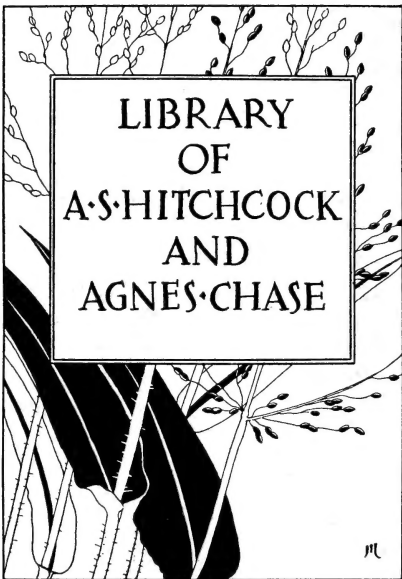


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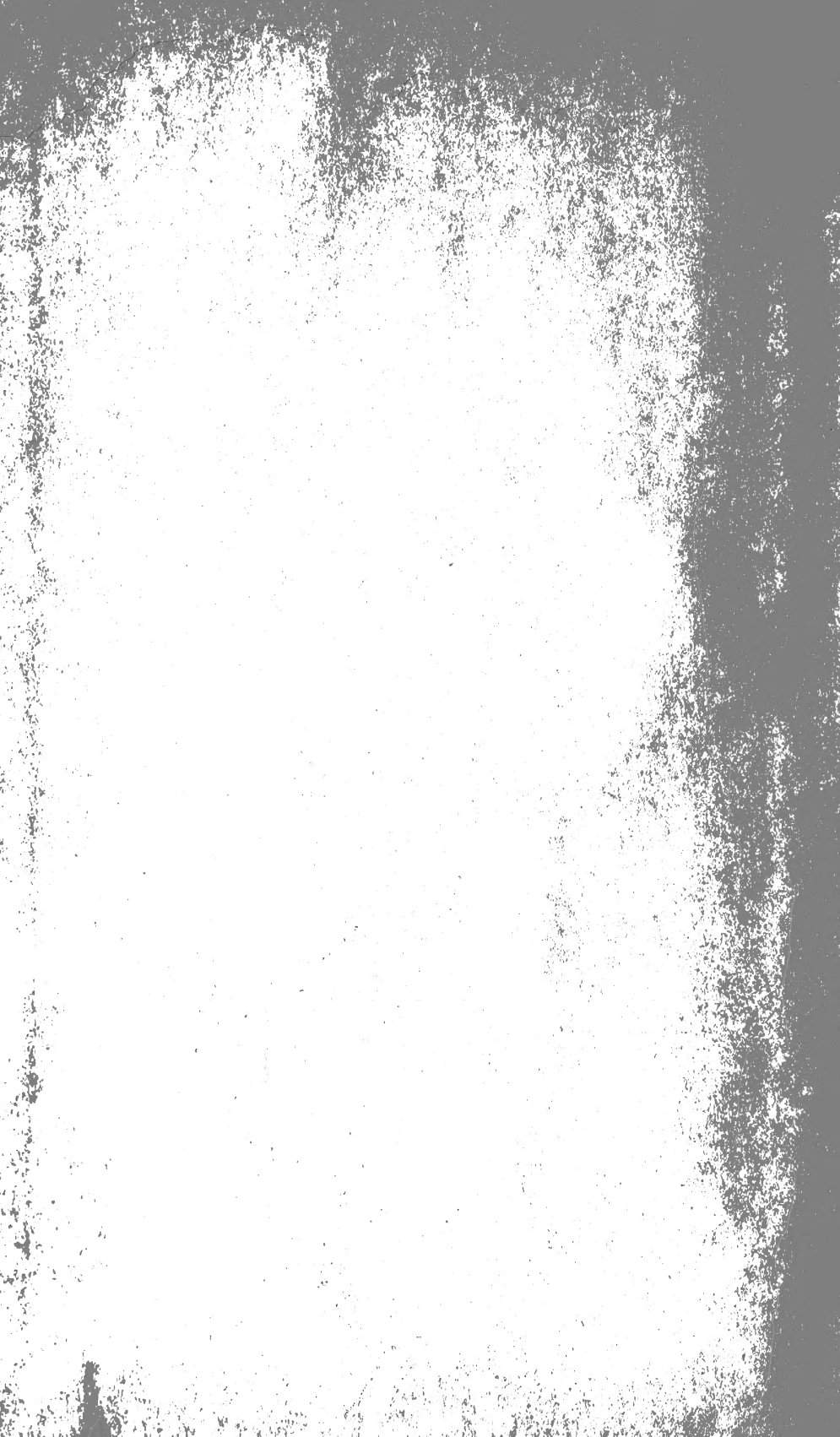
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REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY.  
Part III. By E. BLATTER, S.J., Ph.D., F.L.S.

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Gram. by

Blatter + McCann

Mayden

Androp to Coelocarpus

See TX (part XI) for key

genera

pp 1-33



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., Ph.D., F.L.S.

PART III

(Continued from page 917 of Vol. xxxi)

GRAMINEÆ (Cke. ii, 907)

BY

E. BLATTER AND C. MCCANN

We have decided to take up the *Gramineæ* for several reasons. Since Cooke's publication of this family several new species have been described and McCann has added over 50 species which are new to the Presidency. More important than the numerical additions are the changes made during the last fifteen years with regard to the general arrangement of the grasses and the definition of certain genera. A great amount of work has been done in Europe as well as in America. In Europe it was chiefly O. Stapf who, with his vast experience of the grass-flora of many countries and the rich material of the Kew Herbarium at his disposal, has advanced our knowledge of the grasses and their systematic co-ordination more than anybody else. A comparison of his monograph of the grasses in the Flora of Tropical Africa which is still in progress with that of the Flora Capensis shows at once in which direction and to what extent progress has been made. As regards the second sub-family *Pooideæ* the two works reveal only minor changes; but considerable changes were found necessary in the first subfamily *Panicoideæ*. Here again it is chiefly the genera *Andropogon* and *Panicum* and their allies which have been affected. In this respect, especially where the tribe of *Paniceæ* is concerned, we owe a good deal to American botanists. It was chiefly the fact that there were no definite dividing lines for the genera of *Andropogoneæ* and *Paniceæ*, that induced Stapf not 'to unite the groups wherever intermediate links can be detected,' which would bring about endless confusion, but 'to be satisfied with approximately definable groups, which can on the whole be easily grasped and remembered.' In other words, it is preferable from a practical point of view to adopt smaller genera than unmanageable large genera for merely theoretical reasons. As the Kew Herbarium, as far as the grasses are concerned, owes its systematic arrangement entirely to Stapf, and as colonial workers will always appeal to Kew in their difficulties, we thought it advisable to follow Stapf in the definition and sequence of the tribes as laid down in the Flora of Tropical Africa. As of late the grass-problems have received renewed attention by the Agricultural Departments in India, we do not consider it superfluous to bring the systematic account of the grasses of Bombay up-to-date.

An asterisk in front of a name means that the particular genus or species has been introduced.

Two complete keys, one natural and one artificial will be given at the end.

SUBFAMILY I. PANICOIDEÆ

The mature spikelets fall entire from their pedicels or with them, all are alike or differ in sex and structure. Perfect spikelets with 2 heteromorphous florets, the upper hermaphrodite, the lower male or barren. Rhachilla not continued beyond the upper floret.

TRIBE I. *Mayideæ*.—Sexes borne on different inflorescences on the same plant or the female spikelets at the base of the inflorescence, and the male above them. The male spikelets in pairs, one sessile, the other pedicelled, or both pedicelled, in spike-like solitary or paniced racemes, 2-flowered. Glumes

membranous or chartaceous, enclosing the florets. Valves more or less hyaline, awnless. The female spikelets solitary with or without a rudimentary pedicelled companion, 1-flowered. Glumes firm, at least the lower which ultimately often becomes bony, or both thin and more or less hyaline. Valves hyaline awnless.

1. Male and female spikelets in separate inflorescences.
  - Male spikelets in a large terminal panicle. The female spikelets in the axils of the leaves
  - (a) Female spikes distinct, articulated ... \*1. *Euchlæna*.
  - (b) Female spikes grown together into a spongy more or less cylindrical body ... \*2. *Zea*.
2. Male and female spikelets in separate portions of the same spike, the female below.
  - (a) Grain enclosed in the usually globose or ovoid ivory-like capsuliform supporting sheath ... 3. *Coix*.
  - (b) Grain enclosed in the hardened outer glumes ... 4. *Polytoca*.

\*1. *EUCHLÆNA*, Schrad.

Stout and tall annuals with leaves very broadly linear or oblong. Male spikelets 2-nate (sessile and pedicellate) on the spiciform fascicled branches of a terminal panicle, 2-flowered with coriaceous glumes. Female spikelets in 2-ranked spikes which are clustered in the leaf-axils, not fused as in the Maize joints rhomboidal, oblique, articulate, excavate, with the margins of the excavation embracing the cartilaginous outer glume and with it forming a smooth pseudocarp.

\*1. *Euchlæna mexicana*, Schrad. Ind. Sem. Hort. Götting. (1832), var *luxurians*; H. H. Mann in Bull. 77, Dept. of Agric., Bombay.—*Reana luxurians*, Dur. in Bull. Soc. Acclim. Sér. II, IX (1872), 581.

*Vern. name*: Teosinte.

*Description*: A large, very succulent, strong growing, annual grass, 30 cm.—3 m. high. Leaves long, 5-7.5 cm. broad. Male spikelets 8-9 mm. long, crowded in long spikes in a corymb 15-25 cm. long. Female spikes in the leaf-axils. Styles very long, protruding from the top of the enclosing leaf-sheath. The spike of the female spikelets breaking up at maturity into rhomboidal seed-like joints. Nearly allied to Maize and resembling it in its tassel of male flowers and broad leaves. A single plant often sends up 100 stems.

*Locality*: Cultivated in the Ganeshkhind Botanic Garden.

*Distribution*: A native of Guatemala.

*Uses*: Cultivated for green fodder, but it does not stand drought well. Horses are fond of it.

\*2. *ZEÄ*, Linn. (Cke. ii, 1051, Stapf. Fl. Trop. Afr. ix, 26)

Tall, stout, annual grasses with large leaves, the axils of the lower bearing the female inflorescences (cobs), tightly enveloped by large membranous bracts. Sexes in different inflorescences on the same plant. Male inflorescence terminal, of paniced spike-like racemes with 2-nate spikelets shortly unequally pedicelled or one sessile on the inarticulate rhachis, both similar, 2-flowered, awnless. Glumes subequal, membranous, convex, obscurely 2-keeled, 9-10-nerved. Valves more or less hyaline, 3-5-nerved; valvules similar, 2-nerved, obscurely keeled; lodicules 2, fleshy. Stamens 3; anthers linear. Female spikelets 2-nate in 4-11 longitudinal rows, slightly immersed in the spongy axis of the cob, with a lower barren and an upper fertile floret, awnless. Glumes similar, very broad, fleshy below, hyaline above, nerveless, ciliate. Lower valve resembling the glumes, but shorter and ciliate, with or without a similar but smaller valvule; upper valve similar to the lower with a valvule about as long as the ovary. Lodicules 0. Ovary obliquely ovoid. Style very long, 2-fid at the tip, papillose upwards, exerted in long silky tassels from the sheathing bracts. Grain large, subglobose or dorsally more or less flattened, surrounded by the dried up glumes, valves and valvules; scutellum large, equalling or exceeding  $\frac{3}{4}$  of the grain.

Species 1.—A native of America.

\*1. *Zea mays*, Linn. Sp. pl. ed. I, 971; Beauv. Agrost. 136, t. 24, fig. 3; Steud. Syn. Pl. Glum. I, 9; Benth. and Trim. Med. Pl. t. 296; Duthie, Field and

Gard. Crops 25, t. 5; Koern. and Wern. Handb. d. Getreidebaues I, 331-378, II, 772-870; Harshberger, Maize, in Contrib. Lab. Univ. Pensylv. I (1893), 75-202; Nicholls, Text-book Trop. Agr. (1892), 260-265; Montgomery, Corn Crops (1913), 1-275; Davy, Maize (1914); Stapf. in Fl. Trop. Afr. IX, 26.

*Vern. Names*: Maize, Buta, Maka.

*Description*: Culms up to 3 m. high, sometimes more. Leaf-sheaths terete, more or less hairy upwards along the margin; ligule short, truncate, thinly membranous, more or less pubescent; blades linear-lanceolate, up to over 90 cm. long and 10 cm. wide, glabrous or almost so, tips often drooping. Male panicle up to over 20 cm. long; rhachis pubescent; spikelets up to 12 mm. long; anthers 6 mm. long. Female spike (cob) and grains varying much in size and shape, the grains also in colour.

*Locality*: Cultivated widely in the Presidency as a forage for cattle and as a vegetable and for flour.

*Origin*: The origin of Maize is a much discussed question. Some are of opinion that it has been developed from Teosinte (*Euchlœna*), others that the original wild form has become extinct. A more acceptable opinion is that it is a hybrid between Teosinte and an unknown or extinct species resembling pod-corn, a variety of *Zea mays* in which each kernel is enveloped in the elongated floral bracts.<sup>1</sup>

Kuwada<sup>2</sup> who studied the number of chromosomes in Maize came to the conclusion that *Zea mays* was originally derived from the hybridization between *Euchlœna* and some unknown species of the tribe *Andropogoneæ*, long chromosomes belonging to the former and short ones to the latter, and that the nuclei of its various individuals possess both kinds of chromosomes in various combinations according to the law of chance.

To explain the structure of the ear of Maize, Collins published evidence which indicated that the ear may have developed through the twisting of yoked pairs of spikelets. Weatherwax<sup>3</sup> tries to refute this opinion. He contends that dropping of rows of seeds is due to the discontinuance of a row of paired spikelets and not to the loss of the pedicelled spikelets from yoked pairs, and that there is no indication that short rows represent long rows partially aborted, but that the abortion of spikelets or of rows in the ear seems to be much more constant as a characteristic of theories than of real ears.

Genetics of Maize: Those interested in Maize from a genetic point of view are referred to the more recent publications mentioned in the foot-note.<sup>4</sup>

<sup>1</sup> Collins. The origin of maize. Journal Wash. Acad. Sci. 2 (1912), 520.

<sup>2</sup> Kuwada, Y. Die Chromosomenzahl von *Zea mays* L. Ein Beitrag zur Hypothese der Individualität der Chromosomen und zur Frage über die Herkunft von *Zea mays* L. Jour. Coll. Sci. Imperial Univ. Tokyo, 39 (1919), 1-148.

<sup>3</sup> Weatherwax, P. A misconception as to the structure of the ear of maize. Bull. Torrey Bot. Club, 47 (1920), 359-362.

<sup>4</sup> Blaringhem, L.—Production par traumatism d'une forme nouvelle de Mais à caryopses multiples, *Zea Mays* var. *Polysperma*. Compt. Rend. Acad. Sci. Paris 170, (1920), 677-679.

Collins, G. N.—Structure of the maize ear as indicated in *Zea-Euchlœna* hybrids. Jour. Agr. Res., 17 (1919), 127-135.

Collins, G. N.—Dominance and the vigor of first generation hybrids. Amer. Nat., 55 (1921), 116-133.

Collins, J. L.—Chimeras in corn hybrids. Jour. Heredity, 10 (1919), 2-10.

Emerson, R. A.—The nature of bud variations as indicated by their mode of inheritance, Amer. Nat., 56 (1922), 64-79.

Hume, A. N.—A system for breeding corn or gregarious animals. Jour. Heredity, 11 (1920), 191-192.

Jones, D. F.—Segregation of susceptibility of parasitism in maize. Amer. Jour. Bot., 5 (1918), 295-300.

Jones, D. F.—The effect of inbreeding and crossbreeding upon development. Proc. Nation. Acad. Sc., 4 (1918), 246-250.

Jones, D. F.—Heritable characters of maize. Jour. Heredity, 11 (1920), 161-167.

Jones, D. F.—Selection in self-fertilized lines as the basis for corn improvement. Jour. Amer. Soc. Agron., 12 (1920), 77-100.

Kempton, J. H.—Heritable characters of maize. Jour. Heredity, 11 (1920), 111-115.



3. *Coix*, Linn. (Cke. ii, 997).

Species 5 or 6.—Hot countries of the Old World.

*Coix Lacryma-Jobi*, Linn. Sp. Pl. ed. i, 972; Cke. ii, 997; Stapf in Fl. Trop. Afr. ix, 27.—*Coix Lacryma*, Linn. Syst. ed. x, 1261; Duthie, Grasses of N. W. India, 11, and Fodder Grass, N. Ind. 18.

