PISTIA STRATIOTES, Linn.; F. B. I. vi. 497; Roxb. Cor. Pl. t. 268.

Common in tanks and wells in all districts; up to 3,000 ft.

The Water Soldier.

Leaves obovate-cuneate, apical margin rounded or retuse or shallowly lobulate and undulate, densely, closely pubescent on both faces, 1—4 in. long, very variable in breadth; spathe 5 in.

long. Vern. *Hind.* Jalkhumbi; *Tel.* Antharai-dhaman, Nirubuduki; *Tam.* Kodi-tamarai, Agasa-tamarai; *Mal.* Koddapail.

2. *Cryptocoryna*, Fisch.

Aquatic, marsh, or riverain herbs; rootstock creeping; stem short or 0. *Leaves* often grass-like, radical. *Spathes* often partly subterranean or submerged, margins connate into a tube below with a transverse septum forming an almost closed chamber for the spadix, the tube more or less produced above the chamber and then expanding into a usually narrow, often contorted, limb. *Spadix* very slender, adnate at the tip to the septum of the spathe; ♂ and ♀ flowers separated by a bare region of the spadix. *Perianth* 0. ♂ flowers numerous, forming a cylinder. *Stamens* 1—2; anthers sessile, cells 2, conical, pollen vermiform. *Ovaries* in a single whorl of 4—7 at the base of the spadix, connate, 1-celled, mixed with a few neuters; style short; recurved; ovules many, erect, orthotropous. *Berries* of fleshy, connate, 2-valved carpels. *Seeds* many, oblong; testa rugose; albumen copious; embryo axile.

Tube of spathe longer than the limb:—

Limb of spathe ovate-oblong, densely fimbriate-ciliate, 2—3 in. long, .6—1.2 in. wide. *Leaves* linear-oblong or lanceolate, inequilateral, 7—16 in. long, .8—4 in. wide; petioles 4—12 in. long; peduncles short, tube of spathe up to 12 in. long; ovaries 5—7; fruit long-peduncled, globose, 1 in. diam.....1. *ciliata*.

Limb of spathe not fimbriate-ciliate:—

Spathe closely twisted, 4—10 in. long, limb linear-lanceolate, caudate, 1—3 in. long. *Leaves* linear or narrowly linear-lanceolate, grass-like, up to 18 in. long and .75 in. wide; peduncle very short; ovaries 4—6.....2. *retrospiralis*.

Spathe not twisted; limb ovate or lanceolate:—

Leaves oblong-lanceolate, finely acuminate, 4—6 in. long, .5—8 in. wide, margins flat; peduncle short; tube of spathe 4—5 in. long, limb narrowly ovate, 1—1.5 in. long with a subulate-caudate prolongation up to 3 in. long; ovaries 5—6.....3. *concolorina*.

Leaves linear, 6—10 in. long, .25—3 in. wide, margins crisply waved; peduncles slender, 2—3 in. long (fruiting up to 5 in. long); tube of spathe 5—6 in. long, limb lanceolate, acuminate, 1.5—3 in. long; ovaries 6—7
4. *Wightii*.

Tube of spathe shorter than the limb:—

Limb of spathe linear-lanceolate, 3—5 in. long, at first twisted, margins denticulate, transversely lamellate within, tube obconic, less than 1 in. long; peduncle very short included with the tube of the spathe in the leaf-sheath. *Leaves* linear-lanceolate, 3—8 in. long, .3—6 in. wide; ovaries 5—6, stigmas broadly elliptic.....5. *spiralis*.

Limb of spathes very slender, 6—8 in. long, closely twisted, margins entire, not lamellate within, tube nearly cylindrical, 1 in. or less long; peduncle very short. *Leaves* narrowly linear, 8—12 in. long, .5—7 in. wide; ovaries 4—5, stigmas orbicular or broadly oblong.....6. *unilocularis*.

1. *CRYPTOCORYNE CILIATA*, Fisch.; F. B. I. vi. 492; Wt. Ic. t. 775.
Coromandel (Roxburgh); Mysore and Carnatic (G. Thomson).
Spathe dull-green, spotted with purple near the limb which has an ovate yellow patch nearly 1 in. long in the mouth.
2. *CRYPTOCORYNE RETROSPINALIS*, Kunth; F. B. I. vi. 493; Wt. Ic. t. 772.
In most Districts up to 1,500 ft.
Spathe deep-green, streaked with purple.

3. *CRYPTOCORYNE CONSOBRINA*, Schott; F. B. I. vi. 493.
W. Gháts (G. Thomson, Perrottet).
4. *CRYPTOCORYNE WIGHTII*, Schott; F. B. I. vi. 493.
Mysore (Wight); Calicut.
5. *CRYPTOCORYNE SPIRALIS*, Fisch.; F. B. I. vi. 494; Wt. Ic. t. 773.
E. and W. Coasts at low levels.
Spathe greenish without, dark-purple within.
6. *CRYPTOCORYNE UNILOCULARIS*, Wight Ic. t. 774. *C. Roxburghii*,
Schott; F. B. I. vi. 494.
N. Circars (Roxburgh); Coromandel (Wight).
Spathe within purple marbled with white.

3. *Lagenandra*, Dalz.

Marsh herbs; rootstock creeping, usually annulate. *Leaves* usually long-petioled and broad. *Spathe* tubular below, margins connate with a transverse septum forming an almost closed chamber for the spadix, limb expanded above. *Spadix* slender, adnate by its apex to the septum of the spathe; ♂ and ♀ portions well separated by a bare region of the spadix. *Perianth* 0. ♂ *flowers* numerous, forming a cylindric or oblong mass near the apex of the spadix. *Stamens* 1-2; anthers sessile, pollen sausage-shaped. *Ovaries* numerous, at the base of the spadix, spirally arranged and free or in several connate cycles, 1-celled; stigma subsessile, peltate or discoid; ovules 1 or 2—many on a basal placenta, orthotropous. Berries free or connate. *Seeds* 1-6 oblong, furrowed; albumen copious; embryo elongate, axile.

Rhizome stout, up to 2 in. diam.; leaves oblong or elliptic-oblong, obtuse or acute at both ends, 6-17 in. long, 2-5 in. wide, margins undulate, veins very numerous, ascending, nearly straight from the very broad midrib; petioles as long as the blade; stipular sheaths acuminate, 2-keeled, up to 7 in. long; peduncles shorter and more slender than the petioles, up to 12 in. long; spathes 3-9 in. long, tube broad, limb much longer, ovate-lanceolate, caudate-acuminate.....1. *ovata*. Rhizome up to .5 in. thick; leaves ovate- or elliptic-oblong, acute or obtuse, base rounded, sometimes emarginate, 3-6 in. long, 1.4-2.6 in. wide; petioles usually longer than the blade, up to 7.5 in. long; veins numerous, ascending from the broad midrib, widely arched, margins not undulate; stipular sheaths triangular-lanceolate, acute, not keeled, up to 2.5 in. long; peduncles 1 in. or less long, slender; tubular portion of the spathe 2 in. long, oblong, closed chamber about half that length, slightly constricted above the spadix, limb triangular, terminating in a subulate-filiform appendage 1.5-2 in. long, verrucose within.....2. *Meeboldii*.

1. *LACENANDRA OVATA*, Thw. *L. toxicaria*, Dalz.; F. B. I. vi. 495.
Throughout the W. Coast and Gháts, in marshes and along water-courses, often gregarious; from sea-level to 4,000 ft.
Spathe greenish-purple without, dark-purple within. Vern. Mal. Karin-pola.
2. *LACENANDRA MEEBOLDII*, Fischer n. comb. *Cryptocoryne Meeboldii*,
Engl. in Pflanzenr. iv. 23. f. 234.
Agalhatti, Mysore at 3,000 ft. (Meebold); Tuppanad, S. Malabar at 650 ft. (Fischer).
Spathe dark-purple.

4. *Acorus*, Linn.

Aromatic marsh herbs; rootstock creeping. *Leaves* distichous, ensiform, bases equitant. *Peduncle* like the leaves and as long. *Spathe*

continuing the ensiform peduncle. *Spadix* sessile, cylindrical, dense-flowered. *Flowers* hermaphrodite. *Perianth* of 6 orbicular, concave segments. *Stamens* 6; filaments linear, flat; anthers reniform, cells confluent above. *Ovary* conical, 2—3-celled; style and stigma minute; ovules many, pendulous, orthotropous. *Berries* oblong. *Seeds* few, oblong, pendent from the apex of the cells; albumen fleshy; embryo axile.

ACORUS CALAMUS, Linn.; F. B. I. vi. 555.

Lower Pulney Hills (Bourne). The Sweet Flag.

Rootstock very aromatic; leaves 1.5—6 ft. long, 3—1.25 in. wide; spathe 6—30 in. long; spadix 2—4 in. long, free from the spathe.

The roots are used medicinally and also to protect clothing from insect-attack. Often cultivated. Vern. *Hind.* Gorbach; *Tel.* Vasa Vadaja; *Tam.* Vashambu; *Mal.* Vashanpa; *Kan.* Bajai.

5. *Typhonium*. Schott.

Tuberous herbs. *Leaves* entire, 3—5-lobed or pedatisect; appearing with the inflorescence. *Spathe* with a short, convolute, persistent tube below, mouth constricted, expanded above into a broad or narrow deciduous limb. *Spadix* usually exserted, with a long smooth or muricate, often stipitate, barren appendage. ♂ and ♀ flowers well separated, with neuters above the ♀ and sometimes below the ♂. *Perianth* 0. *Stamens* 1—3; anthers sessile. *Ovary* 1-celled; stigma sessile; ovules 1—2, basal, erect, orthotropous. *Berry* ovoid, 1—2-seeded. *Seeds* globose; albumen copious; embryo axile.

Limb of spathe open, broadly ovate:—

Apex of spathe acute or acuminate, not twisted; neuters above ♀ flowers numerous, long, filiform, curved. Leaves hastately 3-lobed or sub-3-partite, 2—12 in. diam., lobes ovate, acute or acuminate; petioles up to 1 ft. long; peduncle 1—4 in. long; spathe 3—12 in. long, 1.5—4 in. wide, nearly flat; appendage of spathe stipitate, muricate, base expanded and intruded.....1. *trilobatum*.

Apex of spathe elongate-caudate, twisted; neuters above ♀ flowers dense, erect, short, obtuse or subacute. Leaves cordately or hastately sagittate, sub-3-lobed, 2—5 in. long, 2—4 in. wide; petioles 4—8 in. long; peduncles 2—2 in. long; spathe 1.5—4 in. long, 1—3 in. wide; appendage of spadix truncate or rounded at the base.....2. *divaricatum*.

Limb of spathe narrowly lanceolate, acuminate, not expanded. Leaves ovate-cordate, sagittate or hastate-oblong, 1—7 in. long, sometimes almost 3-partite and 6 in. across; petioles 4—12 in. long; peduncles slender, 2—8 in. long; spathe 3—8 in. long, 3—5 in. wide, tube ovoid or oblong; appendage of spathe shortly stipitate, as long as or longer than the spathe, base conical, tip filiform; neuters short, lower clavate, upper subulate.....3. *flagelliforme*.

1. *TYPHONIUM TRILOBATUM*, Schott; F. B. I. vi. 509. *Arum orixense*, Roxb.; Wt. Ic. t. 801.

E. Coast. Not common.

Spathe red-purple within; appendage of spathe bright-red.

2. *TYPHONIUM DIVARICATUM*, Dcne.; F. B. I. vi. 510. *Arum divaricatum*, Linn.; Wt. Ic. t. 790.

E. Coast. Not common.

Spathe red-brown.

3. *TYPHONIUM FLAGELLIFORME*, Bl. *T. cuspidatum*, Dcne.; F. B. I. vi. 511. *Arum flagelliforme*, Roxb.; Wt. Ic. t. 791.

E. and W. Coasts as far N. as Cochin; at low elevations.
Spathe greenish, white or lurid without, red within.

6. *Theriophonum*, Bl.

Tuberous herbs. *Leaves* few, cordate, sagittate or hastately 3-lobed; petioles long. *Spathe* tubular below, slightly constricted at the mouth, limb erect, oblong or lanceolate, acuminate or subcaudate. *Spadix* included, slender. ♂ and ♀ flowers well separated. *Perianth* 0. *Stamens* 1—2, aggregated in a narrow, cylindrical mass 3—5 times longer than the ♀ inflorescence; anthers sessile, globose, connective thin, sometimes produced. *Ovaries* usually few, oblong, 1-celled; stigmas sessile; ovules few to many, basal or apical, orthotropous. *Neuters* below rather long, filiform, upper shortly subulate, uppermost sometimes verrucose. *Berries* ovoid. *Seeds* ovoid, erect or pendulous; albumen copious; embryo axile.

Anthers beaked, opening by slits; neuters many, close to the anthers:—

Spathe subcylindric, margins waved and crenate, subacute or shortly cuspidate, 3—5 in. long, 1.25—1.75 in. wide, base of tube broadly truncate, intruded. *Leaves* orbicular-hastate or hastate-triangular-trilobed, margins undulate, 1.5—4 in. long; petioles 2—12 in. long; peduncle a little shorter; spadix half as long as the spathe, appendage cylindric; neuters 13—16 in. long.....1. *minutum*.

Spathe oblong, acute, margins not crenate, 4—6 in. long, 1.25—2 in. wide, base truncate. *Leaves* hastately triangular, sometimes 3-lobed, up to 4 in. diam.; petioles 3—12 in. long; peduncles 2—4 in. long; spadix about half as long as the spathe, appendage cylindric; neuters 25—33 in. long.....2. *Wightii*.

Anthers not beaked, opening by pores; lower neuters near the ovaries, upper few or 0:—

Leaves distinctly 3-lobed, lobes linear to broadly triangular, the lateral usually at right angles to the apical or even sometimes pointing slightly forwards, the sinus very wide, midlobe largest, all acute or acuminate, up to 5 in. long and 4.5 in. across the lateral lobes; petioles usually much longer than the blade; somewhat shorter than the peduncle; spathes 2—5 in. long, tube short, cylindric or oblong, base rounded, limb expanded, oblong, 1—2 in. wide, acute, spadix about half as long as the spathe, appendage shortly stipitate, slender, subulate...3. *indicum*.

Leaves cordately linear- to ovate-hastate, not or indistinctly 3-lobed, acute, basal lobes rounded, sinus narrow, up to 5 in. long and 2 in. wide; petioles slender, as long as or up to 3 times longer than the blade; peduncles very slender, short; spathe with a long cylindric tube, limb narrowly lanceolate, acute; spadix about $\frac{1}{2}$ the length of the spathe, appendage stipitate, slender, subulate.....4. *infaustum*.

1. *THERIOPHONUM MINUTUM*, Engl. *T. crenatum*, Bl.; F. B. I. vi. 512.
Mootalur, Madras (Wight); Tranquebar (Heyne).
Spathe pale-yellowish-green, striated, the waved margin red; appendage purple.
2. *THERIOPHONUM WIGHTII*, Schott; F. B. I. vi. 512.
Carnatic (Wight).
Spathe white (?).
3. *THERIOPHONUM INDICUM*, Engl. *T. Datzellii*, Schott; F. B. I. vi. 513.
Wynaad (Beddome), Attapadi Valley and Anamalai Hills at 2,000 ft. (Fischer); Krishnagiri, Salem (Jacob); Punalur, Travancore (M. Rama Rao).
Tube of spathe green fading to white, limb deep-purple; appendage greenish-yellow.

4. *THERIOPHONUM INFAUSTUM*, N. E. Br.; F. B. I. vi. 513.
Palghat (Wight); Travancore (V. Narayanswami).
Spathe white or purplish.

7. *Ariopsis*, Nimmo.

Small tuberous herbs. *Leaves* entire, peltate, appearing with or before the inflorescence. *Spathe* small, cymbiform, open, tube 0, persistent. *Spadix* shorter than the spathe, appendage 0. ♂ and ♀ flowers approximated, ♂ imbedded in the spadix, neuters 0. *Perianth* 0. *Anthers* connate in groups of 3, each 2-celled, surrounding a pore into which all open. *Ovaries* few, on one side of the spadix only, 1-celled, oblong; stigmas sessile, stellately 4-6-fid; ovules many, orthotropous, 2-seriate on 4-6 parietal placentæ. *Berries* 3-6-angled. *Seeds* linear-oblong, slightly attenuate to an obtuse apex, pendulous; albumen copious; embryo axile.

ARIOPSIS FELTATA, Nimmo; F. B. I. vi. 519. *Remusatia vivipara*, Wight Ic. t. 900.

W. Coast and Ghâts; from near sea-level to 4,000 ft.

Tubers small, clustered, with many slender root-fibres; leaf solitary, suborbicular, sometimes broader than long, apiculate, 1-8.5 in. diam., base rounded, emarginate or cordate; petioles about as long as the blade, slender, inserted about $\frac{1}{2}$ up the blade; peduncles 1-4 in. long, slender; spathes .5-1 in. long, .3-.6 in. wide, apiculate, violet with a green dorsal ridge, paler within, ♂ flowers dark-purple, ♀ green, stigmas yellow; seeds longitudinally furrowed.

8. *Colocasia*, Schott

Tall, coarse herbs; tuberous or with a short stout caudex. *Leaves* appearing with the flowers, simple, peltate. *Peduncles* stout. *Spathe* with a thick, convolute, accrescent tube, mouth constricted, persistent, limb erect, deciduous. *Spadix* free, shorter than the spathe, appendage cylindrical-subulate or 0. ♂ and ♀ flowers with interposed flat neuters. *Perianth* 0. *Stamens* 3-6, connate in an obpyramidal synandrium, cells linear, opening by short slits. *Ovaries* ovoid or oblong, 1-celled; stigmas sessile, flat, 3-5-rayed; ovules several to many, suborthotropous, on 2-4 parietal placentas. *Berries* obconic or oblong. *Seeds* oblong; albumen copious; embryo axile.

COLOCASIA ANTIQUORUM, Schott; F. B. I. vi. 523; Wt. Ic. t. 786, fig. 1.
Arum nymphaefolium, Roxb.; Wt. Ic. t. 786, fig. 2.

In all Districts, wild or cultivated; sea-level to 3,000 ft.

Tubers up to 6 in. diam.; leaves ovate to suborbicular-cordate, 6-20 in. long, 3-12 in. wide, apex rounded and usually apiculate, basal sinus triangular, margins undulate, dark-green sometimes clouded with black; petioles stout, 3-4 ft. long, green or violet, inserted $\frac{1}{2}$ - $\frac{1}{3}$ of the blade from the sinus; peduncles much shorter, solitary or clustered and connate; spathe 8-18 in. long, tube oblong, limb narrowly lanceolate, caudate-acuminate, pale-yellow, 2-4 times longer than the tube.

All parts of the plant are eaten. Vern. *Hind.* Kachu; *Ur.* Saru; *Tel.* Kaladi; *Tam.* Shana-dumpa; *Mal.* Shamai-gaddai; *Kan.* Kachchi.

9. Alocasia, Neck.

Stout herbs or shrubs, roots usually rhizomatous but often forming a distinct above-ground caudex. *Leaves entire*, usually very large, sometimes peltate, more or less ovate-cordate or -sagittate; petioles long. *Peduncles* usually several, sometimes connate, appearing with the leaves. *Spathes* with a thick, convolute, persistent tube constricted at the mouth; limb erect, cymbiform, cucullate or oblong, much longer than the tube. *Spadix* free, shorter than the spathe; appendage cylindrical-subulate or 0. ♂ and ♀ flowers separated by a few flat neutrals. *Perianth* 0. *Stamens* 3—8, connate into an obpyramidal, hexagonal synandrium. *Ovaries* ovoid or oblong, 1-celled; styles very short; stigmas 2—4-lobed; ovules few, basilar, erect, orthotropous. *Berries* enclosed in the accrescent tube of the spathe which becomes lacerate, ellipsoid or obconic-ellipsoid or subglobose. *Seeds* subglobose, erect, testa smooth; albumen copious; embryo axile.

Not caulescent; lowest secondary nerves of the leaves flabellately spreading, not united for any distance with the primary nerves of the basal lobes. Caudex a short cylindrical tuber up to 2 in. diam.; leaves broadly ovate-cordate, obtuse and shortly apiculate, 6—8 in. long, nearly 6 in. wide, margins undulate; petioles stout, 8—10 in. long, sinus semi-circular; spathe 4—6 in. long, limb cucullate; spadix nearly as long, appendage thickened at the base, subulate, subacute

1. *montana*.

Caulescent; lowest secondary nerves of the leaves united to the primaries of the basal lobes to near their apex:—

Leaves not or very slightly peltate, ovate-cordate, up to 3 ft. long, width less than the length from sinus to apex, acute or rounded with a deflexed cusp, sinus rather narrow and deep, margins undulate. Caudex up to 8 ft. long and 8 in. diam.; petioles 2—3 ft. long; peduncles 4—8 in. long, several, usually paired; spathes 8—12 in. long, limb narrowly oblong, apex rounded with a small subulate cusp; spadix about as long, appendage conoid, rugulose

2. *indica*.

Leaves distinctly though not deeply peltate, broadly ovate-sagittate, 2—4 ft. long, 1.5—3 ft. wide, width greater than the length from sinus to apex, shortly apiculate, sinus deep and narrow, margins undulate. Caudex up to 16 ft. long and 1 ft. diam., but usually much smaller; petioles 2—4 ft. long; peduncles 6—8 in. long, usually 2 or more in each axil, stout; spathes 6—10 in. long, limb hooded-cymbiform, cuspidate; spadix nearly as long, appendage nearly as long as the floral part, cylindrical, obtuse, sinuously sulcate.....3. *macrorrhiza*.

1. ALOCASIA MONTANA, Schott; F. B. I. vi. 525. *Arum montanum*, Roxb.; Wt. Ic. t. 796.

N. Circars (Roxb.).

Spathe coloured. The roots are said to be used for poisoning tigers.

2. ALOCASIA INDICA, Schott; F. B. I. vi. 525. *Arum indicum*, Roxb.; Wt. Ic. t. 794.

Probably not wild in S. India, but widely cultivated.

Spathe yellowish-green, sometimes with reddish streaks; smelling offensively. The stem and roots are eaten. Vern. *Hind.* Mankanda.

3. *ALOCASIA MACRORRHIZA*, Schott; F. B. I. vi. 526. *Arum odorum*, Roxb.; Wt. Ic. t. 797.

Rampa Hills (Ramaswami, Narayanswami).

Spathes pale-green; fragrant.

10. *Remusatia*, Schott

Tuberous herbs emitting leafless bulbiferous shoots from the sides of the tuber. *Leaf* solitary or 2 from a tuber, entire, peltate, ovate-cordate. *Spathes* coriaceous; tube ovoid, convolute, accrescent over the fruit, mouth constricted; limb broad or narrow, erect or refracted, deciduous. *Spadix* very short, sessile; appendage 0. ♂ and ♀ flowers separated by neuters. *Perianth* 0. *Stamens* 2—3; anthers sessile, connate into a 4—6-angled and sulcate, flat-topped synandrium, synandria densely packed, mixed with neuters. *Ovaries* crowded, ovoid, 1-celled or 2—4-celled upwards; stigmas sessile, disciform; ovules many, orthotropous or nearly so, in 2 series on 4—6 parietal placentae. *Berries* small, obovoid. *Seeds* small, ovoid; albumen copious; embryo axile.

REMUSATIA VIVIPARA, Schott; F. B. I. vi. 521. *Arum viviparum*, Roxb.; Wt. Ic. t. 798.

In all Districts up to 5,000 ft. In clefts on tree trunks or in pockets of soil on bare rock; rarely flowering but propagating by bulbils.

Tubers .5—1.5 in. diam.; bulbiferous shoots up to 18 in. long, slender, brown, bulbils at the nodes oblong, squarrosely scaly, .1—25 in. long; leaves acute, up to 18 in. long and 12 in. wide, margins undulate, basal lobes rounded; petioles 6—12 in. long, inserted $\frac{1}{4}$ — $\frac{1}{2}$ of the blade above the sinus; peduncles short, enclosed in cataphylls; spathe 4—5 in. long, tube ovoid or oblong, green, much shorter than the orbicular-ovate or caudate, golden-yellow limb; spadix hardly longer than the tube, ♂ portion clavate.

11. *Arisaema*, Mart.

Tuberous herbs. *Leaves* 1—2, rarely 3, 3- or pedati-sect or the leaflets radiate. *Spathes* deciduous, convolute, limb often broad, usually incurved, often acuminate or caudate. *Spadix* included or exserted; appendage often very long. *Flowers* dioecious or monoecious and the sexes contiguous, neuters 0, few or many above the fertile. *Perianth* 0. ♂ flowers many, usually stipitate. *Stamens* 2—5; anthers sessile, oblong or subglobose. *Ovaries* densely crowded, 1-celled; styles short or 0; stigmas disciform; ovules 1—9, basal, orthotropous. *Berries* 1—few-seeded. *Seeds* ovoid or globose; albumen copious; embryo axile.

Spadix with appendage much longer than the spathe. Leaves usually pedatisect, sometimes nearly radiate; leaflets 5 (rarely 4) —18, sessile or petiolulate, linear-to ovate- or ob-lanceolate, subcaudately acuminate; petioles 1—3 ft. long; sheaths often purple-mottled; peduncles .5—4 ft. long; spathe 3—6 in. long; tube sub-cylindric, gaping, gradually dilated into the ovate or ovate-oblong, acuminate,

incurved limb; spadix with a smooth appendage tapering like a rat-tail, sigmoidally curved, often erect, then curved down and finally again erect; flowers monoecious or dioecious, a few neuters above the ♂.....1. *tortuosum*.

Spadix with appendage shorter than the spathe, rarely exerted from the tube; leaves always radiate:—

Spathe caudate-acuminate:—

Appendage of spadix not stipitate, apex clavate; neuters present in the ♀ inflorescence:—

Leaflets 5—11, linear- to ob-lanceolate, acuminate, margins papillose, 2—11 in. long, .8—3 in. wide; petioles stout, up to 2 ft. long, usually mottled and banded with red and brown; peduncles shorter than the petioles; spathes 4—12 in. long; tube narrowly cylindrical, ribbed, dilated into the ovate-lanceolate limb which terminates in a caudate prolongation .3—1.5 in. long, mouth often slightly revolute; spadix tapering into a narrowly clavate appendage.....2. *Leschenaultii*.

Leaflets 10 (in the only known specimen), obovate-lanceolate, abruptly cuspidate, margins smooth, revolute, base cuneately narrowed from about $\frac{1}{2}$ below the apex with nearly straight sides, posterior leaflets 6 in. long, 2.5 in. wide, the others decreasing to the anterior pair 4.5 in. long, 1.5 in. wide; petiole stout, suffused with pale reddish-brown and spotted with pink; peduncle stout; spathe 8 in. long; tube 3 in. long, gaping above; limb broadly ovate-acuminate, inarching, mouth revolute, apex long-caudate; spadix a little longer than the tube, appendage stout, cylindrical, base slightly enlarged, obtuse; flowers monoecious.....3. *pulchrum*.

Appendage of spadix stipitate, slender, tapering to the erect or recurved tip. Leaflets 5—9, cuneately obovate, cuspidate-acuminate, 3—5 in. long, 1.25—2 in. wide; petioles 10—22 in. long; peduncles shorter or longer; spathe 3.5—7 in. long; tube funnel-shaped; limb ovate-lanceolate, caudate-acuminate, mouth slightly revolute; neuters 0.....4. *Wightii*.

Spathe 3—5 in. long; tube broadly cylindrical, base almost truncate, limb broadly ovate, acute, not caudate, margin dilated around the mouth. Leaflets 5—9, ovate- to oblong-lanceolate, acuminate, 2.5—7 in. long, .75—2.25 in. wide, veins close, parallel, submarginal close to the usually undulate, papillose margin; petioles rather slender, up to 16 in. long; peduncles as long, stouter, green mottled with red-brown; spadix with a slender, subulate appendage shortly exerted from the tube; flowers monoecious, neuters a few above the ♂.....5. *Murrayi*.

1. *ARISAEMA TORTUOSUM*, Schott; F. B. I. vi. 502. *Arum curvatum*, Roxb.; Wt. Ic. t. 788; *Arum tortuosum*, Wall. Pl. As. Rar. t. 111.

Rampa Hills at 4,500 ft. (Narayanswami); Horsleykonda at 4,000 ft. (Fischer); W. Gháts, 3,000—7,000 ft. The Cobra-flower. Spathe pale-green or purplish. Vern. Tam. Katu-senai; Kan. Awu-mari-gidda.

Var. *neglectum*, Fischer. *A. neglectum*, Schott; F. B. I. vi. 504. Leaflets always radiate. W. Gháts.

2. *ARISAEMA LESCHENAUULTII*, Bl.; F. B. I. vi. 504.

W. Gháts; 4,000—8,000 ft. The Cobra-flower. Spathe dark-green, vertically striped with purple.

3. *ARISAEMA PULCHRUM*, N. E. Br.; F. B. I. vi. 505.

Sispara Ghát, Nilgiri Hills at 3,000 ft. (Beddome). Spathe light-green tinged with purple at the base, vertically striped with white.

4. *ARISAEMA WIGHTII*, Schott; F. B. I. vi. 507.

W. Gháts; Billigirirangans at 5,000 ft. (Fischer); Nilgiri Hills (King); S. Coimbatore, Sholear banks at 3,300 ft. (Fischer);

Tinnevely Hills (Barber). Travancore 2,700—3,300 ft. (K. Venkoba Rao).

5. *ARISAEMA MURRAYI*, Hook ; F. B. I. vi. 507.

Nilgiri Hills (G. Thomson, King).

Tube of spathe green, limb white with a red rim round the mouth of the tube.

12. *Amorphophallus*, Bl.

Tuberous herbs, rarely subarborescent. *Leaves* appearing after the flowers, 1—2 or 3, trisect, segments pinnati- or bipinnati-sect. *Peduncles* usually long. *Spathes* broadly ovate or oblong; limb campanulate or funnel-shaped, convolute or open. *Spadix* included or exerted. *Flowers* monoecious, crowded in cylindrical masses, the 2 sexes contiguous or shortly separated by a few neuters. *Perianth* 0. *Stamens* 1—6; anthers subsessile or the filaments as long, 2-celled, opening by pores, the 2 pores joined by a slit. *Ovaries* globose or ovoid, 1—4-celled; styles short or long; stigmas capitate, entire, emarginate or 2—4-lobed; ovules solitary, sub-basal, anatropous. *Neuters* 0 or few. *Berries* subglobose or ovoid. *Seeds* exalbuminous; embryo filling the seed.

♂ and ♀ inflorescences contiguous, neuters 0:—

Leaves not bulbiferous; styles 3—4 times longer than the ovary; stigmas deeply 2—4 lobed:—

Appendage of spadix subglobose or amorphous, deeply sinuously lobed, equaling or longer than the fertile region, up to 5 in. diam. Tuber 8—10 in. diam.; leaves 1—3 ft. wide, segments spreading, entire or forked, the ultimate obliquely oblong, acuminate, 2.5 in. long; petioles 2—3 ft. long, stout, smooth or warted, dark-green with paler blotches; peduncles short, stout, elongating in fruit; spathes campanulate, fleshy below, 6—10 in. wide and long, margins recurved, undulate and crisped; spadix as long; ♂ and ♀ regions about equal in length; styles up to 5 in. long, purple.....1. *campanulatus*.

Appendage of spadix globose-ovoid, smooth, shorter than the fertile region, up to 1.5 in. diam. Tuber 2—3.25 in. diam.; leaves as of the last species; peduncle very short, rough; spathe campanulate-infundibuliform, 3—5 in. diam., margins crisply waved; spadix shorter than the spathe, ♂ inflorescence about twice as long as the ♀; styles up to 3 in. long.....2. *dubius*.

Leaves bulbiferous at the forks, 12—18 in. diam.; leaflets lanceolate or obovate, 3—8 in. long, acute or acuminate, margins usually purple; petioles 3—4 ft. long, spotted. Tuber 2—4 in. diam.; peduncle 8—12 in. long, green and pink streaked with green or black; spathe erect, ovate-cymbiform, acute or obtuse, 4—8 in. long, 3—5 in. wide; spadix sessile, stout, about as long as the spathe; appendage about as long as the fertile region, elongate-conoid or oblong, rounded; ♂ inflorescence half as long again as the ♀.....3. *bulbifer*.

♂ and ♀ inflorescences separated by a row of neuters:—

Spadix with appendage 3—6 times longer than the spathe. Tuber 2—2.2 in. diam., bulbiferous; leaves 1—2.5 ft. diam., segments lanceolate, long acuminate, 2—6 in. long; petioles 1—2 ft. long; spathes erect, ovate, convolute to the middle, 2—4 in. long, 1.4—2 in. wide, acute or acuminate; spadix stipitate, fertile region as long as the spathe or a little less; appendage linear-subulate, flexuous; neuters oblong or elongate diamond-shaped, rather large, depressed, rugose.....4. *syriaticus*.

Spadix with appendage as long as or a little shorter than the spathe. Tuber about 1 in. diam.; leaflets oblong, acute or acuminate, decurrent, 1—10 in. long; petioles 8—12 in. long; spathe 3 in. long, 1.2 in. wide, convolute below, expanded above into an erect, lanceolate, acute limb; spadix shortly stipitate, appendage slender, subulate, about 1½ times the length of the fertile region; neuters elongate diamond-shaped, gibbous in the middle.....5. *Hohenackeri*.

1. **AMORPHOPHALLUS CAMPANULATUS**, Bl.; F. B. I. vi. 513. *Arum campanulatum*, Roxb. Cor. Pl. t. 272; Wt. Ic. t. 782, 785.
N. Circars (Roxb.); Rampa Hills (Ramaswami, Narayanswami).
Cultivated in most districts for the edible tubers. Spathe greenish-pink with pale blotches, purple at base within, appendage red-purple. Vern. *Hind.* Zamin-kand; *Tel.* Manshi-kanda. *Tam.* Karu-naik-kishangu; *Mal.* Karuna-kishannai, Muleshena.
2. **AMORPHOPHALLUS DUBIUS**, Bl.; F. B. I. vi. 514.
Malabar (Rheede).
Spathe green, limb purple, edges greenish, appendage chestnut-brown. Vern. *Mal.* Shena.
3. **AMORPHOPHALLUS BULBIFER**, Bl.; F. B. I. vi. 515.
Rampa Hills at 2,000 ft. (Narayanswami); Nadgani Ghát, S. Malabar (Bourne).
Spathe greenish or yellowish mottled pink without, pink or salmon deepening to scarlet within, appendage pale flesh-coloured or white, ♀ flowers red.
4. **AMORPHOPHALLUS SYLVATICUS**, Kunth. *Synantherias sylvatica*, Schott; F. B. I. vi. 518. *Arum sylvaticum*, Roxb.; Wt. Ic. t. 802.
Circars (Roxb.); Nilgiri-Wynaad (Beddome).
Spathe clouded, barred and streaked with green and pale-pink, appendage brown.
5. **AMORPHOPHALLUS HOHENACKERI**, Engl. *Raphiophallus*, Schott; F. B. I. vi. 518.
S. Kanara near Mangalore among bushes (Hohenacker).

13. *Plesmonium*, Schott.

Tuberous herbs. *Leaves* 1—3, appearing after the flowers; 3-foliolate or -sect and pinnatisect. *Spathes* ovate, erect, convolute-campanulate below, expanded above. *Spadix* free, stipitate, included or exerted; appendage 0. ♂ and ♀ *inflorescences* separated by a dense belt of clavate, disciform or truncate neuters. *Perianth* 0. *Stamens* 1—6; anthers nearly sessile, cells subquadrate, immersed in the connective, opening by short, curved, apical pores. *Ovaries* slightly sunk in the spadix, 2—3-celled; styles conical; stigmas large, capitate or discoid; ovule solitary, axile. *Berries* ovoid, 2—3-celled and seeded. *Seeds* ellipsoid; albumen 0; embryo filling the seed.

PLESMONIUM MARGARITIFERUM, Schott; F. B. I. vi. 518. *Arum margaritifera*, Roxb.; Wt. Ic. t. 795.

Vizagapatam District (Barber); Rampa Hills at 1,500 ft. (Ramaswami, Narayanswami).

Tuber up to 4 in. diam.; leaf solitary, rarely 2, 12—18 in. diam.; leaflets narrowly lanceolate, acuminate, sometimes forked, 4—8 in. long; petioles 12—30 in. long; peduncles 1—2 ft. long; spathe broadly ovate, 3—5 in. long, leathery, green without, deep purple at the base within, sometimes flushed with purple upwards; ♀ inflorescence .75—1.5 in. long, neuters large, clavate, pure white, occupying a space of about .75 in., ♂ inflorescence 1.5—2 in. long.

14. *Anaphyllum*, Schott.

Tall herbs; rootstock creeping. *Leaves* hastate-sagittate when young, later pinnati- or pedately-lobed; petioles very long. *Peduncles* long. *Spathes* oblong-ovate or lanceolate, base convolute or open, limb sometimes twisted. *Spadix* much shorter than the spathe, stipitate, cylindrical; appendage 0. *Flowers* hermaphrodite, covering the whole spadix. *Perianth* of 4 truncate sepals incurved at the top. *Stamens* 4—6; filaments flat; anthers much shorter. *Ovary* ovoid, 1-celled; style thick, conical or almost absent; stigma disciform; ovule solitary, parietal, anatropous or semi-anatropous. *Berries* obovoid.

Mature leaves trisect usually not quite to the rib; up to 18 in. diam., the middle segment deeply pinnately lobed, the lateral pedately lobed; lobes linear-, oblong- or triangular-lanceolate, obtuse, acute or acuminate; petioles slender, very long; peduncles slender, up to 3 ft. long; spathes oblong-ovate or elliptic, acute or obtuse and apiculate, 2—4.5 in. long, .9—2.25 in. wide, expanded from the base, not twisted; spadix 1—1.3 in. long.....1. *Beddomei*.

Mature leaves up to 2 ft. long, pinnatisect to or nearly to the midrib; leaflets often narrowed into a definite petiolule, sometimes sessile and shortly decurrent, apical leaflet sometimes 3-lobed, basal pair undivided, linear-oblong- or ovate-lanceolate, acute or acuminate, up to 20 in. long and 6 in. wide, lowest pair usually the largest; petioles 2—4 ft. long; peduncles about as long; spathes linear- to oblong-lanceolate, acuminate or caudate-acuminate, shortly convolute at the base, then expanded and lightly contorted, 8—16 in. long, 1.5—5.25 in. wide; spadix 1.5—3.5 in. long.....2. *Wightii*.

1. *ANAPHYLLUM BEDDOMEI*, Engl.

Anamalai Hills (Beddome, Fischer); Tinnevelly and Travancore Hills, at about 4,000 ft.
Spathe 5—7-veined.

2. *ANAPHYLLUM WIGHTII*, Schott; F. B. I. vi. 551.

W. Gháts from the Attapadi Valley (Fischer) to Tinnevelly and Travancore, 300—4,000 ft.
Spathe about 13-veined, dark-violet; smelling strongly of putrid flesh. Vern. *Mal. Sulli*.

15. *Lasia*, Lour.

Stout herbs; rhizome branched, spinous. *Leaves* hastate and entire or pedately pinnatifid, petioled. *Peduncles* long, spinous. *Spathes* very long, base convolute, blade much longer, twisted. *Spadix* short, sessile, cylindrical, obtuse; appendage 0. *Flowers* hermaphrodite. *Perianth* of 4, rarely 6, obovate, truncate segments incurved at the tip. *Stamens* 4—6; filaments short, flat; anthers a little shorter. *Ovaries* ovoid, 1-celled; styles stout; stigmas depressed; ovules solitary, pendulous from the top of the cell, anatropous or semi-anatropous. *Berries* obpyramidal, hexagonal. *Seeds* compressed, rugose; albumen 0 or evanescent; embryo filling the seed.

LASIA SPINOSA, Thw. *L. heterophylla*, Schott; F. B. I. vi. 550: Wt. Ic. t. 777.

Rampa Hills at 2,500 ft. (Gamble, Narayanswami).

Rhizome thick; leaves 6—18 in. long, when young hastate or sagittate, acuminate, older often broader than long and deeply pedately pinnatifid, lobes linear-, elliptic- or oblong-lanceolate, acuminate, 1-ribbed, spinous on the nerves beneath; petioles

terete, 1—4 ft. long, spinous; peduncles as long; spathe 8—14 in. long, purple or claret, open only at the base; spadix 1—2 in. long; perianth-segments pink; berries densely, minutely muricate at the apex.

16. *Scindapsus*, Schott.

Stout shrubs climbing on trees and rocks by means of adventitious aerial roots. *Leaves* entire, alternate, distichous; petiole long, geniculate near the apex, often winged. *Peduncles* axillary, short. *Spathe* coriaceous, deciduous. *Spadix* sessile, cylindrical, a little shorter than the spathe, dense-flowered; appendage 0. *Flowers* hermaphrodite. *Perianth* 0. *Stamens* 4—6; filaments short, flattened; anthers erect, longer than the filaments. *Ovary* obconic, truncate, 1-celled; stigma sessile, linear or elliptic; ovule solitary, basilar, anatropous. *Berries* confluent, pericarp with many inter-cellular needles. *Seeds* rounded, compressed; albumen 0; embryo filling the seed, horse-shoe-shaped.

SCINDAPSUS OFFICINALIS, Schott; F. B. I. vi. 541; Wt. Ic. t. 778.

Ganjam District (Gamble, Barber); Vizagapatam District (Jacob). *Leaves* ovate to suborbicular, inequilateral, 5—12 in. long, 2.5—6 in. wide, acuminate; petioles 3—6 in. long, more or less broadly winged to the knee, wing rounded or subcordate at the apex; spathe oblong with a cuspidate beak, 4—6 in. long, green outside, yellow within; spadix stout, nearly as long as the spathe, lengthening up to 9 in. in fruit, densely packed with prismatic, truncate ovaries. Vern. *Tel.* Enugu-tippali.

17. *Rhaphidophora*, Hassk.

Differing from *Scindapsus* only by the following characters: *Leaves* often pinnatifid or pinnatisect, or if entire usually variously perforate; petioles not winged, but more or less sheathing at the base. *Anthers* much shorter than the filaments. *Ovary* sub 2-locular; style very short or elongate conical; ovules many. *Seeds* oblong; albumen copious; embryo axile.

RHAPHIDOPHORA PERTUSA, Schott; F. B. I. vi. 546. *Scindapsus pertusus*, Schott; Wt. Ic. t. 781.

In all Districts in hilly tracts in evergreen or moist deciduous forests; up to 4,000 ft.

Leaves ovate to suborbicular in outline, inequilateral, sometimes entire and if so perforate with elliptic holes, sometimes pinnatifid on one side to near the base and perforate on the other or more rarely completely pinnatifid to near the midrib, 8—12 in. long, 6—12 in. wide, apex shortly cuspidate, lobes few, unequal, dilated towards the oblique, falcate-acuminate margin; petioles deeply channelled above, 6—12 in. long; ovaries truncate; stigmas subsessile, pulvinate. Vern. *Tel.* Enugan-alleru; *Tam.* Anai-tippili; *Mal.* Anatippali; *Kan.* Dodda-tippali.

18. *Pothos*, Linn.

Evergreen branching shrubs climbing by adventitious aerial roots. *Leaves* distichous, simple, blade sometimes obsolete; petioles often

broadly winged and articulated to the blade. *Peduncles* axillary or terminal or on short lateral shoots. *Spathes* small, persistent, reflexed. *Spadix* sessile or stipitate, globose, obovoid, cylindrical or filiform, often decurved. *Flowers* hermaphrodite, aggregated or distant. *Perianth* of 6 segments incurved at the tip. *Stamens* 6; filaments flat; anthers small. *Ovaries* ovoid, oblong or depressed, 3-celled; stigmas sessile, umbonate; ovules 1 in the inner angle of each cell, anatropous, ascending. *Berries* ellipsoid or obovoid, 1-3-seeded. *Seeds* compressed-ellipsoid, testa thick; albumen 0; embryo filling the seed.

Stems unarmed; spadix globose, ovoid or cylindrical, dense-flowered, glabrous:—

Petioles broadly winged, wings truncate or rounded at the apex, narrowed to the semi-amplexicaul base, 1-2.5 in. long, .2-5 in. wide at the apex, in young shoots sometimes reduced to .2 in. long and .1 in. wide; blade of leaf usually lanceolate, sometimes linear-lanceolate, acuminate, rarely very broadly obovate and rounded, up to 4 in. long and 1.5 in. wide, often reduced to a mere point or altogether wanting, base rounded, veins close, forming a very acute angle with the mid-rib; peduncles axillary, solitary, .2-3 in. long, base embraced by a few minute, apiculate, suborbicular cataphylls; spathe suborbicular, apiculate, .1-2 in. long; spadix globose or obovoid, .25-3 in. long, deflexed; berries oblong, .5-7 in. long.....1. *scandens*.

Petioles not winged, channelled above, .2-7 in. long, very shortly sheathing; leaves elliptic- or oblong-lanceolate, cuspidate-acuminate, base narrowed, 4.5-7.5 in. long, 1.2-2 in. wide, veins nearly horizontal; peduncles from extra-axillary very short branchlets, solitary or 2-3 together, slender, .9-2 in. long, embraced by ovate to linear-oblong apiculate or obtuse cataphylls, the terminal up to .4 in. long; spathe linear- to broad-oblong, .6-1 in. long, acute or obtuse; spadix narrowly cylindrical, .7-1.4 in. long; berries oblong, .4 in. long

2. *Thomsonianus*.

Stems armed at the nodes with 1-several straight or curved spinules up to .1 in. long; leaves linear- or elliptic-lanceolate, acute or acuminate, base narrowed, 3-5.6 in. long, .8-1.4 in. wide, veins prominent below, forming an obtuse angle with the midrib (about 45°); petioles .25-5 in. long, channelled above, shortly sheathing; peduncles 1.3-2.5 in. long, slender, usually curved, on short axillary branchlets embraced by several linear-oblong, blunt cataphylls, the terminal .3 in. long; spathe ovate-lanceolate, cymbiform, acute or obtuse, .5-7 in. long; spadix very slender, 1.5-2.3 in. long, furfuraceously brown-pubescent as are the flowers, straight or zig-zag; flowers in distant groups of 3-4.....3. *armatus*.

1. *POTHOS SCANDENS*, Linn.; F. B. I. vi. 551; Wt. Ic. t. 776.

W. Coast and Gháts, up to 2,500 ft.; growing on trees and rocks like ivy. Spadix yellow.

2. *POTHOS THOMSONIANUS*, Schott; F. B. I. vi. 555.

Wynaad (Beddome); Carnatic (G. Thomson); Travancore (Beddome, Lawson, M. Rama-Rao); Kannikatti, Tinnevely District (Herb. Madras).

3. *POTHOS ARMATUS*, Fischer in Kew Bull. 1929, 126.

Tambracheri Ghát, Malabar (Barber); Ponnudi to Kullar (Barber).

The spines are modified adventitious rootlets.

Family CLXVIII. LEMNACEAE.

Small or minute scale-like, green, gregarious, floating herbs, stemless, rootless or with capillary rootlets; propagating by budding or by hibernating bulbils, rarely by seed. *Fronde* smooth above, spongy below. *Flowers* very minute, monoecious, naked or enclosed in a

membranous spathe. *Perianth* 0. *Stamens* 1 or 2; anthers 1- or 2-celled. *Ovary* sessile, 1-celled; style short; stigma truncate or funnel-shaped; ovules 1—7. *Fruit* a flask-shaped utricle. *Seeds* 1—7; testa coriaceous; albumen fleshy or 0; embryo cylindric, axile.

Fronds flat above, with 1 or more roots; flowers in marginal clefts; anthers 2-celled.....1. *Lemna*.
Fronds minute, subglobose, rootless; flowers on the upper surface; anthers 1-celled, sessile.....2. *Wolffia*.

1. *Lemna*, Linn.

Fronds flat with 1 or more capillary rootlets from the margins or lower surface. *Flowers* in marginal clefts enclosed together in a transitory spathe; ♂ in pairs. *Stamens* solitary; filament filiform; anther 2-celled, globose. *Ovary* solitary; ovules 1—7. *Utricle* 1—7-seeded.

Rootlet solitary:—

Fronde asymmetric, nearly flat on both surfaces, .12—25 in. long, root sheathed, appendaged; root-cap acute.....1. *paucicostata*.
Fronde suborbicular or obovate in outline, flat above, convex below, .3—5 in. long; root-sheath elongate; root-cap acute.....2. *gibba*.
Rootlets several, tufted from the lower surface; fronds thick, orbicular or nearly so in outline, flat above, slightly convex below, .25—35 in. long, often purple below.....3. *polyrrhiza*.

1. *LEMNA PAUCICOSTATA*, Hegelm.; F. B. I. vi. 556.

In still waters in most localities.

2. *LEMNA GIBBA*, Linn.; F. B. I. vi. 556.

In still waters in all Districts.

3. *LEMNA POLYRRHIZA*, Linn.; F. B. I. vi. 557.

In still waters in all Districts.

2. *Wolffia*, Horkel.

Fronds very minute, subglobose, rootless. *Flowers* in a groove on the upper surface of the frond, naked; ♂ solitary. *Stamen* solitary; anther 1-celled, sessile. *Ovary* solitary; style short; stigma depressed; ovule solitary. *Utricle* spherical.

WOLFFIA ARRHIZA, Wimm.; F. B. I. vi. 557.

In still waters in all Districts.

Fronds .05 in. long or less.

Family CLXIX. TRIURIDACEAE.

Slender, leafless, saprophytic herbs devoid of chlorophyll. *Stems* simple or very little branched, filiform, bearing a few distant scales. *Flowers* monoecious or dioecious, small, in terminal corymbs or racemes; pedicels decurved, bracteate. *Perianth* 3—8-partite or -lobed, segments valvate in bud. *Stamens* 2—6, hypogynous or perigynous; anthers free or immersed in a thick disk, cells 2, confluent. *Pistillodes* 0 or 3, subulate. *Staminodes* in ♀ 0 or few. *Ovary* of many 1-celled carpels sessile on a receptacle; style terminal, lateral or basal, persistent; stigma acute, clavate or penicillate; ovule solitary, erect, anatropous. *Fruit* of several obovoid, coriaceous or fleshy achenes in a globose head; nucleus hard.

Sciaphila, Blume.

Perianth 3—8-partite or -lobed. *Anthers* sessile at the base of the perianth. *Styles* ventral or basal.

SCIAPHILA JANTHINA, Thw.; F. B. I. vi. 558.

Tinnevely and Travancore; 2,000—3,000 ft. (Beddome).

Stems 4—8 in. long; scales and bracts ovate-lanceolate, acuminate, up to 1 in. long; flowers monoecious or dioecious, long pedicelled, ♂ 12 in. diam., ♀ 25 in. diam.; perianth segments 8; anthers 4, sessile on a thick disk; style subbasilar, filiform, much longer than the ovary.

Family CLXX. ALISMACEAE.

Marsh or water plants, usually erect, sometimes floating, often with milky juice. *Leaves* radical or clustered at the nodes of floating stems, entire. *Flowers* regular, 1-sexual or hermaphrodite, in umbellate or paniculate whorls. *Perianth* of 6 segments in 2 series, the outer 3 herbaceous, the inner petaloid, rarely 0. *Stamens* 6— (rarely 3—) many, hypogynous or epigynous; anthers basifixed, erect. *Carpels* superior, 3—6 or more, 1-celled; sessile or stipitate on a flat or raised receptacle; style long, short or 0, subterminal or ventral; stigma simple; ovules 1—many in each carpel. *Fruit* of achenes or follicles. *Seeds* small; albumen 0; embryo straight or conduplicate.

Fruit indehiscent, of 3 or more achenes; ovule solitary, basal:—

Flowers all hermaphrodite.....1. **Alisma.**

Some or all of the flowers 1-sexual:—

Some of the flowers hermaphrodite; stamens 6; receptacle flat

2. **Limnophyton.**

All the flowers 1-sexual; stamens usually more than 6; receptacle oblong or globose.....3. **Sagittaria.**

Fruit dehiscent, of 6—9 follicles; ovules many on the inner wall

4. **Tenagocharis.**

1. Alisma, Linn.

Scapigerous herbs. *Leaves* lanceolate, cordate or sagittate. *Flowers* in umbelled or panicked whorls. *Sepals* persistent. *Petals* deciduous. *Stamens* 6 or 9. *Carpels* few-many; receptacle small. *Fruit* of small coriaceous or hard achenes. *Seeds* with a horse-shoe-shaped embryo.

Leaves coriaceous, reniform- or orbicular-cordate, apex rounded or retuse, basal sinus wide, 2.5—4.5 in. long, 2—6.5 in. wide, ribs 13—17, prominent, cross-nervules very numerous and close, straight; bracts at the lower forks less than .5 in. long; achenes 5—8, obovoid, long-awned with the persistent style, dorsally ridged, ridges smooth.....1. **reniforme.**

Leaves membranous, narrowly to broadly ovate-cordate, narrowed to a blunt apex, basal sinus narrow, 2.5—6 in. long, 1.2—3 in. wide, ribs 5—17, often slender, cross-nervules comparatively few and distant, not markedly straight; bracts at the lower forks 1—2.5 in. long, smaller upwards; achenes 2—6, ovate-reniform, style deciduous, dorsally ridged, ridges tubercled.....2. **oligococcum.**

1. ALISMA RENIFORME, Don: F. B. I. vi. 560; Wt. Ic. t. 322.

Mangalore (Wight).

Flowers white or pink-purple.

2. *ALISMA OLIGOCOCCUM*, F. Muell.; F. B. I. vi. 560.
Paravur in Travancore (K. Venkoba Rao).
Flowers white.

2. *Limnophyton*, Miq.

Erect, succulent marsh herbs. Characters the same as those of *Alisma* except that there are ♂ flowers with 6 stamens in 2 series as well as the hermaphrodite ones with smaller stamens.

LIMNOPHYTON OBTUSIFOLIUM, Miq.; F. B. I. vi. 560.

In all Districts, more common on the Eastern side; sea-level to 6,000 ft.

Leaves reniform- or deltoid-sagittate, apex usually rounded, sometimes acute, basal sinus usually deep and wide, basal lobes spreading, long, tapering to a fine point, usually longer than the blade above the petiole, which is 1.5—6.5 in. long, 1.5—12 in. wide; petioles 4 in.—5.5 ft. long; panicle 1.4 ft. long; bracts at the forks whorled, broadly ovate-lanceolate, acuminate, up to 1 in. long; flowers numerous, 3—5 in. diam., white, of the upper whorls ♂, of the lower ♀; achenes 12—20 in a globose head, obovoid, .15 in. long, irregularly 4-ridged, ridges indistinctly crenulate.

3. *Sagittaria*, Linn.

Erect aquatic herbs. *Leaves* erect or in deep water sometimes floating, cordate or sagittate. *Flowers* 1-sexual or polygamous, in paniced or spicate whorls. *Sepals* herbaceous, persistent. *Petals* membranous, deciduous. *Stamens* 6—many; filaments compressed. *Staminodes* often present in ♀ flowers. *Carpels* laterally flattened, crowded on a large globose or oblong receptacle; style ventral or apical; stigma papillose; ovule solitary, basal. *Fruit* a globose or oblong head of crowded, flattened, crested or winged achenes. *Seeds* erect, testa thin; embryo horseshoe-shaped.

Mature leaves hastate or sagittate, blade above the petiole 2—8 in. long, apex acute or acuminate, basal lobes usually diverging, narrower and often longer than the rest of the blade, tapering to a fine point; petioles up to 2 ft. long, trigonous; flowers .5—7.5 in. diam., lower ♀ nearly sessile, with staminodes, upper ♂ with longer pedicels and about 24 stamens, ♀ rare; achenes obliquely obovate, apiculate, wing broad, entire or subcrenate. Young and floating leaves often strap-shaped or cordate-oblong.....1. *sagittifolia*.
Leaves broadly ovate, deeply cordate, apex rounded, 1—4 in. long, 1—3.5 in. wide, basal lobes rounded; petioles, scapes and pedicels often hairy; flowers .7 in. diam., lower ♀ with 9—12 stamens, upper more numerous ♂ with 6—12 stamens; achenes surrounded by a broad, prominently toothed wing. 2. *guayanensis*.

1. *SAGITTARIA SAGITTIFOLIA*, Linn.; F. B. I. vi. 561.
Nilgiris at 7,800 ft. (Lawson). Rare.
Petals white, the claw usually purple.
2. *SAGITTARIA GUAYANENSIS*, H. B. K.; F. B. I. vi. 561.
Nilgiris (G. Thomson); Quilon. Not common.
Petals white.

4. *Tenagocharis*, Hochst.

Marsh plants with milky juice. *Leaves* petioled, elliptic. *Flowers* hermaphrodite, in terminal single or superposed, bracteate whorls. *Sepals* herbaceous, persistent. *Petals* membranous, deciduous. *Stamens* 8—12; filaments filiform. *Carpels* 6—9, whorled, sessile on a flat receptacle; style short; ovules many, anatropous. *Fruit* of 6—7 erect, membranous follicles. *Seeds* numerous, minute, smooth; embryo conduplicate, horseshoe-shaped.

TENAGOCHARIS LATIFOLIA, Buchen. *Butomopsis lanceolata*, Kunth; F. B. I. vi. 562.

Ganjam District (Beddome, Barber).

Leaves elliptic-lanceolate, acute at both ends, 2—6 in. long, .65—2.25 in. wide; petioles up to 8 in. long, dilated at the base; scapes stout, usually longer than the leaves; bracts scarious, ovate, acute, up to .65 in. long; flowers .75 in. diam., 3—20 at the apex, sometimes with an additional whorl below; pedicels 1—6 in. long; petals white; follicles .35 in. long, shortly beaked, connate below.

Family CLXXI. APONOGETONACEAE.

Submerged or floating glabrous, aquatic herbs; rhizome tuberous of stoloniferous; tubers usually globose with numerous root-fibres. *Leaves* radical, rarely sessile, petioles with a sheathing base; blade oblong to linear-lanceolate, membranous, floating or submerged, with 3—7 or more longitudinal nerves and numerous transverse nervules. *Peduncles* long, emerging, bearing a simple or 2—4-branched spike. *Flowers* very small, actinomorphic, hermaphrodite, very rarely dioecious. *Perianth* of 1—3, generally 2, membranous, white or coloured sepals. *Stamens* 6 in 2 whorls, rarely more in 3 or 4 whorls; filaments free, filiform or subulate; anthers small, basifixed, 2-celled, subglobose or ellipsoid. *Carpels* free, usually 3, rarely 4—5 or in ♀ flowers 6—8, sessile, 1-celled, usually narrowed into a slender style; stigma discoid or linear, slightly decurrent; ovules 2—8, basal or 2-seriate on the ventral suture, ascending, anatropous. *Fruit* of 3 or more inflated, coriaceous, beaked follicles. *Seeds* 1—8, erect, oblong or cylindrical; exalbuminous; testa herbaceous or fleshy, sometimes ribbed; embryo elongate, compressed or cylindrical, erect.

Aponogeton, Linn. f.

The only genus. Characters of the Order.

Spike simple in all Indian species.

Leaves mostly floating, oblong to linear-lanceolate, acute or obtuse, base rounded or shallowly cordate, 1—8 in. long, up to 2 in. wide; spike 1—6 in. long, usually dense-flowered; sepals 2, obovate or suborbicular, .1 in. long; stamens as long or longer; follicles 3, subglobose; seeds 1—8, 6—8-ribbed, striate.....1. *natanis*.
Leaves all submerged, oblong to linear-oblong, rounded or subacute, base narrowed into the petiole, 7—20 in. long, sometimes much longer, up to 1.5 in. wide, margins undulate or crisped; spike 3—5 in. long, usually lax-flowered; sepals 2, obovate-spathulate, .17 in. long, much longer than the stamens; follicles 3, oblong, beaked; seeds 1—2, smooth.....2. *crispus*.

1. *APONOGETON NATANS*, Engl. & Kr. *A. monostachyon*, Linn. f.; F. B. I. vi. 564; Roxb. Cor. Pl. t. 81.
In all Districts; sea-level to 4,000 ft.
Sepals white, pink or pale-blue, anthers bluish-purple. Vern. *Tel.* Namma; *Mal.* Parua-kelanga.
2. *APONOGETON CRISPUS*, Thunb.; F. B. I. vi. 564.
Travancore (Rangachari); Madras (Bourne); Wynaad (Beddome).
Sepals white.

Family CLXXII. POTAMOGETONACEAE.

Freshwater or marine herbs, submerged or floating. *Leaves* distichous, alternate or less often opposite, sessile or petioled, often vaginate at the base, often stipulate. *Flowers* usually very small, emerging or submerged, solitary, spicate or cymose, hermaphrodite or monoecious, actinomorphic. *Perianth* 0 or of 3—4 sepals, rarely cupular. *Anthers* sessile. *Carpels* 1-several, free or nearly so, 1-celled; stigmas 1 or 2; ovule solitary, usually pendulous from the apex and orthotropous, rarely parietal and anatropous. *Fruit* of coriaceous, subwoody or membranous drupelets. *Seeds* exalbuminous; embryo axile.

Flowers in erect, emerging, naked spikes; perianth of 4 sepals...1. *Potamogeton*.
Flowers submerged, solitary or in small cymes enclosed in the leaf-sheath or a spathiform bract; perianth cupular or 0:—

Delicate herbs; leaves filiform; stigma single, peltate:—

Carpels 4, stipitate, ovoid, not keeled.....2. *Ruppia*.

Carpels 2—9, sessile, curved, sausage-shaped, dorsally keeled...3. *Zanichellia*.

More robust herbs; leaves strap-shaped or terete; stigmas 1—2, subulate:—

Anthers 2, inserted at the same level; stigmas 2.....4. *Cymodocea*.

Anthers 2, one inserted above the other; stigma 1.....5. *Diphanthera*.

1. *Potamogeton*, Linn.

Submerged or floating herbs; rhizome creeping. *Leaves* submerged or floating, linear, lanceolate, oblong or sometimes rotund, petioled or sessile, rarely amplexicaul. *Flowers* very small on spikes rising from a membranous spathe, hermaphrodite; bracts 0. *Perianth* of 4 concave, green sepals. *Anthers* 4, sessile at the base of the sepals; pollen globose. *Carpels* 4, sessile; stigma subsessile or decurrent, persistent. *Drupelets* small, coriaceous or membranous, often dorsally ridged. *Seeds* subreniform.

Upper or all the leaves floating, the latter petioled, none amplexicaul or semi-amplexicaul:—

Leaves all broad and petioled. Stem terete, branched; upper floating leaves sometimes opposite, thinly coriaceous, elliptic-lanceolate and acute or oblong or suborbicular and obtuse, base rounded or cuneate, 1.5—4 in. long, 1—2.5 in. wide, submerged leaves membranous linear- to elliptic-lanceolate, acute, up to 8 in. long and 1 in. wide, often undulate; petioles often very long; stipules free, up to 1.5 in. long; peduncles axillary or leaf-opposed, 1—6 in. long; spikes 1—1.5 in. long, dense-flowered; sepals 1 in. long, suborbicular, clawed; drupelets 1—1.25 in. long, oblique, shortly beaked.....1. *indicus*.

Submerged leaves very narrowly linear or filiform without distinct petiole. Stems very slender; floating leaves membranous, elliptic- to ovate-oblong, acute, .5—1.5 in. long; petioles usually shorter than the blade; stipules free, .5—1 in. long;

peduncles slender, axillary or leaf-opposed; spikes 3—5 in. long, lax-flowered; sepals orbicular-obovate; drupelets semiglobose with a hooked beak, .08 in. long, ribs often toothed and tubercled.....2. *javanicus*.
 Leaves all submerged, without distinct petiole:—
 Stem rather stout, terete, slightly branched; leaves ovate-lanceolate, cordate, amplexicaul, obtuse, .75—1.5 in. long, .5—1 in. wide; stipules small, caducous; peduncles axillary, rather stout, 1—2 in. long; spikes dense-flowered, .5—1 in. long; sepals elliptic-obovate, clawed; drupelets compressed-globose with a short curved beak, hardly keeled, smooth, .1 in. long.....3. *perfoliatus*.
 Stem filiform, copiously distichously branched; leaves narrowly linear or filiform, acute, 1—6 in. long, .04—1 in. wide; stipules adnate to the leaf-sheath with free tips; peduncles slender, axillary, elongate; flowers interruptedly whorled on a spike .2—1.25 in. long; sepals suborbicular; drupelets dimidiate-obovate, shortly beaked, .1—1.5 in. long.....4. *pectinatus*.

1. POTAMOGETON INDICUS, Roxb.; F. B. I. vi. 565.
In all Districts; sea-level to 7,000 ft.
2. POTAMOGETON JAVANICUS, Hassk.; F. B. I. vi. 566.
Travancore; in backwaters.
3. POTAMOGETON PERFOLIATUS, Linn.; F. B. I. vi. 566.
Chingleput lake; Ootacamund lake (Gamble).
4. POTAMOGETON PECTINATUS, Linn.; F. B. I. vi. 567.
Chilka lake (Hooper, Annandale); Samalkota canal (Barber);
Kistna District (Gamble); Coimbatore (Wight).

2. *Ruppia*, Linn.

Slender, much-branched herbs submerged in brackish water; rootstock creeping. Leaves alternate or subopposite, filiform; sheaths stipuliform. Flowers minute, hermaphrodite, peduncled within the leaf-sheath; peduncle elongating after flowering, ultimately straight or spirally coiled. Perianth 0. Stamens 2; anthers sessile, 2-celled. Carpels 4; stigma sessile, peltate; ovule pendulous. Drupelets 4, stipitate, ovoid, obtuse or beaked. Seeds pendulous, uncinat, embryo macropodal.

RUPPIA MARITIMA Linn.; *R. rostellata*, Koch; F. B. I. vi. 568.

Along the coasts.

Leaves 2—4 in. long; peduncles .25 to several inches long; stipes of drupelets up to 1 in. long; drupelets .08—1 in. long.

Subspecies *spiralis*, Linn. peduncles long and spirally coiled.

Subspecies *rostellata* Koch. peduncles .25—1 in. long, not coiled.

3. *Zanichellia*, Linn.

Submerged fresh- or brackish-water herbs; rootstock slender; stem filiform, cymosely branched. Leaves narrowly linear or filiform; stipular sheaths membranous. Flowers minute, monoecious, both sexes enclosed together in a membranous sheath. ♂ perianth 0. Stamen solitary; filament filiform; anther linear, 2—3-celled. ♀ perianth cupular, hyaline. Carpels 1—9, sessile or stipitate; style short or long; stigma peltate; ovule pendulous, orthotropous. Drupelets usually 4, coriaceous, compressed. Seeds pendulous, oblong, testa thin; embryo cylindrical.

ZANICHELLIA PALUSTRIS, Linn. subsp. PEDICELLATA Syme; F. B. I. vi. 568.

Salt marshes and fresh-water lagoons.

Leaves 1—3 in. long, alternate or opposite; drupelets distinctly stipitate, compressed sausage-shaped, incurved, beaked, crested on the back.

4. *Cymodocea*, Koenig

Submerged marine herbs; rootstock rigid, jointed, creeping, branching, bearing the annular scars of fallen leaves. *Leaves* distichous, oblong, linear or terete; stipular sheaths membranous, mouth more or less 2-auriculate. *Flowers* axillary, monoecious, enclosed in membranous sheaths. *Perianth* 0. *Stamens* 2; anthers elongate, connate, stipitate, pollen in threads. *Carpels* 2, sessile, ovoid, compressed; style short; stigmas 2, subulate; ovule pendulous, orthotropous. *Drupelets* 2, ovoid, coriaceous or woody. *Seeds* pendulous; embryo macropodal.

Leaves flat, flowers solitary:—

Leaf scars forming closed rings; leaves up to 8 in. long, .2 in. wide, apex rounded, usually entire, 7—13-nerved; sheaths compressed-cylindric, up to 2.5 in. long and .2 in. wide; drupelets with a coarsely, acutely dentate keel

1. *rotundata*.

Leaf scars forming open rings; leaves up to 8 in. long and .4 in. wide, apex rounded, minutely toothed, 11—19-nerved; sheaths obconic, 1—1.5 in. long, up to .4 in. wide at the mouth, much narrowed to the base.....2. *serrulata*.

Leaves fleshy, terete, grooved, tip 3-toothed, 3—6 in. long, .05 in. wide or less; sheaths narrowly obconic, up to 1.25 in. long and .2 in. wide at the mouth; flowers in terminal, dichotomously branched cymes 1—2 in. long, each pair sessile on a short peduncle enclosed in a spatheform bract with a linear tail; bracts .2 in. long.....3. *isoetifolia*.

1. *CYMODOCEA ROTUNDATA*, Aschers. & Schweinf.
Pambam (Parthasarathy Iyengar); Tuticorin.
2. *CYMODOCEA SERRULATA*, Aschers. & Magn.; F. B. I. vi. 570.
Pambam (Parthasarathy Iyengar); Tuticorin (Wight).
3. *CYMODOCEA ISOETIFOLIA*, Aschers.; F. B. I. vi. 570.
Pambam (Parthasarathy Iyengar); Tuticorin (Wight, Thurston).

5. *Diplanthera*, Thouars

Submerged marine herbs; rootstock slender, branching, rigid, jointed, bearing the annular scars of fallen leaves. *Leaves* very narrowly linear, apex with 2 minute lateral teeth, 3-nerved; sheaths cylindric, distinctly 2-auriculate and ligulate. *Flowers* axillary, monoecious. ♂ *peduncles* long. *Anthers* equal, sessile, one inserted above the other by about half its length. *Carpels* included in the sheath with the single subulate style exerted. *Drupelet* subrotund-ovate, slightly compressed.

DIPLANTHERA UNINERVIS, Aschers. *Cymodocea australis*, Trim.; F. B. I. vi. 570.

Ennore backwater (Thurston); Tuticorin.

Leaves 3—7 in. long, .1—1.6 in. wide, apex between the teeth truncate or rounded, the midnerve often shortly excurrent to form a third tooth; anthers .12 in. long; drupelets .12 in. long.

Family CLXXIII. NAJADACEAE.

Slender, submerged, salt- or fresh-water herbs; stems rooting from the nodes, branched, filiform, smooth or muricate. *Leaves* alternate, opposite or ternate, linear, entire or minutely spinulose-serrulate; base sheathing, sheaths truncate, rounded or 2-auriculate at the apex margins more or less toothed. *Flowers* minute, axillary, solitary or a few together, monoecious, rarely dioecious, naked or enclosed in a tubular or inflated spathe. *Perianth* 0 or tubular and hyaline. *Stamen* 1, adnate to the perianth, 1—4-celled. *Carpel* 1, sessile; style cylindrical; stigmas 2—4, slender; ovule solitary, basal, erect, anatropous. *Achenes* oblong or ellipsoid. *Seeds* erect, testa very thin, areolate; embryo straight, macropodal.

Najas, Linn.

The only genus. Characters of the Order.

(The key and characters below have been adapted from Rendle's monograph in 'Pflanzenreich,' iv. 12.)

Flowers of both sexes devoid of spathe. Shoots a few inches to over 2 ft. long; leaves .6—1 in. long, .16—25 in. wide, marginal spinules minute, numerous; auricles of the sheath elongate, about $\frac{1}{2}$ the length of the sheath, toothed; flowers solitary or 2—4 together; ♂ perianth ending directly above the anther in 2 ear-like lobes; fruit ellipsoid-oblong, attenuate at the apex, .07—09 in. long; areoles minute, subquadrate or polygonal.....1. *graminea*.

At least the ♂ flowers enclosed in a spathe:—

Flowers of both sexes in a spathe. Shoots very slender; leaves .8—1.6 in. long, .2 in. or less wide, marginal spinules few, often as long as the width of the leaf; auricles of sheath variable, truncate or lobed, never elongate; spathe of ♂ narrowed into an irregularly toothed mouth ending in 2 opposite linear prolongations 1—2-spined at the apex; perianth closely investing the anther; spathe of ♀ with a neck $\frac{1}{4}$ — $\frac{1}{2}$ its length, mouth spinulose; fruit ellipsoid, enclosed in the persistent spathe, .08 in. long; areoles quadrate.....2. *indica*.

Spathe absent from ♀ flowers:—

Anthers 1-celled. Shoots 1.5—10 in. long; leaves tapering, .4—1 in. long, .12—2 in. wide, margins with a few broad-based, up-curved spinules; sheaths broad, usually truncately rounded with a few prominent teeth on the shoulders; spathe of ♂ ellipsoid, elongate below, ending above the perianth in a short cylindrical neck; perianth closely investing the anther; fruit ellipsoid, .08—1.2 in. long; areoles in the shape of ladder-like pits

3. *minor*.

Anthers 4-celled:—

Apex of the spathe cut into deep irregular segments bearing 1 or more brown spinules. Shoots dichotomously branched, up to 6 in. long; leaves up to 1 in. long and .02 in. wide, spinules few, the dorsal keel sometimes spinulose; auricles of sheath rather broad, the apex cut into 2—4 deep spiny teeth.....4. *lacerata*.

Spathe ellipsoid, apex not lacerate. Leaves .6—8 in. long, .025 in. wide, marginal spinules numerous; auricles of sheath often falcately curved, with a few teeth along the outer edge, inner edge entire; fruit .8 in. long; areoles minute, quadrate.....5. *falciculata*.

1. NAJAS GRAMINEA, Del.: F. B. I. vj. 569.

Cuddapah and Anantapur Districts, up to 3,000 ft. (Gamble); Madras (Wight).

Var. *minor*, Rendle. Smaller and more delicate; leaves .28—.64 in. long; auricles of sheath shorter; fruit .04—.06 in. long. Tuticorin (Wight).

2. NAJAS INDICA, Cham.
Tranquebar (Klein.)
3. NAJAS MINOR, All. ; F. B. I. vi. 569.
Horsleykonda at 4,000 ft. (Gamble); ponds in Ootacamund Gardens at 7,500 ft. (Gamble).
Var. *spinosa*, Rendle. Leaves very narrow, marginal spinules as long as the width of the leaves or nearly so; fruit .06—.07 in. long.
Godavary District (Gamble); Madras (Wight).
4. NAJAS LACERATA, Rendle.
Madras (Wight); Tinnevely (Beddome).
5. NAJAS FALCICULATA, A. Braun; F. B. I. vi. 569.
Madras (Wight).

Family CLXXIV. ERIOCAULACEAE

Annual or perennial scapigerous, marsh (less frequently aquatic) herbs. *Stem* usually simple, often very short or 0. *Leaves* radical or, in aquatic species, cauline, usually narrow and grass-like, base sheathing, veins parallel. *Flowers* minute, unisexual, densely packed in a solitary, globose, hemispheric subglobose or discoid head surrounded by an involucre of bracts terminating a usually ribbed peduncle with a basal sheath. *Heads* androgynous, rarely unisexual, but often with a preponderance of one sex; receptacle naked or pilose, flat, convex, hemispherical, conical or columnar; flowers solitary in the axil of a bract. ♂ *flower* stipitate; sepals 2 or 3, free or more or less connate or spathaceous and split down one side, equal or often one smaller and differently shaped, sometimes winged on the back; petals usually united into a cylindrical or funnel-shaped lobed or truncate tube, one lobe sometimes much larger than the rest, rarely free, each lobe usually bearing a black subapical gland; stamens 4 or 6, usually in 2 series, filaments filiform, anthers 2- or 4-celled, usually black, sometimes white or yellow. ♀ *flower* sessile or stipitate; sepals usually free, rarely more or less connate, usually 2 or 3, rarely 1 or 0; petals 3, free (rarely 0), usually pilose and bearing a black gland at the apex; ovary superior, sessile or shortly stipitate, 2—3-celled, cells 1-ovuled, style single, usually short, stigmas as many as the cells of the ovary, usually long and single, sometimes 2-fid. *Seeds* pendulous, minute, oblong or ellipsoid, brown, testa thin, often with rows of white papillae, smooth or reticulate and often more or less ribbed; albumen farinaceous; embryo minute.

Eriocaulon, Linn.

Characters of the Order. *Stem* when present always simple, usually short or 0. *Peduncles* often twisted, glabrous or hairy. ♂ *flowers*: lobes of the corolla always present though often minute, 1 often enlarged and sometimes protruding beyond the floral bract, usually bearing an apical black, rarely red, gland. ♀ *flowers*: petals very rarely absent, rarely less than 3, always free. In many species the floral bracts and the sepals are furnished with peculiar white or

yellowish cylindrical, blunt, opaque hairs which resemble elongate papillae; in the key these are termed papillose-hairs.

N.B.—*The flowers are very apt to vary; sometimes 2 and 3 sepals are found in the different flowers of the same head; black and white anthers have been seen in the same head; there is often considerable variation in the indumentum, from glabrous to almost densely hairy. In older flowers the originally spathaceous calyx is apt to split into its component sepals, consequently great care is needed in dissection, especially when examining herbarium specimens.*

Water-plants, only peduncles emerging; stems submerged, up to 3 ft. long, with many capillary, flexuous, 1-nerved leaves 1.5—2 in. long; peduncles numerous, umbellate on the apex of the stem, 1.5—4 in. long; sheath up to 1 in. long, mouth oblique; heads subglobose, .12—16 in. diam., dark-brown and glabrous or pale-green and white-puberulous at the apex; receptacle villous; ♂ calyx spathaceous, split down the front, anthers black; ♀ sepals 3, obovate, cymbiform, petals linear or linear-spathulate, pilose, usually with an apical black gland
1 *setaceum*,

Terrestrial or marsh plants; stems very short or 0; leaves radical:—

Leaves linear-oblong, apex rounded and cuspidate, 1—3.5 in. long, .16—25 in. wide, glabrous; peduncles few to many, 6—12 in. high, 7-ribbed; sheaths up to 4 in. long, glabrous, mouth oblique; heads subglobose, .16—25 in. diam.; bracts broadly obovate-cuneate, obtuse, glabrous, the floral slightly narrower; receptacle glabrous; ♂ sepals 2, free, obovate-lanceolate, hyaline, slightly winged and puberulous near the apex, corolla lobes unequal, anthers black; ♀ sepals 2, elliptic-lanceolate, acute, with a pubescent, rounded crest-like wing on the back, petals 3, unequal, narrowly linear-lanceolate, apex villous and with a conspicuous black gland.....2. *cuspidatum*.

Leaves not linear-oblong, apex not rounded:—

All the bracts much longer than the flowers and stellately spreading. Leaves linear-ensiform, subacute, 1—3 in. long, .25—5 in. wide, glabrous or slightly hairy; peduncles 2—8 in. high, 4-ribbed, more or less hairy with spreading hairs; sheaths 1—1.5 in. long, glabrous or slightly hairy near the base, mouth oblique, long acuminate; heads globose, .25—35 in. diam., stellately echinulate from the long, spreading, glabrous bracts, the involucre lanceolate, scarious, the floral narrower, hyaline; receptacle pilose; ♂ sepals 2, free or connate, obliquely ovate, glabrous, hyaline, anthers black; ♀ sepals 3, falcately ovate with a long subulate acumen, dorsally crenately winged, glabrous, white, petals 3, linear-spathulate, pilose, with an apical black gland; seeds oblong-subglobose, dark brown.....3. *stellatum*.

Floral bracts not much longer than the flowers, not stellately spreading:—

Floral bracts conspicuously regularly imbricating, closely appressed and concealing the flowers:—

Peduncles many; heads conical or hemispheric, base usually truncate, .13—38 in. diam., up to .3 in. high. Stem short, thick; leaves linear or linear-ensiform, glabrous, 3—12 in. long, up to 1 in. wide at the base; peduncles stiff, up to 22 in. high, 4—5-ribbed, glabrous; sheaths 3—6 in. long, mouth oblique, long acuminate; involucre bracts orbicular or obovate, glabrous, yellow, shining; floral bracts cuneate-obovate, triangular-cuspidate, white-pubescent in the upper half; receptacle globose, columnar or hemispheric, sparsely hairy; ♂ sepals 2, usually more or less connate, boat-shaped, winged, glabrous; ♀ sepals 3, free, glabrous, 2 boat-shaped and broadly winged on the back, 1 smaller, linear, flat, petals 3, much shorter, linear, with an apical tuft of long hairs, eglandular; seeds subglobose, longitudinally ribbed, ribs white-papillose

4. *sexangulare*.

Peduncle solitary; head depressed-globose, .5 in. diam. Stem very short, thick, woolly; leaves equitant, ensiform, acute, minutely papillose, sparsely pilose below, about 20-nerved, up to 10 in. long and 1 in. wide at the base; peduncle 16 in. long, about 10-ribbed, glabrous; sheath 10 in. long,

externally sparsely pilose, mouth oblique, acute; involucre bracts obovate, glabrous, pale-brown, the inner ones darker; floral bracts rhomboid- or obovate-cuneate, acute, dark-grey, upper part inflexed, white papillose-hairy on the back; ♂ sepals 2, free or nearly so, obovate, apex densely white papillose-hairy, corolla-lobes with a black ensiform gland and a tuft of white papillose hairs; stamens black; ♀ sepals 2, free, boat-shaped, densely white-silky in the upper half, petals 3, linear, silky-pilose, apex with a black gland and a tuft of white papillose-hairs, stigmas overtopping the petals.....5. *ensiforme*.

Floral bracts not conspicuously regularly imbricating:—

One ♂ petal larger and extruded beyond its floral bract:—

Heads .5 in. diam. or larger, subglobose. Stem short, thick, silky woolly; leaves ensiform, acute or subacute, glabrous, striate, glaucescent, many-nerved, 2—12 in. long, up to 1.25 in. wide at the base; peduncles solitary, rarely 2, glabrous, many-ribbed, up to 3 ft. long; sheath lax, usually rather longer than the leaves, mouth very oblique, subacute, often lacerate; involucre bracts ovate-lanceolate, acute or subacute, glabrous, olivaceous; floral bracts cuneate-oblong, long acuminate, olive-grey, dorsally long-pilose in the upper half; receptacles pilose; ♂ sepals 3, nearly free, dark-green, spatulate-oblong, keeled, pilose, corolla-lobes rather large, apex with a black gland and densely papillose-hairy; anthers black; ♀ sepals 3, free, narrowly obovate-oblong, dark-olive, pilose, petals 3, free, unequal, spatulate-oblong, pilose, with an apical black gland.....6. *robustum*.

Heads less than .4 in. diam:—

Mouth of sheath distinctly oblique:—

Floral bracts oblanceolate, conspicuously caudately cuspidate, very black, dorsally more or less white papillose-hairy near the apex. Leaves narrowly linear-ensiform, acute or acuminate, glabrous, 1—5 in. long, .05—1.5 in. wide; peduncles 1-many, 3—20 in. long, 6-ribbed, glabrous; sheaths close, as long as the leaves, glabrous, acute, sometimes lacerate; heads globose, dark or ashy; involucre bracts obovate, rounded, scarious, blackish, shining; receptacle convex, shortly villous; ♂ sepals 3, free, nearly black, apex hairy, anthers black; ♀ sepals 3, free, narrow, nearly black, more or less whitish hairy, petals 3, narrowly oblanceolate, pilose, with a small black apical gland.....7. *longicuspis* var. *polycephala*.

Floral bracts obovate-cuneate, rounded or acuminate, not caudate, yellowish-brown, sparsely hairy. Leaves narrowly ensiform, acute, 1—3 in. long, up to .2 in. wide, glabrous; peduncles few-many, glabrous, 5—6-ribbed, slender, 4—12 in. high; sheaths as long as the leaves, close; heads subglobose, .15—2 in. diam.; involucre bracts broadly obovate, rounded, glabrous, straw-coloured or pale-brown; receptacle more or less pilose; ♂ sepals 3, free or connate into a spathe split down the front, obovate-lanceolate, glabrous or more or less hairy near the apex, one sometimes flatter, narrower and acute; ♀ sepals 2, rarely 3, boat-shaped, acute, glabrous or with a few papillose hairs at the apex, petals 3, linear, hairy, with an apical black gland, 1 slightly longer than the rest...8. *odoratum*.

Mouth of sheath truncate or nearly so, rarely somewhat oblique, often lacerate, narrowly scarious. Leaves linear, acuminate, glabrous, 3—7-nerved, .5—3 in. long; peduncles 1—4, glabrous, 5—8-ribbed, 1—8 in. high; sheaths close, usually a little shorter than the leaves, glabrous; heads globose, black and densely snowy-white papillose-hairy, .18—3.5 in. diam.; involucre bracts broadly obovate, rounded or subacute, black, glabrous; floral bracts cuneate-obovate, cuspidate, black, outermost nearly glabrous, inner with an inflexed and densely snowy papillose-hairy apex; receptacle conical or subglobose, glabrous, ♂ sepals 3, one or less united into a spathe split down one side, obovate, concave, nearly black, apex densely white papillose-hairy, corolla-lobes white papillose-hairy and with a black apical gland, anthers yellow turning black; ♀ sepals 3, free, elliptic to obovate,

boat-shaped, acute, black, apex white papillose-hairy, petals 3, linear-spathulate, pilose and with an apical black gland.....9. *metaleucum*, ♂ petals equal or nearly so, none extruded beyond the floral bract; mouth of sheaths oblique:—

Plant more or less hairy, the involucrel bracts at least pubescent:—

Heads .35—1 in. diam:—

Involucrel bracts black or dark-brown, obovate, rounded or sub-acute, base often brown-woolly. Leaves linear or linear-ensiform, acuminate, long-hairy on both faces, up to 20 in. long and .75 in. wide; peduncles usually several, hairy, 5—8-ribbed, up to 36 in. long; sheaths as long as the leaves, hairy, close, acute; heads globose, .5—1 in. diam. or more; floral bracts obovate or spathulate cuneate, acute or subacute, dark-olive, apex densely white papillose-hairy; receptacle flat or convex, pilose; ♂ calyx spathaceous, split down one side, lobes 3, acute, dark olive, apex white papillose-hairy, corolla-lobes triangular-ligulate, apex white papillose-hairy and with a black gland; ♀ sepals 3, free, deeply boat-shaped, base usually subacute, keeled, apex densely white papillose-hairy, petals linear-spathulate, pilose, with an apical black gland; seeds subglobose, dark-brown, finely reticulate.....10. *Brownianum* var. *nilagirensis*.

Involucrel bracts straw-coloured or pale-brown, obovate or obovate-oblong, rounded, inner acute, pale-brown silky at least at the base. Leaves linear or ligulate, apex attenuate, obtuse or subacute, glabrous, up to 20 in. long and 1 in. wide; peduncles several to many, twisted, stout, 6—9-ribbed, glabrous or sparsely hairy, up to 31 in. high; sheath lax, glabrous or more or less hairy, mouth very oblique, acuminate; heads globose, snowy, appearing echinate through the prominent floral bracts, which are cuneate-obovate, caudate-acuminate, pale or dark grey-green, apex densely white papillose-hairy; receptacle narrowly columnar, pilose, ♂ calyx spathaceous, split down one side, dark, lobes 3, short, rounded, apex white papillose-hairy, corolla-lobes triangular-ligulate, apex white papillose-hairy and with a black gland, anthers black; ♀ sepals 3, free, oblanceolate-oblong, concave or nearly flat, often keeled, apex densely white papillose-hairy, petals 3, oblanceolate-oblong, shortly clawed, hairy, with or without an apical black gland; seeds subglobose, red-brown, with a few longitudinal white-fenestrate ribs.....11. *robusto-Brownianum*.

Heads not exceeding .25 in. diam.:—

Bracts whitish. Leaves linear-lanceolate or ligulate, apex attenuate; subacute, glabrous, 1—2.5 in. long, .2—5 in. wide; peduncles few, slender, shallowly 6-ribbed, glabrous, 3—8 in. high; sheaths lax, glabrous, 1—2.25 in. long, acute; heads subglobose; involucrel bracts broadly obovate or quadrate, obtuse, scarious, hairy upwards and ciliate at the apex; floral bracts cuneate-oblong, obtuse, dorsally hairy; receptacle villous; ♂ calyx spathaceous, split down one side, truncate, glabrous or nearly so, corolla-lobes minute, with an apical black gland, glabrous, anthers black; ♀ sepals 3, free, deeply boat-shaped, 1 sometimes winged on the back, 1 sometimes flat, petals 3, spathulate, pilose, with an apical black gland; seeds broadly oblong, reddish-brown, slightly ribbed.....12. *lanceolatum*.

Involucrel bracts blackish or dark-brown, floral bracts greenish-brown. Leaves linear-lanceolate, obtusely acuminate, glabrous, 3—5 in. long; peduncles several, glabrous, acutely 4—5-ribbed, 5—10 in. high; sheaths half as long as the peduncles, widened and lax in the upper half, glabrous, long acuminate; heads cylindrical-globose, .15—2 in. diam.; involucrel bracts semi-circular, dorsally white powdery-pubescent; floral bracts rhomboid or cuneate-obovate, apex inarched, acute, white powdery-pubescent, receptacle large, ellipsoid, more or less pilose; ♂ sepals 2, free, narrowly boat-shaped, olive, curved, powdery-puberulous upwards, corolla-lobes minute, papillose, with or without a black apical gland, anthers black; ♀ sepals 2, free, olive, falcate-ovate or semirhomboid, boat-shaped, apiculate.

keel winged, white powdery-pubescent upwards, petals 3, linear-spathulate, pilose, with or without a black apical gland

13. *Vanheurckii*.

Plant and involucrel bracts quite glabrous:—

Anthers white or yellow:—

Bracts pale; ♀ petals 0. Leaves capillary or very narrowly linear, finely acuminate, .4—2 in. long; peduncles numerous, slender, faintly ribbed, .6—6 in. high; sheaths shorter than the leaves, acute; heads .1—2 in. diam., whitish or purplish; involucrel bracts scarious, outer broadly obovate-oblong, inner narrower, apex of all rounded; floral bracts linear-oblong to oblanceolate, obtuse or subacute, glabrous, hyaline, shining, often with a central purplish zone; receptacle columnar, glabrous or nearly so; ♂ calyx spathaceous, split down one side, apex 3-toothed, glabrous, corolla-lobes minute, glabrous, with an apical black gland; ♀ sepals usually 2, sometimes 0, 1 or 3, free, narrowly linear or filiform, acute, glabrous, hyaline; seeds oblong-globose, reddish-brown, apex shortly mucronate and darker, finely transverse-striate.....14. *Sieboldianum*.

Bracts black; ♀ petals 3. Leaves linear, acuminate, 4—7-nerved, transverse venules usually conspicuous, 1—3 in. long, .05—1 in. wide; peduncles several, not ribbed, transverse venules usually visible, 4—10 in. high; sheaths close, usually a little longer than the leaves, transverse venules conspicuous, acute, often divided into 2—5 segments; heads subglobose, .15—2 in. diam., black, the apex with white indumentum; involucrel bracts suborbicular or obovate-oblong, rounded; floral bracts obovate-lanceolate, boat-shaped, acute or cuspidate, white papillose-hairy at the apex on the back; receptacle conical or subhemispheric, glabrous; ♂ calyx spathaceous, split down one side, truncate or obscurely 3-lobed, blackish upwards, apex more or less densely white papillose-hairy, corolla lobes white papillose-hairy and with an apical black gland; ♀ sepals 3, free, oblong or obovate, boat-shaped, greenish-black, truncate or rounded, denticulate, apex white papillose-hairy, petals 3, linear-spathulate, usually longer than the sepals, pilose, with a large apical black gland; seeds subglobose, brown, angular.....15. *Ritchieanum*.

Anthers black or dark green:—

Involucrel bracts hyaline:—

Leaves narrowly linear or setaceous, 1—2 in. long; peduncles several, slender, striate, 2—4 in. long; sheaths shorter than the leaves, acute; heads conic-subglobose, .06 in. diam., whitish; involucrel bracts obovate-oblong, rounded or subacute; floral bracts narrowly obovate, acute, hyaline, glabrous or subpubescent; receptacle shortly columnar, villous; ♂ calyx spathaceous, split down one side, 3-lobulate, glabrous, silvery-grey, corolla-lobes small, with an apical black gland; ♀ sepals 3, narrowly boat-shaped, acute, hyaline, glabrous, with a spongy wing on the middle of the back, petals 3, linear, glabrous, ciliate, eglandular; seeds oblong-subglobose, one side nearly straight, brown...16. *Margaretæ*.

Leaves linear, up to 2 in. long and .1 in. wide; peduncles many, slender, striate, up to 6 in. high; sheaths shorter than the leaves, striate, acute, often split; heads conic-subglobose, .1 in. diam., whitish; involucrel bracts lanceolate, acute or subacute; floral bracts obovate, cuspidate or caudate, pale straw-coloured or darkish-grey, glabrous or sparsely white-hairy; receptacle columnar, villous; ♂ calyx spathaceous, split down one side, lobes ovate or obovate, acute, sparsely white-ciliate, darkish, corolla-lobes glabrous, with or without an apical black gland; ♀ sepals 3, free, boat-shaped, hyaline, 2 broadly winged, the third narrower and not winged, all more or less ciliate, petals 3, linear, apex pilose, eglandular.....17. *Elenoræ*.

Involucrel bracts not hyaline:—

Floral bracts glabrous or nearly so:—

Leaves ensiform, subacute, or obtusely acuminate, .5—2.25 in.

long, .05—13 in. wide; peduncles many, shallowly 5—8-ribbed, 2—10 in. high; sheaths shorter than the leaves, lax upwards, acute; heads hemispheric, .1—15 in. diam.; involucrel bracts broadly obovate, rounded or truncate, pale straw-coloured, scarious; floral bracts spatulate-obovate, concave, rounded or shortly acute, glabrous or sparsely puberulous, subhyaline; receptacle narrowly conic, glabrous; ♂ sepals 2, connate on one side by half their length, obovate, concave, rounded or truncate, glabrous or slightly puberulous, corolla-lobes glabrous or puberulous, with or without a black apical gland; ♀ sepals 2, free, linear or spatulate, obtuse, hyaline, glabrous or sparsely puberulous, petals 3, narrowly oblanceolate, glabrous or nearly so, with or without an apical black gland; seeds ellipsoid, brown, longitudinally few-ribbed.....18. *truncatum*.

Leaves very narrowly linear or filiform, acuminate, base dilated, .5—75 in. long; peduncles numerous, capillary, striate, 1—2 in. high; sheaths shorter than the leaves, lax, acute; heads campanulate, white, shining, .1 in. diam.; involucrel bracts ovate-lanceolate, acute or acuminate; floral bracts shorter, oblanceolate, acute or cuspidate; receptacle small, columnar, glabrous or sparsely villous; ♂ calyx spathaceous, split down one side, irregularly 3-toothed, pale, glabrous; ♀ sepals 2, free, boat-shaped, falcately curved, spinulose-winged or -keeled on the back, glabrous, rarely a third filiform present, petals 0

19. *minutum*.

Floral bracts pilose or distinctly pubescent:—

Leaves densely rosulate, pectinate, linear-lanceolate, acute, slightly concave above, .4—7 in. long, .1 in. wide at base; peduncle solitary, 2—2.5 in. long; sheath lax, as long as the leaves; heads subglobose, .15—2 in. diam.; involucrel bracts broadly obovate, conspicuous, yellowish; floral bracts obovate, cuspidate, keeled, hairy at the apex; ♂ calyx spathaceous, nearly truncate or shortly 3-cuspidate, ciliolate, corolla-lobes with a black apical gland; ♀ sepals 3, free, oblong-ovate, sub-obtuse, brown upwards, ciliate, petals 3, oblong-cuneate, with an apical black gland.....20. *pectinatum*.

Leaves not rosulate nor pectinate:—

Involucrel bracts lanceolate, much longer than the floral bracts and the flowers:—

Floral bracts oblong-obovate, truncate or rounded, hyaline, apex shortly white-hairy. Leaves linear-lanceolate, acute or acuminate, 7—11-nerved, .2—1.5 in. long, .06—16 in. wide at base; peduncles several striate, .3—2.5 in. high; sheaths lax, up to 1 in. long, acute; heads hemispheric, small, few-flowered; involucrel bracts acuminate, scarious, pale-yellow or nearly white, glistening; receptacle glabrous or nearly so; ♂ sepals 3, free or more or less connate into a split spathe, obovate-cuneate, truncate or obtuse, dark, apex white papillose-hairy, corolla-lobes minute, glabrous, apical black gland minute; ♀ sepals 2, rarely 3, linear, when 3 one narrower, apex dark with pubescent tip, petals 3, oblanceolate, tip hairy with a black gland; seeds narrowly oblong, yellow, with longitudinal rows of white papillae

21. *xeranthemum*.

Floral bracts obovate-cuneate, cuspidate, dark-green, apex white papillose-hairy. Leaves linear, apex narrowed, sub-acute, .15—4 in. long, .25 wide; peduncles many, striate, 2.5—7 in. long; sheaths lax, half as long as the leaves, obtuse; heads hemispheric, .2—25 in. diam.; involucrel bracts acute or obtuse, straw-coloured; receptacle small, conical, pilose; ♂ calyx spathaceous, split down one side, lobes 3, small, rounded, apex white papillose-hairy, corolla-lobes white papillose-hairy at the tip with a black gland;

♀ sepals 3, free, dark, 2 narrowly boat-shaped, white-puberulous in the upper half, 1 flat, linear-spathulate, tip white-hairy, petals 3, linear-oblancoate, pilose, eglandular
22. *Dianae*.

Involucral bracts not longer than the floral bracts and the flowers:

♂ calyx spathaceous, split down one side, 3-lobed or partite:—

Sepals white or nearly so. Leaves linear-ensiform, acute or acuminate, 5—11-nerved, purplish beneath, often drying red, .5—4 in. long, up to .5 in. wide; peduncles numerous, 5-ribbed, 1—11 in. high; sheaths lax, shorter than the leaves, often purplish, obtuse; heads globose ovoid or hemispherical, grey or snow-white, .16—25 in. diam.; involucral bracts obovate, very obtuse, scarious, glistening, eventually reflexed and often concealed under the head; floral bracts obovate or oblanceolate, acuminate or cuspidate, dark or pale, hairy near the apex; receptacle globose or columnar, sparsely pilose; ♂ calyx-lobes oblong, apex white papillose-hairy, corolla-lobes linear, apex white papillose-hairy, with or without a black gland; ♀ sepals 3, free, linear-spathulate, hyaline or nearly so, apex hairy, petals narrowly oblanceolate, pilose, apex with a black gland; seeds oblong-ellipsoid, pale-brown, smooth or with a few transverse striae.....23. *quinquangulare*.

Sepals dark:—

Heads subglobose:—

Leaves linear or ensiform, obtuse or acuminate, .2—3.5 in. long; peduncles few—many 5—8-ribbed, .7—16 in. high; sheaths lax, as long as the leaves, obtuse, often split; heads subglobose, black, .15—25 in. diam., involucral bracts obovate or suborbicular, rounded, black or dark brown; floral bracts cuneate-obovate, acute or cuspidate, nearly black, more or less pubescent near the apex; receptacle small, hemispherical, pilose; ♂ calyx spathaceous, split down one side, lobes, obovate, more or less white papillose-hairy at the apex and with a black gland; ♀ sepals 3, free, all boat-shaped or 1 flat, dark green, white papillose-hairy near the apex, petals spathulate, pilose, with an apical black gland; seeds oblong-subglobose, brown, finely transverse-striate, often white-papillose
24. *collinum*.

Leaves ligulate, narrowed to an obtuse apex, many-nerved, 2—12 in. long, .15—6 in. wide at base; peduncles many, about 8-ribbed, 4—15 in. high; sheaths lax, up to 3 in. long, obtuse; heads .1—25 in. diam. involucral bracts lanceolate or ovate, acute or subacute, pale; floral bracts cuneate- or oblong-obovate, cuspidate, dark green, apex white, hairy.
Other characters as in last the species.

22. *Dianae* var. *Richardiana*.

Heads distinctly conical with a flat base, .1—15 in. diam. and up to .2 in. high. Leaves linear, up to 1.5 in. long, acuminate; peduncles many, 2.5—6 in. long, usually 5-ribbed; sheaths close, shorter than the leaves, acute or obtuse; involucral bracts obovate, rounded, pale brown; floral bracts obovate, caudately cuspidate, outer glabrous, innermost white- or yellowish-puberulous near the apex; receptacle conical, pilose; ♂ calyx-lobes subacute, glabrous, corolla-lobes glabrous or with a few white papillose hairs at the tip, with or without a small apical

black gland; ♀ sepals 3, free, linear-spathulate, glabrous, subequal or 1 shorter and narrower, petals 3, ligulate or ligulate-spathulate, longer than the sepals, usually with a small apical black gland, glabrous or sparsely pilose; seeds oblong-subglobose, yellowish-brown, reticulated with transverse ridges.....25. *conicum*.

♂ sepals free, 2, rarely 3:—

Heads .1—1.5 in. diam., many-flowered. Leaves linear, or ensiform, .5—3 in. long; peduncles many, 1—5 in. long, shallowly 5-ribbed; sheaths lax, widened upwards, as long as or a little shorter than the leaves, acute; involucrel bracts obovate-oblong or nearly rotund, apex rounded or subtruncate, yellowish-brown, shining; floral bracts obovate-spathulate, concave, rounded or shortly cuspidate, dark, apex white-hairy; receptacle flat, shortly conical or hemispheric, pilose; ♂ sepals rarely 3, obovate-oblong, concave, obtuse, glabrous or more or less white hairy at the apex, corolla-lobes glabrous or nearly so, with or without an apical black or red gland; ♀ sepals 2, rarely 3, boat-shaped, sometimes with a thickened keel or a narrow dorsal wing, white pubescent near the apex, petals 3, very short, filiform, with an apical tuft of long hairs, eglandular; seeds oblong, reddish-brown, with longitudinal rows of white papillae.....26. *Thwaitesii*.

Heads .05 in. diam., few-flowered. Leaves linear, acute, up to .5 in. long; peduncles solitary or few, .5—1.6 in. high, 2—4-ribbed; sheaths lax upwards, about as long as the leaves, acute; involucrel bracts obovate-oblong, obtuse or apiculate, dark green; floral bracts narrowly obovate, concave, obtuse or subacute, dark green, apex shortly puberulous; ♂ sepals narrowly obovate-oblong, apex shortly white-pubescent, apex of corolla-lobes shortly white-pubescent and with a black gland; ♀ sepals 2, boat-shaped, sometimes keeled, obtuse, apex shortly white-pubescent, petals 3, half as long as the sepals, capillary, with a tuft of long hairs at the apex, eglandular; seeds subglobose-ovate, reddish-brown, faintly transverse-reticulate, with or without longitudinal rows of white papillae
27. *Gambiei*.

1. *ERIOCAULON SETACEUM*, Linn.; F. B. I. vi. 572; Fyson J. I. B. ii. 193, t. 1. *E. intermedium*, Koern.; Fyson J. I. B. ii. 193.
Mysore, 2,000—3,000 ft. (Meebold); West Coast.
2. *ERIOCAULON CUSPIDATUM*, Dalz.; F. B. I. vi. 581; Fyson J. I. B. ii. 317, t. 38.
Mysore at Tirthahalli (Fyson); Qulon (Venkoba Rao).
3. *ERIOCAULON STELLULATUM*, Koern.; F. B. I. vi. 579; Fyson J. I. B. ii. 317, fig. p. 319.
Mysore at Tirthahalli (Fyson) Wynaad, 3,000 ft. (Beddome).
4. *ERIOCAULON SEXANGULARE*, Linn.; F. B. I. vi. 580; Fyson J. I. B. ii. 318, tt. 39, 40; *E. Wallichianum*, Mart.; Wall. Pl. As. Rar. t. 249.
Along the W. Coast at low elevations.
5. *ERIOCAULON ENSIFORME*, Fischer in Kew Bull. 1930, 159.
Tinnevelly Hills.
6. *ERIOCAULON ROBUSTUM*, Steud.; F. B. I. vi. 572; Fyson J. I. B. ii. 310, fig. p. 311.
Nilgiri Hills, 5,000—7,000 ft.; Attapadi Hills (Fischer).

7. ERIOCAULON LONGICUSPIS, Hook. f. var. POLYCEPHALA, Fyson J. I. B. ii. 308, fig. p. 309. *E. polycephalum*, Hook. f. F. B. I. vi. 573.
Vizagapatam Hills at 5,000 ft. (A. W. Lushington); W. Gháts, 3,000—7,000 ft.
8. ERIOCAULON ODORATUM, Dalz.; F. B. I. vi. 574; Fyson J. I. B. ii. 308, t. 24.
Mysore State (Meebold); Anamalai Hills (Fischer); Pulney Hills; High Wavy Mountains (Blatter & Hallberg); Travancore, 3,000—7,000 ft.
Smelling of chamomile.
9. ERIOCAULON MELALEUCUM, Mart.; F. B. I. vi. 574; Fyson J. I. B. iii. 18. *E. Geoffreyi*, Fyson J. I. B. ii. 196, fig. p. 197. *E. horsleykondae*, Fyson var. *megalocephala*, Fyson J. I. B. iii. 14, t. 44.
W. Gháts from Mysore to the Pulney Hills; 5,000—7,000 ft.
10. ERIOCAULON BROWNIANUM, Mart. var. NILAGIRENSE, Fyson J. I. B. ii. 263, fig. p. 263. *E. Brownianum*, Mart. (in part); F. B. I. vi. 576.
W. Gháts, 5,000—7,000 ft.
11. ERIOCAULON ROBUSTO-BROWNIANUM, Ruhl.; Fyson J. I. B. ii. 264, t. 18. *E. Rhodae*, Fyson J. I. B. ii. 264, fig. p. 265.
Kurg.; S. Kanara; Malabar; Wynaad; sea-level to 3,500 ft.
12. ERIOCAULON LANCEOLATUM, Miq.; F. B. I. vi. 577; Fyson J. I. B. ii. 266, t. 23.
Near Mangalore (Hohenacker).
13. ERIOCAULON VANHEURCKII, Muell.-Arg. *E. Thomasi*, Fyson J. I. B. ii. 318; t. 41.
Near Mangalore (Hohenacker); Mundomuzhi in Travancore (Calder & Ramaswami).
14. ERIOCAULON SIEBOLDIANUM, Sieb. & Zucc.; F. B. I. vi. 577; Fyson J. I. B. iii. 15, tt. 50, 51.
At low elevations in all the coastal Districts.
15. ERIOCAULON RITCHIEANUM, Ruhl.; Fyson J. I. B. iii. 16. *E. horsleykondae*, Fyson J. I. B. iii. 13, t. 43.
Mysore (Talbot); Horsleykonda at 4,000 ft. (Gamble, Fischer); on the Nilgiri Kundahs at 7,000 ft. (Barnes).
16. ERIOCAULON MARGARETAE, Fyson J. I. B. ii. 316.
Rudrasiri in Mysore (Fyson).
17. ERIOCAULON ELENORAE, Fyson J. I. B. ii. 316, t. 35.
Gudalur, Nilgiri District (Beddome); Manantoddy, Wynaad.
18. ERIOCAULON TRUNCATUM, Harb.; F. B. I. vi. 578; Fyson J. I. B. ii. 199.
Rampa Hills (V. Narayanswami); Seshachalam Hills at 2,500 ft. (Gamble); Chingleput District; S. Kanara; Chedleth in N. Malabar at 2,600 ft. (Fischer); Quilon and Courtallam.
19. ERIOCAULON MINUTUM, Hook. f. F. B. I. vi. 579; Fyson J. I. B. ii. 317, t. 36.
Mysore (Adams); Nilgiri Kundahs at 7,000 ft. (Barnes).
20. ERIOCAULON PECTINATUM, Ruhl.; Fyson J. I. B. iii. 17.
Nilgiris (Perrottet).
21. ERIOCAULON XERANTHEMUM, Mart.; F. B. I. vi. 584; Fyson J. I. B. ii. 200, fig. p. 201.

- W. Coast; Mount Stuart, S. Coimbatore District at 2,400 ft. (Fischer).
22. *ERIOCAULON DIANA*, Fyson J. I. B. ii. 259, tt. 11, 12.
Rudrasiri in Mysore (Fyson).
Var. *longibracteata*, Fyson J. I. B. ii. 259, t. 13.
With longer involucral bracts and the 3rd ♀ sepal broad.
S. Kanara (Fyson); Calicut.
Var. *Richardiana*, Fyson J. I. B. ii. 260, t. 14.
Kurg; Mysore; S. Kanara; Kanoth in N. Malabar.
23. *ERIOCAULON QUINQUANGULARE*, Linn.; F. B. I. vi. 582; Fyson J. I. B. ii. 204, t. 9.
In all Districts; sea-level to 4,000 ft.
24. *ERIOCAULON COLLINUM*, Hook. f. F. B. I. vi. 584; Fyson J. I. B. ii. 206, fig. p. 207.
Mysore at 3,000 ft. (Meebold); W. Gháts up to 7,500 ft. Common.
25. *ERIOCAULON CONICUM*, Fischer n. comb. *E. Dianae*, Fyson var. *conica*, Fyson J. I. B. ii. 260.
Mahendragiri, Ganjam (Fischer); Agalhatti, Mysore at 3,500 ft. (Meebold); Gudalur, Nilgiri Districts (Beddome).
26. *ERIOCAULON THWAITESII*, Koern.; F. B. I. vi. 583; Fyson J. I. B. ii. 202, fig. p. 202.
N. Coimbatore at 4,400 ft. (Fischer); Nilgiri Hills; Shevaroya (Bourne); Pulney Hills (Fyson).
27. *ERIOCAULON GAMBLEI*, Fischer in Kew Bull. 1930, 160.
Neduvattam, Nilgiris at 6,000 ft. (Gamble).

Family CLXXV. CYPERACEAE.

Grass-like annual or perennial herbs; roots fibrous; rhizomes 0, short or long, often scaly. Stems usually solid, terete or more often 3-angled. Leaves grass-like, sometimes 0, often 3-ranked, usually crowded near the base of the stem; sheaths closed, rarely split; ligule 0 or insignificant. Bracts usually like the leaves and commonly a little broader. Flowers 1 or 2-sexual, in the axils of glumes arranged distichously or spirally in spikelets which are solitary or variously disposed in heads or panicles; the bases of the branches of the inflorescence sometimes embraced by a sheath (*cladophyllum*). Perianth 0 or of 6 scales or bristles or an indefinite number of hairs. Stamens 1—3, rarely more; anthers linear or oblong, basifixed, apex sometimes crested. Ovary superior, sometimes enclosed in a utricle, 1-celled; ovule 1, basal, erect, anatropous; style short or long, 2—3-cleft, rarely entire or nearly so, branches slender, stigmatic. Fruit a compressed, rounded or 3-angled, sometimes bony; nut. Seed free, erect; embryo minute, enclosed in the usually floury albumen.

Nut not enclosed in a utricle:—

Nut-bearing glumes containing perfect stamens as well:—

Empty glumes at base of spikelets 0—2:—

Glumes distichous (see also *S. Fimbristylis*); hypogynous bristles 0:—

Stigmas 2:—

Rhachilla deciduous as a whole.....1. *Kyllinga*.

- Rhachilla persistent:—
 Nut compressed radially to the rhachilla.....2. *Pycnosus*.
 Nut compressed tangentially to the rhachilla.....3. *Juncellus*.
 Stigmas 3 or style subtire:—
 Rhachilla persistent.....4. *Cyperus*.
 Rhachilla deciduous above the 2 lowest glumes leaving a knob:—
 Keels of nut-bearing glumes not winged.....5. *Mariscus*.
 Keels of nut-bearing glumes winged.....6. *Courtoisia*.
 Glumes spirally arranged (basal ones sometimes distichous in 8. *Fimbristylis*):
 hypogynous bristles or scales sometimes present:—
 Style-base dilated and constricted or articulated above the nut:—
 Hypogynous bristles present; style usually persistent; leaves 0
 7. *Eleocharis*.
 Hypogynous bristles 0; leaves usually developed:—
 Style-base often persistent, if falling not leaving a tumour on the nut;
 leaves sometimes reduced to sheaths.....8. *Fimbristylis*.
 Style deciduous, leaving a tumour on the nut.....9. *Bulbostylis*.
 Style-base not dilated, continuous with the nut:—
 Hypogynous bristles not hyaline, sometimes 0; not enveloping the nut:—
 Hypogynous bristles all setaceous, rarely 0; glumes rarely awned and
 then from the apex.....10. *Scirpus*.
 Hypogynous bristles rarely 0, 3 of them broadly ovate, rarely all
 setaceous; glumes awned on the back from below the apex
 11. *Fuirena*.
 Hypogynous bristles 2, hyaline, elliptic, enveloping the nut
 12. *Lipocarpa*.
 Empty glumes at base of spikelets 3 or more:—
 Stigmas 2; style-base dilated, not continuous with the nut; nut beaked by
 the persistent style-base.....13. *Rynchospora*.
 Stigmas 3; style-base not dilated; nut not beaked.....14. *Remirea*.
 Nut-bearing glumes devoid of perfect stamens:—
 Spikelets 2-sexual; ♀ flower solitary, terminal; nuts not bony:—
 Stems trigonous; leaves broad; inflorescence paniculate.....15. *Hypolytrum*.
 Stems terete; leafless; inflorescence of a single lateral spikelet...16. *Lepironia*.
 Spikelets 1-sexual or the ♀ flower basal; nuts bony:—
 Spikelets usually 2-sexual, ♀ flower basal.....17. *Scleria*.
 Spikelets unisexual, ♀ flower terminal.....18. *Diplacrum*.
 Nut enclosed in a utricle:—
 Spikelets 1-flowered; flower 2-sexual; rhachilla deciduous above the 2nd glume;
 2nd glume spathiform.....19. *Ascopholis*.
 Spikelets many-flowered; flowers unisexual; rhachilla persistent; glumes not
 spathiform.....20. *Carex*.

1. *Kyllinga*, Rottb.

Stem 3-angled, leafy only at the base, terminated by 1—3, rarely more, sessile, capitate, ovoid or cylindrical spikes. *Spikelets* numerous, small, compressed; glumes 4—5, rarely more, distichous; rhachilla disarticulating and falling off whole above the 2 lowest, very small, empty glumes; 3rd glume 2-sexual, 4th ♂ or empty, rarely ♀, 5th (and rarely 1 or 2 more) rudimentary or altogether absent. *Stamens* 1—3. *Ovary* suborbicular; style not swollen at the base. *Nut* smooth, sometimes apiculate by the persistent base of the style.

Rhizome very short or 0; stems close:—

Keel of nut-bearing glume not crested:—

Rhizome practically 0; stems not robust:—

Stems more or less thickened at the base, solitary or tufted, 3—10 in. high; leaves from half to as long as the stem, rarely longer, 0.5—1.7 in. wide; bracts 3—4, up to 6 in. long; heads usually 3, rarely fewer or 4—5, cylindrical-ovoid, pale, central one up to 4 in. long, others smaller; 2 upper glumes narrow, nutlet yellow-brown.....1. *triceps*.

- Stems not or hardly thickened at the base, solitary or tufted, 3—16 in. high; leaves from half to $\frac{1}{2}$ as long as the stem, .05—1 in. wide; bracts 3—4, up to 4.5 in. long; heads usually solitary, cylindrical, up to .6 in. long, sometimes 2 smaller lateral present; upper glumes broad; nut yellow-brown, ultimately black.....2. *cylindrica*.
 Rhizome horizontal, thick; stems 2—many, rather robust, up to 36 in. high, acutely 3-angled at the summit; leaves much shorter, .1—2 in. wide; bracts 3—4, 1—7.5 in. long; head solitary, subglobose or ovoid, up to .4 in. long; upper glumes subequal, ovate, acute, keel smooth, tip excurrent; nut oblong-obovoid, ultimately black.....3. *melanosperma*.
 Keel of nut-bearing glume with a broad, hyaline, toothed crest. Root fibrous; stems slender, 2—12 in. long, tufted; leaves usually longer, up to .12 in. wide; bracts 3—4, divaricate, up to 6 in. long; head usually solitary, subglobose, .17 in. diam.; upper glumes ovate, subacute, keel excurrent and recurved...4. *squamulata*.
 Rhizome elongate, clothed with oblong brown scales; stems spaced, rarely close:—Rhizome up to 16 in. long; stems .75—36 in. high; leaves few, usually much shorter, up to .2 in. wide; bracts 3—4, up to 6 in. long; head usually solitary, subglobose or ovoid, up to .3 in. long; upper glumes ovate, keel setulose; nut elongate, yellowish-brown.....5. *brevifolia*.
 Rhizome up to 6 in. long; stems slender, up to 25 in. long; leaves as long, longer or shorter, up to .2 in. wide; bracts 3—4, up to 7 in. long; head usually solitary, ovoid, up to .4 in. long, upper glumes ovate, keel of the nut-bearing one with a lunate, entire crest; nut suborbicular, yellowish-brown
 6. *monocephala*.

1. *KYLLINGA TRICEPS*, Rottb.; F. B. I. vi. 587.

In all the E. and Central Districts, up to 3,000 ft.; dry parts of Travancore. Vern. Kan. Ananta Gonde Hullu.

2. *KYLLINGA CYLINDRICA*, Nees; F. B. I. vi. 588.

Mysore; Nilgiri and Pulney Hills; up to 6,000 ft.

Very like the previous species but more slender.

3. *KYLLINGA MELANOSPERMA*, Nees; F. B. I. vi. 588.

W. Gháts; 4,000—7,000 ft.; Travancore at 300 ft. (Calder); Kollimalai Hills.

4. *KYLLINGA SQUAMULATA*, Vahl.; F. B. I. vi. 589.

S. Kanara (Metz).

5. *KYLLINGA BREVIFOLIA*, Rottb.; F. B. I. vi. 588.

Mahendragiri, Ganjam District (Fischer); Rampa (Narayan-swami); Vizagapatam District, Mysore and W. Gháts.

6. *KYLLINGA MONOCEPHALA*, Rottb.; F. B. I. vi. 588.

In all Districts; from sea-level to 7,000 ft.

Much resembling the last species.

2. *Pycnus*, Beauv.

Stems leafy at the base or sometimes above. Inflorescence of 1—many corymbose-subumbellate spikes, sometimes fascicled; umbel usually simple. Glumes distichous, 4—very many, 2 lowest empty, the next bi-sexual, the uppermost 1—3 sterile or empty. Rhachilla persistent. Stamens 1—3. Style 2-fid. Nut laterally compressed in the plane of the rhachilla.

Epidermal cells of the nut longitudinally oblong. Stems tufted, 4—12 in. high; leaves filiform, usually shorter; bracts 1—2, often 1 or 2 more above, subtending the next spikelets, up to 3 in. long; spikelets straw-coloured, compressed, linear-oblong, .25—5 in. long, .1 in. wide, in fruit up to 1.5 in. long; glumes 7—40 pairs, narrowly ovate, acute, margins sometimes partly hyaline, minutely mucronate; nut compressed-orbicular, obtuse, black, often with whitish transverse lines

1. *stramineus*.

Epidermal cells of the nut subquadrate-hexagonal, sometimes appearing dotted:—

Stems clothed to considerably above the base (up to half its length) with the leaf-sheaths, 3—18 in. high. Rhizome creeping, 4—10 in. long; leaves from half to as long as the stem, up to 15 in. wide, rarely 0; bracts 3—5, 1—6 in. long; umbel simple, sometimes contracted into a head, rays stout or slender, up to 1.5 in. long; spikelets linear or oblong-lanceolate, compressed, 3—7 in. long, 1—15 in. wide, reddish; glumes 3—14 pairs, shallowly boat-shaped, obtuse, 3-nerved on the back, mid-nerve green, not excurrent, sides reddish-brown; nut suborbicular, compressed, brown.....2. *sanguinolentus*.

Stems with leaves only at the base:—

Rhachilla of spikelets distinctly winged. Stems 2—12 in. high, tufted; leaves as long or longer, flaccid; bracts 3—4, up to 6.5 in. long and 2 in. wide, often longer than the stem; umbel simple, rays 3—7, up to 3.5 in. long, sometimes reduced to a cluster of sessile spikelets; spikelets compressed, oblong, 6—10-flowered; glumes narrowly ovate-oblong, keel herbaceous, produced into a slightly recurved cusp, sides hyaline with 2—3 strong nerves; nut oblique, ovate-oblong, much compressed, apex truncate or slightly retuse, dark-brown.....3. *hyalinus*.

Rhachilla of spikelet not or very faintly winged:—

Glumes distinctly cuspidate, apex retuse. Stems tufted, few or crowded, slender, 1—6 in. high; leaves shorter or longer, filiform; bracts 3—4, up to 5 in. long; heads of spikelets sessile and congested or umbelled with 2—6 rays or broken up into pedunculate spikes sometimes up to 3 in. long; spikelets compressed, ovate-lanceolate to linear, 15—7 in. long, .05—1 in. wide; glumes 8—25 pairs, pale or marked with red, oblong or orbicular when opened out, keel strong, sides hyaline; nut obovoid or oblong, minutely apiculate, dark-brown.....4. *pumilus*.

Glumes not cuspidate nor retuse:—

Stems tufted:—

Nut symmetric or nearly so:—

Rhachilla straight, not at all winged; glumes obtuse; styles long-exserted. Annual; stems 2—25 in. high; leaves shorter, almost filiform; umbel simple, rays 3—5, subsessile to 2 in. long; bracts 2—4, up to 9 in. long; spikes of 5—50 more or less congested spikelets; spikelets compressed, linear, parallel-sided, apex hardly tapering, blunt or subacute, 15—75 in. long, 1—12 in. wide, pale-brown to dark-chestnut or almost black, 2—50-flowered; nut broadly ellipsoid or obovoid, apex rounded and distinctly apiculate, dark-brown.....5. *globosus*.

Rhachilla more or less zigzag with a very narrow hyaline wing, wider near the insertion of the acute glumes; styles not or slightly exserted. Perennial; stems 3—30 in. high, sometimes almost 0; leaves shorter, up to 16 in. wide; umbel simple, rays 2—7, up to 2 in. long, or sometimes congested into a single head; bracts 3—8, up to 8.5 in. long; spikelets congested or distant, narrowly linear, tapering to an acute apex, 3—75 in. long, 1 in. or less wide, pale- or reddish-brown, 10—50-flowered; nut narrowly oblong, apex subtruncate, minutely apiculate, brown.....6. *odoratus*.

Nut asymmetric, oblong, sometimes slightly curved, the side away from the rhachilla flattened, the other curved, both faces with a median longitudinal depression. Stems rarely solitary, 1—10 in. high; leaves shorter, very narrow; umbel usually simple, rays 3—6, up to 4 in. long; bracts 3—6, up to 6 in. long and 1 in. wide; spikelets aggregately apiculate at the ends of the rays, linear, straw-coloured, 4—1 in. long, .05 in. wide, 16—50-flowered; rhachilla in fruit zigzag; glumes narrow, obtuse, sides nerveless; nut shortly apiculate, dark-brown.....7. *sulcinus*.

Stems solitary:—

Glumes acute, not white- or hyaline-margined. Stems 6—36 in. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, 1 in. wide, rigid, sometimes twisted; umbel simple, rays 3—8, up to 4 in. long; bracts 2—5, up to 8 in. long;

spikelets ovate or ovate-lanceolate, yellowish- or reddish-brown, .4—·7 in. long, .15—·2 in. wide; glumes ovate, .15—·175 in. long, usually mucronate; nut broadly obovate, slightly unsymmetric, black

8. *unioloides* var. *angulata*.

Glumes obtuse, margins white- or brownish-hyaline:—

Stems robust, 10—31 in. long; leaves as long, .2 in. wide, flaccid; umbel simple or compound, primary rays 4—10, up to 6 in. long; bracts 3—5, up to 25 in. long; bracteoles few, confined to the base of the umbel, subulate, filiform, rays closely embraced below by a truncate or shortly acutely 2-lobed sheath; spikelets racemed, linear- to ovate-oblong, reddish-brown, .5—1.25 in. long, .1—·12 in. wide; glumes on the same side slightly overlapping at maturity, .1 in. long, margin paler, usually undulate; nut broadly ellipsoid or obovate, truncate or retuse, black or dark-brown.....9. *puncticulatus*.

Stems robust, up to 3 ft. high; leaves shorter, up to .5 in. wide, flaccid; umbel compound; primary rays 4—12, up to 9 in. long, loosely embraced below by a 2-lobed sheath, the lobes short or long and acuminate; bracts 4—6, up to 20 in. long and .6 in. wide; bracteoles numerous, throughout the umbel, filiform; spikelets racemed, linear or linear-lanceolate, pale-brown, .6—1.1 in. long, .1—·12 in. wide; glumes distant, not overlapping at maturity, .1 in. long, margins white, conspicuous, flat; nut obovate, apex rounded, black.....10. *albomarginatus*.

1. *PYCREUS STRAMINEUS*, C. B. Clarke; F. B. I. vi. 589.
Kamban, Madura District (Blatter and Hallberg); S. Kanara; Cochin (Gamble); Travancore.
Roots aromatic (J. D. Hooker).
2. *PYCREUS SANGUINOLENTUS*, Nees; F. B. I. vi. 590.
Mahendragiri, Ganjam District (Fischer); Mysore (Meebold); Kurnool (Bourne); Coimbatore (Wight); Nilgiri and Pulney Hills, up to 6,000 ft.; Malabar (Barber); Peermade, Travancore (K. Venkoba Rao).
3. *PYCREUS HYALINUS*, Dom. *P. pumilus*, Nees; F. B. I. vi. 591.
About Madras City; Satiangangan, Coimbatore District (A. W. Lushington, Fischer); Pulney Hills at 6,000 ft. (Anglade).
4. *PYCREUS PUMILIS*, Dom. *P. nitens*, Nees; F. B. I. vi. 591. *Cyperus pygmaeus*, Retz., and *C. pusillus*; Vahl; F. B. I. vi. 619.
E. and W. Coasts at low levels; Nilgiri, Shevaroy and Bababudan Hills.
5. *PYCREUS GLOBOSUS*, Reichb. *P. capillaris*, Nees, var. *nilagiricus*, C. B. Clarke; F. B. I. vi. 592.
In all Districts; from near sea-level to 7,000 ft. Vern. Kan. Chendu Cheni Hullu.
6. *PYCREUS ODORATUS*, Urb. *P. polystachyus*, Beauv.; F. B. I. vi. 592. *P. ferrugineus*, C. B. Clarke; F. B. I. vi. 593.
In all Southern Districts; up to 2,000 ft. Vern. Kan. Mummule Jambu Hullu.
7. *PYCREUS SULCINUX*, C. B. Clarke; F. B. I. vi. 593.
Anamalais (Beddome); Travancore (M. Rama Rao).
8. *PYCREUS UNIOLOIDES*, Dom., var. *ANGULATUS*, Dom. *P. angulatus*, Nees; F. B. I. vi. 593.
Nilgiri and Pulney Hills; 6,000—7,000 ft.

9. *PYCREUS PUNCTICULATUS*, Nees ; F. B. I. vi. 593.
Ganjam (Beddome); Carnatic and Mysore; in rice-fields and tank margins.
10. *PYCREUS ALBOMARGINATUS*, Nees ; F. B. I. vi. 594.
Quilon (K. Venkoba Rao), in rice-fields.

3. *Juncellus*, C. B. Clarke.

Stems erect, leafy only near the base. *Leaves* rarely reduced to sheaths; sheaths not inflated. *Inflorescence* umbellate or capitate. *Spikelets* compressed; rachilla persistent. *Glumes* distichous, concave, the 2 lowest empty, the uppermost 1--3 sterile or empty, the intermediate bisexual. *Stamens* 3 or 2. *Style* 2-fid. *Nut* plano-convex, more or less compressed at right angles to the rachilla.

Inflorescence umbelled. *Rhizome* very short or 0; *stems* robust, 3 ft. or sometimes more high, often over 1 in. diam. at the foot; *leaves* several, as long as the stem or shorter, 3--5 in. wide, coriaceous; *umbel* large, compound, primary rays 4--10, up to 8 in. long, secondary rays 4--8, up to 6 in. long; *bracts* about 6, up to 35 in. long and 6 in. wide; *bracteoles* 3--6, linear, usually shorter than the spikes; *spikelets* straw-coloured, in sessile and peduncled crowded spikes up to 2 in. long, elliptic-lanceolate or ovate-oblong, 15--25 in. long; *glumes* ovate, mucronulate; *nut* obovoid, pale-brown.....1. *alopecuroides*.

Inflorescence capitate:--

Rhizome 0; *stems* densely tufted, 5--10 in. long; *leaves* numerous, as long or shorter, very narrow; *bracts* 2--6, dilated at the base, up to 6 in. long; *spikelets* sessile, densely packed in a terminal ovate or globose head 2--5 in. long, 1 in. wide; *glumes* greyish-brown; closely imbricate, oblong-lanceolate, cuspidate; *nut* ellipsoid, pale brown.....2. *pygmaeus*.

Rhizome creeping, slender, short or long, sometimes floating and up to 2 yards long, clothed with brown scales; *stems* congested or distant, bases enclosed in chestnut-red sheaths, 3--24 in. high; *leaves* usually short, sometimes as long as the stem, sometimes almost absent; *bracts* 2, 1 very short and broad, the other up to 2 in. long, appearing as if a continuation of the stem; *spikelets* sessile, few--30 in a densely congested head which appears to be lateral, linear-oblong, straw-coloured, 2--5 in. long; *glumes* broadly ovate, acute, mucronulate; *nut* obovoid, plano- or concavo-convex.....3. *laevigatus*.

1. *JUNCCELLUS ALOPECUROIDES*, C. B. Clarke ; F. B. I. vi. 595.
Vizagapatam District at 2,000 ft. (Gamble); Carnatic and Mysore; in rice-fields.
Vern. *Kan.* Billi Jambu Hullu.
2. *JUNCCELLUS PYGMAEUS*, C. B. Clarke ; F. B. I. vi. 596.
In all Districts; up to 1,500 ft.
3. *JUNCCELLUS LAEVIGATUS*, C. B. Clarke ; F. B. I. vi. 596.
In all the Eastern Districts; in marshy places.

4. *Cyperus*, Linn.

Annual or perennial erect or floating herbs. *Leaves* usually radical, flat or terete and channelled, rarely entirely reduced to sheaths. *Inflorescence* capitate or of simple or compound umbels; *bracts* like the leaves, rarely reduced almost to scales, usually divaricate, sometimes one erect. *Spikelets* linear or oblong, usually compressed, seldom terete. *Rachilla* persistent, often winged, the wings often interrupted and in pairs opposite the nuts, sometimes united to the glumes. *Glumes* usually distichous, the 2 lowest empty, 4--many

succeeding ones bisexual, the uppermost 1—3 sterile or empty. *Stamens* 3 or 2, rarely 1; anthers sometimes crested. *Style* 3-fid, rarely undivided, not tumid at the base nor articulated to the nut. *Nut* usually 3-gonous, less often plano-convex.

Plants floating in water; base or angles of the nut corky:—

Style long, undivided or obscurely 3—2-toothed. Stems slender, up to 18 in. long; leaves from $\frac{3}{4}$ to as long; bracts 1—8 in. long; spikelets numerous, congested in a single head .2— $\frac{7}{8}$ in. diam., angular, .2— $\frac{5}{8}$ in. long, rigid, often curved; rhachilla stout, very narrowly winged; glumes broadly ovate, boat-shaped, rigid, acute or acuminate; nut half as long as the glume, ovoid, unequally 3-sided, base corky.....1. *cephalotes*.

Style short, branches 3, as long, linear. Stem robust, sharply 3-angular, up to 4 ft. high; leaves as long or longer, up to .5 in. wide; bracts several, up to 20 in. long, margins usually scabrous; umbel compound, usually large with corymbose radii up to 2 in. long; spikelets narrowly ovate to oblong, .3—6 in. long, light- or reddish-brown, umbellately or digitately clustered; glumes regularly imbricate, ovate, boat-shaped, mucronate; nut $\frac{3}{4}$ the length of the glume, ellipsoid, unequally 3-sided, angles corky.....2. *platystylis*.

Plants rooted in marshes, dry soil or sand; nut not corky:—

Spikelets digitate or clustered, not spicate nor racemose:—

Glumes aristate or distinctly mucronate:—

Leaves and bracts filiform, less than .05 in. wide:—

Spikelets less than .1 in. wide:—

Glumes chestnut-brown, ovate, plicate, with awnlets $\frac{1}{2}$ as long, margins not hyaline. Stems tufted, 1—5 in. high; leaves as long or shorter; bracts shorter or longer than the inflorescence, up to 4.5 in. long; spikelets .2—1 in. long, clustered in single heads or compound-umbellate with rays up to 2 in. long; nut trigonous, linear-oblong, sides parallel, dark-red.....3. *castaneus*.

Glumes pale- or ferruginous-brown, ovate, plicate, with awnlets as long, margins often hyaline. Stems tufted, 2—6 in. high; spikelets .15— $\frac{5}{8}$ in. long; nut trigonous, oblong-obovoid, chestnut. *Other characters as in the last species*.....4. *uncinatus*.

Spikelets much compressed, .3—7 in. long, .12—18 in. wide, reddish-brown. Stems tufted, 2—8 in. high; leaves usually shorter; bracts 2, rarely 3, usually short, sometimes up to 2 in. long; inflorescence of a single head of 3—20 digitate spikelets; glumes broadly ovate, boat-shaped, keeled, conspicuously mucronate, margins usually hyaline, bases imbricating; nut trigonous, obovoid, dark-brown.....5. *Teneriffae*.

Leaves and bracts .25 in. or more wide:—

Glumes lax and rather distant, at least in fruit. Rhizome short; stems up to 24 in. high; leaves as long, .3—6 in. wide; bracts 4—10, nearly as long as the leaves; umbel decomposed, 3—12 in. diam.; rays many, up to 4 in. long; spikelets 3—9 together, digitate, linear-oblong, .15— $\frac{4}{5}$ in. long, compressed; rhachilla narrowly winged; glumes complicate, sub-orbicular when opened out, shortly cuspidate, margins broadly hyaline, pale-yellow to nearly chestnut; nut trigonous, broadly ellipsoid, dark-brown.....6. *diffusus*.

Glumes closely imbricate even in fruit. Spikelets .2—7 in. long, hardly compressed; glumes ovate, cuspidate. *Other characters as in the last species, but plant generally larger; stem up to 30 in. high; leaves and bracts longer; umbel larger and more compound; rays up to 8 in. long*

7. *pubisquama*.

Glumes at most minutely mucronate:—

Glumes .025 in. or less long, obovate, apex rounded. Stems tufted, weak, 3—20 in. long; leaves flaccid, usually shorter, .1—17 in. wide; bracts 2—4, 1—10 in. long; umbel simple or compound or less often reduced to a head, rays 3—10, slender, up to 1.5 in. long; spikelets many, densely aggregated into congested globose heads, .1—2 in. long; rhachilla not winged; nut subequally trigonous, broadly ellipsoid, nearly as long as the glume, yellow or pale-brown.....8. *difformis*.

Glumes .04 in. or more long, oblong or ovate, obtuse or acute:—

Inflorescence umbellate, not a single head:—

Rhizome slender, creeping; stems arising along it singly or in tufts, weak, up to 30 in. high; leaves usually shorter but sometimes longer, 1—3, narrow; bracts 2—3, usually shorter than the umbel, but occasionally much longer; umbel simple or compound; rays usually 4—10, sometimes up to 20, slender, up to 4 in. long; spikelets in clusters of 3—8, spreading stellately, linear, acute, compressed, .1—5 in. long, .04 in. wide; glumes plicate, ovate-oblong when unfolded, obtuse, sometimes very shortly mucronate, pale- or chestnut-brown, .05—075 in. long; nut trigonous, globose-ovoid, pale-brown, smooth.....9. *Haspan.*
Rhizome 0; stems solitary or tufted, weak, 2—12 in. high; spikelets .1—3 in. long; glumes .04 in. long, apex broadly obtuse, not mucronulate, margins hyaline; nut nearly globose or very obscurely 3-sided, white, minutely verrucose when ripe. *Other characters as in the last species*.....10. *tenuispica.*

Inflorescence a single head:—

Rhizome short; rootlets wiry; spikelets distinctly compressed:—

Stem considerably thickened below, rigid, 5—18 in. high; leaves from $\frac{1}{4}$ to nearly as long, narrow; bracts 2, rarely 3, one longer than the other, .5—9 in. long; spikelets 3—20, spreading, lanceolate to elliptic-oblong, acute, pale, sometimes almost white, .4—1 in. long, .15—2 in. wide; glumes ovate-lanceolate, acute, closely imbricate, up to .2 in. long; nut trigonous, obovoid, dark-brown or black.....11. *niveus.*

Stem only slightly thickened below, very slender, 3—10 in. high; leaves shorter or longer, very narrow; bracts 3—5, usually 3, .5—4 in. long; head dense, globose, whitish or pale cinnamon-coloured, .2—6 in. diam.; spikelets elliptic, .15—2 in. long, .1 in. wide, obtuse; glumes oblong-lanceolate, obtuse, hardly imbricate, .05—1 in. long; nut trigonous, oblong-ellipsoid, black.....12. *leucocephalus.*

Rhizome creeping; rootlets thick; spikelets not or hardly compressed:—

Rootlets glabrous or nearly so; rhizomes dichotomously branched, sheathed at the nodes with chestnut-coloured scales, rarely tuberous; stems rigid, terete, 2—20 in. high; leaves usually shorter, terete, grooved on the upper side, rigidly coriaceous, often recurved, bracts 2—3, the lower up to 4 in. long, erect and appearing to be a prolongation of the stem; head globose, of many radiating sessile spikelets; spikelets ovoid or elliptic-oblong, acute, .25—3 in. long, straw-coloured or pale-brown; glumes ovate, convex, hardly keeled, rounded and sometimes minutely apiculate, conspicuously 13-nerved, margins hyaline; nut trigonous, obovoid, concavo-convex, black...13. *arenarius.*

Rootlets densely woolly; stems robust, trigonous at the apex, up to 24 in. high, base thickened and clothed with broad dark-chestnut scales; leaves about as long, narrow, concave, coriaceous; bracts 3—4, elongate; head of 30—80 congested spikelets; spikelets lanceolate, acute, slightly compressed, .5 in. long, pale-brown; glumes imbricate, ovate, acute or very shortly cuspidate; nut obovoid, obscurely trigonous, dark-brown.....14. *pachyrrhizus.*

Spikelets distinctly spicate or racemose:—

Rhachilla of spikelets not or hardly winged:—

Glumes cuspidate or aristate:—

Spikelets linear-oblong, acute, strongly compressed, .3—7 in. long (up to 1.25 in. in fruit), .1—2 in. wide, yellowish when ripe, 20—60-flowered. Stems tufted, up to 30 in. long, sometimes much reduced and almost absent; leaves usually shorter, very narrow; bracts 3—5, up to 8 in. long; umbel simple, often with a sessile head at the fork, sometimes reduced to a single head; rays up to 6, up to 5 in. long; spikelets 4—9, subdigitate or spicate at the ends of the rays, more numerous when in a single head; glumes plicate, ovate when unfolded, imbricate, keel produced into a strong mucro, .15—2 in. long; nut trigonous, broadly obovoid, black or dark-brown.....15. *compressus.*
Spikelets oblong or linear-oblong, flat, .1—3 in. long, 6—30-flowered, yellowish- or reddish-brown. Stems tufted, 1—9 in. high; leaves usually

shorter, narrow; bracts 2—5, .5—4 in. long; heads single or in umbels of 2—5 rays up to 1 in. long; spikelets crowded into globose or oblong heads which appear echinate by the spreading awns; glumes oblong, .04—05 in. long, tapering into a fine recurved awn as long, sides strongly nerved to the margin; nut trigonous, elliptic-obovoid, dark-brown

16. *aristatus*.

Glumes obtuse or minutely mucronate, not cuspidate nor aristate:—

Glumes plicate, orbicular-obovate when opened out, gibbous towards the rhachilla when folded, scarcely imbricate, keeled, sides nerveless, .05 in. long. Stems solitary or tufted, 3—31 in. high, trigonous; leaves usually shorter; bracts 3—5, 1—14 in. long; umbel decomposed, rays many, 1—8 in. long, bearing irregularly fascicled umbellules formed of narrow interrupted spikes of 5—20 spikelets; spikelets linear-oblong, .2—6 in. long, yellow or pale-brown; nut trigonous, obovoid, black.....17. *Iria*.

Glumes oblong or elliptic-oblong, not gibbous:—

Spikelets crowded in cylindrical spikes. Stems stout, trigonous, 10—48 in. high; leaves usually a little shorter, sometimes longer, up to .35 in. wide; bracts 3—7, up to 28 in. long and .5 in. wide; umbel compound, large, erect, primary rays 4—13, up to 16 in. long, secondary umbels with 2—6 rays up to 6 in. long; spikelets densely imbricate in spikes 1—2 in. long, linear-oblong, flat, erect, .3—7 in. long, pale, reddish- or chestnut-brown; glumes oblong, apiculate or cuspidate, .05 in. long, margins hyaline, keel 5-nerved, hardly imbricate; nut trigonous, obovoid-oblong, dark-brown.....18. *eleusinoides*.

Spikelets not crowded in cylindrical spikes:—

Margins of glumes not or very inconspicuously hyaline:—

Glumes .05 in. long, conduplicate:—

Spikelets spreading even in fruit. Rhizome stoloniferous; stems solitary or 2—3, slightly apart, 4—36 in. high; leaves longer or shorter, narrow; bracts 3—6, up to 16 in. long; umbel compound, usually large; primary rays 6—10, up to 10 in. long; secondary rays fewer, shorter, spreading, bearing horizontally spreading sessile spikelets on a slender rhachis; spikelets narrowly linear, .3—1 in. long; rhachilla very slender, wavy; glumes red-brown, elliptic-oblong, obtuse, distant, very slightly imbricate, diverging in fruit; nut trigonous, narrowly oblong, as long as or slightly exceeding the glume, dusky-brown.....19. *distans*.

Spikelets nearly erect, not spreading, in fruit contracted into tassels. Bracts usually, at least 1—2 of them, longer than the inflorescence, up to 43 in. long and .6 in. wide; spikelets .3—5 in. long; glumes pale, red- or chestnut-brown, more or less imbricate and closely appressed to the straight or slightly wavy rhachilla even in fruit, not diverging; nut trigonous, narrowly oblong, shorter than the glume, brown. *Other characters as in the last species*.....20. *nutans*.

Glumes coriaceous, .07—09 in. long, shallowly concave, oblong, apex rounded, not keeled, brown or pale-brown, imbricate. Rhizome creeping, thick, stoloniferous; stems robust, up to 3 ft. high, sharply trigonous; leaves 0 or few, 2—6 in. long; bracts 3—5, up to 6 in. long and .35 in. wide; umbel simple, compound or congested; rays 3—12, 1—3 in. long, the longer ones corymbosely branched; spikelets 4—10 in a spike, linear, nearly terete, .3—6 in. long; nut narrowly oblong, obtusely trigonous, ultimately black.....21. *malaccensis*.

Margins of glumes distinctly hyaline:—

Rhachis of spike hispidulous on the angles. Rootstock small, stoloniferous; stems up to 3 ft. high; leaves nearly as long or much shorter, up to .4 in. wide; bracts 3—5, up to 21 in. long and .5 in. wide; umbel compound; primary rays 2—10, up to 9 in. long, bearing pedicelled spikes of horizontal spikelets; spikelets linear or linear-lanceolate, .15—5 in. long; glumes .05—08 in. long, broadly ovate, sometimes minutely apiculate, pale- or reddish-brown; nut trigonous, subglobose obovate, black.....22. *pilosus*.

Rhachis of spike glabrous. Rootstock short, stout, stoloniferous and bulbiferous; stems up to 42 in. high; leaves often longer, thick, coriaceous or spongy, 1—5 in. wide; bracts 2—5, up to 8 in. long; umbel compound; primary rays 3—7, rather stout, 1—8 in. long; secondary rays bearing loosely corymbose spikes of 5—10 spikelets; spikelets remote, linear-oblong, 3—1.2 in. long, straw-coloured or reddish, shining; glumes boat-shaped, suborbicular when expanded, .08—1 in. long; nut trigonous, broadly obovoid, black
23. *procerus*.

Rhachilla of spikelets distinctly 2-winged opposite the seeds:—

Leaves short, rarely half as long as the stem, or 0:—

Stems terete, stout, thickened below, transverse septa distinct when dry, up to 6 ft. high. Rootstock stout, woody, stoloniferous; leaves reduced to sheaths or sometimes with a short foliaceous limb; bracts 1—3, scale-like, triangular, acute, under 1 in. long; umbel compound; primary rays up to 10, 1—6 in. long, slender, often curved; secondary rays terminating in corymbs of 8—15 spikelets; spikelets narrowly linear; 4—1.5 in. long; glumes oblong, obtuse or subacute, concave, 1 in. long; nut trigonous, narrowly oblong, black.....24. *articulatus*.

Stems trigonous above, spongy below, septae not or hardly visible when dry, up to 6 ft. high. Rhizome creeping, stout, woody; leaves reduced to sheaths or sometimes with a blade up to 6 in. long; bracts developed:—

Stems bluntly trigonous above; bracts 3—5, linear-ensiform, shorter than the inflorescence, up to 3 in. long and .2 in. wide; umbel compound; primary rays 6—15, slender, up to 6 in. long; secondary rays terminated by spikes or corymbs of 4—16 spikelets; spikelets linear, 4—1.5 in. long; glumes ovate-oblong when unfolded, obtuse or subacute, 1 in. long, straw-coloured or pale reddish-brown; wing of rhachilla narrow, usually pale; nut narrowly elliptic-oblong, trigonous, .06 in. long, black.....25. *corymbosus*.

Stems sharply trigonous above; lower bracts longer than the inflorescence, up to 25 in. long and .5 in. wide; glumes usually red-brown; wing of rhachilla rather wide, usually blood-red in fruit. *Other characters as in the last species*.....26. *Pangorei*.

Leaves long, very rarely less than half as long as, often longer than, the stem:—

Rhizomes stoloniferous:—

Stolons slender, ending in black-coated bulbils; stems subsolitary, slender, 2—12 in. long; leaves many, coming off a little distance above the base, slender, usually as long as or a little longer than the stem; bracts 2 or 3, arising one above the other, filiform, up to 4 in. long; inflorescence of a head of umbels 1—2 in. in diam., formed of slender alternate spikes bearing 3—12 spikelets; spikelets linear, 3—7 in. long; glumes ovate-oblong when unfolded, boat-shaped, obtuse, sometimes minutely mucronate, .05 in. long, 7—13-nerved, reddish-brown, laxly imbricate; nut trigonous with concave sides, obovoid, obtuse, black...27. *bulbosus*.

Stolons not bulbiferous:—

Leaves flaccid, flat; umbels expanded, usually compound:—

Tubers not zoned; stems subsolitary, trigonous, 4—18 in. high; leaves shorter or longer, narrow, often numerous; bracts usually 3, shorter or more often longer than the inflorescence, up to 2 ft. long; umbel simple or compound; rays few to many, up to 6 in. long; secondary, if present, few, ending in 4—8 approximate, spreading spikelets; spikelets linear to lanceolate, 3—1.4 in. long; glumes imbricate, 1 in. long, plicate, ovate when expanded, obtuse or acute, keel 5—7-nerved, pale-straw or brown, or chestnut, sometimes with a reddish tinge; nut trigonous, broadly obovoid, greyish-black
28. *rotundus*.

Tubers zoned; stems usually solitary, trigonous, 6—12 in. high; leaves as long or nearly so; bracts 3—5, often shorter than the inflorescence; umbel usually compound; primary rays 6—8, slender, up to 4 in. long; secondary 3, up to 1.5 in. long; spikelets distantly alternate at the ends of the rays, yellow or yellow-brown, 4—8 in.

long; glumes rather laxly imbricate, .1 in. long, plicate, ovate when expanded, obtuse, distinctly striately nerved and keeled, keel greenish. *Other characters as in the last species*.....29. *esculentus*.
 Leaves rigid, filiform or very narrow; umbel simple, compact. Stolons elongate, branching, clothed with broad, acute scales; stems enlarged and tuberous below, 4—12 in. long, wiry, often flexuous; leaves shorter or as long, usually subulate and squarrosely recurved; bracts 3, up to 3 in. long; umbel of 4—6 rays, sessile or with peduncles up to 1.2 in. long, bearing 3—8 spreading spikelets; spikelets ovate or linear-oblong, hardly compressed, .25—6 in. long; glumes densely imbricate, broadly ovate when expanded, plicate, acute, .1 in. long, red, keel greenish, margins broadly hyaline, the lowest sometimes scarious; nut obovoid, plano-convex, dorsal surface hardly keeled, dark-brown.....30. *stoloniferus*.

Rhizome not stoloniferous:—

Spikelets linear, .4—1.2 in. long. Stems solitary, trigonous, 9—36 in. high; leaves from $\frac{1}{2}$ as long up to a little longer, narrow; bracts 3—5, usually short but sometimes up to 20 in. long; umbel usually with several rays up to 10 in. long, each with 3—16 alternating spikelets aggregated at the end; glumes broadly ovate when expanded, very concave, obtuse, .15 in. long, yellowish-brown, keel broad, margins scarious; nut subglobose in outline, sharply trigonous, dark red-brown

31. *Zollingeri*.

Spikelets .3 in. or less long, numerous in large compound umbels:—

Anthers not or very shortly crested:—

Spikelets distinctly compressed:—

Spikes digitate, all sessile, dense, cylindric, up to 1.5 in. long. Rhizome 0; stems solitary, stout, up to 3 ft. long, sharply trigonous; leaves rather shorter, up to .3 in. wide; bracts 5—7, some shorter, rest much longer than the inflorescence, up to 23 in. long; umbel rarely simple, dense; spikelets ovate or oblong-lanceolate, .12—2 in. long, .05 in. wide, suberect; glumes densely imbricate, plicate, broadly ovate when expanded, .05 in. long, obtuse, keel produced into a cusp, brown; nut small, ovoid or broadly ellipsoid, trigonous or with the dorsal angle very obtuse, black.....32. *imbricatus*.

Spikes umbelled or corymbose, some at least peduncled, cylindric, dense or lax, 1—2.5 in. long. Rhizome short; stems usually solitary, robust, spongy below, trigonous, up to 6 ft. high; leaves shorter or longer, up to .4 in. wide; bracts 3—6, up to 3 ft. long and .5 in. wide; primary rays 5—12, up to 9 in. long; spikelets numerous, close or somewhat distant, erect or spreading horizontally, elliptic or oblong-lanceolate, subacute, markedly compressed, .15—3 in. long, .05—0.75 in. wide; glumes closely or laxly imbricate, broadly ovate when expanded, .05 in. long, keel produced into a distinct cusp, bright brown, red-brown or chestnut, keel often green or pale; nut very small, trigonous, broadly ellipsoid, narrowed at both ends, yellowish, dark-brown or black.....33. *exaltatus*.

Spikelets terete or nearly so, spirally inserted round an angular rachis, spreading horizontally, .15—3 in. long, .05 in. or less wide. Rhizome stout, woody, creeping, sometimes 0; stems robust, woody, sharply trigonous upwards, up to 5 ft. high; leaves longer or shorter, up to .6 in. wide; bracts 3—12, up to 30 in. long and .6 in. wide; primary rays 4—10, up to 1 ft. long; spikes sessile or some peduncled, dense, cylindric, 1—2.2 in. long; glumes minute, broadly oblong when expanded, obtuse with a short cusp, chestnut or yellowish-brown; nut trigonous, ellipsoid or obovoid, straight or curved, dark-yellowish-brown or dark-grey.....34. *digitatus*.

Anthers with a crest $\frac{1}{2}$ — $\frac{1}{3}$ as long as the cells:—

Stem above bluntly trigonous, the angles smooth, stout, up to 4 ft. high; leaves nearly as long, up to .6 in. wide; bracts 8—12, up to 30 in. long; primary rays 7—12, up to 8 in. long; secondary

fewer, up to 2 in. long; spikes narrowly cylindrical, clustered at the ends of the rays and a few sessile at the base of the partial umbels, 1—2.5 in. long; spikelets more or less densely spirally inserted on the angular rhachis, erect, linear, hardly compressed, .15—25 in. long, acute, glumes closely imbricate, ovate when expanded, keeled, acute or very shortly mucronate, .05 in. long or less, pale- or yellowish-brown; nut very small, trigonous, ellipsoid, subacute at both ends, pale-brown or grey.....35. *elatus*.
Stem upwards sharply trigonous, angles scabrous, cutting, stout, sometimes reaching 20 ft. high, usually much shorter; leaves as long or somewhat shorter, up to 1 in. wide, margins and keel serrulate; bracts 4—6, up to 31 in. long and 1 in. wide; primary rays 8—12, erect, up to 9 in. long; spikes linear, 5—10 corymbose at the ends of the secondary rays; spikelets densely spiral on the angular rhachis, subulate or nearly so, acute, .2—3 in. long; glumes closely imbricate and appressed, broadly ovate or suborbicular when expanded, concave, slightly keeled and minutely mucronulate, .1 in. long, pale-brown; nut very small, trigonous, narrowly oblong, apex acute, pale-lead-coloured.....36. *platyphyllus*.

1. *CYPERUS CEPHALOTES*, Vahl; F. B. I. vi. 597.
Madras (Wight); Cochin (Meebold); Travancore (Calder and Ramaswami).
2. *CYPERUS PLATYSTYLIS*, R. Br.; F. B. I. vi. 598.
Locality uncertain (Wight, Heyne).
3. *CYPERUS CASTANEUS*, Willd.; F. B. I. vi. 598.
In all Districts; at low elevations in swamps and rice-fields.
4. *CYPERUS UNCINATUS*, Poir. *C. cuspidatus*, H. B. K.; F. B. I. vi. 598.
S. Kanara (Hohenacker); Pulney Hills at 3,000 ft. (Saulière); Travancore (Ramaswami). In moist sandy places.
5. *CYPERUS TENERIFFAE*, Poir.; F. B. I. vi. 601.
Nallamalai Hills (Beddome); Dekkan; Coromandel; Nilgiri Hills (Hohenacker); Anamalai Hills (Fischer); Travancore. From sea-level to 7,000 ft.
In dry and often rocky situations.
6. *CYPERUS DIFFUSUS*, Vahl; F. B. I. vi. 603.
Rampa Hills at 3,000 ft. (Ramaswami); Paikonda Hills (Jacob); Anamalai Hills (Beddome); Travancore.
7. *CYPERUS PUBISQUAMA*, Steud.; F. B. I. vi. 604.
Mysore (Meebold) and the W. Coast.
In wet localities and in marshes in evergreen forest.
8. *CYPERUS DIFFORMIS*, Linn.; F. B. I. vi. 599.
In all districts, in marshy localities; sea-level to 8,000 ft. Vern. *Kan.* Kari Sanna Jambu Hullu.
9. *CYPERUS HASPAN*, Linn.; F. B. I. vi. 600.
In all Districts, in marshy localities and in rice-fields; sea-level to 5,000 ft.
10. *CYPERUS TENUI SPICA*, Steud. *C. flavidus* Clarke non Retz.; F. B. I. vi. 600.
Common in all Districts in rice-fields; sea-level to 3,000 ft. Vern. *Kan.* Honnai Hu Hullu.
11. *CYPERUS NIVEUS*, Retz.; F. B. I. vi. 601.
N. Circars up to 1,500 ft.; Rampa (Narayanswami).
In dry grass-lands.

12. *CYPERUS LEUCOCEPHALUS*, Retz.; F. B. I. vi. 602.
Dekkan; Madanapalli (Fischer), Cuddapah Dist. (Meebold).
13. *CYPERUS ARENARIUS*, Retz.; F. B. I. vi. 602.
Along the sea-coast and river banks and in other sandy localities at low elevations.
14. *CYPERUS PACHYRRHIZUS*, Nees; F. B. I. vi. 602.
Coastal sands (Wight); Krusadai Island (Parthasarathy).
15. *CYPERUS COMPRESSUS*, Linn.; F. B. I. vi. 605.
In all Districts in moist situations; sea-level to 6,000 ft. The whole plant usually with a grey- or silvery-green sheen. Vern. *Tam.* Kunnagorai; *Kan.* Vusumani Hullu.
16. *CYPERUS ARISTATUS*, Rottb.; F. B. I. vi. 606.
In all Districts in moist sandy or pasture soils; sea-level to 8,000 ft.
17. *CYPERUS IRIA*, Linn.; F. B. I. vi. 606.
In all Districts in rice-fields and wet situations; sea-level to 4,000 ft. Vern. *Kan.* Dabbai Jambu Hullu.
18. *CYPERUS ELEUSINOIDES*, Kunth; F. B. I. vi. 608.
In all the E. and Central Districts; Nilgiri, Pulney and Travancore Hills; sea-level to 6,000 ft.
19. *CYPERUS DISTANS*, Linn. f.; F. B. I. vi. 607.
Dekkan; Carnatic; Nilgiri and Pulney Hills; Travancore; sea-level to 8,000 ft.
20. *CYPERUS NUTANS*, Vahl; F. B. I. vi. 607.
In most Districts inland; 1,000—6,500 ft.
21. *CYPERUS MALACCENSIS*, Lam.; F. B. I. vi. 608.
Quilon (Lawson).
22. *CYPERUS PILOSUS*, Vahl; F. B. I. vi. 609.
Mysore, Nilgiri and Pulney Hills; W. Coast at low elevations.
23. *CYPERUS PROCERUS*, Rottb.; F. B. I. vi. 610.
E. Districts from Nellore southwards, mostly near the sea in rice-fields; Bangalore (Cameron).
24. *CYPERUS ARTICULATUS*, Linn.; F. B. I. vi. 611.
In all the E. Districts; Ganjam (Alcock); Bellary; Cuddapah (Gamble); Mysore (Meebold); usually in standing water; sea-level to 3,000 ft. Vern. *Kan.* Yalai Jambu Hullu.
25. *CYPERUS CORYMBOSUS*, Rottb.; F. B. I. vi. 612. *C. tegetiformis*, Roxb.; F. B. I. vi. 612.
In all E. Districts and Travancore; sea-level to 3,000 ft. Vern. *Tam.* Pangorai. The stems of this and the next species are used for the fine Tinnevely mats.
26. *CYPERUS PANGOREI*, Rottb. *C. tegetum*, Roxb.; F. B. I. vi. 613.
In all Districts; from sea-level to 5,000 ft. Vern. *Tam.* Pangorai.
27. *CYPERUS BULBOSUS*, Vahl; F. B. I. vi. 611.
Dekkan and Carnatic; Beypore in S. Malabar; sea-level to 1,500 ft. Usually in sandy soil.
28. *CYPERUS ROTUNDUS*, Linn.; F. B. I. vi. 614. *C. Fenzelianus*, Steud.; F. B. I. vi. 615. *C. subcapitatus*, C. B. Clarke; F. B. I. vi. 616. *C. tuberosus*, Rottb.; F. B. I. vi. 616.

- In all Districts; sea-level to 6,000 ft. Vern. *Kan.* Bhadra Hullu.
A troublesome weed, difficult to eradicate.
29. *CYPERUS ESCULENTUS*, Linn.; F. B. I. vi. 616.
At low levels and also in the Hills; Horsleykonda at 4,000 ft. (Gamble); Nilgiris (Hohenacker); Anamalais (Beddome). Not common. The tubers are sometimes used as food.
30. *CYPERUS STOLONIFERUS*, Retz.; F. B. I. vi. 615.
In coastal Districts, especially in sea-shore sand.
31. *CYPERUS ZOLLINGERI*, Steud.; F. B. I. vi. 612.
Pulney Hills at 7,000 ft. (Bourne); Peermade (Venkoba Rao).
32. *CYPERUS IMBRICATUS*, Retz. *C. radiatus*, Vahl; F. B. I. vi. 617.
Tranquebar (? Retz); Pykara at 6,000 ft. (Gamble); Kodaikanal (Bourne).
33. *CYPERUS EXALTATUS*, Retz.; F. B. I. vi. 617.
In all Districts from Cuddapah (Gamble) and Mysore southwards. In wet situations; sea-level to 3,000 ft. Vern. *Tam.* Paddupai Korai; *Kan.* Kempu Jambu Hullu.
34. *CYPERUS DIGITATUS*, Roxb.; F. B. I. vi. 618.
Bababudan, Nilgiri and Pulney Hills; 2,000—6,000 ft.
35. *CYPERUS ELATUS*, Linn. f.; F. B. I. vi. 618.
Dekkan (Wight).
36. *CYPERUS PLATYPHYLLUS*, Roem. v. Sch.; F. B. I. vi. 618.
E. Coast near the sea. Sriharikota (Gamble); Madras (Wight).

5. *Mariscus*, Vahl.

Erect herbs, usually perennial and glabrous; generally resembling the genus *Cyperus*. *Inflorescence* of a single head or in simple or compound umbels. *Spikelets* usually in compact compressed or terete heads. *Glumes* distichous, persistent on the rhachilla which disarticulates above the two lowest (which are empty and smaller than the rest), leaving a small knob or disk with, sometimes, an annular ridge on its summit. *Stamens* usually 3. *Style* 3-fid, continuous with the ovary; stigmas slender. *Nut* trigonous.

Base of stem thickened by turgid, chestnut-brown sheaths:—

Head solitary (rarely 2—4 together), ovoid, dense, 3—6 in. diam. Stolons 0; stems tufted, 3—20 in. high; leaves shorter or longer, flaccid; bracts 3—5, sometimes up to 9, 2—15 in. long, spikelets ovoid, bearing 2—6 nuts; glumes pale-brown; nuts oblong or subovoid, black.....1. *dubius*.
Spikes cylindric, subcapitate or in a simple umbel. Stolons slender, elongate, clothed in oblong-lanceolate, striate, pale-brown scales; stem solitary, 3—12 in. high; leaves usually shorter; spikes dense, 3—9 together, sessile or shortly peduncled, divaricate, up to 75 in. long; bracts 4—8, 2—7 in. long; spikelets narrowly ellipsoid, spreading at right angles, bearing 1 nut; glumes straw-coloured; nut ellipsoid, dark-brown.....2. *bulbosus*.

Base of stem not thickened by sheaths:—

Spikelets not markedly compressed; glumes not aristate:—

Umbels simple; spikelets bearing 1—3, rarely 4, nuts; transverse veinlets of leaves and bracts not visible:—

Roots producing stolons:—

Spikelets subulate, 1-flowered. Stolons long, scaly; stems slender, usually thickened into a nodule at the base, 2—24 in. long; leaves shorter or longer; bracts 3—6, up to 8 in. long; rays 3—7, 0—1.5 in. long, terminating

in dense cylindric spikes 2—7 in. long; glumes brown, 3rd striate; nut oblong-ellipsoid, often slightly curved, pale-brown.....3. *panicus*. Spikelets 2-flowered. Stolons short, very slender, scaly; stems slender, up to 12 in. long; leaves as long, very slender; bracts 4—5, up to 6 in. long; rays few, 0—1 in. long, spikes cylindric, lax, 3—1 in. long; glumes dusky-green; nut unknown.....4. *tenuifolius*.

Roots without stolons:—

Spikelets erect or suberect:—

Spikelets 2—4-flowered, subulate, often curved; rhachilla developed. Rhizome very short, nodulose; stems 4—24 in. high; leaves shorter or longer, up to 3 in. wide; bracts 4—8, up to 15 in. long and 3 in. wide; rays 5—11; spikes up to 1.5 in. long, sessile or peduncles up to 1.5 in. long; glumes obtuse, not cuspidate; nut obovate-oblong, obtuse, brown, muricate, usually slightly curved.....5. *cyperinus*.

Spikelets 1-flowered; rhachilla minute. Rhizome very short, hardly nodulose; stems 3—12 in. high; leaves shorter or longer, very narrow; bracts 4—7, 1—5 in. long, narrow; spikes cylindric, up to .7 in. long, sessile or up to .3 in. long; when sessile the umbel appears almost capitate; nut-bearing glume cuspidate. *Other characters as in the last species*.....6. *pictus*.

Spikelets spreading at right angles, cylindric, up to .15 in. long. Rhizome short, thick, creeping, clothed in the remains of old leaf-sheaths; stem 2.5—30 in. high; leaves usually much shorter, sometimes as long; bracts 4—11, 1—12 in. long; spikes 5—14, cylindric, up to 1.75 in. long, nearly sessile or peduncles up to 1.25 in. long; spikelets 1—2-flowered; nut-bearing glume cuspidate; nut narrowly elliptic-oblong, apex acute, dark-chestnut or nearly black, minutely muricate, slightly curved.....7. *Siberianus*.

Umbels compound; spikelets bearing 5—14, rarely 3—4, nuts, .2—4 in. long; transverse veinlets of leaves and bracts more or less raised and distinct:—

Spikes cylindric or ovoid, .6—75 in. long; spikelets narrowly ovate or linear-lanceolate. Rhizome short; stems robust, bluntly trigonous, 1—3 ft. high; leaves shorter or longer, more or less spongy, up to .35 in. wide, margins of leaves and bracts sharply spinulose; bracts about 5, up to 38 in. long and .35 in. wide; primary rays up to 9, up to 3.5 in. long, some simple, others umbelled with 4—6 rays up to .75 in. long with 1—2 bracteoles up to 1 in. long; glumes broadly ovate, obtuse, strongly striate, greyish-brown; nut broadly ellipsoid, apiculate, black.....8. *pennatus*.

Spikes globose, .3—7 in. diam.; spikelets linear-subulate, .2—4 in. long. Rhizome short; stems spongy, terete or nearly so, 1—4 ft. high; leaves as long, up to .5 in. wide, spongy, margins smooth or scabrous; bracts 8 or more, 1.5—44 in. long, up to .5 in. wide, margins spinulose; primary rays 8—14, .75—6 in. long, secondary up to 13, .3—2 in. long, tertiary fewer and shorter; bracteoles up to 2 in. long, about as many as the rays; glumes narrow, much convoluted, subacute, reddish-brown; rhachilla with a broad hyaline wing; nut narrowly oblanceolate-oblong, distinctly beaked, brown, iridescent, minutely muricate.....9. *compactus*.

Spikelets markedly compressed, 6—26-flowered, .3—1.1 in. long; glumes elliptic with a curved arista, brown. Roots fibrous; stems tufted, slender, often capillary, 1.5—7 in. high; leaves as long, filiform; bracts few, up to 6 in. long; umbel subsimple; rays few, usually under 1 in. long; spikes broad-quadrate, usually a few sessile, up to .5 in. long, with 6—20 lax spikelets; nut narrowly oblong, acute, brown.....10. *squarrosus*.

1. *MARISCUS DUBIUS*, Kükenthal n. comb. *Cyperus dubius*, Rottb. Desc. et. Ic. 20. *Mariscus Dregeanus*, Kunth; F. B. I. vi. 620.

In all the E. Districts; Mysore, Nilgiri and Palney Hills up to 6,000 ft.; Travancore.

2. *MARISCUS BULBOSUS*, C. B. Clarke; F. B. I. vi. 620.

Horsleykonda at 4,000 ft. (Gamble); Chingleput, Salem and Tinnevely Districts.

3. *MARISCUS PANICEUS*, Vahl; F. B. I. vi. 620.
Carnatic; Mysore; N. Coimbatore, Nilgiri, Anamalai and Pulney Hills; Travancore. From near sea-level to 7,000 ft.
4. *MARISCUS TENUIFOLIUS*, Schrad.; F. B. I. vi. 622.
Tinnevelly Hills (Beddome).
5. *MARISCUS CYPERINUS*, Vahl; F. B. I. vi. 621.
In all Districts except the wettest; 1,500—7,000 ft.
Var. *bengalensis*, C. B. Clarke; F. B. I. vi. 621.
Umbel contracted into a quasi head; spikelets linear, bearing 2—4 nuts.
Kotagiri in the Nilgiri Hills at 6,500 ft. (Sedgwick).
6. *MARISCUS PICTUS*, Nees; F. B. I. vi. 621.
Mysore and Nilgiris.
7. *MARISCUS SIEBERIANUS*, Nees; F. B. I. vi. 622.
Nilgiri, Anamalai (Beddome) and Pulney Hills; High Wave Mountains (Jacob); Travancore.
8. *MARISCUS PENNATUS*, Dom. *M. albescens*, Gaud.; F. B. I. vi. 623.
Near the sea on both coasts.
One of the sedges used for mat-making.
9. *MARISCUS COMPACTUS*, Druce. *M. microcephalus*, Presl.; F. B. I. vi. 624.
Rampa Hills (Narayanswami); Mysore (Meebold); Chingleput and Malabar Districts; Travancore; 300—3,000 ft.
10. *MARISCUS SQUARROSUS*, C. B. Clarke; F. B. I. vi. 623.
Chingleput, Coimbatore, Madura and S. Kanara Districts; Cochin and Travancore States; sea-level to 1,500 ft.

6. *Courtoisia*, Nees.

Erect herbs with simple stems and grass-like leaves only near the base. *Inflorescence* of globose, umbelled spikes. *Spikelets* compressed; rhachilla not winged, disarticulating above the 2 lowest glumes. Glumes distichous, the 2 lowest empty, the next 1—6 bearing 2-sexual flowers and dorsally winged, the uppermost empty or sterile. *Stamens* 3. *Style* short, persistent; stigmas 3, linear. *Nut* trigonous, apex acute, continuous with the style.

COURTOISIA CYPEROIDES, Nees; F. B. I. vi. 625.

Kurg; Mysore; Nilgiri Hills; Malabar; Carnatic.

In swampy situations. Vern. *Kan.* Bili Sanna Jambu Hullu. Stems tufted, 3—24 in. high; leaves shorter or longer, narrow, flaccid; bracts 3—7, 2.5—16 in. long; primary rays 5—9, up to 5 in. long, secondary fewer, up to 1 in. long; spikes congested, .2—5 in. diam.; spikelets flat, .15 in. long, usually bearing 2 nuts, rarely 1; glumes yellowish-brown, .12 in. long, boat-shaped, flattened, the whole length of the keel winged; nut narrowly fusiform, dark-brown.

7. *Eleocharis*, R. Brown.

Herbs with a stout rhizome or fibrous roots, sometimes stoloniferous. *Stems* simple, tufted, terete, angled or fluted. *Leaves* reduced

to sheaths embracing the base of the stem, rarely with a short herbaceous or membranous limb. *Inflorescence* a solitary terminal, subglobose, ovoid or cylindrical, few- or many-flowered spikelet which is sometimes proliferous. *Glumes* imbricate round the rhachilla in 3—many spirals, the lowest usually empty and bract-like, often longer than the rest but always shorter than the spikelet, the uppermost glumes empty, the intervening 2-sexual. *Stamens* 3—1. *Hypogynous bristles* 3—9, rarely absent, though sometimes small, retrorsely scabrous or spinulose. *Style* 2—3, rarely 4-fid, papillose, base swollen and usually constricted just above the nut, usually persistent. *Nut* obovoid, usually plano-convex when the style is 2-fid and trigonous when it is 3-fid.

Stem robust; spikelets narrower or hardly wider than the stems.

Stolons elongate:—

Glumes smooth, apex rounded or truncate, hyaline margins usually narrow:—

Glumes broadly ovate, straw-coloured, .2—25 in. long, midrib strong, usually raised. *Stems* terete, transversely septate within; septae usually visible outside when dry, 12—41 in. high; *spikelets* cylindrical, .75—2 in. long; *bristles* 7, as long as the nut or longer, yellow; *nut* orbicular-obovoid, plano-convex or trigonous, smooth, pale-brown.....1. *plantaginea*.

Glumes closely imbricate, quadrate, straw-coloured, .1—125 in. long, without midrib. *Stem* trigonous upwards, not septate, 12—30 in. high; *spikelets* cylindrical, .6—1 in. long; *bristles* much shorter than the nut, brown; *nut* orbicular-obovoid, trabeculate, pale, shining.....2. *spiralis*.

Glumes much striated, elliptic-oblong, brown, .17—2 in. long, apex narrowed, obtuse, hyaline margins usually broad. *Stems* trigonous upwards, not septate, 6—36 in. high; *spikelets* cylindrical, .5—1.7 in. long; *bristles* 6, slightly longer than the nut, brown; *nut* orbicular obovoid, biconvex, pale- or dark-brown, faintly striate.....3. *fistulosa*.

Stem slender; spikelets markedly wider than the stem:—

Style 2-fid; nut biconvex. Stolons 0:—

Bristles glistening-white. *Stems* filiform, 1—7 in. high; *spikelets* ovoid or subglobose, .06—25 in. long; *glumes* broadly ovate-oblong, back green, sides membranous, purplish-brown; *bristles* 4—7, as long as the nut; *nut* obovoid, smooth, dark-brown or black, polished.....4. *atropurpurea*.

Bristles reddish-brown. *Stems* 2—14 in. high; *spikelets* subglobose or conical-ovoid, .1—2 in. long; *glumes* orbicular-ovate, membranous, pale-brown, often with a reddish tinge; *bristles* 4—7, usually longer than the nut, reddish-brown; *nut* obovoid, dark-brown or black, polished.....5. *capitata*.

Style 3-fid; nut trigonous:—

Stems fluted, hardly angled:—

Nut prominently trabeculate; *style-base* nearly as broad as the nut. *Stolons* 0; *stems* filiform, 1—7 in. high; *spikelets* narrowly ellipsoid or ovoid, .05—15 in. long; *glumes* 6—8, boat-shaped, subacute, back narrowly green, sides hyaline with a chestnut band; *bristles* about 6, as long as the nut, pale-brown; *nut* pale straw-coloured.....6. *Chaetaria*.

Nut smooth; *style-base* narrow. *Stolons* slender; *stems* rigid, 3—18 in. high; *spikelets* narrowly elliptic or ovoid, .2—4 in. long, frequently producing a branchlet from the axil of the lowest empty glume which may bear a smaller subsidiary spikelet; *glumes* many, ovate- or elliptic-oblong, lower obtuse, upper subacute, hyaline or green along the midrib, margins reddish- or purplish-brown; *bristles* 6—7, longer than the nut, pale- or dark-brown; *nut* obovoid, obscurely trigonous, pale, smooth.....7. *congesta*.

Stems sharply 4- (sometimes 3-) angled, 8—36 in. high. *Stolons* slender; *spikelets* narrowly ellipsoid to cylindrical-lanceolate, .4—1 in. long; *glumes* numerous, ovate, obtuse, yellow along the midrib, sides reddish-brown; *bristles* about 6, longer than the nut, glistening red-brown, very scabrid; *nut* obovoid, yellow, smooth; *style-base* elongate-obpyramidal, 4-sided, fuscous, scabrid

8. *tetraquetra*.

1. *ELEOCHARIS PLANTAGINEA*, R. Br.; F. B. I. vi. 625.
Mysore; Coimbatore; Carnatic; Travancore. In swamps, from near sea-level to 3,000 ft.
2. *ELEOCHARIS SPIRALIS*, R. Br.; F. B. I. vi. 627.
Carnatic; in swamps.
3. *ELEOCHARIS FISTULOSA*, Schult.; F. B. I. vi. 626.
Mysore; Coimbatore; S. Kanara. In swamps from near sea-level to 3,000 ft.
4. *ELEOCHARIS ATROPURPUREA*, Kunth; F. B. I. vi. 627.
Carnatic; S. Kanara. At low levels.
5. *ELEOCHARIS CAPITATA*, R. Br.; F. B. I. vi. 627.
In all Districts in rice-fields and moist sandy localities; from sea-level to 2,000 ft.
6. *ELEOCHARIS CHAETARIA*, Roem. & Sch.; F. B. I. vi. 629.
Mysore; S. Kanara; Travancore. In drying swamps and rice-fields; from near sea-level to 3,000 ft.

Var. *subvivipara* Fischer n. comb. *E. subvivipara*, Boeck.; F. B. I. vi. 629. Stems taller, up to 12 in. long; spikelets frequently viviparous. Nilgiri Hills; Travancore.

7. *ELEOCHARIS CONGESTA*, D. Don; F. B. I. vi. 630.
Nilgiri and Pulney Hills; 5,000—7,000 ft.
8. *ELEOCHARIS TETRAQUETRA*, Nees; F. B. I. vi. 630.
Nilgiri and Pulney (Bourne) Hills; 6,000—7,000 ft.

8. *Fimbristylis*, Vahl.

Herbs, usually erect, with a short rhizome or fibrous roots, rarely stoloniferous. Stems usually tufted. Leaves narrow, from near the base of the stem, sometimes all reduced to sheaths. Inflorescence terminal, umbellate, corymbose or reduced to a few spikelets or a single one. Spikelets solitary or clustered, usually many-flowered, the solitary usually pedicelled but frequently one or more in the corymb sessile. Glumes usually spirally imbricate but sometimes the lower or all distichous, usually glabrous, deciduous from the base upwards, the lowest 1—3 empty, the uppermost few tabescent, the intermediate 2-sexual. Stamens 1—3. Bristles 0. Style long, 2—3 (rarely 4-) fid, usually more or less pubescent or villous, base dilated and constricted just above the nut, persistent or wholly deciduous leaving no button on the nut. Nut biconvex or trigonous, often stalked, smooth or tubercled, often trabeculate by the transverse superficial cells or reticulate by small rounded or hexagonal cells.

Glumes spirally disposed (sometimes distichous in 17. *nigrobrunnea*):—

Spikelets 1—5:—

Style 2-fid; nut biconvex:—

Leafless or nearly so; bracts 0:—

Nut linear-oblong, slightly narrowed below, pale-straw-coloured, 0.6 in. long, trabeculate in about 9 vertical series, not fluted, stalked, deciduous with the glume. Roots fibrous; stems quadrangular, 4—26 in. high; leaves 0, the uppermost sheath sometimes with a short limb; spikelet solitary, ovoid or conical, .25—4 in. long, rarely cylindrical-conical and up to .8 in. long; glumes oblong or obovate-oblong, rounded, .13 in. long, nearly flat, not keeled.....1. *tetragona*.

Nut subglobose obovoid, transversely fluted:—

Spikelet continuous with the stem, lanceolate, .2—4 in. long. Roots fibrous; stems obtusely quadrangular, 2—12 in. high; leaves 0; glumes ovate, subacute, .14—17 in. long, not plicate, pale with a green excurrent keel; nut .07 in. long, pale-straw-coloured.....2. *acuminata*.

Spikelet usually set obliquely on the stem, ovate-lanceolate, .25—5 in. long. Rootstock creeping; roots fibrous; stems terete, 8—18 in. high; leaves 0, sheaths with a very short mucronate, ovate limb bordered with brown; glumes orbicular or very broadly ovate, nearly flat, not keeled, rounded, apiculate, .17 in. long, brown; nut whitish .05—06 in. long
3. *nutans*.

Leaves several:—

Glumes narrowly oblong, nearly flat in flower, boat-shaped in fruit, obtuse, slightly keeled, pale-brown or whitish, sometimes reddish towards the apex, .1 in. long. Root fibres slender; stems slender, striate, 1—15 in. high; leaves $\frac{1}{2}$ to as long, slender; spikelets solitary, oblong-ellipsoid, .2—3 in. long; bracts 0, but the lowest glume sometimes with a leaf-like appendage up to 1 in. long resembling a bract or an extension of the stem; nut obpyriform, apex subtruncate, sessile, .06 in. long, pale- or dark-brown, minutely papillose, papillae often whitish

4. *polytrichoides*.

Glumes suborbicular or very broadly ovate, usually shortly apiculate, slightly concave, not keeled, pale-brown, 1.1—1.4 in. long. Root fibres slender; stems slender, rigid, striate, 3—16 in. high; leaves $\frac{1}{2}$ as long to a little longer, slender; spikelets ovoid, .2—32 in. long, solitary or 2—5 in a simple irregular umbel, 1 or 2 sessile at the forks, the others terminating rays up to 1 in. long; bracts 2, usually shorter than, but sometimes one exceeding the spikelet; nut suborbicular-obovoid, straw-coloured, smooth, .06—08 in. long, stalked.....5. *schoenoides*.

Style 3-fid; nut trigonous, obovoid, apex subtruncate, .05—06 in. long, black or dark-brown, minutely tubercled. Rhizome very short; stems slender, obtusely angled, glabrous or shortly laxly hairy, 3—18 in. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long; slender, usually channelled, shortly hairy; spikelets solitary, ovoid-ellipsoid, .3—6 in. long; bract 0, rarely 1 up to 1.2 in. long; glumes broadly oblong, obtuse, concave, .12—18 in. long, chestnut, not keeled.....6. *Kingii*.

Spikelets many, umbellate (rarely reduced to a few in depauperated specimens):—

Style 2-fid (rarely casually 3-fid); nut flattened:—

Spikelets solitary, the majority peduncled:—

Margins of glumes not white or hyaline:—

Spikelets globose or oblong-cylindric, echinate with the curved awns of the glumes, .25—4 in. long. Roots fibrous; stems slender, .5—6 in. high; leaves usually shorter, sometimes as long, filiform; umbels simple or compound, often dense; rays variable in number, up to 1 in. long; bracts several, filiform, often overtopping the umbel; glumes narrowly elliptic, pale with a green nerve excurrent as a long awn, .06—08 in. long; nut nearly cylindric, .02—03 in. long, brown, glabrous or with a few thick capitate hairs.....7. *dipsacea*.

Spikelets ellipsoid or ovate-oblong:—

Spikelets angled by the prominent keels of the glumes, narrowly ellipsoid, .15—3 in. long. Roots fibrous; stems 1—10 in. high; leaves shorter or as long, narrow, more or less pubescent; sheaths usually pubescent; umbels compound or decomposed, rays few to many, up to 1 in. long; bracts shorter or longer than the umbel, more or less pubescent; glumes ovate, reddish-brown, usually puberulous, 1—3-nerved, .06—07 in. long, the midrib forming a conspicuous green keel prolonged into a cusp, sometimes to a short, curved awn; nut broadly obovoid, pale- to dark-brown, smooth, more or less trabeculate, .025—03 in. long.....8. *bis-umbellata*.

Spikelets not angled:—

Glumes glabrous, broadly ovate, concave, keeled, apiculate, .1 in. long, reddish-brown. Rhizome short or 0; stems slightly swollen at base, striate or obscurely angled, up to 24 in. high; leaves usually shorter, sometimes longer, coriaceous, linear, flat, glabrous

or more or less densely pubescent; umbels usually decomposed, sometimes contracted; rays few, up to 1.5 in. long; bracts few, shorter or longer than the umbel; spikelets ovoid, acute, .2—3 in. long; nut broadly obovoid, pale-brown, trabeculate, .05 in. long

9. *dichotoma*.

Glumes more or less puberulous:—

Glumes ferruginous-brown, hoary-puberulous outside in the apical half, glabrous and usually paler in the basal half, broadly elliptic-ovate, apiculate, concave, .15—17 in. long, keel green. Rhizome 0 or very short; roots fibrous; stems subangular or slightly flattened, 8—30 in. high; leaves often 0, sometimes up to 6 in. long, narrow, margins scabrous; sheaths thin, glabrous or puberulous, mouth truncate, minutely ciliate; umbels usually simple of 5—10 rays up to 1 in. long; bracts 2—4, shorter or longer than the umbel, up to 4 in. long; spikelets ellipsoid, .35—5 in. long; nut broadly obovoid, umbonate, shortly stalked, smooth, pale-yellow, .06—07 in. long.....10. *ferruginea*.

Glumes brown-puberulous outside all over, ovate, apiculate, hardly keeled, boat-shaped, .08—09 in. long. Rhizome short or 0; roots fibrous; stems subangular or slightly compressed, 10—20 in. high; leaves shorter, up to 12 in. long, few, very narrow, margins smooth; sheaths glabrous, mouth oblique, glabrous or sparsely ciliate; umbels compound; primary rays 8—10, up to 2 in. long, partial rays fewer and shorter; bracts up to 2 in. long; spikelets narrowly ellipsoid, .25—35 in. long; nut broadly obovoid, apex rounded, apiculate, shortly stalked, fuscous-brown, minutely reticulate, .04 in. long.....11. *compressa*.

Margins of glumes broadly white or hyaline. Rhizome short or long; root fibres long; stems rigid, obtusely trigonous, swollen at the base, 2—18 in. high; leaves much shorter, rarely as long, crowded on the rootstock, rigid, narrow, flat or margins incurved, glabrous; umbels simple or compound, often contracted with clustered spikelets; rays up to 1.5 in. long; bracts short, erect, rigid; spikelets ellipsoid or ovoid, .15—25 in. long; glumes broadly ovate, obtuse, sometimes minutely apiculate, keeled, .06—08 in. long, brown; nut obovoid, apex rounded, .04 in. long, black, minutely tubercled.....12. *spathacea*.

Spikelets clustered, all sessile:—

Clusters of spikelets in a single head. Rhizome 0:—

Spikelets cylindrical, .17—27 in. long, .06—08 in. wide. Root fibres slender; stems numerous, slender, subtrigonous, 1—8 in. high; leaves usually shorter, very slender, glabrous, canaliculate; bracts 3—5, up to 3 in. long; glumes ovate, subacute, .05 in. long, brown or silvery-grey, keel green; nut orbicularly obovoid, .02 in. long, shortly stalked, pale, exterior cells obscure.....13. *argentea*.

Spikelets ovoid-ellipsoid, .18—2 in. long, .1 in. wide. Root fibres rather stout; stems few, compressed, 6—12 in. high; leaves half as long, narrow, flat; bracts 2, suddenly acute, up to 1 in. long; glumes lanceolate, subacute, boat-shaped, not keeled, .08 in. long, pale-brown or greyish; nut obovate, shortly stalked, .03—04 in. long, exterior cells transverse, conspicuous.....14. *albicans*.

Clusters of spikelets umbelled. Rhizome thick, woody, up to 6 in. long, sometimes branched; stems rigid, terete or slightly angled, glabrous or minutely white-silky, 1.5—8 in. high; leaves }—} as long, numerous, closely imbricating, coriaceous, ligulate, curved, appressed ashy- or brown-silky; umbels simple or compound, one cluster sessile and 2—5 with peduncles (rays) up to 1 in. long; bracts 2—3, silky, up to .75 in. long; spikelets ellipsoid-oblong, acute .2—25 in. long; glumes ovate, subacute, keeled, .13 in. long, ashy-silky; nut obovate, apex rounded, smooth, pale-brown, .06 in. long.....15. *sericea*.

Style 3-fid (rarely casually 2-fid); nut trigonous:—

Spikelets solitary, mostly peduncled:—

Rhizome present, often woody:—

Spikelets not contracted:—

Whole plant glabrous or nearly so (margins of leaves and ribs of rays scabrid in *21. complanata*):—

Margins of glumes hyaline or scarious:—

Leaves 0 or few, very slender, finely acuminate, longer or shorter than the stem. Rhizome small; root fibres slender; stems weak, angled, up to 30 in. high; umbel decomposed; rays many, slender, up to 3 in. long; bracts filiform, shorter than the umbel; spikelets very numerous, ellipsoid or ovoid, .15—2 in. long; glumes broadly ovate, .07 in. long, keeled, apiculate, pale-brown, margins hyaline; nut globose obovoid, .02—03 in. long, pale-brown, minutely tubercled, exterior cells transverse.....16. *quinquangularis*. Leaves several, ligulate, apex obtuse. Stems rigid; margins of glumes scarious, nut obovoid-elliptic, trabeculate

26. *junciformis* var. *abbreviata*.