*Locality: Sind*: Umarnot, sandy plains (Sabnis B717!); Chuar Chemali, Indus River (Blatter and McCann D680!); Mirpur Sakro (Blatter and McCann D681! D683!); Gharo (Blatter and McCann D682!).—*Gujarat*: (Graham).—*Khandesh* (McCann!)—*Konkan*: Gokhiwara, Bassein (Ryan 25!); Matheran (Paranjpe!); Dohe Forests (Ryan 713!); Junga Hill, Thana (Paranjpe!); Alibag, rice fields (Ezekiel!); Kenery Caves, foot (McCann 9876!); Sion (McCann 8453!); Bhandup, near tank (McCann 5098!); Horse-shoe Valley, Ghatkoper (McCann 9877!); Common along line from Kalyan to Kasara in streams (McCann!).—*Deccan*: Lonavla (Garade! McCann! Woodrow); Khandala, common all over (McCann 9405!); Purandhar (McCann 5005!); Igatpuri (McCann 4346!); Panchgani Ghat (Cooke); Panchgani (Blatter!).—*S. M. Country*: Devaryi (Sedgwick and Bell 4426!); Dharwar (Sedgwick 1856!).—*Kanara*: (McCann!); Common all through the Konkan and Deccan during the rains, filling up the banks of streams and fields.

*Distribution*: Tropical Asia, cultivated in Africa and America.

*Uses*: Used as fodder for cattle. Duthie says that they fatten on it. Haines calls it a poor fodder for cattle. Of the false fruits there are several varieties differing much in size, shape and colour, and used for decorative purposes in the place of beads. According to Stapf one variety with thin shells is an important cereal in Burma and in the Farther East. Waxy endosperm, first found in maize from China, Burma and the Philippines, has been found now in *Coix Lacryma-Jobi* from the same region.<sup>1</sup>

4. *POLYTOCA*, Br. (Cke. ii, 998)

1. *Polytoca Cookii*, Stapf in Hook. Ic. Pl. 24 (1895) t. 2333; Cke. ii, 998.

*Locality: Kathiawar*: Junagad (Blatter).—*Konkan*: Tungar forest, Bassein (Bhide); Bombay (Dalzell); Salsette (Jacquemont 706). *Deccan*: Khandala (McCann 9881!); Igatpuri (McCann 9880!); near Mahableshwar (Woodrow<sup>1</sup>); Mahableshwar (Woodrow, Cooke). *Kanara*: (Lisboa).

*Distribution*: Apparently endemic in the Bombay Presidency.

2. *Polytoca barbata*, Stapf in Hook. f. F. B. I. vii (1896), 102; Cke. ii, 599.

*Coix barbata*, Roxb. Fl. Ind. iii, 569; Dalz. and Gibs. Bombay Fl. 289. *Coix gigantea*, Herb. Russ. ex Wall Cat. No. 8626.—*Chionachne barbata*, Br. in Benn. Pl. Rar. Jav. 18; Aitchis, Cat. Panj. Pl. 157; Duthie Grass. N. W. Ind. 11, and Fodd. Grass. N. India, 19.

*Locality: Gujarat*: Chharodi farm (Gammie 16536!); Nadiad farm (Herb. Econ. Bot. Poona!); Surat (Sedgwick!); Junagad, Kathiawar (Blatter 3784!). *Khandesh*: Toranmal (McCann 9883!); Taloda (Golne!). *Konkan*: Between Worli Fort and Hornby-Villard Road on bank, Bombay (Sabnis 9884!); Thana (McCann!). *Deccan*: High hills round Junnar, Poona District (Dalzell and Gibson); Poona (Woodrow); College of Science, Poona (Herb. Econ. Bot. Poona!); Ganeshkhind Bot. Gard. (Herb. Econ. Bot. Poona!); Haveli (Herb. Econ. Bot. Poona!); near Sholapur (Woodrow!). *S. M. Country*: S. W. of Dharwar (Sedgwick and Bell 4433!); Kunemelihalli (Sedgwick 1947!); Kholapur (Woodrow!, Herb. Econ. Bot. Poona!). *Kanara*: Gersoppa Falls (Talbot!).

*Distribution*: India, Ceylon, Java.

Kempton J. H.—Linkage between brachytic culms and pericarp and cob color in maize. Jour. Washington Ac. Sc. 11 (1920), 13-20.

Kempton, J. H.—A brachytic variation in maize. U. S. Dept. Agr. Bul. 925 (1921).

Richey, F. D.—The inequality of reciprocal corn crosses. Jour. Amer. Soc. Agron. 12 (1920), 186-196.

Urbain, A.—Influence des matières de réserve de l'albumen de la graine sur le developement de l'embryon. Rév. Gén. Bot. 32 (1920), 125-139, 165-191.

<sup>1</sup> Kempton, J. H. Waxy endosperm in *Coix* and *sorghum*. Jour. Heredity, 12 (1921), 396-400.

TRIBE II. *Andropogoneae*.—Spikelets usually in pairs, one sessile, the other pedicelled, very rarely both pedicelled, those of each pair usually alike as to sex (homogamous) or different (heterogamous) on the axes of variously arranged, often spike-like racemes. Glumes more or less rigid and firmer than the valves, and the lower always longer than the florets. Valves membranous, often hyaline, that of the upper floret awned or reduced to an awn or muticous.

The key to the genera of this tribe will be given below.

#### 5. DIMERIA, R. Br.

*Woodrowia diandra*, Stapf. must be referred to this genus. The genus *Woodrowia*, therefore, disappears from the Bombay Flora.

##### I. Spikelets in 2-3-nate racemes. Annuals

(a) Rhachis nearly straight. Awn long..... 1. *D. ornithopoda*.

(b) Rhachis circinate curved. Awn short..... 2. *D. Woodrowii*.

##### II. Spikelets in many-nate racemes. Perennial..... 3. *D. gracilis*.

##### III. Spikelets in panicles. Annual..... 4. *D. diandra*.

The species of this genus usually inhabit open, flat, dry, gravelly plains which are well drained during the monsoon, and several species may be found associated with each other in the same locality to the exclusion of every other plant. Where *D. ornithopoda*, *gracilis* and *diandra* grow together, the two former are more numerous.

1. *Dimeria ornithopoda*, Trin. Fund. Agrost. (1820), 167, t. 14; Hack. Monogr. Androp. 81; Hook. f. in F. B. I. vii, 104; Cke. ii, 945.—*D. filiformis*, Hochst. in Hohenack. Pl. Ind. Or. no. 231.—*Andropogon filiformis*, Roxb Fl. Ind. i 256.—*Andropogon Roxburghianus*, Schult. Mant. ii, 451.—*Psilostachys filiformis*, Dalz. and Gids. Bomb. Fl. 305.

*Description*: Cke. l.c.

*Locality*: *Konkan*: Kankeshwar Hills, Alibag (Bhide!); Marmagao (Talbot!); Vetora (Sabnis 33715!).—*Deccan*: Mahableshwar (Dalzell and Gibson, Lisboa); Lingmala to Mahableshwar, 4,000 ft., rain 200 inch. (Sedgwick and Bell 4653!); Lonavla (Bhide!, Lisboa); Khandala, Tata's Lake, very common (McCann A309!, 9885!, Woodrow!); Sakhar-Pathar, Lonavla (Gammie 15948!); Panchgani (Blatter and Hallberg B1214!, B1219!, B1279!, B1289!, Woodrow!)—*S. M. Country*: Castle Rock (Bhide!), Londa (Woodrow!).—*Kanara*: Yellapore (Sedgwick 3124!); Birchy (Talbot 2251!); Karwar (Hallberg and McCann A307!); Siddhapur to Sirsi, open grass land (Hallberg and McCann A313!); Jagalbet, N. Kanara (Talbot 1565).

*Distribution*: All over India, Malay Islands, Japan, Tropical Australia.

2. *Dimeria Woodrowii*, Stapf in Hook. Ic. Pl. 24 (1895), t. 2312; Hook. f. in F. B. I. vii, 104; Cke. ii, 945.

*Description*: Cke. l.c.

*Locality*: *Konkan*: Marmagao (McCann!, Bhide!, Talbot 2557); Karanjee, Ratnagiri Dist. (Herb. Econ. Bot. Poona!); Ratnagiri (Herb. Dhura!, Woodrow!).—*Kanara*: Mirjan (Hallberg and McCann!); Honavar, open rocks (McCann!).

*Distribution*: W. Peninsula.

3. *Dimeria gracilis*, Nees ex Steud. Syn. Gram. 413; Hack. Monogr. Androp. 88; Hook. f. in F. B. I. vii, 105; Cke. ii, 946.

*Description*: Cke. l.c.

*Locality*: *Konkan*: Penn. hills (Bhide!); Vetora (Sabnis 3714!).—*Deccan*: Lonavla (Bhide!, Woodrow); Khandala (McCann A318!); on the Ghats (Lisboa!).—*S. M. Country*: Castle Rock (Bhide!); Anmod to Castle Rock (Sedgwick 3254!).—*Kanara*: Bell and Sedgwick 3165!; Supa (Sedgwick and Bell 4880!); Arbail Ghat (Sedgwick and Bell 5018!); Sirsi (Gammie!); Kumwada (Talbot 2260!); Yellapore (Talbot 1527!); Kadra (Talbot!); Sumpkhund (Hallberg and McCann A308!); Sirsi to Siddhapur (Hallberg and McCann A311!); Devimani (Talbot!).

*Distribution*: W. Peninsula, Ceylon.

Where this species is growing together with other species of *Dimeria* it can easily be recognized by its towering the others.

4. *Dimeria diandra*, Stapf in Bhide, New and revised spec. of Gram. from Bombay Jour. and Proc. As. Soc. Bengal, new s. vii, (1911), 515.—*Woodrowia diandra*, Stapf in Hook. Ic. Pl. (1866), t. 2447; Hook. f. in F. B. I. vii, 241; Cke. ii. 1012.

*Description*: Cke. l. c. except for the number and description of the glumes, this part of the diagnosis must read like this: Glumes 4: Lower involucreal glume more or less dorsally hairy, with ciliolate margins; upper involucreal glume with a densely ciliate keel; lower floral glume obovate-oblong, hyaline, nerveless; upper floral glume 2-lobed, with a geniculate awn about 12 mm. long from the sinus, column of awn 4 mm. long, spirally ciliate, brown, the upper part of the awn yellow, longer than the column.

*Locality*: *Konkan*: Vasco da Gama (Bhide!); Marmagoa (Talbot 2557!).—*Deccan*: Khandala, open grass land (Saxton and Bhide!, McCann A317!).—*S. M. Country*: Castle Rock (Bhide!).—*Kanara*: Kumberwada (Talbot 2261!); Kadra (Talbot 2822!); Devimani (Talbot 3547!); Jog to Siddahapur, open grass land, rocky soil (Hallberg and McCann A314!); Mirjan (Hallberg and McCann A315!).

*Distribution*: W. Peninsula.

#### 6. ISCHÆMUM, Linn. (Cke. ii, 957)

Species about 50.—All belonging to the Old World, except 3 found in tropical America.

Cooke, l. c. describes 12 species. Of these *Ischæmum angustifolium* has to go under *Pollinidium* and *Ischæmum laxum, sulcatum* and *spathiflorum* under *Schima*. Instead 3 species new to the Presidency will be added to the genus *Ischæmum*, viz. *I. impressum*, Hack., *I. conjugatum*, Roxb. and *I. timorense*, Kth.

In *Ischæmum* the racemes are geminate or digitate.

A. Margins of lower involucreal glume of sessile spikelet inflexed or incurved from base to apex.

I. Leaves rounded at the base (slightly cordate in *I. molle*), sessile on the sheath.

1. Pedicel of upper spikelet less than 1/3 the length of the lower spikelet.

(a) Lower involucreal glume of sessile spikelets with nodulose margins ... 1. *I. aristatum*.

(b) Lower involucreal glume of sessile spikelets closely transversely ribbed ... 2. *I. rugosum*.

(c) Lower involucreal glume of sessile spikelets dorsally villous all over, not transversely ridged nor with nodulose margins ... 3. *I. molle*.

2. Pedicel of upper spikelet 1/3 the length of the lower spikelet or more.

(a) Upper involucreal glume of sessile spikelets 2-fid, 3-nerved ... 4. *I. diplophogon*.

(b) Upper involucreal glume of sessile spikelets acuminate, 5-nerved ... 5. *I. pilosum*.

II. Leaves hastate or cordate at the base, often petioled.

1. Pedicel of upper spikelet not 1/3 of the lower spikelet.

(a) Leaves 7.5—13 cm. long ... 6. *I. semisagittatum*.

(b) Leaves 25—35 cm. long ... 7. *I. conjugatum*.

2. Pedicel of upper spikelets as long as the lower spikelet, or longer ... 8. *I. impressum*.

B. Margins of lower involucreal glume of sessile spikelets broadly incurved below the middle.

I. Keel of upper involucreal glume winged above the middle.

1. Sessile spikelets 3 mm. long; callus large, glabrous; awn 4 mm. long ... 9. *I. Lisboæ*.

2. Sessile spikelets 5 mm. long; callus short, bearded; awn 12 mm. long ... 10. *I. ciliare*.

II. Keel of upper involucreal glume not winged. 11. *I. timorense*.

1. *Ischæmum aristatum*, Linn. Sp. Pl. (1753), 1049; Cke. ii, 958; Ranag Achariyar, South Ind. Grass. (1921), 151.

*Description*: Cke. l. c.

This grass is a very variable one, so variable, indeed, that it is almost impossible to distinguish good varieties, in spite of Hackel's and Hook. f.'s efforts.

*Locality*: *Khandesh*: W. Khandesh (Blatter!).—*Konkan*: Bassein (McCann 4474!); Sion Bombay (McCann 5233!); Bhandup (McCann 9899!); Parsik, railway line (McCann 9991!); Matunga near Bombay (Woodrow 4).—*Deccan*: Khandala, on rocks (McCann 9908!); Lohagad, half way up (McCann 9906!); Deolali (Blatter and Hallberg 4554!); Igatpuri (Blatter and Hallberg 5169!); Mahableshwar (Talbot 4534!); Lonavla (Garade!); Panchgani (Blatter and Hallberg 81216!); Pasarni Ghat (Blatter and Hallberg 81307!).—*S. M. Country*: Devarayi (Sedgwick and Bell 4456!); Castle Rock (Bhide!); Belgaum (Ritchie 812/2).

*Distribution*: India (also on higher hills), Ceylon, China, Malaya.

2. *Ischæmum rugosum*, Salisb. Ic. Stirp. Rar. (1791), 1, t. 1; Roxb. Fl. Ind. I, 320; Hack. Monogr. Androp. 206; Duthie Grass. N.W. Ind. 18, and Fodd. Grass. N. Ind. 31; F. B. I. VII, 127; Cke. ii, 959; Ranga Achariyar, South Ind. Grass. (1921), 153; Haines Bot. Bihar and Orissa pt. V (1925), 1021.

*Locality*: *Konkan*: Bombay Island (Blatter!); Kankeshwar Hills, Alibag (Bhide!); Bassein (McCann 4479!).—*Deccan*: Khandala, common, Echo-point in a dry pool (McCann 9903!); Igatpuri, common (McCann 4348!)! Poona (Woodrow).—*Kanara*: Halyal (Talbot 2140!).

*Distribution*: India, Ceylon, China, Malaya.

3. *Ischæmum molle*, Hook. f. in F.B.I. vii (1896), 128; Cke. ii, 959.

*Locality*: *Konkan*: Sion creek (Sabnis 9900!).—*Deccan*: Lonavla (Bhide! Woodrow), Igatpuri (McCann 9543!); Khandala, railway line (McCann 9944!).

*Distribution*: W. Peninsula, Central Provinces.

4. *Ischæmum diplopogon*, Hook. f. in F.B.I. vii (1896), 129; Cke. ii, 960.

*Locality*: *Konkan*: Matheran (Woodrow).—*Deccan*: Mahableshwar (Woodrow 4); Mahableshwar, wet rocks in a stream (Sedgwick and Bell 4595!); Amberwadi, Nasik District (Patwardhan!); Sakar Pathar, Lonavla (Gammie 15963!); Khandala (McCann!); Bhorkas near Poona (Woodrow 3!).

*Distribution*: W. Peninsula.

5. *Ischæmum pilosum*, Hack. Monogr. Androp. 240; Duthie Fodd. Grass N. India 31; Cke. ii, 961.

*Vern. Names*: Khavo (Broach), Kunda (Poona), Nuth, Kanigyanhullu (Bijapur).

*Locality*: *Gujarat*: Surat, roadside (Sedgwick!).—*Khandesh*: (Lisboa); Amalner (Blatter and Hallberg 4397!).—*Deccan*: Ganeshkhind Bot. Gard. Kirkee (Gammie!); Mangri, 8 miles E. of Poona (Herb. Econ. Bot. Poona!); Yerowda (Herb. Econ. Bot. Poona!); Chattarshinji Hill, Poona (Ezekiel!); Kirkee (Talbot!); Poona (Bhide!); Sholapur (Lisboa); Satara (Lisboa).—*S. M. Country*: Kunemelihalli (Sedgwick 2138!); Dharwar (Sedgwick and Bell 5341!); black soil field, Haveri (Talbot 2185!); Gadag (Talbot 2185!); black soil field, 7 miles S. of Hubli (Sedgwick 5341!).