Margins of glumes neither hyaline nor scarious:—

Stems not markedly flattened:—

Leaves ligulate, flat; spikelets over .25 in. long:—

Spikelets ovoid, sometimes compressed with distichous glumes, .25—.55 in. long, .13—.16 in. wide. Rhizome short, woody; stem slender, angular, up to 24 in. long; leaves usually much shorter, numerous, narrowly ligulate, tip rounded or suddenly acute; umbel simple or compound; rays 3—6, 5—2 in. long, bearing comparatively few spikelets; bracts very short, rigid, usually erect; glumes broadly triangular-ovate when unfolded, coriaceous, cuspidate, .13—.16 in. long, keel slender, very dark-brown, shining; nut broadly obovoid, .04 in. long, pale-brown, minutely tubercled.....17. *nigrobrunnea*.

Spikelets narrowly lanceolate, terete, .75—1 in. long, .15—.2 in. wide. Rootstock short; stems slender, angled, up to 24 in. high; leaves much shorter, several, narrowly ligulate, rigid, tip rounded; umbels simple or compound; rays 3—5, rigid, up to 2 in. long, each with 1—3 spikelets; bracts 2—3, shorter than the spikelets; glumes ovate, boat-shaped, .2—2.5 in. long, rigid, cuspidate, reddish-brown, the slender keel paler, nut broadly obcordate, .05 in. long, apiculate, faces concave, angles rounded, greyish-brown, subtubercled.....18. *insignis*.

Leaves filiform, numerous, $\frac{1}{2}$ — $\frac{1}{3}$, the length of the stems. Rhizome short, woody; stems slender, obtusely angled, up to 2 ft. high; umbels decomposed; primary rays 3—10, very slender, up to 2 in. long; spikelets narrowly oblong or linear-lanceolate, .2—2.5 in. long; glumes lanceolate, acuminate, cinnamon-brown, margins paler, glandular, .14 in. long; nut narrowly oblong-obovoid, greyish-brown, .03—.04 in. long, minutely stalked.

19. *cyperoides*, var. *cinnamometorum*.

Stems distinctly flattened near the umbel, usually 2-edged, 8—36 in. long. Rhizome short, woody, sometimes absent; root fibres wiry; leaves crowded at the base, flat, linear, suddenly narrowed, obtuse or subacute, margins scaberulous near the apex, usually much shorter than the stem, sometimes nearly as long; umbels decomposed, effuse; bracts 2—4, usually shorter than the inflorescence, sometimes as long; rays 5—10, usually flattened, up to 6 in. long, corymbosely branched; spikelets many, ovoid or narrowly oblong, .15—.3 in. long; glumes ovate, complicate, brown, keel strong, produced into a distinct mucro, .08—.1 in. long; nut obovoid, .02—03 in. long, pale straw-coloured or whitish, minutely tubercled.....20. *complanata*.

Leaf-sheaths and stems more or less hairy; bracts and bracteoles hoary-pubescent. Rhizome short, creeping; stems thickened at the base, 5-angled, usually deeply grooved, 10 in.—5 ft. high; leaves 0; sheaths 3—4, lax, lowest short, coriaceous, upper membranous, longer, uppermost up to 6 in. long, limb short scarious; umbels compound; bracts short, ovate, caudate; rays 3—10, up to 1.5 in. long; partial rays fewer and shorter; spikelets elliptic, nearly terete, .14—.25 in. long; glumes broadly ovate, concave, keel usually produced into a short cusp,

chestnut-brown, margins narrowly hyaline, .1—·15 in. long; nut globosely obovoid, apiculate, stalked, very pale to pale-brown, trabeculate, .05 in. long.....21. *pentaptera*. Spikelets contorted, narrowly cylindrical, .2—·5 in. long. Rhizome stout, woody; stems solitary or twin, rigid, terete, striate or shallowly ribbed, up to 25 in. high; leaves usually much shorter, sometimes as long, numerous, flat, up to .17 in. wide, margins scabrid near the suddenly acute apex; umbels decomposed; bracts 4—5, shorter than the inflorescence, margins scabrid; primary rays 6—8, terete or somewhat compressed, up to 3.5 in. long, partial rays fewer and shorter; glumes broadly ovate when expanded, .1 in. long, subacute, keeled, pale reddish-brown, margins hyaline; nut narrowly obovate, .04 in. long, shortly stalked, pale-brown, exterior cells transversely oblong.....22. *contorta*.

Rhizome absent (unknown in 23. *Arnottiana*):—

Glumes obtuse:—

Spikelets broadly ellipsoid, .2 in. long, .1—·12 in. wide. Rootstock and leaves unknown; stem sharply 5-angled, glabrous, up to 14 in. or more long; umbel decomposed; bracts 3—4, very narrow, up to .6 in. long, margins scabrid; primary rays 7—8, up to 1.3 in. long, partial ones fewer and shorter; glumes broadly ovate, concave, sometimes apiculate, hardly keeled, chestnut, .08—·09 in. long; nut narrowly obovate, minutely apiculate, shortly stalked, .04 in. long, pale-brown, transversely lineolate, faintly tubercled.....23. *Arnottiana*. Spikelets subglobose, .09—·11 in. long. Root fibres slender; stems weak, 4—5-angled upwards, 2—20 in. high; leaves shorter or longer, narrow, acuminate; umbel decomposed; bracts 2—3, filiform from a broad base, much shorter than the inflorescence; primary rays 4-many, slender, somewhat compressed, up to 2 in. long, partial ones fewer and shorter; glumes broadly ovate, concave, keeled, .05 in. long, brown or pale-chestnut; nut narrowly obovate, sharply or obtusely 3-angled, minutely tubercled, yellowish-brown, .02 in. long

24. *miliacea*.

Glumes acute, ovate-lanceolate, keel shortly excurrent and strongly incurved at the base, glandular-puberulous or glabrous, .08—·1 in. long, brown or yellowish brown, margins scarious. Roots fibrous; stems tufted, 4—5-angled, angles smooth or scabrid, 4—14 in. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, rarely as long, almost filiform; umbels simple or subcompound; bracts 2—3, short, setiform; rays 2—4, up to 1 in. long, bearing 1—3 spikelets; spikelets ellipsoid or oblong-ellipsoid, .15—·25 in. long; nut globosely obovoid, .03 in. long, greyish-white, tubercled.....25. *tenera*.

Spikelets clustered, all sessile:—

Umbels decomposed:—

Leaves many, much shorter than the stem, nearly filiform (broader and ligulate in var. *latifolia*), not exceeding .15 in. wide at the base; sheaths short, open. Rhizome woody, short or creeping; stems 4—5-angled or slightly compressed, smooth, 4—18 in. high; bracts 2—4, much shorter than the inflorescence, rigid, erect; primary rays 3—6, up to 2 in. long; spikelets in clusters of 3—6 (solitary in var. *abbreviata*), narrowly oblong or ovoid, .16—·25 in. long; glumes ovate, shortly mucronate, keel slender, pale- or fuscous-brown, margins scarious, .08—·1 in. long; nut obovoid, brown or pale, .05 in. long, minutely tubercular.....26. *junciformis*. Leaves 0 or several, as long as the stem, narrowly ligulate, .3—·5 in. wide at the base; sheaths coriaceous, closed, the uppermost up to 6 in. long. Rootstock unknown; stem swollen at the base, 5-angled, angles scabrid, up to 2 ft. high; bracts lanceolate, caudate, margins setulose-scabrid, much shorter than the inflorescence; primary rays about 8, ribbed, ribs scabrid, up to 2 in. long; spikelets numerous, ellipsoid, .2 in. long; glumes broadly ovate when expanded, .14 in. long, strongly keeled, shortly cuspidate, reddish-brown, margins paler; nut obovoid-elliptic, pale-brown, .05 in. long, trabeculate.....27. *aggregata*.

Umbels simple:—

Glumes ovate, apical half glandular, keel or the whole glume often puberulous, minutely mucronate, dark, margins membranous and paler.

Rhizome oblique; stems slender, obscurely 4—5-angled, up to 15 in. long; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, very narrow, usually deeply channelled, margins minutely scabrid near the apex; bracts 3, the lowest sometimes longer than the inflorescence, spinulose-scabrid; the apex often puberulous; rays 5—7, up to 1 in. long; spikelets in clusters of 2—7, sometimes solitary, ovate or ellipsoid, .15—4 in. long, style sometimes 4-fid; nut minute, depressed-obovoid, dark, trabeculate...28. *paupercula*. Glumes ovate, glabrous, keel shortly produced as a mucro, .12—15 in. long, dark chestnut, margins narrowly scarious and pale. Rhizome short, woody; stems slender, obscurely angled, 1.5—12 in. long; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, subsetaceous, rigid; umbels sometimes contracted into a single head; bracts 1—3, setaceous from a broad base, usually very short, sometimes up to 1.5 in. long; spikelets 2—7 together, very rarely solitary, sessile or with peduncles up to .5 in. long, ellipsoid-oblong, .2—33 in. long; nut obovoid, minutely stalked, pale, smooth, .05 in. long

29. *uliginosa*.

Glumes distichous:—

Glumes broad, strongly cuspidate:—

Spikelets solitary, sometimes 2—3, broadly ovate, usually much compressed, sometimes slightly contorted, .2—5 in. long, .17—25 in. wide. Rhizome small; stems tufted, very slender, angled, 2—18 in. high; leaves usually $\frac{1}{2}$, sometimes as long or longer, filiform, channelled, smooth; sheaths membranous; bract 0 or 1, erect, shorter than the spikelet or as long; glumes coriaceous, very broadly ovate, strongly keeled, acute, smooth, .15—2 in. long, pale straw-coloured, shining, the empty basal glumes often aristate; nut pear-shaped with a distinct stalk, .08—1 in. long, densely tubercled, the tubercles often showing through the glume.....30. *monostachya*.

Spikelets 2—5 in a simple umbel, rarely solitary, ovate or oblong-lanceolate, .5—1 in. long, .15—33 in. wide, somewhat compressed, sometimes slightly contorted. Rhizome short, woody; stems rigid, obscurely angled, 9—30 in. high; leaves $\frac{1}{2}$ as long, narrow, rigidly pointed, concave, margins spinulose-scabrid towards the base; sheaths coriaceous; rays 1—4, up to 2.5 in. long; bracts 1—2, erect, rigid, up to 1 in. long, margins usually scabrid; glumes coriaceous, broadly ovate, strongly keeled, smooth, .25—32 in. long, pale-brown or yellowish; nut subglobose obovoid with a long stalk, 3-ribbed, dark-brown, .1—13 in. long, minutely tuberculate.....31. *tristachya*.

Glumes broadly triangular when unfolded, subacute, weakly keeled, not cuspidate, glabrous or the keel minutely scabrid, .08—12 in. long, pale-brown, margins paler, the upper ones sometimes more or less spirally arranged. Rhizome 0; roots fibrous; stems tufted, slender, obtusely quadrangular, 4—8 in. high; leaves very narrowly ensiform, 1.75—4 in. long; rays 1—4, up to 1.2 in. long, capillary; bracts 1 to each ray, up to .25 in. long; spikelets lanceolate, .2—35 in. long; nut obpyramidal, truncate, .025—04 in. long, very pale-brown, white-tubercled.....32. *Narayani*.

1. FIMBRISTYLIS TETRAGONA, R. Br.; F. B. I. vi. 631.
Mysore; Malabar; Coimbatore; Nilgiri Hills; Kambakkam Hills; sea-level to 3,000 ft.
2. FIMBRISTYLIS ACUMINATA, Vahl; F. B. I. vi. 631.
Mysore; S. Kanara; Travancore; sea-level to 3,500 ft.
3. FIMBRISTYLIS NUTANS, Vahl; F. B. I. vi. 632.
Kambakkam Hills at 200 ft. (Fischer).
4. FIMBRISTYLIS POLYTRICHOIDES, R. Br.; F. B. I. vi. 632.
E. Coast from Godavary District southwards; near the sea.
5. FIMBRISTYLIS SCHOENOIDES, Vahl; F. B. I. vi. 634.
Mysore; Cuddapah Hills; Carnatic; Courtallam; near sea-level to 3,500 ft. Vern. Kan. Kadu Gundu Hullu.
6. FIMBRISTYLIS KINGII, C. B. Clarke; F. B. I. vi. 633. *F. trabeculata*, C. B. Clarke; F. B. I. vi. 633.

Nilgiri and Pulney Hills, 6,000 ft. upwards; Attapadi Valley at 5,300 ft. (Fischer).

7. FIMBRISTYLIS DIPSACEA, Benth.; F. B. I. vi. 635.
S. Kanara; Mysore; Carnatic; Quilon.
8. FIMBRISTYLIS BIS-UMBELLATA, Bub. *F. dichotoma*, auc. non Vahl; F. B. I. vi. 635. *F. aestivalis*, Vahl; F. B. I. vi. 637.
In all Districts, especially in rice-fields; near sea-level to 4,000 ft. Vern. Tam. Kadu korai; Kan. Kadu Sabbasigai Hullu, Niru Sabbasigai Hullu.
Var. *hirtistyla*, Fischer, var. nov. The base of style furnished with villous hairs resembling those of *F. squarrosa*, Vahl.
Mysore; Pulney and Tinnevelly Hills.
9. FIMBRISTYLIS DICHOTOMA, Vahl. *F. annua*, Roem. & Sch. var. *diphylla*, Kükenthal. *F. diphylla*, Vahl; F. B. I. vi. 636.
In all Districts; sea-level to 6,000 ft.
10. FIMBRISTYLIS FERRUGINEA, Vahl; F. B. I. vi. 638,
In all Districts, usually in the drier tracts, but also in Malabar and at Quilon; sea-level to 6,000 ft.
11. FIMBRISTYLIS COMPRESSA, Boeck.; F. B. I. vi. 639.
Madras Peninsula (Wight, Roxburgh).
12. FIMBRISTYLIS SPATHACEA, Roth.; F. B. I. vi. 640.
Near the sea on both coasts; Kowdalli in N. Coimbatore (Jacob).
13. FIMBRISTYLIS ARGENTEA, Vahl; F. B. I. vi. 640.
Mysore; Cuddapah; Chittoor; Nilgiris; Malabar; Travancore; Tinnevelly; usually at low elevations up to 4,000 ft.; sometimes growing in clefts of rocks. Vern. Kan. Bettada Vusamani Hullu.
14. FIMBRISTYLIS ALBICANS, Nees; F. B. I. vi. 641.
Deccan (Wight).
15. FIMBRISTYLIS SERICEA, R. Br.; F. B. I. vi. 641.
Ganjam in coastal sands (Lawson, Gamble).
16. FIMBRISTYLIS QUINQUANGULARIS, Kunth; F. B. I. vi. 644.
Rampa District (Narayanswami); Mysore; Carnatic.
Var. *crassa*, C. B. Clarke; F. B. I. vi. 644. Much more robust; rhizome woody; stems rigid, sharply angled; leaves 0; sheaths long. Nilgiri, Anamalai and Pulney Hills at 6,000 ft.; Mysore at 3,000 ft. (Meebold).
17. FIMBRISTYLIS NIGROBRUNNEA, Thw.; F. B. I. vi. 648.
Nilgiri, Anamalai, Pulney and Tinnevelly Hills.
18. FIMBRISTYLIS INSIGNIS, Thw.; F. B. I. vi. 645.
Anamalai Hills (Beddome).
19. FIMBRISTYLIS CYPEROIDES, R. Br., var. CINNAMOMETORUM, C. B. Clarke; F. B. I. vi. 650.
Cuddapah (Gamble); Carnatic; Anamalai Hills (Beddome); S. Kanara (Hohenacker); Pulney, Travancore and Tinnevelly Hills; near sea-level to 3,000 ft.
20. FIMBRISTYLIS COMPLANATA, Link; F. B. I. vi. 646.
In all Districts; sea-level to 3,000 ft.

21. *FIMBRISTYLIS PENTAPTERA*, Kunth ; F. B. I. vi. 645.
Pulney Hills (Saulière); High Wavy Mountains (Blatter & Hallberg, Jacob).
22. *FIMBRISTYLIS CONTORTA*, Fischer in Kew Bull. 1931, p. 45.
Courtallam.
23. *FIMBRISTYLIS ARNOTTIANA*, Boeck. ; F. B. I. vi. 643.
Cannanore.
24. *FIMBRISTYLIS MILIACEA*, Vahl ; F. B. I. vi. 644.
In all Districts ; sea-level to 5,000 ft.
25. *FIMBRISTYLIS TENERA*, Roem. & Sch. ; F. B. I. vi. 642. *F. monticola*, Steud ; F. B. I. vi. 642.
S. Kanara ; Mysore ; Bellary ; Chingleput ; Nilgiri and Anamalai (Beddome) Hills ; Travancore.
26. *FIMBRISTYLIS JUNCIFORMIS*, Kunth ; F. B. I. vi. 647.
Vizagapatam ; Cuddapah ; Chingleput ; N. Coimbatore ; Nilgiris ; near sea-level to 3,000 ft.
Var. *latifolia*, C. B. Clarke ; F. B. I. vi. 648.
Leaves broader, flat or slightly concave, curved and twisted ; sometimes some of the spikelets solitary.
Dekkan.
Var. *abbreviata*, C. B. Clarke ; F. B. I. vi. 648.
Leaves narrow, flat ; spikelets mostly solitary, a few sometimes paired.
Anamalai Hills (Beddome) ; Travancore (Bourdillon) ; Courtallam (Jacob).
27. *FIMBRISTYLIS AGGREGATA*, Fischer in Kew Bull. 1931, p. 44.
Anamalai Hills (Beddome).
28. *FIMBRISTYLIS PAUPERCUA*, Boeck. ; F. B. I. vi. 647.
Nilgiri, Pulney, High Wavy and Tinnevelly Mountains.
29. *FIMBRISTYLIS ULIGINOSA*, Steud. ; F. B. I. vi. 648.
Nilgiri and Pulney Hills ; 6,000—7,000 ft.
30. *FIMBRISTYLIS MONOSTACHYA*, Hassk. ; F. B. I. vi. 649.
In all Districts except the wettest ; sea-level to 4,000 ft.
31. *FIMBRISTYLIS TRISTACHYA*, Thw. ; F. B. I. vi. 649.
Nellore and Chingleput Districts.
32. *FIMBRISTYLIS NARAYANII*, Fischer in Kew Bull. 1931, p. 46.
Travancore ; Courtallam.

9. *Bulbostylis*, Kunth.

Annual herbs ; rhizome short or 0. *Stems* tufted, leafy only at the base. *Leaves* very narrow, rarely absent ; sheaths usually finely hairy. *Spikelets* of few to many flowers, flattened in umbelled or congested corymbs, sometimes reduced to a solitary one. *Glumes* imbricate on all sides, 1—2 lowest empty, the uppermost few tabescent, the intermediate 2-sexual. *Hypogynous bristles* 0. *Stamens* 1—3, usually 2. *Style* 3-fid, deciduous, as long as the nut, with a small bull-biform base which remains as a minute button on the apex of the nut when the style falls off. *Nut* obovoid, 3-gonous, smooth, hardly stalked.

Spikelets few to many in dense, terminal, globose heads:—

Stems slender, striate, 2—12 in. high; leaves half as long or a little more, glabrous or hispid-puberulous, sheaths pilose; bracts 3, shorter than the head or up to 2 in. long; spikelets linear-oblong, 1—3 in. long; glumes laterally compressed, lanceolate to cymbiform, .06—16 in. long, nearly glabrous, or more or less densely puberulous or minutely hispid, keel strong, straight or sigmoidally curved, mucous, apiculate or produced into a straight or curved awn up to half its length, margins usually hyaline; nut broadly obovoid, obtusely trigonous, smooth, straw-coloured, .025—03 in. long.....1. *barbata*. Stem thick, rigid, curved, often twisted, shallowly grooved, 1—3 in. long; leaves $\frac{1}{2}$ — $\frac{1}{3}$ as long, rigid, channelled, hispid-puberulous; bracts 3, up to .5 in. long; glumes rigid, hispid-puberulous. *Other characters as in the last species*

2. *subspinescens*.

Spikelets umbelled, rarely reduced to a single spikelet:—

Umbel lax, simple or compound, spikelets nearly all solitary and distant. Stems very slender, glabrous, 1—12 in. high; leaves usually shorter, capillary, apex pungent, glabrous, sheaths slenderly hairy at least near the mouth; bracts lanceolate, cuspidate or caudate, short, one sometimes up to .5 in. long; spikelets ellipsoid, .15—27 in long; glumes compressed, ovate-cymbiform, glabrous, dark-brown, .075 in. long, keel conspicuous, green, mucous or excurrent; nut obovoid, trigonous, .03—04 in. long, smooth, pale-straw coloured or fuscous

3. *capillaris* var. *trifida*.

Umbel usually congested, sometimes lax, spikelets usually closely packed. Stems slender, glabrous or puberulous towards the top, up to 15 in. high; leaves usually less than $\frac{1}{2}$ as long, slender, acuminate, usually puberulous, sheaths finely hairy at least at the mouth; bracts lanceolate, cuspidate, short; spikelets lanceolate, .15—2 in. long; glumes compressed, broadly cymbiform, brown, puberulous, .075 in. long, keel greenish, apiculate; nut broadly obovoid, sharply trigonous, .03—04 in. long, pale-straw coloured, transversely wrinkled.....4. *puberula*.

1. *BULBOSTYLIS BARBATA*, Kunth; F. B. I. vi. 651.

In all Districts; from sea-level to 4,000 ft. Vern. *Tam. Mukkutikorei*; *Kan. Chavuri Hullu*.

Sometimes the whole plant turns reddish in drying.

2. *BULBOSTYLIS SUBSPINESCENS*, C. B. Clarke; F. B. I. vi. 652.

Waltair (Proudlock).

3. *BULBOSTYLIS CAPILLARIS*, Kunth, var. *TRIFIDA*, C. B. Clarke; F. B. I. vi. 652.

Bahabudan, Nilgiri, Pulney and Travancore Hills; 6,000 ft. and upwards.

4. *BULBOSTYLIS PUBERULA*, Kunth; F. B. I. vi. 652.

Near the coasts.

Var. *gracilis*, Fischer. Stems very slender, puberulous; leaves sometimes longer than the stems; 2 of the bracts like the leaves, up to 3 in. long; umbels sometimes lax.

Mundanthorai (Barber); Travancore (Bourdillon); loc. ? (Wight).

10. *Scirpus*, Linn.

Herbs; quite glabrous or the inflorescence slightly hairy. *Rhizome* 0 or creeping. *Leaves* narrow, arising from the base of the stem or from up to $\frac{1}{3}$ of its height, in submerged species from all along the stem, sometimes altogether absent. *Inflorescence* terminal or lateral of 1 to very many spikelets in clusters or umbels or corymbs. *Spikelets* usually many-flowered. *Glumes* spirally imbricate, rarely subdistichous below, 1—3 lowest empty, uppermost few tabescent, the intermediate

1—many with hermaphrodite flowers. *Hypogynous bristles* 0—7 (rarely 8 or 9), usually linear, sometimes broad, retrorsely scabrid, rarely plumose. *Stamens* 1—3, anterior. *Style* 2—3-fid, glabrous, base linear or conic and continuous with the nut. *Nut* sessile or nearly so, obovoid or oblong, trigonous with 3, biconvex with 2 stigmas, apex obtuse or acute, without apical button.

Leaves arising from $\frac{1}{4}$ the height of the stem or higher:—

Stems flaccid, slender, 1.5—12 in. long; leaves filiform, usually numerous, often clothing most of the stem, .5—2.2 in. long; bracts 0; spikelets solitary, terminal, ovate, .15—2 in. long; glumes ovate, concave, obtuse, purplish-brown, midrib and margins green, .08—0.9 in. long; bristles 0; style 2-fid; nut obovoid, biconvex, apiculate, almost stalked, .05 in. long, pale, smooth.....1. *fluitans*.
Stems rigid, erect, trigonous; spikelets 2—many (rarely single) in umbels or corymbs; style 3-fid; nut obovoid, trigonous:—

Glumes broadly ovate, membranous, apex bifid, keel strong and produced into a straight or recurved awn, glabrous or puberulous, brown or golden-brown, .15—25 in. long, awn .05—1 in. long. Rhizome creeping, bearing tubers; stem moderately strong, 1—6 ft. high; leaves often as long, coriaceous, .15—2 in. wide (wider in tall plants); bracts 3—5 up to 6 in. long; spikelets usually many in a simple or compound umbel, clustered, sometimes reduced to a single spikelet, ovoid or cylindrical, .4—1.7 in. long; bristles 3—6, usually shorter than the nut; nut acute, dark olive-brown, smooth, shining, .07—1.2 in. long

2. *maritimus*.

Glumes ovate-oblong, chartaceous, apex entire, obtuse, apiculate, not awned, strongly keeled, dark-brown, glabrous or puberulous, .1—1.4 in. long. Rootstock stout, sometimes stoloniferous; stem stout, spongy below, sharply trigonous or 3-winged above, 4—10 ft. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, up to 1 in. wide; bracts 3, up to 40 in. long and .5 in. wide; spikelets in large, compound corymbs, solitary on slender, scabrid peduncles, ovoid, .15—3 in. long; bristles 5—6, sparsely retrorsely hispid, shorter or longer than the nut; nut .7 in. long with a conical apex, brown, smooth.....3. *grossus*.

Leaves radical or reduced to sheaths:—

Spikelets solitary or in simple clusters (1—2 rays sometimes added in 4, *supinus*):—

Spikelets lateral on the stem:—

Glumes not awned; bracts 0:—

Spikelets clustered; leaves reduced to sheaths:—

Inflorescence borne above the middle of the stem:—

Stems slender, terete:—

Glumes ovate-cymbiform, acute, strongly keeled, usually shortly mucronate, green, margins usually pale-brown, .08—1 in. long. Stems 3—18 in. high; sheaths sometimes with a very short, erect blade; spikelets 3—12 in sessile clusters, sometimes 1—2 rays added, borne well below the apex of the stem; bristles 0; style 3-fid; nut globose obovoid, trigonous, .04—0.5 in. long, black, transversely undulate-rugose.....4. *supinus*.

Glumes suborbicular-ovate, acute, keel not prominent, sometimes shortly mucronate, pale-brown, .12—1.4 in. long. Stems flaccid or rigid, 8—33 in. high; sheaths with an oblique, usually shortly cuspidate mouth; spikelets sessile, 2—5 (rarely solitary), in a cluster borne well below the apex of the stem; bristles 5—6, retrorsely hispid, shorter or longer than the nut; style 2-fid; nut broadly obovoid or subcircular, biconvex, apiculate, slightly narrowed at the base, brown or nearly black, .09—1 in. long, faintly transversely lineolate.....5. *erectus*.

Stems robust, sharply triquetrous or almost 3-winged, 1—6.5 ft. high. Rootstock short with fibrous rootlets or with a stout horizontal rhizome up to 6 in. long; sheaths with oblique rounded mouth; spikelets few to many in a cluster .5—2 in. below the acute apex of the stem, ovate or subcylindrical, .4—9 in. long; glumes broadly ovate, acute, often apiculate, keel inconspicuous, .14—1.8 in. long, pale- to reddish-

brown; bristles 5—8, retrorsely hispid, longer or shorter than the nut; style 3-fid, puberulous; nut broadly obovate, apiculate, biconvex, plano-convex or subtrigonus, dark olive-brown, faintly transversely striate and finely vertically lineolate, .08 in. long.....6. *mucronatus*.

Inflorescence below the middle of the terete, transversely septate stem, septae visible externally; bristles 0; style 3-fid:—

Stems usually robust, spongy, .5—5 ft. high, over .1 in. diam., usually much more; sheaths lax, mouth oblique and often open; spikelets sessile, few to many in a dense lateral head often arising some distance above the mouth of the sheath, ovoid to cylindrical-oblong, .2—75 in. long; glumes broadly ovate, very concave, narrowed, apex acute or subacute, often apiculate, hardly keeled, .17—23 in. long; nut broadly or narrowly obovate, sharply trigonus, apex shortly conical and apiculate, 2 or all 3 sides concave, black, smooth or with 16—20 more or less pronounced transverse wavy lines, .07—09 in. long

7. *articulatus*.

Stems slender, 3—12 in. high, .06 in. diam. or less; sheaths close, mouth oblique; spikelets sessile, few to many in a dense lateral head arising immediately above the mouth of the sheath, ovoid, .15—25 in. long; glumes suborbicular, slightly concave, not keeled, apex rounded, sometimes minutely apiculate, .1—12 in. long and slightly wider, pale-brown; nut obovoid, apex not narrowed, apiculate, obtusely trigonus with a vertical ridge along each angle, sides convex with 8—10 strong transverse undulate ridges, black, .05 in. long...8. *Jacobi*.

Spikelets solitary, at right angles to the stem and near its apex, oblong, .06—09 in. long. Stems capillary, 1—6 in. high; leaves few, capillary .25—1 in. long; glumes obovate rhomboid, obtuse, densely imbricate, .025 in. long, reddish brown; bristles 0, replaced by 1—2 obovate, hyaline scales as long as the nut; stamen 1; style very shortly 2 fid; nut very narrowly obovoid, biconvex, fuscous, minutely muricate, slightly shorter than the glume.....9. *Isolepis*.

Glumes obovate-rhomboid, .025 in. long, acute, produced into a curved awn longer than itself, reddish-brown, awn brown. Stems filiform, 1—10 in. high; leaves shorter, filiform; bracts 0 or solitary, filiform, up to .5 in. long; spikelets 2—7 (sometimes 1) sessile, in a lateral head .5—2 in. below the apex of the stem, subglobose or ovate, .1—2 in. long; bristles 0; style, minute, 3-fid; nut narrowly obovoid-oblong, trigonus, .02 in. long, brown to black.....10. *squarrosus*.

Spikelets terminal, sessile, 2—6 in a cluster, rarely solitary, narrowly lanceolate, .3—5 in. long. Rhizome short, woody; stem rigid, terete, 4—32 in. high; leaves reduced to short sheaths, mouth oblique with a short cusp or sometimes a blade up to 1 in. long; bract 1, lanceolate, shorter than the spikelets; glumes narrowly ovate, acute, keeled, .18—23 in. long, pale-brown; bristles 5—6, brown, smooth, much longer than the nut; style 3-fid, puberulous; nut narrowly ellipsoid, narrowed at both ends, base of style falling late, sharply trigonus, smooth, brown, .07 in. long.....11. *subcapitatus*.

Spikelets corymbose; umbel lateral; bracts 0:—

Spikelets sessile, 3—many clustered at the ends of the rays, ellipsoid, .2—35 in. long. Rhizome horizontal, 2—4 in. long; stems stout, terete, 2—6 ft. high; leaves reduced to sheaths with a very oblique, cuspidate mouth; rays 3—14, sometimes a few again umbelled, flat, margins smooth, 0—3 in. long; glumes ovate, acute, .15—18 in. long, pale- or rusty-brown, acute, keel strong, produced into a mucro; bristles 0; style 3-fid; nut narrowly obovate, trigonus, apex narrowed, yellow, smooth, .08 in. long.....12. *corymbosus*.

Spikelets seldom, sessile, solitary, oblong-cylindric, .4—7 in. long. Stem stout, trigonus upwards, 2—6 ft. high; leaves grass-like and up to 24 in. long or reduced to sheaths; rays 4—12, some again umbelled, 0—3 in. long, flat, margins scabrid; glumes elliptic-oblong, .12 in. long, apex notched, keel produced into a cusp, red-brown, margins scarious; bristles 2—7, longer than the nut, red-brown, terete or flat, plumose; style 2-fid; nut obovate, bi- or plano-convex, apiculate, dark brown, smooth, .08 in. long.....13. *litoralis*.

1. *SCIRPUS FLUITANS*, Linn. ; F. B. I. vi. 653.
Nilgiri and Pulney Hills ; 6,500—8,000 ft.
2. *SCIRPUS MARITIMUS*, Linn. ; F. B. I. vi. 658.
Mysore, Nellore. Usually near water.
Var. *affinis*, C. B. Clarke ; F. B. I. vi. 659. Spikelets 1, or 2—5 clustered in a head, ovoid-lanceolate, 5—7 in. long ; glumes pale straw-coloured with paler margins, 27 in. long.
Malabar
3. *SCIRPUS CROSSUS*, Linn. ; F. B. I. vi. 659.
Carnatic. In still or running water.
4. *SCIRPUS SUPINUS*, Linn. ; F. B. I. vi. 655.
In all Districts ; sea-level to 4,000 ft. Often in rice-fields.
5. *SCIRPUS ERECTUS*, Poir. ; F. B. I. vi. 656
Nilgiri and Pulney Hills ; N. Coimbatore ; N. Arcot ; up to 6,500 ft.
6. *SCIRPUS MUCRONATUS*, Linn. ; F. B. I. vi. 657.
W. Ghâts from Mysore to Travancore ; 3,000—8,000 ft. Vern. *Kan.* Hommagali Hullu.
7. *SCIRPUS ARTICULATUS*, Linn. ; F. B. I. vi. 656.
In most Districts, especially near the coast ; Mysore ; sea-level to 3,000 ft. In tanks and marshy places.
8. *SCIRPUS JACOBI*, Fischer in Kew Bull. 1931, 103.
Nellore District at Gudur (Jacob) ; "Pulicat Hills" ? Kambakkam (Heyne) ; Coimbatore District at Virumandampalayam, 700 ft. (Fischer). Often growing with the last species and confused with it.
9. *SCIRPUS ISOLEPIS*, Boeck. ; F. B. I. vi. 663.
Mysore (Cameron). Vern. *Kan.* Sanna Gundu Hullu.
10. *SCIRPUS SQUARROSUS*, Linn. ; F. B. I. vi. 663.
In all Districts from Mysore southwards ; sea-level to 2,000 ft. Vern. *Kan.* Kadu Vusamani Hullu.
11. *SCIRPUS SUBCAPITATUS*, Thw. ; F. B. I. vi. 661.
Nilgiri and Pulney Hills ; 6,000—8,000 ft.
12. *SCIRPUS CORYMBOSUS*, Heyne ; F. B. I. vi. 657.
Mysore (Meebold) ; 2,000—3,000 ft.
13. *SCIRPUS LITORALIS*, Schrad. ; F. B. I. vi. 659.
Cuddapah, Kurnool and Chingleput Districts ; Travancore ; sea-level to 2,000 ft.

11. *Fuirena*, Rottb.

Herbs, usually erect with creeping rhizome or fibrous roots. *Stem* leafy to above the middle or to the top. *Leaves* grass-like with an annular membrane at the mouth of the sheath. *Spikelets* in dense terminal and axillary clusters, many-flowered. *Glumes* spirally imbricate, strongly awned from the back a little below the apex, setose or puberulous at least in the upper half of the back, lowest 1—2 empty, uppermost few tabescent, intermediate bisexual, falling off gradually from the base upwards from the persistent rhachilla. *Hypogynous bristles* 2-seriate, rarely 1-seriate, sometimes 0 ; the 3 outer opposite the angles of the nut, usually short, linear, the 3 inner opposite the faces of the nut, linear, quadrate, obovate or partite, clawed, usually strongly

3-ribbed. *Stamens* 2—3. *Style* as long as or longer than the nut and continuous with it; *stigmas* 3, linear, usually long and puberulous. *Nut* ovoid or obovoid, trigonous, apex acute or conical, base more or less stipitate, exterior cells sometimes trabeculate.

Glumes 3-ribbed, not rigid, flat or slightly concave:—

Bristles all setiform or 0; leaves strongly 1-ribbed:—

Nut obovate, bluntly trigonous, .06 in. long, apex pyramidal, testa parchment-like, white, smooth, slightly creased, exterior cells minute, hexagonal. Rhizome short; stem triangular, more or less densely white-pubescent at the apex, up to 3.5 ft. high; leaves rigid, narrowly linear-lanceolate, acuminate, 1.5—8.5 in. long, margins recurved and scabrid, glabrous or more or less pubescent, especially the uppermost one; rhachis of inflorescence white-pilose, bracts linear-lanceolate, white-pilose, up to 1.5 in. long; spikelets sessile, 2—10 in corymbose clusters, ellipsoid, .3—5 in. long; glumes broadly elliptic-oblong, slightly concave, .13—17 in. long, .08—1 in. wide, awn .07—1.5 in. long, dorsal surface and awn grey hispid or puberulous, when dry pale-brown or fuscous with reddish streaks in the lower $\frac{1}{2}$, apex and awn green, bristles 0

1. *pubescens* var. *pergamentacea*.

Nut broadly obovate or suborbicular, sharply trigonous, .05 in. long, apex conical, shortly stalked, straw-coloured, the angles often dark and erose, faces with 3—5 slender vertical lines, the exterior cells transversely oblong and trabeculate. Rhizome often long, woody; stems up to 5 ft. high, sharply trigonous, slightly pubescent near the apex; leaves and spikelets as in the last species; rhachis of inflorescence glabrous or puberulous; glumes oblong, .1—14 in. long, .06—08 in. wide, awn .06 in. long, dorsal surface and awn grey-puberulous, when dry fuscous or reddish in the lower $\frac{1}{2}$, apex and awn greenish; bristles 0, 3 or 6; when 6, 3 outer very short, 3 inner shorter or longer than the nut, hispid.....

2. *Wallichiana*.

Bristles 3 or 6, the 3 inner broad and flat; leaves 3—5-ribbed:—

Rhizome 0; stems slender, up to 16 in. high, striate glabrous below, patently hairy above; leaves linear-lanceolate, acuminate, 1—5 in. long, up to .3 in. wide, usually patently hairy as are the sheaths; spikelets ovoid or oblong, .2—4 in. long; glumes obovate or oblong, rounded, .06—1 in. long, awn .05—06 in. long, the upper half on the back and the awn puberulous, the awn and often the midrib setose, fuscous-brown, awn paler; bristles 6, 3 outer short, setiform, hispidulous, 3 inner quadrate, strongly 3-ribbed or almost 3-keeled, .05 in. long including a straight claw nearly as long as the blade, apex apiculate, outer angles acute or shortly apiculate, basal angles slightly hastate; nut narrowly or broadly obovoid, cuspidate, shortly stalked, .04—05 in. long, sharply trigonous, whitish, smooth or faintly transversely lineolate

3. *glomerata*.

Rhizome creeping, woody; stem rather robust, up to 4 ft. high, strongly striate or ribbed, glabrous or nearly so; leaves linear-lanceolate, acuminate, up to 9 in. long and .65 in. wide, glabrous or more or less pubescent; rhachis of inflorescence densely, softly pilose; spikelets narrowly oblong, .2—3 in. long; glumes obovate-oblong, .09—11 in. long, awn .04—06 in. long, fuscous-brown, the upper half on the back and the awn hispid, the awn sometimes setose; bristles 3 or 6, 3 outer when present short and setiform, 3 inner .05—06 in. long, obovate-oblong with a claw much shorter than the blade and so much S-shaped that the blade appears sessile, apiculate, 3-nerved, glabrous or minutely puberulous; nut broadly obovate, sharply trigonous, acuminate, shortly stalked, .04 in. long, pale- or chestnut-brown, smooth or slightly rugulose.....

4. *umbellata*.

Glumes rigid, 7-ribbed, the 2 outer ribs vanishing about the middle, the rest converging into the stiff, usually curved awn, obovate, cymbiform with flat, ciliate margins, .08—11 in. long, awn, .04—06 in. long, keel and awn puberulous or hispidulous. Rhizome 0; stems, 1—12 in. high, glabrous below, more or less pubescent above; leaves linear, acuminate, 3—5-ribbed, up to 4 in. long and .2 in. wide, laxly hairy as are the sheaths; spikelets crowded in capitate, simple or lobed clusters, ovoid, .15—2 in. long; bristles 6, 3 outer short, setiform, sparsely retrorsely hispid, 3 inner quadrate or suborbicular with a short straight claw, 3-ribbed, .04—05 in. long, apex 3-toothed, the middle tooth longest, with a

short filiform awn from the back near the apex; nut obovoid, sharply trigonous, acuminate, shortly stalked, .033 in. long, pale-brown or almost white, smooth

5. *uncinata*.

1. *FUIRENA PUBESCENS*, Kunth, var. *PERGAMENTACEA*, Fischer, var. nov. Pulney Hills (Bourne 3097 type, 1207, 3096; Anglade 2164 at Palamalai 1782).
2. *FUIRENA WALLICHIANA*, Kunth; F. B. I. vi. 665. N. Coimbatore Hills (Fischer at 4,000 ft., Jacob).
3. *FUIRENA GLOMERATA*, Lam.; F. B. I. vi. 666. In most Districts; sea-level to 3,500 ft. Vern. Kan. Petlu Góri Hullu.
4. *FUIRENA UMBELLATA*, Rottb.; F. B. I. vi. 666. Ganjam Agency (Barber); S. Kanara, Malabar, Cochin and Travancore; near sea-level to 2,600 ft. In swamps.
5. *FUIRENA UNCINATA*, Kunth; F. B. I. vi. 666. E. Districts from Ganjam to Chingleput, Salem and Coimbatore; sea-level to 2,000 ft.

12. *Lipocarpa*, R. Brown.

Glabrous herbs; rhizome 0 or short. *Stems* tufted, obtusely triangular. *Leaves* grass-like, from the base of the stem only. *Spikelets* 1—20 in a single terminal bracteate head, many-flowered. *Glumes* spirally imbricate, 1—2 lowest empty, uppermost few tabescent, intervening bisexual, falling away successively from the base of the persistent rhachilla. *Hypogynous bristles* replaced by 2 subequal opposite hyaline scales more or less adherent to the nut. *Stamens* 1—3, usually 2. *Style* short, slender, stigmas 2, sometimes 3. *Nut* sessile, plano-convex or trigonous, obovoid or linear-oblong, smooth, usually minutely punctate.

Glumes pale or fuscous, sides hyaline and usually dotted and streaked with red-brown, spathulate-oblancoate, apex triangular, acute, .1—.13 in. long. Rhizome 0 or short, vertical; stems rigid, 3—26 in. high; leaves as long in small plants, up to 9 in. long, rigid; bracts usually 3, rigid, unequal, .5—4.5 in. long, base broad; spikelets broadly ovoid, aggregated in heads of 3—10, rarely 1—2, .25—4 in. long; scales narrowly lanceolate, nearly as long as the glumes, longitudinally veined, readily splitting into linear segments, nut narrowly obovate-oblong, plano-convex or biconvex, brown, .04—0.05 in. long.....1. *argentea*.

Glumes dark-purple or purple-spotted, cuneate-obovate, suddenly acute, .07 in. long. Rhizome 0; spikelets ovoid, 1—8, commonly 3 aggregated in a head, .15—25 in. long; scales lanceolate, acute or obtuse, nearly as long as the glume; nut narrowly oblong, brown, nearly as long as the scales, very similar otherwise to the last species but smaller and more slender and with flaccid leaves and bracts

2. *triceps*.

1. *LIPOCARPHA ARGENTEA*, R. Br.; F. B. I. vi. 667. Mysore, Wynaad, Nilgiri and Pulney Hills; 3,000—7,000 ft. Often confused with *Kyllinga triceps*, Rottb.
2. *LIPOCARPHA TRICEPS*, Nees. *L. sphacelata*, Kunth; F. B. I. vi. 667. Ganjam District (Gamble), Mysore, Salem District, Carnatic; sea-level to 3,000 ft.

13. *Rynchospora*, Vahl.

Erect herbs; rhizome 0 or woody and short or long, roots fibrous. *Leaves* grass-like, either from the base only or from nodes all along

the stem. *Spikelets* solitary or fascicled, in single or corymbose bracteate heads or in panicles, terminal or axillary added, 1—9-flowered, rarely many-flowered. *Glumes* imbricate all round the rhachilla, lower sometimes more or less distichous, lowest 3—4, sometimes more, smaller and empty, usually enlarging upwards, uppermost few narrow, empty or ♂, intervening bisexual. *Hypogynous bristles* 0—6, sometimes 7—8, when present setiform, often scabrid or plumose. *Stamens* 1—3, rarely 6. *Style* long or short, base dilated; stigmas 2, very short or long. *Nut* ovoid, oblong or subglobose, biconvex or nearly flat, beaked by the persistent, sometimes elongate style-base, sessile or shortly stalked, smooth or transversely undulate.

Leaves from near the base of the stem only; spikelets aggregated in a single globose head, .3—4 in. diam., lanceolate, acute; glumes 7—8, floral ovate-lanceolate, acuminate, .19—26 in. long; style long, stigmas very short:—

Nut broadly obovoid, turgidly biconvex, .07—09 in. long, including a triangular beak $\frac{1}{2}$ — $\frac{1}{3}$ as long and a distinct stalk, black when ripe, smooth, the upper part sometimes minutely scabrid. Stem slender, 6—27 in. high; leaves narrowly linear, acute, flat or complicate, 2—16 in. long; bracts 3—8, unequal, nearly always longer than the head, up to 2.2 in. long, margins and midrib below pilose-ciliate; glumes shining, fuscous- or yellowish-brown; bristles usually 6, sometimes 0, much shorter than the nut, ascendingly hispidulous

1. *Wallichiana*.

Nut narrowly oblong, much compressed, sides nearly flat, .1—16 in. long, including the narrowly triangular beak and short stalk, .03 in. wide, dark-brown or black, the faces covered with white or pale papillae. Stem, leaves and bracts as in the last species; glumes usually narrower and paler; bristles 5—6, much longer than the nut, sometimes twice as long; style very slender

2. *Wightiana*.

Leaves from nodes throughout the stem; spikelets paniculate or corymbose:—

Stems robust, sharply triangular, 2—5 ft. high; leaves up to 2 ft. long, .5—1 in. wide, acuminate, margins and midrib below scabrid; spikelets narrowly subulate, .2—5 in. long, numerous in corymbose panicles up to a foot long; bracts like the leaves, often longer than the inflorescence; glumes 6—7, pale-brown, keeled, floral ovate, concave, mucronate or cuspidate, up to .28 in. long; bristles 6, sometimes fewer, about as long as the nut; nut obovoid, truncate, thick, sessile, without the beak about .13 in. long, greyish-brown, the sides somewhat undulate or excavate; faces flattish, punctate, beak elongate-conical from a base as broad as the nut, and as long as or longer than it, up to .25 in. long, acuminate, the faces channelled; style very shortly 2-fid.....3. *corymbosa*.

Stems slender, nearly terete; up to 2 ft. high; leaves very narrow; style-branches long; nut turgidly biconvex:—

Leaves setaceous, 4—12 in. long, smooth; bracts usually very short; spikelets few in lax panicles, solitary on long capillary pedicels, linear-lanceolate, .2—3 in. long, often bearing 2 nuts; glumes ovate-oblong, .12—19 in. long, mucous or mucronate, brown with darker dots; bristles 0; nut quadrately obovoid-globose, .07 in. long including the short, broad, basally emarginate beak, ashy, faces with 4—5 strong transverse wavy ridges.....4. *gracillima*.

Leaves flat, sometimes channelled, midrib strong, margins often scaberulous, 3—20 in. long, up to .15 in. wide; bracts usually shorter than the panicles; spikelets few in terminal or corymbose panicles, shortly pedicelled or somewhat clustered, ellipsoid, .15 in. long, often bearing 3 nuts with an empty glume between the 2 upper ones; glumes rotund-ovate, keeled, cuspidate, fuscous-brown, the floral .14—18 in. long; bristles 5—6, about as long as the nut, not overtopping the beak, ascendingly hispidulous; nut broadly obovate or suborbicular, truncate, .1—12 in. long including the triangular beak, brown with darker dots in wavy transverse lines or concolorous and faintly transversely undulate-linear; basal margins of the beak truncate or with a short rounded projection

5. *glauca*.

1. *RYNCHOSPORA WALLICHIANA*, Kunth; F. B. I. vi. 668.
Travancore, in backwaters at Ambalapuzha (K. Rangachari).
2. *RYNCHOSPORA WIGHTIANA*, Steud; F. B. I. vi. 669.
Mysore and W. Coast; sea-level to 3,000 ft.
3. *RYNCHOSPORA CORYMBOSA*, Dom. *R. aurea*, Vahl; F. B. I. vi. 670.
W. Coast and hills; Kollimalai and Sirumalai Hills; sea-level to 2,000 ft. in marshes.
4. *RYNCHOSPORA GRACILLIMA*, C. B. Clarke; F. B. I. vi. 671.
Tinnevelly Hills (Beddome).
5. *RYNCHOSPORA GLAUCA*, Vahl; F. B. I. vi. 671.
Nilgiri, Anamalai (Beddome), Pulney and High Wavy (Blatter and Hallberg) Mountains; 5,500—7,500 ft.

14. *Remirea*, Aublet.

Creeping, branched, rigid, glabrous, perennial herbs; rhizome long. *Stems* erect, short, leafy throughout. *Spikelets* in a crowded terminal, solitary or digitate head, 1-flowered. *Glumes* 4, laxly imbricate on all sides, 3 lowest empty, increasing in size upwards, 4th containing a pseudo-terminal bisexual flower. *Hypogynous bristles* 0. *Stamens* 3. *Style* not dilated at the base; stigmas 3, linear. *Nut* linear-oblong or ellipsoid, trigonous, smooth, closely embraced by the floral and the 3rd glumes.

REMIREA MARITIMA, Aubl.; F. B. I. vi. 677.

S. Kanara and Malabar Districts, on the coastal sands.

Rhizome sometimes several feet long, rooting at the nodes and producing erect stems up to 6 in. high; leaves closely spirally imbricate, rigid, linear, channelled, 1—3 in. long, apex triquetrous, pungent; bracts 2—6, like the leaves; spikes ellipsoid, 2.5—5 in. long; spikelets ellipsoid, 1.6 in. long; glumes brown, 3 empty coriaceous, ovate, ribbed, floral oblong, very thick, corky, 1.25 in. long, with a deep groove in which the nut lies; nut linear-oblong, often curved, very shortly beaked, 1 in. long, black, minutely punctate.

15. *Hypolytrum*, L. C. Rich.

Robust, perennial herbs; rootstock woody, stolons long, hardening into rhizomes. *Stems* erect, trigonous, leafy to above the middle. *Leaves* grass-like, linear-ensiform, 3-ribbed. *Bract* long or short. *Spikes* in subumbellate panicles with spreading branches or contracted into a lobed head, ellipsoid or subglobose. *Spikelets* imbricate all round the rhachis, 3-flowered, the 2 basal ♂ with each a single stamen and a terminal naked ♀ flower between. *Glumes* 3—7, basal empty, next 2 opposite, membranous or hyaline, each containing a solitary stamen, 0—4 empty glumes intercalated between the ♂ and ♀ flowers. *Bristles* 0. *Style* continuous with the ovary, persistent; stigmas 2, long. *Nut* ovoid or fusiform, turgidly biconvex, often nearly terete, bony, with a more or less conspicuous beak, smooth or rugose.

HYPOLYTRUM LATIFOLIUM, L. C. Rich.; F. B. I. vi. 678. *H. Wightianum*, Boeck.; F. B. I. vi. 678.

W. Coast and Gháts; 500—3,000 ft.

Stem 2—3 ft. high, trigonous; leaves sometimes longer, acuminate, base narrowed, 5—8 in. wide, margins and midrib below spinulose, especially near the apex; bracts like the leaves, up to 17 in. long; spikes sessile or pedunculate in compound corymbose or contracted panicles, oblong-cylindric in flower, subglobose and lobed in fruit, 2—25 in. long; empty glume brown with darker dots, oblong or obovate, rounded or subacute, 07—12 in. long, slightly concave, keeled, rigid, ♂ glumes complicate, narrowly boat-shaped or oblanceolate, acute or subacute, 05—12 in. long, membranous or hyaline, keel brownish and more or less ciliate, appressed to the ripe nut; intercalated glumes 0; nut either fusiform and acuminate, or broadly ovoid, acute or cuspidate, base narrowed or rounded, turgidly biconvex or nearly terete, 1—14 in. long, including the inconspicuous or large and patent sometimes swollen beak which is often longer than the nut itself and as broad or broader, often pale and speckled with brown; nut brown, smooth or rugose, sometimes empty.

16. *Lepironia*, L. C. Rich.

Erect, leafless herb; rhizome horizontal, woody, clothed in scales. *Stems* tufted, terete, transversely septate, septae visible from without when dry, sheathed at the base. *Spike* solitary, lateral near the apex of the stem, sessile. *Bracts* 0. *Spikelets* imbricate all round, 4—10-flowered, 2 basal and 2—8 above ♂ with a single stamen, the terminal a naked ♀. *Glumes* 9—25, lowest empty, rigid, concave, containing the rest, next two opposite, complicate, boat-shaped, each with 1 stamen, 6—21 following with a single stamen or empty, a few narrowly boat-shaped, the others flat, at least 3 or 4 below the terminal empty. *Style* long, continuous with the beak of the ovary; stigmas 3. *Nut* large, bony, broadly ellipsoid, much compressed, ribbed or smooth.

LEPIRONIA ARTICULATA, Dom. *L. mucronata*, L. C. Rich.; F. B. I. vi. 684.

Vicinity of Tranquebar (Koenig). Perhaps only cultivated or a casual escape. Used in Java for mat-making.

Stems up to 36 in. high and 15 in. diam.; sheaths 2—3, striate, up to 8 in. long, mouth oblique, acute; spike ellipsoid, acute, up to 8 in. long, arising 75—2 in. below the finely acuminate tip of the stem; spikelets numerous; rhachilla stout, persistent, lobed by the lenticular scars of fallen spikelets; lowest glume suborbicular, obtuse, 2—25 in. long, brown with darker streaks, margins very narrowly hyaline, next two glumes opposite, complicate, narrowly boat-shaped, about 2 in. long, hyaline, keel curved, brown and ciliate, containing a single stamen, the next 6—21 more or less whorled, very narrowly boat-shaped or flat, acute, about 19 in. long, usually hyaline with brown midrib, about 5 containing a single stamen, the rest empty; staminal filaments long, flat; anthers linear about 08 in. long with a subu-

late dark beak $\frac{1}{2}$ as long; nut obovoid, biconvex with one side more turgid than the other, .15—.16 in. long, beak narrow, truncate, brown, smooth or more or less ribbed.

17. *Scleria*, Berg.

Erect herbs with fibrous roots or woody rhizomes. *Stems* usually triquetrous, leafy throughout. *Inflorescence* of copious or restricted panicles or reduced to apparently simple spikes. *Bracts* leaf-like, often sericeous-caudate; bracteoles usually filiform. *Spikelets* fascicled or solitary, androgynous or unisexual, narrow in flower, the ♀ usually shorter and broader. *Glumes* many, imbricate all round; in ♂ or ♀ spikelets 1—4 lowest subdistichous, empty, the next empty or containing a ♀ flower, the following several narrower, not keeled, convolute, containing linear hyaline scales and 1—3 stamens, uppermost tabescent; in ♀ spikelets 2—3 lower glumes empty, the next containing a ♀ flower, the upper glumes empty. *Anthers* often cuspidate. *Disc* below the ovary annular, rarely obscure or 0, often enlarged and cupular or 3—6-lobed. *Style* slender; stigmas 3. *Nut* ovoid, oblong or globose, often obtusely trigonous, very often white and polished like marble, smooth or variously sculptured.

Annuals, rhizome 0 or very small:—

Panicle sparingly branched, glabrous; disc 3-lobed, lobes small, oblong or subquadrate, truncate, rounded or acute; nut subglobose or globose-oblong, often minutely apiculate, .1—12 in. long, white or pale-grey, tessellately longitudinally reticulate. Stems rather slender, 3—36 in. high; leaves up to 12 in. long and .2 in. wide; spikelets few, clustered, .2—25 in. long.....1. *tessellata*. Spikelets few, .2—26 in. long, clustered in a single terminal, peduncled head, peduncle and head hairy; disc small, reflexed, entire or nearly so; nut globose above a rather stout, 6-ribbed, glabrous base, .06 in. diam., whitish or pale-brown, covered with white-pubescent tubercles. Stems slender, 4—12 in. high; leaves as long or shorter, very narrow; glumes setose, villous, more or less cuspidate

2. *Neesii*.

Perennials with woody rhizome:—

Disc 0:—

Leaves .1 in. wide or less, as long as or shorter than the stem; sheaths hairy at least at the mouth. Rootstock hard, elongate, nodular; stems slender, up to 3 ft. high; bracts and bracteoles long, almost capillary; spikelets in small clusters on a filiform rhachis, .16 in. long; nut broadly ellipsoid, obtusely trigonous, .1 in. long, smooth (wrinkled in var. *Roxburghii*), white polished

3. *lithosperma*.

Leaves .5—1 in. wide, up to 3 ft. long; sheaths glabrous. Rootstock stout; stems robust, sharply trigonous, up to 8 ft. high; panicles large, branches trigonous, spreading; bracts like the leaves, bracteoles long, filiform from a dilated base; spikelets very many, clustered, .2 in. long; nut ellipsoid-ovate above a bluntly triangular base, acute, subacute or cuspidate, .12—16 in. long, white, smooth, polished.....4. *corymbosa*.

Disc developed:—

Disc 3-lobed:—

Nuts smooth:—

Panicles with many capillary bracteoles; lobes of disc triangular, acute, $\frac{1}{2}$ — $\frac{1}{3}$ as long as the nut; nut globose or broadly ovoid, .1—12 in. long, white or brownish, minutely puberulous, smooth, polished, sometimes faintly transversely lineolate. Rootstock nodular; stems trigonous, up to 3 ft. high; leaves up to 20 in. long and .3 in. wide; sheaths often winged, mouth with a short, rounded, scarious, usually hairy ligule; panicles small, slender; spikelets solitary or clustered, .15 in. long.....5. *hebecarpa*.

Panicles with few or no capillary bracteoles; nuts glabrous:—

Disc-lobes small, obtuse; nut nearly globose, apex slightly raised, .14 in. long, white, smooth, polished. Rootstock stout, stoloniferous; stems up to 3 ft. high, trigonous; leaves up to 4 ft. long, .5—1 in. wide; sheaths triquetrous, mouth truncate and with a narrow membrane; spikelets sessile, solitary, distantly spicate on the slender, angled, flexuose branches of a terminal, long-peduncled panicle, .15—16 in. long.....6. *poaeformis*. Disc-lobes broadly ovate or suborbicular, rounded, acute or acuminate; nut oblatly spherical, .1 in. long, .12 in. wide, white, smooth, polished. Stems up to 4 ft. high, rather stout, sharply trigonous; leaves up to 2 ft. long and .4 in. wide; sheaths trigonous, mouth truncate or with a very short, arched ligule; spikelets numerous, sessile or pedunculate, subsolitary on the stiff, straight, angled branches of terminal and axillary oblong panicles, .14 in. long.....7. *laevis*.

Nuts reticulate, globose or broadly ellipsoid, obtuse or apiculate, .1—1.5 in. long, white, pale-brown or dark, sometimes purplish-brown; disc-lobes short, rounded. Stems stout, sharply trigonous, angles scabrid, up to 6 ft. high; leaves up to 2 ft. long and .66 in. wide; sheaths sharply trigonous, those of the midstem often winged, mouth with a short, rounded, coriaceous ligule; spikelets sessile or peduncled, subsolitary in large, long-peduncled, decom-pound panicles, .14 in. long.....8. *cochinchinensis*.

Disc cupular, crenate, $\frac{1}{2}$ — $\frac{3}{4}$ as long as the nut. Stem stout, trigonous, angles smooth or scaberulous, up to 8 ft. high; leaves up to 2 ft. long and .75 in. wide; sheaths not winged, mouth truncate; spikelets numerous, sessile or shortly peduncled, solitary on the branches of terminal and axillary oblong panicles, .17 in. long; bracteoles filiform; nut globose, .09—1.2 in. in diam., brown, closely, rugosely pitted.....9. *sumatrensis*.

1. *SCLERIA TESSELLATA*, Willd.; F. B. I. vi. 686.
Tada, Nellore District (Bourne); Mysore at 3,000 ft. (Meebold); Nilgiri Hills at Kaity (Hohenacker). In swampy situations.
2. *SCLERIA NEESII*, Kunth; F. B. I. vi. 688.
Yeddicarra, Malabar District.
3. *SCLERIA LITHOSPERMA*, Sw.; F. B. I. vi. 685.
In all Districts; sea-level to 4,000 ft.
Var. *Roxburghii*, Thw.; F. B. I. vi. 686. Rather larger; nut transversely wrinkled with ferruginous glands.
Ganjam and N. Coimbatore Districts (Fischer); Pulney Hills (Bourne); Travancore; Tinnevely District.
4. *SCLERIA CORYMBOSA*, Roxb.; F. B. I. vi. 686.
Rampa District at 2,000 ft. (Narayanswami); Godavary, Chingleput and Malabar Districts; Travancore.
5. *SCLERIA HEBECARPA*, Nees; F. B. I. vi. 689.
Rampa Hills at 2,500 ft. (Ramaswami, Narayanswami); W. Coast from sea-level to 2,500 ft.
Var. *pubescens*, C. B. Clarke; F. B. I. vi. 689. Leaves softly villous on both faces.
Travancore (Narayanswami).
6. *SCLERIA POAEFORMIS*, Retz. *S. oryzoides*, Presl.; F. B. I. vi. 691.
Without precise locality (Rottler Collection).
7. *SCLERIA LAEVIS*, Retz.; F. B. I. vi. 694.
Travancore at Karippanthode (Rama Rao).
8. *SCLERIA COCHINCHINENSIS*, Druce. *S. elata*, Thw.; F. B. I. vi. 690.
S. melanostoma, Boeck.; F. B. I. vi. 692.
Mahendragiri in the Ganjam District at 4,300 ft. (Fischer and Gage); Cuddapah forests (Beddome); Gersoppa Falls (Meebold);

Bababudan, Nilgiri, Anamalai, Shevaroy, Pulney, Travancore and Tinnevely Hills; 2,000—7,000 ft.

9. *SCLERIA SUMATRENSIS*, Retz.; F. B. I. vi. 693.
Travancore.

18. *Diplacrum*, R. Brown.

Small, tufted, glabrous, annual herbs. *Stems* leafy throughout. *Spikelets* very small in small, dense terminal and axillary clusters at the mouth of the leaf-sheaths, 1-sexual; ♂ 3—4 at the base, 1—2-flowered with about 3 glumes, stamens 1—2; ♀ terminal, 1-flowered with 2 opposite glumes. *Style* slender; stigmas 3. *Nut* globose or nearly so.

DIPLACRUM CARICINUM, R. Br. *Scleria caricina*, Benth.; F. B. I. vi. 688.

Kambakkam Hills in Chingleput District (Bourne); Mysore at 3,500 ft. (Meebold); S. Kanara and Malabar Districts; Quilon (Wight); near sea-level to 2,500 ft.

Stems slender, 1—14 in. high, clothed with the leaf-sheaths; leaves linear, flat, .5—3 in. long; bracts short, lanceolate, margins minutely scabrid; clusters of spikelets small; spikelets minute, ♂ 3—5 at the base, .05—06 in. long, glumes 3—4, membranous or hyaline, brownish, ♀ narrowly ovate, glumes 2 slightly united at the base and falling with the nut from the minute knobbed pedicel, coriaceous, ribbed, .07 in. long, 3-cuspidate, lobes acuminate, midlobe longest, lateral lobes and part of the margins sometimes hyaline; nut nearly globose, minutely apiculate, .05 in. long, whitish or pale-brown, strongly 15-ribbed, the ribs sometimes anastomosing.

19. *Ascopholis*, Fischer.

Erect, glabrous herbs; roots fibrous. *Stem* solitary, swollen at the base and clothed in fleshy scales, leafy near the base only. *Spikes* sessile, 3-several aggregated in a globose terminal bracteate head. *Spikelets* spirally imbricate, 1-flowered. *Rhachilla* disarticulating above the 2 empty glumes, leaving a knob. *Glumes* 2, opposite, lower empty, upper spathiform containing a single hermaphrodite flower enclosed in a longer utricular scale which is split down one side about half-way. *Bristle* 0 or 1. *Stamens* 3. *Style* continuous with the ovary, base not enlarged; stigmas 2—3, filiform. *Nut* enclosed in the scale, oblong, sessile, plano-convex or subtrigonal.

ASCOPHOLIS GAMBLEI, Fischer in Kew Bull. 1931, 105.

Ootacamund at 7,000 ft. (Gamble).

Stem striate, 1.5—4 in. high; leaves shorter or longer, filiform or very narrowly linear; spikes oblong, about .4 in. long; bracts 4, linear from a broad base, .4—2.8 in. long; spikelets linear; glumes hyaline and brown-dotted, veined, .1—1.2 in. long; scale pale-brown often with darker dots, .14—1.5 in. long; bristle 0 or 1, capillary, white, much shorter than the ovary; nut narrowly oblong, plano-convex or subtrigonal, dark-brown, .1 in. long.

20. *Carex*, Linn.

Herbs, usually erect, with a perennial rhizome. *Stems* leafy mainly at the base. *Leaves* grass-like, the 2—3 lowest usually reduced to sheaths. *Inflorescence* of simple or paniced spikes, rarely reduced to 1 spikelet; flowers unisexual. *Spikelets* usually solitary, rarely all clustered, androgynous or unisexual, rarely dioecious; androgynous spikelets usually with the ♀ flowers below and few to many ♂ above; when unisexual usually 1—few terminal spikelets are ♂ with more numerous ♀ below; sometimes unisexual and androgynous spikelets occur on the same plant. *Glumes* usually numerous, imbricate all round the rachilla, persistent, 1—flowered or empty. *Stamens* 2—3. *Ovary* and nut completely enclosed in an entire or more or less deeply 2-toothed utricle; style slender, sometimes dilated at the base; stigmas 2—3, exerted from the utricle. *Nut* lenticular or trigonous.

Inflorescence spicate (sometimes a little paniculate at the base in *C. longicuris*):—
 Spikelet single, terminal, linear-oblong, .5—57 in. long, 5—6-flowered. *Stems* 2—3 in. high, base slightly swollen and enclosed in sheaths; leaves shorter, .12 in. wide; glumes broadly oblong, pale-ferruginous, obtuse, margins hyaline, two only with ♀ flowers; stigmas 3.....1. *Christii*.
 Spikelets several:—

Spikelets androgynous, ovoid or oblong, more or less crowded in a compound spike; stigmas 2:—

Spike not or hardly interrupted, .5—1.1 in. long, ovate or oblong; bracteoles 1—3, elongate, filiform, up to 6 in. long, rarely all very short. *Stem* slender, 3—25 in. high; leaves usually shorter, sometimes longer, very narrow, canaliculate or margins involute; spikelets 8—14 in the spike, sometimes more, ovoid, .2—3 in. long; glumes ovate, cuspidate or awned, .15 in. long, pale-brown or ferruginous; utricle .17—2 in. long, lanceolate or ovate-lanceolate below, narrowed into a slender 2-fid beak, margins scaberulous...2. *nubigena*.
 Spike interrupted in the lower part, .9—4 in. long, linear; bracteoles very short, rarely one of them up to 2 in. long, filiform. *Stems* slender, 4—36 in. high; leaves usually shorter, rarely longer, flat, up to .25 in. wide; spikelets 6—14 or more, distant below, crowded towards the apex, narrowly or broadly ovate, .2—5 in. long; glumes ovate, acuminate, more or less aristate, .1—12 in. long, pale-brown; utricle .15 in. long, ovate or ovate-lanceolate below, narrowed into a slender 2-fid beak, margins scaberulous.....3. *foliosa*.

Spikelets linear or cylindric, often elongate, solitary or clustered:—

Utricles distinctly beaked:—

Utricles not tomentose:—

Stigmas 2; spikes androgynous, ♂ portion apical, short:—

♀ glumes ovate or ovate-lanceolate, glabrous, .21—26 in. long including an arista usually nearly as long as the blade, pale straw-coloured, keel and arista green. *Stems* slender, up to 38 in. high; leaves shorter or longer, 1—2 short ones from mid stem, flat, .1—25 in. wide; bracts very narrow, up to 9 in. long; spikelets solitary, 3—12, distant, on rather long slender peduncles, linear, .5—3 in. long; utricles .2—29 in. long, ellipsoid or ovate below, narrowed into a slender 2-fid beak minutely scabrid on the margins, many-ribbed, glabrous, straw-coloured or green
 4. *longipes* var. *dissitiflora*.

♀ glumes not aristate, rarely cuspidate:—

Utricle .15—18 in. long, elliptic below, narrowed into a slender 2-fid beak, base narrowed, dark-brown or cinnamon-coloured, many-ribbed, hispid. *Stems* slender, up to 42 in. high; leaves usually shorter, .1—2 in. wide; bracteoles very slender, up to 2 in. long; spikelets 4—12, linear, sessile or shortly peduncled, .3—1.25 in. long; ♀ glumes oblong-ovate to lanceolate, obtuse, subacute or acuminate, brown, .1—16 in. long.....5. *brunnea*.
 Utricle .13—17 in. long, elliptic-lanceolate below, narrowed into a

slender 2-fid beak scaberulous on the margins, base stipitate, pale-brown, many-ribbed, glabrous. Stems slender, up to 30 in. high; leaves shorter, 1 in. wide; bracteoles filiform up to 1.5 in. long; spikelets numerous, sometimes more or less paniced below, linear, .3—1 in. long; ♀ glumes ovate or oblong-lanceolate, obtuse or acuminate, rarely shortly cuspidate, reddish-brown, .09—1.6 in. long
6. *longicruris*.

Stigmas 3:—

♀ glumes aristate or cuspidate:—

Spikelets androgynous:—

Spikelets ovate or ellipsoid, .25—4 in. long, few-flowered, clustered in a few distant short ovoid spikes. Stems slender, up to 3 ft. high; leaves shorter or longer, up to .15 in. wide; bracts longer than the inflorescence; ♀ glumes ovate or ovate-lanceolate, .17—1.9 in. long, including an arista often nearly as long as the blade, glabrous, striate, very pale-brown, margins often narrowly hyaline; utricles .2—2.6 in. long, broadly ovate below, narrowed into a 2-toothed beak nearly as long, many-nerved, very pale-brown

7. *leucantha*.

Spikelets numerous, narrowly linear, .7—2.5 in. long, many-flowered, pedicelled in distant clusters, ♂ often numerous. Stems rather stout, up to 3 ft. high; leaves about as long, .2—3 in. wide; bracts shorter than the inflorescence; ♀ glumes lanceolate or linear-oblong, .22—3 in. long including a distinct arista, bright chestnut or brown; utricles .2—2.4 in. long, narrowly fusiform below, narrowed into a slender 2-fid beak, few-ribbed, glabrous, beak and angles scabrid, olivaceous or ferruginous. 8. *Walkeri*.

Spikelets unisexual, 3—5 close together on a radical scape, one terminal ♂, linear, lateral ♀ ovate or oblong:—

Utricles .09—1 in. long, obovate or broadly elliptic below, narrowed into a short, rather wide emarginate beak, many-ribbed, yellowish-green, pubescent, rarely glabrescent. Leaves longer than the peduncles, up to .08 in. wide; bracts longer than the inflorescence, upper filiform; peduncles 2.5 in. high; ♀ glumes obovate, .12—1.6 in. long including a long scabrid arista, pale straw-coloured, midrib green.....9. *breviculmis*.

Utricles .21—2.5 in. long, broadly elliptic below, gradually narrowed into a long, conical, deeply 2-fid beak, few to many-ribbed, pale-brown or olivaceous, glabrous. Leaves up to 20 in. long, .1—2.5 in. wide; bracts .5—1.7 in. long; peduncles slender, 4—11 in. high; ♀ glumes broadly ovate or ovate-lanceolate, .22 in. long including a long glabrous arista, pale-brown.....10. *Jacksonia*.

♀ glumes broadly ovate or obovate, obtuse or subacute, .1—2 in. long, pale-brown or green, many-ribbed. Spikelets androgynous, linear, 1—2.5 in. long, ♂ portion apical slender, rather long, ♀ longer and wider, 1—3 on a radical slender scape up to 16 in. high; leaves longer, up to 25 in. long, .1—3 in. wide, flat above, often complicate below; utricles .16—2.4 in. long, ovate-elliptic and trigonous below, narrowed into a conical shortly 2-fid beak, the two interior margins narrowly winged and ciliate.....11. *speciosa*.

Utricles grey-tomentose, .16—1.7 in. long, ovate-elliptic below, narrowed into a slender or narrowly conical, deeply 2-fid beak nearly half as long, brown, not ribbed. Stems rather stout, trigonous, leafy to the top; leaves linear, up to 13 in. long, .25—4 in. wide, decreasing upwards into the bracts and downwards into reddish sheaths with or without a short blade, sheaths and upper surface and margins of blades scaberulous; spikelets unisexual, 4—9, solitary, distant, more or less peduncled, one terminal ♂, linear, 3—9 in. long, the rest ♀, cylindric, .4—1.7 in. long; ♀ glumes dense, ovate or oblong, .13—1.4 in. long, apex narrowed and obtuse with a short arista, ferruginous.....12. *hebecarpa*, var. *ligulata*.

Utricles not or very shortly beaked:—

♀ glumes with a long hispid awn, oblong or ovate, apex deeply emarginate, .1—1.4 in. long, including the awn, sides pale-brown, midrib and awn green.

Stems up to 40 in. long; leaves shorter or longer, up to .3 in. wide; bracts long, upper filiform; spikelets unisexual. 1 terminal ♂, rest ♀ with sometimes a few ♂ flowers at the tip, linear-cylindric, 1—3.6 in. long, solitary, pedicelled, often drooping; stigmas 2; utricles biconvex, ovate or trapezoid, acute, hardly beaked, usually very shortly stipitate, brown with pale angles, faces covered with white papillae which turn chocolate- or purplish-brown on drying.....13. *phacota*.

♀ glumes not awned:—

♂ spikelet 1, terminal, rest ♀; utricles longer than their glumes:—

Stigmas 2; utricles ovate, compressed, hardly beaked, mouth minutely emarginate, brown, .1 in. long, glabrous. Rhizome very small; stems slender, up to 15 in. high; leaves up to 4 in. long and .1 in. wide; bracts up to .4 in. long; spikelets 3—5, ♂ linear, 1—1.3 in. long, ♀ cylindric .6—1.6 in. long, sometimes with a few ♂ flowers at the apex; ♀ glumes oblong, rounded, sometimes apiculate, brown, midrib green, margins sometimes very narrowly hyaline, .08 in. long

14. *pseudo-aperta*.

Stigmas 3; utricles broadly ovoid, subtrigonal, not compressed, beak very short, mouth truncate, .09—1.1 in. long, dark cinnamonous- or purplish-brown when dry, papillose, faces strongly 3—5 nerved. Rhizome short, creeping; stems slender, up to 18 in. high; leaves shorter or longer, up to .35 in. wide; bracts up to 9 in. long; spikelets 3—5, ♂ linear, .5—1.4 in. long, ♀ sometimes with a few ♂ flowers at the apex, cylindric, .3—1.4 in. long; ♀ glumes ovate-oblong, obtuse, sometimes mucronulate, dark-brown, keel green, .06—0.8 in. long

15. *maculata*.

♂ spikelets 3, close together, terminal, linear, 4—7 in. long; ♀ several, distant on long, capillary peduncles, linear, 1—1.75 in. long. Stems slender, about 3 ft. high; bracts very narrow, not sheathing; ♀ glumes oblong, obtuse, .11—1.2 in. long, purplish-brown, midrib green, margins narrowly hyaline; stigmas 3, sometimes 2; utricles about equalling their glumes, elliptic below narrowed to the stipitate base and to a very short beak, dusky grey, 3—5-nerved, faces granulate.....16. *vicinalis*.

Inflorescence paniced; spikelets androgynous, ♂ portion apical:—

Spikelets .8 in. long or, usually, much less, ♂ portion very short; utricles narrow, beak long, slender:—

Partial panicles pyramidal, slender, expanded. Stems usually stout, up to 5 ft. high; leaves shorter or longer, up to .65 in. wide, widest in the middle, passing into the long sheathing bracts; bracteoles filiform; rhachis of inflorescence hispid; spikelets very numerous in decompound panicles, linear-oblong, .3—5 in. long; ♀ glumes ovate-lanceolate, acute or acuminate, .07—0.9 in. long, reddish-brown; utricles .12—1.6 in. long, narrowly ellipsoid or lanceolate below, narrowed into a very slender, long or short, usually bent beak with a rounded, rarely very shortly bifid mouth, olivaceous, ribbed.....17. *filicina*.

Partial panicles ovoid or oblong; mouth of utricles distinctly bifid:—

Rhachis of inflorescence glabrous, the angles more or less scabrid. Stem stout, up to 30 in. high; leaves often as long or longer, .2—5 in. wide; bracts narrow, up to 9 in. long; bracteoles few, very narrow, up to 3 in. long; spikelets suberect, narrowly linear when young, later oblong or ovate, .3—8 in. long; ♀ glumes ovate, .1—1.5 in. long including usually a short arista, straw-coloured or pale-brown; utricle .16—2.2 in. long, ellipsoid-trigonal below, narrowed into a long-straight beak, margins scabrous...18. *Wightiana*.

Rhachis of inflorescence more or less hairy or pubescent:—

Rhachis appressed pubescent; partial panicles usually contracted. Stems rather stout, up to 3 ft. high; leaves usually shorter, sometimes longer, up to .5 in. wide, minutely puberulous, upper sheaths puberulous at least at the mouth; bracts up to 8 in. long; bracteoles narrowly ensiform, scabrid-puberulous; spikelets crowded, oblong or linear-oblong, .3—4 in. long; ♀ glumes .1—1.8 in. long, lanceolate, usually scabrid-cuspidate or -aristate, reddish-brown, keel green; utricles .15—2.4 in. long, lanceolate or ellipsoid below, narrowed into a long slender beak with scabrid margins, obscurely ribbed.....19. *Lindleyana*.

Rhachis and peduncles shortly, rather densely, patently hairy; partial

panicles expanded. Stems rather stout, up to 30 in. high; leaves shorter, up to 3 in. wide, glabrous or minutely puberulous, uppermost sheaths sometimes puberulous at the mouth; bracts up to 8 in. long; bracteoles very slender, very short; spikelets usually at right angles to the rachis, oblong, 3—5 in. long; ♀ glumes narrowly ovate, .09—12 in. long, acute, cuspidate or rarely scabrid-aristate, ferruginous; utricles spreading, .19—23 in. long, ovate or elliptic below, narrowed into a slender beak nearly as long, several-ribbed, glabrous.....20. *raphidocarpa*.

Spikelets elongate, rarely less than 1 in. long; ♂ portion often as long as ♀:—
 Utricles gibbous, broadly ovoid, obscurely trigonous, coriaceous, .16—18 in. long, beak short, 2-fid, strongly many-ribbed, brown to dark red-brown, glabrous or the beak slightly hispidulous. Stems robust, up to 5 ft. high; leaves often longer, up to 5 in. wide; bracts up to 12 in. long; spikelets linear, up to 2.5 in. long; ♀ glumes broadly ovate, .13—17 in. long, obtuse or acute, sometimes distinctly scabrous-aristate, ferruginous or brown, usually with a broad hyaline margin, ribbed.....21. *baccans*.
 Utricles not gibbous, hardly trigonous, membranous, .14—18 in. long, elliptic below, narrowed into a moderately long, 2-fid beak, narrowed to the base, hardly ribbed, pale-brown or greenish, margins usually spinulose; ♀ glumes ovate, lanceolate, acute, usually scabrid-aristate, .15—19 in. long, pale-brown, not or hardly ribbed, margins seldom narrowly hyaline. *Stems, leaves, bracts and spikelets as in the last species*.....22. *myosurus*.

1. CAREX CHRISTII, Bocck.
 Nilgiri Hills (*vide* Kükenthal).
2. CAREX NUBIGENA, D. Don; F. B. I. vi. 702.
 Nilgiri, Anamalai (Beddome) and Pulney Hills; 6,000—8,000 ft.
3. CAREX FOLIOSA, D. Don. *C. muricata*, Linn., var. *foliosa*, C. B. Cl.;
 F. B. I. vi. 703.
 Nilgiri and Pulney Hills; 6,500—8,000 ft.
4. CAREX LONGIPES, D. Don, var. *DISSITIFLORA*, C. B. Cl.; F. B. I. vi.
 705.
 Nilgiri, Anamalai (Beddome) and Pulney Hills; High Wavy
 Mountain (Blatter and Hallberg); 6,000—8,000 ft.
5. CAREX BRUNNEA, Thunb.; F. B. I. vi. 705.
 Nilgiri, Anamalai (Beddome), Pulney and Tinnevely Hills;
 5,000—7,000 ft.
6. CAREX LONGICRURIS, Nees; F. B. I. vi. 705.
 Nilgiri and Anamalai (Beddome) Hills; 7,000—8,000 ft.
7. CAREX LEUCANTHA, Arn.; F. B. I. vi. 721.
 Courtallam; Tinnevely Hills.
8. CAREX WALKERI, Arn.; F. B. I. vi. 725.
 Nilgiri and Tinnevely (Beddome) Hills; 6,000—7,500 ft.
9. CAREX BREVICULMIS, R. Br.; F. B. I. vi. 746.
 Nilgiri and Pulney Hills; at high elevations.
10. CAREX JACKIANA, Boott.; F. B. I. vi. 735.
 Nilgiri, Anamalai (Beddome), Shevaroy (Beddome) and
 Tinnevely (Hooper and Ramaswami) Hills; High Wavy
 Mountain (Blatter and Hallberg); 3,500—7,000 ft.
11. CAREX SPECIOSA, Kunth; F. B. I. vi. 729.
 Rampa (Ramaswami), Nilgiri, Pulney and Tinnevely (Beddome)
 Hills; 3,000—4,000 ft.
12. CAREX HEBECARPA, C. A. Mey, var. *LIGULATA*, Kükenth. *C. ligulata*,
 Nees; F. B. I. vi. 747.
 Nilgiri and Pulney Hills; 5,000—7,000 ft.

13. *CAREX PHACOTA*, Spr.; F. B. I. vi. 708.
Nilgiri, Bolampatti (Beddome), Anamalai (Fischer), Pulney and Tinnevelly Hills; High Wavy Mountain (Blatter and Hallberg); 5,000—7,000 ft.
14. *CAREX PSEUDO-APERTA*, Boeck.
Nilgiri Hills at 6,000 ft. (Gamble).
15. *CAREX MACULATA*, Boott; F. B. I. vi. 735.
Nilgiri Hills; 5,000—7,000 ft.
16. *CAREX VICINALIS*, Boott; F. B. I. vi. 735.
Nilgiri Hills (Schmidt).
17. *CAREX FILICINA*, Nees; F. B. I. vi. 717.
W. Gháts; 6,000—8,000 ft.
18. *CAREX WIGHTIANA*, Nees; F. B. I. vi. 720.
Courtallam; Travancore in low country in evergreen forest.
19. *CAREX LINDLEYANA*, Nees; F. B. I. vi. 721.
Nilgiri, Anamalai (Beddome) and Pulney Hills; High Wavy Mountain (Jacob); 6,000—7,000 ft.
Var. *mercarenis*, Fischer. *C. mercarenis*, Hochst.; F. B. I. vi. 719.
Partial panicles laxer; spikelets narrower; utricles narrower, more or less puberulous.
W. Gháts from S. Kanara to Tinnevelly; 3,600—8,000 ft.
Var. *major*, Fischer. *C. mercarenis*, Hochst., var. *major*, Steud.; F. B. I. vi. 719. Spikelets 5—75 in. long; utricles distant, scabrous-hairy.
Mercara (Hohenacker); Attapadi (Fischer). Anamalai (Beddome) and Pulney Hills; High Wavy Mountain (Blatter and Hallberg); 5,000—8,000 ft.
20. *CAREX RAPHIDOCARPA*, Nees; F. B. I. vi. 719.
Pulney Hills at 6,000 ft.
21. *CAREX BACCANS*, Nees; F. B. I. vi. 722.
Mahendragiri in Ganjam District (Fischer); Godavary District (Narayanswami); W. Gháts; 3,000—7,000 ft.
22. *CAREX MYOSURUS*, Nees; F. B. I. vi. 723.
Rampa (Narayanswami) and Dindigul Hills at 2,600 ft.; throughout the W. Gháts; 4,000—7,000 ft.

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

PART X
GRAMINEAE

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

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CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS, KEW;
21st November, 1934.

FLORA OF MADRAS

Family CLXXVI. GRAMINEAE.

Erect, decumbent or creeping, sometimes floating herbs, or tall reeds, shrubs or trees or climbers; annual or perennial by means of rhizomes. Stems simple or more commonly branched from the base, generally terete and hollow between the nodes. *Leaves* alternate, commonly 2-ranked, nearly always with a sheathing base split down one side; ligule at the junction of the blade (or petiole) and the sheath consisting of a membrane or a fringe of hairs, rarely absent; blades usually long and narrow, rarely ovate parallel-nerved, sessile or sometimes petioled. *Inflorescence* terminal, rarely terminal and lateral, composed of paniced, racemose, simply or compoundly spicate, or capitate spikelets, rarely reduced to a single spikelet; rarely dioecious. *Flowers* solitary or 2—many aggregated in a spikelet. *Spikelets* homogeneous or differing in sex and shape; 1-sexual or 2-sexual with all the florets 2-sexual or 2-sexual with ♂ only or ♀ and ♂ in the same spikelet. The two, seldom more, lowest bracts of the spikelet (*glumes*), one sometimes absent, empty, the rest (*lemmas*) containing a naked floret or sometimes empty by reduction, usually with a smaller bract (*palea*) between the floret and the axis. Usually there are 2, rarely 3—several, hyaline, usually minute scales (*lodicules*) within the palea, representing the reduced perianth. *Stamens* 3, rarely 6, 4, 2 or 1, very rarely more than 6; filaments slender, often very long, free, rarely united; anthers versatile with 2 parallel cells. *Ovary* entire, 1-celled; styles 2, rarely 3 or 1, free or connate at the base, usually clothed above with simple or branched stigmatic hairs; ovule solitary, erect, anatropous. *Fruit* a grain, free within the lemma and palea or adnate to either or both. *Seed* erect, albumen copious, floury; embryo minute or large, at the base of and outside the albumen. Mature spikelets falling entire from the tips of their pedicels or together with the pedicel or a part of it or with a part of the rachis, or else breaking up above the glumes into separate false fruits, rarely persistent and shedding the grain.

The genera are those adopted by Stapf in the 'Flora of Tropical Africa' wherever possible, and the key to the genera is based on that in the same work. For the necessary modifications much assistance was derived from Haines's 'Botany of Bihar and Orissa,' Cooke's 'Flora of the Bombay Presidency,' together with Blatter and McCann's revision thereof, and Melle. A. Camus's key in 'Flore générale de l'Indo-Chine.'

Mr. C. E. Hubbard, of Kew, has given much help and advice, but he is in no way responsible for the ultimate result.

The measurements given for culms exclude the inflorescence; those of the leaves refer to the blades only, and those of the glumes and lemmas exclude cusps, aristas or awns if present, unless otherwise stated.

Sexes in different inflorescences or if in the same then ♀ few at the base and ♂ above:—

Monoecious; leaves flat, not spiny; ♂ paniced or spicate:—

Sexes in separate inflorescences; ♂ in large panicles, ♀ spikes in an axillary sheath, fused together to form a spongy body.....1. *Zea*.

Sexes in the same inflorescence; ♂ in several pairs, ♀ solitary or few:—
♀ solitary within a closed, globose, stony bract.....2. *Coix*.

♀ 1—several, each embraced by the oblong, dorsally compressed, coriaceous lower glume which is open ventrally.....3. *Chionachne*.

Dioecious; leaves involute, rigid, spiny; inflorescence in globose heads

4. *Spinifex*.

Sexes mixed:—

Mature spikelets falling entire from or with their pedicels or with the contiguous joint of the rhachis, all alike or differing in sex and structure, perfect ones with 2 heteromorphous florets, lower ♂ or empty, upper bisexual:—(5—67).

Spikelets usually in pairs, one sessile, the other, rarely both, pedicelled, rarely 3-nate or solitary on the axes of variously arranged, often spiciform racemes; glumes firmer than the lemmas; lemmas membranous, often hyaline, the upper sometimes awned or reduced to an awn:—(5—44).

Joints and pedicels not bulbous, not adnate to one another, if thick then the spikes digitate or in spathaceous panicles:—(5—38).

All spikelets alike in shape and sex or if dissimilar then paleas very short or absent:—

Spikes in compound panicles or racemose on an elongate common axis; spikelets 1-flowered:—

Rhachis tough; all spikelets pedicelled:—

Panicle thyrsoid; callus long-silky-hairy; spikelets 2-nate, one long, one short-pedicelled:—

Panicle narrow-thyrsiform, silvery hairy; lemmas awnless

5. *Imperata*.

Panicle broadly fan-shaped, brownish-hairy; lemmas usually awned

6. *Miscanthus*.

Panicle narrow; spikelets solitary; glumes shortly brown-hairy

7. *Cleistachne*.

Rhachis readily disarticulating; spikelets 2-nate, one sessile, the other pedicelled:—

Spikelets awnless. Leaves not narrowed to the base, not petioled:—

Glumes membranous or chartaceous at the base only. Panicles wide, more or less silvery-plumose.....8. *Saccharum*.

Glumes chartaceous or coriaceous throughout. Panicles narrow, rufous-hairy, not plumose.....9. *Eriochrysis*.

Spikelets awned. Leaves narrowed at the base, often long petioled

10. *Spodiopogon*.

Spikes digitate or solitary; spikelets 1-flowered, or if 2-flowered then the lower glumes channelled:—

Rhachis inarticulate; spikelets not paired.....11. *Dimeria*.

Rhachis articulate:—

Spikes solitary, capillary; spikelets 2-awned.....12. *Pogonatherum*.

Spikes digitate; spikelets 1—2-awned:—

Rhachis fragile; pairs of spikelets always one sessile and one pedicelled; glumes $\cdot 1$ in. or more long; upper lemma much wider than its awn.....13. *Eulalia*.

Rhachis more or less persistent; pairs of spikelets often both pedicelled; glumes less than $\cdot 1$ in. long; upper glume hardly wider than its awn:—

Lower glume flat or depressed on the back, not channelled

14. *Pseudopogonatherum*.

Lower glume deeply channelled on the back....15. *Microstegium*.

Sessile and pedicelled spikelets dissimilar, sessile bisexual, pedicelled ♂, empty or 0, or if similar (*Pollinidium*) then the paleas well-developed and the rhachis compressed:—

Fertile spikelets 2-flowered:—

Pedicelled spikelets present:—

Both spikelets awned; joints of rhachis and pedicels flattened or thickened; paleas well developed:—

- Rootstock and base of culm clothed with woolly sheaths; rhachis flattened; spikelets all similar and homogamous...16 **Pollinidium**.
Culm not woolly at base; joints and pedicels stout; spikelets heterogamous:—
- Spikes clustered or digitate; lower glumes not channelled
17. **Ischaemum**.
- Spikes solitary; lower glumes channelled on the back
18. **Setima**.
- Sessile spikelet awnless; lower glumes 3-toothed...19. **Lophopogon**.
Pedicelled spikelets suppressed, pedicels only present:—
- Spikes usually 2; margins of glumes smooth.....20. **Apocopsis**.
Spikes solitary; margins of lower glumes spinulose- or bristle-pectinate.....21. **Eremochloa**.
- Fertile spikelets 1-flowered:—
- Panicles not subtended by spathes:—
- All pairs of spikelets alike:—
- Upper lemma awned from the back below the middle; spikes digitate.....22. **Arthraxon**.
- Upper lemma awned from the tip or the sinus:—
- Upper lemma reduced to the hyaline stipitiform base of the awn; joints and pedicels filiform with a translucent longitudinal depression:—
- Racemes in compound panicles.....23. **Capillipedium**.
Racemes subdigitate, fascicled or verticillate on an elongate axis.....24. **Amphilophia**.
- Upper lemma not reduced, 2-fid, awned from the sinus; joints and pedicels solid:—
- Raceme of many pairs of spikelets:—
- Primary branches of the panicle whorled; lower glumes coriaceous, muricate or tuberculate.....25. **Vetiveria**.
Primary branches not whorled; lower glumes chartaceous, smooth.....26. **Pseudosorghum**.
- Raceme of few pairs of spikelets, rarely 6, sometimes reduced to 1 sessile and 2 pedicelled:—
- Spikelets dorsally compressed; pedicelled spikelet sometimes reduced to a pedicel only; sessile spikelet awned or not
27. **Sorghum**.
- Spikelets laterally compressed, raceme nearly always reduced to 1 sessile and 2 pedicelled spikelets on the tips of slender peduncles, all awned.....28. **Chrysopogon**.
- Lowest 1 or more pairs of spikelets homogeneous and differing from all above them:—
- Spikes digitate, rarely solitary; sessile spikelets dorsally compressed; callus of lemma short.....29. **Dichanthium**.
Spike solitary; sessile spikelets subcylindric; callus elongate, pungent.....30. **Heteropogon**.
- Panicles subtended by spathes; spikes usually 2, or 1, rarely more, on a common peduncle sheathed by a spatheole:—
- Spikes reduced to 1 or a few nodes with or without a surrounding involucre of modified ♂ or empty spikelets:—
- Involucre of modified spikelets present:—
- Involucral spikelets persistent, the rest jointed on the rhachis and falling separately.....31. **Themedia**.
Involucral spikelets jointed on the peduncle and falling together with the rest.....32. **Isilema**.
- No involucre present:—
- Callus of spikelet not inflated.....33. **Pseudanthistiria**.
Callus much inflated.....34. **Apluda**.
- Spikes many-noded, not reduced nor involucred:—
- Spikes solitary in each spatheole:—
- Joints and pedicels slender.....35. **Eremopogon**.
Joints and pedicels thickened upwards to a cupped apex, often with a dentate terminal appendage.....36. **Schizachyrium**.