*Distribution*: W. Peninsula, Central Provinces, Rajputana.

6. *Ischæmum semisagittatum*, Roxb. Hort. Beng. (1814), 8; Hack. Monogr. Androp. 208; Cke. ii, 961.

*Locality*: *Khandesh*: W. Khandesh (McCann!).—*Konkan*: Kenery Caves (McCann 9,914!); Sion, Bombay (McCann 5,251!); Bassein (McCann 4482!); Sewri, Bombay (McCann 3586!); Marmagoa (Talbot 2560!); Parel, Bombay (Woodrow); Thana (Lisboa).—*Deccan*: Mahableshwar, in forests (Sedgwick and Bell 4802!); Lonavla (Bhide! Woodrow); Khandala, very common (McCann 9613!); Igatpuri, very common (McCann 4319!); Satara (Lisboa).—*S. M. Country*: Castle Rock (Bhide!); Dudsagar Falls (McCann!).—*Kanara*: Anmod (Sedgwick 3273!); Supa (Talbot 2092!); Jugglepet (Talbot 2089!); Yellapur (Talbot, 738). A very common grass growing usually in the shade of trees. It is common throughout the S. part of the Presidency.

*Distribution* : Bengal, W. Peninsula, Ceylon.

Var. *dasyantha*, Hack. Monogr. Androp. (1889). 209; Cke. ii, 962

*Locality* : Konkan (Stocks ex. Cke.).—*Kanara* (Woodrow !)

7. *Ischæmum conjugatum*, Roxb. Fl. Ind. i, 321 (not of Roxb. Hort. Beng. (1894), 8); Hack. Monogr. Androp. 205; F. B. I. vii, 131. *Spodiopogon conjugatus*, Voigt. Hort. Suburb. Calc. 706 — *Andropogon cordatifolius*, Steud. Syn. Gram. 376.

*Description* : An annual. Stem spreading from the root and creeping, then geniculately ascending, 30-35 cm. high, slender, stiff, purplish, repeatedly branching upwards. Leaves short, 25-35 mm. long, base hastate or broadly, deeply cordate, acuminate, broadest at the base, rather rigid, striate, lower petioled; sheath of the upper ventricose and often open; ligule short, glabrous. Spikes 2, short, 25-35 mm. long, sessile, villous; joints very short, quadrately clavate, plano-convex, ciliate. Sessile spikelets 3 mm. long, pale. Glumes 4. Lower involucrel glume oblong, obtuse, flat, 2-toothed, villous from below or above the middle to nearly the top, margins narrowly inflexed, not winged, upper half often greener, even or lower margins obscurely nodose. Upper involucrel glume lanceolate, acuminate, strongly keeled, puberulous. Lower floral glume paleate. Upper floral glume cleft to about the middle, awn dorsally inserted at or below the cleft, slender, about twice as long as the spikelet. Pedicelled spikelets subsessile, almost awnless. Lower involucrel glume as in the sessile.

*Locality* : *Konkan* : Okda Forest (Ryan, 712 !). *Deccan* : Mahabeshwar to Pratabgad (Bhide !); Khandala (Garade !); College Farm, Poona (Pawar !).—*Kanara* : Gersoppa Falls (Chibber !).

*Distribution* : Bengal, W. Peninsula, naturalized in Ceylon.

8. *Ischæmum impressum*, Hack. Monogr. Androp. 210; F. B. I. vii, 132.

Stem 10-20 cm. high, slender, prostrate below, branching upwards, quite glabrous. Leaves 5-8 cm. long, upper 18 mm. broad, ovate or oblong-lanceolate, cordate, lower narrower, petioled, sparsely hairy beneath, margin thickened, scaberulous, sometimes crenulate; sheath compressed, glabrous; ligule oblong. Spikes 2, yellow; joints and pedicels stout, clavate, ciliate with rigid hairs, forked at the top. Sessile spikelets 6-8 mm. long, shining; callus short, broad, bearded. Lower involucrel glume linear-oblong, flat, dorsally broadly irregularly depressed with shallow subsemilunar pits in the lower 2/3, above it winged and 2-cuspidate, narrowed and margins subnodulose at the base, wings erose. Upper involucrel glume obtuse, chartaceous, ciliate, dorsally rounded with a median gibbosity and an auricle-like wing above it. Lower floral glume oblong-lanceolate, hyaline, 3-nerved, ciliate. Upper floral glume much shorter, glabrous, cleft to above the middle, awn short, geniculately inserted at the cleft. Pedicelled spikelets smaller than the sessile. Lower involucrel glume obtuse, glabrous, many-nerved, winged on one margin. Upper involucrel glume 7-nerved. Upper floral glume mucronate.

*Locality* : *Deccan* : Mahabeshwar (Sedgwick and Bell, 4514 !); Panchgani, Tableland (Blatter, 5083 !, B1221 !, B1285 !); Igatpuri (Blatter !); Khandala, Echo-Point (McCann 9943 !); Lonavla (Bhide !).

*Distribution* : We have found this species only in the W. Ghats. Hooker f. mentions the Konkan, but with a sign of interrogation. As we have never met it in the Konkan, it is not likely to occur in that region. Where Huegel's specimen comes from we cannot say, and will in all probability never be known. We think it is quite safe to say that *I. impressum* is endemic in the W. Ghats of the Bombay Presidency.

9. *Ischæmum Lisboaë*, Hook. f. in F. B. I. vii, (1896), 133; Cke. ii, 962.

*Locality* : *Kanara* : N. Kanara (Lisboa); Karwar (Talbot 2209 !, McCann !). A rare grass, apparently endemic in N. Kanara.

10. *Ischæmum ciliare*, Retz. Obs. 6 (1791), 36; Hack. Monogr. Androp. 225; Duthie Fodd. Grass. N. India. 30; Cke. ii, 962. *I. geniculatum*, Roxb. Fl. Ind. I, 322. *S. obliquivalvis*, Nees in Nov. Act. Cur. XIX, Suppl. I (1843), 185; Duthie Grass. N. W. Ind. 16.

*Locality* : *Konkan* : Bassein (Ryan 445 !); St. Xavier's College Comp., Bombay (McCann 4594 !); Parel, Bombay (Woodrow); Compoli (McCann

9415 !); Alibag, sandy shore (Ezekiel !); Uran (McCann 5126 !); Salsette (Jacquemont 710).—*Deccan*: Khandala, very common (McCann 9612 !); Ganeshkhind Bot. Gard. (Herb. Econ. Bot. Poona !); Igatpuri (Blatter and Hall. 3927A !).—*S. M. Country*: Muzgad, hill-side (Sedgwick 1823 !); Castle Rock (Bhide !).—*N. Kanara*: Yellapore (Talbot 1526 !); Halyal, borders of rice fields (Talbot 2141 !); Ankola (Mamlatdar of Ankola !); Karwar, sea coast, sandy soil near Gaol (Talbot 2821 !); Gersoppa Falls (McCann !); Common throughout Kanara (McCann !); Kakti (Woodrow).

*Distribution*: India, Ceylon, China, Malaya, Australia.

11. *Ischænum timorense*, Kunth Revis. Gram. i, 369, t. 98; Hack. Monogr. Androp. 229; F. B. I. vii, 136:—*I. tenellum*, Roxb. Fl. Ind. i, 323.

Stem 15–45 cm. high, slender, branched, straggling, nodes glabrous, or sparingly bearded. Leaves 2.5–10 cm. long, sessile and petioled, linear-lanceolate, acuminate, glabrous or sparsely hairy, base of upper rounded, of lower rounded; sheath lax, mouth hairy; ligule obscure. Spikes 2–3, 25–50 mm. long, rather slender, sparingly villous; joints and pedicels about half as long as the spikelets, nearly equal, shortly ciliate. Sessile spikelets 2.5–3 mm. long, greenish or with green nerves; callus narrow, long-bearded. Lower involucreal glume ovate or ovate-lanceolate, acuminate, bicuspidate, 5–9-nerved, base ventricose, margins broadly involute below, subauricled, dorsally convex, polished, nerves strong. Upper involucreal bracts longer, acuminate or aristulate, dorsally rounded, recurved, 3–5-nerved, tip 2-toothed, dorsally usually ciliate. Lower floral glume lanceolate, falcate, palea linear-oblong. Upper floral glume short, 2-lobed, glabrous, awn in the cleft very slender, shortly exserted. Pedicelled spikelets like the sessile awned.

*Locality*: *Sind*: Sukkur (Mamlatdar of Sukkur !).—*Deccan*: Mahableshwar, common (Sedgwick and Bell 4503 !); Lonavla (Bhide !); Khandala, behind the Saddle (McCann 9915 !).—*S. M. Country*: Deciduous forests W. of Dharwar (Sedgwick and Bell 4500 !); Devikop (Sedgwick 2170 !); S. W. of Dharwar (Sedgwick and Bell 4429 !); Londa (Bhide !).—*Kanara*: Suppa (Talbot 2101 !); Yellapore (Talbot 2327 !); Dandeli (Talbot 2494 !).

*Distribution*: Burma, Chittagong, Bengal, Central Provinces, Sind, W. Peninsula, Ceylon, Malaya, Pacific Islands.

## 7. THELEPOGON, Roth. (Cke. ii, 971).

Species 1.—India and tropical Africa.

1. *Thelepogon elegans*, Roth. ex Roem. and Schult. Syst. ii, 788; Nov. Pl. Sp. 62; Hack. Monogr. Androp. 267; F. B. I. vii, 148; Cke. ii, 671.—*Andropogon princeps*, A. Rich. Tent. Fl. Abyss. ii, 470, t. 102.—*Rhyniachne princeps*, Hochst. ex Steud. Syn. Pl. Glum. i, 360.—*Jardinea abyssinica*, Steud. l.c.—*Rhytachne princeps*, Durand and Schinz. Consp. Fl. Afr. v, 700.

*Vern. Names*: Bodga (Kaira), Bhatad (Thana), Bangadi (Poona), Pharoda (Ahmednagar).

*Description*: Cke. l.c.

*Locality*: *Gujarat*: Ahmedabad (Sedgwick !); Kaira (ex Burns).—*Konkan*: Matheran (D'Almeida A257 !); Thana (ex Burns).—*Deccan*: Najar to Pasur Rd. (Paranjpe !); Lina Hill, Nasik District (Blatter and Hallberg A79 !, 4544 !); Katraj Ghat (Gammie !); Bairawadi, Purandhar (McCann 5053 !); Panchgani (Blatter and Hall. B1267 !); Poona (Woodrow); Hewra (Dalzell); near Nasik (Edgeworth); Ahmednagar (ex Burns).—*S. M. Country*: Dharwar (Sedgwick 1824 !); Alnawar (Talbot 2303 !); Belgaum (Ritchie 812).—*Kanara*: Halyal (Talbot 2094 !, 2142 !).

*Distribution*: Central India, W. Peninsula, Tropical Africa.

*Uses*: Eaten by horses, although very bitter (Dalzell).

## 8. SEHIMA, Forsk. Fl. Aegypt.

Arab. 178; Stapf. in Fl. Trop. Afr. ix, 35.

Annual or perennial grasses. Blades convolute when young, at length flat, narrow; ligules a line of stiff hairs. Racemes usually gently curved, dorsiventrally and laterally compressed, with the pedicelled spikelets converging over the convex side, joints and pedicels sublinear and parallel. Sessile and pedicelled spikelets heteromorphous. Spikelets 2-nate, those of each pair

differing in sex, one sessile, the other pedicelled on the articulate fragile rhachis of solitary spike-like racemes, the pedicelled tardily separating from their pedicels, the sessile deciduous together with the adjacent joint of the rhachis and the pedicel. Florets 2; lower male, upper bisexual in the sessile, male or neuter in the pedicelled spikelets. Sessile spikelets: glumes equal or subequal; lower grooved, rarely flat, 2-dentate or 2-mucronate, more or less chartaceous, upwards acutely 2-keeled with inflexed margins, keels winged; upper glume boat-shaped, keeled upwards with a bristle-like awn. Valves hyaline, of lower floret entire, mucous, of upper 2-fid and awned from the sinus. Valvules more or less equalling their valves, hyaline. Lodicules 2, cuneate. Stamens 3. Stigmas linear-oblong, laterally exerted. Grain oblong, obtusely trigonous; embryo reaching to the middle of the grain. Pedicelled spikelets flat, with 2 florets resembling the lower floret of the sessile spikelets, the lower or both more or less reduced and barren.

Species about 5.—India, Tropical Africa, N. America.

A. Racemes enclosed in long narrow spathes ... 1. *S. spathiflorum*.

B. Racemes not enclosed in spathes—

I. Sessile spikelets 6-7 mm. long. Lower involucrel glume of sessile spikelet 6-nerved ... 2. *S. nervosum*.

II. Sessile spikelets 7-11 mm long. Lower involucrel glume of sessile spikelet 3-5-nerved ... 3. *S. ischæmoides*.

III. Sessile spikelet 9 mm. long. Lower involucrel glume of sessile spikelet 2-nerved ... 4. *S. sulcatum*.

1. *Sehima spathiflorum*, nov. comb. Blatter and McCann.—*Ischæmum spathiflorum*, Hook. f. in F. B. I., vii (1896), 138; Cke. ii, 963.

*Description*: Cke. l. c.

*Locality*: Khandesh: Toranmal (McCann 9922 !).—Konkan: Penn (Bhide !); Matheran (Paranjpe !); Bassein (Ryan 2300 !); Kenery Caves (McCann 9920 !); Island of Salsette in hilly stony places (Jacquemont 797).—Deccan: Lonavla (Bhide !); Khandala (Woodrow); Khandala, in watercourses, very common (McCann 9928 !); Palasdari on the Bor Ghat, G. I. P. Railway (Woodrow); Lohagad, plain (McCann 9919 !); Bairawadi, Purandhar (McCann 5054 !); Igatpuri (Blatter and Hallberg 3836 !, McCann !).

*Distribution*: Endemic.

2. *Sehima nervosum*, Stapf. in Fl. Trop. Afr. IX, 36; Haires pt. v, 1023.—*S. macrostachyum*, Hochst. in Schimp. Pl. Abyss. n. 1705.—*Andropogon nervosus*, Rottl. apud Willd in Verh. Naturf. Fr. Berlin, iv (1803), 218.—*Andropogon striatus*, Klein apud Willd. Sp. Pl. iv. (1805), 903; R. Br. Prodr. 201.—*A. tazacensis*, Steud. Syn. Pl. Glum. i, 369.—*A. macrostachys*, Anders. in Schweinf. Beitr. Fl. Aeth. 306 (*per errorem* 310).—*Ischæmum laxum*, R. Br. Prodr. 205; Hook. f. in F. B. I. vii, 136, *partim*; Cke. ii, 964, *partim*.—*Ischæmum laxum* var. *genuinum*, Hack. in Monogr. Androp. 245.—*Ischæmum nervosum*, Thw. Enum. Pl. Zeyl. 305.—*Ischæmum macrostachyum*, A. Rich. Tent. Fl. Abyss. ii, 472.—*Pollinia striata*, Spreng. Pug. ii, 12.—*Hologamium nervosum*, Nees in Edinb. N. Phil. Journ. xviii, 185.

*Description*: A perennial, densely tufted grass. Stems erect, 60 cm. to 1 m. high, on a short rootstock, simple or nearly so, slender, terete, about 4-noded, middle and upper internodes exerted, smooth or slightly rough below the inflorescence, glabrous. Leaves 15-30 cm. and longer, 2-4 mm. broad, erect, linear, narrowed into long capillary tips, flat, smooth, striate, glaucous, more or less scabrid, lateral nerves about 3 on each side, like the midrib whitish and prominent on both sides; sheaths shorter than the internodes, tight, terete, striate, smooth or nearly so, glabrous or sparingly hirsute from tubercle-based hairs; ligule a line of short stiff hairs. Racemes solitary, 5-10 cm. long, erect, slightly curved, pale, fragile; joints and pedicels parallel, sublinear, slightly compressed, 3-4.5 mm. long, densely ciliate with white hairs along the angles, otherwise glabrous, tips more or less oblique. Sessile spikelets lanceolate-linear to linear, acuminate, 6.25-7 mm. long, pale green, with a shortly bearded callus. Glumes subequal: lower subchartaceous to chartaceous, with an unequally 2-toothed, flat and membranous beak, the teeth of which sometimes run out into ciliate mucros, deeply grooved, especially below the middle, acutely 2-keeled, outer keel generally winged upwards, intracarinal nerves 4, with transverse veins in the upper part, like these green and raised on a white



ground; upper glume subchartaceous, slightly shorter, boat-shaped, sublinear in profile, keeled above, with the keel widened at the apex and passing into a fine bristle 11-12.5 mm. long. 5-nerved with five transverse veins, ciliate. Lower floret: valve faintly 2-nerved, hyaline, ciliate, 4.5 mm. long, with a narrow, linear valvule of about equal length and a male flower. Upper floret bisexual: valve oblong-lanceolate, 4 mm. long, 2-fid, with narrow lobes, hyaline, 3-nerved, ciliate; awn up to 43 mm. long slender, column spirally twisted, bronze colour, very minutely ciliate along the spiral, bristle whitish, as long as the column or slightly longer; valvule as long as the valve, linear, subacute, 2-nerved, ciliate. Anthers 3 mm. long. Styles and stigmas pale, 2 mm. long. Pedicelled spikelet lanceolate, acuminate, green or tinged with purple, 7-8.5 mm. long, glabrous; lower glume slightly 2-toothed, long-ciliate from the hairs of the tightly inflexed margin, keels very narrowly or obscurely winged, wing rigidly ciliate, intracarinal nerves 5, the inner 3 very prominent and rough; upper glume lanceolate, long and finely acuminate, hyaline, ciliate, 3-nerved; lower floret as in the sessile spikelet; upper floret very much like the lower. Stamens smaller in the lower floret or both florets reduced and empty.