Spikes twin in each spatheole:—

All pairs of spikelets similar; racemes terminating the culms

37. *Andropogon*.

Lowest pair of spikelets of one or both spikes homogeneous; lowest joint sometimes much thickened; plant often aromatic; panicles decomposed.....38. *Cymbopogon*.

Joints of the rhachis and often the pedicels much swollen, sometimes joint and pedicel fused to form a cylindric axis in which the lower glume is sunk; pedicelled spikelet sometimes suppressed:—

Sessile and pedicelled spikelets very unlike, sessile, globose

39. *Hackelochloa*.

Spikelets more or less alike and compressed or the pedicelled suppressed:—

Spike readily disarticulating:—

Lower glumes convex; pedicelled spikelets suppressed; pedicels fused with the joints.....40. *Ophiuros*.

Lower glumes flat; ends of joints hollowed out:—

Pedicelled spikelets as large as or only slightly smaller than the sessile:—

Raceme terete; lower glumes of sessile spikelets not or very narrowly winged, awnless.....41. *Rottboellia*.

Raceme compressed; lower glume of sessile spikelets broadly winged or if only winged in upper half then 1—2-awned

42. *Manisuris*.

Pedicelled spikelets rudimentary; sessile spikelets deeply sunk in opposite cavities.....43. *Mnesithea*.

Spike with cohering joints with truncate tips, compressed

44. *Hemarthria*.

Spikelets in usually continuous spikes, racemes or panicles; glumes herbaceous or membranous, the lower generally smaller, sometimes minute or absent; lower lemma generally resembling the upper glume, the upper always fertile, ultimately rigid, chartaceous or crustaceous, mucicous, mucronate or awned:—

Upper floret only fertile; lower lemma not hardened:— (45—66)

Inflorescence of usually slender, spiciform, digitate, subdigitate or distant, very rarely solitary racemes; fruiting lemma usually with flat thin margins with the usually minute lower palea attached to its base:—

Spikelets mucicous; lower lemmas with 5—7 close, prominent nerves

45. *Digitaria*.

Spikelets awned or aristate; lower lemma smooth.....46. *Alloteropsis*.

Inflorescence usually different, various; fruiting lemma with more or less inrolled margins; lower palea not attached to the upper lemma:—

Spikelets falling entire and singly from the persistent pedicels, rarely falling with the contiguous joints of an articulate rhachis (51. *Stenotaphrum*):— (47—64)

Spikelets mucicous, or if awned then subsessile in false secund spikes with the awns from the entire or the very slightly notched tips of the upper glumes and the lower lemmas, or the tips of the lower or both glumes; fruiting lemmas crustaceous:— (47—63)

Inflorescence never an open or contracted-cylindric panicle:—

Back of fruit turned away from the axis:—

Spikelets strongly laterally compressed; lower glume herbaceous, as long as the spikelet.....47. *Pseudochinolaena*.

Spikelets more or less dorsally compressed; lower glume never herbaceous:—

Bases of spikelets with a swollen annular callus formed by the rudimentary lower glume and the base of the rhachilla

48. *Eriochloa*.

Bases of spikelets devoid of swollen callus, lower glume distinct

49. *Brachiaria*.

Back of fruit turned towards the axis:—

Lower glume absent or reduced to a scale; spikelets usually conspicuously plano-convex with the flat side turned away from the rhachis.....50. *Paspalum*.

Lower glume well developed:—

Rhachis flat, articulated; spikelets in cavities of the rhachis, ultimately falling with the contiguous joint

51. *Stenotaphrum*.

Rhachis not articulated; spikelets falling from their pedicels:—

Glumes muticous:—

Fruiting lemmas acute, not mucronate; spikelets solitary, their sides contiguous.....52. *Paspalidium*.

Fruiting lemmas obtuse, abruptly mucronate; spikelets paired or if solitary then their backs contiguous

53. *Urochloa*.

Glumes, at least the upper, caudate or awned:—

Leaves linear; glumes entire, the lower awnless

54. *Echinochloa*.

Leaves lanceolate; glumes slightly notched, the lower awned.....55. *Oplismenus*.

Inflorescence an open or a contracted, cylindric spiciform panicle:—

Spikelets not supported by bristle-like branchlets, rarely replaced by a minute bristle (57. *Holcolemma*):—

Spikelets not gibbous, or if slightly so then not in cylindric, spiciform racemes:—

Panicles open, or if contracted the branches spreading, not spiciform:—

Glumes similar, subequal, shorter than the spikelet:—

Rhachis branched, branches long; base of rather broad leaves rounded; glumes lanceolate, acuminate, prominently nerved; fruiting lemmas smooth.....56. *Ottochloa*.

Rhachis simple; base of very narrow leaves narrowed; glumes broadly ovate, subacute, not prominently nerved; fruiting lemmas finely transversely rugulose

57. *Holcolemma*.

Glumes dissimilar, the lower much the shorter, rarely absent

58. *Panicum*.

Panicles contracted, dense, branches appressed spiciform

59. *Hymenachne*.

Spikelets distinctly gibbous and oblique, or if only slightly so then in cylindric, spiciform racemes:—

Spikelets laterally much compressed.....60. *Cyrtococcum*.

Spikelets turgid, not compressed.....61. *Saccolopia*.

Spikelets, at least the upper of each branch, supported by bristle-like branchlets:—

Terrestrial, erect; panicle contracted, usually spiciform; bristles many, not produced beyond the terminal spikelet

62. *Setaria*.

Aquatic, decumbent; panicle open; bristle solitary, much produced beyond the terminal spikelet.....63. *Pseudoraphis*.

Spikelets finely awned or mucronate from the sinus of the distinctly notched upper glumes and lower lemmas, the latter rarely muticous, delicately pedicelled, paniced; lower glume minute; fruiting lemma rigidly membranous.....64. *Rhynchelytrum*.

Spikelets involucrate with spines or bristles, falling in groups, seldom singly:—

Involucre of free, naked or feathery bristles.....65. *Pennisetum*.

Involucre of spines or rigid bristles united into a hard cup

66. *Cenchrus*.

Both florets fertile, or if the lower ♂ then its lemma hardened and more or less resembling the upper.....67. *Isachne*.

Mature spikelets breaking up, leaving the persistent or subpersistent glumes on the rhachis or pedicels, or if falling entire then not consisting of 2 heteromorphous florets:—

Blades of leaves not transversely veined or articulate on the sheaths, or if so (112. *Lophatherum*, 113. *Centotheca*) not large woody shrubs or trees:—

Awn of fertile floret if present kneed and twisted below the knee (rarely straight in reduced forms):—(68—85)

Spikelets 2—several-flowered:—

Florets 2 only, dissimilar; lower lemma awnless; awn of upper lemma, when present, from the entire tip:—

Tall reeds; leaves distichous; panicles large, decomposed; spikelets very small, jointed on the pedicels; upper lemma awnless

68. *Thysanolaena*.

Small or moderate-sized plants; leaves not distichous; panicles small, not decomposed; spikelets not jointed on the pedicels; upper lemma usually awned, sometimes also with 2 setae.....69. *Arundinella*.

Florets 2—several, all alike or the uppermost reduced; lemmas membranous, often with hyaline margins; awn, when present, from the back or the sinus or from between bristles:—

Small or moderate-sized plants; panicles not decomposed; rhachilla rarely jointed between the lemmas:—

Florets 2—several; lemmas 2-cleft, usually awned from the back below the sinus:—

Perennials; spikelets moderate-sized, erect or suberect; glumes usually 1—3-nerved.....70. *Avenastrum*.

Annuals; spikelets large, pendulous; glumes 7—9-nerved

71. *Avena*.

Florets 2 only; lemmas entire:—

Weak marsh plants; glumes not keeled; rhachilla elongate between the lemmas; upper lemma the longer, coriaceous

72. *Coelachne*.

Rigid, erect, terrestrial plants; glumes keeled; rhachilla short between the equal, chartaceous lemmas.....73. *Zenkeria*.

Very tall reeds; panicles decomposed; rhachilla jointed between the lemmas:—

Lemmas silky-hairy; rhachilla elongate, glabrous or short-hairy at the base:—

Lemmas hairy all over the back below the middle.....74. *Arundo*.

Lemmas hairy from the nerves on the sides only...75. *Neyraudia*.

Lemmas glabrous; rhachilla short, long-hairy.....76. *Phragmites*.

Spikelets 1-flowered:—

Inflorescence paniced:—

Panicles dense, oblong-spiciform or lobulate.....77. *Polypogon*.

Panicles effuse or narrow, not dense or spiciform:—

Lemma cylindric, coriaceous, tightly enfolding the grain, awned, awns often 3.....78. *Aristida*.

Lemma lanceolate, membranous or cartilaginous, not enfolding the grain:—

Spikelets not jointed on the pedicels; awn, when present, from the back of the lemma.....79. *Agrostis*.

Spikelets jointed on the pedicels; usually awned from the tip of the lemma.....80. *Garnotia*.

Inflorescence spicate or racemose:—

Racemes 2—3, seldom solitary; rhachis broad, flat, disarticulating; spikelets mixed with rigid flowerless glumes.....81. *Trachya*.

Racemes solitary; rhachis narrow, not flat, not articulated; flowerless glumes absent:—

Upper glume 5-ribbed, armed with hooked spinules.....82. *Tragus*.

Glumes neither ribbed nor spinulose:—

Rhachis straight; spikelets spreading:—

Spikelets minute, shaped like a shoe or a bird's head, awnless

83. *Lopholepis*.

Spikelets larger, narrowly lanceolate; glumes tapering into a long fine awn.....84. *Parotis*.

Rhachis flexuous, forming recesses into which the spikelets are appressed.....85. *Zoysia*.

Awn of the fertile floret, when present, never kneed:—

Lemmas typically 3-nerved:—

Inflorescence paniced, or if spicate (some *Eragrostis*) then not secund:—

Spikelets 1-flowered, very small; glumes and lemmas very similar, awned.....86. *Sporobolus*.

Spikelets 2—many-flowered, or if only 1-flowered then glumes and lemmas dissimilar:—

Lemmas entire:—

Glumes rigid, coriaceous, awned.....87. *Myriostachya*.

Glumes membranous or cartilaginous, not awned, at most caudate-acuminate:—

Upper glumes 1-nerved:—

Spikelets short, straight, crowded; spikelets closely packed
88. *Desmostachya*.

Spikelets slender, long, flexuous; spikelets distant
89. *Leptochloa*.

Upper glumes 3—5-nerved:—

Lower glume 1-nerved, upper 3-nerved; lemmas moderately rigid; rhachilla glabrous.....90. *Eragrostis*.

Lower glume 3-nerved, upper 5-nerved; lemmas coriaceous; rhachilla joints bearded.....91. *Halopyrum*.

Lemmas emarginate:—

Spikelets laterally compressed, sessile or subsessile, few—many-flowered; rhachilla not produced beyond the lemmas
92. *Diplachne*.

Spikelets terete, pedicelled, 1-flowered; rhachilla produced beyond the lemma into a filiform arista.....93. *Dichaetaria*.

Inflorescence of sessile or subsessile spikelets in 2-ranked, secund, usually dense, solitary, digitate or racemously arranged spikes:—

Spike solitary, rarely twin:—

Spikelets more or less sunk in the rhachis.....94. *Oropetium*.

Spikelets not sunk in the rhachis:—

Spikelets awnless.....95. *Microchloa*.

Spikelets awned:—

Spikelets 1—2-flowered in pedicelled, articulate clusters; rhachilla produced beyond the upper lemma
96. *Melanocenchris*.

Spikelets 1—many-flowered, sessile, not in clusters:—

Spikelets 3—many-flowered; lower glume usually lodged in a furrow in the rhachis; rhachilla not produced beyond the terminal lemma.....97. *Tripogon*.

Spikelets 1—3-flowered; lower glume not lodged in the rhachis; rhachilla produced beyond the uppermost lemma
98. *Enteropogon*.

Spikes digitate, umbelled or racemose, very rarely solitary or if so then lemmas obovate:—

Spikelets 1-flowered; spikes always digitate.....99. *Cynodon*.

Spikelets 2—several-flowered, sometimes only 1—2 fertile:—

Fertile florets 1—3 with 1 or more imperfect above or below; spikes umbelled or racemose, rarely solitary; lemmas awned or aristate.....100. *Chloris*.

Fertile florets 2—several, none imperfect:—

Spikes digitate or subdigitate or capitate, usually rigid; glumes shorter than lemmas:—

Spikes terminated by a spikelet; glumes and lemmas mucicous or obscurely mucronate.....101. *Eleusine*.

Spikes terminating in a sharp point; upper glume and lemmas rigidly mucronate or cuspidate.....102. *Dactyloctenium*.

Spikes racemose, slender, spreading or deflexed; glumes much longer than the lemmas

Lemmas typically 5—many-nerved:—

[103. *Dinebra*.

- Lemmas broad, 4-9-lobed:—
 Inflorescence a contracted panicle; lemmas 9-nerved and -awned
 104. *Enneapogon*.
- Inflorescence a simple spike; lemmas spirally arranged in a cone,
 4-nerved, and lobed, 1-5-awned.....105 *Pommereuilla*.
- Lemmas entire or 2-, rarely 3-lobed:—
 Spikelets in compact, subcapitate or cylindric, often interrupted,
 spikes:—
 Leaves flat, neither distichous nor pungent, usually long; spikes
 cylindric, often interrupted.....106. *Elytrophorus*.
- Leaves convolute, distichous, rigid, pungent, 1-2 in. long; spikes
 capitate.....107. *Aeluropus*.
- Spikelets not compact, in spikes, racemes or panicles:—
 Inflorescence paniced:—
 Glumes absent, or minute or setaceous; fertile floret solitary:—
 Lower florets represented by 2 scales or bristles; glumes minute,
 scale-like or subulate.....108. *Oryza*.
- Lower florets suppressed; glumes 0 or reduced to a rim:—
 Glumes represented by an entire or 2-lobed rim; lemmas
 awnless.....109. *Leersia*.
- Glumes suppressed; lemmas awned.....110. *Hygrophiza*.
- Glumes, at least the upper, developed:—
 Two lower lemmas 2-lobed, awned from below the sinus
 111. *Anthoxanthum*.
- Lemmas entire:—
 Leaves flat, lanceolate, with numerous transverse venules:—
 Spikelets not compressed; fertile floret 1, with several closely
 sheathing, cuspidate empty lemmas above
 112. *Lophatherum*.
- Spikelets compressed; fertile florets 1-3, empty lemmas
 0-1-several, usually with erect or deflexed bulbous-based
 bristles; muticous.....113. *Centotheca*.
- Leaves usually narrow, no transverse venules:—
 Lower 1-3 lemmas bisexual, those above empty, enfolding
 each other to form a clavate or oblong terminal body
 114. *Melica*.
- Upper lemmas not in a terminal sterile body:—
 Glumes and lemmas muticous; spikelets laterally com-
 pressed:—
 Panicles expanded; glumes and lemmas subequal:—
 Spikelets ovate or triangular; pedicels capillary;
 glumes and lemmas broadly ovate, obtuse, not keeled
 115. *Briza*.
- Spikelets oblong; pedicels not capillary; glumes and
 lemmas ovate-lanceolate, acute, keeled.....116. *Poa*.
- Panicles narrow; spikelets elongate-oblong; glumes
 much shorter than the strongly nerved lemmas
 117. *Glyceria*.
- Glumes and lemmas caudate, aristate or awned:—
 Panicles contracted; spikelets in dense clusters;
 rachilla short between the lemmas.....118. *Dactylis*.
- Panicles more or less expanded; spikelets not clustered;
 rachilla elongate between the lemmas:—
 Lower glume much the shorter; lemmas subulate,
 not keeled.....119. *Vulpia*.
- Glumes subequal; lemmas oblong or lanceolate:—
 Lemmas rounded on the back or keeled only in
 the upper half, .25 in. or less long...120. *Festuca*.
- Lemmas sharply keeled throughout, .28 in. or more
 long.....121. *Bromus*.
- Inflorescence a simple spike or raceme:—
 Leaves narrowed into a petiole; lemmas convolute, acutely 2-
 122. *Streptogynus*.

Leaves not petioled; lemmas entire:—

Spikelets distant on the rhachis:—

Rhachis straight, not recessed; spikelets nearly terete, not distichous.....123. *Brachypodium*.

Rhachis flexuous, recessed; spikelets much compressed, distichous.....124. *Lolium*.

Spikelets aggregated into a dense oblong head:—

Spikelets solitary at the nodes, without involucrel outer glumes.....125. *Triticum*.

Spikelets 3-nate at the nodes; outer glumes of each cluster together forming a quasi involucre.....126. *Hordeum*.

Blades of leaves usually transversely veined, articulate on their sheaths; large woody shrubs or trees with large culm-sheaths with an imperfect blade:—
Bamboos.

Paleas differing from the lemmas, 2-keeled, or if not keeled then the stamens monadelphous:—

Staminal filaments free:—

Stamens 3.....127. *Arundinaria*.

Stamens 6:—

Spikelets in globose congested heads.....128. *Dendrocalamus*.

Spikelets not in globose congested heads:—

Imperfect blade of culm-sheath broadly triangular, erect; paleas 5—7-nerved between the keels; pericarp thin, adnate to the seed
129. *Bambusa*.

Imperfect blade linear-ensiform, recurved; paleas 1-nerved between the keels; pericarp crustaceous, free from the seed

130. *Teinostachyum*.

Staminal filaments united into a tube; stamens 6.....131. *Oxytenanthera*.

Paleas 0 or resembling the lemmas, not keeled; stamens usually numerous; filaments free or united.....132. *Ochlandra*.

1. *Zea*, Linn.

Tall, stout, annual herbs. *Leaves* large, flat. *Inflorescence* monoecious; ♂ spikelets in large terminal subdigitate or racemose panicles of spiciform racemes; axes of ♀ spikes fused into a spongy, sub-cylindric core in axillary sheaths. ♂ spikelets 2-nate, one pedicelled, the other sessile, 2-flowered. *Glumes* subequal, membranous. *Lemmas* similar, hyaline, their paleas similar. *Lodicules* 2, fleshy. *Stamens* 3. ♀ spikelets 2-nate in 4—11 longitudinal rows, slightly immersed in the axis; florets 2, the lower reduced to an empty lemma. *Glumes* similar, very broad, fleshy below, hyaline above. *Lemmas* like the glumes; paleas short, broad, the lower sometimes wanting. *Lodicules* 0. *Styles* long, 2-fid at the tip, exerted in long silky tassels from the sheathing bracts. *Grain* subglobose, surrounded by the dried-up glumes, lemmas and paleas.

ZEAL MAYS, Linn.; F. B. I. vii. 102.

A S. American plant cultivated in many localities for its edible grain and its fodder leaves. Maize or Indian Corn.

Stems robust, up to 10 ft. or more high; leaves up to 3 ft. long and 4 in. wide; ♂ spikelets 25—35 in. long; styles several inches long. Vern. *Ur.* Mokka; *Tel.* Mokka jounalu; *Tam.* Makka cholam, Turaka cholam; *Mal.* Makka cholam; *Kan.* Makkai jola.

2. *Coix*, Linn.

Annual or perennial, tall, erect or floating plants. *Leaves* flat. *Inflorescence* of fascicled axillary and terminal spiciform racemes, consisting usually of one ♀ spikelet completely enclosed in a globose or ovoid basal bract through which the rachis grows out and bears the ♂ spikelets above. *Bract* eventually stony and polished, sometimes continued into a leafy blade, rarely a second bract above. ♂ *spikelets* imbricate in pairs or threes, one of them pedicelled. *Glumes* subequal, herbaceous, the lower flat with 2 lateral winged keels, the upper boat-shaped with a median keel. *Florets* 2, both staminate or the upper empty. *Lemmas* similar, membranous, the upper shorter; *paleas* hyaline. *Lodicules* 2, cuneate, fleshy. *Stamens* 3. ♀ *spikelets* enclosed in the bract with 2 bare pedicels. *Glumes* hyaline-membranous and inflated below, contracted into an acute cartilaginous beak, the upper acutely keeled between 2 deep grooves. *Florets* 2, the lower usually reduced to an empty lemma resembling the lower glume, *upper lemma* resembling the upper glume, with a broad palea. *Lodicules* 0. *Stamens* 3, rudimentary. *Style* long, deeply 2-fid, exerted from the mouth of the sheathing bract. *Grain* subglobose or ellipsoid, enclosed in the bract; embryo as long.

Annual; culms up to 5 ft. high; leaves linear-lanceolate, 5—18 in. long, .5—2 in. wide, base cordate, rarely narrowed; peduncles up to 3 in. long; ♀ bract .3—5 in. long; ♂ racemes 4—2 in. long; spikelets 2—3-nate; wings of lower glume .03—07 in. wide.....1. *Lachryma-Jobi*.
 Perennial; culms up to 15 ft. high; leaves linear, 1—4 ft. long, .1—7 in. wide, base narrowed or slightly rounded, not cordate; peduncles up to 7 in. long; ♂ racemes 7—2.5 in. long; spikelets usually 3-nate; wings of lower glume .02—05 in. wide.....2. *gigantea*.

1. COIX LACRYMA-JOBI, Linn.; F. B. I. vii. 100; S. I. G. fig. 126.

In all Districts except the hottest and driest localities; from near sea-level to 7,000 ft. Job's tears.

Sometimes cultivated by hill tribes for the grain. The stony bracts are strung by the hillmen into necklaces and other ornaments. The leaves are readily eaten by cattle. Vern. *Hind.* Sankru; *Tam.* Kattu-kundamani.

2. COIX GIGANTEA, Roxb. *C. Lachryma-Jobi*, Linn. var. *gigantea*, Stapf; F. B. I. vii. 100.

In the same localities as the last species.

3. *Chionachne*, R. Br.

Annual or perennial erect herbs. *Leaves* flat, narrow. *Inflorescence* of spiciform racemes; racemes entirely ♂ or with 1 or more ♀ spikelets at the base, at first enclosed in spathiform bracts; rachis articulate at the base and above each ♀ spikelet. ♂ *spikelet* 2-flowered, solitary or 2-nate and then one pedicelled. *Glumes* dissimilar, lower herbaceous, shallowly concave with a narrow membranous wing on each side, upper chartaceous or rarely herbaceous, narrower. *Lemmas* similar, membranous, paleate, both staminate or the upper empty. *Lodicules* 2, cuneate. *Stamens* 3. ♀ *spikelets* oblong, dorsally compressed, 2-flowered. *Glumes* very dissimilar; lower thickly coriaceous,

embracing but not concealing the rhachis between its inflexed margins, enclosing the upper glume and floret; upper membranous or chartaceous. *Lemmas* delicately hyaline; the lower empty, paleate or not; the upper narrow, its palea wrapped round the pistil. *Lodicules* 0. *Styles* very long. *Grain* orbicular, compressed, ventrally channelled, free inside the hardened lower glume.

Culms up to 2 ft. high; leaves up to 12 in. long, 1—25 in. wide; spathes always closed, 1—1.5 in. long, mucicous or mucronate; racemes solitary; ♀ spikelets 2—5, 27—34 in. long; ♂ spikelets usually many; wings of lower glume glabrous, not ciliate.....1. *semiteres*.

Culms up to 8 ft. high; leaves up to 3 ft. long, 22—65 in. wide; spathes chaffy, at first plicate, soon opening out, .5—1 in. long with an arista 2—5 in. long; racemes umbellated; ♀ spikelets solitary, 19—3 in. long; ♂ spikelets usually few; wings of lower glumes more or less puberulous, ciliate.....2. *Koenigii*.

1. CHIONACHNE SEMITERES, C. E. C. Fischer n. comb. *Polytoca semiteres*, Benth. ex Hook. f.; F. B. I. vii. 101.

S. Arcot District (Barber); Tinnevely District at Palamcottah (Wight).

2. CHIONACHNE KOENIGII, Thw. *Polytoca barbata*, Stapf ex Hook. f.; F. B. I. vii. 102; S. I. G. fig. 127.

Northern Districts as far as S. Bellary and Cuddapah; Nilgiri, N. Coimbatore and Travancore Hills; 200—3,500 ft. Vern. *Kan.* Suku dabha.

4. *Spinifex*, Linn.

Gregarious, much-branched, woody shrubs. *Leaves* rigid, thickly coriaceous, involute, spreading and recurved. *Inflorescence* dioecious, in large, terminal, globose, bracteate heads with radiating spiciform racemes. *Spikelets* articulate on the short pedicels; ♂ several, distichous in each raceme, 2-flowered; ♀ solitary, 1-flowered. *Glumes* chartaceous, acute, subequal or the upper slightly longer. *Lemmas* subequal, paleate; in ♂ both staminate or the lower empty; in ♀ the lower empty, the upper fertile. *Lodicules* 2, large, connate below, strongly nerved. *Stamens* 3. *Styles* 2, long, united below. *Staminodes* sometimes present in ♀ floret. *Grain* clavate, tipped with rigid style-base, free within the hardened lemma and palea.

SPINIFEX LITTOREUS, Merr. *S. squarrosus*, Linn.; F. B. I. vii. 63; S. I. G. figs. 105, 106.

Sea-shore sands in all coastal districts.

Whole plant pale grey or glaucous; stems forming thickets; leaves channelled, up to 13 in. long; ♂ heads up to 6 in. diam., bracts and rhachises pungent, spikelets 36—4 in. long; ♀ heads up to 13 in. diam.; bracts pungent up to 8 in. long, spikelets hidden at the base of the bracts, up to .52 in. long.

A useful sand-binder. Vern. *Ur.* Gudukanko; *Tel.* Ravani suruni misalu; *Tam.* Ravanan meesai.

5. *Imperata*, Cyrill.

Erect, perennial herbs; culms leafy, solid. *Leaves* narrow. *Inflorescence* a terminal, spiciform or thyrsiform panicle. *Spikelets* all alike, generally 2-nate, one short-, the other long-pedicelled,

disarticulating from the pedicels; 2-flowered, the lower usually reduced to an empty lemma, rarely ♂. *Glumes* subequal, membranous, enveloped in long silky hairs from the obscure callus and from the lower half of the glume. *Lemmas* hyaline, mucicous; the lower usually much smaller than the glumes; the upper still smaller, with a broad palea. *Lodicules* 0. *Stamens* 1—2. *Styles* 2, connate below. *Grain* oblong; embryo half as long or longer.

IMPERATA, CYLINDRICA, Beauv.

Var. *Koenigii*, Dur. et Schinz. *I. arundinacea*, Cyr.; F. B. I. vii. 106 in part.; S. I. G. fig. 128.

In all Districts, usually in wet situations; sea-level to 7,000 ft. Root-stock stoloniferous, often creeping; culms 1—4 ft. high; leaves 2—2.5 in. long, 1—6 in. wide; panicles 1—8.5 in. long, narrow, white-silky hairy. Cotton grass.

Eaten by cattle only when young and tender. Vern. *Hind.* Dabh.; *Tel.* Dharba, Modewa gaddi; *Tam.* Tharpai pullu, Dharbai pul; *Kan.* Sanna dabbai hullu.

6. *Miscanthus*, Anderss.

Tall, perennial herbs. *Leaves* flat, narrow, long. *Inflorescence* terminal, of numerous spiciform racemes crowded into a usually nodding, fan-shaped corymb; rhachis slender, not articulated. *Spikelets* in similar pairs at the nodes, one long—the other short-petioled, 1-flowered, the callus with long hairs forming a quasi involucre. *Glumes* chartaceous, subsimilar. *Lemmas* hyaline; the lower empty; the upper narrower, 2-toothed or 2-lobed, usually with an awn from the sinus; palea usually minute, containing a bisexual floret. *Lodicules* 2. *Stamens* 2—3. *Styles* 2, free. *Grain* oblong; embryo half as long.

MISCANTHUS NEPALENSIS, Hack.; F. B. I. vii. 107.

Nilgiris at Ootacamund; 7,500 ft. (Narayana and Raju, possibly introduced); without precise locality (Ramaswami). Culms up to 6 ft. high; leaves up to 18 in. long and 6 in. wide; corymbs up to 9 in. long; callus of spikelets very short, bearing numerous fine, brown hairs up to 3/4 in. long; glumes brown, 0.8—1.2; awns 1.4—4.2 in. long.

7. *Cleistachne*, Bentham.

Annual or perennial erect herbs. *Leaves* flat, elongate. *Panicles* narrow. *Spikelets* solitary, all alike; pedicels slender with thickened tips. *Glumes* subequal and similar, more or less coriaceous. *Lemmas* hyaline; the lower empty, without palea; the upper shorter, entire or 2-toothed, with a stout geniculate awn; palea short, containing a bisexual floret. *Lodicules* 2, cuneate, ciliate. *Stamens* 3. *Styles* 2, free. *Grain* oblong to obovoid-oblong, free; embryo half as long.

CLEISTACHNE STOCKSII, Hook. f.; F. B. I. vii. 162.

Bababudan Hills (Law); Travancore at Santhapara, 4,000 ft. (Meebold).

Culms up to 4 ft. high; leaves 10—16 in. long, 2—3 in. wide, more or less soft-hairy, margins spinulose; panicles 6—10 in.

long, rhachis and pedicels slender, rufous-hairy; glumes 15—18 in. long, dark-brown, rufous-hairy; awns 5—1 in. long.

8. Saccharum, Linn.

Erect, perennial, tall or very tall herbs; culms usually solid. *Leaves* narrow, flat, sometimes rolled up when dry. *Inflorescence* of large terminal panicles of racemes, often very silky and showy; rhachis articulate and fragile. *Spikelets* usually surrounded by long silky hairs from their bases, 2-nate, one pedicelled and falling from the pedicel, the other sessile and falling with the joints of the rhachis; florets 2. *Glumes* 2, equal, often subcoriaceous or chartaceous below, membranous to hyaline upwards. *Lemmas* hyaline; the lower empty; the upper sometimes awned, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or shortly connate. *Grain* oblong to subglobose; embryo half as long or shorter.

Callus-hairs at least twice as long as the spikelets; glumes glabrous on the back; lemmas not cuspidate:—

Glumes uniform, whitish throughout, 12—15 in. long. Culms up to 20 ft. high; leaves up to 5 ft. long and 2 in. wide; panicles up to 3 ft. long, densely silvery.....1. *officinarium*.

Glumes coriaceous and brown below, subhyaline and white in the upper $\frac{1}{2}$. 14—17 in. long. Culms up to 15 ft. high; leaves 1—4 ft. long, 2—5 in. wide; panicles up to 2 ft. long, usually rather contracted, silvery.....2. *spontanum*.

Callus-hairs much shorter than the spikelets; glumes uniformly membranous, pale or brown with darker tips, white- or yellowish-villous on the lower $\frac{1}{2}$ of the back; lemmas cuspidate:—

Leaves up to 6 ft. long, 8—2 in. wide. Culms up to 20 ft. high; panicles effuse, white villous, up to 30 in. long; joints of rhachis 18—2 in. long, pedicels shorter, both white-villous; glumes 12 in. long, acute, white-villous except the glabrous upper one of the sessile spikelets.....3. *arundinaceum*.

Leaves up to 3.5 ft. long, 1—2.5 in. wide. Culms up to 10 ft. high; panicles rather contracted, yellowish-villous, up to 16 in. long; joints of rhachis and pedicels 1—12 in. long, yellowish-villous; glumes 15—19 in. long, acuminate, yellowish-villous.....4. *ciliare*.

1. SACCHARUM OFFICINARUM, Linn.; F. B. I. vii. 118.

Cultivated in most Districts. The Sugar-cane.

The sap is extracted from the culms by crushing and boiled down to sugar. The residue after crushing can be utilized for paper making and for cordage. The leaves are used as fodder. Vern. *Hind.* Ukh; *Ur.* Aku; *Tel.* Cheruku; *Tam.* Karumbu; *Mal.* Karimbu; *Kan.* Khabbu.

2. SACCHARUM SPONTANEUM, Linn.; F. B. I. vii. 118; S. I. G. fig. 129.

In all Districts, usually near water; sea-level to 5,000 ft.

A good fodder for buffaloes; the leaves are used for thatching. Vern. *Hind.* Kans; *Tel.* Rellu gaddi.

3. SACCHARUM ARUNDINACEUM, Retz.; F. B. I. vii. 119.

Tinnevelly District and Travancore.

The culms are used for hut walls and for screens. Vern. *Tam.* Pi Karumbu; *Kan.* Hodakai hullu.

4. SACCHARUM CILIARE, Anderss. *S. arundinaceum* Retz.; F. B. I. vii. 119 in part.

Ganjam District.

9. *Eriochrysis*, Beauv.

Perennial herbs. *Leaves* mostly crowded at the base, very narrow. *Inflorescence* a contracted, hairy panicle of spiciform racemes; rhachis articulate, fragile. *Spikelets* 2-nate, one sessile, the other pedicelled, differing usually slightly in size and often in sex, the pedicelled falling from its pedicel, the sessile falling with the contiguous joint of the rhachis and the pedicel. *Florets* 2, the lower reduced to an empty lemma, the upper bisexual or sometimes in the pedicelled spikelet the stamens 0 or rudimentary. *Glumes* subequal, chartaceous or coriaceous. *Lemmas* hyaline, without paleas. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* obovoid to ellipsoid-globose; embryo half as long.

ERIOCHRYSIS RANGACHARII, C. E. C. Fischer in Kew Bull. 1932, 246.

At Pykara, Nilgiri Hills; 6,000 ft. (K. Ranga Achari).

Culms wiry, 5—12 in. high; leaves very narrow, plicate or more or less expanded above with involute margins, basal up to 9 in. long and 2 in. wide, softly villous; racemes 3—4; spikelets narrowly lanceolate, 15—25 in. long, surrounded by long, dense, rufous hairs; glume-margins long rufous-ciliate; florets of both spikelets usually bisexual.

10. *Spodiopogon*, Trin.

Tall, usually perennial herbs. *Leaves* flat, often petioled. *Inflorescence* of paniced 2—3-nate spikelets; rhachis jointed. *Spikelets* usually one sessile and 1—2-pedicelled, 1—2-flowered, the lower ♂, or empty, the upper bisexual. *Glumes* subequal, membranous, sometimes aristate. *Lemmas* hyaline; lower plicate, paleate or not; upper deeply 2-lobed or 2-partite with a long slender awn from the sinus, its palea short. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* free, narrowly fusiform.

SPODIOPOGON ALBIDUS, Benth.; F. B. I. vii. 108.

Mysore State; W. Coast and Ghâts: Ramandrug and Hospet in the Bellary District; up to 7,000 ft.

Culms tufted, much branched, straggling, up to 4 ft. high; leaves flaccid, acuminate, often aristate, 2—10 in. long, 4—14 in. wide, base narrowed into a petiole 4—3.5 in. long; panicle at first enclosed in a long spathaceous sheath; rhachis and pedicels more or less densely silky-hairy; glumes 22—27 in. long, sometimes aristate, more or less villous; lemmas 16—24 in. long; awns 5—8 in. long.

11. *Dimeria*, R. Br.

Slender, annular or perennial herbs. *Leaves* narrow. *Inflorescence* of terminal solitary, twin or fascicled slender spikes or, more usually, spiciform racemes; rhachis inarticulate, terete, angular or flat. *Spikelets* solitary, secund, bifarious, laterally strongly compressed, articulate on the rhachis or on a very short, rarely long, pedicel, 2-flowered. *Glumes* 2, rigid, coriaceous, chartaceous or membranous, keeled, often divaricate in flower, subequal or the upper larger, with usually hyaline margins and the keel sometimes winged. *Lemmas* shorter, hyaline; the

lower empty and without palea; the upper complicate, bifid with a slender long awn from the sinus, its palea small, containing a bisexual floret. *Lodicules* 0 or 2, minute, rarely well developed. *Stamens* 2 or 3. *Styles* 2, free. *Grain* linear, compressed, free within the lemmas.

Rhachis of raceme terete or angled; leaves sparingly ciliate; awns geniculate:—
Internodes of rhachis less than half as long as the upper glume; glumes coriaceous, upper 2—3 in. long including an arista, winged all down the keel and ciliate. Culms 3—7 in. high; leaves 1—2 in. long; racemes solitary; callus .05 in. long.....1. *avenacea*.

Internodes more than half as long as the upper glume; glumes chartaceous, not winged; callus very short:—

Racemes 2, rarely 3 or 1, .9—1.6 in. long. Culms very slender, 5—8 in. high; leaves 1 in. long; glumes subequal, about .13 in. long; upper lemma .11 in. long; awn .28 in. long.....2. *Hohenackeri*.

Racemes 3—5 or more, 3—5 in. long. Culms 2—3 ft. high; leaves 2—6 in. long; lower glume .14—26 in. long, acuminate, upper .15—28 in. long; upper lemma .13—21 in. long; awn .3—45 in. long.....3. *gracilis*.

Rhachis of raceme flat, sometimes keeled on one face:—

Awns geniculate:—

Glumes not winged or upper sometimes narrowly so at apex only:—

Culms slender or very slender; leaves and sheaths glabrous or sparingly hairy, not villous, .1 in. wide; glumes membranous:—

Margins of rhachis ciliate. Culms 2—20 in. high; leaves 1—2 in. long; sparingly ciliate; racemes solitary or twin, .7—2.5 in. long; glumes ciliate, lower .1—17 in. long, upper .11—2 in. long, often narrowly winged at apex; upper lemma .07—09 in. long; awn .28—4 in. long...4. *Thwaitesii*.

Margins of rhachis glabrous or asperulous; leaves more or less hairy; racemes 2- or 3-nate, .7—2 in. long; glumes not ciliate or the upper at the apex only:—

Rhachis .03 in. wide. Culms 2—10 in. high; leaves 1—3 in. long; lower glume .08—1 in. long, upper .1—2 in. long; upper lemma .07—08 in. long; awn .3—4 in. long.....5. *ornithopoda*.

Rhachis very slender. Culms 4—14 in. high; leaves 1—1.5 in. long; lower glume .06—07 in. long, upper .07—08 in. long; upper lemma .05—066 in. long; awn .23—3 in. long.....6. *tenera*.

Culms comparatively robust, up to 2 ft. high; leaves and sheaths usually densely villous, 3—6 in. long, .2 in. wide; racemes usually 2, 2.5—3.5 in. long; rhachis .03—05 in. wide, its margins villous; glumes chartaceous, villous, lower .15—18 in. long, upper .18—2 in. long, apex sometimes narrowly winged; upper lemma .1—14 in. long; awn .3—4 in. long.....7. *pubescens*.

Upper glume distinctly winged, wing corky:—

Racemes usually solitary, .7—1.3 in. long. Culms 2—8 in. high; leaves 1—2 in. long; margins of rhachis ciliate; lower glume .17 in. long, not winged, upper .18—22 in. long, keel narrowly winged throughout and ciliate; upper lemma .12—13 in. long; awn .36—45 in. long.....8. *Lawsoni*.

Racemes 2- or 3-nate, .5—1.2 in. long. Culms 7—14 in. high; leaves 2—3 in. long; rhachis glabrous; lower glume .12—16 in. long, its keel narrowly winged throughout, upper .13—17 in. long, its keel broadly winged and ciliate; upper lemma .1—15 in. long; awn .35—42 in. long.....9. *bialata*.

Awns not geniculate, .3—33 in. long. Culms 10—18 in. high; leaves 2—6.5 in. long, glabrous or nearly so; racemes 2- or 3-nate, 2—5 in. long; lower glume .1—12 in. long, obtuse, upper .13—15 in. long, ciliate, sometimes narrowly winged at apex; upper lemma .1—12 in. long.....10. *Lehmanni*.

1. DIMERIA AVENACEA, C. E. C. Fischer, n. comb. *D. pusilla*, Thw.: F. B. I. vii. 103.

Mahendragiri, Ganjam District (Fischer); Kambakkam, Nellore District (Bourne); Tranquebar (Koenig *vide* Retzius).

2. DIMERIA HOHENACKERI, Hochst.; F. B. I. vii. 103.

Mangalore (Hohenacker).

In rice fields.

3. *DIMERIA GRACILIS*, Nees; F. B. I. vii. 105.
S. Kanara District.
4. *DIMERIA THWAITESII*, Hack. *D. pusilla*, Thw. var. *pallida*, Thw.;
F. B. I. vii. 103.
W. Coast; Madras; Travancore; sea-level to 3,000 ft.
In rice fields.
5. *DIMERIA ORNITHOPODA*, Trin.; F. B. I. vii. 104 in part.
Mysore State, 2,000—3,000 ft. (Meebold); Malabar; Travancore.
6. *DIMERIA TENERA*, Trin. *D. ornithopoda*, F. B. I. vii. 104 in part.
Godavari District at Bison Hill (Barber); S. Kanara and Mala-
bar Districts; Bababudan, Mysore, Nilgiri and Travancore
Hills; from sea-level to 5,000 ft.
7. *DIMERIA PUBESCENS*, Hack.; F. B. I. vii. 105.
Mysore State, 3,000—3,500 ft. (Meebold).
In wet localities.
8. *DIMERIA LAWSONI*, C. E. C. Fischer n. comb. *D. pusilla*, Thw.
var. *Lawsoni*, Hook. f.; F. B. I. vii. 103.
Mysore (Meebold); Coorg (Lawrie); Wynaad (Lawson); 2,000—
3,000 ft.
On granite rocks (Meebold).
9. *DIMERIA BIALATA*, C. E. C. Fischer in Kew Bull., 1933, 351.
S. Kanara District at Siradi (Meebold).
10. *DIMERIA LEHMANNI*, Hack.; F. B. I. vii. 104.
Kambakkam Hills (Bourne).

12. *Pogonatherum*, Beauv.

Slender annual or perennial erect herbs. *Culms* branching, leafy. *Leaves* flat, narrow, suberect. *Racemes* terminal, solitary; rachis fragile. *Spikelets* 2-nate, one sessile the other pedicelled, 1—2-flowered; callus bearded with fine hairs. *Glumes* membranous; lower truncate, rounded on the back; upper usually longer, keeled, 2-fid with a long slender awn from the sinus. *Lemmas* hyaline; lower usually absent from the pedicelled spikelet; upper 2-fid, with a slender awn from the sinus, its palea broad, containing a bisexual floret. *Lodicules* 0. *Stamens* 1—2. *Styles* 2, free, short. *Grain* oblong, free; embryo $\frac{1}{2}$ as long.

POGONATHERUM PANICEUM, Hack. *P. saccharoideum*, Beauv.; F. B. I. vii. 141.

Godavari District; Mysore State at 2,000 ft. (Meebold); W. Coast and Gháts; up to 6,000 ft.

Culms 2—12 in. high, tufted; *leaves* .8—2 in. long, .05—1 in. wide; *racemes* .5—1.3 in. long; rachis subtrigonal, joints and flat pedicels .03—0.05 in. long, long-ciliate; hairs of callus white, .1—1.8 in. long; *glumes* .04—0.09 in. long; *lemmas* .03—0.07 in. long; *awns* .5—1 in. long.

13. *Eulalia*, Kunth

Annual or more often perennial, erect herbs. *Leaves* narrow. *Inflorescence* of digitate or fascicled, rarely solitary, spiciform racemes; rachis readily disarticulating; joints and pedicels long-ciliate. *Spikelets*

2-nate, similar, one pedicelled, the other sessile. *Glumes* 2, subequal, membranous or chartaceous; lower dorsally flat or depressed with inflexed, more or less keeled margins; upper usually boat-shaped, 1-keeled. *Lemmas* hyaline, dissimilar; lower ♂ or empty, sometimes suppressed, rarely with a palea; upper usually much shorter, rarely entire, usually 2-fid, often deeply so, with a long awn from the sinus, usually without palea, enclosing a bisexual floret. *Lodicules* 2. *Stamens* usually 3. *Styles* 2, free. *Grain* oblong or obovate-oblong; embryo $\frac{1}{2}$ — $\frac{2}{3}$ as long.

Leaves flat, acute, 3—9 in. long, 2—45 in. wide. Culms 2—3 ft. high; racemes 4—8, 2—6 in. long; joints and pedicels .14—.16 in. long; glumes .21—.24 in. long, lower 4-nerved, at least in the pedicelled spikelet; upper lemma .1—15 in. long, its awn .44—.63 in. long.....1. *quadrinervis* var. *Wightii*.

Leaves usually convolute, finely acuminate, up to 16 in. long, .1—25 in. wide; lower glume nerveless or 2-nerved:—

Hairs of the racemes white. Culms 9—43 in. high, quite glabrous; lower sheaths glabrous; racemes 2—17, rarely 1, 1.5—8 in. long; joints and pedicels .08—.11 in. long; glumes .1—.16 in. long; upper lemma .06—.1 in. long, hardly wider than its awn; awn .38—.54 in. long.....2. *tristachya*.

Hairs of the racemes usually reddish-brown, rarely greyish; culms 10—52 in. high, densely white- or brown-silky for a short distance below the inflorescence; lower sheaths usually red-brown tomentose at the base; racemes 2—11, 1—5.5 in. long; joints and pedicels .1—.16 in. long; upper lemma .1—.17 in. long, decidedly wider than its awn; awn .5—.8 in. long.....3. *phaeothrix*.

1. EULALIA QUADRINERVIS, O. Ktze.

Var. *Wightii*, Hook. f. *Pollinia quadrinervis*, Hack. var. *Wightii*, Hook. f.; F. B. I. vii. 110.

Rampa Hills at 4,500 ft. (Narayanswami); Pulney Hills; 6,000—7,000 ft. (Wight, Bourne).

2. EULALIA TRISTACHYA, O. Ktze. *Pollinia argentea*, Trin.; F. B. I. vii. 111.

W. Coast and Gháts; Kambakkam Hills; sea-level to 5,000 ft.

A good fodder when young.

3. EULALIA PHAETHRIX, O. Ktze. *Pollinia phaeothrix*, Hack.; F. B. I. vii. 112.

Rampa Hills (Narayanswami); N. Coimbatore and Sirumalai Hills; W. Gháts; 3,000—8,800 ft.

Very common in open downs at high elevations.

14. Pseudopogonatherum, A. Camus

Annual erect herbs. *Leaves* very narrow, often inrolled. *Inflorescence* of few to many spiciform racemes approximate on a common, persistent axis. *Spikelets* 2-nate, both pedicelled and falling from the pedicels or less often one of them sessile and falling with the pedicel of the other. *Glumes* chartaceous or membranous, lower rounded or flat on the back with inflexed margins, upper often aristate or mucronate. *Lemmas* hyaline, lower ♂, empty or sometimes suppressed, upper narrow, often bifid, with a long awn. *Lodicules* 2. *Stamens* usually 3. *Style* 2, free. *Grain* oblong or obovate-oblong; embryo $\frac{1}{2}$ — $\frac{2}{3}$ as long.

PSEUDOPOGONATHERUM CONTORTUM, A. Camus. *Pollinia articulata*, Trin.; F. B. I. vii. 109.

Goonsur in Ganjam District (Gamble); Kodagundi Reserved Forest in Vizagapatam District (Jacob).

Culms up to 3·5 ft. high; leaves 4—10 in. long, ·05—·07 in. wide; racemes 4—13, 1—2·5 in. long, rhachis and pedicels white-hairy; both spikelets pedicelled; lower glume ·08—·09 in. long, ciliate, upper with a capillary awn ·12—·17 in. long; awn of upper lemma geniculate, ·7—·8 in. long.

15. *Microstegium*, Nees

Annual or perennial, erect or decumbent herbs. *Leaves* flat, narrowed to the base and often petioled. *Inflorescence* of fascicled, spiciform racemes; rhachis readily disarticulating; joints and pedicels usually long-ciliate. *Spikelets* 2-nate, one sessile, the other pedicelled, similar. *Glumes* membranous or chartaceous, the lower dorsally longitudinally channelled, with more or less keeled margins, upper boat-shaped, medially keeled. *Lemmas* hyaline, lower ♂ or empty, rarely paleate, sometimes absent, upper much shorter, 2-fid with a long awn from the sinus, usually without palea. *Lodicules* 2. *Stamens* 1, 2 or 3. *Styles* 2, free. *Grain* oblong or obovate-oblong.

Racemes 2—10, fascicled, 1·5—3 in. long; margins of joints and pedicels densely ciliate; callus shortly bearded. Culms up to 4 ft. high; leaves sometimes shortly petioled, 1—4·5 in. long, ·2—·5 in. wide; glumes of sessile spikelet ·14—·15 in. long; awns very slender, ·2—·4 in. long.....1. *ciliatum*.
Racemes 3—6, somewhat distant, 1—4 in. long; joints and pedicels slender, glabrous or slightly ciliate at the base only; callus not bearded, Culms up to 5 ft. high; leaves 1—2 in. long, ·3—·5 in. wide; glumes of sessile spikelet ·15—·18 in. long; awns capillary ·5—·7 in. long.....2. *nudum*.

1. *MICROSTEGIUM CILIATUM*, A. Camus. *Pollinia ciliata*, Trin.; F. B. I. vii. 116.
Pulney and Travancore Hills; 6,000 ft.
2. *MICROSTEGIUM NUDUM*, A. Camus. *Pollinia nuda*, Trin.; F. B. I. vii. 117.
Pulney Hills; 5,000—7,000 ft.

16. *Pollinidium*, Stapf ex Haines

Densely tufted perennial herbs; rootstock and basal sheaths woolly. *Leaves* convolute, wiry. *Inflorescence* of more or less paniced, digitate or fascicled, spiciform racemes; rhachis compressed, articulated, fragile. *Spikelets* 2-nate, one sessile, the other pedicelled, similar; callus densely clothed with long brown hairs. *Glumes* 2; lower flattened, 2—3-toothed, 5—7-nerved, margins inflexed, hairy on the back at the base; the upper cymbiform, cuspidate or aristate, 3—5-nerved. *Lemmas* hyaline; lower elliptic, its palea finely ciliate; upper narrow, conduplicate, entire or 2-toothed, finely awned from the tip or the sinus, its palea broad, nearly as long, densely ciliate at the apex. Other characters as in *Ischaemum*.

POLLINIDIUM BINATUM, C. E. Hubbard. *Ischaemum angustifolium*, Hack.; F. B. I. vii. 129.

Ganjam, Vizagapatam and Godavari Districts.

Culms 1—3 ft. high; leaves up to 3 ft. long and ·16 in. wide; the old sheaths white-woolly at the base; racemes 1—4, 1—2 in. long; joints slender, ·12—·16 in. long, glabrous or with a line

of hairs, densely rusty- or golden-villous at the base, pedicels similar, shorter; lower glumes chartaceous, .13—.16 in long; upper lemmas .13—.15 in. long; awns .16—.28 in. long.

Used for paper-making and locally for fibre, cordage and mats. Eaten by cattle when young. Vern. *Hind.* Bhabar, Sabai; *Ur.* Babuli.

17. *Ischaemum*, Linn.

Usually perennial. *Leaves* convolute when young, eventually flat, usually narrow, sometimes petioled. *Inflorescence* of twin, digitate, fascicled or corymbose spiciform racemes; rhachis compressed, readily disarticulating; joints and pedicels flattened or subconcave on the inner side, often stout. *Spikelets* 2-nate, one sessile or with a short pedicel and falling with the contiguous joint, the other long-pedicelled and falling from the pedicel, the pairs alike or differing only in sex or more or less heteromorphous; florets 2, generally the lower ♂, the upper bisexual, rarely ♂ or empty in the long pedicelled spikelet. *Glumes* subequal, lower flattened or somewhat convex, rarely concave on the back, coriaceous below, chartaceous and sometimes strongly nerved towards the apex, seldom chartaceous throughout, entire or 2-fid and cuspidate, with more or less keeled, inflexed margins: upper glume boat-shaped, medially keeled at least towards the apex, sometimes awned. *Lemmas* hyaline to rigidly membranous; lower mucicous; upper of sessile spikelet usually 2-fid and geniculately awned from the sinus, rarely mucronate or mucicous; that of the long-pedicelled spikelet sometimes similar but more often entire and awnless; the paleas hyaline, subequal to the lemmas. *Lodicules* 2. *Stamens* 3, sometimes small or rudimentary in the fertile florets. *Styles* 2, free. *Grain* oblong or lanceolate, dorsally compressed; embryo about half as long.

Sessile spikelets, at least, awned:—

Margins of lower glume of sessile spikelets expanded below the middle, incurved at the base, apex 2-toothed or -cuspidate; upper lemmas of both spikelets 2-lobed to about the middle with an awn from the sinus:—

Racemes 2, rarely 3:—

Lower glume of sessile spikelet distinctly winged at apex, .15—.18 in. long, upper glume and lower pedicelled spikelet 1-keeled and winged at the apex. Culms often creeping at the base, 2—30 in. high; leaves rounded or narrowed at the base, sessile, 1.5—9.5 in. long, .05—.5 in. wide, sparsely to densely hairy; awns .3—.5 in. long.....1. *aristatum*.

Lower glume of sessile spikelets not winged. Culms slender, up to 3 ft. high:—

Lower leaves, at least, acute at base, hairy, 1—3.2 in. long, .2—.5 in. wide, often narrowed into a rather broad petiole up to .75 in. long; racemes .8—2.5 in. long; rhachis distinctly undulate; lower glume of sessile spikelets .13—.18 in. long, ribbed at the apex, more or less hirsute, upper glume minutely 2-lobed, mucronate or cuspidate, keeled upwards, not winged; awns of sessile spikelets .28—.54 in. long, of pedicelled shorter and finer.....2. *timorense*.

Leaves rounded or attenuate at base, 2—4 in. long, .15—.25 in. wide, glabrous or with a few ciliae, sometimes the lowest tapering into a petiole up to 1 in. long; racemes 1—2 in. long; rhachis nearly straight; lower glume of sessile spikelets .14—.26 in. long, strongly nerved at apex, bristly in the middle or hirsute below the middle, upper glume keeled and narrowly winged upwards, with a tuft of hairs below the wing, apex

- minutely 2-toothed with an arista .1—28 in. long; awns of both spikelets .4—1 in. long.....3. *Thomsonianum*.
 Racemes corymbose, 7—12, rarely as few as 3 or up to 16, 1.5—3.5 in. long, silvery hirsute. Culms robust, rooting below, up to 24 in. high; leaves sessile, usually narrowed at base, sometimes rounded, 2.5—9.5 in long, .2—75 in. wide, softly hairy, rarely glabrous; lower glume of sessile spikelets not winged; awns of both spikelets .3—45 in. long.....4. *nilagiricum*.
 Margins of glumes narrowly inflexed, not expanded below; lower glume of pedicelled spikelets flat, 2-keeled:—
 Lower glume, at least, of pedicelled spikelet, winged, its upper lemma entire, awnless; Racemes 2—3, rarely 1:—
 Lower glume of sessile spikelets .34—36 in. long with 3—4 nodules on each margin in the lower part, sometimes connected by rounded transverse ridges, keels narrowly winged. Whole plant glabrous; culms robust; leaves rounded or emarginate at the base, sessile, up to 15 in. long and 1.3 in. wide; racemes 3, up to 4.3 in. long; joints .1 in. wide; lower glume of pedicelled spikelets smooth, with a wide wing on one keel; lemmas brown, awn of sessile spikelets .36 in. long.....5. *Koenigii*.
 Lower glume of sessile spikelets .16—28 in. long; rhachis of racemes, at least, hairy:—
 Pedicels usually more than $\frac{1}{4}$ as long as the sessile spikelets, rarely only $\frac{1}{4}$. Culms slender, erect, 5—36 in. high; leaves rounded or emarginate at base and sessile or narrowed into a petiole up to 2 in. long, more or less hairy, .8—6 in. long, .12—7 in. wide; racemes 1—2.8 in. long; lower glume of sessile spikelets smooth or with 1—3 shallow marginal nodules usually joined by shallow curved, transverse ridges, keels narrowly winged above, glabrous, lower glume of pedicelled spikelets smooth, one keel widely winged, the other wingless or very narrowly winged at apex; awn .3—54 in. long.....6. *commutatum*.
 Pedicels less than half as long as the sessile spikelet:—
 Leaves, at least the lower, cordate or sagittate at base:—
 Pedicels and joints plano-convex, ciliate to densely villous; lower glume of sessile spikelets with 3—6 marginal nodules below the middle, usually connected by transverse ridges, sometimes smooth, keels usually narrowly winged at apex:—
 Leaves, at least some, petioled, base deeply cordate to acutely sagittate, .8—3.5 in. long, .2—5 in. wide. Culms slender, often decumbent at base, up to 20 in. high; racemes 1—2 in. long; lower glume of sessile spikelets narrowly lanceolate, transverse ridges usually irregular and shallow, rarely regular and deep; lower glume of pedicelled spikelets similar but more often smooth or the nodules and ridges more shallow and one keel broadly winged; awn .42—9 in. long.....7. *semisagittatum*.
 Leaves all sessile, shallowly cordate, 2—6.5 in. long, .15—4 in. wide. Culms rather stout, up to 36 in. high; racemes 2—4.6 in. long; lower glume of sessile spikelets ovate or lanceolate-oblong; lower glume of pedicelled spikelets smooth or sometimes faintly noduled, one keel with a wide crescent-shaped wing; awn .4—76 in. long.....8. *molle*.
 Pedicels and joints acutely trigonous, outer angle long-ciliate. Culms erect from a prostrate base, 10—16 in. high; leaves more or less cordate at base, sessile or petioled, .8—3.4 in. long, .12—4 in wide, petioles up to 1 in. long; racemes 1—2.8 in. long; lower glume of sessile spikelets obliquely linear-lanceolate, margins in basal $\frac{1}{4}$ with 2—5 horny, large almost keeled nodules, quite smooth between the margins, in the apical $\frac{1}{4}$ one keel broadly, the other narrowly winged; lower glume of pedicelled spikelets similar but smooth; upper lemma of sessile spikelets usually 2-lobed to below the middle, its awn .4—68 in. long, that of the pedicelled spikelet tapered into a fine arista .1—15 in. long.....9. *Rangacharianum*.
 Leaves not cordate or sagittate:—
 Lower glume of sessile spikelets with 5 horny, usually sharp, deep, regular, seldom irregular, transverse ridges in the lower part, the

keels unequally winged in the upper part. Culms stout, 12—45 in. high; leaves tapered to an acute base, 6—13 in. long, .15—.4 in. wide; racemes 1—3.2 in. long; joints and pedicels plano-convex, stout, outer margin hairy; lower glumes of pedicelled spikelets smooth or more or less ridged, one keel with a wide crescent-shaped wing; lemma of sessile spikelet 2-lobed to below the middle; awn .5—.8 in. long

10. *rugosum*.

Lower glume of sessile spikelets with marginal nodules not extended across the glume or if meeting the ridges very shallow and irregular; lower glume of pedicelled spikelets with one broad and one narrow wing. Culms rather stout, up to 3 ft. high:—

Lower glume of sessile spikelets not or very narrowly winged at apex, below with 2—6 rounded marginal nodules sometimes joined by shallow irregular transverse ridges. Leaves 2.5—6 in. long, .4—.65 in. wide, base rounded, sometimes with a short tomentose petiole; racemes 2.5—4.5 in. long; joints and pedicels obtusely trigonous, glabrous or sparsely hairy on the back; lower glume of pedicelled spikelets oblong, smooth or rugulose; awn up to .62 in. long, sometimes short or even absent.....11. *travancorensis*.

Lower glume of sessile spikelets oblique, the basal $\frac{3}{4}$ with 2—5 marginal nodules, smooth between the margins, one keel broadly the other narrowly winged at apex. Leaves tapering to the base, 1.5—9.5 in. long, .1—.25 in. wide; racemes 1.5—4 in. long; joints and pedicels acutely trigonous, up to .1 in. wide, one angle hairy; lower glume of pedicelled spikelets lanceolate, smooth; awn .23—.52 in. long.....12. *mangaluricum*.

Glumes not winged. Rhizome stoloniferous; culms erect, up to 4 ft. high; leaves 2—14 in. long, .15—.33 in. wide; racemes 3—6, rarely only 2, 3—8 in. long; joints and pedicels subclavate, compressed, yellow- or brownish-pilose; lower glumes of both spikelets narrowly lanceolate; awn slender, .3 in. long; upper lemma of pedicelled spikelets shortly 2-lobed, with a slender arista .1—.2 in. long.....13. *pilosum*.

Both spikelets awnless. Rhizome creeping, stout; culms erect, slender, 7—20 in. high; leaves 1—5.4 in. long, .15—.5 in. wide, base rounded or shallowly cordate, sometimes very shortly petioled; racemes 2, .9—1.5 in. long; joints and pedicels stout, sharply trigonous, more or less ciliate; lower glumes of both spikelets smooth, shining, .25 in. long, narrowly winged at apex; lemma of sessile spikelet shortly 2-lobed, usually with a mucro.....14. *muticum*.

1. ISCHAEMUM ARISTATUM, Linn. *I. ciliare*, Retz.; F. B. I. vii. 133; S. I. G. figs. 135, 136.

Common in all Districts; sea-level to 8,000 ft.

Vern. *Tel.* Erruthota gaddi; *Kan.* Mohbu ganjalu garikai hullu.

Var. *Barberi*, C. E. C. Fischer n. var. More robust, nearly glabrous, more coriaceous; lower glume of sessile spikelet with wide ear-shaped wings at apex; upper lemma of pedicelled spikelets with a slender arista .1—.2 in. long.

Mangalore (Barber No. 4803).

2. ISCHAEMUM TIMORENSE, Kunth; F. B. I. vii. 136.

W. slopes of Nilgiris; N. Coimbatore Hills; W. Coast in Malabar and Travancore; up to 3,000 ft.

Vern. *Kan.* Nilamunga hullu.

Var. *villosum*, C. E. C. Fischer n. var. Joints of rhachis, pedicels and lower glume of sessile spikelets densely villous.

3. ISCHAEMUM THOMSONIANUM, Stapf MS., n. nom. *I. murinum*, Hook. f. non Forst.; F. B. I. vii. 135.

Mysore; Cochin; Travancore; up to 3,000 ft.

4. *ISCHAEMUM NILAGIRICUM*, Hack. *I. hirtum*, Hook. f. non Hack.; F. B. I. vii. 135 in part.
Kistna (Barber) and Salem Districts; Nilgiri and Pulney Hills; up to 6,500 ft.
5. *ISCHAEMUM KOENIGII*, Stapf MS. n. comb. *I. aristatum*, Hook. f. non Linn. subsp. *Koenigii*, Hook. f.; F. B. I. vii. 127.
Precise locality unknown (Koenig).
6. *ISCHAEMUM COMMUTATUM*, Hack.; F. B. I. vii. 131.
W. Gháts, 2,000—7,000 ft.
7. *ISCHAEMUM SEMISAGITTATUM*, Roxb.; F. B. I. vii. 130. *I. conjugatum*, Roxb.; F. B. I. vii. 131.
W. Coast and Gháts; up to 4,000 ft.
8. *ISCHAEMUM MOLLE*, Hook. f.; F. B. I. vii. 128.
Mysore State, 2,000—3,500 ft. (Meebold); W. Coast, near sea-level.
9. *ISCHAEMUM RANGACHARIANUM*, C. E. C. Fischer in Kew Bull., 1933, 352; *I. aristatum*, Ranga Achariar et Tadulingam non Linn.; S. I. G. fig. 130.
Malabar and Travancore; at low elevations.
10. *ISCHAEMUM RUGOSUM*, Salisb.; F. B. I. vii. 127; S. I. G. fig. 132.
In all Districts; up to 6,000 ft.
Eaten when young by horses and cattle; grain occasionally eaten by the poor. Vern. Tam. Kadukken pillu.
11. *ISCHAEMUM TRAVANCORENSE*, Stapf ex C. E. C. Fischer in Kew Bull., 1933, 353.
Wynaad and Travancore.
12. *ISCHAEMUM MANGALURICUM*, Stapf M.S. n. comb. *I. aristatum*, Hook. f. non Linn. var. *mangaluricum*, Hack.; F. B. I. vii. 127; S. I. G. fig. 131.
Mysore State (Meebold); S. Kanara and Malabar Districts; up to 2,000 ft.
13. *ISCHAEMUM PILOSUM*, Hack.; F. B. I. vii. 130; S. I. G. figs. 133, 134.
Deccan.
A moderate fodder. Vern. Tel. Kundara gaddi, Urranki.
14. *ISCHAEMUM MUTICUM*, Linn.; F. B. I. vii. 132.
S. Kanara and Travancore.
Usually growing in water; also among coastal sands.

18. *Sehima*, Forsk.

Annual or perennial erect, tufted herbs. *Leaves* convolute when young, later expanded. *Racemes* solitary, often much curved; rachis jointed, fragile; joints and pedicels plano-convex. *Spikelets* compressed, 2-nate, one sessile, the other pedicelled; 2-flowered; lower floret ♂, upper bisexual in the sessile spikelet, ♂ or neuter in the pedicelled. *Glumes* subequal, usually chartaceous; lower of sessile spikelets usually deeply grooved, rarely flat, 2-toothed or -cuspidate, keeled upwards and often winged on the keels; upper boat-shaped, often aristate. *Lemmas* hyaline; the lower entire and muticous; the upper 2-fid with a geniculate awn from the sinus. *Lodicules* 2. *Stamens* 3. *Grain* oblong, obtusely trigonous; embryo half as long.

Joints and pedicels .14—.18 in. long, ciliate on both edges; lower glume of sessile spikelets .25—.28 in. long, strongly 4-nerved, the 2 median branched, diverging and converging again with a deep depression between; callus .04—.05 in. long; upper glume .21—.26 in. long, entire, keel narrowly winged at the apex, with a setaceous arista .43—.6 in. long; awns 1.2—1.6 in. long. Culms up to 4 ft. high; leaves 3—20 in. long, .1—3 in. wide.....1. *nervosum*.
 Joints and pedicels .18—.26 in. long, ciliate on one margin only; lower glume of sessile spikelets .28—.34 in. long, strongly 4-nerved, the 2 median straight, close together with a groove between; callus .05—.08 in. long; upper glume .23—.27 in. long, 2-cuspidate, not winged, with a setaceous arista .36 in. long; awns 1—1.8 in. long. Culms weak, up to 2 ft. high; leaves 3.5—6 in. long, .1—2 in. wide.....2. *sulcatum*.

1. SEHIMA NERVOSUM, Stapf. *Ischaemum laxum*, R. Br.; F. B. I. vii. 136; S. I. G. fig. 137.

In all Districts except the W. Coast; sea-level to 6,000 ft.

A good fodder. Vern. *Hind.* Chota shadai ghans; *Tam.* Kura itti; *Kan.* Sinna shadai hullu, Nalai hullu.

2. SEHIMA SULCATUM, A. Camus. *Ischaemum sulcatum*, Hack.; F. B. I. vii. 137.

Nellore and Kistna Districts (Bourne).

19. Lophopogon, Hackel

Small, perennial, densely tufted herbs. *Leaves* very narrow. *In-florescence* of terminal, solitary, binate or fascicled, spiciform racemes; rhachis articulate, more or less fragile; joints often cupular at the tip. *Spikelets* 1—2-flowered, 2-nate, one sessile the other pedicelled. *Sessile spikelet* with a short callus, dorsally compressed. *Glumes* chartaceous; the lower truncate, irregularly toothed; the upper longer, acute, apiculate or narrowed into a straight awn. *Lemmas* hyaline: the lower with a linear palea and empty or ♂ with 1—2 stamens; upper often 2-fid with setiform lobes, often aristate from the sinus, its palea quadrate, containing a bisexual or ♂ floret with 2 anthers. *Lodicules* 0. *Pedicelled spikelet* laterally compressed or nearly terete. 2-flowered, the lower floret often ♂, the upper ♀.

- LOPHOPOGON TRIDENTATUS, Hack.; F. B. I. vii. 149; S. I. G. fig. 141.

Cuddapah, Nellore, Chittoor and Chingleput Districts; Mysore State; sea-level to 2,000 ft.; usually in dry localities.

Culms very slender, capillary at apex, often densely white-silky at the base, 3—20 in. high; leaves 1—6 in. long; racemes usually 2, .3—9 in. long; lower glumes narrowly obtusate, 3-toothed or mucronate and lobulate, with a tuft of rufous hairs in the middle, .17—.19 in. long; upper glume narrowly boat-shaped, .18—.22 in. long, narrowed to a fine arista .25—.4 in. long, margins with long rufous hairs; awns .6—.9 in. long.

20. Apocypis, Nees

Annual or perennial herbs. *Leaves* flat. *Racemes* terminal, solitary or 2—3-nate; rhachis not readily disarticulating. *Spikelets* secund, closely imbricate, compressed, solitary, sessile, often accompanied by a pedicel without spikelet. *Glumes* 2, chartaceous or membranous; lower broadly cuneiform, nearly flat, truncate, rounded or emarginate;

upper narrower, usually laterally 2-keeled with broadly inflexed margins. *Lemmas* hyaline; lower oblong, its palea nearly as long, enclosing a ♂ floret or empty; upper very narrow, entire or shortly 2-lobed with a long geniculate awn, its palea much shorter, wrapped round a ♀ or bisexual floret. *Lodicules* 0. *Stamens* 2 or 3. *Styles* 2, free. *Grain* linear or fusiform; embryo half as long.

APOCOPIS WIGHTII, Nees; F. B. I. vii. 142; S. I. G. figs. 139, 140.

In all Districts, except in the driest localities; sea-level to 3,000 ft.

Culms often densely tufted, 2.5–24 in. high; leaves densely imbricate or distant, .5–5 in. long, .05–.25 in. wide, more or less hairy from bulbous bases; racemes usually 2, .5–1.7 in. long, rhachis and pedicels rufous-hairy; lower glume obcordate or obovate truncate, yellow with a red-brown tip or dark-brown with a yellowish tip, glabrous to densely rufous- or fuscous-hairy, .14–.2 in. long; awn geniculate, .75 in. long.

21. *Eremochloa*, Buse

Perennial herbs. *Leaves* more or less equitant, rigid, flat. *Inflorescence* a terminal, solitary, spiciform raceme; rhachis articulated, fragile. *Spikelets* secund, solitary owing to the pedicelled spikelets being reduced to a rudimentary pedicel, sessile, imbricating, dorsally compressed, 2-flowered. *Glumes* chartaceous or coriaceous; lower nearly flat, oblong to subcircular, 2-keeled, the margins pectinate with long spinules or rigid hairs, often winged at the apex; upper elliptic or oblong-lanceolate, 3–5-nerved, *Lemmas* hyaline, mucous, paleate; lower ♂; upper smaller ♀ or bisexual. *Lodicules* 2. *Stamens* 3. *Grain* elliptic or ovoid, flattened on one side; embryo half as long.

EREMOCHLOA MURICATA, Hack.; F. B. I. vii. 140; S. I. G. fig. 138.

Chingleput and S. Arcot Districts.

Culms 5–24 in. high; leaves densely tufted below, .15–.27 in. wide, exactly linear, sometimes with a few ciliae near the rounded base; raceme 2.5–4.5 in. long; lower glume thickly coriaceous, broadly ovate, acute, the upcurved marginal spinules up to .07 in. long, apex with a broad triangular or fan-shaped wing on both sides, wider across than the width of the rest of the glume.

22. *Arthraxon*, Beauv.

Annual or perennial, sometimes decumbent herbs. *Leaves* linear-lanceolate to ovate, base usually cordate or amplexicaul, margins more or less ciliate from bulbous bases. *Inflorescence* of twin, digitate, fascicled or subpanicked simple or branched racemes or spikes; rhachis articulated, fragile. *Spikelets* laterally compressed, 2-nate, one sessile, the other pedicelled, similar or differing in sex mainly owing to reduction, or else solitary and sessile with or without an often very rudimentary pedicel. *Glumes* equal, chartaceous to coriaceous, rarely membranous; lower 2-keeled or rounded on the back and sides and not keeled, sometimes bearing rows of tubercles or spines on the margins; upper thinner, much compressed, keeled upwards, in all our species complicate-boat-shaped. *Lemmas* hyaline; lower empty, usually

without palea; upper subentire with a dorsal or basal, more or less well-developed awn, rarely awnless, enclosing a bisexual floret, palea minute or 0. *Lodicules* 2. *Stamens* 2—3. *Grain* narrowly linear or fusiform; embryo half as long. *Pedicelled spikelet*, when present, usually ♂ and awnless.

Lower glume of sessile spikelets 2-keeled, margins inflexed, back nearly flat:—

Glumes glabrous or nearly so; keels not winged:—

Keels of lower glume of sessile spikelets tubercled or toothed; pedicelled spikelets more or less developed:—

Lower glume of sessile spikelets .2 in. or less long with pectinately toothed keels; joints of rachis .1—.12 in. long, ciliate:—

Lower glume of sessile spikelets lanceolate .18—.2 in. long, back smooth. Rootstock and lowest 1 or 2 sheaths tomentose; culms comparatively robust, up to 36 in. high; leaves lanceolate to linear-lanceolate, .8—3 in. long, .12—65 in. wide, glabrous; awns .26—42 in. long.....1. *lanceolatus*.

Lower glume of sessile spikelets linear or narrowly lanceolate, .2 in. long, nerves on back echinulate, rarely in the lowest spikelets smooth. Rootstock and sheaths not tomentose; culms up to 12 in. high; leaves linear, .8—2.3 in. long, .17—.5 in. wide, usually pubescent, rarely quite glabrous; awns .3—4 in. long.....2. *echinatus*.

Lower glume of sessile spikelets .28 in. or more long, narrowly linear-lanceolate, keels with a double row of tubercles, gradually converted to spinules at the apex. Culms 4—10 in. high; leaves ovate to ovate-lanceolate, .8—2.3 in. long, .25—.6 in. wide, sparsely hairy; joints .18 in. long, long-ciliate; awns .8 in. long.....3. *Meeholdii*.

Lower glume of sessile spikelets linear-lanceolate, subcoriaceous, .2—2.6 in. long, keels spinulose-hispid. Culms comparatively robust; leaves rigid, ovate to oblong-lanceolate, cuspidate, 2—3.5 in. long, .5—1 in. wide, glabrous; joints .16—.19 in. long, compressed, densely ciliate; pedicelled spikelet reduced to a pedicel; awn .42—48 in. long.....4. *depressus*.

Lower glume of sessile spikelets lanceolate, .22 in. long, back densely villous, keels with narrow, densely ciliate wings. Culms 12 in. or more long; leaves linear-lanceolate, 1.2—2 in. long, .3 in. wide, hairy; joints .14 in. long, long white-ciliate, pedicelled spikelet fully developed; awn .48 in. long.... 5. *villosus*.

Lower glume of sessile spikelets compressed-convex, not keeled, margins not inflexed:—

Lower glume entire or minutely 2-toothed; no pedicelled spikelet:—

Paleas about half as long as the upper lemmas, ovate-lanceolate. Culms up to 2 ft. high; leaves linear-lanceolate, acuminate, 1.5—4 in. long, .15—.6 in. wide, margins and midrib below ciliate; pedicels .09 in. long, hairy on the back, devoid of spikelets; glumes of sessile spikelets minutely muriculate, lower .2—2.4 in. long, 5—7-nerved, nerves armed with spinescent tubercles in the upper half, upper longer, keeled, keel spinulose near apex.....6. *rudis*.

Paleas 0:—

Joints subterete, very slender, .07—.1 in. long, finely ciliate on one side only; pedicels 0. Culms very slender, 2—18 in. high; leaves linear to elliptic-lanceolate, .4—2.3 in. long, .07—.55 in. wide; lower glume .1—1.5 in. long, nerves minutely scaberulous; upper glume minutely puberulous, not ciliate; awns .23—.4 in. long.....7. *Quartinianus*.

Joints plano-convex, slender, .12—.18 in. long, glabrous; pedicels .06—.14 in. long, linear, flat. Culms 10—20 in. high; leaves lanceolate to ovate, .7—2.3 in. long, .2—7 in. wide; lower glume .15 in. long, nerves hispid; upper glume hispid at apex, its margins ciliate; awns .3—.5 in. long

8. *hispidus*.

Lower glume of sessile spikelets lanceolate, .1—1.3 in. long, minutely puberulous, 2-cuspidate. Culms very slender, straggling, up to 16 in. long; leaves linear-lanceolate to ovate, .5—1.7 in. long, .15—.47 in. wide, puberulous and often also sparsely hairy; joints very slender, subterete, .03—.08 in. long, densely long-ciliate; pedicels .03—.04 in. long flat, long-ciliate, spikelets fully developed; upper glume of sessile spikelets .08—.09 in. long, with a mucro .06 in. long; awns .24—.4 in. long.....9. *lanceifolius*.

1. *ARTHRAOXON LANCEOLATUS*, Hochst.; F. B. I. vii. 143.
Bellary District at Raman Drug; Nilgiri and Pulney Hills;
2,500—6,500 ft.
Vern. *Tel.* Rai gaddi.
2. *ARTHRAOXON ECHINATUS*, Hochst. *A. spathaceus*, Hook. f.; F. B. I.
vii. 145.
Cuddapah District (Wight, Gamble); Mysore State (Meebold);
about 2,000 ft.
3. *ARTHRAOXON MEEBOLDII*, Stapf.
Mangalore (Meebold).
4. *ARTHRAOXON DEPRESSUS*, Stapf ex C. E. C. Fischer in Kew Bull.
1933, 350.
Mysore State at Agalatti (Meebold); 3,500 ft.
5. *ARTHRAOXON VILLOSUS*, C. E. C. Fischer in Kew Bull. 1933, 350.
Bababudan Hills (Bourne).
6. *ARTHRAOXON RUDIS*, Hochst.; F. B. I. vii. 144.
Mysore State (Meebold); 3,500 ft.
7. *ARTHRAOXON QUARTINIANUS*, Nash. *A. ciliaris*, Beauv. a; F. B. I.
vii. 146.
W. Gháts from Coorg to the Pulney Hills; 3,000—7,000 ft.;
Mysore State; Calicut; Bolampatti Valley at 1,700 ft. (Fischer).
Vern. *Kan.* Nela bidaru hullu.
8. *ARTHRAOXON HISPIDUS*, Makino. *A. ciliaris*, Beauv. b; F. B. I. vii.
146.
Mysore State at 2,000 ft. (Meebold); Malabar (Barber); Travan-
core (Mayuranathan).
9. *ARTHRAOXON LANCIFOLIUS*, Hochst. *A. microphyllus*, Hochst.; F.
B. I. vii. 147.
Rampa Hills at 4,500 ft. (Narayanaswami); Bellary District at
Raman Drug; Mysore State (Meebold); W. Coast.

23. *Capillipedium*, Stapf.

Annual or perennial herbs. *Leaves* flat. *Inflorescence* a rather delicate, usually much divided panicle; main rhachis and branches capillary; racemes 1—4, rarely up to 8-jointed; joints and pedicels slender, longitudinally grooved and translucent in the groove. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape, differing in sex. *Sessile spikelets*: *Glumes* subequal, thinly chartaceous to membranous; lower 2-keeled with narrow, inflexed margins, keels usually bristle-ciliate; upper boat-shaped, more or less grooved on each side of the keel. *Lemmas* dissimilar; lower hyaline empty; upper reduced to the linear, hyaline base of a geniculate awn, containing a bisexual floret; palea absent. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly dorsally compressed; embryo more than half as long. *Pedicelled spikelet* sometimes with only one 2-keeled glume, the second, if present, shorter or much reduced; one or both lemmas sometimes present, hyaline, awnless, sometimes containing a ♂ floret.

Culms stiff, erect, not or hardly decumbent below:—

Culms usually copiously branched, up to 6 ft. high, or even taller, almost woody; nodes glabrous or short-hairy; panicles usually large, lax; callus of sessile

- spikelets shortly bearded; lower glume .08—1 in. long, glabrous or minutely puberulous; awns .36—5 in. long; lower glume of pedicelled spikelets .1—1.6 in. long.....1. *glaucopsis*.
 Culms simple or sparingly branched, up to 4 ft. high, usually slender; nodes usually densely, often long bearded; panicles contracted, rarely somewhat lax; callus of sessile spikelets densely villous; lower glume .1—1.4 in. long, usually villous all over or only below the middle; sometimes only puberulous or quite glabrous, awns .4—9 in. long; lower glume of pedicelled spikelets .14—1.7 in. long.....2. *Huegelii*.
 Culms decumbent and often interlaced, copiously geniculately branched, weak, up to 3 ft. long; nodes shortly hairy; panicles 1—2 in. long, branches few; callus of sessile spikelets densely villous; lower glume .08—1.2 in. long, glabrous or sparsely hairy below the middle; awns .38—6.2 in. long; lower glume of both spikelets equal.....3. *filiculmis*.

1. *CAPILLIPEDIUM GLAUCOPSIS*, Stapf. *Andropogon assimilis*, Steud.; F. B. I. vii. 179
 Ganjam (Gamble) and Godavari Districts; Coorg, Wynaad and Travancore; 300—2,000 ft.
2. *CAPILLIPEDIUM HUEGELII*, Stapf. *Andropogon Huegelii*, Hack. F. B. I. vii. 180. *A. Schmidii*, Hook. f.; F. B. I. vii. 180.
 W. Ghâts from the Bababudan Hills to Travancore; S. Kanara District; sea-level to 7,000 ft. Often aromatic.
3. *CAPILLIPEDIUM FILICULMIS*, Stapf. *Andropogon filiculmis*, Hook. f.; F. B. I. vii. 181.
 Mysore State at Agalatti (Meebold); S. Kanara and S. Malabar Districts.

24. *Amphilophis*, Nash

Perennial herbs. *Leaves* narrow, usually flat. *Inflorescence* of paniced digitate, spiciform, shortly peduncled racemes, usually with a short primary axis, rarely with secondary branches; rhachis of raceme many-jointed, disarticulating horizontally; joints and pedicels filiform, longitudinally grooved and translucent in the groove. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape or the pedicelled reduced, differing in sex except the lowermost pair, which may be homogamous (σ or empty). *Sessile spikelets* dorsally compressed, callus small, usually bearded. *Glumes* subequal, chartaceous or membranous; lower 2-keeled with inflexed margins; upper boat-shaped, acutely keeled. *Lemmas* dissimilar; lower hyaline, empty; upper reduced to the linear stipe of a geniculate awn, containing a bisexual floret; paleas 0 or minute. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, obtuse, slightly compressed; embryo about half as long. *Pedicelled spikelet* similar but awnless; one lemma often present containing a σ floret.

Primary axis of the inflorescence short, much overtopped by the racemes, branches undivided:—

Leaves mostly aggregated near the base, glabrous or hairy, 1—6 in. long, .1—1.5 in. wide. Culms often creeping at the base, up to 30 in. long; racemes 1—10, 1—2.5 in. long; lower glumes usually with a median pit, rarely 2, on the back above the middle, but sometimes quite smooth, .11—1.4 in. long; awns .36—8.5 in. long.....1. *pertusa*.

Leaves mostly cauline, elongate:—

Lower glumes devoid of pits:—

Culms stout, up to 5 ft. high, nodes hairy; leaves 3—24 in. long, .15—3 in.

wide; racemes up to 6, 1-4 in. long; lower glume of sessile spikelets more or less long-hairy on the back below the middle, .16-2 in. long; awns .65-1 in. long.....2. *pseudoischaemum*. Culms comparatively slender, up to 3 ft. high, nodes usually glabrous; leaves often involute, 4-14 in. long, .15-25 in. wide; racemes few to many, 1-4 in. long; lower glume of sessile spikelets glabrous, often dorsally longitudinally depressed, .14-17 in. long; awns .5-85 in. long

3. *Foulkesii*.

Lower glumes usually pitted, at least in most of the spikelets:—

Lower glume of pedicelled spikelets 2-4-pitted, .16-2 in. long; that of sessile spikelets 1-pitted. Culms up to 3 ft. high; leaves 6-25 in. long, .12-3 in. wide; racemes 1-14, 1.5-3.5 in. long; awns .46-85 in. long

4. *insculpta*.

Both lower glumes with 1 dorsal pit, seldom unpitted, .14-19 in. long. Culms often robust, up to 7 ft. high; leaves 4-24 in. long, .12-4 in. wide; racemes 8-20, sometimes more, flexuous, silky, 1.5-3 in. long; awns .12-2 in. long.....5. *Kuntzeana*.

Primary axis up to 10 in. long, much longer than the racemes, stronger branches again branched. Culms 2-6 ft. high; leaves often setose at the base, 4-20 in. long, .2-42 in. wide; racemes numerous, up to 2.5 in. long; lower glume of sessile spikelet with or without a dorsal pit, .12-16 in. long, glabrous or somewhat hairy on the back below the middle, that of pedicelled spikelets unpitted; awns .4-75 in. long.....6. *glabra*.

1. AMPHILOPHIS PERTUSA, Stapf. *Andropogon pertusus*, Willd.; F. B. I. vii. 173; S. I. G. figs. 152, 153.

In all Districts except the wettest localities; sea-level to 4,000 ft.

Often in saline soils. A good fodder and hay. Vern. *Ur. Basana*; *Tel. Janu gaddi, Turri gaddi*; *Tam. Chinna-karai pullu*.

2. AMPHILOPHIS PSEUDOISCHAEMUM, C. E. C. Fischer n. comb. *Andropogon pseudoischaemum*, Nees; F. B. I. vii. 172.

Deccan and Coromandel; 1,000-2,000 ft.

3. AMPHILOPHIS FOULKESII, C. E. C. Fischer n. comb. *Andropogon Foulkesii*, Hook. f., F. B. I. vii. 174.

Nilgiri, Pulney and Tinnevely Hills; 6,000-8,000 ft.

4. AMPHILOPHIS INSCULPTA, Stapf. *Andropogon pertusus*, Willd. var. *insculptus*, Hack.; F. B. I. vii. 174.

W. Ghâts from the Bababudan to the Pulney Hills; 3,600-7,000 ft. Vern. *Kan. Henu ganjalu garikai hullu*.

5. AMPHILOPHIS KUNTZEANA, Haines. *Andropogon Kuntzeanus*, Hack.; F. B. I. vii. 175.

Deccan; Carnatic; N. Coimbatore and Nilgiri Districts; sea-level to 2,000 ft. Uncommon.

6. AMPHILOPHIS GLABRA, Stapf. *Andropogon intermedius*, R. Br.; F. B. I. vii. 175. *A. montanus*, Roxb.; F. B. I. vii. 176.

N. Circars from Ganjam and the Rampa Hills to the Nallamalais; up to 3,500 ft. Vern. *Ur. Gonda bena*.

25. *Vetiveria*, Thouars

Coarse, perennial herbs with stout rhizomes; culms more or less compressed below. *Leaves* narrow, conduplicate in bud, ultimately flat; lower leaf-sheaths much compressed. *Panicles* erect, composed of many-rayed whorls of slender, simple, rarely compound racemes; rhachis 3-many-jointed, fragile; joints and pedicels slender. *Spikelets* 2-nate, one sessile and one pedicelled, the pairs subsimilar but differing

in sex. *Sessile spikelets* slightly laterally compressed. *Glumes* equal, coriaceous or chartaceous; lower rounded on the back, usually mucous, margins subinflexed; upper boat-shaped, keeled towards apex, mucronate or aristulate. *Lemmas* hyaline; lower 2-nerved, entire, empty; upper minutely 2-toothed, mucous, mucronate or with a more or less developed geniculate awn from the sinus, palea minute, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* oblong, slightly oblique at the apex. *Pedicelled spikelets* dorsally compressed, with much thinner glumes than those of the sessile spikelets, like the lemmas usually awnless, usually containing a ♂ floret.

Rootstock with spongy aromatic roots; culms tufted, stout, up to 6 ft. high or more; leaves distichous at the base, coriaceous, conduplicate at least below, 12—36 in. long, .15—4 in. wide, usually glabrous; panicle 6—15 in. long; joints and pedicels glabrous; sessile spikelets with glabrous callus, lower glume mucronate, upper mucronate on the keel; upper lemma entire, mucous or mucronate

1. *zizanioides*.

Rootstock horizontal, roots not spongy nor aromatic; culms comparatively slender, 1.5—5 ft. high; leaves chiefly subradical, rigidly herbaceous, 3—9 in. long, rarely up to 15 in., .06—15 in. wide, glabrous or more often sparsely, shortly hairy and distantly ciliolate; panicles 4—8 in. long, narrow; joints and pedicels with a basal tuft of hairs; sessile spikelets with a bearded callus; lower glume narrowly ensiform with a row of marginal tubercles enlarging upwards and becoming spinulose at the tip, upper shorter, 2-fid with a slender arista .3—5 in. long; upper lemma with a slender awn .8 in. long.....2. *Lawsoni*.

1. VETIVERIA ZIZANOIDES, Nash. *Andropogon squarrosus* Hack. non Linn. f.; F. B. I. vii. 186; S. I. G. fig. 154.

In all Districts except on the W. Coast; sea-level to 3,000 ft. The Khas-khas or Cus-cus grass.

A good fodder when young. The aromatic roots are used for making the well-known khas-khas mats for cooling dwellings and for fans. An aromatic and medicinal oil is extracted from the roots. Vern. *Hind.* Khas-khas; *Tel.* Vatti-veru; *Tam.* Vettiver, Virkel, Viyal; *Mal.* Vettiver; *Kan.* Kadu karai. Dhappa sajjai hullu.

2. VETIVERIA LAWSONI, Blatter et McCann. *Andropogon Lawsoni*, Hook. f.; F. B. I. vii. 187.

Mysore State; Coimbatore and Nilgiri Districts; 1,400—3,000 ft. Cattle are said to eat the leaves and reject the flowering culms. Vern. *Kan.* Karai hullu; Thoddu karai hullu.

26. Pseudosorghum, A. Camus

Annual herbs, decumbent below. Panicles contracted, dense; primary branchlets nearly always solitary, alternate, erect, branching from the base, lower secondary branchlets sometimes verticillate; racemes spiciform, dense, sessile or nearly so; rachis fragile; joints and pedicels slender, hairy. *Spikelets* 2-nate, one sessile, the other pedicelled, differing only in sex. *Sessile spikelets* much imbricated; *Callus* short, bearded. *Glumes* subequal, chartaceous; lower 2-keeled; upper boat-shaped, 1-keeled. *Lemmas* hyaline; lower nearly as long as the glumes, sometimes paleate, empty; upper narrow, shorter, cleft for half its length into 2 narrow lobes with a geniculate awn from the sinus, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2,

free. *Pedicelled spikelets* narrower than the sessile, often much reduced, sometimes only 1 glume left: *Glumes* membranous, harrow; lower 2-keeled; upper similar or boat-shaped and 1-keeled. *Lemmas*, when present, hyaline; lower the longer, empty or containing a ♂ floret.

PSEUDOSORGHUM FASCICULARE, A. Camus. *Andropogon fascicularis*, Roxb.; F. B. I. vii. 117.

Ganjam (Gamble), Godavari (Barber) and Coimbatore (Fischer) Districts; Palghat Hills (Beddome); Cochin State (Meebold); sea-level to 4,000 ft.

Culms up to 5 ft. high; leaves sometimes very short but usually long, up to 20 in. long and 3 in. wide; panicles up to 5 in. long; racemes few or many and dense, 1.5—2 in. long; awns 4—6 in. long.

Vern. Tel. Konda-geri.

27. Sorghum, Pers. sensu A. Camus

Annual or perennial, tall, sometimes woody. *Leaves* at first convolute, eventually flat. *Panicles* often large, with verticillate or scattered branches, usually lax in the wild species, frequently contracted or compacted in the cultivated ones; rhachis fragile or tough; divisions 1—few-jointed; joints and pedicels slender with ciliate edges. *Spikelets* 2-nate on the lateral nodes, one sessile, the other pedicelled or reduced to a pedicel, differing in shape and sex. *Sessile spikelets* more or less dorsally compressed or subglobose or ovate or elliptic: *Glumes* subequal, often coriaceous; lower 2-keeled at apex with narrowly inflexed margins, involute at base, apex erose or 3-toothed; upper shorter, convex, 1-keeled. *Lemmas* hyaline; lower as long as the glumes or nearly so, empty; upper oblong, 2-toothed or 2-fid, rarely entire, mucicous or mucronate or awned from the sinus, paleas sometimes present, including a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3, very rarely 2. *Styles* 2, free. *Grain* obovate or linear-oblong in wild species, globose in cultivated ones, free; embryo half as long or more. *Pedicelled spikelets* more or less reduced, lemmas when present ♂ or empty.

Rhachis of racemes fragile; sessile spikelets falling together with the contiguous joint and pedicel; spontaneous perennial plants:—

Primary branches of the panicle undivided, up to 4 in. long:—

Culms solitary, stout, 3—8 ft. high; nodes white-silky; leaves 8—21 in. long, 1.5—3 in. wide; panicle ultimately effuse, 4—10 in. long; racemes whorled; peduncles very slender; joints, pedicels and spikelets purplish- or reddish-villous; lower glume of sessile spikelets black and polished when ripe; upper lemma acuminate, truncate or 2-fid for up to ½ its length, mucicous, aristate or with an awn up to .56 in. long.....1. *nitidum*.

Culms tufted, comparatively thin, 6—24 in. high; nodes glabrous; leaves 2—4 in. long, 1.5—6 in. wide; panicles narrow, up to 5 in. long; racemes few, alternate; peduncles rather stout; joints and pedicels densely creamy-villous; glumes of sessile spikelets very coriaceous, tomentose on the back; awns .65 in. long.....2. *Stappii*.

Primary branches of the panicle branched, up to 10 in. long, panicles usually effuse, 9—17 in. long. Culms solitary, stout, often woody, 3—15 ft. high; nodes glabrous or nearly so; leaves 5—33 in. long, .3—2.2 in. wide; glumes of sessile spikelets more or less hairy on the back; upper lemma cleft for ½ to ¾ its length, with an awn .43—52 in. long, seldom entire and mucicous...3. *halapense*.

Rhachis of racemes tenaceous; sessile spikelets persistent; usually annual, cultivated plants.....Cultivated species.