*Locality: Gujarat:* Porbandar (Bhide!); Junagad, Kathiawar (Blatter 3799!); Surat, city walls (Herb. St. X. C. 9498!); Ahmedabad (Sedgwick!).—*Khandesh:* (Lisboa); Umalla village, on Tapti river (Blatter and Hallberg 5160!); Toranmal, common on the slopes (McCann 9916!).—*Deccan:* Purandhar Fort (Bhide!, McCann 5106!); Khandala, St. X. Villa compound (McCann 9419!); Deolal (Blatter and Hallberg 4548!); Lonavla (Bhide!); Panchgani (Blatter and Hallberg B1269!); Poona (Woodrow); Poona to Karli (Jacquemont 530).—*S. M. Country:* Dharwar (Bhide!); Haveri (Talbot 2186!).

*Distribution:* Bengal, Behar, Central Provinces, Rajputana, W. Peninsula, Ceylon, Tropical Australia, Somaliland, Abyssinia, Eritrea, Cape de Verd Islands.

*Uses:* Used for thatching in Khandesh (Lisboa). Considered to be one of the best fodder grasses and is eaten by cattle even after the fall of the spikes (Haines).

3. *Setaria ischaemoides*, Forsk. Fl. Aegypt.—Arab. 178; Stapf in Fl. Trop. Afr. IX, 37.—*Setaria Kotschyi*, Hochst. in Flora (1844), 247.—*Ischaemum Setaria*, R. Br. Prodr. I, 204.—*Ischaemum insculptum*, Hochst. in Schimp. Pl. Abyss. n. 739 and Flora (1844), 247; A. Rich. Tent. Fl. Abyss. II, 472.—*Andropogon Setaria*, Steud. Syn. Pl. Glum. I, 369.—*Andropogon lineatus*, Steud. l.c.—*Andropogon schangulensis*, Rupr. ex Steud. l.c.—*Andropogon insculptus*, Anders. in Schweinf. Beitr. Fl. Aeth. 306 (*per errorem* 310).—*Ischaemum laxum*, R. Br. Prodr. (1810), 205; Hook. f. in F.B.I., VII, 135, *partim*.—*Ischaemum laxum* var. *insculptum*, Hack. in Monogr. Androp. 245.—*Andropogon rhyrachophorus*, Stapf in Bull. Soc. Bot. Fr. LV (1908) Mem. VIII. 101.

An annual herb. Stems usually in small fascicles, rarely over 45 cm. high, slender, terete, simple, 2- or 3-noded, middle and upper internodes slightly exerted, smooth, glabrous. Leaves glaucous, linear, tapering to a long fine point, up to 13 cm. long, 1.5-3.1 mm. broad, more or less scabrid, midrib fine like the 1 or 2 primary lateral nerves. Racemes solitary, or sometimes an additional 1 or 2 from the upper nodes, 2.5-7.5 cm. long, erect, or slightly nodding; joints and pedicels parallel, sublinear, slightly compressed, 3.1 mm. long, very densely ciliate from white hairs along the angles, otherwise glabrous, tips more or less oblique. Sessile spikelets linear 7-11 mm. long, pale green, with a shortly bearded callus; lower glume subchartaceous to chartaceous, with an unequally 2-toothed flat and membranous long beak, the teeth of which run out into mucros, deeply grooved, especially below the middle, acutely 2-keeled, the outer keel generally winged upwards, intracarinal nerves 3-5, raised, rough, only distinct just above the groove; upper glume and florets as in *Setaria nervosum*, excepting the bristle of the glume which is over 15.5 mm. long and the awn, the column of which is generally more brown than bronze in colour and has much longer cilia along the spirals. Pedicelled spikelets narrowly lanceolate, long-acuminate, pale green, up to 12.5 mm. long, glabrous; lower glume with two long setaceous teeth, sparingly hairy on the back, otherwise the spikelet as in *Setaria nervosum*.

*Locality:* Deccan (Woodrow 147, Law, ex. Stapf.)

*Distribution:* Tropical Arabia, Yemen, Abyssinia, Sudan, Kordofan, Nubia, Cameroons, Cape de Verd Islands.

4. *Sehima sulcatum*, comb. nov. Blatter and McCann.—*Ischænum sulcatum*, Hack. in Monogr. Androp. 248; Hook. f. in F.B.I., vii, 137; Cke. ii, 964.

*Description*: See Cke. 1.c.

*Locality*: Deccan: Satara (Lisboa); Malsiras, Sholapur Taluka (Lisboa).—*S. M. Country*: Black soil banks 35 miles S. of Dharwar (Sedgwick 3745!); banks of black soil fields 7 miles S. of Hubli (Sedgwick and Bell 5342!); Dharwar, common (Sedgwick 1819!, McCann!).

*Distribution*: Central Provinces, W. Peninsula.

#### 9. POLLINIDIUM, Stapf.

As far as we can make out the diagnosis of this genus was published for the first time in Haines' Botany of Bihar and Orissa, pt. 5 (1924), 1020.

Densely tufted, perennial herbs with woolly rootstock and basal sheaths. Leaves convolute when old, wiry, mouth of sheaths ciliate. Spikes digitate or fascicled, fascicles with filiform peduncles on a more or less branched panicle. Spikelets 2-nate, sessile and pedicelled, similar, on the articulate, fragile, compressed, not stout rachis. Callus densely clothed with long brown hairs. Glumes 4: Lower involucral glume flattened, 2-3-dentate, dorsally hairy at base, 5-7-nerved, margins inflexed; upper involucral glume cymbiform, minutely cuspidate, 3-5-nerved, with a slender awn. Lower floral glume hyaline, sparsely ciliate, elliptic, palea finely ciliate; upper floral glume narrow, conduplicate, entire or 2-toothed shortly awned from the tip or minute sinus, palea broad and nearly as long as the glume, densely ciliate on the top.

1. *Pollinidium angustifolium*, Haines Bot. Bihar and Orissa, pt. 5 (1924), 1020.—*Ischænum angustifolium*, Hack in Monogr. Androp. 241; Hook. f. in F.B.I. vii, 129; Cke. ii, 960.—*Spodiopogon angustifolius*, Trin. in Mem. Acad. Petersb., ser. VI, ii (1833), 300; Spec. Gram. 1c. t. 336.—*Pollinia eriopoda*, Hance in Journ. Bot. iv (1866), 173.—*Andropogon binatus*, Retz. Obs, vi, 21.

*Description*: Cke. 1.c.

*Locality*: Gujarat: Rajkot (Woodrow).—Konkan: Victoria Gardens, Bombay (McCann 4302!).—Deccan: College Garden, Poona (Grade!); cultivated at Poona (Woodrow).

*Distribution*: Afghanistan, India, China, Philippines.

*Uses*: In Bihar and Orissa the Sabai grass is used for strings, ropes and mats (the Baib matting of Calcutta) and is very largely employed for paper-making. Fires improve the crop by removing shade. It is easily grown by division of the rootstock or from seed. From seed it yields a crop in about three years. Cattle do not eat it (Haines). For Bombay see Cke. 1.c.

#### 10. APOCOPIS, Nees. (Cke. ii, 967)

1. *Apocopsis vaginata*, Hack. in Oestr. Bot. Zeitschr. 41 (1891), 8; Cke. ii, 967.—*A. Wightii*, Nees, var. *vaginata*, Hook. f. in F.B.I., vii, 143.

*Description*: Cke. 1.c.

*Locality*: Gujarat: Ahmedabad, field (Sedgwick!).—Konkan: Kalyan (Woodrow).—*S. M. Country*: Forests W. of Dharwar (Sedgwick!)—*Kanara*: Haiyal (Talbot 2379!); N. Kanara (Woodrow).

*Distribution*: Bihar, Central India, Deccan and W. Peninsula, Burma, Ceylon.

#### 11. LOPHOPOGON, Hack.

1. *Lophopogon tridentatus*, Hack. in Engl. and Prantl. Nat. Pflanzenf. ii, pt. ii (1887), 22, 56, Monogr. Androp. 254, t. i. f. 14; Hook. f. in F.B.I. vii, 149; Cke. ii, 966.—*Andropogon tridentatus*, Roxb. Fl. Ind. i, 257.—*Saccharum tridentatum*, Spreng. Syst. i, 283.

*Description*: Cke. 1. c.

*Locality*: Khandesh: Tapti, Bhusawal (Blatter and Hallberg 5457!).—Deccan: Agricultural College compound, Kirkee (Bhide!); Bapodi near Poona (Gammie 15315!); Bowadhar near Poona (Garade!); Rahuri (Nana A80!); Igatpuri (McCann 4572!); Chattarshinji Hill, Poona (Ezekiel!); Deolali (Blatter 9620!, 9610!); Jeur, Sholapur Dist. (Woodrow!).—*S. M. Country*: Dharwar, on dry gravelly uplands 2,400 ft., rain 34 inches (Sedgwick 3010!).

*Distribution*: Central Provinces, W. Peninsula.

12. *APLUDA*, Linn. (Cke. ii, 956)

1. *Apluda varia*, Hack. in Monogr. Androp. 196, var. *aristata*, Hack. l. c. 199; Hook. f. in F.B.I., vii, 150; Cke. ii, 956, *comprehendens etiam alias varietates*; Stapf. in Fl. Trop. Afr. ix, 40; Haines pt. v, 1057.—*Apluda aristata*, Linn. Cent. ii, 71; Schreber Besch. d. Gr. 93, t. 42; Beauv. Agrost. 133; Duthie Fodd. Grass. of N. Ind. 44, t. 29.—*Apluda Gryllus*, Beauv. Agrost. Explic. planches, 15, t. 25, fig. 5 (6 *per errorem*).

As our Bombay specimens must be referred to the var. *aristata* and as Cooke's description comprises also other varieties we give in the following Stapf's diagnosis of the variety *aristata*. This must not prevent botanists from paying attention to the possible occurrence of other varieties in the Presidency.

*Description*: Mostly annual, branched from the base. Stems densely tufted, erect. 30-180 cm. high, or geniculately ascending and often rooting from the nodes, many-noded, terete, smooth and polished. Leaves 10-45 cm. by 4-15 mm., linear-lanceolate, long-attenuated towards the base, almost petioled, tapering upwards to a fine setaceous point, convolute in bud, then flat, somewhat rigid or flaccid, glaucous below, glabrous or very rarely sparingly hairy, slightly rough above, scabrid along the margins, midrib white above, stouter towards the base, primary lateral nerves, 5-8 on each side, fine; sheaths terete, tight and glabrous or very rarely sparingly hairy, those supporting the flowering branches wider and shorter with reduced blades; ligules short, rounded off, glabrous or ciliate. Panicle upto 60 cm. long, much compound, primary branches long, those of the following orders gradually shorter, bearing clusters of trios of spikelets; spathe at the base of the trios ovate to ovate-oblong, mucronate or bearing rudimentary blades, glabrous, green or tinged with purple, 4-4.5 mm. long; bulbous basal joint up to 1.5 mm. long, whitish. Sessile spikelets lanceolate-oblong, acute, up to 4.5 mm. long. Lower involucre glume chartaceous, firmer below, many-nerved; upper involucre glume somewhat gibbous on the back, scaberulous on the keel. Lower floret: Valve oblong-lanceolate, acute, slightly shorter than the glumes, 3-nerved, glabrous; valvule linear-lanceolate, almost as long as the valve, 2-nerved. Upper floret: valve 3.1 mm. long, 2-fid to beyond the middle, awn up to 9.3 mm. long, very fine, with or without a distinct twisted column; valvule generally much shorter, oblong or broad-ovate, nerveless. Anthers 2.3-3.1 mm. long. Stigmas purple, up to 4.5 mm. long. Grain about 1 mm. long, Pedicels 2.3-3.1 mm. long, sparingly ciliate. Lateral pedicelled spikelet 4-5 mm. long. Glumes similar, subherbaceous, lanceolate, acute, many-nerved; lower glume rather flat on the back, upper not or obscurely keeled and not gibbous. Florets as in the sessile spikelet but the upper not awned, both are male more or less reduced. Terminal spikelet reduced to a short striate glume, continuing the pedicel.

*Locality*: *Gujarat*: Broach (Chibber !); Nadiad Farm (Herb. Econ. Bot. Poona !); Surat (Gammie 16467 !, Cooke); Karu Roa, Cutch (Blatter 3776 !); Kala Pacham Island (Blatter 3735 !); Garvi Dangs (Sedgwick !); Ahmedabad (Cooke).—*Khandesh*: Muravat, Tapti bank (Blatter and Hallberg 4434 !); N. slope of Chanseli Hill (McCann A83 !); Toranmal (McCann A84 !); Munmad, Ankai Hill (Blatter A146 !).—*Konkan*: Dhapli forest (Roan !); extremely common throughout the islands of Bombay and Salsette (McCann !); Bassein (McCann 4480 !); Alibag, margin of water-works (Ezekiel !).—*Deccan*: Purandhar (McCann 5008 !, Bhide !); Khandala, very common (McCann 5294 !); Diva Ghat (McCann A86 !); Sholapur (D'Almeida A87 !); Igatpuri, very common (McCann 4325 !, 4324 !); Panchgani (Blatter 53-85 !, Bhide !, Blatter and Hallberg B1322 !).—*S. M. Country*: Dharwar (Sedgwick and Bell 4489, 2400 ft., rain 34 inches; Londa (Gammie 15851 !); Belgaum (Ritchie 824).—*Kanara*: Halyal (Talbot 2495 !); Juggleput (Talbot !); Kawarwad (Talbot 2246 !).

*Distribution*: Socotra, India, Ceylon, E. Tropical Asia, Malaya, Australia, Pacific Islands.

*Uses*: A fairly good fodder grass, and readily eaten by cattle when young (Duthie).

13. *HEMARTHRIA*, R. Br. (Stapf in Fl. Trop. Afr. ix, 54)

Decumbent or ascending perennial grasses with branched, many-noded stems. Leaves linear, conduplicate in bud, then flat. Ligules very short, membranous.

Racemes compressed, often curved, tips more or less subulate from the slender terminal spikelet; rhachis not or tardily breaking up. Spikelets pseudo-opposite owing to the fusion of joints and pedicels, each pair made up of a sessile (secondary) spikelet and the pedicelled companion of the sessile spikelet of the next lower node. Spikelets two-nate on the tough or tardily disarticulating rhachis of spike-like, spathe-supported racemes which terminate the culms and their often fascicled branches, alike in sex and shape, or at least similar; joints and pedicels fused into roughly semicylindric internodes, hollowed out on the inner face for the reception of the sessile spikelet; disarticulation at a right angle to the rhachis or slightly oblique, tips of joints truncate, not hollowed out or appendaged. Sessile spikelet: Florets 2, lower reduced to a barren valve, upper bisexual, awnless. Glumes equal or subequal, lower flat on the back, 2-keeled, very narrowly inflexed along the margins, coriaceous or subcoriaceous, closing up the cavity formed by the adjacent joint and pedicel, upper membranous, adhering to the inner face of the cavity. Valves hyaline, of lower floret 2-nerved, of upper usually nerveless. Valvule of upper floret hyaline, small, nerveless. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong, dorsally slightly compressed; embryo about  $\frac{2}{3}$  the length of the grain: hilum conspicuous, punctiform, subbasal. Pedicelled spikelet with more elongated acuminate glumes, especially the terminal, the upper glume mucronate or aristate.

Species about 8. Throughout the warm countries of the Old World, 1 also in America, but probably introduced.

1. *Hemarthria glabra*, comb. nov. Blatter and McCann. *Rottbællia glabra*, Roxb. Fl. Ind. ed. Carey i, 353. *Hemarthria coromandelina*, Steud. Syn. i, 358. *Rottbællia compressa*, Linn. f. Suppl. 114, var. *genuina*, Hack. Monogr. Androp. 286; Hook. f. in F. B. I. vii, 153. *Rottbællia compressa*, Linn. f. Suppl. 114, *partim*; Cke. ii, 952, *partim*. *Hemarthria compressa*, Kunth Enum. i, 465, *partim*.