1. *SORGHUM NITIDUM*, Pers. *Andropogon serratus*, Thunb.; F. B. I. vii. 185.
In all Districts from Coorg to Travancore; 1,000—7,000 ft. Vern. Kan. Chikka narala hullu.
2. *SORGHUM STAFFII*, C. E. C. Fischer n. comb. *Andropogon Stapfia*, Hook. f.; F. B. I. vii. 184.
Palamkotta (Wight).
3. *SORGHUM HALEPENSE*, Pers. *Andropogon halepensis*, Brot.; F. B. I. vii. 182.
In all Districts, except on the W. Coast; sea-level to 7,000 ft. A good fodder and hay grass when mature; when young it is said to have sometimes had injurious and even fatal effects on animals eating it. Vern. Tam. Kadu-cholam; Kan. Kadukambu hullu.

CULTIVATED SPECIES: Various species and races of Sorghum are cultivated in all Districts. Hitherto these have been clubbed under the name *Andropogon Sorghum*, Brot.; F. B. I. vii. 183. The Great Millet.

The cultivated Sorghums are under revision by Mr. J. D. Snowdon, and until the result of his work is published it would be inadvisable to attempt a classification. As far as is known at present the following five species with varieties and races are grown in India: *S. Roxburghii*, Stapf, *S. bicolor*, Moench, *S. Durra*, Stapf, *S. cernuum*, Host, *S. subglabrescens*, Schweinf. et Aschers. The vernacular names, which cannot at present be correlated with the different species, are: Hind. Juari, Bajra; Ur. Jonna; Tel. Jonna, Jonnalu; Tam. and Mal. Cholam; Kan. Jola; with racial names qualifying each.

The plants are of great economic importance as comestible grains and as a fodder, hay and thatch grasses.

28. *Chrysopogon*, Trin.

Usually perennial, erect herbs. Leaves narrow, flat or complicate. Panicles terminal, usually lax, branches whorled, rarely 2-nate or solitary, simple or divided at the base. Spikelets in threes at the ends of the branches, one sessile and 2 pedicelled, falling together from the thickened, oblique, rarely glabrous tips of the peduncles, rarely 2-nate in 2-jointed racemes and then 1 sessile and 1 pedicelled, the sessile falling with the contiguous joint and pedicel; pedicels (and joints when present) filiform. Sessile spikelets usually laterally compressed: Glumes subequal, coriaceous or chartaceous; lower complicate or involute, backs rounded or more or less 1-keeled; upper boat-shaped, more or less 1-keeled. Lemmas hyaline; lower empty; upper entire or 2-toothed, with a more or less perfect geniculate awn; palea small or 0, enclosing a bisexual floret. Lodicules 2. Stamens 3. Grain linear, laterally compressed; embryo half as long. Pedicelled spikelets dorsally compressed: Glumes subequal, thin, sometimes awned. Lemmas hyaline, muticous, usually enclosing a ♂ floret.

Pedicels half as long as the sessile spikelets or longer:—

Pedicels glabrous. Rootstock woody, creeping; culms 5—20 in. high; leaves mostly basal, 8—6 in. long, 1—25 in. wide, glabrous, panicles 1.5—3.5 in. long, narrow, branches ascending sharply; glumes of sessile spikelets .14—.17 in. long, upper mucronate; awns .16—.24 in. long; glumes of pedicelled spikelets .14—.24 in. long, muticous.....1. *aciculatus*.

Pedicels rufous-hairy; leaves usually puberulous:—

Lower glume, at least, of pedicelled spikelets aristate:—

Leaves conspicuously distichous, sheaths below much compressed and acutely keeled, often beset with bristles from bulbous bases, 3—21 in. long, .1—45 in. wide, often complicate, base semi-amplexicaul. Culms stout, 20—52 in. high; panicles 5—9 in. long, narrow, branches ascending; glumes of sessile spikelets .2—22 in. long, awn of upper .5—.85 in. long; awn of lemma 1.7—2.8 in. long; glumes of pedicelled spikelets .33—.35 in. long, lower with one awn .33—.5 in. long, upper muticous or with an arista .22 in. long
2. *asper*.

Leaves not conspicuously distichous, not bristly, not semi-amplexicaul:—

Culms robust, up to 6 ft. high, lower nodes often bearded; leaves 14—20 in. long, 4—65 in. wide; sparsely pilose at base, finely acuminate, sheaths not keeled; panicles 7—13 in. long, pyramidal, branches ultimately horizontal; sessile spikelet with a callus .04—.07 in. long, glumes .21—.28 in. long, upper with an awn .32—.46 in. long; awn of lemma 1.3—1.7 in. long; glumes of pedicelled spikelets .34—.42 in. long, lower with an awn .24—.42 in. long, upper muticous.....3. *verticillatus*.

Culms comparatively slender, up to 3 ft. high, nodes glabrous; leaves 1.7—9.5 in. long, .1—3 in. wide, usually abruptly acute, pubescent, rarely glabrous, lower sheaths somewhat compressed and keeled; panicles 5—7 in. long, branches ascending; sessile spikelets with a callus .09—.2 in. long, glumes .18—.23 in. long, awn of upper .36—.66 in. long, awn of lemma 1.5—2.4 in. long; glumes of pedicelled spikelets .26—.36 in. long, awn of lower .25—.63 in. long, upper finely acuminate, muticous or mucronate.....4. *orientalis*.

Glumes of pedicelled spikelets .37—.53 in. long, acuminate or caudate-acuminate, not aristate or awned. Culms 7—36 in. high; leaves 8—14 in. long, .15—.6 in. wide, complicate, rather stiff, often densely imbricate at the base; panicles 3—6 in. long, branches erect or spreading; sessile spikelets with a callus .04—.06 in. long, glumes .23—.26 in. long, upper mucronulate or with an arista up to .26 in. long, awn of lemma 1.25—1.45 in. long...5. *zeylanicus*.

Pedicels less than half as long as the sessile spikelets:—

Leaves glabrous:—

Leaves not distichous:—

Upper glume of sessile spikelets more or less ciliate, usually rufous-hairy on the keel; glumes of pedicelled spikelets usually pubescent or hispid, lower aristate. Rootstock often creeping; culms 9—38 in. high; leaves 1.8—8 in. long, .05—.1 in. wide, usually rigid, sometimes ciliate from bulbous bases; panicles 1.5—3 in. long, branches usually spreading; glumes of sessile spikelets .12—.22 in. long, upper with an arista .26—.33 in. long, awns of lemmas .92—1.1 in. long; glumes of pedicelled spikelets .13—.22 in. long, lower with an arista .14—.22 in. long (in variety *robusta* all parts larger)

6. *montanus*.

Upper glume of sessile spikelets glabrous; glumes of pedicelled spikelets muticous, glabrous. Culms 6 ft. or more high; leaves 6—36 in. long, .2—3 in. wide, sheaths silky at base, margins often silky-ciliate; panicles 4—6 in. long, branches spreading; glumes of sessile spikelets .17—.22 in. long, upper with arista .12—.3 in. long, awn of lemmas .76—1.2 in. long; glumes of pedicelled spikelets .17—.18 in. long.....7. *Hackelii*.

Leaves conspicuously distichous, 4.5—8.2 in. long, .15—.2 in. wide. Rootstock woody, creeping; culms up to 3 ft. high; panicles 3—6 in. long, branches ascending; hairs of pedicels and callus pale straw-coloured, latter slender, glabrous in upper half; glumes of sessile spikelets .22—.24 in. long; upper mucronate; awn of lemma .47—.56 in. long; glumes of pedicelled spikelets .22 in. long, muticous.....8. *polyphyllus*.

Leaf-sheaths and blades puberulous, blades 5—9 in. long, 1—42 in. wide. Culms 1—2 ft. high; panicles 2—3 in. long, branches spreading with sparsely, shortly, white-ciliate apices; glumes of sessile spikelets 21—25 in. long, pale, upper more or less rufous-hairy, with an arista 16—28 in. long; awn of lemmas 1·2 in. long; glumes of pedicelled spikelets 15—2 in. long, mucous, lower rufous-hispid in lower half.....9. *velutinus*.

1. CHRYSOPOGON ACICULATUS, Trin. *Andropogon aciculatus*, Retz.; F. B. I. vii. 188.
In all Districts: sea-level to 2,000 ft. The Love-grass. Eaten by cattle before flowering. Vern. Tel. Putthi gaddi.
2. CHRYSOPOGON ASPER, Heyne ex Hook. f. *Andropogon asper*, Heyne ex Hook. f.; F. B. I. vii. 189; S. I. G. figs. 155, 156.
Cuddapah District; Horsleykonda; Kambakkam Hills; Nilgiri Hills at Naduvattam; 1,000—6,000 ft.
Doubtfully distinct from *C. orientalis*, A. Camus.
3. CHRYSOPOGON VERTICILLATUS, Trin. *Andropogon verticillatus*, Roxb.; F. B. I. vii. 189.
Rampa Hills at 2,000—3,000 ft. (Narayanaswami); Godavari District (Bourne).
4. CHRYSOPOGON ORIENTALIS, A. Camus. *Andropogon Wightianus*, Steud.; F. B. I. vii. 191; S. I. G. fig. 157.
In most Districts from Cuddapah southwards; sea-level to 7,000 ft.
A conspicuous grass owing to the bright red or purple glumes of the pedicelled spikelets.
5. CHRYSOPOGON ZEYLANICUS, Thw. *Andropogon zeylanicus*, Nees; F. B. I. vii. 192.
W. Gháts; 4,000—8,000 ft.
The glumes of the pedicelled spikelets are purple and green. Vern. Kan. Badi hullu.
6. CHRYSOPOGON MONTANUS, Trin. *Andropogon monticola*, Schult.; F. B. I. vii. 192; S. I. G. fig. 158.
In all Districts except the W. Coast; sea-level to 3,000 ft.
Often on laterite soil.
A good fodder grass. Vern. Tel. Gurra batto kelu.
- Var. *robustus*, Hook. f.; F. B. I. vii. 193.
Culms stouter and taller; all parts larger.
Godavari, Kistna, Guntur, Bellary and Coimbatore Districts. Vern. Kan. Chello san kanni.
7. CHRYSOPOGON HACKELII, C. E. C. Fischer n. comb. *Andropogon Hackelii*, Hook. f.; F. B. I. vii. 194.
W. Gháts from Coorg to Travancore; 2,000—5,000 ft.
8. CHRYSOPOGON POLYPHYLLUS, Blatter et McCann. *Andropogon polyphyllus*, Hack. ex Hook. f.; F. B. I. vii. 194.
Godavari District: Devypatnam (Gamble) and Kolur Gorge (Bourne).
9. CHRYSOPOGON VELUTINUS, Arn. ex Hook. f. *Andropogon velutinus*, Hook. f.; F. B. I. vii. 194.
Cuddapah District (Wight).

29. *Dichanthium*, Willemet

Perennial, seldom annual, tufted herbs. *Leaves* narrow. *Inflorescence* of subdigitate, rarely solitary, subpanicled or racemosely arranged, short-peduncled, spiciform racemes; joints and pedicels slender. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape and size, differing in sex, the lowermost 1—2 pairs of the raceme usually homogamous and ♂ or empty. *Sessile spikelets* dorsally compressed: *Glumes* equal, thinly chartaceous; lower usually rounded at the apex, 2-keeled, at least in the upper half; upper boat-shaped, acutely 1-keeled. *Lemmas* usually without palea, sometimes a minute upper one present; lower hyaline empty; upper reduced to a firm pale stipe hyaline at base, passing into a geniculate awn, the stipe rarely very narrowly margined and finely 2-fid at apex; its floret bisexual. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, obtuse, slightly compressed. *Pedicelled spikelets* awnless; lower lemma present or not, if present sometimes empty, sometimes containing a ♂ floret.

Culms leafy; leaves glabrous or sparsely hairy; glumes .18 in. or less long; upper lemma of sessile spikelets reduced to an awn:—

Stem below inflorescence and peduncles of spikes glabrous:—

Culm nodes patently hairy, rarely glabrous; culms up to 40 in. high; leaves 2—1½ in. long, .1—2 in. wide; racemes 2—9, 1—3 in. long; glumes .1—1.5 in. long, lower of sessile spikelets elliptic, apex rounded or narrowed and obtuse; awns .6—1 in. long.....1. *annulatum*. Nodes usually glabrous, seldom somewhat hairy, rarely patently so; racemes solitary or sometimes 2-nate; lower glume of sessile spikelets obovate or obovate-oblong:—

Culms usually erect from a geniculate base, 10—36 in. high, occasionally dwarf and 3—4 in. high; leaves 1.5—4.5 in. long, .05—1.7 in. wide; racemes 1.4—2.2 in. long; glumes .12—1.5 in. long, apex rounded or subacute; awns .6—9 in. long.....2. *caricosum*.

Culms creeping, apical 2—6 in. erect; leaves .9—2 in. long, .05—1 in. wide; racemes .8—1 in. long; glumes .16 in. long, apex rounded; awns .75 in. long.....3. *pallidum*.

Stem below the inflorescence usually and peduncles always softly, patently hairy; culms 1—4 ft. high; nodes usually patently hairy, sometimes glabrous; leaves 3—12 in. long, .1—2 in. wide; racemes 1—6, 2—3.5 in. long; glumes .13—1.8 in. long, lower of sessile spikelets elliptic-oblong to broadly obovate, apex rounded or narrowed and obtuse; awns .7—1.1 in. long.....4. *nodosum*.

Culms naked or with 1—2 reduced leaves, 20—40 in. high, slender; leaves mostly basal, 7—10 in. long, .1 in. wide, the cauline up to 4.5 in. long, softly hairy on both sides, often involute; racemes usually solitary, sometimes 2—3, 2—2.2 in. long; glumes .26—4 in. long, lower of sessile spikelets narrowly elliptic-oblong to lanceolate, acute or obtuse, up to .36 in. long; awns .9—1.2 in. long, their bases with a narrow hyaline margin cleft for about ¼ its length into 2 capillary lobes.....5. *polyptychum*.

1. *DICHANTHIUM ANNULATUM*, Stapf. *Andropogon annulatus*, Forsk ; F. B. I. vii. 196 ; S. I. G. figs. 160, 161.

In all the Eastern and Central Districts; at low elevations. A fair fodder.

2. *DICHANTHIUM CARICOSUM*, A. Camus. *Andropogon caricosus*, Linn.; F. B. I. vii. 196 ; S. I. G. fig. 159.

In all Districts except the W. Coast; near sea-level to 3,000 ft. A fair fodder. Vern. Kan. Urukun hullu.

3. *DICHANTHIUM PALLIDUM*, Stapf MS. n. comb. *Apocopsis pallida*, Hook. f.; F. B. I. vii. 143.
Nilgiri Hills (Foulkes).
This may be an impoverished form of the last species.
4. *DICHANTHIUM NODOSUM*, Willem. *Andropogon caricosus*, Linn. var. *mollicomus*, Hack.; F. B. I. vii. 196.
Mysore State; Godavari, Bellary, Salem and Coimbatore Districts; 1,000—3,000 ft.
5. *DICHANTHIUM POLYPTYCHUM*, A. Camus. *Andropogon polyptychus*, Steud.; F. B. I. vii. 198.
Nilgiri and Pulney Hills (Bourne); 6,000—7,000 ft.

30. Heteropogon, Pers.

Annual or perennial usually branched herbs; branches mostly flowering and gathered into spatheate panicles. *Leaves* narrow, flat. *Racemes* spiciform, usually solitary, terminating the culms or their sometimes fascicled branches; spikelets 2-nate, one sessile, the other pedicelled, the 1—several lower pairs alike, ♂ or empty, the upper pairs differing in sex and strikingly in shape; rachis many-jointed, not or tardily disarticulating between the homogamous pairs of spikelets, fragile between the heterogamous. *Fertile sessile spikelets* terete or subterete. *Callus* often pungent, densely bearded upwards. *Glumes* equal, coriaceous or chartaceous, obtuse. *Lemmas* hyaline; lower empty; upper very slender, cartilaginous at apex and passing into a usually stout, geniculate awn; palea small or 0, enclosed floret ♀ or bisexual. *Lodicules* 2, large to minute. *Stamens* 3, or rudimentary or 0. *Grain* sublinear, terete; embryo slightly more than half as long. *Lower sessile and pedicelled spikelets* dorsally compressed, often twisted, imbricate: *Glumes* dissimilar; lower 2-keeled, usually winged upwards on one or both keels. *Lemmas* hyaline, often more or less reduced or suppressed, with or without 3 stamens.

Joints and pedicels glabrous; lower glume of fertile spikelets tightly involute, brown-hispid:—

Culms usually tall, comparatively stout; leaves glabrous or more or less setose from tubercles at the base; upper glume of fertile spikelets deeply grooved on both sides of the midrib:—

Leaves basal or basal and cauline, not strikingly distichous, very variable, 2—17 in. long, .1—4 in. wide. *Culms* 6—45 in. high; *racemes* 1—2.5 in. long; *fertile spikelets* with a callus .07—1.1 in. long, densely rufous-hairy; *glumes* .15—2.2 in. long; *awns* 2—3.5 in. long; *lower glume* of other spikelets .23—3.1 in. long, glabrous or more or less densely setose from tubercles, upper glume slightly longer, glabrous or with a few apical setae from tubercles

1. *contortus*.

Leaves from the middle of the culm, strikingly distichous, rigid, complicate, usually curved, 1—3 in. long, .1—1.3 in. wide. *Culms* 15—18 in. high, sheathed below; *glumes* of fertile spikelets .24—2.7 in. long; *awns* .21—2.4 in. long; *glumes* of other spikelets .36—4 in. long, subequal, glabrous

contortus var. *distichus*.

Culms slender, 6—9 in. high; *leaves* 1—2.5 in. long, .05 in. wide, glabrous or puberulous, ciliate at base; *racemes* .5—1.5 in. long; *fertile spikelets* with a callus .09—1 in. long, rufous-hairy on one side, *glumes* .22—2.3 in. long, upper not channelled, *awns* 1.6 in. long; *glumes* of other spikelets .28 in. long, glabrous

2. *polystachyos*.

Joints and pedicels whitish hairy; lower glume of fertile spikelets not tightly involute:—

Leaves flat, .5—2.6 in. long, .12—22 in. wide, hirsute, margins thickened. Culms slender, almost capillary, 2—12 in. high; racemes sometimes 2-nate, .5—1.5 in. long; lower glume of fertile spikelets .13—16 in. long, oblong, convex, pale silky-hairy at least below the middle, upper boat-shaped, hardly keeled, glabrous; awns 1—1.6 in. long, glabrous in basal half; glumes of other spikelets .14—18 in. long, lower elliptic-oblong, truncate or 3-lobulate, 2-keeled, keels narrowly winged at apex.....3. *oliganthus*.

Leaves tightly involute, filiform, 3—8 in. long, glabrous. Culms wiry, 16 or more in. high; racemes 2—2.5 in. long; glumes of fertile spikelets .23—26 in. long, glabrous, lower narrowly linear-lanceolate, 2-toothed, 2-keeled at apex, with a deep median channel below the middle, glabrous, upper narrowly boat-shaped, not keeled, arista .13—15 in. long, slender, hairy below the middle; glumes of other spikelets .31—34 in. long, narrowly lanceolate, acuminate, 2-keeled, glabrous.....4. *bellariensis*.

1. HETEROPOGON CONTORTUS, Beauv. ex Roem. et Schult. *Andropogon contortus*, Linn.; F. B. I. vii. 199; S. I. G. figs. 162, 163.

In all Districts; sea-level to 7,500 ft.

All the awns of a raceme often twisted about each other. A variable and very common, gregarious and very troublesome grass owing to the sharp, barbed callus and the hygroscopic awns which cause the fruit to adhere to and penetrate into the clothing of man and the hairs of animals. The Spear-grass.

A good fodder and suitable for hay-making, but when in fruit the latter should first be separated. Useful for thatching. Vern. *Hind.* Kher; *Ur.* Sinkolo; *Tel.* Eddi gaddi, Kaseri gaddi; *Dubba* gasari gaddi, Yerragoyi; *Tam.* Oosi pullu, Karunsi pullu, Pani pullu; *Kan.* Kari vunugada hullu, Sunkari hullu.

Var. *distichus*, C. E. C. Fischer n. var.

Anamallais at 3,500 ft. (Barber); Kodaikanal, 6,000—7,000 ft. (Bourne).

2. HETEROPOGON POLYSTACHYOS, Schult. *Andropogon polystachyos*, Roxb.; F. B. I. vii. 202.

Without precise locality (Wight).

3. HETEROPOGON OLIGANTHUS, Blatter et McCann. *Andropogon oliganthus*, Hochst.; F. B. I. vii. 201.

W. Gháts from Kudrai Mukh to Travancore; 3,000—8,000 ft.

4. HETEROPOGON BELLARIENSIS, C. E. C. Fischer n. comb. *Andropogon bellariensis*, Hack.; F. B. I. vii. 201.

Anantapur District on Gooty Fort Hill (Campbell, Wight).

31. *Themeda*, Forsk.

Coarse annual or perennial herbs. Leaves narrow. Inflorescence terminating the culms and their upper branches in short solitary racemes subtended by spathes, crowded in paniculate, often glomerate fascicles; rachis terete, tough or tardily disarticulating and glabrous between the homogeneous pairs of spikelets, readily disarticulating above them. Spikelets 2-nate, the terminal group 3-nate; 2 lowest pairs persistent, alike, ♂ or empty, sessile or subsessile, closely approximate to form a quasi involucre, the following pairs differing in sex and conspicuously in shape, one sessile, the other on a jointed pedicel, and falling with the upper part of the pedicel. *Involucral and pedicelled*

spikelets similar, the latter narrower, much dorsally compressed, awnless: *Glumes* usually 2; lower 2-keeled, one or both keels sometimes scariously winged; upper occasionally suppressed. *Lemmas* hyaline; upper often suppressed, both or either with or without a ♂ floret. *Sessile spikelets* above the involucre terete: *Callus* usually acute to pungent, so densely bearded as to conceal more or less the adjacent joint and pedicel bases. *Glumes* equal, coriaceous except the submembranous tips; lower tightly involute, without keel, sometimes grooved down the middle; upper with a deep longitudinal groove on each side, firm between the grooves, margins thin. *Lemmas* dissimilar; lower hyaline, epaleate, empty; upper stipitiform, base hyaline, cartilaginous upwards and passing into a stout geniculate awn, or hyaline throughout and awnless or passing into a more or less reduced awn, paleate or not, containing a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3. *Styles* 2. *Grain* linear-obovate, subterete, grooved on the front; embryo about half as long.

Involucral spikelets all on the same level; only one bisexual spikelet in the raceme:—

Branching strict; clusters of inflorescence very numerous in numerous fascicles:—

Perennial, erect; culms robust, up to 10 ft. high; leaves 10—20 in. long, .1—55 in. wide; clusters in globose or fan-shaped, drooping fascicles; lower glumes of involucre spikelets .23—42 in. long, glabrous or more or less setose from tubercles; lower glume of bisexual spikelets .18—27 in. long, glabrous, pubescent or rarely densely silky, sometimes muriculate, apex usually hispid; awns .6—2.5 in. long.....1. *triandra*.

Annual, erect or more often geniculately ascending and scrambling; culms slender, up to 6 ft. long; leaves up to 12 in. long and .25 in. wide; clusters usually narrow, erect or suberect; lower glumes of involucre spikelets .18—2 in. long, margins in upper half beset with stiff bristles from large tubercles; lower glumes of bisexual spikelets .16—17 in. long, puberulous; awns 1.3—1.5 in. long.....2. *quadrivalvis*.

Branching very effuse; clusters few in few, small, superposed fascicles on filiform branches; leaves on the main culms up to 14 in. long and .3 in. wide, tips filiform, upper leaves 3—4 in. long, filiform; lower glumes of involucre spikelets .26—27 in. long, glabrous except for a very few bristles from tubercles near the apex; lower glumes of bisexual spikelets .18 in. long, glabrous and shining below, hispidulous at apex; awns 1—1.7 in. long.....3. *laxa*.

Involucral spikelets in superposed pairs; often 2 bisexual spikelets in the raceme:—

Panicle racemiform; lower glumes of bisexual spikelets .12—14 in. long, back longitudinally channelled. Culms usually slender, up to 4 ft. high, leafy, not clothed at base with leaf-sheaths; leaves 3—20 in. long, .1—55 in. wide; spathules usually finely setose from large tubercles; lower glumes of involucre spikelets .26—34 in. long; setose from minute tubercles; awns .8—1.3 in. long.....4. *tremula*.

Panicle decomposed, thyriform; lower glumes of bisexual spikelets .14—18 in. long, not channelled. Culms robust, up to 10 ft. high, clothed at the base with broad, coriaceous, equitant leaf-sheaths; leaves up to 4 ft. long and .33 in. wide; spathules slender, glabrous; lower glumes of involucre spikelets .17—24 in. long, glabrous, rarely setose from minute tubercles, apex hispidulous; awns .6—9 in. long.....5. *cymbaria*.

1. THEMEDA TRIANDRA, Forsk. *Anthistiria imberbis*, Retz.; F. B. I. vii. 211.

In all Districts; sea-level to 7,000 ft.

Very variable, especially in indumentum. Eaten by cattle only when young. Vern. Tam. Erigai thattu pullu; Kan. Bettanchi hullu, Thodda anji hullu, Gondamanchi hullu.

2. *THEMEDA* QUADRIVALVIS, O. Ktze. *Anthistiria ciliata*, Linn. f.; F. B. I. vii. 213.
Ganjam, Kurnool, Bellary, Coimbatore and Tinnevely Districts; Coorg, Mysore State. Vern. *Kan.* Guntu nalai hullu.
3. *THEMEDA* LAXA, Stapf ex Haines. *Anthistiria laxa*, Anderss.; F. B. I. vii. 213.
Rampa (Narayanswami) and Vizagapatam Districts. (K. Ranga Achariyar), 2,500 ft.
4. *THEMEDA* TREMULA, Hack. *Anthistiria tremula*, Nees; F. B. I. vii. 214; S. I. G. fig. 165.
Hills from Coorg to Travancore; S. Kanara District; near sea-level to 7,000 ft.
5. *THEMEDA* CYMBARIA, Hack. *Anthistiria cymbaria*, Roxb.; F. B. I. vii. 215.
W. Gháts; 1,000—7,000 ft. Vern. *Tam.* Noshia palai pullu; *Kan.* Balai hullu.

32. *Iseilema*, Andersson

Annual or perennial; culms compressed, at least at base. *Leaves* narrow with compressed, keeled sheaths. *Panicles* with usually fascicled branches interspersed with spathe-like bracts. *Racemes* fascicled, each in the axil of a complicate spathe with scarious margins. *Spikelets* lanceolate, the four basal whorled to form a quasi involucre as in *Themeda*, but all pedicelled; rhachis short, bearing one sessile and two pedicelled spikelets, or sometimes 2-jointed and then the lower with one sessile and one pedicelled spikelet, disarticulating from the peduncle immediately below the involucre spikelets. *Involucral and upper pedicelled spikelets* similar, the latter usually narrower and with longer pedicels, sometimes much reduced or represented by the pedicel alone: *Glumes* membranous, subequal, more or less 2-keeled, usually strongly nerved. *Lemmas* hyaline, usually only the lower present, epaleate, containing a ♂ floret. *Sessile spikelets* with a very short, more or less bearded callus: *Glumes* subequal, coriaceous or chartaceous; lower lanceolate, truncate, emarginate or 2-toothed; upper more or less boat-shaped, acute. *Lemmas* dissimilar; lower short, hyaline, epaleate, empty; upper a hyaline stipe passing into a geniculate awn, subtending a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, dorsally compressed; embryo half as long.

Pedicels of involucre spikelets longer than broad, glabrous; glumes membranous; glumes of sessile spikelets lanceolate, glabrous on the back; upper pedicels slender, .05—1 in. long, sparsely hairy, their spikelets like the involucre:—

Spathes very narrow, rarely without minute tubercles on the keel and margins; peduncles very slender, .28—5 in. long, often much exserted, hispidulous upwards, minutely tubercular at apex. Culms 4—36 in. high; leaves 1.2—6 in. long, .05—1 in. wide; pedicelled spikelets .14 in. long; glumes of sessile spikelets .11—12 in. long; awns .4 in. long.....1. *prostratum*.

Spathes comparatively broad, devoid of tubercles; peduncles .08—1 in. long, not exserted, devoid of tubercles. Culms 10—40 in. high; leaves 2—8 in. long, .05—1.5 in. wide; pedicelled spikelets .17—21 in. long; glumes of sessile spikelets .14—2 in. long; awns .45—5 in. long.....2. *laxum*.

Pedicels of involucre spikelets as broad at apex as long, sides and base densely bearded; glumes coriaceous, .23—27 in. long, longitudinally depressed on each

side of midrib. Culms 3—30 in. high; leaves 1—4·5 in. long, .07—·18 in. wide; spathes usually glabrous, sometimes sparsely ciliate from rather large tubercles; glumes of sessile spikelets beaked, the beak 2-keeled, lower .22—·24 in. long, back more or less pubescent, upper slightly shorter, more or less 1-keeled; awns .54 in. long; upper pedicels .12—·15 in. long, capillary, glabrous, bearing 1 or 2 much reduced glumes or none.....3. *anthephoroides*.

1. *ISELEMA PROSTRATUM*, Anderss. *I. Wightii*, Anderss.; F. B. I. vii, 218.

Northern and Eastern Districts; Nilgiri and Coimbatore Districts; at low elevations in the drier parts.

An excellent fodder.

2. *ISELEMA LAXUM*, Hack.; F. B. I. vii, 218; S. I. G. figs. 166—168.

In all Eastern and Central Districts from Ganjam to S. Arcot; Mysore State; sea-level to 2,500 ft.

An excellent fodder. Often confused with the previous species. Vern. *Tel.* Erra chengali gaddi; *Tam.* Tenga nari pillu.

3. *ISELEMA ANTHEPHOROIDES*, Hack.; F. B. I. vii, 219; S. I. G. figs. 169, 170.

In the coastal Districts from Ganjam to Nellore; Bellary and Cuddapah Districts; sea-level to 1,000 ft.

33. *Pseudanthistiria*, Hook. f.

Annual herbs. *Leaves* narrow. *Panicles* leafy; branches slender, each terminating in a subumbellate fascicle of racemes subtended by a spathe-like bract. *Racemes* subtended by a complicate, acuminate or caudate, keeled spathe, resembling those of *Themeda*, but lacking the involucre spikelets, 2-jointed, the basal with one sessile and one pedicelled spikelet, the upper with one sessile and 2 pedicelled. *Sessile spikelets* with a short, short-bearded callus: *Glumes* subequal; lower chartaceous, slightly narrowed upwards, truncate, margins narrowly inflexed in upper part, broadly involute below; upper membranous, lanceolate acute or obtuse. *Lemmas* dissimilar; lower small, quadrate, empty; upper stipitiform, hyaline below, hardening upwards into a fine geniculate awn, subtending a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3. *Grain* small. *Pedicelled spikelets* with slender pedicels $\frac{1}{2}$ as long: *Glumes* subequal, membranous. *Lemmas* 0, or sometimes one present. *Lodicules* and *stamens* as in the sessile spikelet.

Leaves tapering from base to apex, more or less hairy from tubercles on both sides; primary nerves 3—4 on each side of the midrib distinct from the finer secondaries; peduncles .04 in. long, pubescent; back of lower glume of sessile spikelets not sulcate; lower glume of pedicelled spikelets usually sparsely setose at apex:—

Spathes .25—·3 in. long, margins setose, usually from minute tubercles; lower glume of sessile spikelets nerveless or nerves 2 at the apex, .1—·11 in. long. Culms erect, up to 2 ft. high; leaves 1·5—6 in. long, .06—·15 in. wide, base slightly narrowed; awns .6—·76 in. long; lower glume of pedicelled spikelets .1—·12 in. long.....1. *heteroclita*.

Spathes .32—·8 in. long, margins only or most of the face in lower half bristly from rather large, sometimes blackish tubercles; lower glume of sessile spikelets .12—·22 in. long, 7-nerved. Culms erect, up to 3 ft. high; leaves 3—7·5 in. long, .18—·3 in. wide, base rounded; awns .9—1·2 in. long; lower glume of pedicelled spikelets .14—·22 in. long.....2. *hispida*.

Leaves widest near the middle, glabrous, primary and secondary nerves usually indistinguishable, .9—2·4 in. long, .1—·3 in. wide. Culms erect from decumbent,

rooting bases, slender, up to 18 in. high; spathes .4—52 in. long, margins finely ciliate from minute tubercles; peduncles .65—12 in. long, hairy; lower glume of sessile spikelets .14—.18 in. long, 7-nerved, back slightly sulcate on each side of the midrib; awns .75—1 in. long; lower glume of pedicelled spikelets .2—24 in. long, not setose.....3. *umbellata*.

1. PSEUDANTHISTIRIA HETEROCLITA, Hook. f.; F. B. I. vii. 219.
S. Kanara and S. Malabar District; near the coast.
2. PSEUDANTHISTIRIA HISPIDA, Hook. f.; F. B. I. vii. 219.
Mysore State; S. Kanara; sea-level to 4,000 ft.
3. PSEUDANTHISTIRIA UMBELLATA, Hook. f.; F. B. I. vii. 220.
Godavari District; W. Coast and Gháts, from Coorg southwards; sea-level to 4,000 ft.

34. *Apluda*, Linn.

Annual or perennial, leafy herbs, often geniculate and rooting from the nodes. *Leaves* flat, sometimes petioled. *Panicles* compound, leafy; branchlets clustered; clusters subtended by a spathe. *Spikelets* in threes at the tips of the branchlets, embraced by a boat-shaped bract, 1 sessile and 2 pedicelled, all similar in shape, muticous or the sessile awned, alike in sex or more often the pedicelled ♂ only; the whole falling together with the bulbous basal joint, or else the pedicelled spikelet when fertile disarticulating separately: the terminal spikelet small or almost suppressed, on a broad, flat, glume-like pedicel. *Glumes* equal; lower convolute, margins not or very narrowly inflexed; upper keeled. *Lemmas* hyaline, paleate; lower entire muticous, usually containing a ♂ floret; upper deeply 2-fid, and geniculately awned from the sinus or entire or nearly so and muticous, containing a bisexual floret, or in the pedicelled spikelets with a ♂ floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly laterally compressed.

Upper lemma of sessile spikelets 2-lobed for half its length or more; awn .26—.66 in. long. Culms 1—10 ft. high; leaves 2.5—15.5 in. long, .1—.65 in. wide, narrowed at the base and often with a petiole up to 1.5 in. long; bracts .16—.34 in. long, aristate; basal joint small and hemispheric or up to .16 in. long and turbinate or cylindrical; lower glume of sessile spikelet .12—.31 in. long, margins narrowly winged above the middle.....1. *aristata*.

Upper lemma of sessile spikelet entire or very shortly 2-lobed, awnless. Otherwise as in the last species, but more slender, usually smaller in all its parts and more glabrous.....2. *mutica*.

1. APLUDA ARISTATA, Linn. *A. varia*, Hack. subsp. *aristata*, Hack.; F. B. I. vii. 150; S. I. G. figs. 142, 143.

In all Districts; sea-level to 7,000 ft.

Common, very variable in the dimensions of all its parts and in indumentum. Often scrambling over bushes.

A fairly good fodder, readily eaten by cattle when young. Vern. *Hind.* Gururna; *Tam.* Manda pillu, Mungil pillu, Sengamanri pillu; *Kan.* Sanna kari kachi hullu, Akku hullu.

2. APLUDA MUTICA, Linn. *A. varia*, Hack. subsp. *mutica*. Hack.; F. B. I. vii. 150.
Pondicheri (Perrottet).

35. *Eremopogon*, Stapf

Perennial, rarely annual, erect herbs; culms simple below, more or less branched above, sometimes in fastigiata bundles each supported by a bladeless sheath. *Racemes* spiciform, solitary, terminating each branchlet, spathate; rhachis many-jointed, fragile, joints and pedicels filiform. *Spikelets* 2-nate, one sessile and one pedicelled, similar in shape, differing in sex, except the 1—3 lowest pairs which are homogeneous and ♂ or empty, disarticulating horizontally. *Sessile spikelets* dorsally compressed: *Callus* small, shortly bearded. *Glumes* equal, thinly chartaceous to membranous; lower 2-keeled with narrowly inflexed margins; upper boat-shaped, acutely 1-keeled. *Lemmas* dissimilar; lower hyaline; upper reduced to a slender stipe, hyaline below, passing into a geniculate awn, rarely with a very narrow hyaline margin shortly cleft at the apex, subtending a bisexual floret; paleas 0. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Pedicelled spikelets* similar to the sessile, but awnless. *Lemmas* usually absent, sometimes one hyaline, containing a ♂ floret.

EREMOPOGON FOVEOLATUS, Stapf. *Andropogon foveolatus*, Del.; F. B. I. vii. 168; S. I. G. figs. 148, 149.

In all the hotter parts; Bababudan Hills (Meebold); sea-level to 3,000 ft.

Culms tufted, 6—30 in. high; basal sheaths white- or cream-tomentose; leaves 1.3—6 in. long, almost filiform to .1 in. wide; racemes .6—1.5 in. long; glumes .12—.14 in. long, lower ones with a circular median pit above the middle of the back; awns .7—.9 in. long. A good fodder.

36. *Schizachyrium*, Nees

Annual or perennial herbs. *Leaves* narrow. *Inflorescence* of terminal, solitary, spiciform racemes supported by or more or less enclosed in narrow spathes, frequently collected into a false panicle; rhachis fragile, many-jointed; joints often stout, thickened upwards with a scarious, cupuliform, more or less toothed terminal appendage. *Spikelets* 2-nate, one sessile, the other pedicelled, differing in sex and often in size and shape, both falling together with the contiguous joint. *Sessile spikelets* dorsally compressed: *Glumes* subequal; lower chartaceous or subcoriaceous. *Lemmas* hyaline; lower empty; upper 2-toothed or 2-fid, rarely entire, awned from the apex or sinus, containing a bisexual floret. *Lodicules* 2. *Stamens* 3, rarely 2. *Styles* 2, free. *Grain* narrowly linear, subterete; embryo short. *Pedicelled spikelets* similar; lower lemma empty; upper if present containing a ♂ floret.

Culms solitary or 2—3 together, 2—30 in. high, divaricately branched from most of the nodes; leaves suddenly narrowed to a sharp point, at least those on the main stems, base rounded and constricted, .7—1.8 in. long, .07—.2 in. wide; spathes .4—.75 in. long, usually as long as the raceme; joints .08—.11 in. long, glabrous, with a tuft of hairs at the base; lower glume of sessile spikelets .1—.12 in. long; minutely puberulous; callus with a tuft of hairs; awns .28—.36 in. long

1. *brevifolium*.

Culms tufted, usually densely so, 2—22 in. high, fastigiate branched; leaves tapering from the not or slightly constricted base to the acuminate tip, 1—4 in.

long, .05—1 in. wide; spathes .8—1.7 in. long, often becoming bright red, racemes usually exserted; joints .17—2 in. long, densely long white-hairy on the back; lower glume of sessile spikelets .2—2.2 in. long, back long-white-hairy; awns .4—5.5 in. long.....2. *exile*.

1. SCHIZACHYRIUM BREVIFOLIUM, Nees. *Andropogon brevifolius*, Sw.; F. B. I. vii. 165.
Godavari District at Bison Hill (Barber); Nilgiri Hills at Gudalur; Travancore State.
2. SCHIZACHYRIUM EXILE, Stapf. *Andropogon exilis*, Hochst.; F. B. I. vii. 166.
Nellore and Anantapur Districts; Travancore State.

37. *Andropogon*, Linn.

Usually perennial, erect herbs. *Leaves* usually flat. *Inflorescence* of paired, rarely solitary, or corymbose, often digitate or subdigitate, spiciform racemes subtended by spathes, terminating the culms or their branches, sometimes collected into false panicles; rhachis articulated, fragile; joints and pedicels very slender, usually plano-convex, thickened upwards, cupped and usually 2—3-toothed at the apex, more or less densely ciliate. *Spikelets* 2-nate, one sessile, the other pedicelled, differing in sex and usually more or less in shape and size, the lowest pair sometimes homogeneous and imperfect. *Sessile spikelets* dorsally or laterally compressed: *Glumes* equal or subequal, membranous to coriaceous; lower flat, concave or channelled on the back, margins inflexed and sharply keeled at least in the apical half, keels sometimes winged; upper boat-shaped, 1-keeled upwards, sometimes aristulate. *Lemmas* hyaline or the upper one firmer, with or without small paleas; lower empty; upper 2-toothed or -fid, awned from the sinus, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* subulate to oblong, subterete or plano-convex; embryo half as long. *Pedicelled spikelets* often very different from the sessile, always more or less dorsally compressed, never concave or channelled on the back, sometimes reduced and small or entirely suppressed: *Glumes* membranous to chartaceous; upper often 2-keeled upwards, keels sometimes narrowly winged; lower mucicous or aristulate. *Lemmas* if present, hyaline, ciliate, mucicous; lower empty; upper containing a ♂ floret.

Leaves not or only slightly narrowed at the base:—

Lower glume of sessile spikelets linear-oblong, back deeply channelled, keels not winged; upper lemma of sessile spikelets shortly 2-fid:—

Culms 4—6 ft. high; lower leaves 1—3 ft. long, upper 10—20 in. long, .2—2.5 in. wide; racemes 3—5, sometimes only 2, 1—2 in. long; lower glume of sessile spikelets .17—1.8 in. long, upper .18—2 in. long with a fine arista .27—3.3 in. long; awn of upper lemma .6—1 in. long; glumes and lower lemma of pedicelled spikelets aristate.....1. *ascinodis*.

Culms 3—24 in. high; leaves 1.5—5 in. long, .05—2 in. wide; racemes 2, secund, .5—1 in. long; glumes of sessile spikelets .18 in. long, upper mucronate; awns of upper lemmas .5—6 in. long; glumes and lemmas of pedicelled spikelets mucicous.....2. *pumilus*.

Lower glume of sessile spikelets flat, .28—3 in. long, keels usually winged at the apex. Culms up to 40 in. high; leaves 3—8 in. long, .1—2 in. wide, more or less hairy; racemes 2, 1.6—3 in. long; upper glume of sessile spikelets .26—3 in. long, with an arista .16—2.2 in. long; upper lemma cleft to the middle with an awn .55—7 in. long; lower glume of pedicelled spikelets aristate

3. *longipes*.

Leaves tufted at the base of culms 7—36 in. high, at least the lower tapering to a very narrow, often elongate, almost petioled base, 1·8—3·5 in. long, ·08—·16 in. wide; racemes 1—3, 1·6—2 in. long; glumes livid or purple, lemmas white or reddish-purple; lower glume of sessile spikelets flat, usually with a shallow depression near the base, keels often narrowly winged, apex 2-toothed or -mucronate, ·25—·34 in. long; upper lemmas cleft to the middle, lobes very narrow, awn ·5—·8 in. long; glumes and lemmas of pedicelled spikelets mucicous, lower glume often narrowly winged at the apex.....4. *lividus*.

1. ANDROPOGON ASCINODIS, C. B. Clarke. *A. apricus*, Hook. f. non Trin.; F. B. I. vii. 169.
Ganjam District at Aska (Gamble); Coorg.
2. ANDROPOGON PUMILUS, Roxb.; F. B. I. vii. 170; S. I. G. figs. 150, 151.
In all the drier tracts; sea-level to 4,000 ft.
Often on black-cotton soil.
3. ANDROPOGON LONGIPES, Hack.; F. B. I. vii. 170.
Nilgiri Hills.
4. ANDROPOGON LIVIDUS, Thw.; F. B. I. vii. 209.
Nilgiri and Pulney Hills, at high elevations; Anaimudi Peak in Travancore at 8,840 ft. (Barnes).
In open downs often burnt over.

38. Cymbopogon, Hack.

Perennial, densely tufted, often aromatic herbs. *Leaves* flat, often very coarse. *Inflorescence* of paired racemes, usually one of them sessile, the other peduncled, subtended by a spatheole, terminating the culms and their branches, collected into a frequently much-branched panicle; rhachis fragile, several-jointed; spikelets 2-nate, one sessile, the other pedicelled, lowest pair of one or both racemes homogamous (♂ or empty), the rest differing in sex and more or less in shape; joints and pedicels filiform, their tips often more or less cupped or auricled, those of the lowest pair sometimes conspicuously swollen, oblong or barrel-shaped. *Sessile spikelets* (except the lowest one) dorsally, rarely laterally compressed; *Callus* very short, obtuse, shortly hairy. *Glumes* subequal, more or less chartaceous; lower flat, slightly depressed, narrowly grooved or broadly channelled on the back, 2-keeled at least from the middle upwards, keels usually narrowly winged; upper boat-shaped, 1-keeled, keel sometimes narrowly winged. *Lemmas* hyaline; lower entire empty; upper 2-fid or -lobed, awned from the sinus or entire and mucicous, rarely firmer and stipitiform below the awn; column of the awn smooth; paleas 0, usually containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, subterete or plano-convex; embryo half as long. *Pedicelled spikelets* differing more or less in shape and size from the sessile, never depressed or grooved on the back; *Glumes* mucicous; lower chartaceous; upper thinner. *Lemmas* (usually the lower only present) hyaline, containing a ♂ floret, rarely both suppressed.

The following key is based on Dr. Stapf's in 'Kew Bull.', 1906, 350, and that of Melle. A. Camus in 'Rev. Bot. Appliq.', 1921, i, 271.

Spikelets awnless:—

Lower glume of fertile spikelets lanceolate, acute, back flat, 2-keeled, keels

narrowly winged, .16—18 in. long. Culms up to 5 ft. high; panicles pyramidal or linear-oblong.....1. *Nardus*.
Lower glume of fertile spikelets linear or linear-lanceolate, acuminate, back distinctly concave in lower half, .18—2 in. long. Very like the last species in other respects.....2. *citratus*.

Fertile spikelets bearing a slender, geniculate awn:—

Lower glume of fertile spikelets not channelled, at most slightly depressed or foveolate:—

Lowest pedicel not or hardly stouter than the rest; the longer leaves usually much narrowed to the base:—

Panicle often greyish, lax, with slender, long, flexuous, often drooping branches and comparatively inconspicuous spathes. Culms 3—6 ft. high; leaves 8—60 in. long, .1—8 in. wide; glumes .18—2 in. long, back of lower smooth or 1—2-foveolate.....3. *flexuosus*.

Panicle erect, dense, often interrupted, with rather conspicuous, frequently purplish-brown to blackish spathes. Otherwise hardly distinguishable from the last species, slightly more robust with rather shorter awns

4. *confertiflorus*.

Lowest pedicel of at least the sessile racemes much swollen, back convex, coriaceous. Culms 1—4 ft. high; leaves 6—25 in. long, .06—35 in. long, not narrowed to the base; panicles erect, narrow, often interrupted, hairs of joints and pedicels white, often conspicuously contrasting with the pale-brown spikelets; lower glume of fertile spikelets .15—2 in. long, its back flat or slightly depressed below the middle; awns .3—6 in. long.....5. *coloratus*.

Lower glume of fertile spikelets deeply channelled:—

Channel of glume in lower half, very narrow, corresponding to a rib on the inner side:—

Lowest pedicel of sessile racemes slightly swollen and connate to the base of the rhachis:—

Leaves linear-lanceolate, subcordate or amplexicaul, 3—18 in. long, .2—1.25 in. wide, finely caudate. Culms up to 6 ft. high; panicles 4—12 in. long, turning reddish (often very bright) when mature; glumes .13—16 in. long; awns .45—55 in. long.....6. *Martini*.

Leaves narrowly linear, not caudate or amplexicaul, 3—12 in. long, .15—3 in. wide. Culms up to 3 ft. high; panicles 4—8 in. long, glaucous or straw-coloured when mature; glumes .12—16 in. long; awns .3—7 in. long.....7. *caesioides*.

Lowest pedicels not swollen, free from the rhachis. Culms 1—2 ft. high; leaves subcordate, finely acuminate, 2.5—8 in. long, .2—4 in. wide, often purplish near the base; panicles narrow, stiff, spathes often with rudimentary blades, purplish-brown with yellowish scarious margins; spikelets usually green in the lower part and purple in the upper; glumes .18 in. long; awns .4—5 in. long.....8. *polyneuros*.

Fertile glumes wedged between the rather stout joint and the pedicels, deeply channelled for most of its length and all its width between the keels, the channel ceasing abruptly a little above the base, which appears slightly humped, .15—16 in. long, not winged; awns .4—5 in. long. Culms slender, 6—25 in. high; leaves 1.5—15 in. long, .03—26 in. wide.....9. *Gidarba*.

1. CYMBOPOGON NARDUS, Rendle. *Andropogon Nardus*, Linn.; F. B. I. vii. 205; *A. Schoenanthus*, Wall. Pl. As. Rar. t. 28.

Only known in cultivation. Grown for its aromatic oil. The Citronella grass.

2. CYMBOPOGON CITRATUS, Stapf.

Occurring only as a cultivated plant grown for its aromatic oil. The Lemon grass. Vern. *Tel.* Vasana gaddi, Chippa gaddi, Nimma gaddi; *Tam.* Vasana pillu, Karpura pillu; *Mal.* Vasana pullu.

3. CYMBOPOGON FLEXUOSUS, Wats. *Andropogon Nardus*, Linn. var. *flexuosus*, Hack.; F. B. I. vii. 207.

- In all Districts from Bellary and Chingleput southwards, except on the W. Coast; W. Gháts. Also cultivated for the extraction of "Malabar lemon-grass oil." A white and a dark form are distinguished. The Ginger grass. Vern. *Tam.* Chukkunari pillu, Sukkunari pillu; *Mal.* Chukkunari pullu; *Kan.* Anthi balai.
4. *CYMBOPOGON CONFERTIFLORUS*, Stapf. *Andropogon Nardus*, Linn. var. *nilagiricus*, Hack.; F. B. I. vii. 206.
Rampa Hills (Narayanswami); W. Coast and Gháts; 3,000—6,000 ft. Vern. *Toda* Bambai.
5. *CYMBOPOGON COLORATUS*, Stapf. *Andropogon Nardus*, Linn. var. *coloratus*, Hook. f.; F. B. I. vii. 206.
In all Districts from Bellary and Nellore southwards except the W. coast; sea-level to 3,000 ft.
Used for thatch. Frequently deformed by a fungus, *Epichloe* sp. Vern. *Tel.* Botha gaddi; *Tam.* Manda pillu, Manákru pillu, Manjin pillu, Sengamani malai pillu, Sengana pillu; *Kan.* Badhai hullu, Karatha anjai hullu.
6. *CYMBOPOGON MARTINI*, Wats. *Andropogon Schoenanthus*, Linn. var. *Martini*, Hook. f.; F. B. I. vii. 204.
Eastern and Central Districts from Kistna and Bellary to Coimbatore and Salem; Mysore, Nilgiri and Pulney Hills; sea-level to 5,000 ft. The Geranium grass.
The source of Rusa oil, of which there are two kinds, *Motia* and *Sufia*, which though differing chemically appear to be derived from separate, morphologically indistinguishable races of this species. Sometimes cultivated. Vern. *Hind.* Rusa; *Tel.* Kachi gaddi; *Tam.* Kavattan pillu, Kannam pillu; *Kan.* Kasi hullu, Kunthi hullu, Anchet hullu, Nanj hullu, Bili dodda kachi hullu.
7. *CYMBOPOGON CAESIUS*, Stapf. *Andropogon Schoenanthus*, Linn. var. *caesius*, Hack.; F. B. I. vii. 205; S. I. G. fig. 164.
From Mysore State, Bellary and Kurnool Districts southwards, except on the W. Coast; 500—5,000 ft.
Used for thatching; eaten by cattle only when young. Vern. *Tel.* Kasi gaddi, Kamanchi gaddi; *Tam.* Kamakshi pillu, Mandap pillu, Muchival pillu; *Kan.* Kasi hullu, Kamancha hullu, Anji hullu.
8. *CYMBOPOGON POLYNEUROS*, Stapf. *Andropogon Schoenanthus*, Linn. var. *versicolor*, Hack.; F. B. I. vii. 205.
Nilgiri Hills; 3,000—7,000 ft.
9. *CYMBOPOGON GIDARBA*, Haines. *Andropogon Gidarba*, Ham. ex Hook. f.; F. B. I. vii. 208.
Mysore State; Vizagapatam, Cuddapah, Bellary, Nellore and Tinnevelly Districts. Vern. *Tel.* Seetha Kasi gaddi, Thigavomi gaddi.

39. Hackelochloa, O. Kuntze

Annual, erect, much-branched, usually low herbs. *Leaves* linear. *Inflorescence* of axillary and terminal, often fascicled, cylindric, spiciform racemes; rachis fragile, joints hollowed, completely fused with the pedicels. *Spikelets* 2-nate, dissimilar, one sessile, the other with a

pedicel fused to the joint. *Sessile spikelets* globose: *Callus* obconic. *Glumes* subequal; lower cartilaginous, subglobose; upper chartaceous, broadly ovate-oblong, lining the cavity of the joint. *Lemmas* hyaline; lower epaleate and empty; upper paleate, containing a bisexual floret. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Grain* suborbicular; embryo $\frac{2}{3}$ as long. *Pedicelled spikelets* as long as the sessile or longer: *Glumes* equal, ovate, green; lower slightly asymmetrical; upper boat-shaped, prominently 1-keeled. *Lemmas* sometimes wanting, when present hyaline, empty or the upper containing a ♂ floret.

HACKELOCHLOA GRANULARIS, O. Ktz. *Manisuris granularis*, Linn. f.; F. B. I. vii. 159; Roxb. Cor. Pl. t. 118; S. I. G. fig. 147.

In all the central and eastern Districts and in the hills; usually in the drier tracts; sea-level to 4,000 ft.

Culms 1.5—30 in. high; leaves 1.2—7.5 in. long, .1—.5 in. wide, hairy, base often cordate; racemes .2—7 in. long; lower glume of sessile spikelets .04—06 in. long, pitted.

A moderately good fodder. Vern. *Hind.* Trinpali; *Tel.* Kuru jedanai gaddi, Guru singu gaddi; *Kan.* Kadu sanna barka hullu.

40. *Ophiuros*, Gaertner f.

Erect, usually much-branched herbs. *Leaves* flat or convolute. *Racemes* spiciform, cylindric, terminal on the usually fascicled branchlets; rhachis horizontally or slightly obliquely fragile, joints completely fused with the pedicels to form deeply hollowed, cylindric recesses for the sessile spikelets. *Sessile spikelets* with a narrow callus fused to the base of the joint: *Glumes* equal; lower thickly coriaceous, nearly flat; upper thinly membranous, boat-shaped. *Lemmas* hyaline, paleate; lower containing a ♂ floret or empty; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly compressed; embryo $\frac{1}{4}$ as long. *Pedicelled spikelets* entirely suppressed or rudimentary and minute.

OPHIUROS EXALTATUS, O. Ktz. *O. corymbosus*, Gaertn. f.; F. B. I. vii. 160. *Rottboellia corymbosa*, Linn. f.; Roxb. Cor. Pl. t. 181.

Mysore State and the Eastern Districts; sea-level to 3,000 ft. Culms up to 7 ft. high, base tuberous; leaves 4—12 in. long, .15—3 in. wide; racemes 1—4 in. long; lower glumes oblong, obtuse, .08—11 in. long, smooth or more or less pitted in rows. Used for thatching. Vern. *Tel.* Pedda panuku; *Tam.* Kinangu pillu, Sothu alagu pillu.

41. *Rottboellia*, Linn. f.

Annual, sometimes perennial, usually tall herbs, branched above, often with tilt-roots from the lowest nodes. *Leaves* large, broadly linear, flat. *Inflorescence* of solitary, slender, cylindric or very narrowly subulate, spiciform racemes; rhachis nearly horizontally to very obliquely fragile; joints fused with the usually shorter pedicels to form a deeply concave, thin-walled recess to receive the sessile spikelets. *Sessile spikelets* pale: *Glumes* subequal, coriaceous; lower slightly convex and closing the cavity; upper deeply boat-shaped. *Lemmas* hyaline,

paleate, nearly as long as the glumes; lower usually enclosing a ♂ floret; the upper a bisexual one. *Lodicules* 2. *Stamens* 3. *Grain* broadly oblong or ellipsoid, compressed; embryo nearly as long. *Pedicelled spikelets* usually shorter than the sessile: *Glumes* green, membranous or chartaceous. *Lemmas* hyaline, both or the upper only containing a ♂ floret or reduced and empty. Joints and spikelets in the upper part of the raceme more and more reduced and forming a tail-like appendage.

ROTTBOELIA EXALTATA, Linn. f.; F. B. I. vii. 156. Roxb. Cor. Pl. t. 157; S. I. G. fig. 145.

In all Districts except in the driest localities; sometimes growing in water; sea-level to 7,000 ft.

Culms usually several feet, up to 12 ft., high, sometimes quite short; leaves up to 4 ft. long and 1·2 in. wide; racemes 2—6 in. long; joints 2—23 in. long; glumes 15—22 in. long, the lower of sessile spikelets often narrowly winged on both sides near the apex, upper glumes on the keel and the lower glume of pedicelled spikelets on one side. Vern. *Hind.* Barsali; *Tel.* Konda panuku.

42. *Manisuris*, Linn.

Annual or perennial low herbs. *Culms* usually tufted and branched. *Leaves* narrow, conduplicate, ultimately flat. *Racemes* solitary, terminal, compressed; rhachis fragile; joints fused with the pedicels to form a short, truncate, convex internode, hollowed on the inner face to receive the sessile spikelets, falling with the 2 spikelets. *Spikelets* 2-nate, one sessile, the other only appearing so by the fusion of its pedicel with the joint. *Sessile spikelets* dorsally compressed: *Glumes* dissimilar; lower coriaceous, smooth or more or less rugose, muricate or spinulose, its upper half 2-keeled and winged, often 1—2-awned; upper membranous or chartaceous, more or less boat-shaped and 1-keeled. *Lemmas* hyaline, usually paleate; lower empty or containing a ♂ floret; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong; embryo as long. *Pedicelled spikelets* as long as the sessile: *Glumes* coriaceous or chartaceous, smooth, often aristate; lower 2-keeled and usually winged on one keel; upper 1-keeled and variously winged. *Lemmas* hyaline or absent or more or less reduced, when perfect sometimes the upper containing a ♂ floret.

Lower glume of sessile spikelets ovate, acute, not awned, margins winged, wings rounded above, usually narrowed at the middle and expanded at the base; 11—13 in. long, back smooth or shallowly transversely grooved, puberulous; glumes of the pedicelled spikelets mucous. Culms wiry, 6—28 in. high; racemes 1—3 in. long.....1. *Myurus*.

Lower glumes of all spikelets terminated by flat, single or paired and divaricate awns:—

Lower glume of sessile spikelets ovate, 13 in. long, tapering into an acuminate awn up to 36 in. long, its margins winged above the middle, wings narrowly lunate, backs with 3—6 transverse, sometimes slightly warted ridges; lower glume of pedicelled spikelets similar but winged on one side only and the back smooth. Culms slender, 3—12 in. high; leaves 1—3 in. long, very narrow; racemes 1—2 in. long.....2. *acuminata*.

Lower glume of sessile spikelets lanceolate, acute, 1—12 in. long, terminated by 2 divaricate, often unequal awns 22—27 in. long, margins winged, wings

acute below and tapering onto the base of the awns, back below 4—6-grooved, with 5—9 marginal hooked spinules, the back smooth or with spinules or sometimes the spinules fused into crenulate laminae; lower glume of pedicelled spikelets with an awn .27—42 in. long, upper with an arista .1—16 in. long. Culms slender, 2—10 in. high; racemes .8—2.4 in. long.....3. *forficulata*.

1. *MANISURIS MYURUS*, Linn.; Roxb. Cor. Pl. t. 117. *Rottboellia Myurus*, Benth.; F. B. I. vii. 154; S. I. G. fig. 144.
Carnatic; Coimbatore, N. Arcot, Madura and Tinnevely Districts; usually in dry localities; low elevations to 2,000 ft. Vern. *Tel.* Nalla panuku; *Tam.* Waritsira pillu.
 2. *MANISURIS ACUMINATA*, C. E. C. Fischer n. comb. *Rottboellia acuminata*, Hack.; F. B. I. vii. 155.
Mysore State at Talguppa, 2,000—3,000 ft. (Meebold). On flat rocks.
 3. *MANISURIS FORFICULATA*, C. E. C. Fischer in Kew Bull. 1933, 355. *Rottboellia divergens*, Lisboa non Hack.; F. B. I. vii. 155.
Cochin State at Kavalay; 3,000—4,000 ft. (Meebold).
- Var. *hirsuta*, C. E. C. Fischer in Kew Bull. 1933, 357.
Glumes smaller, densely hirsute, hardly aristate.
Bababudan Hills (Meebold).

43. *Mnesithea*, Kunth.

Perennial erect herbs. *Leaves* narrow. *Inflorescence* of solitary, terminal, spiciform, cylindrical racemes; rhachis fragile; joints fused with the pedicels into a terete internode deeply hollowed to receive the two sessile opposite spikelets, separated by a hyaline, often evanescent membrane. *Sessile spikelets* all alike; *Glumes* equal in size and shape; lower coriaceous, convex, closing the cavity; upper rather rigidly hyaline. *Lemmas* hyaline; lower resembling the upper glume, paleate or not, empty; upper oblong, its palea shorter, enclosing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Grain* narrowly oblong, compressed; embryo $\frac{2}{3}$ as long. *Pedicelled spikelets* represented by minute rounded or truncate single glumes, rarely by 2.

MNESITHEA LAEVIS, Kunth; S. I. G. fig. 146. *Rottboellia perforata* Roxb. Cor. Pl. t. 182; F. B. I. vii. 158.

In all the east coast Districts; Mysore State; Shevaroy Hills; W. Ghâts from the Nilgiri to the Travancore Hills; sea-level to 3,000 ft.

Culms 1—4 ft. high; leaves 1—20 in. long; .1—35 in. wide; racemes 2—8.5 in. long; joints .14—18 in. long.

Eaten by cattle when young. Vern. *Tel.* Panuku, Kolupu gaddi; *Kan.* Sunku dabbai hullu.

44. *Hemarthria*, R. Brown

Erect or decumbent, perennial herbs. *Leaves* narrow, flat. *Racemes* spiciform, compressed, often curved, tips more or less subulate owing to the slender terminal spikelet, terminating the culms and their fascicled branches, subtended by a spathe; rhachis disarticulating tardily; joints semicylindric owing to their fusion with the pedicels, hollowed out to receive the sessile spikelets. *Sessile spikelets* closing the

cavity in the rhachis: *Glumes* subequal; lower nearly flat; upper boat-shaped, 1-keeled, sometimes adhering to the joint and pedicel. *Lemmas* hyaline, with or without paleas; lower empty; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, dorsally compressed. *Pedicelled spikelets* very like the sessile: *Glumes* usually more elongate; upper usually mucronate, caudate or aristate.

HEMARTHRIA COMPRESSA, Kunth. *Rottboellia compressa*, Linn. f.; F. B. I. vii. 153; Roxb. Cor. Pl. t. 156.

Godavari, Nellore and Chingleput Districts; usually in wet situations.

Culms 1—5 ft. high, decumbent and rooting below; leaves 1—5 in. long, 1—2 in. wide; racemes 2.5 in. long; lower glume of sessile spikelets 18—23 in. long, 2-keeled, margined or very narrowly winged at apex; upper glume of pedicelled spikelets sometimes narrowly winged on the keel near the apex. Vern. Tel. Shervu panuku.

45. Digitaria, Haller

Annual or perennial, slender herbs. *Leaves* narrow, flat, often flaccid. *Inflorescence* of 2—many digitate or more or less distant, alternate, opposite or whorled spikes or racemes, rarely paniculate; rhachis triquetrous, flat or terete with or without green wings. *Spikelets* usually 2—3-nate, jointed on the pedicels and falling from them entire. *Glumes* dissimilar; lower a minute membranous scale or delicate, evanescent, hyaline membrane or sometimes absent; upper membranous, sometimes very thin, rarely absent. *Lemmas* 2; lower 5—7-nerved, empty or with a minute palea and lodicules; upper chartaceous with hyaline margins, faintly 3-nerved; palea as long as and embraced by the lemma, finely 2-nerved, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed by the slightly hardened lemma and palea, oblong, plano-convex with rounded angles in section.

Racemes not in a pyramidal panicle with the lower opposite or whorled:—

Spikelets .09 in. or more long. Culms tufted from a geniculate, often rooting base:—

Hairs not clavate-tipped:—

Rhachis flat, up to .04 in. wide, margins winged. Culms up to 2.5 ft. high; leaves up to 10 in. long; racemes 2—14, subdigitate or 2—3-nate on a short common axis, up to 7 in. long, appressed, acutely acuminate; .1—14 in. long; lower glume very small or 0; barren lemma similar to the upper glume and like it with lines of fine appressed, ultimately spreading hairs between the nerves; grain oblong, whitish.....1. *marginata*.

Rhachis trigonous, not winged. Culms up to 3 ft. high; racemes 5—13, alternate or opposite, sometimes more or less branched and subverticillate; spikelets 2-nate; upper glumes and barren lemmas more or less silky-hairy. Otherwise as in the last species.....2. *Griffithii*.

Hairs of upper glume and barren lemma clavate-tipped. Culms 6—24 in. high, rarely branched; leaves up to 9 in. long; racemes 2—7, subdigitate on a short common axis, up to 5 in. long; rhachis flat, narrowly winged; pedicels 2—3-nate, hispidulous, the hairs forming a tuft at the tips; spikelets elliptic-oblong, obtuse, .09—11 in. long, appressed, subimbricate; lower glume 0; upper shorter than the lemmas, 3-nerved with 4 lines of clavate-tipped brownish hairs; barren lemma similar, somewhat shaggy with clavate-tipped

hairs; upper lemma soon becoming dark brown to black; grain ellipsoid, white.....3. *ternata*.

Spikelets .08 in. or less long:—

Hairs not clavate-tipped:—

Rhachis straight, flat, margins winged:—

Fruiting lemmas pale. Culms rising singly or in fascicles from a long creeping and rooting base, slender, 3—14 in. high; leaves 5—2.5 in. long; racemes 2 or 3, digitate, slender, .8—2.5 in. long; pedicels 2—3-nate, flexuous, tips discoid; spikelets elliptic-oblong, .05—0.07 in. long, appressed, subimbricate; lower glume 0 or rudimentary, upper delicate, nearly as long as the spikelet, finely pubescent; barren lemma 7-nerved, appressed-pubescent between nerves; grain ellipsoid, whitish.....4. *longiflora*.

Fruiting lemmas dark brown or black. Culms tufted, base not creeping, 2—20 in. high; leaves 1—4 in. long; racemes 2—5, up to 4 in. long, digitate or when more than 3, 2 or 3 from a lower level; spikelets .06—0.08 in. long. Otherwise as in the last species.....5. *chinensis*.

Rhachis flexuous, trigonous, capillary. Culms tufted, slender, 3—26 in. high; leaves finely acuminate, up to 15 in. long; racemes 3—10, alternate, spreading, sometimes branched, up to 4 in. long; pedicels 2—5-nate, some longer than the spikelets; spikelets elliptic-oblong, acute, .05—0.06 in. long, not imbricate; lower glume 0, upper thinly membranous, pubescent; fruiting lemma elliptic, dark brown, shining.....6. *pedicellaris*.

Hairs on upper glumes and barren lemmas short, clavate-tipped. Culms tufted, 6—24 in. high; leaves up to 6 in. long; racemes 3—15, erect, subdigitate or alternate, up to 4 in. long; rhachis trigonous, slender; pedicels sometimes as long as the spikelets, setulose at least at the apex; spikelets secund, broadly ellipsoid, .04—0.05 in. long; lower glume 0, upper sometimes reduced to a tuft of hairs or $\frac{1}{3}$ the length of the barren lemma; fruiting lemma black, longitudinally striolate.....7. *Royleana*.

Racemes in a pyramidal panicle, the lower opposite or whorled. Culms creeping below, 3—30 in. high; panicles 1.5—5 in. long, common axis slender, subterete; racemes many, up to 3.5 in. long, divaricate; rhachis capillary, usually naked for a short distance at the base; spikelets narrowly lanceolate, acuminate; upper glume and slightly shorter barren lemma several-ribbed, white appressed-hairy between the ribs.....8. *Wallichiana*.

1. *DIGITARIA MARCINATA*, Link. *D. sanguinalis*, Scop. var. *extensum*, Rang. et Tad., S. I. G. figs. 74, 75. *Paspalum sanguinale*, Lamk. var. *commutatum*, Hook. f.; F. B. I. vii. 15; ditto var. *extensum*, Hook. f.; F. B. I. vii. 15; ditto var. *Rottleri*, Hook. f.; F. B. I. vii. 16.

In all Districts; sea-level to 7,000 ft.

A good fodder. Vern. Hind. Takri takra; Tam. Arisi pillu, Akki pillu; Kan. Henu akkibu hullu.

Var. *fimbriata*, Stapf. *D. sanguinalis*, Scop. var. *ciliaris*, Rang. et Tad., S. I. G. figs. 71, 72. *Paspalum sanguinale*, Lamk. var. *ciliare*, Hook. f.; F. B. I. vii. 15. With the hairs of the mature spikelet spread out horizontally forming a rigid fringe on both sides, often mixed with thick-walled bristles from tubercular bases.

Distribution and vernacular names of the species.

2. *DIGITARIA GRIFFITHII*, Stapf. *D. sanguinalis*, Scop. var. *Griffithii*, Rang. et Tad., S. I. G. fig. 73. *Paspalum sanguinale*, Lamk. var. *Griffithii*, Hook. f.; F. B. I. vii. 15.
3. *DIGITARIA TERNATA*, Stapf. *Paspalum ternatum*, Hook. f.; F. B. I. vii. 17.

Bababudan, Nilgiri and Mysore Hills; Ramandrug; 3,000—8,000 ft. Vern. Kan. Bili akkibu hullu.

4. DIGITARIA LONGIFLORA, Pers. ; S. I. G. figs. 76, 77. *Paspalum longiflorum*, Retz. ; F. B. I. vii. 17 in part.
In all Districts ; sea-level to 6,000 ft. Vern. Tel. Pakuru gaddi ; Kan. Tapari hullu.
5. DIGITARIA CHINENSIS, Hornem. *Paspalum longiflorum*, Hook. f. non Retz. ; F. B. I. vii. 17 in part.
Ganjam, Godavari and Chittoor Districts ; Mysore State ; Nilgiri, Anaimalai and Pulney Hills ; 400—6,000 ft.
6. DIGITARIA PEDICELLARIS, Prain. *Paspalum pedicellare*, Trin. ; F. B. I. vii. 19.
In all Districts, except in the driest and wettest parts ; 2,000—6,000 ft.
7. DIGITARIA ROYLEANA, Prain. *Paspalum Royleanum*, Nees ; F. B. I. vii. 18.
Mysore State at Shimoga (Meebold) ; Ramandrug ; 2,000—3,000 ft. Vern. Kan. Bili akkabu hullu.
8. DIGITARIA WALLICHIANA, Stapf. *Paspalum Perrottetii*, Hook. f. ; F. B. I. vii. 20.
Bababudan, Nilgiri and Pulney Hills ; 4,000—7,000 ft.

46. Alloteropsis, Presl.

Annual or perennial, erect herbs. *Leaves* usually flat. *Racemes* spiciform, digitate or whorled, often compound. *Spikelets* solitary, twin or fascicled, more or less compressed dorsally, articulated on and falling entire from the pedicels. *Glumes* thinly membranous to chartaceous ; the lower the shorter ; the upper nearly as long as the spikelet and densely ciliate. *Lemmas* dissimilar ; the lower as long as or longer than the upper, its palea short, 2-fid or 2-partite, enclosing a ♂ floret ; the upper narrowed into a short mucro or an arista, its palea 2-nerved and 2-keeled with basal auricled flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic-oblong to sub-orbicular, dorsally compressed, free within the hardened lemma and palea.

ALLOTEROPSIS CIMICINA, Stapf. *Axonopus cimicinus*, Beauv. ; F. B. I. vii. 64 ; S. I. G. figs. 107, 108.

In all Districts ; sea-level to 4,000 ft.

Culms up to 3 ft. high ; leaves lanceolate, base cordate, .5—4.25 in. long, .15—.7 in. wide, glabrous or more or less hairy from tubercles ; racemes few to many, 2—9 in. long ; spikelets .12—.15 in. long ; upper lemma mucronate or with an arista up to .13 in. long. Vern. Kan. Niru sajjai hullu.

47. Pseudechinolaena, Stapf

Annual herbs. *Culms* slender, erect from a prostrate rooting base. *Leaves* flaccid. *Panicle* simple ; racemes few, spiciform. *Spikelets* pedicelled, 2-nate or more often solitary with or without an accompanying reduced one, secund. *Glumes* herbaceous, subequal or the lower shorter ; lower nearly flat, 3-nerved, smooth or nearly so ; upper boat-shaped, gibbous below, 7-nerved with rows of transparent spots between.

naked or with short or long hooked hairs or bristles from the spots. *Lemmas* chartaceous; lower membranous at the margins and hyaline at a point at the base, oblong-lanceolate, laterally compressed, rounded on the back, as long as the spikelet, its palea more or less convolute, 2-nerved, empty or containing a ♂ floret; upper shorter, broadly lanceolate to oblong, back very convex, faintly 5-nerved, its palea similar, tightly clasped by the lemma when mature, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, plano-convex, gibbous on the back at the apex.

PSEUDECHINOLAENA POLYSTACHYA, Stapf. *Panicum uncinatum*, Raddi; F. B. I. vii, 58.

W. Gháts from Mysore to Travancore; 2,000—6,000 ft.

Culms 3—24 in. high; leaves ovate to linear-lanceolate, acuminate, 1—3 in. long, .17—.65 in. wide, more or less hairy or pubescent; panicles up to 7 in. long; racemes up to 2 in. long; spikelets obliquely ovoid, .14—.19 in. long; bristles when present up to .07 in. long.

48. *Eriochloa*, H. B. et K.

Annual or perennial erect herbs. *Leaves* more or less flat. *In-florescence* racemously paniced; racemes peduncled or the upper sessile. *Spikelets* solitary or 2-nate, secund, ovate-lanceolate to oblong, acute or acuminate, sometimes finely, shortly aristulate, the base thickened into an annular callus, falling entire from the thickened apex of the pedicels. *Glumes* very unequal; lower reduced to a minute cupular rim clasping the callus; the upper membranous, corresponding to the outline of the spikelet, faintly 5-nerved, sometimes aristulate. *Lemmas* dissimilar; lower about equalling and resembling the upper glume, sometimes 2-keeled, empty or enclosing a ♂ floret; the upper chartaceous or almost crustaceous, faintly 5-nerved, with a fine barbelate mucro, its palea 2-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* dorsally compressed, free within its lemma and palea and the upper glume and lower lemma.

ERIOCHLOA PROCERA, C. E. Hubbard. *E. polystachya*, H. B. et K.; F. B. I. vii, 20; S. I. G. figs. 78, 79.

In all Districts; sea-level to 3,000 ft. Often in rice-fields.

Perennial; culms tufted, 1—5 ft. high; leaves up to 13 in. long, .15—.4 in. wide; racemes numerous, alternate, up to 4 in. long; spikelets .13—.15 in. long; upper glume and lower lemma finely white-silky, sometimes glabrescent in fruit.

Much liked by cattle. Vern. *Fam.* Tandambaran pillu, Mathanka pillu, Karungani pillu.

49. *Brachiaria*, Griseb.

Annual or perennial herbs. *Leaves* narrow, usually flat. *In-florescence* of spiciform, sometimes branched racemes, sessile on a common filiform, triquetrous or more or less flattened rhachis, rarely paniced; pedicels solitary or twin. *Spikelets* elliptic- to ovate-oblong, more or less dorsally compressed, the convex side turned away from

the rhachis. *Glumes* dissimilar; the lower towards the rhachis and much shorter than the upper. *Lemmas* dissimilar; the lower subequal to and resembling the upper glume, its palea similar, with well-developed incurved flaps below the middle, usually enclosing a ♂ floret; the upper crustaceous or subcoriaceous, with firm, narrowly involute margins, its palea similar and almost as long, 2-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* broadly oblong or elliptic, more or less flattened, tightly enclosed in the more or less hardened lemma and palea.

Spikelets imbricate or approximate:—

Rhachis flat, margins scaberulous, often setulose; spikelets secund:—

Culms 3—30 in. high, slender, nodes glabrous, rarely puberulous; leaves 6—6.5 in. long, .15—4 in. wide; racemes 2—6, simple:—

Peduncle below the inflorescence more or less hairy; spikelets elliptic-obovate, acute or subacute, .1—12 in. long. Culms prostrate or straggling, 2—20 in. high; leaves 6—2.7 in. long, .15—3 in. wide; racemes 2—4, .9—1.7 in. long.....1. *distachya*.

Peduncle glabrous, rarely puberulous; spikelets elliptic or elliptic-oblong, acute, usually apiculate, .14—16 in. long. Culms usually erect, 12—30 in. high; leaves 3—6.5 in. long, .16—4 in. wide; racemes 4—6, 1—2.6 in. long.....2. *miliiformis*.

Culms 3—8 ft. high, robust, nodes villous; leaves 5—12 in. long, .3—7 in. wide; racemes numerous, 1—3.5 in. long, the lowest at least usually branched; spikelets lanceolate, acute, .12—13 in. long; pedicels usually setose; lower glume .05 in. long, upper .11—12 in. long.....3. *mutica*.

Rhachis trigonous or terete:—

Spikes erect, appressed to the rhachis, 6—11, .2—8 in. long. Leaves softly pilose from bulbous bases, .6—3.5 in. long, .07—22 in. wide, base rounded; spikelets secund, elliptic to broadly oblong, .07—09 in. long; lower glume .02 in. long, glabrous, upper .06 in. long, pilose, rarely glabrous...4. *eruciformis*.

Spikes erecto-patent or horizontal:—

Leaves lanceolate, base subcordate, clasping the culm, 1.7—6 in. long, .15—7 in. wide, glabrous or pubescent, spikes up to 2 in. long; spikelets not secund, broadly elliptic, acute or apiculate, .1—13 in. long; lower glume .04—07 in. long, upper broadly oblong, apiculate, .09—1 in. long, puberulous

5. *ramosa*.

Leaves ovate, base rounded, not clasping, .5—1.8 in. long, .18—55 in. wide, softly villous, margins markedly cartilaginous, often crisped; spikes .4—75 in. long; spikelets secund, elliptic-obovate, .08—095 in. long; lower glume .025—04 in. long, obtuse, upper obovate, obtuse, gibbous, .06—08 in. long, glabrous or puberulous; lower lemma longer than the glumes

6. *semiundulata*.

Spikelets distant; upper glume elliptic-oblong, glabrous:—

Upper lemma broadly stipitate. Culms erect, up to 8 ft. high; leaves ensiform from a narrowed, rounded base, finely acuminate, 4—9 in. long, .27—8 in. wide; spikes numerous, up to 3.5 in. long, lower often verticillate; rhachis usually more or less pubescent; spikelets elliptic, .14—15 in. long; lower glume .05—08 in. long, upper .11—13 in. long; upper lemma usually rugulose

7. *semiverticillata*.

Upper lemma sessile. Culms weak, decumbent, 1—2 ft. high; spikes not verticillate:—

Leaves narrowly linear, glabrous or slightly puberulous at the narrow base, 2.5—8.5 in. long, .1—13 in. wide, margins and sheaths not ciliate; spikes usually numerous, up to 4 in. long; spikelets elliptic, .1—13 in. long; lower glumes .05—08 in. long, upper .1—11 in. long.....8. *remota*.

Leaves linear-lanceolate to lanceolate, base rounded or subcordate, usually sparsely bristly from bulbous bases, 2—6 in. long, .25—65 in. wide, margins usually ciliate from bulbous bases, at least near the base, sheaths ciliate; spikes usually few. Other characters as in the last species.....9. *Kurzii*.

1. BRACHIARIA DISTACHYA, Stapf. *Panicum distachyum*, Linn.; F. B. I. vii. 37; S. I. G. figs. 97, 98.
In all Districts; sea-level to 3,000 ft. Vern. *Tel.* Koranna gaddi;
Kan. Hambu haraka hullu.
2. BRACHIARIA MILIIFORMIS, Chase. *Panicum distachyum*, Linn.; F. B. I. vii. 37 in part.
S. Kanara and N. Coimbatore Districts; Travancore. Vern.
Kan. Kada samai hullu.
Very similar to the last species and often confused with it.
3. BRACHIARIA MUTICA, Stapf. *Panicum muticum*, Forsk.; F. B. I. vii. 34.
Shevaroy Hills (Perrottet); Tinnevelly District at Mundanthorai (Barber) and Courtallam (Venkoba Rao).
A native of America and W. Africa, introduced and run wild here and there. An excellent fodder.
4. BRACHIARIA ERUCIFORMIS, Griseb. *Panicum Isachne*, Roth; F. B. I. vii. 28; S. I. G. figs. 80, 81.
In all Districts; sea-level to 6,000 ft.
A moderate fodder. Vern. *Tel.* Domakalu gaddi.
5. BRACHIARIA RAMOSA, Stapf. *Panicum ramosum*, Linn.; F. B. I. vii. 36; S. I. G. figs. 95, 96.
In all Districts; sea-level to 6,000 ft. Vern. *Tel.* Eduri gaddi;
Kan. Kadu baragu hullu.
6. BRACHIARIA SEMIUNDULATA, Stapf. *Panicum villosum*, Lamk.; F. B. I. vii. 34.
W. Gháts; 5,000—7,000 ft.
7. BRACHIARIA SEMIVERTICILLATA, Alston. *Panicum semiverticillatum*, Rottl.; F. B. I. vii. 38.
Nilgiri, N. Coimbatore, Anamallai, Pulney and Tinnevelly Hills; 1,500—6,000 ft. Vern. *Kan.* Manju hullu, Thapparakai hullu.
8. BRACHIARIA REMOTA, Haines. *Panicum remotum*, Retz.; F. B. I. vii. 38.
Ganjam District at Chatrapur (Fischer); Salem to Tinnevelly Districts; Anamallai and Travancore Hills; sea-level to 3,000 ft.
9. BRACHIARIA KURZII, A. Camus. *Panicum Kurzii*, Hook. f.; F. B. I. vii. 38.
Rampa Hills (Narayanaswami).

50. *Paspalum*, Linn.

Perennial, sometimes annual herbs. *Leaves* narrow, flat or more or less inrolled. *Inflorescence* of solitary, digitate or racemose spikes; rhachis flat and winged or trigonous. *Spikelets* secund, 2-seriate, solitary or paired, sessile or nearly so, orbicular, oblong or ovate. *Lower glume* usually absent, rarely represented by a small scale; upper membranous, about equalling the spikelet, rarely shorter or absent, 3—more-nerved. *Lemmas* dissimilar; lower similar to the upper glume, empty; upper chartaceous to crustaceous, faintly nerved, its palea subequal, similar and embraced by it, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* more or less biconvex, tightly enclosed in the hardened lemma and palea.

Spikelets .09 in. or more long:—

Glume and lemmas glabrous; spikelets normally 2-ranked:—

Spikelets suborbicular or nearly so, obtuse, .09—13 in. long. Rhizome short; culms $\frac{1}{2}$ —3 ft. high, leaves glabrous, up to 18 in. long, .15—4 in. wide; racemes 2—5, rarely solitary, .8—5.8 in. long; rhachis broad, winged, with a median keel, produced at the apex into 2 short rounded or acute lobes; upper lemma and palea crustaceous, latter with wide membranous auricles at the base.....1. *scrobiculatum*.

Spikelets oblong to oblong-lanceolate, acute or subacute. Culms creeping and rooting below:—

Spikelets oblong, subacute, .1—13 in. long; upper lemma nearly as long as the spikelet. Culms up to 3 ft. high; leaves flat, up to 8.5 in. long, .15—25 in. wide, glabrous or more or less densely hairy; racemes 2—3, .8—3.5 in. long.....2. *orbiculare*.

Spikelets oblong-lanceolate, acute, .12—14 in. long; upper lemma $\frac{1}{4}$ — $\frac{1}{2}$ shorter than the spikelet. Culms up to 13 in. high; leaves flat or involute, .9—4.3 in. long, .07—16 in. wide, glabrous; racemes 2, very rarely 3, .5—2 in. long.....3. *vaginatum*.

Glume and barren lemma puberulous or hairy; spikelets normally 4-ranked:—

Racemes usually 7—9, 1.2—3 in. long; spikelets suborbicular, acute, .08—1 in. long. Culms erect, up to 4 ft. high; leaves up to 10 in. long, .15—3 in. wide; rhachis glabrous or nearly so, with setulose margins; glume and barren lemma minutely puberulous.....4. *longifolium*.

Racemes usually 3—5, 2—4 in. long; spikelets broadly ovate, acute, .14—16 in. long. Culms erect, up to 5 ft. high; leaves up to 10 in. long, .4—5 in. wide; rhachis hairy at the base, with minutely scabrid margins; glume and barren lemma sparsely silky, long white-ciliate.....5. *dilatatum*.

Spikelets .06—07 in. long:—

Racemes paired, rarely 3, 1.3—5 in. long; rhachis flat, margins cartilaginous and smooth or scaberulous; spikelets compressed plano-convex, subobtuse, apiculate or shortly acute; glume ciliate with rather long white hairs, barren lemma glabrous. Culms erect from often very long rooting runners, up to 3 ft. high; leaves up to 8 in. long, .35—6 in. wide, glabrous.....6. *conjugatum*.

Racemes 6—20, alternate, .15—1 in. long; rhachis subtriquetrous, margins more or less bristly from tubercles; spikelets rigidly plano-convex, obtuse; glumes more or less ciliate with rigid hairs from tubercles; barren lemma more or less bristly. Culms 2—12 in. high; leaves .7—3 in. long, .2—65 in. wide; sparsely hairy on the ribs.....7. *compactum*.

1. *PASPALUM SCROBICULATUM*, Linn.; F. B. I. vii. 10; S. I. G. figs. 69, 70.

In all Districts; sea-level to 7,000 ft. Wild or cultivated. The wild form, which is generally smaller and more slender, is the var. *Commersonii*, Stapf.

The grain is used for food, but requires careful preparation as it is liable to act as a narcotic poison. The straw makes good cattle-fodder. Vern. *Hind.* Kodo; *Ur.* Khoddi; *Tel.* Arugu, Nita ari gaddi, Arikelu. *Tam.* Varagu, Karu varagu; *Kan.* Haraku hullu, Arikel.

2. *PASPALUM ORBICULARE*, Forst. *P. scrobiculatum*, Linn.; F. B. I. vii. 11 *in part*.

Ganjam, Nellore, Arcot and Coimbatore Districts; sea-level to 2,000 ft.

3. *PASPALUM VAGINATUM*, Sw. *P. distichum*, Linn.; F. B. I. vii. 12.

In sea-shore and river sand; near sea-level.

4. *PASPALUM LONGIFOLIUM*, Roxb. *P. scrobiculatum*, Linn.; F. B. I. vii. 11 *in part*.

Travancore,

5. *PASPALUM DILATATUM*, Poir.
A S. American fodder-grass; introduced and occasionally run wild.
6. *PASPALUM CONJUGATUM*, Berg.; F. B. I. vii. 11.
Mysore; Wynaad; Travancore; 500—4,000 ft.
7. *PASPALUM COMPACTUM*, Roth.; F. B. I. vii. 12.
Bababudan, Coorg, Nilgiri and Travancore Hills; 4,000—6,000 ft.

51. *Stenotaphrum*, Trin.

Perennial or annual, erect herbs, often creeping or prostrate at the base. *Leaves* flat, with compressed sheaths. *Panicles* spiciform, terminal or sometimes also from the upper axils; rhachis flat, continuous or jointed, bearing 1—8 spikelets sunk in hollows or chambers in its anterior face. *Spikelets* lanceolate to ovate-oblong, falling entire from rudimentary pedicels. *Glumes* 2, dissimilar; the lower smaller, sometimes scale-like; the upper nearly or quite as long as the spikelet, 5—11-nerved. *Lemmas* similar, chartaceous to coriaceous; the lower palcate or not, empty or containing a ♂ floret; the upper with a 2-keeled palea of similar texture, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or nearly so. *Grain* broadly elliptic-oblong, plano-convex, closely embraced by, but free within the lemma and palea; embryo half as long.

STENOTAPHRUM DIMIDIATUM, Brogn. *S. glabrum*, Trin.; F. B. I. vii. 90.

Travancore State at Ambalapuzha (Ranga Achariyar). Rare. Culms erect from the root or from a slender rhizome, 5—13 in. high; leaves exactly linear, apex rounded, 1·3—3 in. long; 15—2 in. wide; panicle 1—3·6 in. long; rhachis alternately narrowly and broadly winged on one side and the other, the broader wing usually with an apical tooth and forming the hollow to receive the spikelet, spikelets 15—19 in. long; lower glume rounded, 05 in. long.

52. *Paspalidium*, Stapf

Perennial terrestrial or semi-aquatic herbs; culms often spongy below. *Leaves* flat or involute. *Inflorescence* of few to many spiciform, sessile or subsessile racemes secund on a common triquetrous rhachis. *Spikelets* ovoid to ovate-lanceolate, turgid or more or less compressed. *Glumes* dissimilar and unequal; the lower much the smaller, turned away from the axis. *Lemmas* dissimilar; lower similar to, but usually longer than the upper glume, margins inflexed, with or without a palea, containing a ♂ floret; the upper elliptic, crustaceous with firm, involute margins, its palea 2-keeled, of the same texture, almost as long, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the more or less hardened lemma and palea.

Spikelets ovoid or subglobose, hardly compressed, obtuse or acute, 09—13 in. long; lower glume broadly ovate or suborbicular, rounded, 05—07 in. long; upper glume acute, 07—1 in. long; lemmas 08—12 in. long, smooth. *Leaves* ciliate near the

base, 1—13 in. long, .1—4 in. wide; racemes usually, the lowest always, shorter than the internodes, distant .3—1.3 in. long.....1. *flavidum*. Spikelets ovate to ovate-lanceolate, acute or apiculate, distinctly flattened; lower glume broader than long, thinly membranous truncate, retuse or undulate, .03 in. long; racemes mostly as long as or longer than the internodes, the lowest sometimes shorter, imbricate, .3—1.6 in. long. Culms often spongy below:—

Upper glume broadly oblong, obtuse, .07 in. long; lower lemma acute or apiculate, .09—1.1 in. long; upper lemma .09 in. long, distinctly punctate. Leaves 2.2—9 in. long, .1—3 in. wide.....2. *punctatum*.

Upper glume broadly ovate, apiculate, .07—0.8 in. long; lower lemma apiculate, .08—0.9 in. long; upper lemma smooth. Leaves 7—12 in. long, .2—3 in. wide.....3. *geminatum*.

1. PASPALIDIUM FLAVIDUM, A. Camus. *Panicum flavidum*, Retz.; F. B. I. vii. 28; S. I. G. figs. 82, 83.

In all Districts; sea-level to 4,000 ft.

The spikes are sometimes reduced to 1—3 spikelets.

A good fodder. Vern. *Hind.* Sanka; *Tel.* Uda gaddi; *Tam.* Arisi pillu.

2. PASPALIDIUM PUNCTATUM, A. Camus. *Panicum punctatum*, Burm.; F. B. I. vii. 29.

In all the eastern Districts; sea-level to 600 ft. Often in water.

3. PASPALIDIUM GEMINATUM, Stapf. *Panicum paspaloides*, Pers.; F. B. I. vii. 30. *P. fluitans*, Retz.; S. I. G. figs. 84, 85.

In all Districts; sea-level to 3,500 ft. Often in water. Vern.

Kan. Gaddai vadavina hullu.

53. Urochloa, Beauv.

Annual or perennial herbs. Leaves linear-lanceolate to ovate, flat. Inflorescence of several racemes sessile or subsessile on a common, more or less triquetrous, rarely strap-shaped axis with a straight or zig-zag keel on the anterior face; pedicels solitary or twin, 2—several seriate. Spikelets broadly ovate to lanceolate, more or less flattened or depressed, the convex side turned towards the axis, falling entire from the disc-tipped pedicels. Glumes membranous, usually very unequal; the lower the shorter, turned away from the axis; the upper either glabrous or more or less densely felted-pubescent. Lemmas dissimilar; the lower closely resembling the upper glume in all respects, empty or holding a ♂ floret; the upper crustaceous or subcoriaceous with narrow involute margins, elliptic-oblong, concave, obtuse and usually with a scabrid or barbellate micro or cusp, containing a bisexual floret. Lodicules 2. Stamens 3. Styles 2, free. Grain tightly enclosed in the more or less hardened lemma and palca.

Spikelets .13—1.6 in. long; upper lemma distinctly cuspidate:—

Spikelets ovate to elliptic-oblong, acute. Culms up to 3 ft. high; leaves subcordate, clasping the stem, hairy or rarely nearly glabrous, ciliate from tubercles, 1.2—6.7 in. long, .2—7 in. wide; lower glume broadly ovate, clasping the base of the spikelet, acute or obtuse, .04—0.6 in. long; upper glume and lower lemma about the size and shape of the spikelet; upper lemma with a cusp .03 in. long

1. *panicoides*.

Spikelets lanceolate, acuminate. Leaves glabrous, 1.2—4.4 in. long, .3—8.5 in. wide. Other characters as in the last species.....2. *setigera*.

Spikelets ovate to elliptic, acute or apiculate, .07—0.9 in. long. Culms prostrate or creeping, rather slender, up to 20 in. long; leaves rounded at base, clasping the stem or not, glabrous or minutely pubescent, .5—3.5 in. long, .12—6 in. wide;

lower glume suborbicular, .02—.03 in. long; upper glume and lower lemma elliptic-ovate, acute; upper lemma broadly oblong, apiculate or mucronate, .06 in. long
3. *reptans*.

1. *UROCHLOA PANICOIDES*, Beauv. *Panicum javanicum*, Hook. f. non Poir.; F. B. I. vii. 35; S. I. G. figs. 1, 3, 4, 7, 93, 94.
In all Districts except the wettest; sea-level to 3,000 ft.
The grain is eaten by the poor. A good fodder. Vern. *Hind.* Kuri; *Tel.* Salla wudu; *Kan.* Kadu billi samai hullu.
2. *UROCHLOA SETIGERA*, Stapf. *Panicum setigerum*, Retz.; F. B. I. vii. 36.
Eastern and Central Districts from Kistna to Tinnevely; sea-level to 2,000 ft.
An excellent fodder.
3. *UROCHLOA REPTANS*, Stapf. *Panicum prostratum*, Lamk.; F. B. I. vii. 33; S. I. G. figs. 91, 92.
In all Districts except the wettest; sea-level to 6,000 ft.
The grain is eaten by the poor in times of scarcity. A good fodder much liked by cattle. Vern. *Tam.* Shani pillu.

54. *Echinochloa*, Beauv.

Annual or perennial, often tall herbs. *Leaves* narrow. *Inflorescence* of crowded panicles of loosely arranged, secund, spiciform branches bearing spikelets from the base or near it; rhachis triquetrous. *Spikelets* ovate to elliptic- or lanceolate-oblong, 2-nate or clustered, articulated on and falling entire from the pedicels. *Glumes* membranous, unequal; the lower much the shorter, mucronate, cuspidate or awned; the upper coincident in outline with the spikelet, acute, cuspidate or shortly awned. *Lemmas* dissimilar; the lower equalling the upper glume (excluding cusp or awn), its palea 2-keeled, empty or containing a ♂ floret; the upper subcoriaceous or crustaceous, ovate to elliptic-oblong, obtuse or apiculate, polished, very convex on the back, its palea as long, with rounded sides and flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* broadly elliptic, plano-convex.

Racemes simple, rather distant, .3—1.25 in. long; lower glume and upper lemma about equal; obtuse, acute or cuspidate. Annual, up to 2 ft. high; leaves 2—8 in. long, .15—.45 in. wide, ligule 0; spikelets ovoid, .1—1.2 in. long; lower glume .04—.05 in. long, upper .09—.11 in. long; lemmas .08—.1 in. long, lower with a ♂ floret.....1. *colona*.

Racemes usually more or less branched, .8—2 in. long; lower glume and upper lemma cuspidate or awned, the latter the longer; lower lemma often awned:—

Annual, up to 3 ft. high; leaves 3—21 in. long, .2—5 in. wide, ligule 0, junction of blade and sheath glabrous, usually marked by a brown zone; spikelets .15—.18 in. long; lower glume .07—.12 in. long, upper .15—.17 in. long; lower lemma empty, .14—.17 in. long, upper .12—.15 in. long; awn of lower lemma up to 2 in. long.....2. *crus-galli*.

Usually perennial, up to 6 ft. high; culms rooting and often branching from submerged nodes; leaves 3—18 in. long, .2—4 in. wide, ligule a fringe of stiff hairs, sometimes absent on the uppermost leaf; lower lemma empty or with a ♂ floret. Otherwise as in the last species.....3. *stagnina*.

1. *ECHINOCHLOA COLONA*, Link. *Panicum colonum*, Linn.; F. B. I. vii. 32; S. I. G. figs. 89, 90.

In all Districts, except in the wettest localities; sea-level to 6,000 ft.

An excellent fodder. The grain is eaten by the poorer classes. Vern. *Hind.* Sawank; *Tel.* Otha gaddi, Kaproda gaddi; *Tam.* Sawu, Sauri, Varsanum pillu, Karum pul.

Var. *frumentacea*, Blatt. & McCann. n. comb. *Panicum Crus-galli*, Linn. var. *frumentaceum*, Hook. f.; F. B. I. vii. 31. A taller and more robust plant with dense, sometimes corymbose panicles. Cultivated for its grain in most Districts. The straw is a valuable fodder. Vern. *Hind.* Shamula, Sanwa; *Ur.* Samu; *Tel.* Bonta shama, Pala oodalu, Sawa, Chamalu; *Tam.* Kudraivalli pillu, Rail pillu; *Kan.* Sarnai, Savai.

2. *ECHINOCHLOA CRUS-GALLI*, Beauv. *Panicum Crus-galli*, Linn.; F. B. I. vii. 31; S. I. G. figs. 6, 86, 87.

In most Districts; in rice-fields and other wet places; sea-level to 6,000 ft.

The grain is eaten by the poor. A good cattle-fodder and sometimes cultivated for that purpose. Vern. *Hind.* Sanwak; *Tel.* Pedda-wundu; *Kan.* Kadu dabhai hullu.

3. *ECHINOCHLOA STAGNINA*, Beauv.; S. I. G. fig. 88. *Panicum Crus-galli*, Linn.; F. B. I. vii. 31 in part.

In all Districts, in wet places, often partly submerged; sea-level to 3,000 ft.

Often confused with the last species. Vern. *Tel.* Bontha oodu; *Kan.* Kadu dabhai hullu.

55. *Oplismenus*, Beauv.

Annual or perennial herbs, usually decumbent and rooting at the base. *Leaves* thin, flat, ovate to lanceolate, often rather unsymmetrical. *Inflorescence* of simple or paniced spiciform racemes. *Spikelets* solitary or fascicled, secund. *Glumes* subequal, herbaceous or membranous, more or less keeled upwards, both or only the lower awned. *Lemmas* dissimilar; the lower similar to but longer than the glumes, muticous, mucronate or aristate, its palea perfect, reduced or absent, containing a ♂ floret or empty; the upper chartaceous to subcoriaceous, nearly as long as the lower, muticous, its palea as long as and embraced by the lemma, containing a bisexual floret. *Lodicules* 2, broadly cuneate, often very delicate. *Stamens* 3. *Styles* 2, free. *Grain* oblong, tightly embraced by the hardened lemma and palea.

Perennial; culms slender to rather robust, up to 3 ft. high; leaves .8—6.5 in. long, .25—1 in. wide; panicles up to 1 ft. long; racemes distant, few to many, sometimes reduced to sessile clusters of spikelets, up to 3 in. long; spikelets .12—1.8 in. long, awns needle-like, smooth, up to .43 in. long.....1. *compositus*. Annual; culms slender, up to 18 in. high; leaves .7—2.2 in. long, .2—55 in. wide; panicles up to 4 in. long; racemes distant or close, few, up to .7 in. long; spikelets .09—1 in. long, awns capillary, minutely scaberulous, up to .41 in. long

2. *Burmanni*.

1. *OPLISMENUS COMPOSITUS*, Beauv.; F. B. I. vii. 66. *O. undulatifolius*, Hook. f. non Beauv.; F. B. I. vii. 66.

In all Districts; sea-level to 7,000 ft. Common. Vern. *Tel.* Kodi juttu gaddi, Konda anthrika gaddi.

2. *OPLISMENUS BURMANNII*, Beauv.; F. B. I. vii. 68.

In all Districts; sea-level to 3,000 ft.

Much liked by cattle. A good hay-making grass. Vern. *Tam.* Mungil pillu.

56. *Ottochloa*, Dandy

Perennial herbs, creeping and rooting below, geniculate and scrambling above. *Leaves* narrow, flat, firmly papery. *Panicles* elongate, widely open or contracted; racemes more or less distant, short; rhachis and pedicels filiform. *Spikelets* usually in small, approximate or distant clusters, narrowly oblong, acute, dorsally compressed. *Glumes* 2, similar and subequal, firmly membranous, much shorter than the spikelet. *Lemmas* subequal; the lower membranous, the size and shape of the spikelet, empty; the upper subcoriaceous, margins very narrowly hyaline, its palea similar, embraced by it all along, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic, almost flat.

OTTOCHLOA NODOSA, Dandy. *Panicum nodosum*, Kunth; F. B. I. vii. 43.

Travancore State; at low elevations and up to 6,000 ft. (Meebold). Culms up to 6 ft. high; leaves narrowed and almost petioled or rounded or subcordate, 1·8—5 in. long, ·32—·5 in. wide; panicles up to 8 in. long, branches up to 5 in. long; spikelets ·13—·15 in. long.

57. *Holcolemma*, Stapf et Hubbard

Annual or perennial herbs. *Leaves* linear, flat. *Panicles* narrow, spiciform. *Spikelets* fascicled or solitary on a slender, simple rhachis, together with setae at the lower nodes or replaced by setae, oblong to lanceolate, back flat and deeply channelled. *Glumes* hyaline or thinly membranous; the lower $\frac{1}{2}$ — $\frac{2}{3}$ as long as the spikelet; the upper slightly longer. *Lemmas* dissimilar; the lower as long as the spikelet, base slightly saccate, membranous with a longitudinal median channel of thinner tissue, its palea as long, 2-keeled, concave and hyaline between the keels, empty or enclosing a ♂ floret; the upper as long as or slightly shorter than the lower, becoming crustaceous, finely granulate and transversely rugose, enclosing its similar palea except at the tip, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic-oblong, dorsally compressed.

HOLCOLEMMMA CANALICULATUM, Stapf et Hubb. *Panicum canaliculatum*, Nees; F. B. I. vii. 43.

Precise locality unknown (Wight).

Culms slender, weak, up to 4 ft. high; leaves flaccid, 3—6 in. long, ·1—·15 in. wide, finely acuminate; panicles 1·5—4 in. long; spikelets ·12—·14 in. long.

58. *Panicum*, Linn.

Annual or perennial, erect or procumbent, sometimes woody herbs. *Leaves* very diverse. *Inflorescence* of usually open panicles, generally

much divided. *Spikelets* lanceolate to oblong, elliptic or orbicular, rarely somewhat oblique, falling entire or nearly so. *Glumes* herbaceous; the lower rarely absent, sometimes hyaline, usually considerably shorter than the upper, seldom as long; the upper rounded on the back. *Lemmas* dissimilar; the lower similar and subequal to the upper glume, with or without a palea, empty or enclosing a ♂ floret; the upper coriaceous or crustaceous, obtuse or acute, mucicous, margins usually involute, its palea similar, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the hardened lemma and palea.

Lower glume distinct, at least $\frac{1}{2}$ as long as the spikelet:—

Leaves linear:—

Leaves not markedly distichous, flat, not rigid or glaucous:—

Glumes equal, .07—11 in. long, obtuse. Culms 1—3 ft. high; leaves 2—3.2 in. long, .2—4 in. wide, closely ribbed; spikelets .08—12 in. long, upper lemma .06 in. long.....1. *oreades*.

Lower glume shorter than the upper:—

Spikelets .06—08 in. long. Culms 1—12 in. high; leaves 1—6 in. long, very narrow; lower lemma distinctly shorter than the upper glume, not much longer than the upper lemma.....2. *humile*.

Spikelets .085 in. or more long:—

Spikelets 2—26 in. long. Culms 1—4 ft. high, softly hirsute below the nodes; leaves tapering from a broad base, 4—14 in. long, .25—8 in. wide, sheaths with long spreading hairs from conspicuous tubercles; upper lemma ovate, .13—15 in. long, brown, shining, usually with 5 pale-brown nerves.....3. *miliaceum*.

Spikelets .16 or less long:—

Upper lemma smooth:—

Annuals; nodes of culms glabrous:—

Spikelets not gaping; keel of glumes not scaberulous; upper lemma acute or subacute:—

Panicles contracted, branches and pedicels moderately slender. Culms 1—2 ft. long; leaves tapering from a broad base, 3—12 in. long, .15—5 in. wide (in cultivated forms sometimes much larger, stout, up to 3 ft. high; leaves up to 2 ft. long and 1 in. wide); spikelets .13—17 in. long; lower glume .04—09 in. long; upper lemma .08—12 in. long, dark brown at maturity, often with 5 paler veins.....4. *miliare*.

Panicles effuse; branches and pedicels capillary. Culms slender, 6—22 in. high; leaves not tapering, 2—8 in. long, .25—35 in. wide; spikelets .1—12 in. long; lower glume .03—05 in. long; upper lemma .06—08 in. long, pale brown or whitish

5. *psilopodium*.

Spikelets gaping, .11—15 in. long; upper lemma obtuse, .07—11 in. long, yellow. Culms 6—36 in. high; leaves usually basal only, not tapering, 1.3—13 in. long, .12—4 in. long, copiously hairy from tubercles, rarely glabrous; panicles often large; lower glume .05—1 in. long, cuspidate, keel scaberulous...6. *trypheron*.

Perennials:—

Lower glume broader than long, obtuse, $\frac{1}{2}$ as long as the spikelets or less. Culms stout, 2—3 ft. high, base creeping or floating and rooting at the lower nodes, nodes glabrous; leaves tapering, 4—11 in. long, .25—4 in. wide, sheaths inflated; pedicels scabrid, usually much enlarged at the apex; spikelets lanceolate, .12—16 in. long.....7. *paludosum*.

Lower glumes ovate, acuminate, $\frac{1}{2}$ — $\frac{3}{4}$ as long as the spikelets. Culms solid, terete, woody below, up to 6 ft. high, nodes thickened, puberulous; leaves very finely acuminate, 6—24 in. long, .25—8

in. wide, sheaths not inflated; panicles large, pedicels slender, not enlarged at the apex; spikelets ovoid, acute, .12—.13 in. long

8. *antidotale*.

Upper lemma transversely rugulose, .08—.1 in. long. Culms usually stout, up to 10 ft. high; nodes hirsute; leaves tapering from a broad, rounded or cordate base, 6—24 in. long, .35—.8 in. wide, margins spinulose; lowest node of the panicle villous; spikelets 11—.16 in. long; lower glume suborbicular, .04—.06 in. long

9. *maximum*.

Leaves distichous, involute, seldom expanded, rigid, glabrous, 2.5—13 in. long, .15—.3 in. wide. Culms creeping at the base, stoloniferous, often nodular, 1—5 ft. high, sterile shoots closely leafy; spikelets .1—.13 in. long; lower glume suborbicular, .04—.05 in. long.....10. *repens*.

Leaves ovate to lanceolate:—

Spikelets .13 in. or less long:—

Leaves ovate, acute, base cordate, amplexicaul, 1—3.2 in. long, .5—1.2 in. wide. Culms decumbent and rooting below, up to 3 ft. long; spikelets .07—.09 in. long; glumes glabrous, puberulous or sometimes pilose from tubercles, upper gibbous, .06—.08 in. long, very slightly longer than the lower; lower lemma about as long, upper very little shorter than the lower glume.....11. *brevifolium*.

Leaves lanceolate, acuminate, base broad, deeply cordate, 3.5—8.5 in. long, .4—1.2 in. wide. Culms erect, up to 6 ft. high, base shortly woody; spikelets .1—.13 in. long; upper glume not gibbous, subequal to the lower lemma, a little longer than the lower glume and upper lemma

12. *montanum*.

Spikelets .16—.22 in. long. Culms slender, up to 5 ft. high; leaves ovate-lanceolate, acuminate, base rounded or cordate, 2.5—7 in. long, .35—.1 in. wide; upper glume and lower lemma subequal, larger than the lower glume and upper lemma.....13. *Gardneri*.

Glumes minute or one or both absent. Culms slender, up to 3 ft. high; leaves 2.5—8 in. long, .15—.53 in. wide; panicles large, effuse, branches and pedicels capillary; spikelets .1 in. long; lower lemma 5—7-nerved, glabrous or silky between the nerves, enfolding the slightly shorter upper.....14. *subglume*.

1. PANICUM OREADES, Domin *P. aequiglume*, Hook. f. non Hack. et Arechav.; F. B. I. vii. 44.
Nilgiri Hills at 5,000 ft. (Lawson, Bourne).
2. PANICUM HUMILE, Nees; F. B. I. vii. 48.
Vizagapatam and S. Kanara Districts; Travancore State.
Considered a good fodder in N. India.
3. PANICUM MILIACEUM, Linn.; F. B. I. vii. 45.
Cultivated for its edible grain. The common Millet.
The straw is a useful fodder. Vern. *Hind.* Chena; *Ur.* Rala; *Tel.* Varagalu, Wuragi, Warigalu, Barigalu; *Tam.* Samai, Kadai-kanni; *Kan.* Baragu.
4. PANICUM MILIARE, Lamk.; F. B. I. vii. 46.
Much cultivated in all Districts for its edible grain and run wild; sea-level to 7,000 ft. The little Millet.
The straw is a good fodder. Vern. *Hind.* Savan; *Ur.* Suniva; *Tel.* Chamalu, Ganga samalu. Sani, Savai; *Tam.* Samai, Shamai Peru samai; *Kan.* Shamai, Bili samai hullu; *Mal.* Shama.
5. PANICUM PSILOPODIUM, Trin.; F. B. I. vii. 46.
In all Districts; sea-level to 6,000 ft.
Not easily distinguished from the last species, of which it is probably the truly wild form. In salt swamps the whole plant becomes rather stiff, with narrow erect leaves. Vern. *Tam.*

Kadaikanai, Piva pillu, Samai, Uragadam, Pattu pillu, Kalam pillu.

The spikelets are very commonly inhabited by a larva and then they become much hypertrophied, up to 3 in. long. In normal spikelets occasionally a coriaceous linear ensiform appendage $\frac{1}{3}$ — $\frac{2}{3}$ as long as the upper lemma is found attached to the rhachilla between the two lemmas.

6. *PANICUM TRYPHERON*, Schult. ; F. B. I. vii. 47 ; S. I. G. fig. 101.
In all Districts ; sea-level to 6,000 ft. Vern. *Tel.* Adavi satha gaddi ; *Tam.* Samai-karunai ; *Kan.* Kadu karai samai hullu.
7. *PANICUM PALUDOSUM*, Roxb. *P. proliferum*, Hook. f. non Lamk. ; F. B. I. vii. 50.
Ganjam, Cuddapah and Coimbatore Districts ; Mysore State ; Lower Pulney Hills ; Courtallam ; sea-level to 3,000 ft.
8. *PANICUM ANTIDOTALE*, Retz. ; F. B. I. vii. 52.
Bangalore ; Carnatic ; Nilgiri and Shevaroy Hills.
Grazed by cattle only when young. Used medicinally for ulcers (*vide* Koenig), and in throat affections ; the smoke when it is burnt is said to be a disinfectant. Vern. *Tam.* Nassiam pillu, Pinisu pillu.
9. *PANICUM MAXIMUM*, Jacq. ; F. B. I. vii. 49.
A tropical African grass cultivated for its valuable fodder and occasionally found as an escape. The Guinea grass. Vern. *Hind.* Gini ghans ; *Tam.* Ginio pillu ; *Kan.* Gini hullu.
10. *PANICUM REPENS*, Linn. ; F. B. I. vii. 49 ; S. I. G. figs. 102, 103.
In all Districts ; in sandy soil or in standing, including brackish, water ; sea-level to 7,000 ft. The Ginger grass.
Much liked by cattle and alleged to stimulate the yield of milk. Vern. *Ur.* Reda ; *Tel.* Ladda gaddi, Kari gaddi ; *Tam.* Tinei pillu, Inji pillu ; *Mal.* Inchi kanu pullu ; *Kan.* Sonti hullu.
11. *PANICUM BREVIFOLIUM*, Linn. *P. ovalifolium*, Poir. ; F. B. I. vii. 44.
In all Districts ; sea-level to 3,500 ft.
12. *PANICUM MONTANUM*, Roxb. ; F. B. I. vii. 53.
In all Districts ; sea-level to 4,000 ft.
13. *PANICUM GARDNERI*, Thw. *Isachne Gardneri*, Benth. ; F. B. I. vii. 26.
W. Gháts ; 5,000—7,500 ft.
14. *PANICUM SUBEGLUME*, Trin. ; F. B. I. vii. 51.
In all the Eastern Districts from the Rampa Hills to Tinnevely ; sea-level to 2,000 ft.

59. Hymenachne, Beauv.

Stout, erect herbs. *Leaves* broadly linear. *Inflorescence* a thyrsoid panicle with erect, appressed branches ; branchlets spiciform. *Spikelets* very numerous, secund, narrowly lanceolate, acuminate, articulated on minute pedicels ; rhachilla produced between the glumes and between the upper glume and the lower lemma. *Glumes* membranous ; the lower shorter, cuspidate, keeled ; the upper sheathing the rhachilla, prominently 3-nerved, cuspidate or awned. *Lemmas* longer than the

upper glumes; the lower membranous, lanceolate, tapering into an arista, 5-nerved, empty; the upper shorter, oblong, membranous in flower, hardening in fruit, faintly 2-nerved, embracing its palea except at the tip, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* very small, oblong, tip contracted; embryo large, orbicular.

HYMENACHNE PSEUDO-INTERRUPTA, C. Muell. *Panicum Myurus*, H. B. K.; F. B. I. vii. 39.

Near the coast line: not common.

Root stock creeping or floating; culms erect, 2—6 ft. high, rooting at the lower nodes, spongy below; leaves 3·5—18 in. long, ·3—·75 in. wide, base rounded or cordate; panicle 4·5—12 in. long; spikelets ·16—·2 in. long; glumes and lower lemma scaberrulous on the ribs; upper glume strongly 3-ribbed, acuminate-caudate, ·15 in. long; lower lemma ·18—·2 in. long, tapering into an arista $\frac{1}{3}$ as long; upper lemma ·12—·13 in. long.

60. *Cyrtococcum*, Stapf

Perennial, usually weak herbs. *Leaves* usually narrow, sometimes ovate, flat. *Panicles* effuse or contracted. *Spikelets* long- or short-pedicelled, distant or approximate, obliquely obovate to semi-obovate, much laterally compressed. *Glumes* thinly membranous, unequal or subequal. *Lemmas* dissimilar; the lower similar to the upper glume, its palea, if present, narrow, 2-nerved, empty; the upper narrowly boat-shaped, papery to subcrustaceous with firm, narrowly involute margins, as long as the lower or nearly so, its palea subequal to it, narrowly convex on the back, with fine keels and thin flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* small, obovoid, free within the hardened lemma and palea.

Pedicels short, rarely as long as the spikelets:—

Leaves ·5—1·7 in. long, ·1—·4 in. wide. Culms slender, creeping and branching below, up to 18 in. high; panicle up to 2·5 in. long, branches few; spikelets few, hispid, ·06—·07 in. long.....1. *trigonum*.

Leaves 2—7·5 in. long, ·2—·65 in. wide. Culms rather stout, erect from a creeping base, up to 3 ft. high; panicle 2·5—8·5 in. long, branches many; spikelets numerous, glabrous, rarely softly puberulous, ·07—·09 in. long.....2. *oxyphyllum*.

Pedicels long, usually longer than the spikelets:—

Upper lemma semi-ovate, with a linear or oblong apical pale callus, its palea usually with a small round apical callus; glumes more or less keeled:—

Lower lemma obtuse; glumes usually puberulous or hispidulous; panicles effuse, simply branched:—

Spikelets ·09—·1 in. long; upper lemma semi-ovate. Culms slender, erect from a creeping, rooting base, 5—12 in. long; leaves linear to linear-lanceolate, 1—4 in. long, ·2—·35 in. wide.....3. *parvus*.

Spikelets ·06—·08 in. long; upper lemma broadly semi-ovate. Culms up to 18 in. high; leaves ovate to lanceolate, 1—3 in. long, ·2—·65 in. wide.

Other characters as in the last species.....4. *radicans*.

Lower lemma and glabrous glumes acute or cuspidate. Culms rather robust, up to 3 ft. high from a decumbent base; leaves 3—8 in. long, ·25—·6 in. wide; panicles up to 1 ft. long, fastigiately branched; spikelets ·08—·09 in. long, less compressed than in any of the previous species.....5. *longipes*.

Upper lemma semi-lanceolate, acute, without apical callus, its palea without callus; glumes not keeled. Culms very slender, up to 18 in. high; leaves 1—2·7 in. long, up to ·3 in. wide; panicles laxly effuse, branches and pedicels capillary; spikelets distant, ·05—·07 in. long.....6. *sparsicomum*.

1. CYRTOCOCCUM TRIGONUM, A. Camus. *Panicum trigonum*, Retz. : F. B. I. vii. 56.
In all Districts ; up to 3,000 ft. Usually in shade. Vern. Kan. Abbu karkai.
2. CYRTOCOCCUM OXYPHYLLUM, Stapf. *Panicum pilipes*, Nees et Arn. ; F. B. I. vii. 57.
In all Districts ; sea-level to 6,000 ft. In open grass lands and woods and in evergreen forest.
3. CYRTOCOCCUM PATENS, A. Camus. *Panicum patens*, Linn. ; F. B. I. vii. 57 in part.
Nilgiri, Pulney and High Wavy Mountains ; 4,000—6,000 ft.
4. CYRTOCOCCUM RADICANS, Stapf. *Panicum patens*, Linn. ; F. B. I. vii. 57 in part.
Mysore State ; W. Coast and Gháts ; N. Coimbatore Hills ; sea-level to 6,000 ft.
Grazed by cattle. Vern. Kan. Akki hullu.
5. CYRTOCOCCUM LONGIPES, A. Camus. *Panicum longipes*, W. et A. ; F. B. I. vii. 58.
Godavari District at Bison Hill (Barber) ; Mysore State ; W. Coast and Gháts ; 2,000—5,000 ft.
6. CYRTOCOCCUM SPARSICOMUM, A. Camus. *Panicum sparsicomum*, Nees ; F. B. I. vii. 58.
Kodaikanal Ghát, about 2,000 ft. (Bourne).

61. Saccolipsis, Nash

Perennial, or sometimes annual herbs. *Leaves* linear, flat or convolute and filiform. *Panicles* effuse or contracted and spiciform. *Spikelets* often small, ovate oblong to conico-lanceolate, subterete or compressed, sometimes more or less oblique, usually somewhat turgid ; pedicels filiform. *Glumes* unequal ; the lower minute or up to half as long as the spikelet ; the upper always very convex, often with a saccate base, 5—13-ribbed. *Lemmas* dissimilar ; the lower about half as long as the upper, with a straight back, its palea hyaline, finely 2-keeled, sometimes reduced or rudimentary, empty or containing a ♂ floret ; the upper very convex, chartaceous, becoming crustaceous, margins narrowly involute, obscurely 5-nerved, its palea of the same texture and almost as long, tightly embraced by it, hardly keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the hardened lemma and palea, elliptic, dorsally compressed, almost plano-convex in section ; embryo about half as long.

Panicles cylindric, spiciform ; pedicels short:—

Lower glume less than $\frac{1}{2}$ as long as the spikelet. Culms usually robust and spongy below, up to 6 ft. high ; leaves 6—15 in. long, 2—5 in. wide ; pseudo spikes 5—13 in. long (in impoverished individuals only 1 in. long) ; spikelets usually in interrupted, crowded fascicles, narrowly ovoid, 14—19 in. long, glabrous.....1. *interrupta*.

Lower glume half as long as the spikelet ; pseudo spikes continuous, rarely interrupted:—

Spikelets ovoid, usually curved, .08—13 in. long, glabrous or more or less densely hispid. Culms slender, 4—24 in. high ; leaves 1.2—5.6 in. long, .06—2 in. wide ; pseudo spikes .35—3.5 in. long.....2. *indica*.

Spikelets subglobose, .06—08 in. long, glabrous. Culms slender, 6—22 in. high; leaves 4—14 in. long, .05—2 in. wide; pseudo spikes 1.4—10 in. long

3. *myosuroides*.

Panicles broad, effuse, up to 4 in. long; pedicels capillary, often longer than the spikelets. Culms slender, 6—20 in. high; leaves 1.5—4 in. long, .1—22 in. wide; spikelets gibbously ovoid, .09—11 in. long, glabrous.....4. *curvata*.

1. *SACCOLEPIS INTERRUPTA*, Stapf. *Panicum interruptum*, Willd.; F. B. I. vii. 40; S. I. G. figs. 99, 100.

In all Districts; sea-level to 6,000 ft. In swampy places.

Grazed by cattle. Vern. *Tel.* Wolam; *Tam.* Tandan pillu; *Kan.* Hodikai hullu.

2. *SACCOLEPIS INDICA*, Chase. *Panicum indicum*, Linn.; F. B. I. vii. 41. In all Districts; sea-level to 6,500 ft. Vern. *Kan.* Kari korlai hullu.

3. *SACCOLEPIS MYOSUROIDES*, A. Camus. *Panicum myosuroides*, R. Br.; F. B. I. vii. 42.

Ganjam District; Mysore State; Carnatic; sea-level to 3,000 ft. Doubtfully separable from the last species.

4. *SACCOLEPIS CURVATA*, Chase. *Panicum curvatum*, Linn.; F. B. I. vii. 42.

Chingleput and Tinnevely Districts; Travancore; up to 6,000 ft. In marshes and in hedges. A good fodder.

62. *Setaria*, Beauv.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* terminal, contracted and cylindric with solitary or clustered spikelets on stunted branchlets which are more or less produced into bristles or divided into a one-sided involucre of bristles, or more or less open panicles with elongated branches and distant spikelets, the bristles present or not. *Spikelets* oblong to ovate, very convex on the back, falling entire, subtended by 1—many bristles. *Glumes* membranous; the lower usually ovate from a clasping base; the upper similar but longer. *Lemmas* dissimilar; the lower corresponding in size and shape with the spikelet, its palea elliptic-oblong, acute, sharply keeled or the keels marginate and narrowly winged, sometimes much reduced, empty or enclosing a ♂ floret; the upper subequal to the lower, very convex on the back or boat-shaped, crustaceous, often transversely rugose or finely pitted, its margins involute and embracing all along the similar palea up to its more or less prominent keels, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ellipsoid, tightly enclosed in the hardened lemma and palea.

Leaves plicate, 4—24 in. long, .4—3 in. wide. Perennial; culms erect from a woody rootstock, up to 8 ft. high; panicles usually long, contracted or expanded, up to 2 ft. long, sometimes reduced and subspiciform; branchlets usually ending in a bristle; spikelets ovate-lanceolate, acute or acuminate, .1—1.5 in. long; upper lemma faintly transversely striate.....1. *palmifolia*.

Leaves flat, not plicate. Annuals:—

Bristles harbellate with erect teeth:—

Upper lemma smooth or faintly transversely striate. Culms up to 5 ft. high; leaves tapering to a long fine point, 6—18 in. long, .4—1.4 in. wide; panicles dense, forming a cylindric, sometimes lobed, continuous pseudo spike up to 12 in. long; branches spiral or more or less whorled; bristles 2—6; spikelets subsistent, broadly oblong or elliptic, .08—11 in. long.....2. *italica*.

Upper lemma distinctly transversely rugose:—

- Panicles continuous, cylindric, 3—6.5 in. long; bristles about 8. Culms up to 40 in. high; leaves 2.5—13 in. long, .15—4 in. wide; spikelets deciduous, ovate to elliptic-oblong; .09—12 in. long.....3. *pallidifusca*. Panicles narrow, interrupted, lax, flexuous, 1.5—8 in. long, branches ending in a bristle, lower up to 1 in. long; involucrel bristles 3—4. Culms slender, up to 3 ft. high; leaves flaccid, 2—12 in. long, .12—7 in. wide; spikelets broadly ovate, .07—08 in. long.....4. *intermedia*. Bristles barbellate with descending teeth. Culms up to 4 ft. high; leaves 3.5—14.5 in. long, .2—1 in. wide; panicles straight or curved, continuous, cylindric, .5—8 in. long; branches ending in a bristle; involucrel bristles 1—4; spikelets oblong-ellipsoid, .07—08 in. long.....5. *verticillata*.

1. SETARIA PALMIFOLIA, Stapf. *Panicum plicatum*, Lamk.; F. B. I. vii. 55.
In all Districts, especially in the hills; near sea-level to 6,000 ft.
2. SETARIA ITALICA, Beauv.; F. B. I. vii. 78.
Widely cultivated and occasionally found as an escape. The Italian Millet. Probably the cultivated form of *S. intermedia*, R. et S. Vern. *Hind.* Kangu; *Ur.* Kangu; *Tel.* Kora, Koralu; *Tam.* Tenai; *Mal.* Tena; *Kan.* Kari biragu, Navanai.
3. SETARIA PALLIDIFUSCA, Stapf et Hubbard. *S. glauca*, Beauv.; F. B. I. vii. 78 *in part.*; S. I. G. fig. 109.
In most Districts; sea-level to 7,000 ft.
Panicles pale-yellow to reddish-brown. A fair fodder. Vern. *Hind.* Bandra; *Tel.* Nakka kora, Kuradakori gaddi, Nakka-toka gaddi.
4. SETARIA INTERMEDIA, Roem. et Sch.; F. B. I. vii. 79; S. I. G. fig. 110.
In all Districts; 2,000—6,000 ft. Vern. *Tel.* Arranki gaddi; *Kan.* Dodda anta purlai hullu, Kari ottai hullu.
5. SETARIA VERTICILLATA, Beauv.; F. B. I. vii. 80; S. I. G. figs. 111, 112.
In all Districts; up to 6,000 ft.
The grain is eaten by the poor; eaten by cattle before the spikes appear. Vern. *Tel.* Chik lenta; *Kan.* Sanna anta purlai hullu.

63. Pseudoraphis, Griffith

Floating or marsh herbs, usually elongate, much branched and rooting at the lower, geniculate nodes. Leaves narrow, flat. Panicles terminal, contracted or effuse, the branchlets produced beyond the uppermost spikelet. Spikelets narrow, obscurely articulated on the short pedicels, persistent. Glumes very unequal; the lower very small, thinly membranous; the upper as long as the spikelet or nearly so. Lemmas smaller and rather firmer than the upper glume; the lower containing a ♂ floret; the upper a bisexual or a ♀; paleas hyaline, cuneiform. Lodicules 2, sometimes only 1 in ♀ florets. Stamens 3, rudimentary in ♀ florets. Styles 2, shortly united at the base. Grain linear-oblong, compressed, free within the subcoriaceous lower and the hyaline upper lemmas.

PSEUDORAPHIS ASPERA, Pilger. *Chamaeraphis spinescens*, Poir.; F. B. I. vii. 62; S. I. G. fig. 104.

Kistna, Cuddapah, Coimbatore and Chingleput Districts; Mysore State; near sea-level to 4,000 ft. (Horsleykonda). Growing in tanks and marshes.

Culms up to 3 ft. long; leaves 1·2—3 in. long, 1—2·2 in. wide, scaberulous; panicles contracted, ultimately effuse, up to 4·5 in. long, branches flattened, undulate, scabrid, the prolongation usually overtopping the uppermost spikelet; spikelets distant, subulate, acuminate, 2·3—3·1 in. long; upper glume caudate.

64. *Rhynchelytrum*, Nees.

Annual or perennial herbs. *Leaves* linear or filiform, flat. *Panicles* compound or decomposed, open or contracted, branches and pedicels capillary, the latter discoid and usually hairy or pubescent at the tips. *Spikelets* linear- to ovate-oblong, laterally compressed, often more or less gaping, usually clothed with soft, shining, often brightly coloured hair. *Glumes* usually separated; the lower minute or small, rarely $\frac{1}{2}$ as long as the spikelet; the upper as long as the spikelet or nearly so, emarginate or 2-lobed, rarely entire, mucicous, mucronate or aristate from the sinus. *Lemmas* dissimilar; the lower resembling the upper glume, usually aristate, its palea 2-keeled, usually containing a σ floret; the upper much smaller and not aristate, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong-ellipsoid, closely embraced by the lemma and palea.

RHYNCHELYTRUM VILLOSUM, Chiov. *Tricholaena Wightii*, Nees et Arn.; F. B. I. vii. 65.

Kurnool (Bourne) and Bellary Districts; Bangalore ("weed in a garden," Sedgwick); 1,000—3,000 ft.

Culms up to 2 ft. high; leaves 1—6 in. long, 1—2·5 in. wide; panicles up to 6 in. long; spikelets 1·9—2·4 in. long, excluding aristas; lower lemma 2-lobed, its arista 0·7—1·4 in. long with very long whitish or pinkish-purple hairs on the back.

65. *Pennisetum*, L. C. Rich.

Annual or perennial, erect, often tall, simple or branched herbs. *Leaves* narrow, flat or convolute. *Panicles* spiciform, usually dense, branches numerous, short and simple with a solitary spikelet or scantily divided and the spikelets in clusters of 2—5, the single ones or clusters subtended by and deciduous with an involucre of few to many, free, usually unequal, scabrid or plumose, simple, rarely branched bristles. *Glumes* usually small and hyaline; the lower sometimes suppressed; the upper rarely more than half as long as the spikelet. *Lemmas* similar and subequal or dissimilar and the upper smaller, membranous to chartaceous; the lower empty or enclosing a σ floret; the upper containing a bisexual floret; paleas subequal and similar to the lemmas, the lower sometimes suppressed. *Lodicules* 2, small or 0. *Stamens* 3; anthers sometimes penicillate at the tip. *Styles* 2, free or more or less connate. *Grain* narrowly oblong to orbicular, enclosed in the slightly hardened lemma and palea; embryo $\frac{1}{2}$ — $\frac{3}{4}$ as long.

Sometimes the spikelets are much reduced (especially in cultivated forms), even to an upper floret with only minute traces of a lower lemma.

Leaves expanded:—

Panicles cylindrical, stout, 1·8—9 in. long; rhachis thick, villous; peduncles villous, ·05—·09 in. long; involucre densely packed all round the rhachis, often purplish, bristles sometimes ciliate, up to 2 in. long. Culms stout, up to 6 ft. high; leaves 4—24 in. long, 2—1·5 in. wide; spikelets 2, rarely 3, to an involucre, pedicelled, 13—17 in. long; lower glume usually 0, upper very short or 0; lemmas subequal, lower sometimes suppressed, 12—14 in. long; anther-tips penicillate.....1. *typhoides*.

Panicles linear, slender, 1—8 in. long; rhachis slender, angled, flexuous, glabrous or puberulous; involucre sessile, spirally arranged at short intervals; spikelets usually solitary, rarely 2 in an involucre. Culms stout, up to 3 ft. high; leaves 3—15 in. long, 2—6 in. wide; anthers not penicillate:—

Inner bristles densely villous, longest up to ·65 in. long; pedicels up to ·07 in. long; lower glume ·05—·07 in. long, more or less villous, upper ·15—·17 in. long, acute, puberulous; lower lemma like the upper glume, 3-toothed at apex, upper chartaceous ·09—·11 in. long, its apex and that of its palea fimbriate.....2. *pedicellatum*.

Inner bristles laxly ciliate, longest up to ·5 in. long; spikelets sessile; lower glume minute or suppressed. Other characters as in the last species

3. *polystachyon*.

Leaves convolute, 3—30 in. long, very narrow; panicles linear; spikelets solitary, sessile; anthers not penicillate. Culms up to 3 ft. high:—

Panicles 3—7 in. long; involucre subsessile, bristles scabrid, not plumose, up to ·74 in. long, often purplish; spikelets ·27—·32 in. long; lower glume orbicular ·04 in. long, upper ovate, ·08—·15 in. long; lower lemma ·24—·29 in. long

4. *Hohenackeri*.

Panicles 1—4·5 in. long; peduncles up to ·05 in. long; bristles plumose, up to 2·5 in. long, sometimes purplish; spikelets ·45—·55 in. long; lower glume oblate, ·02—·04 in. long, upper lanceolate to oblong, ·14—·2 in. long; lemmas ·3—·4 in. long.....5. *villosum*.

1. PENNISETUM TYPHOIDES, Stapf et Hubbard. *P. typhoideum*, Rich.; F. B. I. vii. 82.

Cultivated in all Districts for its edible grain and for fodder; here and there found as an escape; near sea-level to 7,000 ft. The Bull-rush Millet, Pearl Millet or Spiked Millet. Vern. *Hind.* Bajra; *Ur.* Gantiya; *Tel.* Sajja, Sajjalu, Gantelu; *Tam.* Kambu; *Mal.* Kampam; *Kan.* Sajjai.

2. PENNISETUM PEDICELLATUM, Trin.; F. B. I. vii. 86.
Godavari District (Barber).
3. PENNISETUM POLYSTACHYON, Schult. *P. setosum*, Rich.; F. B. I. vii. 87.
Godavari District (Barber).
4. PENNISETUM HOHENACKERI, Hochst. ex Steud.; *P. alopecuros*, Steud.; F. B. I. vii. 84; S. I. G. figs. 113, 114.
Mysore State; Bellary, N. Arcot, Salem, Madura and Malabar Districts; Nilgiri and N. Coimbatore Hills; 1,000—6,000 ft. Vern. *Tam.* Munja pillu; *Kan.* Nosai hullu, Manai geddai.

5. PENNISETUM VILLOSUM, R. Br.

Introduced and run wild along road-sides at Ootacamund. *Pennisetum clandestinum*, Hochst., the Kikiyu grass, an excellent tropical African fodder grass, is being cultivated in certain areas to improve the grazing. It is reported to be a good lawn grass and is likely to spread.

66. *Cenchrus*, Linn.

Annual or perennial herbs. *Leaves* flat and flaccid or convolute, short and rigid. *Inflorescence* of simple spikes or paniced. *Spikelets* narrow, solitary or 2—3, rarely 4, enclosed in an involucre of bristles or spines thickened and united at the base into a cup and falling with it. *Glumes* unequal; the lower small; the upper hardly shorter than the spikelet. *Lemmas*, when both present, dissimilar; the lower empty, containing a ♂ floret or entirely suppressed; the upper more rigid, containing a bisexual floret. *Lodicules* 0 or 2, minute. *Stamens* 3. *Styles* 2, often shortly connate. *Grain* oblong, rather hard, enclosed but free within the lemma and palea.

Involucral bristles not spinose, .3—5 in. long, the inner plumose, even if thickened below the tips always filiform. Culms up to 18 in. high; leaves 2—12 in. long, .1—2 in. wide; spikes 1—3 in. long; lower glume .07—11 in. long, upper .1—13 in. long.....1. *ciliaris*.

Involucral bristles spinose, tips not filiform:—

Base of involucre rounded, bristles all erect, not ciliate, hairy within, up to .16 in. long. Culms up to 12 in. high; leaves 4—5 in. long, .15 in. wide; spikes .05—3 in. long; spikelets .17 in. long; lower glume .06—07 in. long, upper slightly longer; lemmas .13—16 in. long.....2. *setigerus*.

Base of involucre turbinate, bristles stout, the outer spreading or recurved, ciliate, up to .33 in. long. Culms 2—18 in. high; leaves 1—6 in. long, .2 in. wide; spikes 1.5—5 in. long; spikelets .22—26 in. long; lower glume usually suppressed, upper .14—2 in. long; lemmas .15—23 in. long.....3. *barbatus*.

1. *CENCHRUS CILIARIS*, Linn. *Pennisetum cenchroides*, Rich.; F. B. I. vii. 88; S. I. G. fig. 115.

Mysore State; Anantapur, Bellary, Chingleput, Salem, Coimbatore and Madura Districts; up to 3,000 ft.

Spikes often purple. An excellent fodder. Attempts are being made to extend it over wider areas. Vern. *Tam.* Kolukkattai pullu.

Var. *echinoides*, Hook. f. *Pennisetum cenchroides*, Rich. var. *echinoides*, Hook. f.; F. B. I. vii. 88; S. I. G. fig. 116. With rather stouter bristles united higher up into a more definite cup.

2. *CENCHRUS SETIGERUS*, Vahl. *C. biflorus*, Roxb.; F. B. I. vii. 89; S. I. G. fig. 117.

Coromandel. Not common.

Spikes sometimes purple.

3. *CENCHRUS BARBATUS*, Schum. *C. catharticus*, Del.; F. B. I. vii. 90; S. I. G. fig. 118.

Northern Circars; Bellary District.

Grazed by cattle before flowering.

67. *Isachne*, R. Br.

Perennial herbs. *Leaves* flat. *Inflorescence* loosely paniced. *Spikelets* small or minute, subglobose or obovoid, not or obscurely articulated on the pedicels. *Glumes* subequal, convex, herbaceous, often falling separately. *Lemmas* subequal or the lower longer and flatter, coriaceous paleate; the lower containing a ♂ or sometimes a bisexual floret; the upper articulated and often stipitate on the rhachilla and falling separately, containing a bisexual or sometimes a

♀, rarely a ♂ floret. *Lodicules* 2, very minute. *Stamens* 3, rarely 4—6. *Styles* 2, free. *Grain* free within the hardened lemma and palea.

Glumes, at least the lower, longer than the lemmas, cuspidate or caudate:—

Lemmas subequal:—

Branches of the panicles glabrous or pubescent; margins of leaves thickened and cartilaginous; glumes lanceolate, sparsely setose at apex:—

Leaves ovate to ovate-lanceolate, .6—3.5 in. long, .2—5 in. wide (much wider in var. *latifolia*), base rounded and clasping the stem, sheaths more or less densely long-hairy and ciliate. Culms 3—12 in. high; glumes .1—11 in. long; lemmas .06—09 in. long, upper more or less puberulous

1. *Kunthiana*.

Leaves linear to linear-lanceolate, rarely a few narrowly ovate, .6—2.6 in. long, .15—4 in. wide, base narrowed, not clasping the stem, sheaths glabrous, rarely shortly puberulous. Culms 3—40 in. high; glumes .12—15 in. long.

Other characters as in the last species.....2. *Bourneorum*.

Branches of the panicles setose; glumes ovate-orbicular, .09—11 in. long; setose all over the back. Culms 1—5 in. high; leaves lanceolate, .7—2 in. long, .2—4 in. wide, base clasping the stem, margins neither thickened nor cartilaginous, sheaths long-hairy or nearly glabrous, long-ciliate; lemmas hemispheric, .06 in. long, glabrous.....3. *Lisboae*.

Lower lemma elliptic, .08—09 in. long, glabrous, upper broadly ovate, .04—06 in. long, rather densely pubescent. Culms slender, 1—5 in. high; leaves ovate to ovate-lanceolate, .4—1.2 in. long, .15—4 in. wide, sheaths lax, patently hairy from tubercles; glumes ovate, caudate-acuminate, 7-nerved, setose from large tubercles, .09—12 in. long, lower usually the longer.....4. *setosa*.

Glumes as long as or shorter than the lemmas:—

Spikelets .12 in. or less long:—

Leaves 6.5 in. or less long:—

Stems erect or prostrate, 25 in. or less high:—

Spikelets .07—12 in. long; ligules represented by a line of stiff hairs:—

Lemmas subequal and similar, ovate to elliptic-oblong, rather deeply concave, subcoriaceous, puberulous, .06—09 in. long. Culms decumbent, rooting below, up to 24 in. high; leaves asperulous, sometimes softly hairy, 2—5.5 in. long, .2—25 in. wide, usually more or less erect; glumes subequal, broadly ovate to orbicular, glabrous or asperulous and setose upward, .07—11 in. long.....5. *elegans*.

Lemmas markedly unequal and dissimilar, lower elliptic to oblong, shallowly concave, glabrous, membranous:—

Culms prostrate, slender, up to 12 in. long; leaves 1.2—2.3 in. long, .15—3 in. wide; glumes suborbicular or broader than long, .05—09 in. long, upper much more deeply concave, glabrous, sometimes asperulous and setulose at the apex; lower lemma as long, upper broadly ovate to suborbicular, semicircular in section, chartaceous, puberulous at least on the margins, .04—07 in. long.....6. *miliacea*. Culms erect from a decumbent, rooting base, rigid, up to 12 in. long; leaves 1—2.5 in. long, .15—4 in. wide; glumes as in the last species; lower lemma .06—1 in. long, upper crustaceous, hard, usually white, puberulous at least on the margins, .05—08 in. long.....7. *dispar*.

Spikelets .04 in. long; ligules 0. Culms 1.5—7 in. high, very slender; leaves ovate, .35—1.5 in. long, .2—5 in. wide, flaccid; glumes delicately membranous, elliptic to elliptic-ovate, sparsely setose, .03—04 in. long

8. *gracilis*.

Culms straggling, bamboo-like, 4 ft. or more long; leaves 2—6 in. long, .12—25 in. wide, ciliate at base; glumes broadly elliptic-ovate, .08—1 in. long; lemmas boat-shaped, .07—08 in. long.....9. *Angladri*.

Leaves 7—14 in. long, .2—4 in. wide, continuous with the sheath, beset with stiff short or long hairs, margins thickened and cartilaginous. Culms erect, rigid, up to 3 ft. high; spikelets globose; glumes suborbicular, sparsely setose at apex, .08—1 in. long; lemmas orbicular, .06—07 in. long.....10. *Mecholdii*.

Spikelets .14 in. or more long. Culms often stout, 1—5 ft. high; leaves 2—11.5 in. long, .2—1 in. wide; glumes subequal, ovate to ovate-lanceolate, .14—2 in.

long, glabrous or setulose; lemmas subequal, boat-shaped, .12—15 in. long, coriaceous..... 11. *Walkeri*.

1. *ISACHNE KUNTHIANA*, W. et A.; F. B. I. vii. 21.
W. Ghâts; High Wavy Mountains (Blatter and Hallberg); 5,000—8,000 ft.
Var. *latifolia*, Hook f.; F. B. I. vii. 22. Leaves up to 1 in. wide with 2—4 nerves on either side of the midrib prominent below.
W. Ghâts; 5,000—8,000 ft.
Var. *nana*, C. E. C. Fischer n. var.
Culms only 1—2 in. high; leaves 1—25 in. long, .05—1 in. wide, margins not cartilaginous; glumes longer than, equal to or rarely shorter than the lower lemma.
Travancore on Anaimudi Peak at 8,840 ft. (Barnes).
2. *ISACHNE BOURNEORUM*, C. E. C. Fischer in Kew Bull. 1932, 324.
Bababudan, Nilgiri and Pulney Hills; 5,000—8,000 ft.; Travancore on Anaimudi Peak at 8,840 ft. (Barnes).
3. *ISACHNE LISBOAE*, Hook. f.; F. B. I. vii. 22.
Bababudan Hills (Talbot, Meebold); 6,000 ft.
4. *ISACHNE SETOSA*, C. E. C. Fischer in Kew Bull. 1932, 247.
Cochin and Travancore States (Meebold); 3,000—6,000 ft.
5. *ISACHNE ELEGANS*, Dalz.; F. B. I. vii. 23.
Mysore, Nilgiri and Pulney Hills; 5,000—7,000 ft. Vern. *Kan. Kadu sanna samai hullu*.
6. *ISACHNE MILIACEA*, Roth; F. B. I. vii. 25.
Codavari District; W. Coast; at low elevations; usually in wet places.
7. *ISACHNE DISPAR*, Trin.; F. B. I. vii. 26. *I. australis*, Hook. f. non R. Br.; F. B. I. vii. 24.
In all Districts; sea-level to 6,000 ft.; often in wet situations. Readily eaten by horses and cattle. A troublesome weed in rice-fields.
Var. *villosa*, C. E. C. Fischer n. var.
Nodes setose; leaves villous.
High Wavy Mountains (Blatter and Hallberg).
8. *ISACHNE GRACILIS*, C. E. Hubbard in Kew Bull. 1927, 77.
Bababudan Hills at Santaveri (Meebold); 4,000 ft.
9. *ISACHNE ANGLADEI*, C. E. C. Fischer in Kew Bull. 1932, 323.
Pulney and High Wavy Mountains; 4,000—6,000 ft.
10. *ISACHNE MEEBOLDII*, C. E. C. Fischer in Kew Bull. 1932, 323.
Mysore State (Meebold); 2,000—3,000 ft.
11. *ISACHNE WALKERI*, W. et A.; F. B. I. vii. 26.
W. Ghâts; 2,500—7,000 ft.

68. *Thysanolaena*, Nees

Tall, reed-like shrubs with solid, terete culms. *Leaves* distichous, broad, flat. *Panicles* compound, large, effuse. *Spikelets* very numerous, linear-oblong, obscurely articulated on their pedicels. *Glumes* membranous, much shorter than the lemmas, the lower shorter than the upper. *Lemmas* similar; the lower without palea, empty; the upper

paleate, containing a bisexual floret. *Lodicules* 2. *Stamens* 2—3. *Styles* 2, free. *Grain* minute, enclosed in the hardened lemma and palea.

THYSANOLAENA MAXIMA, O. Ktz. *T. Agrostis*, Nees; F. B. I. vii. 61.

Ganjam, Vizagapatam and Rampa Districts; 1,500—4,800 ft.

Culms up to 12 ft. high; leaves subcoriaceous, finely acuminate, cordate, up to 2 ft. long and 3 in. wide; panicle up to 3 ft. long and 2 ft. across; spikelets .07—.09 in. long; lower glume .02—.03 in. long, upper .04 in. long; lemmas lanceolate, boat-shaped, acuminate, .06—.07 in. long, the upper the shorter, ciliate with long spreading hairs.

69. *Arundinella*, Raddi

Annual or perennial, erect herbs. *Leaves* usually narrow. *Panicles* usually branched, rarely congested. *Spikelets* 1—2, rarely 3-flowered, not or imperfectly jointed at the base; rhachilla not produced beyond the uppermost floret, disarticulating above the glumes. *Glumes* membranous, chartaceous or thinly coriaceous, more or less convex; the lower usually much the shorter, 3—5-, rarely 7-nerved. *Lemmas* dissimilar; the lower usually boat-shaped, 3—7-nerved, its palea linear or oblong, 2-keeled, empty or enclosing a ♂ or a bisexual floret; the upper much shorter, usually chartaceous or crustaceous, articulated at the base and more or less separately caducous, involute, entire or 2-toothed, sometimes provided with two apical setae, usually long awned from the apex or sinus, the awn sometimes very short or absent, geniculate and hygroscopically contorting below the middle, the palea of similar texture, enclosed in the lemma, 2-keeled with wide inflexed flaps (palea sometimes lacking in either or both lemmas), containing usually a bisexual, seldom a ♀ floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or very shortly united. *Grain* oblong or ellipsoid, free within the lemma and palea; embryo large; albumen rather hard.

Upper lemma awned, hairy at the base; glumes narrow:—

Upper lemma bearing 2 apical setae:—

Inflorescence congested into a crowded ovoid or oblong head .4—1.7 in. long. A weak annual 1—12 in. high; leaves linear to lanceolate, cordate, 1—2 in. long; lower glumes .16—.22 in. long, setose; upper lemmas .16—.22 in. long, pilose, awns .3—.35 in. long, portion below the knee flat.....1. *avenacea*.

Panicle of distant spikes or effuse; leaves linear; upper lemma scaberulous:—
Spikelets mostly sessile or very shortly pedicelled, bifariously imbricate in spikes .2—1.5 in. long. Culms slender, 10—24 in. high; leaves 1.4—5.5 in. long, .05—.32 in. wide; panicles up to 5 in. long; glumes bristly from tubercles; upper lemmas .07—.15 in. long, awns .2—.35 in. long

2. *mesophylla*.

Spikelets slenderly pedicelled, not bifarious or imbricate. Culms slender or rather stout, 1—3 ft. high; leaves 3—11 in. long, .1—3 in. wide; panicles 3—12 in. long; glumes glabrous or setose, ribs often scabrid; upper lemma .08—.12 in. long, awns .25—.37 in. long; setae .06—.14 in. long....3. *setosa*.

Upper lemma devoid of setae:—

Spikelets small; upper lemma less than .06 in. long:—

Both glumes .07 in. or less long, smooth, glabrous or rarely with a few hairs. A slender annual 4—15 in. high; leaves 4—9 in. long, .15—.82 in. wide; panicles effuse, feathery, 5—8 in. long; upper lemmas .03—.04 in. long, scaberulous, awns .08—.11 in. long, very slender.....4. *pumila*.
Glumes usually, upper always, more than .07 in. long, ribs of lower glume scabrid:—

Panicles compact, ovoid or oblong, rarely somewhat effuse, 1.6—8 in. long,

branches .3—1.5 in. long, spikelets crowded. Culms 1—12 in. high; leaves 1.5—7 in. long, .12—42 in. wide; lower glumes .07—13 in. long; upper lemma .04—06 in. long, scaberulous, awns .13—15 in. long

5. *halcooides*.

Panicles open, branches slender, spikelets not crowded:—

Culms very slender, 3—15 in. high; leaves aggregated near the base, distant above, with a naked peduncle to the panicle; leaves .5—1.3 in. long, .03—1 in. wide; rhachis, the 3—6 branches up to 1 in. long and the pedicels capillary; glumes more or less setose, lower .06—08 in. long, upper .1—12 in. long; upper lemmas .04 in. long, puberulous; awns very slender, .1—12 in. long.....6. *pygmaea*.

Culms more robust; leaves mostly more than 2 in. long and .07 or more in. wide:—

Glumes glabrous, lower .06—1 in. long, upper .1—13 in. long. Culms 3—20 in. high; leaves 1—12 in. long, .12—45 in. wide; panicles 2—20 in. long; upper lemmas .04—06 in. long, papillose, awns .1—11 in. long.....7. *Metzii*.

Glumes usually more or less setose, lower .08—11 in. long, upper .13—15 in. long. Culms 1—4 ft. high; leaves 2.5—13 in. long, .07—2 in. wide; panicles decomposed, 7—20 in. long, branches slender, up to 6 in. long; upper lemmas .05—6 in. long, scaberulous; awns .16—2 in. long.....8. *Lawii*.

Spikelets larger; upper lemma .07 in. or more long, scaberulous; perennials:—

Panicles narrow, 2—7 in. long, branches spiciform, .5—1 in. long, rarely longer, distant or approximate, spikelets crowded subsessile, rhachis and branches densely villous. Culms 12—28 in. high; leaves mostly radical, flat, channelled or involute, stiff; more or less densely villous, rarely glabrous; glumes villous, lower .25 in. long, upper .28 in. long; upper lemmas .13 in. long; awns .18 in. long.....9. *villosa*.

Panicles effuse, branches long, spikelets pedicelled. Leaves glabrous:—

Branches of panicles distant; spikelets in distant pairs:—

Roots not tuberous, not woolly; culms 15—36 in. high; leaves 6—18 in. long; .32—45 in. wide; panicles 5—16 in. long, branches numerous, slender, up to 6 in. long, sometimes again branched; spikelets numerous, sometimes imbricate; lower glumes .12—15 in. long, ribs scabrid; upper .15—18 in. long; upper lemma .07—1 in. long; awns .11—12 in. long.....10. *nepalensis*.

Roots tuberous, densely woolly; culms slender, 6—33 in. high; leaves 4—8 in. long, .1—2 in. wide; panicles spreading, 4—9 in. long, branches few, distant, very slender, undivided, up to 5 in. long, pedicels long, capillary, spikelets few, distant; lower glumes .1—13 in. long, glabrous or scabrid on the ribs, upper .15—17 in. long; upper lemmas .07—1 in. long; awns .2—23 in. long, capillary.....11. *mutica*.

Branches of panicles close, spikelets crowded, rarely rather open with fewer and distant spikelets, 2.5—6 in. long. Culms 3—24 in. high; leaves 2.3—9.5 in. long, .15—6 in. wide; lower glumes .12—16 in. long, upper 16—21 in. long; upper lemmas .07—09 in. long; awns .15—18 in. long.....12. *fuscata*.

Upper lemma unawned, devoid of setae, without hairs at the base; perennials:—

Rootstock hairy; culms comparatively slender, 1—4 ft. high; leaves 3.5—15 in. long, .15—6 in. wide; panicles 3—13 in. long, branches 1—2.5 in. long; lower glumes .07—09 in. long, upper .1—11 in. long; upper lemmas .05—06 in. long, papillose.....13. *leptochloa*.

Rootstock glabrous; culms rather stout, 20—30 in. high; leaves rigid, 5—11.5 in. long, .3—6 in. wide; panicles 7—19 in. long, branches up to 6 in. long; lower glumes .08—12 in. long, upper .11—15 in. long; upper lemma .07—09 in. long, asperous.....14. *Lawsoni*.

1. ARUNDINELLA AVENACEA, Munro; F. B. I. vii. 69.

W. Gháts; 2,000—7,500 ft.

2. ARUNDINELLA MESOPHYLLA, Nees; F. B. I. vii. 69.

W. Gháts; 1,000—7,500 ft.

3. ARUNDINELLA SETOSA, Trin.; F. B. I. vii. 70. *A. nervosa*, Nees; F. B. I. vii. 70.
In all Districts; sea-level to 7,000 ft. Vern. *Tel.* Pathi oopagaddi;
Kan. Hakki varji hullu, Maraga thattu hullu.
Var. *lanifera*, C. E. C. Fischer n. var.
Roots woolly and the setae of the upper lemmas only .02—.025 in. long.
- Cuddapa District at Mogilikuppa (Gamble no. 21307), 3,000 ft.
4. ARUNDINELLA PUMILA, Steud. *A. tenella*, Nees; F. B. I. vii. 71.
W. Coast and Gháts; Mysore State (Meebold); sea-level to 6,000 ft.
5. ARUNDINELLA HOLCOIDES, Trin. *A. agrostoides*, Trin.; F. B. I. vii. 71
Godavari District at Bison Hill (Barber); Cuddapah Hills (Beddome); Mysore State (Meebold); W. Gháts; 2,000—6,000 ft. Vern. *Mal.* Molam pullu.
6. ARUNDINELLA PYGMAEA, Hook. f.; F. B. I. vii. 72.
S. Kanara at Pulicode.
7. ARUNDINELLA METZII, Hochst.; F. B. I. vii. 72.
Mysore State; S. Kanara and N. Malabar Districts; sea-level to 3,000 ft.
8. ARUNDINELLA LAWII, Hook. f.
Mysore at Sagar (Meebold); 2,000 ft.
9. ARUNDINELLA VILLOSA, Arn.; F. B. I. vii. 72.
Bababudan, Pulney and Tinnevelly Hills; Attapadi Valley (Fischer); 2,000—7,000 ft.
10. ARUNDINELLA NEPALENSIS, Trin.; *A. brasiliensis*, Hook. f. non Raddi; F. B. I. vii. 73.
Mysore, Pulney and Travancore Hills; 3,500—7,000 ft.
11. ARUNDINELLA MUTICA, Nees. *A. capillaris*, Hook. f.; F. B. I. vii. 74.
Cuddapah and Nellore Districts; 300 to 3,000 ft.
12. ARUNDINELLA FUSCATA, Nees; F. B. I. vii. 74.
Mysore, Nilgiri, Anamallais and Pulney Hills; 3,000—7,000 ft.
An excellent fodder.
13. ARUNDINELLA LEPTOCHLOA, Hook. f.; F. B. I. vii. 76.
W. Coast from N. Malabar District southwards; Tinnevelly Districts; at low elevations.
14. ARUNDINELLA LAWSONI, Hook. f.; F. B. I. vii. 76.
Nilgiri Hills; 3,000 to 6,000 ft. In swamps.

70. Avenastrum, Jessen

Erect, usually perennial herbs. *Leaves* usually expanded. *Panicles* effuse. *Spikelets* erect, all alike, 2—8-flowered, not jointed on the pedicels; rachilla articulated at the base and between the lemmas. *Glumes* subequal or the upper longer, dorsally rounded or keeled; the lower 1—3-nerved; the upper 3—5-nerved. *Lemmas* all alike, lanceolate or ovate, usually deeply 2-cleft, sometimes 2-toothed or entire, bearing a geniculate awn with a twisted base from about the middle of the back; the lowest always long-awned, the upper ones with shorter awns

or awnless; paleas narrow, 2-keeled, keels ciliate, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* long, glabrous or hairy above the middle, free within the lemma and palea or adhering to the latter.

AVENASTRUM ASPERUM, C. E. C. Fischer n. comb. *Avena aspera*, Munro; F. B. I. vii. 277.

Nilgiri and Pulney Hills; 6,000—7,500 ft.

Culms up to 4 ft. high; leaves 1—18 in. long, 1—22 in. wide, glabrous or more or less pilose; panicles 3—12 in. long; glumes 26—42 in. long, the lower 3-nerved; lowest lemma 37—42 in. long, cleft to the middle; awns 5—6 in. long.

Var. *Schmidii*, C. E. C. Fischer n. comb. *Avena aspera*, Munro var. *Schmidii*, Hook. f.; F. B. I. vii. 277.

Smaller and more slender; leaves mostly radical and more hairy; panicles smaller and more contracted with shorter branches; glumes 17—27 in. long, lower 1-nerved; lowest lemma, 26—3 in. long, entire; awns 32—42 in. long.

Nilgiri and Pulney Hills; 7,000—8,000 ft.

Var. *polyneuron*, C. E. C. Fischer n. comb. *Avena polyneura*, Hook. f.; F. B. I. vii. 277.

Smaller than the typical species in culms and leaves; panicles very effuse with long spreading lower branches; glumes strongly nerved, 32—5 in. long, lower 3-nerved; lowest lemma 44 in. long, cleft for about $\frac{2}{3}$ its length, awns 7 in. long.

Doddabetta in the Nilgiri Hills (Gamble); 8,000 ft.

71. *Avena*, Linn.

Annual erect herbs. *Leaves* usually expanded. *Panicles* effuse, contracted or spiciform. *Spikelets* all alike, 2—4-flowered, not jointed on the pedicels; rhachilla articulated at the base and sometimes between the lemmas. *Glumes* subequal or unequal, the lower usually the shorter, dorsally rounded or weakly keeled, broadly ovate or ovate-lanceolate, acute, 5—11-nerved. *Lemmas* all alike, ovate or lanceolate, 2-toothed or deeply 2-cleft, awned from the back below the cleft or awnless, sometimes only the lowest awned; awn geniculate with a twisted base; paleas narrow, 2-keeled, keels scabrid or ciliate, containing a bisexual floret. *Lodicules* usually 2. *Stamens* 3. *Styles* 2, free. *Grain* long, glabrous or hairy at the apex, free within the lemma and palea or adhering to the latter.

Species of this genus—the Oats—occur only as cultivated crops in the Nilgiri Hills and an occasional escape is met with. The following two species have been recorded:

Rhachilla and lemmas glabrous; upper lemmas usually awnless.....1. *sativa*.
Rhachilla hairy; lemmas hairy on the back below the middle; all the lemmas awned
2. *sterilis*.

1. AVENA SATIVA, Linn.; F. B. I. vii. 275.

2. AVENA STERILIS, Linn.

A more slender plant than the first.

72. *Coelachne*, R. Br.

Small, erect or trailing marshland herbs. *Leaves* short, flat, convolute or involute. *Inflorescence* of open, contracted or spiciform panicles or a single spiciform raceme. *Spikelets* all alike, sessile or pedicelled, not articulated, 2-flowered, both florets perfect or one or both unisexual, if both unisexual the upper ♀. *Glumes* subequal, membranous, orbicular or elongate. *Rhachilla* articulated above the persistent glumes, more or less elongate between the two lemmas, not produced above the upper. *Lemmas* dissimilar; the lower glabrous or nearly so, considerably longer than the upper, containing a bisexual or a ♂ floret; the upper coriaceous, more or less hairy, containing a bisexual or a ♀ floret; both paleate. *Lodicules* 2. *Stamens* 2—3. *Grain* fusiform or oblong, terete or plano-convex, free within the lemma and its palea.

Rhachis, pedicels and rhachilla terete. Nodes of culms pubescent; spikelets numerous; grain subterete, .03—.04 in. long:—

Panicles interrupted, spiciform, .4—3.5 in. long, branches appressed and congested or spreading and scattered, up to .35 in. long, usually shorter, bearing up to 9 ovoid spikelets. Culms erect or decumbent, 2.5—15 in. high; leaves usually flat, .4—.17 in. long, filiform to .13 in. wide; glumes .04—.06 in. long, suborbicular; lower lemmas .06—.09 in. long, upper .04—.06 in. long, puberulous

1. *pulchella* var. *simpliuscula*.

Panicles open, 1—2 in. long, branches spreading, distant, up to .7 in. long, bearing 1—4 lanceolate spikelets. Culms erect, 4—6 in. high; leaves flat, .5—1.1 in. long, up to .06 in. wide; glumes .05—.08 in. long, ovate-oblong; lower lemma .1—.11 in. long, upper .07—.09 in. long, puberulous.....2. *perpusilla*.

Rhachis, pedicels and rhachillas flat. Culms very slender, flaccid, trailing, up to 18 in. long, nodes glabrous, flowering culms 2—4 in. high, unbranched; spikelets in pairs, one sessile and one pedicelled; glumes .11—.14 in. long, the lower ensiform, the upper oblong, concave; lower lemma .16—.17 in. long, upper .08—.09 in. long, broadly oblong, margins shaggily hairy; grain .06 in. long, plano-convex

3. *Meeboldii*.

1. COELACHNE PULCHELLA, R. Br.; F. B. I. vii. 271.

Var. *simpliuscula*, Hook. f.

Mysore, Nilgiri, Pulney and Travancore Hills; 2,000—6,000 ft.

Vern. *Kan.* Sanna purlai hullu.

2. COELACHNE PERPUSILLA, Thw. *C. pulchella*, R. Br. var. *gracillima*, Hook. f.; F. B. I. vii. 271.

Nilgiri Hills (Schmid).

3. COELACHNE MEEBOLDII, C. E. C. Fischer in Kew Bull. 1934, 169.

Cochin State at Chalakudi (Meebold). In tanks.

73. *Zenkeria*, Trin.

Perennial herbs. *Leaves* narrow, flat, convolute or involute. *Panicles* effuse or contracted; branches capillary. *Spikelets* all alike, 2-flowered, laterally compressed, not articulate on the pedicels; rhachilla very short, bearded, disarticulating above the glumes, not or very shortly produced beyond the upper lemma. *Glumes* subequal or the upper longer, 1-nerved, keeled, persistent. *Lemmas* equal and similar, chartaceous, longer than the glumes, usually hairy below the middle, several-veined; paleas shorter, broad, 2-keeled, long-ciliate, enclosing a bisexual floret. *Lodicules* 2, ovate, denticulate. *Stamens* 3. *Styles* 2, free. *Grain* narrowly oblong.

Culms 11—28 in. high; leaves flat or convolute, 2.5—28 in. long, .15—3 in. wide, narrowed into a long stiff channelled quasi petiole; panicles 3—10 in. long, usually effuse; glumes .07—1 in. long; lemmas acuminate or caudate-acuminate, .14—2 in. long.....1. *elegans*.
 Culms 6—10 in. high; leaves rigid, erect, flat with involute margins, 4—12 in. long, .25—3 in. wide, not narrowed into a quasi petiole; panicles 2.5—5 in. long, contracted; glumes .1—1.3 in. long; lemmas acute, .16—1.7 in. long.....2. *Stappii*.

1. ZENKERIA ELEGANS, Trin.; F. B. I. vii. 270.
 N. Arcot, Salem, Coimbatore and Tinnevelly Districts. Nilgiri and Pulney Hills; 1,500—7,000 ft.
2. ZENKERIA STAPPII, Henr.
 Nilgiri Hills (Perrotter).

74. *Arundo*, Linn.

Tall, stout, perennial shrubs, often woody below. *Leaves* broad, flat. *Panicles* large, decomposed; branches fascicled. *Spikelets* laterally compressed, not jointed on the pedicels, 2—8-flowered; rhachilla articulated at the base and between the lemmas. *Glumes* 2, persistent, subequal, narrow, acute or acuminate, keeled, 3-nerved. *Lemmas* lanceolate, entire and acuminate or 2-fid with an arista from the sinus, 3-nerved, long-silky hairy on the back below the middle; paleas hyaline, 2-nerved, each containing a bisexual floret. *Lodicules* 2, obovate. *Stamens* 3. *Styles* 2, free. *Grain* oblong.

ARUNDO DONAX, Linn.; F. B. I. vii. 302.

In most Districts except the W. Coast, usually near water; up to 2,000 ft.

Rhizome creeping; culms fistular, reed-like, up to 10 ft. high; leaves ensiform, amplexicaul, 8—24 in. long, .5—2 in. wide; panicles 9—24 in. long; glumes .25—4.5 in. long; lemmas 2—4, the uppermost empty when more than 3, lowest .42—4.6 in. long, silky pilose.

Not a good fodder though cattle will eat the young leaves. The stems are used in thatch-roofing.

75. *Neyraudia*, Hook. f.

Tall, perennial, leafy herbs or shrubs. *Leaves* flat or sometimes convolute. *Panicles* effuse, decomposed, often nodding. *Spikelets* laterally compressed, 4—8-flowered; rhachilla shortly bearded, jointed at the base or above the first lemma, in which case the latter is entire and empty, and between the lemmas. *Glumes* 2, membranous, subequal or the upper slightly the longer, keeled, 1-nerved. *Lemmas* elongate-subulate, often recurved, acuminate, entire or shortly 2-fid with 2 setae and an often recurved arista from the tip or the sinus, strongly 3-nerved, sides long silky-hairy; paleas short, oblong, 2-keeled, keels scaberulous, all containing a bisexual floret or the lowest empty and glabrous. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* linear-subulate, base acute, loose in the lemma.

NEYRAUDIA ARUNDINACEA, Henr. *N. madagascariensis*, Hook. f.; F. B. I. vii. 305.

Travancore at Devicolam (Meebold); 6,000 ft.

Culms solid, sometimes woody below, 2—8 ft. or more high; leaves 8—24 in. long, 2—1 in. wide; panicles up to 3 ft. high; glumes .08—13 in. long; lemmas .14—2 in. long.

76. *Phragmites*, Adans.

Tall, stout, perennial shrubs; rhizomes creeping, often very long; culms hollow, woody below, leafy nearly to the apex. *Leaves* flat. *Panicles* lax, usually large, decomposed. *Spikelets* 3—10-flowered, linear, terete, slightly laterally compressed, not jointed on the pedicels; rhachilla long silky hairy above the lowest lemma, jointed between the lemmas, sometimes shortly prolonged beyond the uppermost. *Glumes* 2, persistent, membranous, unequal, oblong-lanceolate, 3-nerved. *Lemmas* much longer, the lowest linear-lanceolate, empty or containing a ♂ floret, the rest hyaline, narrowly subulate-lanceolate, caudate-acuminate, 3-nerved; callus long, densely long-silky hairy; paleas much shorter, 2 keeled, each containing a bisexual floret, the uppermost sometimes imperfect. *Lodicules* 2. *Stamens* 1—3. *Styles* 2, free. *Grain* oblong, terete.

PHRAGMITES KARKA, Trin., F. B. I. vii. 304.

In all Districts except the W. Coast; usually near water and often gregarious in large colonies; up to 3,000 ft.

Culms robust, sometimes up to 20 ft. high; leaves stiff, semi-erect, up to 25 in. long, 3—1.5 in. wide; panicles up to 25 in. long; lower glumes .12—16 in. long, upper .22—24 in. long; lemmas .36—5 in. long.

The stems are made into pipes; split stems are plaited into mats. The culms and leaves are used for thatching.

77. *Polygogon*, Desf.

Slender, annual or perennial herbs. *Leaves* flat. *Panicles* spiciform or lobed, dense; rhachis fragile. *Spikelets* minute, uniform, crowded, laterally compressed, 1-flowered, articulate on the pedicels but persistent. *Glumes* 2, subequal, concave, keeled, entire or notched, with a slender arista from the sinus or from the back. *Lemma* much shorter, hyaline, broadly oblong, truncate, toothed, mucicous or aristate; palea small, 2-nerved, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 1—3. *Styles* 2, free. *Grain* obovoid, free within the lemma and palea.

POLYPOGON MONSPELIENSIS, Desf.; F. B. I. vii. 245.

Bababudan Hills (Talbot).

Culms tufted, up to 2 ft. high; leaves 1—4 in. long, 1—1.5 in. wide; panicles cylindrical or oblong, .5—2 in. long; glumes .06—08 in. long, scaberulous, aristas 2—3 times as long; lemmas .04—05 in. long.

78. *Aristida*, Linn.

Annual or perennial, usually slender, tufted herbs. *Leaves* flat or more often convolute, very narrow. *Panicles* branched, contracted or effuse. *Spikelets* all alike, 1-flowered, slender, not articulated on the

short or long pedicels; rachilla very short, disarticulating above the upper glume. *Glumes* narrow, keeled, 3-nerved, the lower usually considerably the shorter, but sometimes subequal or even longer, frequently aristate, sometimes 2-toothed. *Lemma* with a more or less bearded, usually pungent callus, narrow, involute, more or less cylindrical, often attenuate at the apex, terminated by an awn usually consisting of 3 slender, hispidulous, usually subequal setae sessile on the lemma or supported by a short or long, usually twisted column, sometimes the 2 lateral setae shorter than the median or entirely suppressed, the median sometimes plumose, the lemma sometimes jointed at the middle or near the apex or just above the apex of the stamens; palea very narrow, short, embraced by the lemma, sometimes absent, the contained floret bisexual. *Lodicules* 2—3. *Stamens* 3. *Styles* 2, free. *Grain* narrowly cylindrical or elongate-ellipsoid; embryo short or long.

Awn sessile; setae always 3, subequal:—

Glumes mucous. Culms slender, up to 2 ft. high; leaves 1.5—10 in. long; lower glume .14—23 in. long, upper .24—36 in. long; callus .02—03 in. long; lemma .23—44 in. long, keeled; setae .44—84 in. long.....1. *depressa*.

Glumes, at least one, aristate; callus .05—08 in. long; glumes .4—7 in. long (including the aristas):—

Panicles contracted, 3—15 in. long; branches erect, straight, main axis terete, axils glabrous. Culms erect, 4—48 in. high; leaves up to 20 in. long; lemma .38—5 in. long; setae slender, 1—1.5 in. long.....2. *setacea*.

Panicles effuse, 3—9 in. long, branches spreading, flexuous, main axis angled, axils hairy or prominently tumid. Culms usually straggling and curved, up to 2 ft. high; leaves up to 10 in. long; lemma .32—35 in. long; setae rigid, rather wide at the base, 1—1.8 in. long.....3. *Hystrix*.

Awn supported by a column:—

Setae always 3, subequal:—

Lemma .17—23 in. long, elongate-fusiform, attenuate upwards, continuous with the .1—12 in. long column. Culms up to 14 in. high; leaves 1.5—3 in. long, glabrous; panicles usually contracted, 2—4.5 in. long; glumes shortly aristate, .2—32 in. long; callus .02—03 in. long; setae .55—8 in. long.....4. *mutabilis*.

Lemma .08—17 in. long, cylindrical, truncate, articulated with the .6—1.4 in. long, scabrid column. Culms up to 2 ft. high; leaves 2.5—5 in. long, flat or convolute, glabrous or puberulous above, thinly pilose near the base; panicles narrow, lax, 1.5—7 in. long; glumes aristate, .7—9 in. long; callus .08 in. long; setae 1.8—2.4 in. long.....5. *funiculata*.

Setae often reduced to 1, .8—1.2 in. long, the lateral when present much finer, .3—4 in. long. Culms tufted, 6—24 in. high; leaves 4—12 in. long; panicle lax, often expanded, 3—12 in. long; glumes shortly aristate, .4—6 in. long, the upper often suppressed; callus .02—04 in. long; lemma .35—6 in. long, continuous and not perfectly articulated with the .38—5 in. long column.....6. *redacta*.

1. *ARISTIDA DEPRESSA*, Retz. *A. adscencionis*, Linn.; F. B. I. vii. 224 *in part*; S. I. G. figs. 171, 172.

In all but the wettest localities; up to 3,000 ft. Vern. *Tel.* Nari balana gaddi; *Tam.* Kodai balla pullu, Oosi pullu, Shigam pullu, Todapa puvada pullu; *Kan.* Kari sanna hanchi hullu.

2. *ARISTIDA SETACEA*, Retz.; F. B. I. vii. 225; S. I. G. fig. 173.

In all Districts; up to 3,000 ft.

Used for making brooms. Rejected by cattle. Vern. *Kan.* Dodda hanchi hullu, Nai anchi katti.

3. *ARISTIDA HYSTRIX*, Linn. f.; F. B. I. vii. 225; S. I. G. fig. 174.

In all Districts; up to 3,000 ft.

Said to be liked by cattle. Vern. *Kan.* Bili vunugada hullu.

4. *ARISTIDA MUTABILIS*, Trin. et Rupr.; F. B. I. vii. 226; S. I. G. figs. 175, 176.
Cuddapah, Nellore, Anantapur, Coimbatore and Tinnevelly Districts; up to 1,400 ft.
5. *ARISTIDA FUNICULATA*, Trin. et Rupr.; F. B. I. vii. 226; S. I. G. fig. 177.
In all the Eastern Districts south of the Kistna River; up to 2,000 ft. Vern. *Tel.* Kundeti gaddi.
6. *ARISTIDA REDACTA*, Stapf.; F. B. I. vii. 227.
Bababudan Hills; Mysore State; Bellary and Kurnool Districts.

79. *Agrostis*, Linn.

Erect, usually perennial herbs. *Leaves* narrow, flat or slightly convolute. *Panicles* contracted or effuse, branches capillary, whorled. *Spikelets* all alike, 1-flowered, not jointed on the pedicels; rhachilla disarticulating above the glumes, not produced beyond the lemma. *Glumes* 2, equal or unequal, lanceolate, acuminate, keeled, muticous, 1-, rarely 3-nerved. *Lemma* shorter, hyaline, truncate, crenate or cleft, often awned on the back; callus short, glabrous or bearded with hairs less than half as long as the lemma; palea usually much shorter, often minute or 0; the contained floret bisexual. *Lodicules* 2. *Stamens* 3. *Grain* free within the lemma.

Lemmas glabrous; callus glabrous or very shortly hairy:—

Glumes .08—1 in. long, keel scaberulous; lemma .06—08 in. long, 3-toothed or lobulate, awnless, palea 0—05 in. long. Culms up to 3 ft. high; leaves 1.2—5.5 in. long, .08—13 in. wide; panicles 3—12 in. long, effuse (contracted in var. *prorepens*).....1. *stolonifera*.

Glumes .11—14 in. long; keels spinulose-ciliolate, at least in upper half; lemma .06—1 in. long, rounded or truncate and minutely 2-toothed, bearing a geniculate awn .14—16 in. long on the back close to the base, palea .06—1 in. long. Culms 10—18 in. high; leaves 1.2—7 in. long, .05—17 in. wide; panicles effuse, 5—12 in. long.....2. *peninsularis*.

Lemmas hairy; callus long hairy; palea 0; keels of glumes usually spinulose-ciliolate:—

Rootstock slender; culms 4—26 in. high; leaves 1—8 in. long, .03—1 in. wide, base not narrowed; panicles effuse, 2.5—7 in. long; glumes .09—13 in. long; lemma .07—09 in. long, truncate, lobulate or minutely denticulate, awn .09—16 in. long.....3. *pilosula*.

Rootstock stout, covered with the old sheaths; culms 8 in. high; cauline leaves few, 1—1.5 in. long, very slender, base not narrowed, radical leaves up to 4 in. long and .15 in. wide, narrowed into a rigid quasi petiole; panicles 1.5 in. long; glumes .13 in. long; lemma .09 in. long, truncate, 2—4-dentate, awn .18 in. long.

4. *Schmidii*.

1. *AGROSTIS STOLONIFERA*, Linn. *A. alba*, Linn.; F. B. I. vii. 254.
Nilgiri and Pulney Hills; 6,000—7,000 ft.
Var. *prorepens*, Koch.
Rather smaller in all its parts; bearing stolons up to 1 ft. long; panicles contracted.
Nilgiri Hills; 7,000 ft.
2. *AGROSTIS PENINSULARIS*, Hook. f.; F. B. I. vii. 255.
Nilgiri and Pulney Hills; 6,000—7,000 ft.

3. *AGROSTIS PILOSULA*, Trin. *Calamagrostis pilosula*, Hook. f.; F. B. I. vii. 263.
 Nilgiri and Pulney Hills; 3,000—8,000 ft.
4. *AGROSTIS SCHMIDII*, C. E. C. Fischer n. comb. *Calamagrostis Schmidii*, Hook. f.; F. B. I. vii. 264.
 Nilgiri Hills (Schmid).

80. *Garnotia*, Brogn.

Erect, perennial, rarely annual herbs. *Leaves* flat or convolute. *Panicles* terminal, branches slender. *Spikelets* solitary or twin, articulated on the pedicels, very small, narrowly lanceolate, terete, 1-flowered; rhachilla not produced beyond the lemma. *Glumes* 2, subequal, lanceolate, acute, acuminate, cuspidate or awned. *Lemma* narrowly lanceolate, entire or notched, awned, sometimes 3-awned, rarely mucicous; awns straight or with a twisted base, sometimes geniculate or recurved, palea narrower, often auricled at the base; containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* linear or oblong, free within the lemma and palea; embryo about $\frac{3}{4}$ as long.

Culms tufted, nodes glabrous; leaves mostly basal, not articulated on the sheaths, margins of sheaths often woolly:—

Leaves complicate, glabrous, basal sheaths flattened, equitant; panicles contracted, usually very narrow, lemmas geniculately awned:—

Leaves flexuous, not stiff, 9—18 in. long, .1 in. wide, margins smooth. Culms slender, 6—20 in. high; panicles 2.5—10 in. long; glumes .19—22 in. long, with cusps .03—05 in. long; lemma .16 in. long, awn .4 in. long

1. *Schmidii*.

Leaves straight, rigid, often trigonous in section, 15—26 in. long, .1—15 in. wide, margins scabrid. Culms stout up to 3 ft. high; panicles 8—36 in. long; glumes .16—22 in. long, lower cuspidate, upper mucicous; lemma .1—15 in. long, awn .22—28 in. long.....2. *scoparia*.

Leaves flat, pubescent below, narrowed into a long, silky quasi petiole, up to 34 in. long, .3—6 in. wide, sheaths not flattened or equitant, bristly. Culms stout, up to 3 ft. high; panicles up to 20 in. long, effuse; glumes mucicous or very shortly cuspidate, .16—2 in. long; lemmas .13—16 in. long, awnless...3. *lectorum*.

Culms not tufted, nodes usually more or less hairy; leaves scattered, flat, articulate on the sheaths:—

Panicles contracted; branches suberect:—

Leaves narrowed to the base, 1—8 in. long, .1—4 in. wide, glabrous or pubescent. Culms often geniculate and rooting below, up to 3 ft. high; panicles 2.5—9 in. high; glumes .08—15 in. long, lower usually mucicous, upper usually cuspidate; lemma .07—13 in. long, awn .26—35 in. long

4. *stricta*.

Leaves broad at the base, rounded or subcordate, 3—10 in. long, .36—1 in. wide, often short-hairy below. Culms up to 3 ft. high; panicles 5—12 in. long; glumes .1—12 in. long, both aristulate; lemma .09—12 in. long, awn .2—46 in. long.....5. *arundinacea*.

Panicles lax, 2.5—5.5 in. long; branches in distant fascicles, at length spreading. Culms slender, 3—20 in. high; leaves 1.5—3.5 in. long, .1—3 in. wide, narrowed to the base, pubescent; glumes .1—14 in. long, mucicous, sometimes apiculate; lemma .09—11 in. long, awn .14—43 in. long.....6. *courtallensis*.

1. *GARNOTIA SCHMIDII*, Hook. f.; F. B. I. vii. 242.

Nilgiri Hills (Schmid, Lawson); 4,500 ft.

2. *GARNOTIA SCOPARIA*, Stapf ex Hook. f.; F. B. I. vii. 242. *G. tenuiglumis*, Stapf ex Hook. f.; F. B. I. vii. 242.

In most localities except the wettest; up to 7,000 ft.

3. *GARNOTIA TECTORUM*, Hook. f. ; F. B. I. vii. 242.
Anamallai Hills (Beddome); Travancore State at Devicolam (Meebold); 6,000 ft.
4. *GARNOTIA STRICTA*, Brogn. ; F. B. I. vii. 243.
Mysore State, W. Coast and Gháts ; sea-level to 4,000 ft. Sometimes epiphytic.
5. *GARNOTIA ARUNDINACEA*, Hook. f. ; F. B. I. vii. 243.
W. Gháts ; up to 6,000 ft. Vern. Kan. Dobrai hullu.
6. *GARNOTIA COURTALENSIS*, Thw. ; F. B. I. vii. 244.
Nilgiri, Pulney and Travancore Hills ; 6,000—7,000 ft.

81. *Trachys*, Pers.

Annual, diffuse or erect herbs. *Leaves* flat. *Inflorescence* of a solitary spiciform raceme or more usually 2—3 radiating from the apex of a long peduncle ; rhachis rigid, flat, broad, jointed, bearing on the underside of each joint shortly peduncled clusters of 1—6 sessile spikelets mixed with small, scale-like, rigid, flowerless glumes. *Spikelets* subglobose. *Glumes* dissimilar ; the lower small, coriaceous ; the upper elongate, membranous, 3—5-nerved. *Lemmas* dissimilar ; the lower broadly ovate to ovate-oblong, rigidly coriaceous, 9- or more-nerved, its palea minute, empty ; the upper smaller, chartaceous, ovate-lanceolate to linear-oblong, its palea as long, containing a bisexual floret. *Lodicules* 2, very minute or 0. *Stamens* 3. *Styles* 2, free. *Grain* oblong, compressed, free within the lemma and palea.

TRACHYS MURICATA, Steud. *T. mucronata*, Pers. ; F. B. I. vii. 96 ;

S. I. G. fig. 121. *Panicum squarrosum*, Retz. ; Roxb. Cor. Pl. t. 206.

In all but the wettest localities, often in sea-shore sand.

Culms diffuse and rooting below or erect and up to 2 ft. high ; leaves 1—6·5 in. long, 1—5 in. wide, more or less softly-villous ; racemes 5—2·5 in. long, rhachis 12—17 in. wide, its midrib stout ; lower glume 0·7—1·1 in. long, upper 1·3—1·4 in. long ; lower lemma 2·1—2·4 in. long, 9—13-nerved, upper 1·5—1·6 in. long.

82. *Tragus*, Haller

Annual or perennial, small, rigid, decumbent or erect herbs. *Leaves* short, flat. *Raceme* spiciform, solitary, terminal. *Spikelets* sessile in deciduous clusters usually of 2 facing each other, seldom 3 and very rarely 4 or 5, not or obscurely articulated on a short peduncle, 1-flowered. *Glumes* 2 or the lower suppressed ; the lower when present minute, hyaline ; the upper narrowly lanceolate, concave, acuminate, 5-ribbed, ribs armed with hooked spinules. *Lemma* solitary, thinly chartaceous, lanceolate, its palea as long, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* linear-oblong, free within the lemma and palea.

TRAGUS BIFLORUS, Schult. *T. racemosus*, Hook. f. non All. ; F. B. I. vii. 97 ; S. I. G. figs. 122, 123.

In all but the wettest tracts ; often in sandy localities ; sea-level to 3,000 ft.

Culms 2—8 in. high; leaves rigid, glaucous, glabrous, margins stiffly ciliate, .4—2 in. long, .1—.15 in. wide; racemes .7—2.8 in. long; upper glume .16—.18 in. long, sometimes purple, white and semi-transparent between the ribs, lemma .1—.11 in. long, puberulous.

83. *Lopholepis*, Dcne.

Tufted, erect herbs. *Leaves* small, flat. *Racemes* spiciform, simple, terminal. *Spikelets* minute, 1-flowered, shaped somewhat like the head of a bird, jointed but persistent on the short pedicels. *Glumes* coriaceous; the lower incumbent on the upper, consisting of a globose base and a cymbiform limb, keel with a narrow cartilaginous wing, pectinately ciliate with spinules hooked at the tip; the upper lanceolate, acute, similarly keeled. *Lemma* hyaline, minute, broadly oblong, its palea broad, hyaline, containing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Styles* 2, free. *Grain* subulate, concave in front, base gibbously incurved, free within the rigid glumes.

LOPHOLEPIS ORNITHOCEPHALA, Steud.; F. B. I. vii. 98.

Nilgiri (F. Foulkes) and Madura Hills; Madura and Tinnevely Districts and Travancore near the coast.

Glabrous except the inflorescence; culms slender, 3—14 in. high; leaves imbricate at the base, distant upwards, .4—1.8 in. long, .05—.25 in. wide, margins scabrid; racemes 2—6 in. long; pedicels puberulous and with a fringe of stiff hairs on opposite sides; spikelets .07—.09 in. long; glumes muricate, reddish-brown at maturity, lower as long as the spikelets, upper shorter; lemma .03—.04 in. long, curved.

84. *Perotis*, Aiton

Tufted, wiry herbs, usually geniculate at the base. *Leaves* flat. *Racemes* spiciform, simple, terminal. *Spikelets* minute, subulate, 1-flowered, articulated on short or rudimentary pedicels, falling entire. *Glumes* subequal, narrow, tapering into a long, capillary awn. *Lemma* hyaline, much shorter than the glumes, its palea narrower, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, shortly connate. *Grain* linear, terete, nearly as long as the glumes and free within them; embryo $\frac{1}{3}$ as long.

PEROTIS INDICA, O. Ktz. *P. latifolia*, Ait.; F. B. I. vii. 98; S. I. G. figs. 124, 125.

Common in all Districts; on sea-shore sands and elsewhere up to 5,000 ft.; usually in dry soils. Vern. *Tel.* Nakka peecheu, Nakka toka; *Tam.* Narival, Kudrai-val pillu, Thopparai pillu; *Kan.* Nari misai hullu, Jabburu korlai hullu.

Culms 2—18 in. high; leaves closely imbricate below, rigid, pungently acute, .3—2.2 in. long, .15—.4 in. wide, margins spinulose-ciliate; racemes slender, 1.2—7.5 in. long, feathery owing to the long awns; spikelets .06—.08 in. long; glumes hispid; awns .3—.65 in. long, usually purplish.

85. *Zoysia*, Willd.