A word of explanation is required regarding the new name. Haines in his Botany of Bihar and Orissa, pt. VI (1924), 1061, mentions a species under the name of *Hemarthria compressa*, R. Br. and gives as synonym *Rottbællia compressa*, Linn. f. which, in our opinion, is not correct. *Hemarthria compressa*, R. Br. Prodr. Floræ Novæ Hollandiæ et insulæ Van Diemen, p. 207, represents only partly *Rottbællia compressa*, Linn. f. Besides, Stapf in. Fl. Trop. Afr. ix, 55 has separated *Rottbællia compressa*, Linn. f. var. *fasciculata* from the type and described it under the specific name *Hemarthria fasciculata*, Kunth Rev. Gram. i, 153. He was allowed to use this old name, because *Hemarthria fasciculata* is the same plant as Hackel's var. *fasciculata* (Monogr. Androp. 287.) As to the species under consideration, it coincides with Hackel's *Rottbællia compressa* Linn. var. *genuina*. With this *Hemarthria compressa*, Kunth Enum. i, 465 agrees only partly and this name cannot, therefore, be adopted. There are only two names left which can be considered: *Rottbællia glabra* and *Hemarthria coromandelina*. Of these the former is the older and should, therefore, be retained, but as the species is being transferred to the genus *Hemarthria*, the plant has to be called *Hemarthria glabra*, nob.

*Description*: A perennial grass. Stems creeping below, then erect, scandent, 1.5 to 6 m. long (Roxb.). Blade of leaf short, slowly getting narrower upwards, but at the apex slightly obtuse; sheath at the nodes glabrous. Racemes slender, compressed, 6-10 cm. long, solitary or the upper ones often fascicled. Spikelets 2-nate, 4-4.5 mm. long; callus 1 mm. long, obconical, obtuse, glabrous. Sessile spikelets: Lower involucreal glume broad, ovate lanceolate, obtuse, at the apex emarginate or obtusely bidentate, not in the least acuminate, scarcely constricted below the apex. Pedicelled spikelets: Pedicel adnate. Glumes acute or subacuminate.

*Locality*: *Sind*: Bughar, Indus River (Blatter and McCann D661!); Mirpur Sakro (Blatter and McCann D662!). *Gujarat*: Kankaria Tank, Ahmedabad (Sedgwick!).—*Khandesh*: Tapti, Bhusawal N. E. (Blatter and Hallberg 5495!).—*Kanara*: Sirsi to Siddhapur (Hallberg and McCann A78!). We have not included the localities mentioned by Cke. ii, 952 as some of his specimens might belong to another species.

*Distribution*: We do not know of any definite record as to the distribution of this species. Hooker f. calls it common in India. Hackel gives Bengal, Sarampur, Punjab, Nepal, Ceylon, China. Duthie says it occurs in moist

places in the plains, and at low elevations on the hills of N. India, and extends to Australia. It would apparently be correct to say that this plant is found all over India and Ceylon. We are not so sure about Australia.

The question now arises whether *Hemarthria fasciculata*, Kunth occurs in the Presidency. Wight, Roxburgh, Hook. f. and Duthie mention it for other parts of India and Duthie found it in the same localities where he gathered the previous species, but we have no reliable information at hand to say that it has been found in the Bombay Presidency. In all probability it does occur in our parts. In order to help botanists to clear up this point we add Stapf's description and synonymy of *H. fasciculata*, Kunth. At the same time it will be good to remember what Hackel says under *Rottbællia compressa*, Linn. f.: '*Species valde polymorpha; varietates sequentes in speciminibus typicis satis distincte, ed et ipse ita variabiles, ut nullus earum characterum constans, formæque intermedie frequentes.*'

**Hemarthria fasciculata.** Kunth Rev. Gram. i, 153, and Enum. i, 465; Hack. in Mart. Fl. Bras. II, iii, 314, t. 72, fig. 2.—*H. capensis*, Trin. Androp. in Mem. Acad. Petersb. 6 me sér. ii, 245.—*Rottbællia compressa*, Linn. f. var. *fasciculata*. Hack. Monog. Androp. 286; Hook. f. in F.B.I. vii, 153; *Rottbællia compressa*, Linn. f.; Cke. ii, 952, *partim*.—*Rottbællia fasciculata*, Lam. Illustr. i, 204.—*Lodicularia fasciculata*, Link. Hort. Berol. i, 6.—*Lodicularia capensis*, Nees Fl. Afr. Austr. 128.—*Lepturus fasciculata*, Trin. Fund. Agrost. 123.

**Description:** A perennial grass. Stems erect or more often ascending, sometimes from a long decumbent rooting base, usually branched, 30 cm. to 1.5 m. high, many-noded, compressed, glabrous. Leaves linear, gradually tapering, acute, very variable in length and width, up to 23 cm. by 4 mm; sheaths shorter or the lower longer than the internodes, compressed, keeled, often ciliate towards the mouth, otherwise glabrous or almost so; ligules membranous, very short, ciliate. Racemes usually fascicled, straight or curved, tapering to a slender point formed by the terminal spikelet, ultimately more or less fragile. Sessile spikelet linear-oblong to oblong, from a short obtriangular more or less conspicuous glabrous callus, 4-5.5 mm. long, glabrous. Lower glume coriaceous, opaque, usually more or less constricted below the obtuse entire or emarginate, 2-keeled and very narrowly winged tips, smooth, intracarinal nerves about 7; upper broadly oblong-lanceolate, acute, membranous except at the hardened tip, 3-nerved. Lower floret: Valve oblong, subobtusate, distinctly shorter than the glumes, 2-nerved. Upper floret: Valve slightly shorter, ovate-oblong, obtuse, nerveless. Anthers 1.5-2.3 mm. long. Stigmas about 1.5 mm. long, laterally exerted. Grain oblong, dorsally compressed, about 1.5 mm. long, reddish; scutellum exceeding half the length of the grain; hilum punctiform, subbasal. Pedicelled spikelet similar in sex and shape to the sessile, but slightly longer, with the lower glume more acuminate and acute, and the upper sharply mucronate, the mucro somewhat exceeding the lower glume.

**Distribution:** British E. Africa, Mozambique District, throughout Africa in the Mediterranean region (Stapf), India, America, probably introduced.

#### 14. MANISURIS, Linn. f.

Species 1.—Throughout the tropics.

1. **Manisuris granularis**, Sw. Prodr. Veg. Ind. Occ. (1788), 25; Beauv. Agrost. t. xxi, Fig. 10; Roxb. Pl. Corom. ii, 11, t. 118; Mart. and Eichl. Fl. Bras. ii, 2, t. 46; Hack. Monogr. Androp. 314; Duthie Grass. N. W. Ind. 18, Fodd. Grass. N. India. 29, t. 46; Hook. f. F.B.I. vii, 159; Cke. ii, 955; Stapf Fl. Trop. Afr. ix, 57.—*M. polystachya*, Beauv. Fl. Owar. et. Ben. t. 14.—*Cenchrus granularis* Linn. Mant. ii, App. 575.—*Hackelochloa granularis*, O. Ktze. Rev. Gen. Pl. ii, 776.—*Rytitix granularis*, Skeels in U.S. Dept. Agr. Bur. Pl. Industr. Bull. 282 (1913), 20.

**Locality:** *Gujarat:* Charodi (Gammie 16534!).—*Konkan:* Wada Taluka (Ryan 666!); Mulgaum in Salsette, open grass land (McCann 3642!).—*Deccan:* Poona (Woodrow! Cooke); Deolali (Blatter and Hallberg 4552!); Igatpuri (McCann 4573!); Railway line, Kirkee to Poona (Garade 8231!); Chhattar (hinji Hill, Poopa (Ezekiel!); Khandala (Woodrow), behind Hotel

(McCann 9410 !), behind Duke's Nose (McCann 9393 !).—*S. M. Country*: Dharwar (Sedgwick and Bell 4146 !, Woodrow), 2,400 ft., rain 34 in.; Kuput Hill, Dharwar District (Talbot 2323 !).—*Kanara*: Halyal (Talbot 1733 !, 2385 !).

15. *PELTOPHORUS*, Desv. (Stapf Fl. Trop. Afr. ix. 59)

Annual or perennial short grasses with slender, much-branched, rarely simple stems. Leaves linear, narrow, conduplicate in bud, then flat; ligules short, membranous. Racemes much compressed, rather slender, straight or curved, very conspicuously dorsiventral. Spikelets pseudo-opposite owing to the fusion of joints and pedicels, each pair made up of a sessile (secondary) spikelet and the pedicelled companion of the sessile spikelet of the next lower node. Spikelets 2-nate on the rhachis of spike-like, spathe-supported racemes which terminate the stems and their branches, different in sex and shape. Joints and pedicels fused into somewhat stout internodes, convex on the back, hollowed out on the inner face for the reception of the sessile spikelet; disarticulation at a right angle to the rhachis, tips of internodes truncate with two concavities corresponding to the next upper sessile and the adjacent pedicelled spikelet. Sessile spikelet dorsally much compressed. Florets 2, lower male or neuter and then with or without a valvule, upper bisexual, awnless. Glumes equal or the upper shorter; lower coriaceous, transversely rugose or muricate, conspicuously winged from the keels, upper membranous, immersed in the cavity formed by the joint and pedicel, usually 3-nerved, keeled, often indistinctly. Valves hyaline, nerveless or 2-3-nerved. Valvule, if present, hyaline, nerveless or 2-nerved. Lodicules 2, cuneate. Stamens 3. Stigmas linear, laterally exerted low down. Grain oblong; embryo equalling the grain. Pedicelled spikelet male or neuter. Lower glume coriaceous, smooth, asymmetrically or unilaterally winged, upper variously winged from the keel. Florets as in the sessile spikelet but male or barren.

Species 5.—India (4) and Tropical Africa (1).

- |     |  |     |    |                        |
|-----|--|-----|----|------------------------|
| I.  | Lower involucreal glume 2--aristate                              | ... | 1. | <i>P. divergens</i> .  |
| II. | Lower involucreal glume with a simple awn or acuminate.          |     |    |                        |
|     | 1. Lower involucreal glume broadly ovate, acuminate (not awned)  | ... | 2. | <i>P. acuminatus</i> . |
|     | 2. Lower involucreal glume lanceolate with a slender scabrid awn | ... | 3. | <i>P. Talboti</i> .    |

1. *Peltophorus divergens*, comb. nov. Blatter and McCann.

*Rottbællia divergens*, Hack. Monogr. Androp. 293; Lisboa in Jour. Bom. Nat. Hist. Soc., vi (1891), 195; Hook. f. in F. B. I., vii, 155; Cke. ii, 953.

*Description*: Cke. l. c.

*Locality*: *Konkan*: Trombay (McCann A71 !).—*Deccan*: Mahableshwar, 4,500 ft., rain 270 inches (Sedgwick and Bell 4560 !, Lisboa); Panchgani (Blatter and Hallberg B1252 !, B1259 !, B1263 !, B1286 !), behind the Tableland on rocks (Blatter 3805 !); Satara (Lisboa); Lonavla (Bhide !); Khandala (Woodrow), Saddle, very common all over (McCann 9616 !).—*S. M. Country*: Amboli Ghat (Talbot 4305 !); Belgaum (Ritchie 808, 827).—*Kanara*: Castle Rock, 1,800 ft., rain 300 inches (Sedgwick and Bell 4295 !), Karwar (Talbot 3171 !).—Usually growing on rocks in tufts.

*Note*. The spikes are very brittle when dry and always fall off.

*Distribution*: W. Peninsula.

2. *Peltophorus acuminatus*, comb. nov. Blatter and McCann.

*Rottbællia acuminata*, Hack. Monogr. Androp. 291; Hook. f. F. B. I. vii, 155; Cke. ii, 953.

*Description*: Cke. l. c.—We have examined Talbot's specimen No. 1291 and found that the lower involucreal glume is much longer than 8 mm. (1/3 in.) going up to 10 and 12 mm.

*Locality*: *Konkan*: Marmagoa (Talbot 2572 !, 1291); Vasco da Gama (Herb. St. X. C. 9483 !); Malwan (Woodrow).—*Kanara*: Karwar (Talbot 3171 !, 2539, Hallberg and McCann A75 !, Lisboa); Katgal (Hallberg and McCann 9934 !); Castle Rock (Bhide !).

*Distribution*: W. Peninsula. Hooker f., but not Cooke, mentions also the Deccan Peninsula collected in by G. Thomson.

3. *Peltophorus Talboti*, comb. nov. Blatter and McCann.—*Rottbællia Talboti*, Hook. f. in F. B. I. vii, 155; Cke. ii, 954.

*Description*: Cke. l. c.

*Locality*: Konkani: Vasco da Gama (Bhide !); Marmagoa (Talbot 2572 !).

*Distribution*: So far only been found in Goa.

16. *LASIURUS*, Boiss. (Stapf in Fl. Trop. Afr. ix, 60)

Perennial, more or less branched and woody below; branches often in dense fascicles, intravaginal. Leaves linear, convolute or flat, hard; ligule a fringe of hairs. Racemes silky-villous. Spikelets usually 3-nate, rarely 2-nate, on the more or less fragile rhachis of villous spike-like racemes which end the stems and branches (if any) and are supported by or exerted from often spathaceous sheaths, if 3-nate 2 sessile, the sessile different in sex from, but similar in shape to, the pedicelled; rhachis nodes bearded all round; joints and pedicels linear, the latter more slender and shorter, opposite the joints if 2 sessile spikelets be present, otherwise approximate, but not contiguous and parallel to one of the sides of the joint; disarticulation at a right angle to the rhachis, scar at the tips of the joints suborbicular, smooth, often ciliate. Sessile spikelets, if 2, one on each side of the pedicel with a narrow ring-shaped callus. Florets 2, lower male, upper bisexual, awnless. Glumes unequal; lower longer, subcoriaceous, flat on the back, acuminate, 2-keeled upwards and 2-dentate, densely ciliate, upper boat-shaped, membranous, keeled. Valves hyaline, 3-nerved. Valvules hyaline, 2-nerved. Lodicules 2, cuneate. Stamens 3. Stigmas linear, laterally exerted. Grain oblong, slightly dorsally compressed, embryo half its length. Pedicelled spikelet similar to the sessile, but with an indistinct glabrous callus and with both florets male or more or less reduced.

1. *Lasiurus hirsutus*, Boiss. Diagn. ser. II, iv, 146; Stapf Fl. Trop. Afr. ix, 60.—*Saccharum hirsutum*, Forsk. Fl. Aegypt.—Arab. 16.—*Rottbællia hirsuta*, Vahl Symb. i, 11; Hack. Monogr. Androp. 311.—*Ischænum mastrucatum*, Trin. in Mém. Acad. Petersb. 6me. sér. ii, 298.—*Ischænum hirsutum*, Nees in Schimp. Pl. Arab. Fel. No. 791.—*Cælorrhachis hirsuta*, Brongn. apud Dcne. in Ann. Sci. Nat. ser. 2, ii, 13.—*Elyonurus hirsutus*, Munro apud Benth. in Journ. Linn. Soc. xixv, 68; Boiss. Fl. Or. v, 466; Hook. f. in F.B.I. vii, 162; Cke. ii, 973.

*Description*: Cke. l. c.

*Locality*: Sind: Karachi (Bhide !); Sehwan to Laki, foot of hills (Sabnis B613 !); Umarkot, sandy plains (Sabnis B940 !).

*Distribution*: Nubia, Egypt, Brit. Somaliland, Arabia, Afghanistan, Baluchistan, Punjab, Sind, Rajputana.

17. *ELYONURUS*, Humb. and Bonpl. (Stapf in Fl. Trop. Afr. ix, 62)

Usually perennial, caespitose, aromatic grasses. Blades of leaves flat or folded; ligules very short, membranous. Racemes erect, joints strongly compressed, usually villous, tips oblique, not appendaged. Spikelets similar, usually awnless, differing in sex, 2-nate, one sessile, the other pedicelled, on the articulate fragile rhachis of solitary spike-like racemes, the sessile deciduous with the adjacent joint of the rhachis and the pedicel. Florets 2: Lower reduced to an empty valve, upper bisexual in the sessile male, rarely barren, in the pedicelled spikelet. Glumes equal: Lower subcoriaceous to herbaceous, often 9-toothed or 2-fid, rarely awned, dorsally flattened, 2-keeled, usually with fine filiform transparent balsam ducts close to the ciliate or penicillate keels; upper membranous, lanceolate, acute, rarely awned. Valves hyaline, awnless. Valvule obsolete or absent. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong, dorsally compressed; embryo about half the length of the grain.

Species about 15.—Tropical and subtropical regions of both hemispheres.

1. *Elyonurus Royleanus*, Nees ex. A. Rich. Tent. Fl. Abyss. ii, 471; Hack Monogr. Androp. 343; Hook. f. in F.B.I. vii, 161; Duthie Grass. N.W. Ind. 17, and Fodd. Grass. N. India 28, t. 54; Cke. ii, 972; Stapf in Fl. Trop. Afr. ix, 65.—*E. Griesebachii*, Schmidt, Beitr. z. Fl. Capverd 154.—*Ratzeburgia Schimperii*, Steud. Nomencl. ed. ii, 439.—*Rottbællia elegantissima*,



Hochst. ex. Steud. Syn. Pl. Glum. i, 365.—*Andropogon elegantissimus*, Steud. Syn. Pl. Glum. i, 365.—*Andropogon Griesebachii*, Steud. Syn. Pl. Glum. i, 365.