Small, rigid herbs. *Leaves* very narrow, convolute, rigid. *Racemes* spiciform, solitary, simple, terminal; rhachis inarticulate, notched. *Spikelets* ovoid, laterally compressed, 1-flowered, articulated on very short, rather stout pedicels appressed to the rhachis. *Glume* single, coriaceous. *Lemma* smaller than and completely enclosed in the glume, hyaline; palea linear-oblong, containing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Styles* 2, very long, connate below. *Grain* oblong, free within the lemma and glume.

ZOYSIA MATRELLA, Merr. *Z. pungens*, Willd.; F. B. I. vii. 99.

In sea-shore sand on both coasts.

Rootstock wiry, creeping, up to 3 ft. long; culms 1—10 in. high; leaves many, 5—2 in. long; racemes 3—1.4 in. long; glumes 1—1.4 in. long.

86. *Sporobolus*, R. Brown

Perennial, rarely annual, erect, prostrate or creeping herbs. *Leaves* narrow, flat or convolute. *Panicles* effuse or spiciform, often pyramidal. *Spikelets* small or minute, all alike, 1-, rarely 2-flowered, jointed on the pedicels or rarely on the rhachis; rhachilla very short, jointed at the base, not produced beyond the upper or the only lemma. *Glumes* membranous, mucous, nerveless or 1—3-nerved, unequal, the lower smaller, sometimes minute, persistent or falling singly. *Lemmas* mucous, ovate or oblong; paleas as long, sometimes emarginate, closely 2-nerved and often splitting between the nerves as the grain matures, enclosing a bisexual floret. *Lodicules* 2, very minute or 0. *Stamens* 2—3. *Styles* 2, free. *Grain* oblong, obovoid or pyriform, free within the lemma and palea; pericarp thin, hyaline, loose; embryo large.

Lower glume distinctly shorter than the lemma:—

Upper glume distinctly shorter than the lemma; leaves glabrous, flat, complicate or convolute mixed:—

Panicles effuse:—

Lemma .06 in. or more long:—

Lemma .06 in. long. Culms up to 30 in. high; leaves 4—12 in. long, .05—1.5 in. wide; panicles 4—18 in. long; lower glumes .01—0.2 in. long, upper .02—0.4 in. long.....1. *diander*.

Lemma .07—0.8 in. long. Culms up to 3 ft. high; leaves 3—24 in. long, .15—2.3 in. wide; panicles 6—18 in. long; lower glumes .02—0.3 in. long, upper .04—0.6 in. long.....2. *Wallichii*.

Lemma .04 in. or less long. Culms up to 15 in. high; leaves 5—11 in. long, .1—2 in. wide; panicles 12—20 in. long; lower glumes .01 in. or less long, upper .02 in. long.....3. *minutiflorus*.

Panicles spiciform or narrow, rarely slightly expanded:—

Leaves flaccid, usually flat, not pungent, up to 16 in. long, .1—2.2 in. wide.

Not stoloniferous; culms up to 3 ft. high; rather robust; panicles 4—14 in. long, sometimes slightly expanded; lower glumes .02—0.3 in. long, upper .04—0.5 in. long; lemma .06—0.8 in. long.....4. *indicus*.

Leaves rigid, usually convolute, pungent. Stoloniferous:—

Panicles subsPICIFORM, sometimes interrupted and flexuous, .3—4.5 in. long. Culms 7—17 in. high; leaves .33—2.5 in. long, .07—1.4 in. wide; spikelets shortly pedicelled; lower glume .04—0.5 in. long, lanceolate, acute, upper .06—0.8 in. long; lemma .06—1 in. long.....5. *tremulus*.

Panicles strictly spiciform, .7—2.5 in. long. Culms 3—9 in. high; leaves .7—2.7 in. long; spikelets sessile, crowded; lower glumes .02—0.3 in. long, quadrate, truncate, upper .05—0.6 in. long; lemma .07 in. long...6. *spicatus*.

Upper glume as long as or longer than the lemma:—

Stoloniferous; leaves glabrous, margins minutely serrulate, convolute, rigid, pungent, .7—6 in. long. Culms 2.5—14 in. high; panicles spiciform or narrowly pyramidal, 1—4 in. long; lower glumes .03—0.4 in. long, upper .06—1 in. long; lemma .06—0.8 in. long.....7. *orientalis*.

Not stoloniferous; leaves pilose or bristly, rarely nearly glabrous.

Panicles contracted, subspiciform, 1—3 in. long. Culms tufted, 1—12 in. high; leaves flat or convolute, sparsely softly pilose, margins serrulate, sometimes ciliate from minute tubercles, .6—5.5 in. long, .05—1 in. wide; lower glumes .04—0.6 in. long, upper .06—0.8 in. long; lemma .07 in. long
8. *piliferus*.

Panicles effuse; leaves flat, base rounded or subcordate, margins cartilaginous, serrulate and ciliate from tubercles:—

Panicles 1.5—5.2 in. long; rhachis and branches smooth. Culms tufted, spreading, 2—20 in. high; leaves glabrous or sparsely hairy from minute tubercles, .4—6.5 in. long, .15—2.2 in. wide; glumes glabrous, lower .01—0.2 in. long, upper .05—0.7 in. long; lemma .05—0.6 in. long
9. *coromandelianus*.

Panicles 3—8 in. long, rhachis and branches scaberulous. Culms tufted, 4—20 in. high; leaves bristly from tubercles, 1.5—5 in. long, .18—4.5 in. wide; glumes more or less keeled, scaberulous on the back and keel, lower .04—0.5 in. long, upper .06—0.9 in. long; lemma .05—0.6 in. long.....10. *scabrifolius*.

Lower glume as long as or longer than the lemma. Culms decumbent below, erect portion 7—10 in. high; leaves convolute, rarely flat, rigid, pungent, margins smooth, .7—4 in. long, .1 in. wide; panicles narrow, 1—3 in. long; glumes and lemma subequal .08—1 in. long.....11. *virginicus*.

1. *SPOROBOLUS DIANDER*, Beauv.; F. B. I. vii. 247; S. I. G. fig. 178.
In all Districts except the W. Coast; up to 3,500 ft.
Readily eaten by cattle. Vern. Kan. Navalu dondi hullu, Thoddu karai kandaka hullu.
2. *SPOROBOLUS WALLICHII*, Munro ex Hook. f.; F. B. I. vii. 248.
In the central and eastern Districts from Cuddapah southwards; up to 3,000 ft.
3. *SPOROBOLUS MINUTIFLORUS*, Link; F. B. I. vii. 248.
S. Kanara and Chittoor Districts.
4. *SPOROBOLUS INDICUS*, R. Br.; F. B. I. vii. 247.
Kistna, Nilgiri, N. Coimbatore, Madura and Tinnevelly Districts; sea-level to 7,000 ft.
A good pasture grass. Hardly distinguishable from some forms of *S. diander*, Beauv.; both may have 2 or 3 stamens.
5. *SPOROBOLUS TREMULUS*, Kunth.; F. B. I. vii. 250; S. I. G. figs. 179, 180.
In all Districts except the W. Coast and Gháts; up to 2,500 ft.
Vern. Tam. Uppurutnam pillu.
6. *SPOROBOLUS SPICATUS*, Kunth; F. B. I. vii. 250.
Deccan, Coimbatore and Tinnevelly Districts; up to 1,000 ft.
7. *SPOROBOLUS ORIENTALIS*, Kunth; F. B. I. vii. 251.
Godavari, Kistna, Guntur, Chingleput and Tinnevelly Districts; usually in saline soils.
8. *SPOROBOLUS PILIFERUS*, Kunth; F. B. I. vii. 251.
W. Coast and Gháts; up to 7,000 ft.
9. *SPOROBOLUS COROMANDELIANUS*, Kunth; F. B. I. vii. 252; S. I. G. figs. 181, 182. *S. commutatus*, Kunth; S. I. G. figs. 183, 184.

In all central and eastern Districts ; sea-level to 3,000 ft.

A poor fodder. Vern. *Kan.* Nari balada hennu hullu.

10. *SPOROBOLUS SCABRIFOLIUS*, Bhide ; S. I. G. figs. 185, 186.

Coimbatore and Tinnevely (Wight) Districts ; usually in black cotton soil.

11. *SPOROBOLUS VIRGINICUS*, Kunth ; F. B. I. vii. 249.

Coastal sands ; not very common.

87. *Myriostachya*, Hook. f.

Tall, stout, perennial marsh herbs ; rootstock thick, spongy. *Leaves* narrow, long, flat, equitant. *Panicles* narrow, elongate ; branches racemed, filiform ; pedicels jointed on the branchlets. *Spikelets* very many, strongly laterally compressed, distichously racemed, 4—20-flowered, not jointed on the pedicels ; rhachilla very stout, ultimately fragile at the base and between the slightly distant lemmas, not prolonged beyond the uppermost lemma. *Glumes* 2, coriaceous, persistent, subequal, lanceolate, tapering into a rigid awn, 1-nerved. *Lemmas* coriaceous, ovate-lanceolate, narrowed into a very short, stout, scabrid awn, 3-nerved, keel smooth ; paleas as long, chartaceous, acuminate, 2-toothed, 2-keeled, keels ciliate, containing each a bisexual floret. *Lodicules* 2, very minute. *Stamens* 3 ; anthers very small. *Styles* 2, free. *Grain* obliquely ovoid, subterete ; embryo large.

MYRIOSTACHYA WIGHTIANA, Hook. f. ; F. B. I. vii. 327.

Godavari District at Coringa.

Culms densely tufted, up to 10 ft. high ; rootstock sheathed, sometimes floating ; leaves several feet long, up to 65 in. wide ; panicles 1—2 ft. long ; spikelets 4—8-flowered ; glumes 17—21 in. long.

88. *Desmostachya*, Stapf

Perennial herbs, branched at the base ; branches covered with leathery sheaths at or just above the base. *Leaves* coarse, tufted. *Panicles* terminal, long, spiciform, often interrupted below ; axis stiff ; branches more or less spreading. *Spikelets* linear, strongly laterally compressed, often very many-flowered, sessile or subsessile, closely packed and more or less 2-ranked on the lower side of and often at right angles to the rhachis, straw-coloured or tinged with brown or purple, falling entire. *Glumes* 1-nerved, 1-keeled. *Lemmas* rigidly membranous, ovate, acute or subacute, mucous, 3-nerved, acutely 1-keeled ; paleas slightly shorter, 2-keeled, each containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* obliquely ovoid, obtusely trigonous, loosely enclosed in the lemma and palea ; embryo about $\frac{1}{3}$ as long.

DESMOSTACHYA BIPINNATA, Stapf. *Eragrostis cynosuroides*, Beauv. ; F. B. I. vii. 324 ; S. I. G. fig. 226.

Vizagapatam, Kistna, Nellore, Chingleput and Bellary Districts ; usually in sandy soil, often in wet places ; at low elevations.

Culms stout or slender, 7—36 in. high ; stolons stout, covered with shining sheaths ; leaves rigid, tips setaceous, 2—18 in. long, .05—3 in. wide ; panicles 2.5—13 in. long ; glumes .04—06 in. long ; lemmas .06—08 in. long.

89. *Leptochloa*, Beauv.

Annual, usually slender herbs. *Leaves* flat or involute. *Panicles* lax; branches slender, spiciform. *Spikelets* small, sessile or shortly pedicelled 1—many-flowered, alternate and unilaterally 2-seriate, not jointed at the base; rhachilla jointed at the base, produced and jointed between the lemmas. *Glumes* membranous, oblong or lanceolate, 1-keeled, 1-nerved, the upper the longer. *Lemmas* ovate, obtuse or subacute, sometimes cuspidate, 1-keeled, 3-nerved, the lateral nerves close to the margins, often pubescent; paleas shorter, 2-keeled, each containing a bisexual floret or the terminal imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* subglobose, oblong-obovoid, compressed or trigonous, closely embraced by the lemma and palea, free or cohering to the latter.

Leaves lanceolate, flat, .9—3.5 in. long, .2—6 in. wide. *Culms* up to 42 in. high; *panicles* up to 13 in. long; *racemes* usually distant, 1—5 in. long; *spikelets* 1-flowered; *glumes* linear-lanceolate, acuminate or caudate, .09—1 in. long; *grain* fusiform, obtusely trigonous, rarely slightly compressed, grooved on one side, .05 in. long.....1. *uniflora*.

Leaves narrowly linear, flat or involute:—

Spikelets 1-flowered. *Culms* 12—30 in. high; *leaves* 3—7 in. long, .1—12 in. wide; *panicles* 6—13 in. long; *racemes* close, .6—2.3 in. long; *glumes* lanceolate, obtuse or apiculate, .05—06 in. long; *grain* ovoid, .03—04 in. long

2. *polystachya*.

Spikelets 2—7-flowered:—

Glumes lanceolate, acute, acuminate or caudate, .04—06 in. long; *lemmas* pubescent or hairy:—

Culms slender, 3—12 in. high; *leaves* flat, 1.5—5.4 in. long, .1—16 in. wide; *panicles* 2—5 in. long; *racemes* very slender, 1—2.5 in. long; *florets* usually 2, sometimes 3; *grain* subglobose, one side gibbous, the other convex, .025 in. long.....3. *filiformis*.

Culms comparatively stout, 1—4 ft. high; *leaves* flat or involute, 2.5—11 in. long, .1—25 in. wide; *panicles* 6—14 in. long; *racemes* 2—4.2 in. long; *florets* usually 3—6, sometimes 2 or 7; *grain* ellipsoid to oblong, biconvex or compressed.....4. *chinensis*.

Glumes ovate, rounded or retuse, .06—08 in. long. *Culms* up to 8 ft. high; *leaves* flat, 7—17 in. long, .1—2 in. wide; *panicles* 4—6 in. long; *racemes* 2—3.5 in. long; *lemmas* glabrous with the keel ciliolate; *grain* oblong or obovate-oblong, rounded, concavo-convex, .05 in. long.....5. *obtusiflora*.

1. *LEPTOCHLOA UNIFLORA*, Hochst.; F. B. I. vii. 297.

Chingleput, S. Coimbatore, S. Malabar, Madura and Tinnevelly Districts; Travancore; sea-level to 4,000 ft.

2. *LEPTOCHLOA POLYSTACHYA*, Benth.; F. B. I. vii. 298.

In the eastern Districts from Godavari to Tinnevelly; sometimes in marshes; up to 1,000 ft.

3. *LEPTOCHLOA FILIFORMIS*, Roem. et Sch.; F. B. I. vii. 298.

Vizagapatam, Godavari, Chingleput and Tanjore Districts.

4. *LEPTOCHLOA CHINENSIS*, Nees; F. B. I. vii. 299; S. I. G. fig. 212.

In most Districts; often in wet places; sea-level to 3,000 ft. A moderate fodder. Vern. *Tel.* Cheepura gaddi; *Kan.* Kadu sanna kari sajjai hullu.

Some forms of this species are hardly distinguishable from the previous one.

5. *LEPTOCHLOA OBTUSIFLORA*, Hochst.; F. B. I. vii. 299.

Nilgiri and Coimbatore Districts; Cochin State; 1,000—2,000 ft.

90. *Eragrostis*, Beauv.

Annual or perennial, usually erect and slender herbs. *Leaves* narrow, flat, complicate or convolute. *Inflorescence* of terminal open or contracted panicles, rarely of simple spikes. *Spikelets* small, many-, rarely 1—2-flowered, usually strongly laterally compressed, not articulated at the base; rhachilla continuous or articulate between the lemmas, not prolonged beyond the uppermost. *Glumes* 2, usually separately deciduous, broad, obtuse, acute or mucronate, never awned, back rounded, 1-keeled, 1-nerved or the upper sometimes 3-nerved. *Lemmas* imbricate, longer than the glumes which they resemble, sometimes acuminate or emarginate, 3-nerved, ultimately deciduous; paleas deciduous with their lemmas or persistent, broad, 2-keeled, keels smooth, scabrid or ciliate, each containing a bisexual floret or the uppermost and rarely the lowermost imperfect. *Lodicules* 2, very minute or 0. *Stamens* 1—3. *Styles* 2, free. *Grain* minute, globose, oblong-ovoid or obovoid, free within the lemma and palea.

Spikelets paniced:—

Rhachilla more or less jointed, breaking up from the apex downwards:—

Lemmas ciliate:— (1—21)

Lemmas acuminate, mucronate or cuspidate:—

Panicles clavate, dense, sometimes shortly interrupted at the base, rather shining, .8—4 in. long; glumes .06—1 in. long, obtuse; lemmas .1—11 in. long; keels of paleas narrowly winged, long-ciliate. Culms 4—30 in. high; leaves 1.2—5.5 in. long, .1—2.5 in. wide, usually flat.....1. *spicata*.

Panicles cylindric, compact, .8—3 in. long; glumes .04—0.6 in. long, acute; lemmas .08 in. long; keels of paleas not winged, long-ciliate. Culms 8—36 in. high; leaves 2.5—9 in. long, .1—3 in. wide.....2. *ciliata*.

Lemmas obtuse, .04—0.8 in. long; keels of paleas short to long-ciliate. Culms wiry, 4—30 in. high; leaves 1—5 in. long, .15 in. wide; panicles subspiciform, often lobed, dense or somewhat lax, 1.3—5 in. long

3. *coarctata*.

Lemmas not ciliate:—

Panicles spiciform:—

Annuals; culms slender, 5—10 in. high; leaves flat or convolute, usually ascending, 2—3.5 in. long, .1—1.5 in. wide; panicles 1.5—2.5 in. long; lemmas .06—0.8 in. long, their lateral nerves very close to the margins; paleas .05—0.6 in. long, ciliae of keels soft, distinctly longer than the width of the expanded palea.....4. *ciliaris*.

Perennials; culms wiry, 5—20 in. high, leaves often at right angles to the culm; panicles .5—2.2 in. long; lemmas .04—0.65 in. long, their lateral nerves near the middle of the sides; paleas .04—0.5 in. long, ciliae of keels stiff, shorter than the width of the expanded palea.....5. *riparia*.

Panicles more or less effuse:—

Panicles thyriform, 10—24 in. long; branches numerous, capillary, scaberulous, pedicels longer than the spikelets. Culms 8—26 in. high; leaves 8—18 in. long, .2—4 in. wide; glumes .04—0.5 in. long, obtuse; lemmas .06 in. long, obtuse or emarginate; grain subglobose, .02 in. long.....6. *aspera*.

Panicles oblong or linear, not thyriform:—

Grain ovoid, .015—0.2 in. long; stamens 3:—

Culms 2—18 in. high, more or less viscid below the panicle; leaves .7—4.5 in. long, .1—2 in. wide, usually convolute; panicles cylindric or oblong, 1—7 in. long; lower part of rhachis more or less viscid, branches and pedicels with minute glands, scented when fresh; glumes .03—0.5 in. long, obtuse; lemmas .04—0.5 in. long.....7. *viscosa*.

Culms 4—18 in. high, no part of plant viscid or glandular; leaves 3—7.5 in. long, .1—2.5 in. wide; panicles variable, linear, contracted

to oblong and effuse, 1.5—9 in. long; glumes .03—0.05 in. long, obtuse or subacute; lemmas .04—0.06 in. long, obtuse or acute

8. *plumosa*.

Grain obovoid, .01 in. long; stamens 2; panicles narrow, more or less interrupted:—

Branches of panicles more or less whorled; spikelets 2—7, sometimes up to 9-flowered. Culm 6—17 in. high; leaves flat or complicate, 4—10 in. long, .12—2 in. wide; panicles 6—13 in. long; glumes .016—0.04 in. long; lemmas .035—0.05 in. long.....9. *japonica*.

Branches of panicles mostly solitary; spikelets 8—14, seldom 6 or 7-flowered. Culms 12—24 in. high; leaves as in the previous species, up to 16 in. long, .25 in. wide; panicles up to 24 in. long; glumes and lemmas as in the previous species.....10. *diarrhena*.

Rhachilla tough, persistent, lemmas falling off from the base upwards:—

Spikelets ovate or ovate-oblong, much compressed, .16—8 in. long, .12—18 in. wide, up to 80-flowered, pale or purple. Culms 5—25 in. high; leaves 1—7 in. long, .1—2 in. wide; panicles oblong or ovoid, .8—10 in. long; branches usually spreading; glumes .06—1 in. long, acute; lemmas usually slightly shorter, broad, mucronate, their lateral nerves prominent; paleas not or very narrowly winged, falling with the lemmas; grain ellipsoid, or obovoid, .025—0.035 in. long.....11. *unioloides*.

Spikelets linear or linear-oblong, slightly compressed, lateral nerves of lemmas weak, or if spikelets flattened and lateral nerves prominent, then the paleas persistent:—

Spikelets more or less fascicled, close, pointing forwards:—

Leaves glaucous, 1.3—12 in. long, .13 in. wide. Culms 5—56 in. high, often stout; panicles narrow, 2—12 in. long; lemmas .06—1 in. long; grain oblong or oblong-fusiform, .03—0.04 in. long.....12. *gangetica*.

Leaves not glaucous, 2—5 in. long, .05—12 in. wide. Culms 3—36 in. high; panicles contracted or oval and more or less effuse, 3—10 in. long; lemmas .05 in. long; grain globose or subglobose, .016—0.025 in. long.....13. *nutans*.

Spikelets scattered, spreading or pendulous:—

Upper glume 3-nerved, .08 in. long, lower shorter. Culms 10—40 in. high; leaves 7—14 in. long, .18—32 in. wide, flat, margins usually glandular; panicle oblong, usually open, 4—13 in. long, lateral pedicels .04—12 in. long; spikelets linear-oblong, flattish, .24—75 in. long, .08—12 in. wide; lemmas 19—50, lateral nerves strong.....14. *cilianensis*.

Both glumes 1-nerved:—

Spikelets .4—1.5 in. long, .08—0.09 in. wide; glumes .06—0.08 in. long, acute; lemmas 10—70, .07—0.08 in. long. Culms 6—32 in. high; leaves 3.5—7.5 in. long, .1 in. wide; panicles ovate, diffuse, 4—12 in. long

15. *tremula*.

Spikelets up to .8 in. long; lemmas 6—15:—

Panicles rather stiff; lateral pedicels usually less than .12 in. long:—

Glumes subequal or the upper only slightly the longer:

Leaves 1.5—7 in. long, .08—18 in. wide, margins often glandular, mouths of sheaths bearded. Culms 3—22 in. high, tufted; panicles oblong, open, 3—7 in. long; spikelets pale green to dark purplish or olive-grey, .13—3 in. long, .08 in. wide; glumes .04—0.07 in. long; lemmas .07—0.08 in. long; grain globose or ellipsoid-globose .025—0.035 in. long.....16. *poaeoides*.

Leaves 1—7 in. long, .1 in. wide, margins never glandular, mouths of sheaths naked. Culms 9—19 in. high; panicles oblong, 1.5—6 in. long; spikelets .2 in. long, .04—0.05 in. wide; glumes .04—0.05 in. long; lemmas .05 in. long; grain subglobose, .025 in. long

17. *Rottleri*.

Lower glume .02—0.025 in. long, upper .05 in. long. Culms very slender, 2—18 in. high; leaves rather rigid, .4—4.8 in. long, .04—1 in. wide, margins sometimes glandular; panicles oblong, open, 1.5—3.5 in. long; spikelets .3—6 in. long, .05 in. wide; lemmas .06—0.07 in. long; grain oblong, truncate at both ends, dorsally flattened and grooved, .02—0.03 in. long.....18. *Willdenoviana*.

Panicles lax, branches slender, flexuous or flaccid; lateral pedicels 12—36 in. long; lateral nerves of lemmas faint:—

Leaves 2—13.5 in. long, .1—12 in. wide, mouths of sheaths naked. Culms 4—36 in. high; panicles oblong to lanceolate, 2—6.5 in long, branches solitary or 2-nate; spikelets .3—8 in. long, .06—08 in. wide; glumes hyaline, lower .02—025 in. long, obtuse, upper slightly longer, truncate; lemmas obtuse, .07—08 in. long; grain oblong, dorsally grooved, .05—06 in. long.....19. *tenuifolia*.

Mouth of sheaths bearded; grain .03—04 in. long; branches of panicles often whorled:—

Spikelets .16—3 in. long, .04 in. wide. Culms 2—24 in. high; leaves 2—9 in. long, .1—12 in. wide; panicles oblong or pyramidal, open or contracted, 4—13 in. long; lower glume .025—03 in. long, upper .05—06 in. long; lemmas .08 in. long; grain ellipsoid, base laterally apiculate, .04 in. long.....20. *pilosa*.

Spikelets .16—24 in. long, .08 in. wide. Culms 7—30 in. high; leaves 3.5—17 in. long, .1—22 in. wide; panicles effuse, 8—16 in. long; glumes .08—1 in. long, upper slightly the longer; lemmas .1 in. long; grain subquadrate, .03 in. long.....21. *nigra*.

Spikelets secund on a simple spike with a slender rhachis alveolate and hispidulous on the side on which the spikelets are inserted; keels of paleas in all either winged or not:—

Leaves convolute or complicate, very slender, finely acuminate, puberulous above, 1—7.5 in. long. Culms 6—24 in. high; spikes 4—11 in. long; spikelets slightly to much compressed, linear to ovate-oblong, .25—8 in. long, .08—18 in. wide; glumes .07—14 in. long, lower usually acuminate; lemmas 13—53, orbicular or broader than long, convex, keeled, obtuse or apiculate, keels of paleas often distinctly winged; grain broadly ellipsoid or subglobose, often obtusely trigonous, .025 in. long.....22. *bifaria*.

Leaves glabrous above; spikes 3—8.5 in. long; keels of paleas not or very narrowly winged:—

Leaves flat or complicate, rather rigid, apex rounded, .6—4 in. long, .08—12 in. wide. Culms 4—18 in. high; spikelets nearly terete, .24—75 in. long, .06—1 in. wide; glumes .05—06 in. long, obtuse or subacute; lemmas 9—42, very broadly ovate, obtuse, .08 in. long; grain subglobose-ovoid, .026 in. long.....23. *brachyphylla*.

Leaves convolute or complicate, 7—12.5 in. long, .08—1 in. wide. Culms 10—15 in. high; spikelets ovate-lanceolate, much compressed, .28—3 in. long, .1—12 in. wide; glumes .06—1 in. long, acute or acuminate; lemmas 12—30, .1—11 in. long, obtuse or subacute; grain ellipsoid-oblong, .04 in. long.....24. *Walckeri*.

1. ERAGROSTIS SPICATA, Jedwahn. *E. phleoides*, Stapf; F. B. I. vii. 313.
Ganjam, Godavari and Salem Districts; Bangalore; up to 3,500 ft. Vern. Kan. Kadu nawanai hullu.
2. ERAGROSTIS CILIATA, Nees; F. B. I. vii. 313.
Ganjam, Vizagapatam, Rampa and Godavari Districts.
3. ERAGROSTIS COARCTATA, Stapf; F. B. I. vii. 313.
East Coast Districts; Mysore State; up to 2,000 ft.
4. ERAGROSTIS CILIARIS, Link; F. B. I. vii. 314.
Chittoor and S. Arcot Districts.
5. ERAGROSTIS RIPARIA, Nees. *E. tenella*, Roem., et Sch. var. *riparia*, Stapf; F. B. I. vii. 315.
In most Districts; sea-level to 3,000 ft.
A good fodder. Vern. Kan. Kadu kambu hullu.
6. ERAGROSTIS ASPERA, Nees; F. B. I. vii. 314.
Kurnool, Salem, Coimbatore, Nilgiri, S. Arcot, Trichinopoli and Madura Districts; sea-level to 2,000 ft.

7. *ERAGROSTIS VISCOSA*, Trin. *E. tenella*, Roem. et Sch. var. *viscosa*, Stapf; F. B. I. vii. 315.
In all Districts; sea-level to 2,500 ft.
Usually very sticky and scented. Said to be disliked by cattle.
Vern. *Tel.* Bankasigarantha.
8. *ERAGROSTIS PLUMOSA*, Link. *E. tenella*, Roem. et Sch. var. *plumosa*, Stapf; F. B. I. vii. 315.
In all Districts; sea-level to 4,000 ft.
A good fodder liked by horses and cattle. Makes good light hay.
Vern. *Tel.* Chinna garikai gaddi; *Kan.* Sanna purlai hullu.
9. *ERAGROSTIS JAPONICA*, Trin. *E. interrupta*, Beauv. var. *tenuissima*, Stapf; F. B. I. vii. 316.
Godavari, Nilgiri and Tinnevely Districts; Mysore and Travancore States, up to 3,000 ft.
10. *ERAGROSTIS DIARRHENA*, Steud. *E. interrupta*, Beauv. var. *diarrhena*, Stapf; F. B. I. vii. 316.
In the Northern and Eastern Districts; Travancore; up to 1,000 ft.
Var. *Koenigii*, C. E. C. Fischer n. comb. *E. interrupta*, Beauv. var. *Koenigii*, Stapf; F. B. I. vii. 316; S. I. G. fig. 217.
Panicles with short dense branchlets.
In most Districts; sea-level to 3,000 ft.
Readily eaten by cattle. The culms are used for making brooms.
Vern. *Tam.* Kanjara pullu; *Kan.* Kadu gasagasai hullu, Pini hullu.
11. *ERAGROSTIS UNIOLOIDES*, Nees. *E. amabilis*, W. et A.; F. B. I. vii. 317; S. I. G. fig. 218.
In all Districts; often in wet places; up to 7,000 ft.
The glumes are often purple or pink. Vern. *Tel.* Udara gaddi.
12. *ERAGROSTIS GANGETICA*, Steud. *E. elegantula*, Steud.; F. B. I. vii. 318.
In all Districts except on the W. Coast; up to 7,500 ft.
Readily eaten by cattle.
13. *ERAGROSTIS NUTANS*, Nees. *E. stenophylla*, Hochst.; F. B. I. vii. 318.
In all Districts; up to 2,000 ft.
Readily eaten by cattle in the absence of a better grass. Vern. *Ur.* Looha bena; *Tel.* Nakurmaral, Urenkai, Pedda garikai.
14. *ERAGROSTIS CILIANENSIS*, Link. *E. major*, Host.; F. B. I. vi. 320; S. I. G. figs. 221, 222.
In all Districts except on the W. Coast; up to 4,000 ft.
Said to be liked by cattle. Vern. *Kan.* Bettada akabu hullu.
15. *ERAGROSTIS TREMULA*, Hochst.; F. B. I. vii. 320; S. I. G. figs. 219, 220.
Godavari, Kistna, Anantapur, S. Kanara and Tinnevely Districts.
Said to be a good fodder, but the foliage is too scanty to yield much substance. The slender pedicels allow the spikelets to stir with the slightest movement of the air and in that respect it resembles the European Quaker-grass. The seeds are sometimes eaten by the poor.
16. *ERAGROSTIS POAEOIDES*, Beauv. *E. minor*, Host.; F. B. I. vii. 321.
In the Northern, Central and Eastern Districts; up to 7,000 ft.:
Vern. *Tel.* Goob-bai gaddi; *Kan.* Dodda purlai hullu.

17. *ERAGROSTIS ROTTLEI*, Stapf; F. B. I. vii. 321.
Tranquebar (Rotler).
18. *ERAGROSTIS WILLDENOVIANA*, Nees; F. B. I. vii. 322; S. I. G. figs. 223, 224.
In the Central and Eastern Districts from Kistna southwards.
Vern. *Kan.* Kari jontu hullu.
19. *ERAGROSTIS TENUIFOLIA*, Hochst.; F. B. I. vii. 322.
Mysore State; Bellary, N. Coimbatore, Salem, Madura and Tinnevelly Districts; Nilgiri, Pulney and High Wavy Mountains; up to 7,000 ft. Vern. *Kan.* Thodda karakai hullu.
20. *ERAGROSTIS PILOSA*, Beauv.; F. B. I. vii. 323; S. I. G. fig. 225.
In all Districts except on the W. Coast; up to 7,000 ft.
In some localities said to be much liked by cattle, elsewhere reported to be rejected. Vern. *Kan.* Kadu sanna samai hullu.
21. *ERAGROSTIS NIGRA*, Nees; F. B. I. vii. 324.
N. Coimbatore, Nilgiri, Pulney and Tinnevelly Hills; 2,000—7,000 ft.
22. *ERAGROSTIS BIFARIA*, Wight ex Steud.; F. B. I. vii. 325; S. I. G. fig. 227. *E. coromandeliana*, Trin.; F. B. I. vii. 326.
In all Districts; up to 4,000 ft.
Reported to yield good fodder. Vern. *Tel.* Gubbikal gaddi, Nooli gaddi, Wooda tallum; *Kan.* Kodi mara hullu, Nosai hullu.
23. *ERAGROSTIS BRACHYPHYLLA*, Stapf; F. B. I. vii. 327.
In the Central and Eastern Districts, from Vizagapatam to Coimbatore.
24. *ERAGROSTIS WALKERI*, Stapf.
Kurnool District on Cumbum Hill (Bourne).

91. *Halopyrum*, Stapf

Tall, stout, perennial herbs; rootstock creeping, branched, sheathed; roots vermiform. *Leaves* convolute, narrow, rigid. *Panicle* ovoid, elongate; branches alternate, spiciform, short; pedicels not jointed on the branchlets. *Spikelets* large, many-flowered, strongly laterally compressed, sessile or shortly pedicelled, not jointed on the pedicels; rhachilla very short between the lemmas, jointed at the base and between the lemmas, not produced beyond the uppermost one, silky hairy. *Glumes* coriaceous, subequal, ovate-lanceolate, acuminate or apiculate, lower 1—3-nerved, upper 5-nerved. *Lemmas* coriaceous, distichously imbricate, ovate-oblong, cymbiform, 3-nerved; paleas as long, subacute, 2-keeled, each enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ellipsoid, compressed, more or less deeply hollowed or concavo-convex, free within the lemma and palea; embryo large.

HALOPYRUM MUCRONATUM, Stapf; F. B. I. vii. 328.

Coast of Tinnevelly District and on Krusadai Island.

Culms 5—24 in. high; leaves 4—12 in. long; panicles 6—16 in. long; spikelets .5—.9 in. long, 10—17-flowered; glumes .3—.35 in. long. Vern. *Tam.* Uppukarai pullu.

92. *Diplachne*, Beauv.

Tufted herbs. *Leaves* narrow, flat or convolute. *Panicles* lax, erect, simple or nearly so, branches slender, simple. *Spikelets* laterally compressed, sessile or subsessile, few- to many-flowered, not articulated at the base; rhachilla articulated between the lemmas, not prolonged beyond the terminal. *Glumes* membranous, the upper the longer, persistent, oblong-lanceolate, keeled, 1—3-nerved. *Lemmas* rather longer, thin, elliptic-oblong, tip 2—4-toothed 1—3-nerved, mucronate or awned, keeled; *paleas* oblong, 2-keeled, containing each a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid-oblong, subtriangular, free within the lemma and palea.

DIPLACHNE FUSCA, Beauv.; F. B. I. vii. 329.

Kistna, Anantapur, Malabar and Tinnevely Districts; Travancore State; at low elevations.

Culms up to 5 ft. high; leaves 4—18 in. long, rarely flat; panicles 3.5—13 in. long; spikelets 4—13-flowered, .24—.5 in. long; glumes .08—.11 in. long; lemmas .12—.14 in. long, margins and margins of paleas hairy.

Buffaloes are said to eat it readily. Vern. Tam. Mandi pillu.

93. *Dichaetaria*, Nees ex Steud.

Slender perennial herbs. *Leaves* narrow, flat. *Panicles* of a few racemes on a long simple axis. *Spikelets* few, distant, 1-flowered, narrow, terete, pedicelled, not jointed at the base; rhachilla jointed at the base, produced beyond the lemma into a filiform arista bearing a minute empty glume below the middle. *Glumes* 2, equal or unequal, lanceolate, acuminate, 3-nerved, the upper subaristate, separately deciduous. *Lemma* much longer, very narrow, apex bifid with a long recurved awn from the sinus, 3-nerved; callus elongate, bearded; palea as long, finely acuminate, entire or minutely 2-toothed, 2-nerved, containing a bisexual floret. *Lodicules* 2, fleshy. *Stamens* 3. *Styles* 2, free. *Grain* very narrow.

DICHAETARIA WIGHTII, Nees ex Steud.; F. B. I. vii. 300.

Tranquebar (Rottler); rare.

Culms 1—2 ft. high; leaves nearly as long, .1—.3 in. wide, mostly basal; panicles 8—18 in. long; racemes slender, up to 4 in. long; glumes .3—.4 in. long; lemmas .6—.7 in. long; awns .9—1 in. long.

94. *Oropetium*, Trin.

Dwarf, densely tufted, annual or perennial herbs. *Leaves* setaceous. *Spikes* solitary, terminal, slender, 2-ranked. *Spikelets* solitary, sessile, more or less sunk in the alternately distichous hollows in the rhachis, 1—4-flowered; rhachilla slender, disarticulating above the glumes and between the lemmas, when more than one. *Glumes* 2, subequal and persistent in the uppermost spikelet if more than one, otherwise the lower glume very small or 0; upper narrow, rigid, sometimes closing the hollow of the rhachis and concealing the florets. *Lemmas* hyaline, ovate to oblong, 1—3-nerved; paleas as long, 2-keeled, containing a

bisexual floret or, when more than one, the uppermost rudimentary. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, terete, free within the lemma and palea.

OROPETIUM THOMAEUM, Trin.; F. B. I. vii. 366; S. I. G. fig. 228.

Rottboellia Thomaea, Koen.; Roxb. Cor. Pl. t. 132, lower fig.

In all the drier localities; sea-level to 4,000 ft.

Whole plant not exceeding 4 in. high, forming hard tussocks; leaves .25—1 in. long, often curved, more or less hairy; spikes .4—1.5 in. long; rhachis compressed, undulating; upper glumes .08—12 in. long; lemmas semicircular, .05 in. long.

95. *Microchloa*, R. Br.

Slender, usually perennial, tufted herbs. *Leaves* filiform, convolute, subsetaceous, pungent, the lower curved. *Spikes* solitary, terminal, very slender, often curved. *Spikelets* all alike, very small, 1-flowered, alternate and secund in two closely approximate rows, erect, not articulated at the base; rhachilla disarticulating above the glumes, not prolonged beyond the lemma. *Glumes* 2, subequal, subpersistent, lanceolate-oblong, 1-nerved, keeled, cuspidate or acuminate. *Lemmas* much smaller, hyaline, oblong; palea nearly as long, 2-keeled, containing a bisexual floret. *Lodicules* 2, truncate. *Stamens* 3. *Styles* 2, free. *Grain* oblong, fusiform, free within the lemma and palea; embryo $\frac{1}{4}$ — $\frac{1}{2}$ as long.

MICROCHLOA INDICA, Beauv. *M. setacea*, R. Br.; F. B. I. vii. 283.

Rottboellia setacea, Roxb. Cor. Pl. t. 132, upper fig.

Godavari and Bellary Districts; Mysore State; Nilgiri and Pulney Hills; sea-level to 6,500 ft.; often growing on walls. Culms very slender, 1—18 in. high; leaves .4—3.5 in. long; spikes 1—7 in. long, purplish; rhachis rounded on the back, channelled in front, with the sessile spikelets inserted on either margin; glumes .1 in. long. Vern. Tel. Nagavamu gaddi; Kan. Navalu bannada hullu.

96. *Melanocenchris*, Nees

Small, tufted, annual or perennial herbs. *Leaves* rigid, flat or convolute. *Inflorescence* of sessile or shortly peduncled clusters of 4—5 spikelets secund on a flattened, terminal, solitary axis. *Spikelets* sessile, not articulated at the base, 2-flowered; rhachilla jointed at the base and between the lemmas, prolonged beyond the upper and sometimes bearing 1—2 empty scales (abortive lemma and palea of a third floret). *Glumes* 2, coriaceous, narrow, persistent, attenuated into a scabrous arista, the upper broader, with hyaline margins. *Lemmas* thinly membranous, cymbiform or broadly ovate, acute, entire and cuspidate or 3-cuspidate, keeled or nearly flat; paleas narrow, 2-cuspidate, 2-keeled, the lower containing a bisexual floret, the upper a ♂. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Perennial; culms 6—17 in. high; leaves flat, linear or ensiform, mostly aggregated at the base, in elongated culms, narrower cauline ones also present, .7—4 in. long, .05—17 in. wide; rhachis 1.5—3.6 in. long; glumes (including aristas) .23—31 in. long, edges densely ciliate; rhachilla puberulous; lemmas .16—18 in. long, entire or minutely 2-toothed, cuspidate; paleas 2-toothed, back between the keels channelled; grain linear-oblong.....1. *monoica*.

Annual; culms 2—7 in. high; leaves convolute, very narrow, .4—1.7 in. long, not aggregated at base; rhachis .7—1.3 in. long; rhachilla glabrous; lemmas .18—21 in. long, shortly 3-aristate; paleas 2-cuspidate, back between the keels flat; grain elliptic, obtuse, compressed plano-convex; glumes as in *monoica*

2. *Royleana*,

1. MELANOCENCHRIS MONOICA, C. E. C. Fischer n. comb. non O. Ktze. *Gracilea mutans*, Koen.; F. B. I. vii. 283; S. I. G. fig. 187. In dry localities from the Kistna River to S. Arcot; Nilgiri District (Perrottet); up to 2,000 ft.
2. MELANOCENCHRIS ROYLEANA, Nees. *Gracilea Royleana*, Hook. f.; F. B. I. vii. 284; S. I. G. fig. 188.
Mysore State; Guntur, Bellary, Cuddapah, Chingleput and Kollegal Districts; in dry localities; up to 2,000 ft.

97. *Tripogon*, Roth.

Slender, often densely tufted herbs. *Leaves* mostly basal, very narrow, usually convolute. *Spikes* terminal, solitary, slender. *Spikelets* uniform, sessile, unilaterally 2-seriate, few-many-flowered, not articulated on the rhachis; rhachilla produced between the lemmas, not prolonged beyond the terminal, jointed at the base. *Glumes* membranous, 1-nerved; the lower usually lodged in a furrow of the rhachis, 1-toothed or -lobed on one side; the upper longer, entire or notched at the tip, mucronate or aristate, inserted distinctly higher on the rhachilla. *Lemmas* ovate, dorsally convex, 2-fid and awned from the sinus or 4-fid with the outer lobes awned, the inner lobes membranous and rarely awned, rarely truncate and mucicous, 3-nerved; paleas broad or narrow, complicate, usually truncate, keels ciliate, each containing a bisexual floret except the 1 or 2 terminal which are imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* very narrow, free within the lemma and palea.

Culms simple, slender, not thickened by the old sheaths; leaves not equitant, rigid or pungent:—

Lemmas 2-fid or entire:—

Lemmas 2-fid, awned or aristate from the sinus:—

Lemmas distinctly shorter than their awns:—

Awns finely capillary, flexuous, .8—1 in. long; lowest lemma .08—1 in. long, 2-fid, lobes acute; paleas not winged. Culms very slender, 1.5—7 in. high; leaves 1.5—10 in. long; spikes 6—14 in. long; spikelets remote, few-flowered; glumes cuspidate or aristate.....1. *capillatus*.

Awns geniculate or straight, not flexuous, .3—6 in. long:—

Lobes of lemma with aristas .16—22 in. long; lemmas puberulous, .11—14 in. long; awns geniculate, .42—6 in. long; paleas not winged. Culms slender, .5—3 in. high; leaves 1—2 in. long; spikes .3—2.5 in. long; spikelets well separated, few-flowered; glumes acuminate, upper .13—2 in. long.....2. *pauperculus*.

Lobes of lemma triangular, acute, lemma .2—2.5 in. long, awn not geniculate, curved, .3—3.6 in. long; paleas broadly winged. Culms 4—12 in. high; leaves 3—7.5 in. long; spikes 3—9 in. long; spikelets approximate, many-flowered, .5—1.5 in. long; glumes often 2-toothed and -mucronulate, upper .22—3 in. long.....3. *Wightii*.

Lemma longer than its arista, .13—16 in. long, lobes obtuse, arista .08—12 in. long; paleas narrowly winged. Culms 7—15 in. high; leaves 2—7.5 in. long; spikes 2—9 in. long; spikelets .3—9 in. long, many-flowered; glumes acute, upper .13—16 in. long.....4. *Jacquemontii*.

Lemmas rounded or truncate and minutely 3-toothed, .1 in. long, mucicous or with 1 short arista; paleas not winged. Culms 1—4 in. high; leaves .5—3 in. long; spikes 1—3.5 in. long; spikelets 1—2-flowered; glumes coriaceous, obtuse, upper .13 in. long.....5. *Roxburghianus*.

Lemmas 4-fid, .08—15 in. long, 2 inner lobes short, acute, with an arista from the sinus .08—13 in. long, 2 outer short, bearing aristas .07—1 in. long; paleas not winged. Culms 4—24 in. high; leaves 3—15 in. long, glabrous to densely hairy; spikes 2—11 in. long; spikelets usually close, several-flowered; glumes notched or 2-fid, upper .16—23 in. long.....6. *bromoides*.

Culms branched, thickened below by the imbricate, old leaf-sheaths, slender and exserted above, 1—8 in. long; leaves .4—2 in. long, equitant, rigid, pungent, minutely hispidulous above; spikes 1.5—2.5 in. long; spikelets approximate, 7—9-flowered; glumes membranous, .12—16 in. long; lowest lemma .1 in. long, 2-fid, its arista .03—04 in. long; paleas not winged.....7. *pungens*.

1. *TRIPOGON CAPILLATUS*, Jaub. et Spach.; F. B. I. vii. 285.
Mysore and Cochin States (Meebold); Wynaad (Beddome); 3,000—4,000 ft.; often epiphytic.
2. *TRIPOGON PAUPERCULUS*, Stapf; F. B. I. vii. 285.
Bababudan Hills and Mysore State (Meebold); Travancore at Peermade (Venkoba Rao); 2,000—6,000 ft.
Growing on trees and rocks.
3. *TRIPOGON WIGHTII*, Hook. f.; F. B. I. vii. 286.
Horsleykonda; Bellary District; Nilgiri Hills; Cochin and Travancore States; 1,000—6,000 ft.
4. *TRIPOGON JACQUEMONTII*, Stapf; F. B. I. vii. 286.
Nilgiri Hills; Coimbatore District; Travancore; up to 8,800 ft.
5. *TRIPOGON ROXBURGHIANUS*, Bhide. *Lepturus Roxburghianus*, Steud.; F. B. I. vii. 365.
Guntur, Cuddapah, Anantapur and Bellary Districts.
In dry places among rocks.
6. *TRIPOGON BROMOIDES*, Roth; F. B. I. vii. 287.
W. Gháts; Mysore State; Bellary, Cuddapa and Vellore Districts; Travancore; 1,000—7,500 ft.
Often on rocks.
7. *TRIPOGON PUNGENS*, C. E. C. Fischer in Kew Bull. 1934, 170.
S. Coimbatore District at Punachi in the Anamallais (Barber); Pulney Hills at Neutral Saddle (Bourne); 3,000—4,000 ft.

98. *Enteropogon*, Nees

Erect, sometimes tufted, perennial herbs. *Leaves* narrow, usually flat, the upper sometimes involute. *Spikes* slender, solitary or sometimes twin; rhachis flat or trigonous. *Spikelets* all alike, sessile, not jointed at the base, 1—3-flowered; rhachilla jointed at the base, continuous between the lemmas and prolonged beyond the uppermost. *Glumes* persistent, hyaline, acuminate, 1-nerved, keeled, the upper much the longer. *Lemmas* diminishing in length upwards, the lowest rather longer than the upper glume, chartaceous, 3-nerved, more or less keeled, entire or shortly 2-fid, awned from the sinus in continuation of the keel; paleas narrowly lanceolate, obtuse or 2-toothed, 2-keeled, keels scabrid, each containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* narrow, free within the hardened lemma and palea.

ENTEROPOGON MONOSTACHYOS, K. Schum. *E. melicoides*, Nees; F. B. I. vii. 284; S. I. G. fig. 189.

In all Districts from Mysore State and Cuddapah southwards except on the W. Coast; sea-level to 2,000 ft.

Culms up to 3 ft. high, densely tufted; leaves 2.5—21 in. long, .1—2.5 in. wide; spikes 4—8 in. long; lower glume .09—1.4 in. long, upper .22—2.7 in. long; lowest lemma .27—3.1 in. long; awns .24—3 in. long. Vern. *Tam.* Kannai pillu.

99. *Cynodon*, Pers.

Perennial creeping grasses with erect culms. *Leaves* narrow, flat or complicate. *Inflorescence* of 2—8 fascicled or umbellate spikes; rhachis slender. *Spikelets* all alike, sessile, laterally compressed, alternately 2-seriate, imbricate, not jointed at the base, 1-flowered; rhachilla disarticulating at the base, rarely produced beyond the lemma. *Glumes* 2, thin, keeled, acute or mucronate, persistent or separately deciduous. *Lemmas* broader than the glumes, firmly membranous, boat-shaped, 3-nerved, keel ciliate, awnless; paleas 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Lemmas longer than the upper glumes, broadly boat-shaped, .08—1 in. long:—

Erect culms 2—18 in. high; lower leaves usually flat, the upper often complicate, .4—4.7 in. long, .03—1.1 in. wide; spikes 3—7, .6—2.5 in. long, usually more or less erect; lower glume .05—0.8 in. long.....1. *Dactylon*.

Erect culms 7—40 in. high; leaves narrowly ensiform, flat, 1—4.5 in. long, .18—2.7 in. wide; spikes 3—6, usually spreading and curved, 2—4 in. long; lower glumes .04 in. long, upper .05—0.6 in. long.....var. *intermedius*.

Lemmas shorter than or equalling the upper glume, narrowly boat-shaped, .08 in. long, the ciliae on the keel often minutely knobbed. Erect culms 4—9 in. high; leaves flat, .6—2.5 in. long, .1—2 in. wide; spikes 3—5, .6—2.2 in. long; lower glume .04—0.8 in. long, upper .08—1 in. long.....2. *Barberi*.

1. *CYNODON DACTYLON*, Pers.; F. B. I. vii. 288; S. I. G. figs. 190, 191.

In all Districts except on the W. Coast; sea-level to 7,000 ft.

Underground stems often very long. Hariali grass.

A highly nutritious fodder, especially for horses. Vern. *Hind.* Dub; *Ur.* Dubbula ghanso; *Tel.* Gericha gaddi, Gurka hariali; *Tam.* Arugam pillu; *Kan.* Kudi garikai, Karkeri hullu.

Var. *intermedius*, C. E. C. Fischer n. comb. *C. intermedius*, Rang. et Tad.; S. I. G. figs. 192, 193.

Usually without underground stem.

In the same localities as the typical species but less common; up to 3,000 ft. The extreme forms are easily recognized, but the intermediate are not readily distinguishable.

2. *CYNODON BARBERI*, Rang. et Tad.; S. I. G. figs. 194, 195.

In the same region as the former species, but less common; not reported from Travancore.

100. *Chloris*, Sw.

Perennial, rarely annual, erect or decumbent herbs. *Leaves* usually flat, sometimes complicate or convolute. *Inflorescence* of solitary, umbelled or racemosely arranged spikes or spiciform racemes, erect or stellately spreading. *Spikelets* sessile or very shortly pedicelled, unilateral, 2-seriate, not jointed on the rhachis, with 1—4 perfect florets and 1—3 imperfect above; rhachilla articulated above the glumes, prolonged beyond the upper perfect floret and bearing 1—3 empty

lemmas above. *Glumes* 2, membranous, unequal, persistent, narrow, 1-nerved, keeled, mucronate or the upper more or less aristate. *Lemmas* 3-nerved, acute, obtuse or 2-fid, usually awned; paleas 2-nerved, 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* linear-oblong or ellipsoid, compressed or subtrigonal, free within the lemma and palea; often with a loose pericarp.

Spikes solitary, very rarely 2, .8—2.5 in. long, erect. Culms slender, 5—18 in. high; leaves 2—10 in. long; .1—1.5 in. wide; perfect florets 4, lowest lemma .2 in. long, broadly obovate, truncate with an arista .12—1.4 in. long, that of next longer, of the 4th very short or 0; empty lemmas 2, mucous.....1. *tenella*.
Spikes 3—many; perfect florets 1—2:—

Spikes umbelled:—

Perfect floret 1:—

Empty lemma above the floret solitary, well-developed or rudimentary:—

Empty lemma represented by a fine arista .18—5 in. long hardly widened at the base. Culms procumbent or erect, 1—5 ft. high; peduncles long; leaves 2—22 in. long, .07—4 in. wide; spikes 3—10, 2—10.5 in. long; upper glumes .2—3.8 in. long; lemma oblong-lanceolate, glabrous, .17—2.8 in. long; awn .12—6 in. long.....2. *incompleta*.

Empty lemma oblanceolate, truncate, its arista .16—1.8 in. long. Culms decumbent, 3—18 in. high; leaves 1.5—7 in. long, .07—1.1 in. wide; spikes 4—7, .8—2.5 in. long; rhachis hairy; upper glumes .08—1.6 in. long; lemma obovate, acute, .1—1.2 in. long, apical margin long-ciliate; awn .15—2.6 in. long.....3. *virgata*.

Empty lemmas above the floret 2 or 3:—

Culms glabrous, 1—3 ft. high; leaves 2—12 in. long, .1—2 in. wide; spikes 4—20, 2—4 in. long, rhachis scaberulous; upper glumes .1—1.3 in. long; lemma .08—1 in. long, obovate, obtuse, back sparsely hairy, margins densely ciliate above the lower $\frac{1}{3}$, its arista .16 in. long; empty lemmas 2, lower obovate, upper subglobose, their aristas .12—1.8 in. long...4. *barbata*.

Culms puberulous or hairy for at least a short distance below the spikes:—

Culms 3—30 in. high, hairy for a short distance below the spikes; leaves 1—10 in. long; .02—1 in. wide, glabrous; spikes 3—13, .6—2.8 in. long, rhachis glabrous; upper glumes .08—1.3 in. long; lemma obovate to oblanceolate, keel glabrous, back sparingly hairy at the sides, margins long-ciliate, .08—1 in. long; awn .16—3.4 in. long; empty lemmas 2—3, lower obovate, truncate, upper subglobose, their aristas .1—3 in. long

5. *montana*.

Culms 3—8 in. long, usually puberulous throughout, sometimes hairy above; leaves .7—1.5 in. long, .05—1 in. wide, densely short-hairy; spikes 3—4, .5—1 in. long, rhachis densely hairy; upper glumes .08—1 in. long; lemma obovate, obtuse, emarginate or 2-toothed, back asperulous, keels and margins long-ciliate, .1 in. long; awn .2—3 in. long; empty lemmas 3, obovate, apiculate, puberulous, their awns .2—3 in. long

6. *Wightiana*.

Perfect florets 2. Culms 1—3 ft. high, minutely puberulous just below the spikes; leaves 1—10 in. long, .05—2 in. wide, glabrous; spikes 3—9, 1.4—4 in. long; upper glume .07—1 in. long; lowest lemma obovate, back scaberulous, keel and margins long-ciliate, .09—1.6 in. long, awn .16—2.3 in. long; second lemma broader, shorter with a shorter awn; empty lemmas 2, subglobose, their aristas .08—1.8 in. long.....7. *Bournei*.

Spikes racemously arranged, 14—30, 1.5—2.5 in. long. Culms 18—30 in. high; leaves 2—6.5 in. long, .1—1.5 in. wide; upper glume .06 in. long; perfect lemma solitary, .06—0.9 in. long, narrowly lanceolate, acute, 2-toothed, sparsely ciliate on the keel and margins above the middle, its awn .33—4.4 in. long; empty lemmas 2, minute, their awns .25—4 in. long.....8. *polystachya*.

1. CHLORIS TENELLA, Roxb.; F. B. I. vii. 290; S. I. G. fig. 197.

Bellary District.

Reputed a good fodder.

2. *CHLORIS INCOMPLETA*, Roth ; F. B. I. vii. 290 ; S. I. G. fig. 196.
In all Districts except on the W. Coast ; often in hedges and scrambling among bushes ; sea-level to 2,500 ft.
Eaten by cattle before flowering. Vern. *Tel.* Kanthari gaddi ;
Kan. Melamalai hullu.
3. *CHLORIS VIRGATA*, Sw. ; F. B. I. vii. 291 ; S. I. G. fig. 198.
Bellary and Salem Districts ; Mysore State ; 2,000—3,000 ft. Vern.
Tel. Uppu gaddi.
4. *CHLORIS BARBATA*, Sw. ; F. B. I. vii. 292 ; S. I. G. figs. 199, 200, 201.
In all Districts except on the W. Coast ; sea-level to 2,000 ft.
A good fodder before flowering. Vern. *Tam.* Kodai pillu,
Sevarugu pullu ; *Kan.* Henu manchada kalu hullu.
5. *CHLORIS MONTANA*, Roxb. ; F. B. I. vii. 292 ; S. I. G. figs. 204, 205.
In the central and eastern Districts and southwards to Cape
Comorin ; sea-level to 2,000 ft. Vern. *Kan.* Kondai javara hullu
6. *CHLORIS WIGHTIANA*, Nees ; F. B. I. vii. 293.
S. India, without precise locality (Wight).
7. *CHLORIS BOURNEI*, Rang. et Tad. ; S. I. G. figs. 202, 203.
Godavari, Bellary, S. Arcot, Coimbatore and Tanjore Districts ;
up to 2,500 ft.
8. *CHLORIS POLYSTACHYA*, Roxb. ; F. B. I. vii. 292.
Bellary District ; Nilgiri, Coimbatore, Pulney and Tinnevelly
Hills ; Cape Comorin ; up to 2,500 ft.

101. *Eleusine*, Gaertner

Annual or perennial herbs. *Leaves* flat or complicate. *Inflorescence* of capitate, digitate, whorled or scattered spikes. *Spikelets* small, sessile, 2—3-seriate, secund, imbricate, pointing forwards at an acute angle to the rhachis, with a terminal spikelet or sometimes only an abortive lemma ; laterally compressed, not jointed to the rhachis ; rhachilla continuous between the 2—12 lemmas. *Glumes* persistent, subequal, keeled, acute or cuspidate ; lower 1-nerved ; upper often broader, 1—7-nerved. *Lemmas* resembling the glumes ; the lowest usually the longest, 3-nerved ; paleas complicate, strongly 2-keeled, each containing a bisexual floret or the terminal a ♂ or empty. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* small, free within the lemma and palea ; pericarp loose, hyaline.

Erect ; leaves 3 in. or more long ; spikes umbelled or scattered ; lemmas and paleas glabrous :—

Spikes in one whorl, occasionally 1—2 solitary spikes below the umbel ; glumes entire :—

Rhachis of spike slender, glabrous. Culms not very stout, 6—30 in. high ; leaves 3—20 in. long, .1—2.5 in. wide ; spikes 2—9, .9—5.5 in. long ; lowest lemma .12—.14 in. long ; paleas not winged ; grain oblong, narrowed at the ends, laterally compressed.....1. *indica*.

Rhachis broad, margins scabrid. Culms usually stout, 1—3 ft. high leaves 10—24 in. long, .2—.5 in. wide ; spikes 4—many, 1—4 in. long ; lowest lemma .15—.17 in. long ; paleas winged on the keels ; grain globose.....2. *coracana*.

Spikes 4—30 in 1—several whorls with scattered solitary or twin spikes intermixed, 1.5—5 in. long ; rhachis slender. Culms 1—4 ft. high ; leaves 3—10 in. long, .1—.5 in. wide ; glumes usually with notched tips ; lowest lemma .11—.14 in. long, truncate or 2-toothed caudate ; paleas with ciliolate, wingless keels ; grain oblong-subglobose, grooved down one side, rugose and muriculate

3. *verticillata*.

Prostrate or creeping, spreading and rooting from the nodes; culms 1—9 in. high; leaves .5—1.2 in. long, .05—.15 in. wide; spikes numerous, crowded into a globose head, .3—.5 in. across; lowest lemma .15—.17 in. long, cuspidate, densely hairy on the keel and on the 2 lateral nerves below the middle; paleas densely hairy on the keels; grain ovate to nearly orbicular, concavo-convex, transversely rugose

4. *lagopoides*.

1. **ELEUSINE INDICA**, Gaertn.; F. B. I. vii. 293, S. I. G. fig. 206.
In all Districts; up to 6,500 ft.
A fair fodder. Vern. *Tam.* Thippa ragi.
2. **ELEUSINE CORACANA**, Gaertn.; F. B. I. vii. 299.
Cultivated in the dry and hilly parts of most Districts; up to 5,000 ft. Believed to be the cultivated form of the previous species. The grain is an important article of food for the poorer classes. The culms and leaves are a good cattle-fodder. Vern. *Ur.* Mandiya; *Tel.* Ragi, Ragulu, Thamidalu, Chodalu; *Tam.* Ragi, Kalvaragu, Kapai; *Kan.* Ragi.
3. **ELEUSINE VERTICILLATA**, Roxb.; F. B. I. vii. 295.
In all the eastern Districts; Mysore State; Nilgiri and Coimbatore Districts; up to 3,000 ft.
A good fodder. Vern. *Tam.* Kadu kapai.
4. **ELEUSINE LAGOPOIDES**, Merr.; *E. brevifolia*, R. Br.; F. B. I. vii. 294; S. I. G. fig. 207.
Along the E. coast and inland as far as Coimbatore; usually in sandy tracts and salt soils; up to 1,500 ft.

102. *Dactyloctenium*, Willd.

Annual or perennial, usually erect herbs. *Leaves* flat. *Spikes* in one terminal umbel, rarely reduced to a solitary spike. *Spikelets* sessile, laterally compressed, densely imbricate in 2 rows, usually at right angles to the rhachis, which is produced in a rigid point beyond them; rhachilla disarticulating above the lower glume, continuous between the lemmas. *Glumes* deciduous, slightly unequal, 1-keeled, 1-nerved; lower ovate to oblong, acute or obtuse, persistent; upper oblong, obtuse, mucronate or cuspidate. *Lemmas* 3—5, firmly membranous, ovate, 1-keeled, 3-nerved, acuminate, mucronate or cuspidate; paleas 2-keeled, each containing a bisexual floret or the uppermost more or less imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grains* oblong to globose; pericarp loose.

DACTYLOCTENIUM AEGYPTIUM, Beauv. *Eleusine aegyptiaca*, Desf.; F. B. I. vii. 295; S. I. G. figs. 5, 208, 209.

In all Districts; up to 3,000 ft.

Erect or creeping in poor soils; culms 1.5—30 in. high; leaves 1—10 in. long, .08—.35 in. wide, glabrous or more or less pilose; spikes 1—7, digitately radiating, .3—1.5 in. long; lemmas broad, subfalcate, strongly cuspidate, lowest .12—.14 in. long.

103. *Dinebra*, Jacq.

Annual herbs; culms leafy. *Leaves* flat. *Inflorescence* of slender, spreading or deflexed spikes collected in narrow, pyramidal racemes, sometimes paniced. *Spikelets* crowded, secund, 2-seriate, sessile, 2—3-flowered, not jointed at the base; rhachilla slender, jointed at the base, produced beyond the uppermost floret and bearing an imperfect lemma.

Glumes 2, persistent, subequal or the upper longer, lanceolate, 1-nerved, 1-keeled, awned or cuspidate. *Lemmas* much shorter, hyaline, broadly ovate, subacute or obtuse, 1-nerved; *paleas* as long, hyaline, 2-keeled. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ovoid, trigonous, free within the lemma and palea; embryo $\frac{1}{3}$ as long.

DINEBRA RETROFLEXA, Panz. *D. arabica*, Jacq.; F. B. I. vii. 297; S. I. G. figs. 17, 210, 211.

In the central and eastern Districts from Godavary to Coimbatore; up to 3,000 ft.

Culms 2—36 in. high; leaves 2—10 in. long, .1—.3 in. wide; inflorescence 3—16 in. long; spikes .3—2.5 in. long; glumes rigid, .18—21 in. long; lemmas .08—1 in. long; grains .05 in. long, acute. Readily eaten by cattle before flowering. Vern. Tel. Wadata toka gaddi; Kan. Nari balada gandu hullu.

104. *Enneapogon*, Desv.

Perennial herbs. *Leaves* narrow, flat or convolute. *Panicles* contracted or spiciform. *Spikelets* distichous, 1—3-flowered, not jointed on the pedicels; rhachilla disarticulating at the base. *Glumes* 2, persistent, keeled, 3—9-nerved. *Lemmas* 4—5, shorter, broad, concave, 9-nerved, 9-awned; awns subulate, equal or alternately shorter and longer, plumose, ciliate or scaberulous; *paleas* oblong, 2-toothed, 2-keeled, the lowest containing a bisexual floret, the rest gradually shorter and with a ♂ floret or empty, the uppermost rudimentary or reduced to a tuft of hairs. *Lodicules* 2, minute, fleshy. *Stamens* 3. *Styles* 2, free. *Grain* ovoid or oblong, free.

ENNEAPOGON ELEGANS, Stapf. *Pappophorum elegans*, Nees; F.B.I. vii. 301; S. I. G. figs. 215, 216.

In all central and eastern Districts from Kurnool southwards; Coimbatore and Nilgiri Districts; up to 3,000 ft.

Culms slender, wiry, 2—20 in. high, erect from a woody, often thickened base; leaves flat or convolute .9—5 in. long, .05—1 in. wide; panicles 2—3.5 in. long; glumes .16—22 in. long; lowest lemma .08 in. long, its awns .13—14 in. long, the uppermost minute, usually reduced to 3 short aristas.

105. *Pommereulla*, Linn. f.

Perennial creeping herbs; rootstock stoloniferous. *Leaves* linear, flat or complicate; basal sheaths equitant. *Spike* terminal, simple or forked; rhachis flattened. *Spikelets* distant or close, sessile, 2—3-flowered; rhachilla articulated at the base, very short, continuous between the lemmas, shortly produced beyond the uppermost floret, with or without a rudimentary lemma. *Glumes* membranous, persistent, amplexicaul at the base; the lower 1-nerved; the upper broader and longer, 3-nerved. *Lemmas* 5—6, spirally arranged to form an inverted cone; the lowest with a pungent callus; the 2 lowest epaleate and empty, flabelliform, embracing the upper, 4-lobed, lobes acute, acuminate, mucronate, cuspidate or shortly aristate, the 2 inner narrow, the 2 outer broad, the lemma bearing a slender awn on the middle of the back; the upper lemmas gradually smaller, similar but concave at the base,

3-lobed with the middle lobe entire or 2-cuspidate, the third and fourth or third to fifth lemmas paleate; paleas ovate, flat, 2-keeled with wide flaps, containing each a bisexual floret; the uppermost lemma epaleate and empty. *Lodicules* 2. *Stamens* 2—3. *Styles* 2, free. *Grain* oblong, biconvex or plano-convex, loose within the lemma and palea; pericarp loose; embryo orbicular, small.

POMMEREULLA CORNUCOPIAE, Linn. f.; F. B. I. vii. 300; Roxb. Cor. Pl. t. 131; S. I. G. figs. 213, 214.

Vizagapatam (Narayanswami), Kistna (Barber) and Chingleput Districts.

Stolons several inches long; culms solitary or tufted, 1.5—12 in. high; leaves .5—4 in. long, .05—.15 in. wide, apex rounded; spikes partly enclosed in the upper spathiform leaf-sheath or long exerted, .8—3 in. long; glumes .3—.5 in. long; callus .08—.1 in. long, villous; lowest lemma .25—.33 in. long, silkily villous on the nerves, its awn .2—.3 in. long; grain .06 in. long.

106. *Elytrophorus*, Beauv.

Erect, annual herbs. *Leaves* very narrow, flat. *Inflorescence* of densely-packed globose clusters of spikelets continuous in a cylindrical mass, lobed or interrupted, on a simple terminal axis. *Spikelets* very small, laterally compressed, sessile, not articulated at the base, 3—6-flowered, subtended by many empty glumes; rhachilla very short, smooth, jointed at the base and between the lemmas. *Glumes* 2, subequal, persistent, membranous, lanceolate, mucronate or aristate, 1-keeled, 1-nerved. *Lemmas* 3—7, rather larger, ovate, aristate, 3-nerved; paleas complicate, truncately 3-lobed, 2-keeled, one or both keels winged, the uppermost empty, the rest containing each a bisexual floret. *Lodicules* 2. *Stamens* 1—3; anthers minute. *Styles* 2, free. *Grain* minute, narrowly oblong or fusiform, compressed; pericarp loose at both ends.

ELYTROPHORUS SPICATUS, A. Camus. *E. articulatus*, Beauv.; F. B. I. vii. 306.

Ganjam, Chingleput, Arcot, Tanjore and Malabar Districts; Mysore State; sea-level to 3,000 ft.

Culms .05—12 in. high; leaves 1—12 in. long, .05—.2 in. wide; inflorescence 1.5—9 in. long; glumes and lemmas .06—.08 in. long, their aristas .05—.09 in. long. Vern. *Tam.* Vayal tenai; *Kan.* Nela antabu hullu.

107. *Aeluropus*, Trin.

Low, much-branched, rigid, perennial, leafy herbs. *Leaves* distichous, coriaceous, usually convolute, pungent. *Inflorescence* of terminal crowded heads. *Spikelets* minute, sessile, laterally compressed, 6—many-flowered, not articulate at the base; rhachilla obscurely articulate at the base and between the lemmas, not produced beyond them. *Glumes* membranous, persistent, rounded on the back, apiculate, mucronate or cuspidate; lower 1—3-nerved; upper much larger, 5—7-nerved. *Lemmas* membranous, longer than the glumes, 7—9-nerved; paleas as large, broadly cuneate, 3-lobed, lobes crose, 2-keeled, flaps broad, keels nearly

smooth or ciliate, each enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or obovoid, free within the lemma and palea.

AELUROPUS LAGOPOIDES, Trin. ex Thw. *A. villosus*, Trin.; F. B. I. vii. 334.

Coastal sands and alkaline soils on both coasts; often in marshy places.

Roots long, wiry; culms tufted, 1—14 in. high; leaves sometimes flat, .15—2 in. long, up to .15 in. wide; heads oblong or globose, .3—8 in. long; glumes and lemmas more or less villous, the former .06—08 in. long, the latter .1—11 in. long.

108. *Oryza*, Linn.

Tall, annual or perennial herbs. *Leaves* narrow, flat or convolute. *Inflorescence* spicate or paniced. *Spikelets* strongly laterally compressed, 1-flowered, appearing to be articulated on a short dilated pedicel but actually articulated above 2 abortive glumes. *Glumes* above the articulation 2, minute, subulate or absent. *Lemma* chartaceous or coriaceous, the size and shape of the spikelet, often strongly nerved or ribbed, obtuse, acute or awned, its palea as long, similar, containing a bisexual floret. *Lodicules* 2, entire or 2-lobed. *Stamens* 6. *Styles* 2, free. *Grain* narrowly oblong, free within the lemma and palea.

Lemma, excluding its awn, .35 in. or less long, punctate or granulate, not winged on the back:—

Panicles compound, 2.5—12 in. long, spikelets numerous; glumes oblong, .12—14 in. long, often much shorter in cultivated plants; lemma .25—3 in. long, regularly punctate, hispidulous, with a slender barbellate awn 1.4—5 in. long in wild plants, awnless in cultivated ones. Culms up to 4 ft. high; leaves 4—22 in. long, .1—35 in. wide. 1. *sativa*.

Panicles simple, 1.5—4 in. long, spikelets few; lower glume 0 or minute, upper .04—06 in. long; lemma .22—24 in. long, densely irregularly granulate, glabrous. Culms rather slender, up to 3 ft. high; leaves 3—10.5 in. long, .3—9 in. wide.

2. *Meyeriana*.

Lemmas .45—5 in. long, excluding a stiff, glabrous arista .13—17 in. long, keel broadly winged above the middle, smooth, glabrous. Culms up to 6 ft. high; leaves 6—20 in. long, .25—5 in. wide; sheaths tessellate; panicles spiciform, 4—8 in. long; glumes finely subulate, .16—21 in. long. 3. *coarctata*.

1. *ORYZA SATIVA*, Linn.; F. B. I. vii. 92.

In all Districts; in marshes; sea-level to 2,000 ft. Much cultivated in all Districts in wet fields for its edible grain and its straw. The Paddy or Rice plant.

There are numerous races of the cultivated form. Vern. *Hind.* Dhan; *Ur.* Dhanno; *Tel.* Vadlu; *Tam.* and *Mal.* Nellu; *Kan.* Batta.

2. *ORYZA MEYERIANA*, Baill. *O. granulata*, Nees et Arn.; F. B. I. vii. 93. In most Districts; up to 4,000 ft.

3. *ORYZA COARCTATA*, Roxb.; F. B. I. vii. 93.

Godavari District at Tallurevu (Barber).

109. *Leersia*, Sw.

Slender, perennial herbs. *Leaves* narrow, flat. *Panicle* contracted, usually flaccid. *Spikelets* imbricate, laterally compressed, 1-flowered.

Glumes 0 or reduced to an obscure, hyaline, entire or 2-lobed rim. *Lemma* coriaceous or chartaceous, oblong, strongly 1-keeled; *palea* similar in texture and shape, nearly as long but narrower, 1-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* usually 6, sometimes 3 or fewer. *Styles* 2, free. *Grain* oblong, compressed, free within the lemma and palea.

LEERSIA HEXANDRA, Sw. ; F. B. I. vii. 94 ; S. I. G. fig. 119.

In all Districts; in marshes and lakes; sea-level to 7,000 ft. Culms up to 4 ft. high; leaves usually stiff, 3—8 in. long, 1—4 in. wide; panicles 2—5 in. long; lemma obliquely oblong, 13—15 in. long, keels of lemma and palea bristle-ciliate.

Much liked by cattle. Vern. *Hind.* Jungli dhan; *Mal.* Nir valli pullu; *Kan.* Kadu bili sajjabu hullu.

110. Hygorrhiza, Nees.

Glabrous floating herbs; culms spongy below, emitting capillary roots at the nodes. *Panicles* short, broad. *Spikelets* narrowly lanceolate, 1-flowered, articulate on their pedicels but tardily deciduous. *Glumes* 0. *Lemma* thinly chartaceous, narrowed into an awn; *palea* similar but narrower, awnless, containing a bisexual floret. *Lodicules* 2, gibbous. *Stamens* 6; anthers long, slender. *Styles* 2, free. *Grain* narrowly oblong, free within the lemma and palea.

HYGORRHIZA ARISTATA, Nees ; F. B. I. vii. 95 ; S. I. G. fig. 120.

Along both coasts; Mysore State at Kumsi (Meebold) at 2,000 ft. Floating culms a foot or more long, erect branches 2—8 in. high; leaves subcoriaceous, ovate to narrowly ovate-oblong, base subcordate, 1—3.1 in. long, 2—7 in. wide; panicles 1—2 in. long; spikelets few, long-pedicelled; lemma narrowly lanceolate, 23—3 in. long, strongly 5-nerved; awn 25—55 in. long, scabrid.

The grain is eaten by the poor. Readily eaten by cattle. Vern. *Tam.* Valli pullu.

111. Anthoxanthum, Linn.

Perennial, erect, usually sweet-scented herbs. *Leaves* flat. *Panicles* spiciform or more or less branched and somewhat lax. *Spikelets* pedicelled, slightly laterally compressed, 3-flowered; rachilla disarticulating above the glumes. *Glumes* 2, persistent, membranous, sometimes chaffy and shining, complicate, sharply keeled; the upper the longer and with a strong rib on each side close to the keel. *Lemmas* 3; the 2 lower similar and subequal, laterally compressed, 1-keeled, hairy, 2-lobed or -fid, sometimes the upper to near the base, the lowest bearing an arista from $\frac{1}{3}$ — $\frac{1}{2}$ way below the tip, usually slightly overtopping it, but sometimes shorter, the second with a geniculate awn from the back; the uppermost lemma shorter, usually complicate and 1-keeled, glabrous. *Paleas* of the 2 lower lemmas, if present, narrow, 2-keeled, empty or containing a ♂, usually 3-stamened floret; the uppermost palea complicate, 1-keeled, enclosing a bisexual floret, usually with 2 stamens. *Lodicules* 0. *Styles* 2. *Grain* elliptic-ovoid, slightly laterally compressed; embryo $\frac{1}{4}$ as long.

ANTHOXANTHUM HOOKERI, Rendle. *Hierochloa Hookeri*, C. B. Clarke ex Hook. f.; F. B. I. vii. 223.

Pulney Hills in the vicinity of Kodaikanal; 6,000—7,000 ft. Possibly an escape from gardens, but I have seen no specimen from a garden.

Rootstock creeping; culms 20—40 in. high; leaves 4—11 in. long, 2—4 in. wide, closely ribbed as are also the sheaths; panicles lax; upper glume 23—27 in. long; 2 lower lemmas 18—22 in. long, brown-hairy; awn 28—4 in. long; uppermost lemma 1—12 in. long, rarely emarginate with a short arista.

Anthoxanthum odoratum, Linn.; F. B. I. vii. 222. The sweet vernal grass is cultivated in gardens in the hills. It differs from the above species through its smaller size; leaves mostly basal; panicles spiciform, short and close; 2 lower lemmas 12—15 in. long, devoid of paleas and empty; uppermost lemma 06—08 in. long.

112. *Lophatherum*, Brogn.

Perennial, leafy herbs. *Leaves* petioled, flat, narrowly lanceolate, tessellate with transverse nerves. *Panicles* subsimple, lax, narrow; branches alternate. *Spikelets* solitary, secund, narrowly lanceolate, terete, 1-flowered, jointed at the base; rhachilla not jointed, produced beyond the floret and bearing several closely-sheathing, cuspidate, empty lemmas. *Glumes* 2, membranous, the upper the longer, rounded on the back or the lower 1-keeled, 5—7-nerved, acute or obtuse, margins often hyaline. Lowest lemma longer, 7—9-nerved, mucronate or cuspidate; palea narrow, 2-keeled, keels narrowly winged, containing a bisexual floret. *Lodicules* 2—3. *Stamens* 3. *Styles* 2, connate at the base. *Grain* oblong and compressed or fusiform and terete, free within the lemma and palea; embryo long.

LOPHATHERUM GRACILE, Brogn.; F. B. I. vii. 331.

Travancore without specific locality (Venkoba Rao).

Culms 2—5 ft. high; leaves 4—10 in. long, 1—1.5 in. wide; panicles 6—18 in. long, branches few; spikelets 33—5 in. long, terminated by the erect or spreading cusps of the empty lemmas.

113. *Centotheca*, Desv.

Perennial, leafy herbs. *Leaves* rather broad, with transverse veins. *Panicles* subsimple, lax; branches long, slender, spiciform; pedicels capillary. *Spikelets* secund, alternate, laterally compressed, all perfect or the 1—several upper empty, perfect ones 1—3-flowered, not articulated at the base; rhachilla very slender, articulated at the base and between the lemmas, rarely produced above the uppermost. *Glumes* 2, persistent unequal, distant at the insertions, ovate-oblong, 3- or 5-nerved. *Lemmas* ovate to oblong, obtuse or acute, rounded on the back, 5- or 7-nerved, the upper ones usually bearing soft, erect, ultimately deflexed, tubercle-based bristles; paleas narrow, 2-keeled, keels ciliolate, containing each a bisexual floret. *Lodicules* 0. *Stamens* 2—3, *Styles* 2, free. *Grain* ovoid, acute, terete, free within the lemma and palea.

CENTOTHECA LAPPACEA, Desv.; F. B. I. vii. 332.

In most Districts, more abundant in wet localities; up to 3,000 ft. Culms stout, 1—5 ft. high; leaves narrowly lanceolate to ovate, 2—10 in. long, .45—1.4 in. wide; panicles 3.5—14 in. long; glumes .09—1.4 in. long, the upper the longer; lowest lemma .16—.2 in. long.

114. Melica, Linn.

Perennial, erect herbs. *Leaves* narrow, flat or convolute. *Panicles* open, spiciform or reduced almost to a raceme, often secund. *Spikelets* few to many, laterally compressed or subterete, 1—5-flowered, jointed on the pedicels or not; rhachilla disarticulating tardily at the base, readily between the flowering lemmas. *Glumes* 2, membranous, scarious or hyaline, persistent or falling separately, equal or unequal, 3- or 5-nerved or the upper 7-nerved. *Lemmas* firmly membranous, the margins and tips often hyaline, 5—9-nerved; paleas 2-keeled, the lower 1—3, rarely 4—5, containing each a bisexual floret, the several above smaller, empty, embracing each other to form a clavate or oblong terminal body. *Lodicules* 2, connate. *Stamens* 3. *Styles* 2, free. *Grain* oblong or sub-cylindric, terete or semi-terete; embryo small.

MELICA SCABERRIMA, Hook. f.; F. B. I. vii. 330.

Introduced and escaped from gardens around Ootacamund (Gamble); 7,000 ft.

Culms 1—3 ft. high; leaves 2—3.5 in. long, .1—1.5 in. wide; panicles often effuse and large; perfect florets usually 2 or 3, sometimes up to 5; glumes ovate-lanceolate or the upper elongate-lanceolate, lower .18—.2 in. long, 1-nerved, upper .21—.25 in. long, 3-nerved; lemmas .21—.28 in. long, minutely scaberulous.

115. Briza, Linn.

Annual or perennial, erect herbs. *Leaves* flat or convolute. *Panicles* effuse, sometimes reduced to a raceme; branches and pedicels capillary. *Spikelets* pendulous, laterally compressed, few-many-flowered; rhachilla disarticulating above the glumes and between the lemmas. *Glumes* 2, scarious or firmly membranous, boat-shaped and keeled or saccate and rounded on the back, persistent, subequal, 3—9-nerved. *Lemmas* firmly membranous with scarious margins, shaped more or less like the glumes, obtuse, acute or subaristate, 7—9-nerved, the outer 3 or all the lateral nerves palmately spreading; paleas much shorter, broad, 2 keeled, keels often winged, each containing a bisexual floret or the upper reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid, concavo- or plano-convex, usually dorsally compressed; embryo small.

Spikelets ovate, few, sometimes only 1 or 2, .4—.9 in. long, straw-coloured to brown or purplish, 7—20 flowered. Culms 5—26 in. high; leaves 2—8 in. long, .2—.3 in. wide; glumes very broadly ovate, .2—.3 in. long; lemmas very broadly ovate-cordate, .3 in. long, the upper at least silky-hairy.....1. *maxima*. Spikelets numerous, triangular to ovate, often wider than long, .12—.15 in. long, green, rarely purplish, 4—9-flowered. Culms 2—15 in. high; leaves 1.5—5 in. long, .12—.32 in. wide; panicles broadly obovate, lax, 1.5—3.5 in. long; glumes .08—.1 in. long, horizontally spreading; lemmas broadly ovate-cordate, very gibbous below, the scarious margins very broad, .08—.1 in. long, glabrous

2. *minor*.

1. *BRIZA MAXIMA*, Linn.; F. B. I. vii. 336.
Introduced and run wild about the Nilgiri and Pulney Hill Stations and in Travancore; 7,000—8,000 ft. The Large Quaker- or Quaking-grass.
2. *BRIZA MINOR*, Linn.; F. B. I. vii. 336.
Introduced and run wild around Ootacamund and Kodaikanal; 6,000—7,000 ft. The Small Quaker- or Quaking-grass.

116. *Poa*, Linn.

Annual or perennial, usually small herbs. *Leaves* flat or convolute. *Panicles* lax or contracted, rarely spiciform. *Spikelets* laterally compressed, 2—6-flowered, not jointed at the base; rhachilla jointed at the base and between the lemmas. *Glumes* 2, thinly membranous, subequal, acute or obtuse, 1-keeled, 1—3-nerved. *Lemmas* membranous, acute or obtuse, 5—7-nerved; paleas shorter, 2-keeled, each containing a bisexual floret or the uppermost reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid, oblong or linear, often grooved, free within the lemma and palea or adhering to the latter; embryo small.

Lemmas connected by long, often copious silky wool; .12—16 in. long; rhachilla long-silky-woolly. Culms 1—2 ft. high; leaves 2.5—8 in. long, very narrow, panicles 2—2.5 in. long; glumes acute, lower .08—11 in. long, upper .1—1.5 in. long.

1. *trivialis*.

Lemmas not connected by wool, .12 in. long; rhachilla glabrous. Culms tufted, 2—12 in. high; leaves 1—4.5 in. long, .1—1.2 in. wide; panicles 1—2.5 in. long; glumes obtuse, lower .06 in. long, upper .08 in. long.....2. *annua*.

1. *POA TRIVIALIS*, Linn.

Introduced and escaped around Ootacamund and in the Pulney Hills; 5,000—7,000 ft. The Rough Meadow-grass.

2. *POA ANNUA*, Linn.; F. B. I. vii. 345.

Probably introduced and escaped around the Hill Stations of the Nilgiri and Pulney Hills; 4,000—7,200 ft. The Annual Meadow-grass.

117. *Glyceria*, R. Brown

Perennial, rarely annual herbs. *Leaves* flat or convolute. *Panicles* effuse or contracted. *Spikelets* laterally compressed, few- to many-flowered, not jointed at the base; rhachilla jointed between the lemmas. *Glumes* 2, thin, unequal, persistent, 1—5-nerved. *Lemmas* membranous with a broadly hyaline tip, broadly oblong, obovate or fan-shaped, rounded or truncate, rarely subacute, back rounded, 3—9-nerved; paleas 2-keeled, all but the empty uppermost enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* terete or compressed, free between the lemma and palea or sub-adherent to the latter.

GLYCERIA FLUITANS, R. Br.; F. B. I. vii. 347.

Introduced and escaped about Ootacamund; 7,000—7,500 ft.; usually in wet situations. The Floating Meadow-grass.

Culms 1—3 ft. high, lax; leaves flaccid, 2.5—11 in. long, .15—35 in. wide; panicles narrow, 4—12 in. long, branches rather distant; perfect florets 7—12; glumes broadly oblong, lower .08—09 in. long, upper .13—14 in. long; lemmas broadly oblong, the lowest 18—22 in. long; paleas 2-toothed, keels narrowly winged upwards.

118. *Dactylis*, Linn.

Stiff, erect, perennial herbs. *Leaves* flat. *Panicles* terminal, unilateral, composed of short, crowded, unilateral spikes. *Spikelets* subdistichous, compressed, not jointed at the base, 3—10-flowered; rhachilla continuous. *Glumes* scarious, persistent, unequal, lanceolate, acuminate, mucronate or caudate; lower 1-nerved; upper 3-nerved. *Lemmas* rather longer, rigid, subaristate, keel scabrid, 5-nerved; paleas 2-fid, 2-keeled, keels ciliolate, each enclosing a bisexual floret, or the uppermost reduced or empty. *Lodicules* 2, fleshy, 2-lobed. *Stamens* 3. *Styles* 2, free. *Grain* oblong, acute, trigonous, dorsally subcompressed, ventrally channelled.

DACTYLIS GLOMERATA, Linn.; F. B. I. vii. 335.

Introduced and run wild in and about Ootacamund; 7,000—8,000 ft. The Cock's-foot grass.

Culms 1—3 ft. high, erect from a short, creeping rootstock; leaves 3—18 in. long, .1—.3 in. wide; panicles 1.5—5 in. long; lower glume .15—.2 in. long, upper .25 in. long; lemmas 3—4, lowest .26—.3 in. long.

119. *Vulpia*, Gmelin

Annual, slender, erect herbs. *Leaves* very narrow, involute or convolute. *Panicles* contracted, narrow, usually more or less secund; pedicels clavate. *Spikelets* laterally compressed after flowering, 1—7-flowered; rhachilla slender, disarticulating at the base and between the fertile lemmas. *Glumes* very unequal; the lower minute or obsolete or like the upper subulate to subulate-lanceolate but much shorter, 1-nerved; the upper usually 3-nerved. *Lemmas* subulate-lanceolate, tapering into a straight awn, back rounded, faintly 5-nerved; paleas entire or minutely 2-toothed, 2-keeled, 1—several lower containing each a bisexual floret, the 1 or 2 uppermost reduced. *Lodicules* 2, hyaline. *Stamens* 1—3. *Styles* 2, free. *Grain* linear, back strongly compressed, concave in front, enclosed within the lemma and palea, adhering to the latter or to both; embryo small.

VULPIA MYUROS, Gmel. *Festuca Myuros*, Linn.; F. B. I. vii. 356.

Introduced and escaped about Ootacamund and Kodaikanal; 6,500—8,000 ft. The Mouse-tail fescue-grass.

Culms 6—18 in. high; leaves setaceous, at least when dry, 1—10 in. long; panicles narrow, spiciform, erect or nodding, 2—10 in. long; lower glume .02—.07 in. long, upper .16—.2 in. long, acuminate; lemmas 3—5 perfect, 1—2 reduced, lowest .23—.34 in. long, its awn .46—.7 in. long.

120. *Festuca*, Linn.

Perennial, tufted herbs. *Leaves* flat, folded or convolute, often setaceous; sheaths more or less open, seldom closed. *Panicles* more or less compound, contracted or open, sometimes effuse. *Spikelets* laterally compressed (at least after flowering), 2—many-flowered; rhachilla disarticulating at the base and between the lemmas. *Glumes* subequal,

rarely conspicuously unequal, more or less keeled, 1—3-nerved, the upper rarely 5-nerved. *Lemmas* lanceolate, mucicous, mucronate or awned from the tip or very near it, back rounded or keeled towards the apex, 5—7-nerved; paleas more or less 2-toothed, 2-keeled, containing each a bisexual floret, the uppermost usually reduced. *Lodicules* 2, hyaline. *Stamens* 3. *Styles* 2, free. *Grain* oblong, back convex, grooved or concave in front, tightly enclosed in the slightly hardened lemma and palea, free or more or less adhering to the palea or to both; embryo small.

FESTUCA OVINA, Linn.

Introduced and escaped about Ootacamund; 7,000—8,000 ft.

Sheep's fescue-grass.

Culms wiry, 6—15 in. high; leaves convolute and more or less setaceous, 1·3—3 in. long (much longer in the viviparous form); panicles open, 1—3 in. long; glumes 1—1·8 in. long, the upper about $\frac{1}{2}$ longer than the lower; lemmas lanceolate, 2·2—2·5 in. long, 4—7 with perfect florets.

121. *Bromus*, Linn.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* contracted and often dense or open and sometimes effuse or reduced to a raceme. *Spikelets* laterally compressed (at least after flowering), rather large, erect or pendulous, not jointed at the base, usually many-flowered; rachilla disarticulating at the base and between the lemmas. *Glumes* usually unequal, persistent, acute to acuminate; the lower 1—7-nerved; the upper 3—9-nerved. *Lemmas* lanceolate to broadly oblong, back rounded or keeled, 5—13-nerved, usually awned, sometimes 3-awned, median or only awn erect or recurved, sometimes twisted at the base, not kneed; paleas entire or 2-fid, keels 2, scabrid or ciliate, enclosing each a bisexual floret, the uppermost reduced. *Lodicules* 2. *Stamens* 3, rarely 2. *Ovary* obovoid with a villous 2- or 3-lobed appendage. *Styles* 2, lateral on the appendage. *Grain* linear to linear-oblong, usually concavo-convex, enclosed in and usually adhering to the lemma and palea or at least to the latter; embryo small.

Perennial; culms up to 6 ft. high; leaves 4—18 in. long, 1·2—1·5 in. wide, glabrous or more or less hairy; panicles up to 1 ft. long; lower glume 1-nerved, 1·2—1·34 in. long, upper 3-nerved, 1·8—1·43 in. long; lemmas 3—9, 2·8—1·5 in. long, 5—7-nerved, aristate, scaberulous, keeled below the tip.....1. *asper*.

Annual; culms up to 28 in. high; leaves 5—15 in. long, 1—1·3 in. wide, glabrous; panicles narrow, usually nodding, 3—16 in. long; spikelets strongly compressed; glumes keeled, lower 5—7-nerved, 1·44—1·58 in. long, upper 7—9-nerved, 1·49—1·7 in. long; lemmas 4—10, 1·5—1·7 in. long, 9—13-nerved, cuspidate, keeled...2. *catharticus*.

1. *BROMUS ASPER*, Murray; F. B. I. vii. 358.

Nilgiri and Pulney Hills; 5,500—8,000 ft.

Doubtfully indigenous.

2. *BROMUS CATHARTICUS*, Vahl. *B. unioloides*, H. B. K.; F. B. I. vii. 357.

Nilgiri Hills; 6,500—8,000 ft.

An introduced American grass escaped about Ootacamund and Kotagiri; sometimes grown for fodder.

Flowers cleistogamous.

122. *Streptogyna*, Beauv.

Tall, erect, perennial herbs. *Leaves* petioled, flat, with obscure transverse venules. *Spikes* erect, unilateral. *Spikelets* long, narrow, subterete, imbricate, 1—6-flowered, not jointed at the base; rhachilla very long, slender, articulated at the base and between the lemmas. *Glumes* chartaceous, persistent; the lower oblong, tip truncate and erose, 3—7-nerved to the tip; the upper much longer, acuminate, tip entire or 2-toothed, awned. *Lemmas* chartaceous, very narrow, convolute, tip acutely 2-fid and awned from the sinus, 3-nerved; *paleas* as long, keels 2, close, smooth, each enclosing a bisexual floret. *Lodicules* 3, elongate. *Stamens* 2—3. *Style* single, long, twisted, with 2—3 long, tortuous stigmas. *Grain* linear, free but closely embraced by the lemma and *palca*.

STREPTOGYNA GERONTOGEA, Hook. f. *S. crinata*, Thw. non Beauv.; F. B. I. vii. 333.

S. Travancore; in moist forest.

Culms 2—6 ft. high; leaves 6—12 in. long, 4—1 in. wide; spikes 4—16 in. long; lower glumes 3—14 in. long, upper $2\frac{1}{2}$ —3 times longer; lowest lemma a little longer than the upper glume, its awn 6—1 in. long.