*Description*: Cke. l.c.

*Locality*: *Sind*: (Woodrow).—*Gujarat*: Bhodir Maka, Cutch (Blatter 3747 !); Bnuj, Cutch (Blatter 3795 !); Rajkot, Kathiawar (Woodrow).

*Distribution*: Upper Gangetic Plain, Rajputana, W. Peninsula, Arabia, Somaliland, Eritrea, Abyssinia, Sudan, Nubia, Cape de Verd Islands.

#### 18. ROTBOELLIA, Linn. f. (Stapf. in Fl. Trop. Afr. ix, 72)

Annual. usually coarse grasses, often with stilt-roots from the lowest nodes, more or less branched, particularly upwards. Leaves large, linear-lanceolate, rather wide; ligule membranous, short. Racemes dorsiventral, with the spikelets placed anticously and laterally. Spikelets 2-nate on the nodes of the very fragile rachis of stout cylindrical perfectly glabrous spike-like racemes which end the stems and their branches, in the latter case spathe-supported, different in sex and usually in size, colour and nervation except those of the uppermost pairs which are barren, homomorphous and upwards increasingly reduced forming a tail-like appendage to the raceme. Joints dorsally flattened below, widely cup-shaped and hollowed out upwards, more or less completely fused with the pedicels along their posticuous angles. Sessile spikelets pale, triangular in transverse section; the narrow callus fused with the bases of the adjacent joint and pedicel into a glabrous ring from the centre of which protrudes a knob fitting into the cup-shaped hollow of the next lower joint, the whole plexus falling together. Florets 2, lower male, upper bisexual, awnless. Glumes equal: Lower coriaceous, flat on the back, with very narrow inflexed margins, 2-keeled upwards; upper boat-shaped, keeled upwards, acute. Valves hyaline, 3-nerved. Valvules as long or almost as long as the valves, hyaline, 2-nerved. Lodicules, 2, cuneate. Stamens 3. Stigmas suberect or shortly laterally exerted above the middle of the spikelet. Grain broad-oblong or ellipsoid, dorsally compressed; hilum large, suprabasal; embryo almost as long as the grain. Pedicelled spikelet similar to the sessile, but more compressed, green, striate, with two male florets, or smaller and more or less reduced.

Species 2 or 3.—Tropics of the Old World.

1. *Rotboellia exaltata*, Linn. f. Suppl. 114; Roxb. Pl. Corom. t. 157; Fl. Ind. i, 354; Duthie Grass. N.W. Ind. 17; Hack. Monogr. Androp. 293; Hook. f. in F.B.I. vii, 156; Cke. ii, 955.—*R. exaltata*, var. *genuina*, Schweinf. in Höhnel Disc. Lakes Rudolf and Stefanie, ii, App. 352.—*R. exaltata*, f. *arundinacea*, Hack. in Bot. Soc. Brot. v, 215.—*R. arundinacea*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 444.—*Stegosia cochinchinensis*, Lour. Fl. Cochinch. 51.—*Stegosia exaltata*, Nash in Amer. Fl. xvii, i, 84.

*Description*: Cke. l.c.

*Locality*: *Konkan*: Dohe forest, Thana Dist. (Ryan 711 !).—*Deccan*: Agricultural College Farm (Herb. Econ. Bot. Poona !); Poona (Bhide !, Cooke, Woodrow 2 !); Purandhar 4,000 ft. (McCann 5591 !).—*S. M. Country*: Dharwar, in field (Sedgwick 5469 !)—*Kanara*: Hattikeri, near Karwar (Hallberg and McCann A74 !).

*Distribution*: India, Andamans, Ceylon, China, Malaya, Australia, Africa.

var. *robusta*, Hook. f. in F.B.I. vii, 156.

*Description*: Leaf-base more cordately confluent with the sheath. Spikes stouter below, slender above the middle. Spikelets in upper half distichously imbricate, longer than the joints, fertile nearly to the tip. Pales of upper floral glume auricled at the base.

*Locality*: Poona (Woodrow).—We have not seen this plant.

*Distribution*: Malabar, Palamcotta.

#### 19. OPHIURUS, Gaertn. *partim*; R. Br. (Stapf Fl. Trop. Afr. ix, 74)

Annual (?) or perennial, sometimes very coarse grasses, usually much branched upwards. Leaves linear to lanceolate, short to very long, conduplicate or convolute in bud, then flat; ligules very short, membranous. Racemes dorsiventral. Spikelets solitary on the nodes of the fragile rachis of slender cylindrical spikes which end the stems and their usually fascicled spathe-supported branches, their pedicelled companions suppressed or rudimentary and very minute and the pedicels completely fused with the joints, both forming together a deeply

hollowed-out cylindrical receptacle; disarticulation of the internodes at a right angle or slightly oblique to the rhachis, their tips hollowed out. Sessile spikelet with a very narrow callus which is fused with the base of the internode into a rim from the centre of which protrudes a small knob fitting into the hollow of the next lower internode, the whole plexus falling together. Florets 2, lower male or neuter, upper bisexual, awnless. Glumes equal: Lower coriaceous, flat or subconvex on the back with very narrow inflexed margins, faintly nerved with a transverse groove at the base, upper boat-shaped, hyaline, obtuse. Valves hyaline, 2-nerved or nerveless. Valvules similar to the valves. Lodicules 2, cuneate. Stamens 3, Stigmas short, laterally exerted. Grain oblong, dorsally slightly compressed; embryo 1/4 the length of the grain.

Species about 4.—From the Sudan through tropical Asia to Australia.

Stapf has described the species *Ophiurus megaphyllus* which forms part of *O. corymbosus*, Hook. f. in F.B.I. vii, 160 (not of Gærtn. f. and not of *Rottbællia corymbosa*, Linn. f.). What is left over of Hook. f.'s *O. corymbosa* after the separation of *O. megaphyllus* has to go under *O. corymbosa*, Gærtn.

- I. Leaves ensiform, very hairy. Robust, 1.5–1.8 m. 1. *O. megaphyllus*.  
 II. Leaves linear, glabrous. Slender, 0.6–1.2 m. ... 2. *O. corymbosus*.

1. *O. megaphyllus*, Stapf in Haines Bot. Bihar and Orissa pt. V (1924), 1058.—*Ophiurus corymbosus*, Hook. f. in F.B.I. vii, 160, *partim* (non Gærtn. f.); Cke. ii, 951, *partim*; Hack. Monogr. Androp. 317 (*partim*).

*Description*: A large stout grass, 1.5–1.8 m. high, very leafy to the top. Leaves narrowly ensiform, tapering from base to apex, upper 10–18 mm. wide, lower much wider, flat, very hairy as are the sheaths, but more or less glabrescent with age, hairs with small tubercle bases, margins of sheath hirsute. Spikelets 2–4 mm., slightly shorter or longer than the joints, in very numerous peduncled spikes 7.5–10 cm. long, from the leaf-axils. Peduncles 7.5–12.5 cm., sheathed at the base, finally far exerted, each solitary on a branch with a villous node, often geniculate at the node. Sessile spikelets: Glumes 4: Lower involucrel glume oblong, glabrous, with rounded tip, smooth or with few lines of small pits, not becoming recurved sometimes bearing a small appendage. Upper involucrel glume white, becoming inclined forward, quite free from the rhachis when the spikelet opens. Pedicelled spikelets: the lowest are sometimes free at the top and bear a small brown free appendage.

*Locality*: We have not been able to examine all the specimens which were formerly put under *O. corymbosus*, Hook. f. and we are, therefore, not in a position, to assign any specimen to *O. megaphyllus*, Stapf.

*Distribution*: To make a definite statement all the herbarium material of *O. corymbosa*, Hook. f. would have to be examined.

2. *O. corymbosus*, Gærtn. f. Fruct. iii, 4, t. 181 f. 3 a (*Ophiurus*); Haines Fl. Bihar and Orissa, pt. V (1924), 1058; *Rottbællia corymbosa*, Linn. f. Suppl. 114.—*O. corymbosa*, Hook. f. in. F. B. I. vii, 160, *partim*; Cke. ii, 951, *partim*.

*Description*: Perennial. Stems very numerous, glabrous, erect, slender, 0.6–1.2 m. high, bulbous at the base, the bulbous bases connected into a horizontal rhizome. Leaves linear, glabrous, up to 5 mm. broad, margins minutely tubercled at base, the tubercles bearing cilia when young. Spikes very slender, 5–12.5 cm. long, sometimes ending in a small tail like that of a rattle-snake (Haines), spikelets 2.5 mm. long, equalling the joint. Lower involucrel glume of sessile spikelet glabrous, with many longitudinal lines of small pits, narrowly oblong, tip rounded, finally recurved.

*Locality*: Deccan: Deolali (Blatter and Hallberg 4564!); Nasik Road (Blatter 9624!); Talegaum (McCann!).

## 20. CÆLORRHACHIS, BROWN. (Stapf in Fl. Trop. Afr. ix, 78)

Mostly tall, coarse, perennial grasses, much-branched upwards. Racemes with the sessile spikelets which are often imbricate, placed anticiously and pedicelled laterally. Spikelets 2-nate on the nodes of the fragile rhachis of slender, more or less compressed conspicuously dorsiventral spike-like racemes which end the stems and their usually fascicled, spathe-supported branches, different or very rarely alike in sex, similar in shape or the pedicelled more or less or very much reduced; joints and pedicels similar or the latter more slender,

linear to cuneate or subclavate, dorsally compressed, glabrous, contiguous or nearly so; disarticulation of the joints at a right angle to the rhachis, their tips more or less hollowed out, with or without an ear-shaped appendage. Sessile spikelet dorsally compressed, the narrow transverse callus fused with the base of the adjacent joint and pedicel into an obscure rim from the centre of which protrudes a knob fitting into the hollow of the next lower joint, the whole plexus falling together. Florets 2, the lower usually reduced to the valve with a small valvule, always neuter upper bisexual, awnless. Glumes subequal; lower flat or slightly convex on the back, smooth or variously sculptured, with narrow inflexed margins, 2-keeled upwards and more or less winged from the keels, obtuse or emarginate, very faintly nerved; upper chartaceous, keeled, acute, 1-3 nerved. Valves hyaline, of lower floret 2-nerved or nerveless, of upper 3-1-nerved or nerveless. Valvule hyaline, similar to the valve, 2-nerved or nerveless. Lodicules 2, cuneate. Stamens 3. Stigmas shortly laterally exerted. Grain oblong, dorsally compressed; embryo about half the length of the grain. Pedicelled spikelet very varied, similar to the sessile or more or less reduced or rudimentary, male or neuter, very rarely bisexual.

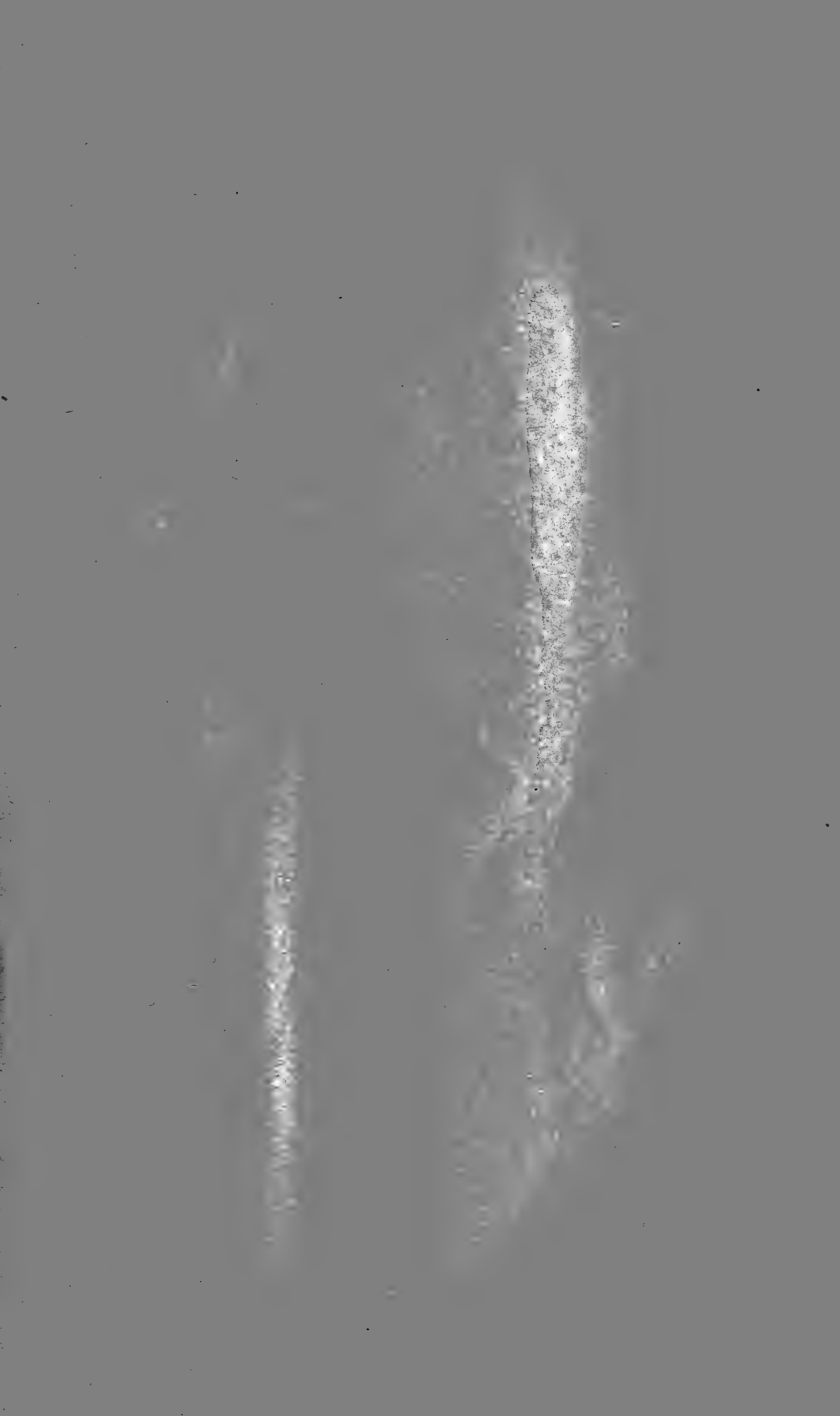
Species about 12. Tropics of both hemispheres.

1. *Cœlorrhachis Clarkei* comb. nov. Blatter and McCann. *Rottbællia Clarkei*, Hack. in Oestr. Bot. Zeitschr. 41 (1891), 8; Cke. ii, 954. *Rottbællia gibbosa*, Hack. ex Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891), 195.

*Locality*: Kanara: Birchy (Talbot 2820!, 2072); Jugglepet (Talbot 1566!)

*Distribution*: Chota Nagpur, W. Peninsula.

(To be continued)





REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY. Part IV.

By E. BLATTER, S.J., Ph.D., F.L.S.

Gram

1927

II

*Imperata* to *Sorghum*

p 281 - 298





REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY  
E. BLATTER, S.J., Ph.D., F.L.S.

PART IV  
GRAMINEÆ

BY  
E. BLATTER and C. McCANN

(Continued from page 33 of this volume)

21. IMPERATA, Cyr.

Species 5 or 6, nearly allied. In the warm regions of both hemispheres.

*Imperata cylindrica*, Beauv. Agrost. 165, t. v, fig. 1, Explan. planch. 5; Cyr. Pl. Rar. Neap. Fasc. ii, 26, t. ii; Hack. Monogr. Androp. 92; Boiss. Fl. Or. v, 452; Duthie Grass. N. W. Ind. 14; Indig. Fodd. Grass t. 15; Fodd Grass. N. Ind. 22; F. B. I. vii, 106; Cke. ii, 946; Haines Bot. Bihar and Orissa, pt. v, 1015; Stapf in Fl. Trop. Afr., ix, 87.—*I. Koenigii*, Beauv. Agrost. 165.—*Saccharum cylindricum*, Lam. Encycl. i, 594; Roxb. Fl. Ind. i, 234; Grah. Cat. Bomb. Pl. 239; Griff. Notul. iii, 80.—*S. europaeum et S. indum*, Pers. Syn. i, 103.—*S. Ravennæ*, Bieb. Fl. Taur. Cauc. iii, 51.