123. *Brachypodium*, Beauv.

Annual or perennial herbs. *Leaves* flat or setaceously convolute. *Racemes* terminal, simple, spiciform; joints of axis more or less hollowed, at least the lower, opposite the spikelets. *Spikelets* often few, rarely solitary, at first cylindrical, later laterally compressed, erect and appressed to the rhachis or spreading, 5-many-flowered; rhachilla disarticulating above the glumes and between the lemmas. *Glumes* 2, persistent, firm, more or less unequal, 3—7-nerved. *Lemmas* oblong to oblong-lanceolate, usually narrowed into a mucro or a straight arista, back rounded, 7—9-nerved, at first imbricate, then spreading; *paleas* rather broad, obtuse or truncate, 2 keeled, keels rigidly ciliate, each enclosing a bisexual floret, the uppermost more or less reduced. *Lodicules* 2, ciliate. *Stamens* 2 or 3. *Ovary* crowned with a villous appendage. *Styles* 2, lateral. *Grain* linear or linear-oblong, concavo-convex, enclosed in the lemma and *palca*, more or less adherent to the latter; embryo small.

BRACHYPODIUM SYLVATICUM, Beauv.; F. B. I. vii. 362.

About the hill-stations in the Nilgiris and around Kodaikanal; 5,000—7,000 ft. Probably introduced and escaped.

Culms up to 4 ft. high; leaves 3—8 in. long, 1—3 in. wide, flat and flaccid or convolute; racemes 2—8 in. long; lower glume 16—18 in. long, 3-nerved, upper 26—27 in. long, 5—7-nerved; lemmas 8—14, 29—36 in. long, 7—9-nerved, mucro or arista 04—32 in. long.

124. *Lolium*, Linn.

Annual or perennial, erect herbs. *Leaves* flat or convolute. *Spikes* terminal, simple, solitary; rhachis alternately and distichously hollowed opposite the spikelets. *Spikelets* solitary, 2-ranked, usually more or less

compressed, the lowest lemma appressed to the rhachis, 3—11-, sometimes more-flowered. *Glumes* 2 in the terminal spikelet, equal and similar, in all the other spikelets the lower glume suppressed; upper linear to oblong, persistent, rigid, many-nerved. *Lemmas* shorter, oblong, obtuse, acute or awned, back rounded, 5-many-nerved; *paleas* as long, 2-keeled, keels sometimes narrowly winged, each containing a bisexual floret or the uppermost reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic- to linear-oblong, tightly enclosed by and adhering to the lemma and palea; embryo short.

LOLIUM PERENNE, Linn.; F. B. I. vii. 365.

Introduced and escaped around Ootacamund and in the Pulney Hills. The Rye grass.

Perennial; culms up to 18 in. high; leaves 3—12 in. long, .05—.15 in. wide, flat or convolute; spikes 3—9 in. long; glumes .34—.4 in. long; lemmas 3—11, .24—.28 in. long.

125. *Triticum*, Linn.

Annual or biennial herbs. *Leaves* flat. *Spikes* terminal, solitary; rhachis excavated opposite the spikelets, articulate or inarticulate. *Spikelets* solitary, distichous, tumid, few-flowered. *Glumes* 2, persistent, rigid, often unequal-sided, obtuse or shortly awned. *Lemmas* oblong or ventricose, back rounded or keeled upwards, muticous or 1—3-awned, 5—9-nerved; *paleas* as long, 2-keeled, keels ciliate, the lower each containing a bisexual floret, the upper enclosing a ♂ floret or empty. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* oblong, ventrally grooved, often hairy, free within the lemma and palea or adhering to the latter.

TRITICUM DICOCUM, Schrank. *T. vulgare*, Vill.; F. B. I. vii. 367.

Cultivated here and there for its grain, but not extensively. The Wheat or Corn plant. Vern. *Tel* Godumalu; *Tam*. Godumai; *Mal*. Kotampam; *Kan*. Godi.

126. *Hordeum*, Linn.

Annual or perennial herbs. *Leaves* flat. *Spikes* terminal, solitary, simple, cylindric; rhachis excavate or jointed. *Spikelets* 2—3-nate in the hollows or at the nodes of the rhachis, 1-flowered or the lateral imperfect; rhachilla jointed below the lemma and produced above it as a bristle, sometimes bearing an abortive lemma. *Glumes* 2, persistent, rigid, narrow, the outer ones of each cluster together often resembling an involucre. *Lemmas* lanceolate, tapering into a long straight or recurved awn, back rounded, 5-nerved; *paleas* about as long, 2-keeled, deeply folded between the keels, containing a bisexual floret, or in the lateral spikelets a ♂ floret or empty and much reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* ovoid- or narrow-oblong, grooved in front, tip usually villous, tightly enclosed in the lemma and palea and adhering to the latter or to both; embryo small.

HORDEUM HEXASTICHON, Linn. *H. vulgare*, Linn. var. *hexastichon*, Aitchis.; F. B. I. vii. 371.

Occasionally cultivated in the hills. The Barley plant. Vern. *Tam*. Ganji, *Dorai ganji*.

127. *Arundinaria*, Michaux

Erect or climbing woody shrubs. *Culms* slender; nodes usually prominent. *Culm-sheaths* thin, papery, straw-coloured; imperfect blades narrow, subulate. *Leaves* usually small. *Inflorescence* various, paniculate or racemose. *Spikelets* often long, compressed, often enclosed in bracteate sheaths, 1-many-flowered. *Glumes* 2, membranous, unequal. *Lemmas* longer, concave, many-nerved, obtuse, acute or mucronate; *paleas* usually shorter, prominently 2-keeled, usually compressed, all containing a bisexual floret, except sometimes the reduced terminal. *Lodicules* 3, ovate or lanceolate, ciliate. *Stamens* 3, rarely up to 6, usually exserted, anthers usually blunt. *Ovary* globular above, often hairy. *Style* short; stigmas 2—3. *Grain* ovate or narrowly oblong, smooth, furrowed on the back, enclosed in the persistent lemma and palea.

Large shrubs; culm-leaves over 4 in. long, distinctly, shortly petioled; spikelets many in large terminal panicles 3—5-flowered:—

- Leaves thick with thickened cartilaginous margins, base nearly truncate, 5—11 in. long, 1—1.7 in. wide.....1. *Walkeriana*.
 Leaves thin, margins neither thickened nor conspicuously cartilaginous, base usually shortly narrowed, 4—7 in. long, .7—1 in. wide.....2. *Wightiana*.
 Small shrubs up to 3 ft. high; leaves densely imbricate, thick, rigid, pungent, margins thickened, cartilaginous, sessile or nearly so, .8—1.5 in. long, .17—.3 in. wide; spikelets in racemes on leafy branches, 1-flowered.....3. *densifolia*.

1. *ARUNDINARIA WALKERIANA*, MUNRO; F. B. I. vii. 377; Gamble Ann. Calc. vii. t. 1.

Pulney Hills (Beddome).

2. *ARUNDINARIA WIGHTIANA*, NEES; F. B. I. vii. 377; Gamble Ann. Calc. vii. t. 2.

Nilgiri, Palghat, Pulney and High Wavy Mountains (Blatter and Hallberg); 3,000—8,000 ft.

Common underwood in the Nilgiri Sholas. Flowering annually; densely gregarious.

Var. *hispida*, Gamble; F. B. I. vii. 377.

Leaf-sheaths and stems thickly covered with golden hairs from tubercles; internodes more flattened on one side.

Nilgiri Hills; 7,000—7,500 ft.

3. *ARUNDINARIA DENSIFOLIA*, MUNRO; F. B. I. vii. 379; Gamble Ann. Calc. vii. t. 7.

Anaimudi in Travancore at 8,500 ft. (Beddome).

Densely gregarious.

128. *Dendrocalamus*, Nees

Trees, sometimes large, always unarmed. *Culms* usually erect from a densely branched rootstock, sometimes nearly solid. *Culm-sheaths* often very large, usually elongate, variously auricled; imperfect blades narrowly triangular. *Leaves* sometimes very broad, without transverse veins but frequently with pellucid glands instead. *Panicles* large, compound; the spikelets usually in globose congested heads in long spikes. *Spikelets* ovate, florets few, rarely more than 6, usually bisexual. *Glumes* 2—3, ovate, acute or mucronate, many-nerved. *Lemmas* similar; *paleas* ovate, acute, truncate, emarginate or 2-cleft, the lower 2-keeled and ciliate,

the uppermost usually rounded on the back and eciliate. *Lodicules* usually 0. *Stamens* 6; filaments free; anthers mucronate or with tufted hairs. *Ovary* ovoid or subglobose, often depressed, hairy above. *Style* long, usually hairy; stigma usually simple. *Grain* small; pericarp crustaceous or hardened.

DENDROCALAMUS STRICTUS, Nees; F. B. I. vii. 404; Bedd. Fl. Sylv. t. 325; Brand. For. Fl. t. 70. Gamble Ann. Calc. vii. tt. 68, 69. *Bambos stricta*, Roxb. Cor. Pl. t. 80.

Gregarious in all the drier hill-tracts; 300—4,800 ft.; absent from the W. Coast. The Male Bamboo.

Variable in size according to climate; culms 20—50 ft. high, 1—3 in. diam., sometimes solid; leaves in very dry localities 1—2 in. long, in moist ones up to 10 in. long, 2—1.2 in. wide; spikelets in dense globose heads 3—1.3 in. diam., spinescent, usually hairy, the fertile intermixed with smaller barren ones; lemmas ending in a short, sharp spine surrounded by ciliate tufts of hairs.

The culms are much used for poles, rafters, lance-shafts, lathies, matting, baskets, etc. Vern. *Hind.* Bans; *Ur.* Salia bhanso, Salimbo bhanso; *Tel.* Sadanapa veduru, Pen veduru, Kanka; *Tam.* and *Mal.* Kal mungil.

129. *Bambusa*, Schreber

Shrubs or trees, rarely climbing, often very large, sometimes thorny. *Culms* from a thick rhizome, sometimes stoloniferous. *Culm-sheaths* usually broad, as also the triangular imperfect blades. *Leaves* small to moderately large, their sheaths variously auriculate. *Inflorescence* usually a large, leafless, compound panicle with the spikelets in heads on spicate branchlets, but sometimes in leafy panicles or paniculate spikes. *Spikelets* 1—many-flowered. *Glumes* 1—3. *Lemmas* ovate-lanceolate, usually mucronate; paleas 2-keeled containing a bisexual floret. *Lodicules* 3, membranous, generally obtuse, ciliate. *Stamens* 6; filaments free, often exserted; anthers narrow, tip obtuse, apiculate or panicillate. *Ovary* oblong or obovate, hairy at the apex. *Style* short or long; stigmas 1—3. *Grain* oblong or linear-oblong, furrowed on one side; pericarp thin, adhering; embryo conspicuous.

Thornless; culms 20—70 ft. high, 2—4 in. diam.; blade of culm-sheath sparingly hairy within; leaves 6—10 in. long, 7—1.5 in. wide; spikelets 1—3 in. long; lemmas .5—1 in. long; ovary hairy.....1. *Tulda*.
Branches armed at the nodes with 2—3 recurved spines; culms 80—100 ft. high, 4—7 in. diam.; blade of culm-sheath densely felted with black or dark-purplish hairs within; leaves up to 8 in. long and 1 in. wide; spikelets .5—1 in. long; lemmas .2—35 in. long; ovary glabrous.....2. *arundinacea*.

1. BAMBUSA TULDA, Roxb.; F. B. I. vii. 387; Gamble Ann. Calc. vii. t. 29.

Vizagapatam District (Gamble); 1,500—2,000 ft.; Nundydroog (Rottler—perhaps cultivated).

Used for building, scaffolding and the making of mats and baskets. Vern. *Hind.* Peka; *Beng.* Tulda, Talda bans.

2. BAMBUSA ARUNDINACEA, Willd.; F. B. I. vii. 395; Roxb. Cor. Pl. t. 79; Bedd. Fl. Sylv. t. 321; Gamble Ann. Calc. vii. t. 48.

In all Districts; 100—4,000 ft. The Thorny Bamboo.

Used for buildings, scaffolding and for many domestic purposes ; for floating heavy timber ; the split culms are woven into mats, baskets, fans, etc. The grain when available is eaten by the poor. Vern. *Ur.* Kōnta bhānsō ; *Tel.* Veduru, Mulla veduru, Bongudu ; *Tam.* Mungil, Periya mungil, Peru varai mungil ; *Mal.* Mulla, Illi ; *Kan.* Dongi, Bidungalu, Hebbidru.

130. *Teinostachyum*, Munro

Shrubs or trees. *Culms* rather slender, drooping above. *Culm-sheaths* usually thin ; imperfect blades recurved. *Leaves* usually lanceolate, acuminate. *Inflorescence* of spicate panicles on leafy branches ; the spikelets in bracteate verticels. *Spikelets* long, narrow, few—many-flowered, the upper and lower florets imperfect, the others bisexual. *Glumes* 1 or 2, ovate, mucronate. *Lemmas* similar with longer mucros ; paleas convolute, 2-keeled, keels ciliate. *Lodicules* 3, conspicuous, 3—9-nerved, persistent. *Stamens* 6 ; filaments free ; anthers exserted, obtuse or obtusely apiculate. *Ovary* ovate or depressed-globose, produced into a long beak enclosing the style ; stigmas 2—3. *Grain* ovoid, acuminate, beaked ; pericarp crustaceous, not adnate to the seed.

TEINOSTACHYUM BEDDOMEI, C. E. C. Fischer n. nom. *T. Wightii*, Bedd. ; F. B. I. vii. 410 ; Bedd. Fl. Sylv. t. 323 ; Gamble Ann. Calc. vii. t. 87

Nilgiri and Travancore Hills ; 3,000—5,000 ft

Culms semi-scandent, 10—20 ft. high, 1—1.5 in. diam. ; ends of branches pendulous ; culm-sheaths papery, 10—12 in. long ; leaves oblong-lanceolate, 6—15 in. long, 1—2 in. wide ; panicles large, terminal, drooping, branches spiciform ; spikelets 5—1 in. long ; glume solitary ; lemmas 3—4, 2—3 fertile, the others incomplete. Flowers at long intervals and dies down.

Used by the jungle tribes for mats, baskets and fencing. Vern. *Tam.* Nanyura, Mai ita, Chittu.

131. *Oxytenanthera*, Munro

Scandent or small or medium-sized, unarmed, erect trees. *Culms* from a thick rhizome, usually creeping underground and stoloniferous. *Culm-sheaths* and imperfect blades usually narrow. *Leaves* usually small. *Inflorescence* a large panicle of spicate heads of few—many spikelets. *Spikelets* elongate, conical, 1—2—3-flowered, the uppermost usually fertile. *Glumes* 1—3. *Lemmas* elongate-ovate, mucronate ; lower paleas 2-keeled, the uppermost convolute, only slightly or not at all keeled. *Lodicules* 0. *Stamens* 6 ; filaments united into a tube, thick at first, later membranous, exserted ; anthers narrow, acute or apiculate. *Ovary* ovoid. *Style* fine ; stigmas 1—3. *Grain* elongate, grooved, beaked by the persistent style ; embryo conspicuous.

Glumes densely, often dark-ciliate, 1—1.6 in. long. *Leaf-sheaths* truncate and rigidly ciliate at the mouth. *Spikelets* .44—4.8 in. long ; lemmas usually 4, densely ciliate above the middle ; .28—4.6 in. long ; grain .25—3.5 in. long

1. *nigrociliata* var. *Hohenackeri*.

Glumes not or sparingly pale-ciliate:—

Branches climbing, whip-like; culms hollow; culm- and sometimes leaf-sheaths with a separable, coriaceous, bristly ring at the mouth; spikelets 35—5 in. long, 1-flowered; glumes and lemmas usually sparingly pale-ciliate on the margins; style hairy.....2. *monadelpha*.

Branches not whip-like even though straggling; culm- and leaf-sheaths without bristly ring; spikelets 6—1 in. long; glumes and lemmas eciliate:—

Culms solid or nearly so, densely velvety-tomentose; culm-sheaths thin, papery at the edges; leaf-sheaths without apical calluses; spikelets slender, long, spinose-apiculate, 1-flowered; style glabrous.....3. *monostigma*.

Culms hollow, glabrous; leaf-sheaths with 2 apical calluses; spikelets robust, 3-flowered; style hairy.....4. *Bourdillon*.

1. *OXYTENANTHERA NIGROCILIATA*, Munro; F. B. I. vii. 401.

Var. *Hohenackeri*, C. E. C. Fischer n. var.

Coorg near Mercara (Hohenacker); S. Kanara (Rhodes Morgan, G. F. F. Foulkes).

2. *OXYTENANTHERA MONADELPHA*, Alston, *O. Thwaitesii*, Munro; F. B. I. vii. 402; Bedd. Fl. Sylv. t. 322; Gamble Ann. Calc. vii. t. 64.

W. Ghâts from the Bababudan to the Travancore Hills; 3,500—6,000 ft.

Gregarious, subscandent, reed-like, 10—12 ft. high. Vern. Wattai (Anamallais—Kadir?).

3. *OXYTENANTHERA MONOSTIGMA*, Bedd.; F. B. I. vii. 462; Gamble Ann. Calc. vii. t. 65.

Coorg and Anamallai Hills.

Erect; culms up to 15 ft. high. Apparently rare.

4. *OXYTENANTHERA BOURDILLON*, Gamble; F. B. I. vii. 403; Gamble Ann. Calc. vii. t. 67.

Travancore, near the Cochin boundary; among precipitous rocks; 3,000—5,000 ft. (Bourdillon).

Straggling, forming open clumps; 20—30 ft. high. Vern. Tam. Kambu; Kan. Aramba.

132. *Ochlandra*, Thwaites

Reed-like woody shrubs or small trees. Culms erect, internodes rather long, thin-walled. Culm-sheaths thin, persistent. Leaves many-veined, margins cartilaginous; sheaths striate, fringed. Inflorescence of spikes or spicate panicles terminating leafy branches; spikelets verticillate, some fertile, some sterile. Spikelets 1-flowered, often very large. Glumes 2—5, variable, usually mucronate. Lemmas similar to the uppermost glume, mucronate; paleas membranous, not keeled. Lodicules 1—several, conspicuous, variable, usually appressed to the filaments. Stamens 6—120; filaments free or united into a tube, exerted; anthers long, usually mucronulate. Ovary narrow. Style long; stigmas 4—6. Grain large or very large, ovoid, long-beaked, supported by the persistent glumes; pericarp very thick, fleshy.

Ligules short:—

Culm leaves 1.7 in. or less wide; inflorescence, when known, of short terminal spikes or spicate panicles on leafy branches; spikelets 1.2 in. or less long; filaments free:—

Culm-sheaths truncate with 2 falcate, long-ciliate auricles, their imperfect blades long-ensiform; spikelets .5—1.2 in. long, glabrous or with a few setae near

the apex of glumes and lemmas. Culms erect, up to 16 ft. high and 1 in. diam.; leaves 4—10 in. long, .4—1 in. wide; glumes .24—6 in. long; lemmas .85 in. long.....1. *scriptoria*.

Culm-sheaths, when known, attenuate into a needle-like blade; spikelets, when known, hirsute:—

Culms and culm-sheaths unknown. Leaves 5—8 in. long, 1—1.5 in. wide, mouth of sheaths with a rounded bristly auricle decurrent on either side; spikelets 1—1.5 in. long, covered with scattered, stiff, bulbous-based, spreading, brown hairs; glumes up to .7 in. long; lemmas up to 1.3 in. long
2. *Beddomei*.

Culms erect or straggling, up to 20 ft. high, .5—7 in. diam.; culm-sheaths persistent, thin, papery, gradually narrowed to a narrow apex, their imperfect blades needle-like, .7—1 in. long; leaves 4—9 in. long, .6—1.7 in. wide. Inflorescence unknown.....3. *setigera*.

Culm-leaves 6—18 in. long, 2—4.5 in. wide, mouth of their sheaths bearing stiff bristles; inflorescence a subverticillate, spicate panicle. Culms erect, 6—20 ft. high, 1—2 in. diam.; spikelets 2—2.5 in. long; glumes up to 2 in. long, mucronate; lemmas 2—2.2 in. long, usually mucicous; filaments united
4. *travancorica*.

Ligules membranous, 1—1.8 in. long. Culms and culm-sheaths unknown; leaves 10—25 in. long, 1.5—4.5 in. wide, their sheaths rarely with a few deciduous bristles at the mouth; inflorescence a terminal verticillate spike with a thick rhachis; spikelets 1—1.7 in. long; glumes .44—1.2 in. long with a cusp .1—25 in. long; lemmas 1.4—1.6 in. long, mucronate.....5. *Wightii*.

1. *OCHLANDRA SCRIPTORIA*, C. E. C. Fischer n. comb. *O. Rheedii*, Gamble; F. B. I. vii. 418; Gamble Ann. Calc. vii. t. 107.

Malabar (Wight); Cochin (Johnston); Travancore; at low elevations. Growing in thick clumps on river banks.

Flowers sporadically every year and does not die down.

Used for mat and basket-making. Vern. *Mal.* Ammei, Ottal, Kolanji.

- Var. *sivagiriana*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 108.

Leaves and spikelets much larger; stamens more numerous, up to 60.

Pulney (Beddome) and Sivagiri Hills.

2. *OCHLANDRA BEDDOMEI*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 110.

Wynaad (Beddome).

3. *OCHLANDRA SETIGERA*, Gamble; F. B. I. vii. 420; Gamble Ann. Calc. vii. t. 115.

Nilgiri Hills at Gudalur at 3,000 ft. (Gamble).

4. *OCHLANDRA TRAVANCORICA*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 111. *Beesha travancorica*, Bedd. Fl. Sylv. t. 324.

Anamallai, Tinnevely and Travancore Hills; sea-level to 5,000 ft. Gregarious in evergreen forest, covering large areas with a dense growth. Flowers at long intervals and dies down.

In great demand locally for mat- and basket-making.

A coarse paper is made from it. The leaves are much eaten by elephants and can be fed to horses if grass is scarce. Vern. *Tam.* Eeral, Eera-katti, Nanal, Odai; *Mal.* Eetta, Kar-eetta, Vei.

- Var. *hirsuta*, Gamble ; F. B. I. vii. 420 ; Gamble Ann. Calc. vii. t. 112.
Leaves thicker, margins more cartilaginous, their sheaths with appressed hairs from bulbous bases ; spikelets thickly clothed with light-brown velvety pubescence.
Travancore Hills (Beddome).
5. *OCHLANDRA WIGHTII*, C. E. C. Fischer n. comb. *O. Brandisii*, Gamble ; F. B. I. vii. 420 ; Gamble Ann. Calc. vii. t. 113.
Travancore ; at low elevations and up to 3,500 ft.
Much resembling the previous species.

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

PART XI
ADDENDA, INDEXES, ETC.

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

WITH MAP

REPRINTED UNDER THE AUTHORITY
OF THE GOVERNMENT OF INDIA

CALCUTTA

1956

The supplementary note, explanatory of Part X, appeared as No. VIII in the 'Kew Bulletin' for 1935, p. 143. That for the present Part will be found on p. ix within.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS, KEW ;

9th September, 1935.

ADDENDA

p. 18, line 28 from the bottom, after fascicles add: or cymes.

For line 27 from the bottom, substitute:

Flowers in fascicles or cymes:—

Leaves not at all peltate:—

Petals 6; anthers opening by transverse slits, styles terete; drupes compressed
6. COCCULUS.

Petals 4—6; anthers opening by vertical slits; styles compressed; drupes
nearly terete.....6a. HYPSEPERA.

Leaves peltate or subpeltate.....6b. PERICAMPYLUS.

p. 21, after line 11, insert:

6a. HYPSEPERA, Miers

Climbing shrubs. *Leaves* elliptic, usually glabrous, 3-ribbed. *Flowers* in axillary racemes, dioecious. ♂ *Sepals* 8—12, 2—3-seriate, outer bractiform, inner 5—6 longer, imbricate. *Petals* 4—6, slightly smaller, fleshy. *Stamens* 6—10; anthers dehiscing vertically. ♀ *Sepals* 8, outer 2, bractiform, imbricate. *Petals* 5—6. *Staminodes* 6, clavate. *Ovaries* 6, rarely 3 or 2; style very short, excentric; stigma linear-oblong, deeply canaliculate. *Drupes* 2—3, fleshy, transversely ovate; endocarp bony, subglobose, hardly compressed, slightly dorsally keeled, sides radially sulcate, cells lunate. *Seeds* conforming to the cells, back keeled, ventrally flat; embryo nearly annular, included in the fleshy albumen; cotyledons accumbent.

HYPSEPERA CUSPIDATA, Miers *Limacia cuspidata*, Hook. f. & T.;
F. B. I. i. 100.

Madgole Hills, Vizagapatam District; 3,000—4,000 ft. (A. W. Lushington).

A woody climber; leaves ovate-oblong to oblong-lanceolate, acuminate, base rounded or acuminate, 2—5 in. long, 1—2.25 in. wide, glabrous, shining; drupes up to .5 in. long.

6b. PERICAMPYLUS Miers

Climbing shrubs. *Leaves* subrotund, peltate or subpeltate, 5—7-ribbed. *Flowers* in axillary cymes, dioecious. ♂ *Sepals* 9 in 3 series, the outer 3 bractiform, minute, inner series successively longer, imbricate. *Petals* 6, very much shorter. *Stamens* 6, embraced by the petals; anthers dehiscing transversely. ♀ *Sepals* 6. *Petals* 6, broader. *Staminodes* 6, filiform. *Ovaries* 3, gibbous; style short, thick; stigma linear, abruptly deflexed. *Drupes* 3, gibbously ovate, fleshy; endocarp bony, suborbicular, compressed, dorsally crested and echinate; cells horseshoe-shaped. *Seeds* curved, radially sulcate; embryo slender, curved, included in the albumen, cotyledons incumbent.

PERICAMPYLUS INCANUS, Miers; F. B. I. i. 102.

Madgole Hills, Vizagapatam District; 3,000—4,000 ft. (A. W. Lushington).

A woody climber; leaves suborbicular, obtuse, acute or retuse, base truncate or subcordate, more or less peltate, 2—4 in. diam.; drupe red.

p. 51, after line 3, insert:

Var. *major*, Fyson in S. I. H. S. i. 49, a larger plant, much less branched; flower terminal and in the upper axils only.

Nilgiri Hills. Rare.

p. 59, for lines 9—12, substitute:

Axils of leaf-nerves nearly always furnished with glands:—

Nerves of leaves 4—5 pairs; wings of fruit .6—9 in. wide.....2. *racophloea*.

Nerves of leaves 6—12 pairs; wings of fruit .7—1 in. wide.....2a. *canarensis*.

Axils of leaf-nerves never furnished with glands:—

Leaves 5—9 in. long, 1.7—3 in. wide, apex blunt, nerves 7—9 pairs; petals .25 in. long; wings of fruit linear to linear-elliptic, 2.3—3.7 in. long, .5—7 in. wide

3. *Wightiana*.

Leaves 2.2—4 in. long, 1—1.75 in. wide, acute or acuminate, nerves 4—8 pairs:—

Leaves elliptic-oblong to oblong-lanceolate, acute or acuminate, 2.5—4 in. long, 1—1.75 in. wide; petals .3—3.5 in. long, wings of fruit broadly oblong or oblong-spathulate, 1.75 in. long, .5 in. wide.....4. *glabra*.

Leaves ovate, caudate-acuminate, 2.2—3.4 in. long, 1—1.6 in. wide; nerves 5—6 pairs; petals 1.3—1.5 in. long.....5. *Jacobi*.

For lines 21—26, substitute:

2a *HOPEA CANARENSIS*, Hole in Ind. For. 1918, 575; Ind. For. Rec. vii, part iii, pl. 1.

S. Kanara (Lodge, McCarthy).

A large tree up to 8 ft. girth. Vern. *Kan.* Malai Haiga.

3. *HOPEA WIGHTIANA*, Wall.; F. B. I. i. 309; W. & A. 85; Ind. For. Rec. xx, part xv, pl. xiv.

Coorg, S. Kanara, Malabar and Travancore in semi-evergreen deciduous forest, up to 1,500 ft.

A small or moderate-sized tree with a brown wood of rather poor quality, seldom used except for fuel. Vern. *Kan.* Nai Irupu, Beribogi.

4. *HOPEA GLABRA*, W. & A. 85; F. B. I. i. 310; Bedd. Fl. t. 96; Ind. For. Rec. xx, part xv, pl. xv.

Evergreen forests of S. Kanara, Travancore and Tinnevely; 1,000—4,000 ft. A large tree with good timber used for railway sleepers and house building. Vern. *Tam.* Kongu; *Mal.* Irumbakam.

5. *HOPEA JACOBI*, C. E. C. Fischer in Kew Bull. 1932, 245.

Coorg (Jacob).

A small tree.

p. 66, for line 4 from the bottom, substitute:

Bracteoles 5, ovate; carpels glabrous or sparsely puberulous:—

Slender plants; corolla and androecium wholly yellow; carpels muricate, without spinules.....1. *procumbens*.

Robust plants, stems 24—40 in. high; corolla yellow with its centre and androecium dark-red-purple; carpels usually spinulose.....1a. *Coxii*.

p. 87, after line 6, insert:

- 1a. PAVONIA COXII, Tad. & Jac. in Journ. Ind. Bot. Soc. v. 11.
Anantapur (Gamble) and Coimbatore Districts.

p. 94, for lines 7 and 6 from the bottom, substitute:

Leaflets nearly glabrous:—

Bracts .08—12 in. long, nearly glabrous; sepals .2 in. long, nearly glabrous; seeds prominently ridged, not tubercled; pedicels 0—1 in. long; stem generally short.....1. *sensitivum*.

Bracts .2—32 in. long, long-ciliate from tubercles; sepals .2—28 in. long, prominently ciliate from tubercles; seeds spirally ridged and tubercled on the ridges.....1a. *longibracteatum*.

p. 95, between lines 7 and 8, insert:

Leaflets 15 or more pairs:—

After line 11, insert:

Leaflets 7—10 pairs, lower ovate, 1—2 apical pairs oblong, basal .5 in. long, .38 in. wide, increasing upwards to 1.38 in. long, .62 in. wide; margins thickened
7. *insignis*.

After line 15, insert:

- 1a. BIOPHYTUM LONGIBRACTEATUM, Tad. & Jac. in Journ. Ind. Bot. Soc. iv. 87.

Mundanthorai, Tinnevely District (Jacob).

After line 23 from the bottom, insert:

7. BIOPHYTUM INSIGNIS, Gamble in Kew Bull. 1921, 216.

Kodamadi, Tinnevely District (Ranga Achariyar, Jacob).

p. 96, for line 8, substitute:

Spur of lip incurved, tip inflated:—

Leaves quite glabrous, orbicular or reniform, apex not narrowed, lobes of wing-petals subequal.....3. *Beddomei*.

Leaves pilose above, narrowed to the apex:—

Leaves thick, erect, suborbicular or ovate, base cordate, pilose above, basal-lobe of wing-petals about half as long as the other two.....3a. *laticornis*.

Leaves thinly membranous, pendulous, elliptic to ovate-lanceolate, base usually attenuate, sometimes rounded, more or less hairy above, distal- and basal-lobes of wing-petals subequal, longer than the median.....3b. *dendricola*.

For line 11, substitute:

Spur of lip short:—

Flowers white, blue within; standard broader than long, crenate.....6. *crenata*.

Flowers purplish-red; standard boat-shaped, entire.....6a. *nilgirica*.

For line 17, substitute:

Lip spurless:—

Leaves erect, orbicular or broadly ovate, base equilateral, nerves flabellate; wing-petals .35—5 in. long:—

Leaves cordate; flowers reddish-brown; wing-petals 3-lobed, lobes broad, rounded.....10. *orchioides*.

Leaves not cordate, flowers white; wing-petals 2-lobed, lobes very narrow, almost filamentous.....10a. *Stacksii*.

Leaves pendulous, ovate or elliptic-ovate, base usually inequilateral, nerves pinnate; wing-petals .7—1 in. long.....10b. *neo-Barnesii*.

For line 43, substitute:

Stem slender; basal-lobe of wings 0 or short, dorsal auricle filiform:—

Leaves rounded and cordate at base; basal-lobe of wings 0; spur of lip as long as the rest of the flower.....19. *ligulata*.

Leaves narrowed at the base, not cordate; basal-lobe of wings short, falcate; spur of lip short, subsaccate.....19a. *Aliciae*.

p. 97, for line 7, substitute:

Flowers .33—5 in. long; lip with a short upcurved spur.....31. *tomentosa*.
 Flowers .6—8 in. long; lip spurless.....31a. *rufescens*.

p. 98, for lines 21—23, substitute:

Spur of lip long, slender:—

Leaf-base rounded, cordate or emarginate, without glandular ciliae; lateral nerves nearly straight, ascending at a sharp angle; lip boat-shaped; seeds covered with long, spiral hairs.....61. *cordata*.

Leaf-base acute, with 1—3 glandular ciliae; lateral nerves strongly arched, nearly horizontal; lip bowl-shaped; seeds glabrous.....61a. *leptura*.

Spur of lip short:—

Leaves ciliate or apiculate between the marginal teeth:—

Spur of lip stout, tip incurved.....62. *uncinata*.

Spur of lip slender, straight.....63. *verecunda*.

Leaves ciliate or apiculate on the marginal teeth; spur very short, boss-like
 63a. *anaimudica*.

For lines 34—35, substitute:

Lip tubiform:—

Flowers scarlet with yellow centre; standard winged on the back; lip narrowed to the long incurved, bugle-shaped, acuminate spur.....68. *phoenicea*.

Flowers scarlet with bright-green lip; standard not winged, its keel hollow; lip saccate, spur short tubular, blunt, upcurved and appressed to the lip
 68a. *coelotropis*.

Lip cymbiform or funnel-shaped:—

Lip cymbiform or shortly funnel-shaped; spur short, straight or upcurved
 69. *Wightiana*.

Lip deeply funnel-shaped; spur tubular, blunt, curved upwards in a semicircle
 69a. *platyadena*.

After line 9 from the bottom, insert:

3a. *IMPATIENS LATICORNIS*, C. E. C. Fischer in Kew Bull. 1930, 154;
 S. I. H. S. t. 59.

Nilgiri Kundahs; 8,000 ft. (Barnes).

On wet rocks and tree trunks. Flowers white with yellow or orange hairs or pink with magenta hairs.

3b. *IMPATIENS DENDRICALA*, C. E. C. Fischer in Kew Bull. 1935, 157.

Coorg; on Thandiadamolu: 4,000 ft. (Barnes).

An epiphyte. Flowers white with a tuft of yellow or orange hairs.

p. 99, after line 3, insert:

6a. *IMPATIENS NILGIRICA*, C. E. C. Fischer in Kew Bull. 1931, 41;
 S. I. H. S. t. 60.

Nilgiri Kundahs; 8,400 ft. (Barnes).

Among grass and on rocks.

After line 13, insert:

10a. *IMPATIENS STOCKSII*, Hook. f.; F. B. I. i. 442.

Coorg; on Thandiadamolu and Brahmagiri; 3,500 ft. (Barnes).

10b. *IMPATIENS NEO-BARNESII*, C. E. C. Fischer in Kew Bull. 1930, 330;
 S. I. H. S. t. 62. *I. Barnesii*, C. E. C. Fischer non Hook. f. in Kew
 Bull. 1930, 153.

Nilgiri Kundahs; 8,000 ft. (Barnes).

An epiphyte. Flowers cream or nearly white.

p. 99, at the bottom, insert:

- 19a. *IMPATIENS ALICIAE*, C. E. C. Fischer in Kew Bull. 1934, 389.
Travancore; 2,000—5,000 ft. (Barnes).
Flowers deep-pink and white with purple streaks.

p. 100, after line 3 from the bottom, insert:

- 31a. *IMPATIENS RUFESCENS*, Benth, ex W. & A.; Wt. Ic. t. 969; S. I. H. S. t. 66.
I. tomentosa, Heyne var. *rufescens*, Hook. f.; F. B. I. i. 449.
Nilgiris, in swamps on the Downs.
Flowers rose-pink or purplish.

p. 103, at end of line 3, add:

- I. Ballardii*, Bedd.; F. B. I. i. 482.

After line 17, insert:

- 61a. *IMPATIENS LEPTURA*, Hook. f.; F. B. I. i. 467.
Travancore; 4,500—5,000 ft. (Beddome, Barnes).
Flowers pink and green.

After line 26, insert:

- 63a. *IMPATIENS ANAIMUDICA*, C. E. C. Fischer in Kew Bull. 1935, 92.
Travancore, on Anaimudi; 8,000 ft. (Barnes).
Flowers crimson.

p. 104, at the start, insert:

- 68a. *IMPATIENS COELOTROPIS*, C. E. C. Fischer in Kew Bull. 1934, 390.
Travancore, on Anaimudi; 6,500—7,500 ft. (Barnes).

After line 5, insert:

- 69a. *IMPATIENS PLATYADENA*, C. E. C. Fischer in Kew Bull. 1934, 393.
Travancore, on Anaimudi; 7,000 ft. (Barnes).
An undershrub. Flowers scarlet and cream.

p. 113, for lines 7—9, substitute:

Leaflets ovate, to ovate-lanceolate, acuminate, base rounded, 2—3 in. long, 1—1.5 in. wide; calyx-lobes 4:—

Branches not conspicuously zigzag; flowers fascicled, ovate in bud; calyx-lobes minute, triangular; stigma globose; berry apiculate.....3. *armata*.

Branches conspicuously zigzag; flowers solitary, cylindric in bud; calyx-lobes distinct, conspicuously auriculate; stigma oblate; berry globose, not apiculate

4. *Beddomei*.

After line 19, insert:

4. *PARAMIGNYA BEDDOMEI*, Tanaka in Journ. Bot. lxxviii. 230.
Anamalais (Beddome).

p. 116, for line 9, substitute:

Leaves simple:—

Small trees; leaves oblong, 4—10 in. long, glabrous; fruiting carpels winged

2. *SAMADERA*.

Small shrubs; leaves linear-spathulate, under 2 in. long; fruiting carpels wingless

2a. *SURIANA*.

p. 117, after line 11, insert:

2a. *SURIANA*, Linn.

Small shrub; branchlets thick, velvety-pubescent. *Leaves* linear-

spathulate, obtuse, velvety. *Flowers* hermaphrodite, terminal, hidden by the leaves. *Calyx* 5-partite, lobes imbricate. *Petals* 5, imbricate. *Disk* inconspicuous. *Stamens* 10, unequal, 5 sometimes barren. *Ovary* of 5 free carpels; styles basilar, filiform; ovules 2 in each carpel, lateral, ascending. Fruit of 5 or fewer carpels covered by the persistent calyx, unwinged. *Seed* solitary, exalbuminous.

SURLANA MARITIMA, LIND. ; F. B. I. i. 522.

Krusadai Island near Pambam (Parthasarathy Iyengar).

An insipid littoral shrub.

p. 118, in line 19 delete "*l. squarrosa*." Before line 20, insert:

Anthers several times longer than the very short filaments.....*l. squarrosa*.

Anthers long, as long as or a little shorter than the slender, elongate filaments
la. Wallichii.

After line 14 from the bottom, insert:

la. OCHNA WALLICHII, Planch. ; F. B. I. i. 524.

Kollimalais in the Salem District (Latham).

Closely resembling *O. squarrosa*, Linn.

p. 190, after line 19 from the bottom, insert:

Var. *cuneifolia*, DC. ; F. B. I. ii. 31. Leaves cuneate at the base, often tomentose beneath.

S. Malabar District ; S. Coimbatore District in the Anamalais ;
Madura District ; 800—2,500 ft. (Fischer). Vern. *Tam.* and *Mal.*
Cheru.

p. 346, for lines 8—5 from the bottom, substitute:

Tufts of bristles sessile as are the appendages:—

Branchlets terete, fleshy, glabrous, bluish when dry; leaves oblong-lanceolate, 1—1.5 in. long, 3—5 in. wide, 3-ribbed, lineolate on the upper, nearly glabrous on the lower surface; calyx-lobes ovate, obtuse, bristly at apex, ciliate on the margins.....*7. sublaevis*.

Branchlets quadrangular, not fleshy nor bluish, hairy from bulbous bases; leaves ovate-lanceolate, acute at both ends, 1.4 in. long, 6—1 in. wide, 3-ribbed with an extra lateral nerve on each side from the base; calyx-lobes triangular, their apices and those of the appendages stellate-setose.....*7a. rosea*.

p. 348, after line 18, insert:

7a. OSBECKIA ROSEA, Fyson in Journ. Ind. Bot. Soc. 1932, 49 ; S. I. H. S. t. 172.

Nilgiri Hills (Fyson).

A small, erect shrub. Flowers pink without trace of purple.

p. 351, for lines 30—32, substitute:

Leaves with one slender pair of nerves from the base:—

Leaves oblong-lanceolate, 1—1.5 in. long, base equilateral, one stronger pair of nerves above the base, bristly-hairy on both sides; capsule smooth, ribbed

2. Clarkei.

Leaves lanceolate, 1.6—4.4 in. long, base very inequilateral, several pairs of nerves above the basal, glabrous or with a few crisped hairs on the nerves; capsule smooth, corky, bluntly 6-ribbed.....*2a. tinnevelienseis*.

For lines 4—1 from the bottom, substitute:

Leaves 3- or 5-ribbed:—

Leaves lanceolate, acute, base narrowed, shortly auricled, conspicuously 3-ribbed from the tip of the short petiole, up to 1.5 in. long; 6 in. wide, sharply serrate,

glabrous; calyx-tube purple, glabrous, smooth, in fruit funnel-shaped from a thick pedicel; petals not clawed.....8. *grandiflora*.
Leaves ovate to ovate-lanceolate, acute, base rounded, 5-ribbed, ribs connected by obliquely transverse veins, 1—2.2 in. long, .5—1.2 in. wide, sharply, evenly and rather deeply serrate; petioles .16—1.2 in. long; calyx-tube white; petals shortly clawed.....8a. *nemakadensis*.

p. 352, after line 28, insert:

- 2a. *SONERILA TINNEVELLIENSIS*, C. E. C. Fischer in Kew Bull. 1934, 165.
Travancore (Beddome); Tinnevely District (Barber, Barnes);
2,000—4,000 ft.
An erect undershrub. Petals pinkish-mauve.

p. 353, after line 11, insert:

- 8z. *SONERILA NEMAKADENSIS*, C. E. C. Fischer in Kew Bull. 1935, 157.
Travancore; 6,500 ft. (Barnes).
A glabrous herb 4—12 in. high. Petals pink-purple.

p. 364, for lines 2—1 from the bottom, substitute:

Erect plants of wet places; petals 4, yellow; seeds with a prominent raphe:—
Leaves and usually the stems and branches hairy; capsules robust, all the seeds alike:—

Sepals and petals .25—4 in. long, not conspicuous; capsules cylindrical or narrowly turbinate:—

Stems more or less 4-ribbed, glabrous or hispidulous above; leaves spatulate, linear-lanceolate or narrowly oblong, rounded, acute or acuminate, base cuneate or acuminate, 1.5—3 in. long, .3—6 in. wide, hispidulous; petioles very short, up to .3 in. long, hispidulous; sepals oblong-lanceolate, acute, hispidulous on the 5 ribs outside; petals obovate, .2—2.5 in. long; capsules cylindrical, terete, slightly fluted, 1—1.7 in. long, hispidulous...2. *suffruticosa*.
Stems terete or bluntly angled, grey-villous; leaves narrowly elliptic, narrowed at both ends, usually blunt, 1—2 in. long, .3—5 in. wide, grey-villous; petioles 0—1.5 in. long, villous; sepals ovate, acuminate, .25—4 in. long, villous outside, puberulous within; petals obovate, .3—4 in. long; capsules narrowly turbinate, terete, .8—1 in. long, grey-villous.....3. *villosa*.

Sepals ovate, long-cuspidate, .5 in. long, brown-tomentose without; petals rotund, shortly clawed, .8—1 in. diam. Stems terete or bluntly angled, brown- or rufous-tomentose; leaves elliptic-lanceolate, acuminate at both ends, 1.8—4.5 in. long, .6—1.3 in. wide, crisped-hairy on both faces; petioles .3—6 in. long, brown-tomentose; capsules obcuneate, 4-angled, .8—1 in. long, brown-tomentose.....4. *speciosa*.

Glabrous, branches slender, usually narrowly winged; leaves lanceolate, narrowed at both ends, .5—3 in. long, .25—5 in. wide; sepals very narrow, .08—1 in. long; petals shorter; capsules linear, slender, terete, .6—8.5 in. long, seeds in the lower part differing from the upper and 1-seriate.....5. *linifolia*.

p. 365, for lines 6—10, substitute:

2. *JUSSIEUA SUFFRUTICOSA*, Linn.; F. B. I. ii. 587 in part.
Mysore, Carnatic, Malabar, Anamallais (Bedd.).
1—2 ft. high. Vern. *Mal. Karambu* (*vide* Rheedee).
3. *JUSSIEUA VILLOSA*, Lam. *J. suffruticosa*, Clarke non Linn.; F. B. I. 587 in part.
Mysore, Carnatic, S. Kanara; Anamallai, Sirumalai and Pulney Hills; near sea-level to 4,800 ft.
2—3 ft. high.

4. *JUSSIEUA SPECIOSA*, Ridl. in Journ. Bot. 1921, 259. *J. suffruticosa*, Clarke non Linn.; F. B. I. 587 in part.
Wynaad; 3,000—4,000 ft. (Gamble, Bourne).
4—6 ft. high; flowers conspicuous.

5. *JUSSIEUA LINIFOLIA*, Vahl.
Kuthuparamba in N. Malabar District.
1—2 ft. high, slender.
Presumably introduced from America.

p. 414, for lines 20—18 from the bottom, substitute:

Branchlets glabrous; leaves elliptic to elliptic-lanceolate; petioles about 1 in. long; stipules short; corolla tube 2 in. or more long:—

Ultimate twigs and rhachis of inflorescence puberulous; flowers 2—25 in. long
2. *glabrata*.

Ultimate twigs and rhachis of inflorescence glabrous; flowers 4—45 in. long
2a. *Gamblei*.

p. 415, after line 13, insert:

- 2a. *WENDLANDIA GAMBLEI*, Cowan in Not. Bot. Gard. Edin. xvi, 271.
Ganjam District on Mahendragiri at 4,600 ft.; Vizagapatam District at Ventala; Rampa Hills at 2,000 ft.
A small glabrous tree.

After line 26, insert:

Subsp. *cinnamomea*, Cowan in Not. Bot. Gard. Edin. xvi, 266.
Receptacle lobed; calyx puberulous, not hirsute; leaves cinnamon-coloured below when dry.

Hyderabad State; Kurnool and Nellore Districts.

p. 446. 30. *PAVETTA*, LIND.

Dr. C. E. B. Bremekamp has recently made a critical study of this genus and has published a monograph in Fedde's 'Repertorium', xxxvii (1934), pp. 1—208. He has kindly furnished me with an extract and key comprising the species found in S. India and, with his kind permission, the following has been adapted from it and may be substituted for p. 446 (last 34 lines), and the first 32 lines of p. 447. References to the monograph are made under the initials F. R. followed by the page number.

Inflorescence axillary:—

Leaves lanceolate, nerves 10—12 pairs; corolla-tube 26—32 in. long

1. *travancorica*.

Leaves elliptic, nerves less than 10 pairs; or if more than 10 pairs, then corolla-tube 5 in. or more long:—

Nerves 10—12 pairs; corolla-tube 5—56 in. long.....2. *concanica*.

Nerves 6—9 pairs; corolla-tube 26—32 in. long.....3. *laeta*.

Inflorescence terminal:—

Flowering shoots green:—

Calyx-lobes keeled. Flowers large:—

Leaves coriaceous:—

Leaves obovate, puberulous below, nerves 6—8 pairs. Shoots and petioles pubescent.....4. *zeylanica* var. *puberula*.

Leaves oblong or narrowly obovate, scabrid below, nerves 9—10 pairs. Shoots and petioles glabrous.....5. *calophylla*.

Leaves subcoriaceous, usually rather thin:—

Glabrous or subglabrous plants:—

Leaves oblong or elliptic, nerves 6—7 pairs.....6. *siphonantha*.

- Leaves oblanceolate, nerves 8—11 pairs.....7. *oblanceolata*.
 Leaves pubescent or scabrid-pubescent below:—
 Leaves oblong to obovate, nerves 5—6 pairs; inflorescence pubescent
 8. *praeterita*.
 Leaves lanceolate or elliptic, nerves 7—8 pairs; inflorescence hispidulous or puberulous:—
 Leaves lanceolate; inflorescence lax, hispidulous.....9. *hispidula*.
 Leaves elliptic; inflorescence contracted, puberulous...10. *madrassica*.
 Calyx-lobes not keeled, often reduced to teeth:—
 Calyx lobed:—
 Calyx-lobes twice as long as broad. Inflorescence puberulous
 11. *Wightii*.
 Calyx-lobes about as long as broad:—
 Undershrub; leaves oblanceolate or narrowly obovate, acuminate, nerves 8—9 pairs; corolla-tube .6 in. long.....12. *nemoralis*.
 Shrub; leaves lanceolate, obtuse or subacute, nerves 5—7 pairs; corolla-tube .18—5 in. long.....13. *blanda*.
 Calyx toothed:—
 Flowering-shoots consisting of a single internode, often covered with cork in the lower part:—
 Leaves elliptic; corolla about .46 in. long.....14. *breviflora*.
 Leaves obovate or oblanceolate; corolla more than .8 in. long
 15. *Hohenackeri*.
 Flowering-shoots comprising more than one internode:—
 Leaves lanceolate or oblong, glabrous.....16. *Thomsonii*.
 Leaves obovate, pubescent on the nerves below.....17. *bengalensis*.
 Flowering-shoots covered with cork up to the inflorescence:—
 Stipules over .4 in. long; calyx-lobes over .06 in. long.....18. *Brunonis*.
 Stipules under .4 in. long; calyx-lobes under .03 in. long:—
 Flowering-shoots peduncle-like, either consisting of a single internode or the lowest internode much longer than all the others together; calyx-lobes .024 in. long.....19. *tomentosa*.
 Internodes of the flowering-shoots gradually decreasing in length from the base up; calyx-lobes .008 in. long.....20. *indica*.
1. PAVETTA TRAVANCORICA, Brem. in F. R. 81. *P. indica* Linn. var *minor*, Hk. f.; Fl. Madr. 633 in part.
 Travancore (Wight).
 2. PAVETTA CONCANICA, Brem. in F. R. 81.
 Attraimalais (Beddome).
 A glabrous shrub, older branchlets grey.
 3. PAVETTA LAETA, Brem. in F. R. 82. *P. indica* Linn.; Fl. Madr. 633 in part.
 Nilgiri (Perrotter) and Pulney (Saulière) Hills.
 Very similar to the last species.
 4. PAVETTA ZEYLANICA, Gamble.
 Var. *puberula*, Brem. in F. R. 90. *P. zeylanica* Gamble in part; Fl. Madr. 633.
 Courtallam (Beddome).
 5. PAVETTA CALOPHYLLA, Brem. in F. R. 90. *P. zeylanica*, Gamble in part; Fl. Madr. 633.
 Nilgiri Hills (Gamble)
 A glabrous shrub.
 6. PAVETTA SIPHONANTHA, Dalz. *P. hispidula*, W. & A.; Fl. Madr. 633 in part.
 Mangalore (Hohenacker); Travancore, 150 ft. (Venkoba Rao).
 A glabrous shrub.

7. *PAVETTA OBLANCEOLATA*, Brem. in F. R. 91.
Palghat and Attraimalai Hills (Beddome).
A glabrous shrub; inflorescence subsessile.
8. *PAVETTA PRAETERITA*, Brem. in F. R. 92. *P. hispidula*, W. & A.;
Fl. Madr. in part.
Courtallam, Quilon (Wight).
A shrub with scabrid-pubescent twigs.
9. *PAVETTA HISPIDULA*, W. & A.; Fl. Madr. 633.
W. Gháts.
10. *PAVETTA MADRASSICA*, Brem. in F. R. 91. *P. indica*, Linn. var.
tomentosa, Hook. f.; Fl. Madr. 633 in part.
Simhachallam, Vizagapatam District (Elliot).
11. *PAVETTA WIGHTII*, Hook. f.; Fl. Madr. 634.
W. Gháts, E. side of Nilgiri Hills; 4,000—6,000 ft.
A shrub with rather large obovate leaves, prominently glandular.
12. *PAVETTA NEMORALIS*, Brem. in F. R. 94.
Cochin State at Kavalai (Meebold).
A glabrous, unbranched undershrub.
13. *PAVETTA BLANDA*, Brem. in F. R. 94. *P. indica*, Linn. var. *minor*,
Hook. f.; Fl. Madr. 633 in part. *P. breviflora*, DC. var. *sub-*
coriacea, Gamble; Fl. Madr. 634.
W. Gháts; 4,000—6,000 ft.
A glabrous shrub; stipules persistent.
14. *PAVETTA BREVIFLORA*, DC.
Var. *glaberrima*, Brem. in F. R. 98. *P. breviflora*, DC.; Fl. Madr.
634 in part. All parts glabrous; calyx not ciliate.
Nilgiri Hills; 4,500—6,000 ft. (Leschenault, Gamble).
Var. *ciliolata*, Gamble ex Brem. in F. R. 98. *P. breviflora*, DC.;
Fl. Madr. 634 in part. Leaves ciliate on the nerves below; calyx
ciliate.
Nilgiri Hills; 5,000—7,000 ft. (Wight, Gamble).
Var. *pubescens*, Brem. in F. R. 98. *P. breviflora*, DC.; Fl. Madr.
634 in part. Leaves above sparsely, below densely pubescent; inflores-
cence densely pubescent.
Nilgiri (Perrottet) and Pulney (Bourne) Hills.
15. *PAVETTA HOHENACKERI*, Brem. in F. R. 98. *P. indica* Linn.; Fl.
Madr. 633 in part.
Nilgiri Hills near Sispara (Hohenacker).
A glabrous shrub.
16. *PAVETTA THOMSONII*, Brem. in F. R. 99. *P. indica*, Linn.; Fl.
Madr. 633 in part.
Carnatic (G. Thomson).
A glabrous shrub; corolla-tube sparingly pilose within.
Var. *glaberrima*, Brem. in F. R. 99. Inflorescence glabrous.
Mysore (G. Thomson); Pondicheri (Perrottet).
Var. *puberula*, Brem. in F. R. 99. Inflorescence puberulous.
Shevagiri Hills (Wight); Travancore at Kottayam (Hobenacker).
17. *PAVETTA BENGALENSIS*, Brem. in F. R. 99. *P. indica*, Linn.; Fl.
Madr. 633 in part.

Mangalore (Hohenacker).

A glabrous shrub.

18. *PAVETTA BRUNONIS*, Wall. ; Fl. Madr. 634.
W. Gháts, N. and W. slopes of Nilgiris at 5,000—6,000 ft.
A softly-tomentose shrub.
19. *PAVETTA TOMENTOSA*, Linn. ; *P. indica* Linn. var. *tomentosa*, Hook. f. ; Fl. Madr. 633 in part.
All forest Districts.
20. *PAVETTA INDICA*, Linn. ; Fl. Madr. 633 in part.
Coromandel.
Var. *glabra*, Brem. in F. R. 119.
Coromandel.
Var. *mollis*, Brem. in F. R. 119.
Cuddapah District (Gamble).

p. 471, for lines 4—1 from the bottom, substitute :

Outer involucre bracts long- aristate, spreading or reflexed. Stem brown-pubescent ; leaves crenate-serrulate, mucronate :—

Stem terete, strongly ribbed ; leaves elliptic-ovate or lanceolate, up to 5.5 in. long and 2.7 in. wide, rugose, reticulate, scabrous ; petioles .2—5 in. long ; involucre bracts spreading ; achenes narrowly turbinate, .12—15 in. long ; pappus reddish.....14. *peninsularis*.
Stem quadrangular ; leaves ovate or ovate-oblong, 2.4—3.5 in. long, 1—1.6 in. wide ; petioles about .2 in. long ; involucre bracts recurved ; achenes clavate-turbinate ; .1 in. long ; pappus yellowish.....14a. *recurva*.

p. 473, for lines 13—15, substitute :

Stem and leaves pubescent ; leaves thin, often large, outer pappus-hairs very short :—

Stem terete ; leaves lanceolate to ovate-lanceolate, acuminate, sharply serrate, densely pubescent below, up to 4 in. long and 2.2 in. wide.....29. *conyzoides*.
Stem quadrangular ; leaves membranous, elliptic, shortly acuminate, serrate-dentate, teeth hardened, puberulous on the nerves below, usually about 4 in. long, and 1.4 in. wide, but sometimes up to 7.5 in. long and 2.6 in. wide
30. *membranacea*.

p. 474, after line 21 from the bottom, insert :

- 14a. *VERNONIA RECURVA*, Bedd. ex S. Moore in Journ. Bot. 1925, 171.
Anamalais at 6,000 ft. (Beddome).

p. 475, after line 4 from the bottom, insert :

30. *VERNONIA MEMBRANACEA*, Bedd. ex S. Moore in Journ. Bot. 1925, 170.
Nilgiri Hills at Sispara ; Attraimalais (Beddome).

p. 476, after line 23, insert :

Leaves elliptic-lanceolate to broadly ovate, reticulate veins obscure, midrib below glabrous or only very slightly rusty-puberulous ; ripe achenes glandular-warted

1. *Lavenia*.

Leaves deltoid-ovate, reticulate veins distinct, midrib below rather densely rusty-pubescent ; ripe achenes glabrous and smooth.....2. *reticulatum*.

In line 24 insert "1" before *ADENOSTEMMA*.

After line 32, insert :

2. *ADENOSTEMMA RETICULATUM*, DC. *A. viscosum*, Forst. var. *reticulatum*, C. B. Clarke ; F. B. I. iii. 243.
Nilgiri Hills and Courtallam.
Very similar to *A. Lavenia*, O. Kze.

After line 7 from the bottom, insert:

*Leaves ovate, deltoid-ovate or rhomboid-ovate; heads 60—75-flowered; involucre subglabrous; corolla .04—.06 in. long.....1. *conyzoides*.
Leaves deltoid; heads 75—100-flowered; involucre hirsute; corolla .1—.12 in. long; style-branches only exerted.....2. *Houstonianum*.

In line 6 from the bottom, insert "1" before *AGERATUM*.

After last line, insert:

2. *AGERATUM HOUSTONIANUM*, Mill.

Nilgiri and Pulney Hills; 4,500—6,500 ft.

p. 504, for lines 31—34, substitute:

Stems and leaves soft and slightly fleshy:—

Leaves mostly cauline, oblong-lanceolate, acuminate, serrate, 4—8 in. long, 2—3 in. wide, green below; heads .5—.66 in. long, bracts as long, narrow; corolla-tube slender, .3 in. long; achenes sparsely hairy.....2. *Walkeri*.

Leaves mostly radical, obovate, obtuse, irregularly toothed, 2.4—3.2 in. long, 1—2 in. wide, violet below; heads .3—.5 in. long, bracts .2—.32 in. long, linear; achenes pubescent.....3. *shevaroyensis*.

At foot of the page, insert:

3. *NOTONIA SHEVAROYENSIS*, Fyson in Journ. Ind. Bot. 1932, 49; S. I. H. S. t. 290.

Shevaroy Hills, in swamps; 4,500 ft. (Fyson).

A scapigerous, glabrous herb up to 3 ft. high. Corymbs large, yellow.

p. 506, after line 15 from the bottom, insert.

Involucral-bracts 8; florets 8—15, rarely fewer:—

After line 8 from the bottom, insert:

Involucral-bracts 5; florets 5, rarely 6. Leaves broadly ovate, abruptly acuminate, base rounded or slightly cordate, 2—4 in. long, 1.2—3.2 in. wide, hoary-tomentose below.....15a. *Ansteadii*.

p. 508, after line 7 from the bottom, insert:

15a. *SENECIO ANSTEADI*, Tad. & Jac. in Journ. Ind. Bot. Soc. 1930, 40.

Tinnevely Hills; 3,000 ft. (Jacob).

A slender, shrubby climber.

p. 515, to species run wild add *Erechthites valerianifolia*, DC., which has escaped in the Madura Hills and in Travancore.

p. 605, after line 17, insert:

Apical part of corolla-lobes folded back along the middle, purplish, basal part greenish or yellowish:—

After line 22, add:

Corolla-lobes expanded and dark-purplish or brownish throughout, mucronate, bearing deciduous stoutly spindle- or club-shaped purple hairs near the tips and along the margins.....2a. *stalagmifera*.

For line 31, substitute:

Umbels few-flowered:—

Branches erect; corolla within pale-green, covered with purple hairs, margins fringed.....7. *indica*.

* Extracted from 'The Compositae of the Malay Archipelago,' by J. T. Koster (1935), 'I. Vernoniae and Eupatoriaceae,' p. 484.

Branches procumbent; corolla within whitish with concentric purple streaks, glabrous, not fringed.....7a. *procumbens*.

After line 6 from the bottom, insert:

2a. *CARALLUMA STALACMIFERA*, C. E. C. Fischer in Kew Bull. 1935, 430; Bull. Madr. Gov. Mus. iv. i; t. 1, figs. 4—6.

Vizagapatam and Chingleput Districts; Pudukottai State (Mayuranathan).

An erect, fleshy herb with slender branches.

p. 606, after line 22 from the bottom, insert:

7a. *CARALLUMA PROCUMBENS*, Grav. & Mayur. in Bull. Madr. Gov. Mus. iv, i, 26; t. iv, figs. 13—17.

S. Travancore (Mayuranathan).

Trailing and rooting among rocks, the stem continues to grow after flowering from just below the inflorescence, the latter then appearing lateral.

p. 629, for lines 22—18 from the bottom, substitute:

Branches twiggy, radiating from the root-stock, procumbent or slightly ascending, appressed-hirsute:—

Leaves ovate- or linear-lanceolate, strigosely hirsute, margins flat, .25—.75 in. long; flower-spikes usually very short but sometimes up to 1 in. long; fruit depressed, nutlets subglobose, not horned, bristly.....10. *scabrum*.

Leaves ovate- or oblong-lanceolate, rigidly hirsute, .12—.32 in. long; flowers distant on short extra-axillary branchlets; fruit conspicuously beaked, quadrangular, nutlets shortly, bluntly horned above the base, villous.....11. *cornutum*.

p. 630, at the foot, insert:

11. *HELIOTROPIMUM CORNUTUM*, Johnst. in Contr. Gray Herb. xcii. 90.

Mangalore (Hohenacker).

Very closely resembling *H. scabrum*, Retz. and confused with it.

p. 697, after line 19, insert:

Var. *pusilla*, C. B. Clarke; F. B. I. iv. 369. Small, nearly glabrous herb.

Coorg, near Mercara (Barnes).

p. 827, after line 20, insert:

Chenopodium Moquinianum, Aellen has been found near Madras and is reported to be spreading.

p. 894, at the foot, add:

E. geniculata, Orteg., an American weed, has escaped from gardens round Bangalore and at Nanjangode in Mysore State and is stated to be spreading (Mayuranathan).

p. 959, for line 28, substitute:

Leaves serrate:—

Leaves opposite; stigma ovate, persistent.....9. *CHAMABAENA*.

Leaves alternate; stigma linear, deciduous.....9a. *DISTEMON*.

p. 966, after line 3, insert:

9a. *DISTEMON*, Wedd.

Slender, erect, annual herbs. *Leaves* alternate, petioled, coarsely toothed, 3-nerved and penninerved. *Flowers* monoecious, in small,

bracteate, 3-flowered, androgynous clusters forming slender axillary and long terminal spikes. *Perianth* of ♂ campanulate, 2—3-fid, valvate; of ♀ tubular, ventricose. *Stamens* 2—3. *Pistillode* woolly. *Ovary* included in and more or less adnate to the perianth; stigma linear, deciduous; ovule erect. *Achene* broadly ovoid, acuminate, enclosed in the thickened fleshy or crustaceous perianth; pericarp fragile. *Seeds* copiously albuminous; cotyledons broad.

DISTEMON INDICUM, Wedd.; F. B. I. v. 588.

Upper Godavari (Mayuranathan).

A slender herb 2—3 ft. high; stem subquadrangular. Leaves broadly ovate, acuminate, base cuneate or less often rounded or subcordate, patchy beneath with whitish, cobwebby pubescence between the hairy nerves, 2—3 in. long.

p. 974, for lines 11—18, substitute:

Bracts of ♂ not exceeding .04 in. long, more or less recurved at the edges; fruit very fleshy, pruinose, oblong, obtuse or shortly apiculate, longitudinally wrinkled when dry, 1.2—1.6 in. long, .6—8 in. diam.....1. *ula*.
Bracts of ♂ cylindric, .08 in. long, margins appressed; fruit hardly fleshy, not pruinose, ovate-oblong, narrowed into a pronounced beak, smooth when dry, 1.2—1.4 in. long, .6 in. diam.....2. *contractum*.

1. **GNETUM ULA**, Brogn. *G. scandens*, Hook. f. non Roxb. in part; Fl. Madr. 1392 in part; *G. funiculare*, B. Sm.; Wt. Ic. t. 1955.

In most Districts; up to 4,500 ft.

A large robust climber. Bark thick, brown, rough with scales. Branchlets slender with thickened nodes. Leaves ovate-oblong or elliptic, 3—7 in. long, 1.6—4 in. wide. Ripe fruit reddish-orange. Vern. Tam. Ana-pendu.

2. **GNETUM CONTRACTUM**, Markgr. in Bull. Jard. Bot. Buit. ser. iii. x. 470. *G. scandens*, Hook f. non Roxb. in part; Fl. Madr. 1392 in part.

Nilgiri Hills at 5,000 ft.; Quilon (Wight).

Hardly to be distinguished from the previous species in the vegetative parts, the leaves are usually smaller, up to 4 in. long and 2 in. wide, with more defined nerves and the ♂ spikes rather stouter.

p. 976, for lines 14 and 13 from the bottom, substitute:

Salt-water, submerged herbs:—

Leaves under 6 in. long, ovate or oblong, in pairs from the axil of a scale; ♂ spathe 1-flowered; perianth single.....6. **HALOPHILA**.

Leaves 2—3 ft. long, narrowly linear, 2—3 enclosed in a basal sheath; ♂ spathe many-flowered; perianth double.....7. **ENHALUS**.

p. 979, for lines 7—11, substitute:

Leaves thinly membranous, elliptic to oblanceolate, base more or less decurrent, smooth, 1.5—3 in. long, .35—.55 in. wide; petioles up to 2.7 in. long.....1. *ovalis*.
Leaves firm, elliptic to elliptic-ovate, base rounded or cuneate, not decurrent, minutely papillose. 4—7 in. long, .2—22 in. wide; petioles .35—1 in. long

2. *Balfouri*.

1. **HALOPHILA OVALIS**, Hook. f. *H. ovata*, Gaud.; F. B. I. v. 663; Fl. Madr. 1398 in part.

Along the coasts and in back-waters.

A slender, creeping herb.

2. HALOPHILA BALFOURI, Solered. *H. ovata*, Gaud.; Fl. Madr. 1398 in part.

Along the E. Coast.

Similar to the previous species but smaller.

7. ENHALUS, Rich.

Submerged monoecious or dioecious, marine herbs; rootstock crinite with the remains of old leaves. *Leaves* narrowly linear, enclosed in twos or threes in a basal sheath. ♂ *flowers* many, minute, enclosed in a short, compressed, subsessile, 2-leaved spathe. *Sepals* and *petals* 3, broadly elliptic. *Stamens* 3. *Pistillode* 0. ♀ *flowers* much larger, solitary, sessile in a longer spathe on a spiral scape. *Sepals* 3, oblong, imbricate. *Petals* 3, longer, linear. *Ovary* ovoid, long-beaked, almost 6-celled; styles 6, bipartite; ovules anatropous, few on each placenta. *Fruit* ovoid, beaked, indehiscent. *Seeds* few, large, cone-like, testa mucilaginous.

ENHALUS ACOROIDES, Rich. ex Steud. *E. Koenigii*, Rich.; F. B. I. v. 663.

Pambam (Parthasarathy Iyengar).

Rootstock creeping in sand. *Leaves* 2—3 ft. long, .5—.75 in. wide.

♀ *spathes* up to 2 in. long, strigose.

p. 1020, for lines 12—14, substitute:

Lip 3-lobed obovate, in the lower $\frac{1}{2}$ the sides bent up to form a tube.

Flowers about .9 in. long:—

Lip lobed a little above the middle, midlobe emarginate, glabrous, not fimbriate.

Leaf ovate-cordate, acute or acuminate.....2. *biflora*.

Lip lobed near the apex, midlobe and sometimes also the smaller side lobes fimbriate, beset with white hairs, the midlobe with tubular, sometimes branched processes on the 3 median nerves. Leaf orbicular-cordate, obtuse

2a. *monantha*.

After line 33, insert:

2a. NERVILIA MONANTHA, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxv. 724.

Billigirirangan Hills, 5,000 ft. (Mayuranathan).

Perianth pale-violet (N. Kanara specimens greenish-white with a rosy tinge, the nerves of the midlobe purplish).

p. 1025, line 2 & 3, for "spike 2—4 in. long," substitute "spike 1—6 in. long"; line 4, for "lower 1 in. long," substitute "lower .7—1.25 in. long"; line 5, after "obtuse" add "ovary beakless:—" and for lines 6 and 7, substitute:

Perianth-lobes not spreading; side lobes of lip usually shorter than the broader midlobe, not diverging; spur less than .4 in. long, shorter than the ovary

20. *Heyneana*.

Perianth-lobes spreading; side lobes of lip as long and wide as the midlobe, diverging nearly at right angles; spur .68—.72 in. long, as long as the ovary

20a. *Barnesii*.

p. 1026, in line 18, after "spur," for ";" substitute ":-" and for the rest of that line and the next four substitute:

Sepals erect, ovate-oblong, obtuse, concave, .5—7 in. long; petals as long, linear, obtuse; lip as long, coriaceous, cuneately obovate, obtuse, claw geniculate, 3-lobed for less than $\frac{1}{2}$ its length, side lobes linear-oblong, obtuse, incurved, shorter than the triangular-ovate midlobe; spur subclavate, about as long as the ovary

28. *Perrottetiana*.

Sepals spreading, lanceolate, slightly falcate, obtuse or subacute, flat, 4--5 in. long; petals shorter, linear-ensiform, subfalcate, sub-acute, lip as long as the sepals, coriaceous, sessile, divided nearly to the base into 3 subequal acute lobes, midlobe linear-oblong, side lobes narrowly lanceolate; spur hardly longer than the sepals, shorter than the ovary.....29. *flabelliformis*.

p. 1028, after line 12, insert:

20a. *HABENARIA BARNESII*, Summerhayes n. sp.

Nilgiri Hills at Gudalurmalai (Barnes 890); Travancore at Nemakad Gap (Barnes 814 in part).

Affinis *H. Heyneanae*, Lindl., a qua tepalis patentibus, labelli lobis lateralibus longioribus ab intermedio fere angulo recto divergentibus recurvis, calcar apice dilatato 17--18 mm. longo, staminodiis fere duplo majoribus differt.

p. 1028, after line 9 from the bottom, add:—

29. *HABENARIA FLABELLIFORMIS*, Summerhayes n. sp.

Travancore on Amaimudi slopes; 7,500 ft. (Barnes 629).

Affinis *H. Perrotetianae*, A. Rich., a qua floribus minoribus, labello fere ad basin tripartito portionibus aequilongis intermedio linear-oblongo acuto lateralibus anguste lanceolatis, calcar brevius differt.

For the last 4 lines of **p. 1077**, and the first 3 of **p. 1078**, substitute:

Panicles short, subsessile, much shorter than the uppermost leaves; fruiting pedicels decurved:—

Stem stout, erect, 8--36 in. high; roots long, fibrous; leaves broadly elliptic or elliptic-lanceolate, acuminate or caudate-acuminate, narrowed into the petiole, puberulous or glabrescent, 3--6.5 in. long, 1--2 in. wide; sheaths glabrous or pubescent, mouth usually ciliate, .6--1.3 in. long; panicles pyramidal; fertile stamens 2; capsules globose, .2--.25 in. diam.; seeds reticulate.....18. *ovalifolium*.

Stem sometimes creeping below and rooting, erect portion up to 20 in. high; leaves ovate-lanceolate, long-acuminate, base narrowed, glabrous; sheaths glabrous or nearly so, .8--1.2 in. long; panicles terminal and among the cluster of leaves, compact, not pyramidal; fertile stamens 3; capsules subglobose, olivaceous, glistening when dry; seeds with deep angular pits in 4 rows separated by prominent zigzag ridges.....18a. *Hallbergii*.

p. 1079, after line 33, insert:

18a. *ANEHEMA HALLBERGII*, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxiii, 74.

Gersoppa Falls (Hallberg & McCann).

Corolla pale-lilac or whitish; filaments of the fertile stamens:

1 long, stout, purple; 1 shorter, purple; 1 still shorter, white.

p. 1082, for lines 14--8 from the bottom, substitute:

Epiphytic, subscapigerous; flowering stems numerous, slender, 3--10 in. long, rooting below, viviparous at apex; leaves radical and cauline, more or less pilose with rufous hairs, the former linear to linear-lanceolate, 1--5 in. long, .2--.4 in. wide, cauline shorter and wider; flowers solitary, twin or 3--4 in an umbel; sepals villous:—

Cauline leaves ovate or elliptic, acute, .2--.75 in. long; flowers 2--4 in an umbel on a capillary pilose peduncle, 2-bracteate; petals connate to the middle; filaments naked; capsules oblanceolate, .1 in. long, rufous-hairy; seeds cylindrical, smooth.....2. *vivipara*.

Cauline leaves elliptic-oblong, acute, appressed-hairy above, hairs below spreading; flowers solitary or twin; petals free nearly to the base; filaments densely bearded with white, moniliform hairs; capsules cylindrical, obtusely trigonous, .14 in. long; seeds sub-cylindrical, smooth.....3. *epiphytica*.

p. 1083, after line 3, insert:

3. BELOSYNOPSIS EPIPHYTICA, C. E. C. Fischer n. comb. *Cyanotis epiphytica*, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxiii. 76.

Above Gersoppa Ghát (Hallberg).

An almost stemless herb. Flowers white.

p. 1099, for lines 25—30, substitute:—

Rhizome stout, up to 2 in. diam.; leaves usually acute at both ends, usually large, veins very numerous, ascending, slightly curved; petioles about as long as to considerably longer than the blades; stipular sheaths acuminate, 2-keeled, up to 7.5 in. long:—

Cataphylls 6—13.2 in. long; leaves oblong-acuminate, 6—22.5 in. long, 1.8—7.5 in. wide; petioles 5.2—42 in. long; peduncles 5—8.4 in. long; spathes narrowly turbinate, 2—10 in. long, strongly twisted upwards, tapering to a subulate tail 1.4—1.8 in. long, dark-purple, smooth below, warted or rugose above.....1. *ovata*.

Cataphylls 2.3—5.4 in. long; leaves elliptic- to ovate-lanceolate, acute or sub-acute, 4.4—8.4 in. long, 1.6—3.6 in. wide; petioles 2.4—12 in. long; peduncles 1.2—2.2 in. long; spathes cylindrical-oblong, usually slightly constricted above the chamber, 1.6—2.3 in. long, .6—8 in. diam., abruptly contracted into a slender, S-curved tail 3.4—5.4 in. long, .05—08 in. diam., flesh-coloured or brownish-buff with 5 longitudinal purple stripes below, not contorted, quite smooth or sometimes very slightly warted and hispidulous above the middle

1a. *toxicaria*.

Line 13 from the bottom, delete "*L. toxicaria*, Dalz." At end, add: in part.

After line 9 from the bottom, insert:

1a. LAGENANDRA TOXICARIA, Dalz. *L. ovata* Thw.; Fl. Madr. 1576 in part.

Travancore; 1,000 ft. (Barnes).

Resembling *L. ovata* Thw. in the vegetative parts and *L. Meeboldii*

C. E. C. Fischer in the spathes.

p. 1105, for lines 7 and 8, substitute:

Limb of spathe expanded:—

Appendage of spadix clavate at apex, not stipitate; neuters present:—

Apex of appendage smooth or at most muriculate:—

For lines 25—29, substitute:

Apex of appendage convolutedly tubercled. Leaflets 7—15, sessile, narrowly oblanceolate, 5—12 in. long, .9—3.5 in. wide, finely caudate-acuminate, sometimes the tail filamentous and up to 2 in. long, nerves numerous; petioles up to 26 in. long; spathes 3—6.4 in. long, limb ovate, ending in a pendant, filamentous tail 1.6—6.8 in. long; spadix cylindrical, terminated by a subglobose or clavate, convoluted knob .3—6 in. diam.....3a. *tuberculatum*.

Appendage narrowed to the apex, not clavate, at most ending in a very small knob:—

Leaflets 5, sessile or the middle one very shortly petiolulate, elliptic-ovate to obovate, 1—4 in. long, .5—2 in. wide; limb of spathe ovate-boat-shaped, tapering into a filamentous tail 2—4 in. long; dioecious; neuters 0; appendage shortly stipitate, abruptly swollen at the base and then tapering to a blunt point, recurved in the upper half.....4. *Wightii*.

Leaflets usually 7, sometimes 5, all distinctly petiolulate; appendage not stipitate, nor abruptly swollen at the base:—

Spathe 3.4—4.4 in. long, limb horizontal, dark-purple, tapering into a filiform tail .3—1.3 in. long, sometimes ending in a small knob. Leaflets elliptic-lanceolate, acuminate at both ends, 3.2—6 in. long, .9—1.9 in. wide, margins entire; spadix straight, narrowly fusiform, tapering into a short tail terminated by a minutely warted small knob.....4a. *Barnesii*.

Spathe 1.6—2.8 in. long, limb overarching, bright-green, abruptly narrowed into a filiform tail .3—8 in. long, upcurved at the apex and ending in a small spherical or clavate knob. Leaflets elliptic-lanceolate to oblanceolate,

acuminate or caudate-acuminate, base acute, 2—10.5 in. long, .66—3.6 in. wide, margins erose; spadix nearly cylindrical, narrowed and curved near the apex, ending in a small minutely warted knob; dioecious or the ♀ with a few anthers intermixed; a few, sometimes forked, neuters above the ♀

4b. *tylophorum*.

Limb of spathe cucullate, leaving only a narrowly cordate opening. Leaflets 9—11, sessile, narrowly elliptic-oblancoate, finely acuminate, base tapering, 3.6—5.4 in. long, .7—1.2 in. wide, margins erose, revolute; spathe 2.4—2.7 in. long, bearing a terminal, filiform tail 1—1.2 in. long; ♂ spadix fusiform, of the ♀ subulate, both obtuse; a few neuters present above the ♀.....4c. *translucens*.

After line 4 from the bottom, insert:

- 3a. *ARISAEMA TUBERCULATUM*, C. E. C. Fischer in Kew Bull. 1925, No. 2, erratum to p. 167. *A. convolutum*, C. E. C. Fischer non Nakai in Kew Bull. 1934, 167.

Nilgiri Hills; 7,000—7,500 ft. (Barnes).

Tube of spathe white, limb purple with 5—7 white bands tapering to the apex; spadix cream-coloured.

4. *ARISAEMA WIGHTII*, Schott; F. B. I. vi. 507 in part; Fl. Madr. 1585 in part.

Nilgiri Hills; 6,000—7,000 ft. (Wight, King, Barnes).

Petioles and peduncles pale-green; spathe bright-green with .5 white vertical streaks and some fine lines, the apical half of the tail black; spadix white below, purple above.

- 4a. *ARISAEMA BARNESII*, C. E. C. Fischer in Kew Bull. 1933, 342. *A. Wightii*, Schott in Fl. Madr. 1585 in part.

Nilgiris, 6,000 ft. (Barnes); Biligirirangans, 5,000 ft. (Fischer); Coimbatore Anamallais, 3,300 ft. (Fischer).

Tube of spathe vertically striped with dark-purple and whitish bands, limb dark-purple streaked outside with green; spadix dark-purple or pale below and dark at apex.

- 4b. *ARISAEMA TYLOPHORUM*, C. E. C. Fischer in Kew Bull. 1933, 346. *A. Wightii*, Schott in Fl. Madr. 1585 in part.

Nilgiris; 6,000 ft. (Viscount Gough, Barnes).

Petioles and peduncles light-green marbled with brownish-pink; tube of spathe white with vertical purple stripes within.

- 4c. *ARISAEMA TRANSLUCENS*, C. E. C. Fischer in Kew Bull. 1933, 344.

Nilgiris; 6,000 ft. (Barnes).

Petioles and peduncles pinkish-purple with brown and pink markings or pink with brown and whitish markings; tube of spathe white with vertical green and purple lines, limb with 6 broad purple bands converging at the apex, translucent between the bands; spadix green with faint purple lines, the apex pure white.

p. 1165, for lines 16—19, substitute:

Spikelets terminal, single, .5—57 in. long; style 3-fid:—

Stem slender, 2—3 in. high, compressed-triquetrous, base slightly swollen and enclosed in sheaths; leaves a little shorter; spikelets linear-oblong, 5—6-flowered, the 1—2 basal florets ♀; glumes broadly oblong, subobtuse, pale-ferruginous, margins broadly hyaline.....1. *Christii*.

Stem capillary, 8—12 in. high, obscurely triquetrous, not swollen at base; leaves a little shorter, filiform, canaliculate; spikelets at first oblong, later ovate, many-flowered, the 6—12 lowest florets ♀; glumes ovate to subrotund, obtuse, often emarginate, reddish.....la. *rara*.

p. 1168, after line 24, insert:

Ia. CAREX RARA, BOOTH; F. B. I. vi. 713.
Ootacamund; 7,000 ft. (Barnes).

p. 1175, after line 10, insert:

Spikes solitary or twin, rarely 3-nate; glumes chartaceous or thinly coriaceous, smooth:—

After line 13, insert:

Spikes corymbose, rarely reduced to 1—3; glumes thickly coriaceous, strongly transversely ribbed or rugose.....21a. THELEPOGON.

p. 1180, in line 17 from the bottom, after "lemmas" add " :— " and in line 16 from the bottom, delete "117 GLYCERIA."

After line 17 from the bottom, insert:

Lemmas membranous with broad hyaline tips, broadly oblong, back rounded; perfect florets 7—12.....117. GLYCERIA.

Lemmas coriaceous throughout, boat-shaped, keeled; perfect floret 1.
117a. EHRHARTA.

p. 1196, after line 14 from the bottom, insert:

21a. THELEPOGON, Roth.

Coarse, perennial herbs. *Leaves* lanceolate. *Racemes* few to many, corymbosely fascicled, rarely reduced to 1—3; rhachis flexuous, fragile, joints thick, more or less deeply excavated. *Spikelets* ovoid, one sessile at each node accompanied by a coriaceous, flat, curved pedicel devoid of spikelet. *Glumes* 2, thickly coriaceous, beaked, transversely strongly ridged, rugose or tubercled; upper sunk in the cavity of the joint, 2-flowered. *Lemmas* and *paleas* hyaline; lower nearly as long as the glume, lanceolate, its palea shorter and enclosing usually a ♂ floret; upper 2-cleft to the middle with a long geniculate, twisting awn from the sinus, its narrow palea enclosing a bisexual floret. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Styles* 2, free. *Grain* narrowly oblong, free.

THELEPOGON ELEGANS, Roth.; F. B. I. vii. 148.

Hyderabad State at Ellora (Ralph).

Culms 1—3 ft. high, branched from the base; leaves lanceolate, cordate, amplexicaul, 3—10 in. long, 3—75 in. wide, hispid with hairs from tubercles or nearly glabrous, margins ciliate; racemes 1—2 in. long, joints of rhachis 22 in. long, pedicels 29 in. long; glumes 25—27 in. long; awns 7—1 in. long.

p. 1199, for lines 4—9, substitute:

Culms simple or sparingly branched, up to 4 ft. high, usually slender; nodes usually densely, often long bearded:—

Panicles contracted, rarely somewhat lax; leaves acute; callus of sessile spikelets densely villous, lower glumes 1—14 in. long, usually villous all over or only below the middle; awns 4—9 in. long; lower glume of pedicelled spikelets 14—17 in. long.....2. *Huegelii*.

Panicles with widely spreading branches; leaves setaceous acuminate; callus of sessile spikelet shortly bearded, lower glumes 11 in. long, scaberulous or slightly hairy on the inflexed margins longitudinally slightly depressed along the median line; awns 6—7 in. long; glumes of pedicelled spikelets 11 in. long.....2a. *parviflorum*.

p. 1199, after line 22, insert:

- 2a. CAPILLIPEDIUM PARVIFLORUM. Stapf. *Andropogon micranthus*,
Kunth; F. B. I. vii. 178.
Horsleykonda (Roscoe Allen).

At the end of p. 1280, insert:

117a. EHRHARTA, Thunb.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* narrow or more or less expanded. *Spikelets* laterally compressed, pedicelled; rachilla disarticulating between the persistent glumes and the lemmas, sometimes shortly produced. *Glumes* 2, very unequal, membranous. *Lemmas* 3, cartilaginous or coriaceous, boat-shaped, keeled, longer than the glumes, the 2 lower empty, the uppermost containing a bisexual floret; palea narrow, keeled. *Lodicules* 2. *Stamens* usually 6. *Styles* 2, distinct. *Grain* elliptic, much compressed; embryo about $\frac{1}{2}$ as long.

EHRHARTA ABYSSINICA, Hochst.

Nilgiris (Schmid).

Culms slender, 1—3 ft. high; leaves up to 1 ft. long; 3 in. wide; panicles spike-like, up to 6 in. long; lower glumes 12 in. long, acute, 5-nerved; upper 16 in. long, obtuse, 7-nerved; lemmas 2—25 in. long, scabrid, the upper empty one minutely tuberculate, often transversely corrugate in the upper half, narrowed at the base into a false pedicel sulcate on the back, the uppermost lemma with a small basal tubercle on each side; stamens 6.

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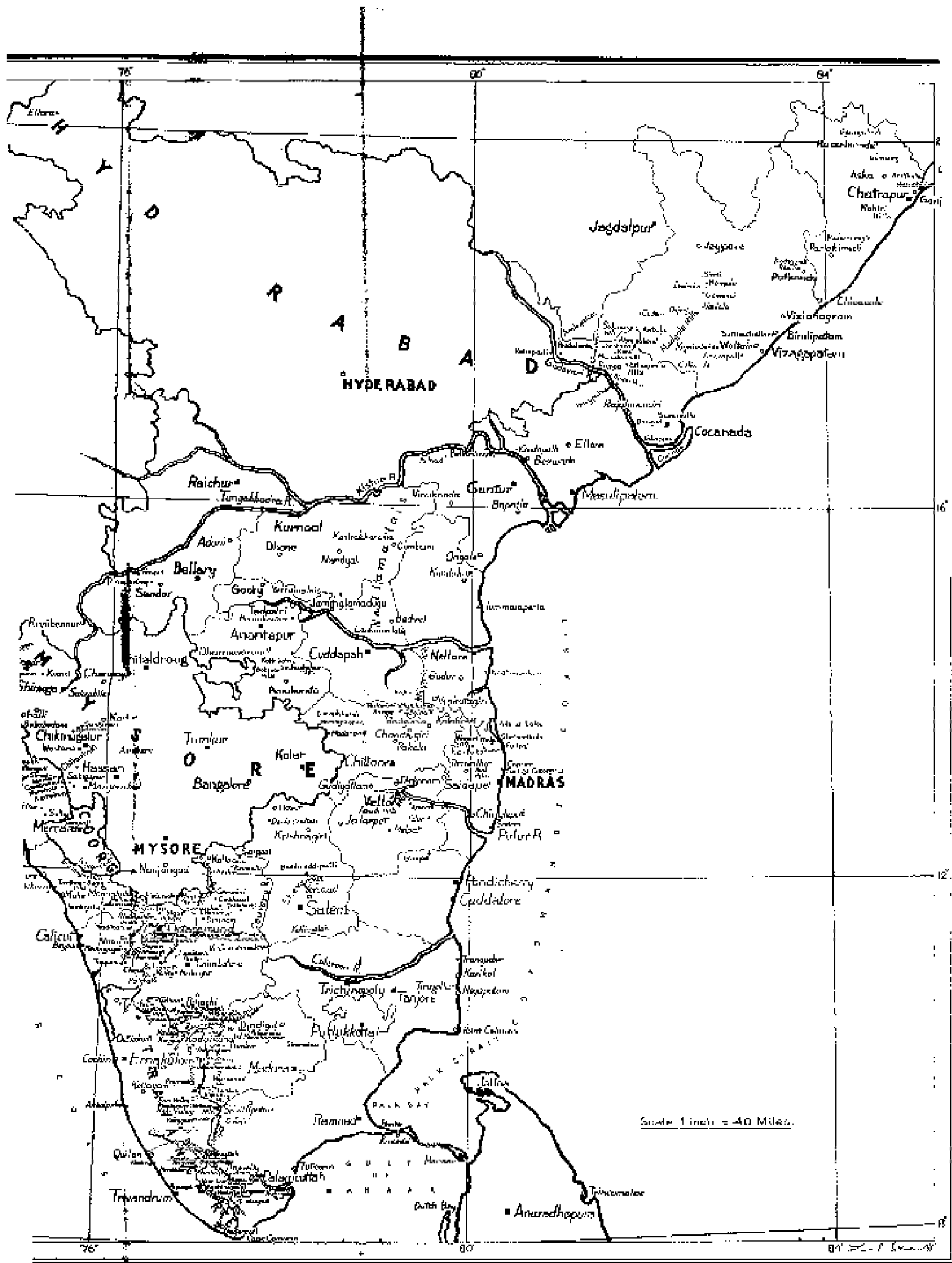
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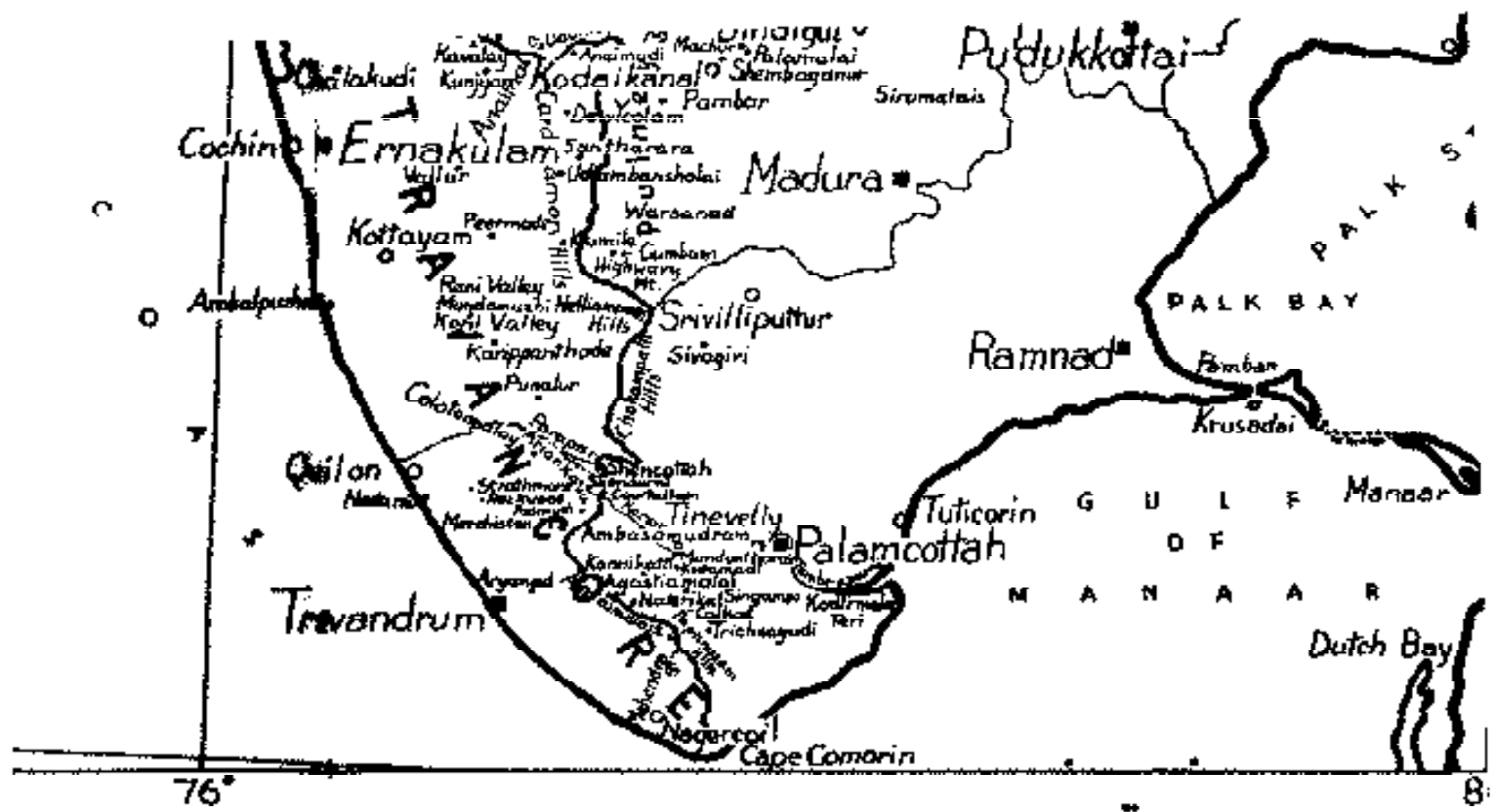
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