Some authors distinguish varieties and subvarieties which scarcely seem to be justified. Stapf who mentions two varieties (var. *Thunbergii*, Durand & Schinz, and var. *Koenigii*, Durand & Schinz) says in a note (l. c. 89): 'The varieties and the type, although on the whole pretty distinct within their areas, often pass into each other, chiefly along the confines of their areas, or they possibly lose their distinctive characters under particular local conditions, when the separation becomes almost impossible.' This does not speak in favour or good varieties. Hackel (l. c. 93-95) has 3 varieties and several subvarieties, and Anderson (in Oeuvres. K. Vet. Akad. Forh. Stockh. 1885, p. 157) is still more liberal with his subvarieties. Hook, f. makes one variety *latifolia* (F. B. I. l. c.) and remarks about one of Hackel's varieties: 'Hackel distinguishes the Indian form as var. *Koenigii* having villous nodes and broader, less rigid leaves, but some of the Indian specimens appear to me quite like the Western Hackel's division depends chiefly on such characters as hairiness of the leaf-insertions, width of the leaves and height of the ligule. The height and shape of the ligule, however, seems, according to Hole's investigations, more or less correlated with the width of the lamina, while the other characters appear to vary with the locality and do not define forms of any constancy. Hole's treatment of *Imperata arundinacea* (On Some Indian For. Grasses and their Oecology, 1911, p. 95) appeals to us much more. Amongst the material observed at Dehra Dun he distinguishes 3 forms which are more or less clearly defined:—

(a) The depauperate form common on lawns or areas where the grass is continually cut or grazed, with minute, almost filiform, culms and small leaves. Leaf-insertions usually long-bearded. Glume IV and pale usually glabrous.

(b) The ordinary savannah form which usually attains a height of about 90 cm. with leaves up to 17 mm. wide. Leaf-insertions bearded or glabrous. Pale and glume IV ciliate.

(c) A robust form found in swamps or marshy soil where there is an abundance of available moisture more or less throughout the year. This plant attains a height of 2·8 m. and probably more. Leaves up to 26 mm. wide, leaf-insertions glabrous. Pale and glume IV ciliate. This is identical with var. *latifolia*, Hook. f.

Forms of this kind could be multiplied according to various localities. As we are not going to distinguish any varieties we give a description of the species including all the variations that so far have been observed.

*Description*:—Culms erect, simple, slender, from 12 cm. in height and almost filiform to 2.8 m. high and 8 mm. diam., 3-4-noded, glabrous, solid, slightly fistular at base: leaf-insertions tumid, glabrous or densely bearded with erect white hairs. Leaf-sheaths rather loose, glabrous or glabrescent, ciliate or glabrous along the margin towards apex, the lowest at length usually breaking up into fibres, usually longer than proper internode; ligules membranous, rounded, truncate or 2-lobed, ciliate, dorsally silky, attaining a height of 3 mm. Blade of uppermost leaf of flowering culm from mucroniform and 1.25 mm. long to 15 cm. long and 6 mm. wide with greatest width in middle, of lower leaves erect or arcuate and attaining a length of 1.2 m. and width of 27 mm., greatest width about the middle, dark green, midrib white, apex acuminate, narrowed towards the base where the midrib occupies almost the entire width of the leaf, smooth, but scabrid on margin and on one or more sub-marginal nerves above, especially towards the apex, white villous above on margins towards the base and behind the ligule. Panicle spike-like, 3-50 cm. long, not exceeding 25 mm. in width, cylindric, very dense; branches and branchlets very numerous, crowded, appressed; pedicels fine with clavate tips, glabrous, scaberulous or pubescent, with long fine hairs below. Flowering panicle purple with the exerted stigmas, the callus-hairs being closely appressed to the axis, fruiting panicle silvery white with the wide-spreading callus-hairs. Spikelets not awned lanceolate, 3 mm long, both spikelets of each pair similar, each 1-flowered and hermaphrodite, and at length falling from the pedicel; callus-hairs soft, white, 2-3 times as long as the spikelets. Lower involucrel glume lanceolate, membranous, slightly thickened towards the base, apex hyaline, 3-9-nerved, none of the nerves extending to apex of glume, margins incurved ciliate above, dorsally villous with soft white hairs overtopping the glume by  $1\frac{1}{2}$  to 3 times the length of the glume. Upper involucrel glume similar and subequal to the lower, but sometimes sub-keeled with mid-nerve extending almost to apex. Lower floral glume oblong, hyaline, nerveless, apex acute or subtruncate and laciniate or denticulate, ciliate,  $\frac{1}{2}$  to  $\frac{3}{4}$  of the upper involucrel glume. Upper floral glume subequal to the lower one, ovate-lanceolate, hyaline, nerveless, apex acuminate, acute or obtuse and laciniate or denticulate, minutely ciliate or glabrous. Pale quadrate, rectangular or subpentagonal hyaline, nerveless, apex denticulate or unequally laciniate, glabrous or ciliate,  $\frac{1}{2}$  the size of the upper floral glume or subequal to it. Lodicules none or very minute. Anthers 2, 2.5-3 mm. long, orange, filaments sometimes connate below. Stigmas 2, 3-4 mm. long, purple.

*Locality*: *Sind*: (Stocks).—*Gujarat*: (Graham).—*Konkan*: Tardeo, Bombay (Hallberg 5398!); Alibag, sandy shore (Ezekiel!); near Thana (McCann!); Banks along railway track between Ghatkoper and Thana, Salsette (McCann!).—*S. M. Country*: Shiggaon (Sedgwick 2353!); Dwararji (Sedgwick and Bell!); Castle Rock (Bhide!); Londa, common (McCann!).—*Kanara*: Halyal (Talbot 1896!).

*Distribution*: The hotter parts of India, ascending in the Himalayas to at least 6,500 feet, Mediterranean region, Africa, Java, Japan, China, Australia.

*Biology and Ecology*: See Hole, l. c. 96.

*Uses*: Duthie says of this grass that 'cattle relish it'. 'In Australia,' he says, 'it is called blady grass and the young succulent foliage which springs up after the occurrence of a fire is much relished by stock. I have observed the same effect resulting from periodical fires on certain parts of the Himalaya where this grass is plentiful.' (Duthie, Fodd. Grass. of N. Ind. 23). 'In India,' according to Hole (l. c. 101) 'the succulent white stolons are eaten by pigs and areas which have been well-worked by pigs in their search for the stolons are not infrequently seen in the forest. It is possible that in some cases the eradication of the species might be cheaply accomplished by the aid of pigs.'

This grass is also known as a paper-making material: 'The ultimate fibre obtained from this grass is very similar in most respects to Esparto; the yield of bleached fibre being about the same. This is a favourable indication inasmuch as Esparto is one of the best known and most useful sources of supply to the trade. The results obtained from the chemical analysis show that the grass is capable of yielding a good quality of cellulose, suitable in every way for the manufacture of paper.'<sup>1</sup>

The leaves are largely used for thatching (Hole).

<sup>1</sup> *Agric. Bull. of the Straits and F. M. States*, vii (1908), 586.

## 22. SACCHARUM, Linn., Stapf Fl. Trop. Afr. ix, 94

The genus as understood by the latest agrostologists comprises also the species which were formerly described under the genus *Erianthus*, Michx. As already remarked by Haines in his Flora of Chota Nagpur the awned upper floral glume of some *Saccharum* breaks down the only distinction between *Saccharum* and *Erianthus*.

Cooke (ii, 948) mentions 3 species of *Saccharum*: *T. spontaneum*, Linn., *S. arundinaceum*, Retz. and *S. officinarum*, Linn. To these we add *S. Munja*, Roxb. and *S. Griffithii*, Munro. The two species of *Erianthus*, observed in the Presidency, viz. *E. Ravennæ*, Beauv. and *E. fastigiatus*, Nees, will be transferred to *Saccharum*.

General characters of *Saccharum*: Perennial tall herbs. Leaves various. Panicle large, often silvery-silky and showy, spikelets usually surrounded by long silky hairs from the base, all alike, binate, one sessile, the other pedicelled on the articulate fragile rachis of panicle racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rachis and pedicel. Florets 2, the lower reduced to an empty valve, the upper hermaphrodite. Involucral glumes equal, often chartaceous to subcoriaceous towards the base, membranous to subhyaline upwards; the lower glume with inflexed margins and in the sessile spikelet usually with an even number of nerves; upper glume 1-, 3-, or 5-nerved. Floral glumes hyaline; upper with a terminal bristle-like usually straight awn, or mucronate, or mucronate, or 0. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong to subglobose; embryo short to half the length of the grain or more; hilum basal.

Key to the species, mainly after Haines.

## A. Awn of upper floral glume not or scarcely exerted from spikelets or 0.

## I. Hairs on callus of sessile spikelet much exceeding the spikelets

## 1. Culms not leafy above, under 17 mm. diam.

Leaves under 20 mm. broad. Lower Involucral glumes ciliate ...

1. *S. spontaneum*.

## 2. Culms densely leafy above, over 25 mm. diam. Leaves over 25 mm. broad. Lower Involucral glumes glabrous ...

2. *S. officinarum*.

## II. Hairs on callus of sessile spikelet shorter or not much longer than spikelet

## 1. Upper involucral glume of sessile spikelet not villous dorsally

(a) Foliage not glaucous. Culms densely leafy above. Sessile spikelet shorter than internodes of rachis ...

3. *S. arundinaceum*.

(b) Foliage glaucous. Culms not leafy above. Sessile spikelet longer than internodes of rachis ...

4. *S. munja*.

## 2. Upper involucral glume of sessile spikelet villous dorsally ...

5. *S. Griffithii*.

## B. Awn of upper floral glume distinctly exerted from the spikelet

## I. Panicles thyriform. Spikelets 3-4 mm. long.

Awn 2.5 to almost 6 mm. long ...

6. *S. Ravennæ*.

## II. Panicles not thyriform. Spikelets 4 to almost 5 mm. long. Awn 8 mm. long ...

7. *S. fastigiatum*.

In the following treatment of the various species we shall draw largely on R. S. Hole, On some Indian Forest Grasses and their Oecology, in *Indian Forest Memoirs*, vol. i, pt. 1 (1911), 50-91.

1. *Saccharum spontaneum*, Linn. Mant. (1771), 183; Roxb. Fl. Ind. i (1832), 235; Griff. Ic. Pl. As. t. 139, f. 63; Dalz. and Gibs. 304; Duthie Grass. N. W. Ind. 15, Indig. Fodd. Grass. 57, Fodd. Grass. N. India, 25; Hack. Monogr. Androp. 113; Hook. f. F. B. I. vii, 119; Cke. ii, 948; Hole in Ind. For. Mem. i, pt. 1, (1911), 50; Haines Bot. Bihar and Orissa (1924), 1011.—*S. semidecumbens*, Roxb. l. c. 236.—*S. canaliculatum*, Roxb. l. c. 246.—*S. chinense*, Nees in Hook. et Arn. Beechy's Voy. 241.—*S. ægyptiacum* var. *sinense*, Anders. in Oefvers. K. Vet. Akad. Förhand. Stockh. (1855), 157 (non *S. sinense*, Roxb.).—*S. spontaneum*, Linn. subsp. *ægyptiacum* var. *nepalense*, Hackel, l. c. 116.—Rheede Hort. Malab. xii, t. 46 (probably).

We have not included the synonyms which Stapf Fl. Trop. Afr. ix, 95, has given under *S. spontaneum* var. *egyptiacum*, Hack. as we are not in a position to judge whether it is a good variety or not. According to Hole the African forms placed under var. *egyptiacum* differ from the Indian plants chiefly by their slightly larger spikelets. But he finds that this difference is very slight and that it fails in the case of some African specimens. 'Considering the great variability of the species in India it seems possible that a more complete knowledge of the African plant will prove *egyptiacum* to be merely one of the several ecological forms which are defined by inconstant characters and which are connected by numerous intermediates.'

*Description*.—Stem erect or decumbent at the base, reaching up to 6 m. in height and 15 mm. in diam., solid above, fistular below, terete, indistinctly striate, usually pruinose when young, polished when old, silky below the panicle and minutely silky below the upper leaf-insertions, glabrous or minutely pubescent below the lower leaf-insertions. Leaf-sheath longer than proper internode, often with reddish or purplish blotches, villous at mouth, often minutely pubescent at base, otherwise glabrous or with scattered appressed hairs, sulcate. Blade erect, of uppermost leaf of flowering culm usually long, varying from 5 cm. to 90 cm. in length, of lower leaves up to 1.2 m. and even 2 m., usually very narrow, often not exceeding 1.5 mm. in width and then consisting of a very narrowly margined concavo-convex midrib, but also attaining a width of 16 mm. glaucous, midrib white, margin scabrid, often villous above at base immediately behind the ligule. Ligule ovate or deltoid, base often sub-aucriced, membranous, subacute or subtruncate, often fimbriate when old, up to 6 mm. high, minutely silky dorsally and ciliate. Flowering panicle 15–60 cm. long, conical or lanceolate to oblong branches horizontally spreading or slightly ascending, usually reddish or purplish, with the callus hairs closely appressed to the branches of the panicle; primary rachis sulcate, silky with long white hairs; primary branches subverticillate, simple or compound. Spikelets in pairs, one pedicelled and one sessile on the capillary jointed branches and branchlets, awnless, lanceolate, 2–5 mm. long, sessile and pedicelled similar, each one-flowered and hermaphrodite, pedicelled fruiting spikelet falling from the pedicel, the sessile spikelet falling later with the attached pedicel and joint of axis; joint of axis longer or shorter than sessile spikelet, villous on margins, or on margins and dorsally; pedicel  $\frac{1}{4}$ – $1\frac{1}{2}$  the length of the sessile spikelet, but usually shorter than spikelet, glabrous or ciliate, shorter than proper joint; callus-hairs white, from  $1\frac{1}{2}$ –7 times as long as sessile spikelet. Lower involucre glume lanceolate, the basal third thickened, becoming hard and polished in fruit and more or less brown in colour, the upper two-thirds membranous hyaline, with 2 lateral nerves from which the margin is inflexed; apex entire or minutely bidentate; margin ciliate; dorsally with the upper two-thirds minutely appressed-pubescent. Upper involucre glume broad-lanceolate, similar to the lower, but subkeeled with one central nerve; apex sometimes mucronate; margin inflexed and long-ciliate. Lower floral glume hyaline, nerveless, shorter than upper involucre glume, ovate-lanceolate, long-ciliate, minutely pubescent above dorsally. Upper floral glume minute, linear, ciliate, hyaline, sometimes 0. Pale minute, ovate, ciliate, often shorter than the lodicules. Lodicules 2, cuneate, glabrous or ciliate at apex. Anthers 3, yellow, turning brown. Stigmas 2, purple.

'The horizontally spreading callus-hairs of the fruiting spikelet form an efficient parachute which aids its distribution by wind. The hairs of neighbouring spikelets becoming entangled together, characteristic flocculent masses of several spikelets are often seen being carried by the wind or hanging on the adjacent vegetation.' (Hole).

As good field characters we may mention the narrow leaves and slender culms, the long callus-hairs and the brown coriaceous base of the involucre glumes.

This is a very variable species, and Hole does not think that we are justified in making different sub-species or varieties. He distinguishes 3 ecological forms:

- (a) The dry sandy soil-form, a xerophilous type. The culms are slender, erect and tufted, usually less than 5 mm. diam. The leaves exceedingly narrow, sometimes only a little more than 1 mm. wide. The callus-hairs not less than  $3\frac{1}{2}$  times the length of the spikelet.
- (b) The swamp form, a hygrophilous type, found in marshes and swamps with an abundance of available moisture more or less throughout the year. The culms are stout, 5–15 mm. diam., usually decumbent at base and not tufted. Leaves broad, reaching a width of 17 mm.

The callus-hairs  $1\frac{1}{2}$ – $3\frac{1}{2}$  times as long as the spikelets. The fruiting panicle elongate-elliptic to oblong with its branches usually more persistent than in other forms.

- (c) The loam-form, intermediate between (a) and (b). The culms are more or less decumbent at the base and not tufted, but less robust and with longer callus-hairs than in (b).

*Locality: Sind:* Shikarpur (Woodrow); Mirpur Sakro (Blatter and McCann D697!).—*Gujarat:* Baroda (Cooke); Domas near Surat (Dalzell and Gibson).—*Khandesh:* Dadgaum (McCann 9892!); Northern slope of Chanseli (McCann 9893!); Bor, Bori River (Blatter and Hallberg 4422!);—*Konkan:* Kamana, Mahim (Ryan 2205!); Sakwar, river side (Ryan? 2080!); Bassein (Ryan 4!); Karjat (Woodrow), on river bank (McCann!); Vihar Lake (McCann 9,894!); Alibag, sandy shore (Ezekiel!).—*Deccan:* Igatpuri, on banks of bund (McCann 4334!); Poona, river bank (Woodrow).—*S. M. Country:* Banks of streams, common in the S. Dharwar District (Sedgwick and Bell 3693!); Haveri (Talbot 2236!); Castle Rock (Gammie 15743!, McCann!); Belgaum (Ritchie).—*Kanara:* Suppa, bed of Kala Nuddi (Talbot 2196!); Hullikal (Talbot 1348!).

*Distribution of the species, irrespective of the varieties:* Africa (Upper Guinea, Nile Land, Mozambique District), Lower Egypt, Arabia, Syria, Afghanistan, India, Ceylon, Burma, China, Java, Philippines, New Guinea, Australia.

*Uses:* A favourite fodder of buffaloes. The leaves are used for thatching and brooms. Valuable as a fixing agent for shifting sand and unstable soil. For *S. spontaneum* as a potential source of paper pulp see W. H. Brown and A. F. Fischer. Philippine forest products as sources of paper pulp, in Forest. Bur. Philipp. Islds. Bull. 16 (1918).

\* 2. *Saccharum officinarum*, Linn. Sp. Pl. ed 1, 54; Roxb. Fl. Ind., i, 237; Beauv. Agrost. Explan. planch. 5, t. iv, fig. 10; Hack. Monogr. Androp. 111; Hook. f. in F. B. I. vii, 118; Cke. ii, 948; Haines Bot. Bihar and Orissa 1012; Stapf Fl. Trop. Afr. ix, 96.

*Description:* Stems up to 6 m. high, many-noded, glabrous or pubescent below the panicle, more or less coated with wax below the nodes. Leaf-sheaths tight, terete, smooth, glabrous except when young; ligules very short, membranous, ciliate; blades linear-lanceolate, up to 1.5 m. long and over 5 cm. broad green above, glaucous below, more or less scabrid along the margins, midrib very stout, rounded on the back, more or less flat above. Panicles pyramidal, up to 1 m. long, dense, silvery; primary rachis glabrous except on the pubescent nodes, or more or less silky; primary branches verticillate or semiverticillate, very slender, glabrous or hairy. Racemes up to 10 cm. long, very fragile; joints and pedicels filiform, more or less ciliate or glabrous, the joints variable in length, the pedicels much shorter. Spikelets lanceolate, up to 4.2 mm. long, surrounded from the callus by a tuft of long silky hairs up to 9 mm. long. Involucral glumes subequal, lanceolate, firm towards the base, otherwise subhyaline the lower acute, 2-nerved to sub-4-nerved, glabrous, the upper very similar 1-3-nerved, glabrous or ciliolate. Lower floral glume oblong, acute or subacute, hyaline, nerveless, ciliate, about 3.3 mm. long, upper floral glume subacute, ciliate, as long as the lower or 0. Pale, if present, very minute, obovate, ciliate. Lodicules broad, cuneate, sparingly ciliolate from the top. Stigmas purplish. 2.1 mm. long. Grain oblong, attenuated upwards, subterete, flesh-coloured; embryo  $\frac{1}{3}$  the length of the grain.

*Locality:* Grown throughout the Presidency.

*Origin:*—There are many indications that S. Asia is the original home of the sugarcane.

\* 3. *Saccharum arundinaceum*, Retz. Obs. bot. fasc. IV (1786), 14; Hackel Monogr. Androp. 117, excl. syn. *S. exaltatum*; Hook. f. in F. B. I., vii. 119 excl. syn. *S. ciliare*, Anders., *S. exaltatum*, Roxb., *S. munja*, Roxb., *S. Sara* Roxb.; Cke ii, 948, excl. syn. *S. exaltatum*, Roxb.; Haines Bot. Bihar and Orissa, 1012. *S. bengalense*, Retz. l. c. v., 16. *S. procerum*, Roxb. Fl. Ind., i, 243.

*Description:* A gigantic tufted grass. Culms biennial (? or triennial), somewhat with the habit of the sugarcane, branched, often 5 m. high, the flowering culms sometimes nearly 9 m. high and over 18 mm. diam., solid. Stem glabrous, smooth, or slightly rough with very long internodes. Blade reaching 1.8 m. in length and 5 cm. in breadth, with rib stout and as broad as the blade at base, keeled below, villous with long silky hairs above, margins

cutting. (According to Hole the midrib in basal leaves occupies at base  $\frac{1}{3}$  or less of the width of the blade). Upper cauline leaves becoming folded and filiform. Leaf-sheaths glabrous. Ligule truncate with a ring or tuft of long silky hairs 6-25 mm. distance from its base. Panicle 60 cm. to 1.2 m. long, pink, white or silvery, diffuse while flowering, with smooth glabrous axis, main branches tufted on the axis, tufts alternate or subverticillate. Spikelets 2.5-3.7 mm. long, much shorter than the internodes of the spike. Pedicel  $\frac{1}{2}$  to equal the length of the sessile spikelet. Joint usually longer than sessile spikelet; majority of pedicels shorter than proper joint. Callus-hairs pale, not dense, as long as spikelet (according to Hole shorter than or subequal to spikelet). Hairs of joint overtop the joint by less than to  $1\frac{1}{2}$  times the length of the joint. Sessile spikelet: Lower involucrel glume chartaceous, dorsally sparsely villous, villi overtopping the glume by about  $1\frac{1}{4}$  the length of the glume. Upper involucrel glume chartaceous, not villous dorsally. Lower floral glume not villous dorsally. Mucro of upper floral glume not exerted beyond apex of spikelet. Pale ciliate. Pedicelled spikelet: Involucrel glumes dorsally villous, villi overtopping spikelet by 1- $1\frac{1}{2}$  times the length of the spikelet. Spikelet sometimes 2-3-flowered with 1-2 additional paleate glumes inside the floral glumes.

*Locality*: Cultivated in gardens.

*Distribution*: Bengal, Assam, Burma, extending into China. It is a native of the evergreen zone of India characterized by a rainfall exceeding 70 in., but is frequently cultivated in gardens throughout India. (Hole).

4. *Saccharum munja*, Roxb Fl. Ind. i (1832), 246; Hole in Ind. For. Memoirs, I (1911), 62; Haines Bot. Bihar and Orissa 1013.—*S. Sava*, Roxb. l. c. 244.—*S. ciliare*, Anders. in Oefvers. K. Vet. Akad. Förhand. Stockh. (1855), 155; Hackel Monogr. Androp. 118, excl. vars. *Griffithii et Boissieri*.—*S. arundinaceum*, Hook. f. in F. B. I., vii, 119 (*partim*).—*S. arundinaceum*, var. *ciliare*, Haines in Fl. Chota Nagpur.

For explanation of above synonymy see Hole, l. c. 65-67.

*Description*: An erect grass, attaining a height of 5.5 m. and 12 m. diam., pale straw-coloured, smooth, striate, solid. Leaf-sheath shortly silky at extreme base, otherwise quite smooth, striate, pale straw-coloured, villous on margins at apex with long white hairs usually much longer than proper internode, uppermost sheath sometimes extending beyond the base of the panicle. Upper leaf of flowering culm 22-70 cm. long, flat, tapering from the base, long-acuminate, 5-10 mm. broad. Lower leaves up to 2 and 2.4 m. by 25 mm., but usually only 18 mm. broad. In basal leaves the concave midrib occupies  $\frac{1}{2}$  or more of width of blade. Colour glaucous, midrib white. Margin scabrid as are one or more intramarginal nerves below, otherwise smooth, but densely white villous at base behind the ligule. Ligule truncate, usually a narrow membranous rim, of upper leaves longer, attaining 3 mm., minutely silky dorsally and ciliate. Flowering panicle 30-90 cm. long, usually lanceolate, pale cream-coloured to dark reddish-purple, branches spreading. Fruiting panicle oblong, branches appressed to the axis, white to greyish-white. Primary rachis glabrous, sulcate, more or less scabrid on the ridges. Primary branches subverticillate, compound. Ultimate branchlets triquetrous, more or less villous with long white hairs on angles and on two faces. Spikelets in pairs, one pedicelled and one sessile on the capillary jointed branches and branchlets of a terminal panicle, awnless, lanceolate, up to 5 mm. long; sessile and pedicelled similar, each one-flowered and hermaphrodite. Pedicelled fruiting spikelet falling from the pedicel, the sessile spikelet falling later with the attached pedicel and joint of axis. Joint of axis triquetrous,  $\frac{1}{2}$  to subequal the sessile spikelet, but usually shorter than the spikelet, villous on two faces and on margins, the villi overtopping the joint by once to twice the length of the joint. Pedicels triquetrous,  $\frac{1}{2}$ - $\frac{3}{4}$  the length of the sessile spikelet, villous with long white hairs on two faces and on the angles. Most pedicels shorter than proper joint, rarely subequal to the proper joint. Sessile spikelets: Lower involucrel glume lanceolate, chartaceous, with two strong lateral nerves and usually 1-4 more or less distinct additional nerves, dorsally long villous on basal half or two-thirds, the hairs overtopping the glume by about the length of the glume, scabrid dorsally on keels, margin inflexed, sparsely ciliate above, apex minutely bidentate to entire. Upper involucrel glume subequal to the lower, lanceolate, chartaceous, keeled, with one strong central

nerve and usually 2-4 more or less distinct additional nerves, glabrous dorsally or minutely pubescent towards apex, scabrid dorsally on keel, margins incurved, ciliate above, apex usually shortly mucronate. Lower floral glume oblong-lanceolate, hyaline-membranous or little shorter than the upper involucre glume, 1-3-nerved, margins incurved, ciliate, apex acute or short mucronate. Upper floral glume broad-lanceolate to elliptic, shorter than or subequal to the upper involucre glume, hyaline, 1-3-nerved, mucronate, ciliate, micro short to 1.25 mm. long, but not exerted beyond the apex of the spikelet. Pale ovate, hyaline, ciliate, from  $\frac{1}{2}$ - $\frac{3}{4}$  the length of the upper floral glume. Pedicelled spikelets similar, but both the involucre glumes are dorsally long villous and usually with 3-5 strong nerves and occasionally 2 additional fainter ones. Lodicules 2, cuneate, glabrous, 0.5 mm. long. Anthers 3, pale yellow to purple, 2-2.5 mm. long. Stigmas yellow, often tinted with purple, 1-1.5 mm. long.

To distinguish this species from *Saccharum Ravennæ* Hole gives the following field-characters: Glaucous narrow leaves, awless spikelets, smooth leaf-sheaths.

*Locality*: *Sind* (Stocks in herb. Boiss. ex Hackel).—*Gujarat*:—(Sedgwick and Sexton).

*Distribution*: Northern India in the Punjab and Upper Gangetic Plain.

*Uses*: The fibre of the upper leaf-sheaths is used for mats, ropes, etc. It has also been favourably reported on as a paper material (Haines).

5. *Saccharum Griffithii*, Munro ex Aitchis. in Journ. Linn. Soc. xix (1822), 191; Hole in Ind. For. Memoirs i (1911), 68-70.—*S. Sara*, Aitchis, l. c. 191; Boiss. Fl. Or. v, 453.—? *S. Griffithii*, Boiss. l. c. 453.—*S. ciliare* var. *Griffithii* Hackel Monogr. Androp. 119.—*Erianthus Griffithii* Hook. f. in F. B. I. vii, 122 (*partim*).

*Description*: A caespitose grass. Culms 2 m. high or slightly higher, solid. Blade glaucous, narrow, about 8 mm. wide; midrib at base usually occupies  $\frac{1}{2}$  or more of width of blade; sheath not hirsute, nodes not bearded. Rhachis of racemes fragile. Spikelets 2 at each node of the rhachis, one sessile and finally deciduous with the accumbent joint, the other pedicelled finally separating from the pedicel, both 1-flowered, hermaphrodite. Spikelets 4-6 mm. long, mucous; pedicel  $\frac{1}{3}$ - $\frac{1}{2}$  the length of the sessile spikelet; joint  $\frac{1}{4}$ - $\frac{1}{2}$  the length of the sessile spikelet. Most pedicels subequal to longer than proper joint; callus-hairs yellow, shorter than subequal to the spikelet; hairs of joint overtopping joint by once to twice the length of joint. Sessile spikelet: Lower involucre glume chartaceous, dorsally densely villous in basal  $\frac{2}{3}$ , villi not overtopping the glume, or overtopping by less than  $\frac{1}{2}$  the length of the glume. Upper involucre glume chartaceous, dorsally villous in basal  $\frac{1}{2}$  or  $\frac{2}{3}$ , villi not overtopping or overtopping by less than  $\frac{1}{2}$  the length of the glume. Lower floral glume sometimes sparsely villous dorsally. Upper floral glume with a very short micro, 1.5 mm. long, not exerted beyond apex of spikelet. Pale ciliate. Pedicelled spikelet: Involucre glumes dorsally villous in basal  $\frac{1}{2}$ - $\frac{2}{3}$ , villi not overtopping or overtopping by less than  $\frac{1}{2}$  the length of the spikelet; no additional glumes inside the floral glumes.

*Locality*: *Sind*:—Near Hyderabad (Blatter and McCann D698 !); W. of Tatta (Blatter and McCann D699 !); near Karachi (ex Hackel l.c.).

*Distribution*: Afghanistan, Baluchistan, Punjab, Sind.

6. *Saccharum Ravennæ*, Linn. Syst. ed. xiii, 88; Sibth. & Sm. Fl. Græca, t. 52; Reichb. Ic. Fl. Germ., fig. 1505; Stapf Fl. Trop. Afr. ix, 97; Haines Bot. Bihar and Orissa 1014.—*Erianthus Ravennæ*, Beauv. Agrost. 162; Roem. and Schult. Syst. ii, 323; Hack. Monogr. Androp. 139; Hook. f. F. B. I. vii, 121; Stapf in Kew Bull. (1907), 208; Nees Gen. Fl. Germ. t. 90; Boiss. Fl. Or. vi, 455; Duthie Grass. N. W. Ind. 15, Fodd. Grass. N. Ind. 26; Cke. ii, 949; Hole in Ind. For. Memoirs, i (1911), 87.—*Andropogon Ravennæ*, Linn. Sp. Pl. ed. ii, 1481; Host. Gram. Austr., iii, 1, t. 1.—*Ripidium Ravennæ*, Trin. Fund. 169.

*Description*: Culms erect, up to 6 m. high and 17 mm. thick, solid, often slightly fistular just below the panicle, smooth and polished, striate, shortly and finely bearded at the leaf insertions. Leaf-sheath hirsute with bulbous-based hairs, the latter varying in colour from white to yellow or brown, the hairs being more or less deciduous and old sheaths are often rough with the persistent bulbous bases; upper sheaths glabrescent, always longer than the proper internode, long ciliate on margins towards the apex. Blade of uppermost leaf of flowering

culm from 20 cm. long and 6 mm. wide, linear and tapering from base, to 75 cm. long and 16 mm. wide with greatest width about the middle; lower leaves usually 1.2-1.5 m. long and 25 mm. wide, but also attaining a length of 1.8 m. and width of 38 mm., broadest about the middle, sometimes in upper third, dark green, midrib white, apex acuminate, narrowed towards the base, in basal leaves the concave midrib occupies  $\frac{1}{3}$  or more of width of lamina at base, often the entire width of the leaf, densely villous above towards the base with bulbous-based hairs, more or less scaberulous along nerves, margins scabrid. Ligule a narrow membranous rim not longer than 1.75 mm., entire, rounded or deeply 2-lobed, patently hairy dorsally with stiff white hairs, ciliate. Panicle 30-90 cm. long, lanceolate, dense or somewhat lax and lobed, silvery silky, with a tinge of grey and purple, or quite white; primary rhachis sulcate, glabrous, smooth below, scabrid on the ridges; branches slender, solitary from the distant nodes, divided from the base, up to 20 cm. long, branchlets unequal, divided again, glabrous except at the nodes. Racemes sessile or the lower more or less peduncled, narrow to oblong; joints and pedicels filiform, long ciliate, with thickened tips, the latter shorter than the joints. Callus-hairs shorter than to subequal to length of spikelet, purplish or brownish. Sessile spikelet: Lower involucre glume lanceolate with 2 lateral keels, dorsally flat or depressed between the keels, apex 2-mucronulate, one or both margins incurved, dorsally scabrid on keels, otherwise glabrous, or more or less villous dorsally, villi not overtopping the glume, or overtopping by less than  $\frac{1}{2}$  the length of the glume, 2-nerved, sometimes with 1-2 additional faint nerves between the keels. Upper involucre glume subequal to the lower, with a central keel, mucronate, margin incurved, ciliate, dorsally scabrid on keel, otherwise glabrous or more or less villous dorsally, villi not overtopping the glume, or overtopping by less than  $\frac{1}{2}$  the length of the glume, 1-nerved and sometimes 1 or 2 partial lateral nerves. Lower floral glume slightly shorter than upper involucre glume, oblong-lanceolate, hyaline, apex mucronate or acute, dorsally glabrous, margin incurved, ciliate above, 1-3-nerved. Upper floral glume usually  $\frac{2}{3}$  the length of the lower, ovate-lanceolate, hyaline, margin incurved, ciliate, long-awned, awn 2.5-6 mm. long, 3-nerved. Pale about  $\frac{2}{3}$  the length of the upper floral glume, ovate-lanceolate, hyaline, glabrous, nerveless. Lodicules 2, cuneate, glabrous. Anthers 3, yellow streaked with purple. Stigmas yellow. Pedicelled spikelet like the sessile, but involucre glumes often strongly 3-nerved and hairy.

Can easily be distinguished from *Saccharum munja* by its distinctly awned spikelets, the broader dark green leaves and hairy leaf-sheaths. (Hole).

*Locality*: Sind—Laki (Bhide!); Khairpur Mirs, sandy plain (Sabnis B226!); Sehwan (Sabnis B36!, B664!); Larkana (Sabnis B444!, Cooke); Pad-Idan (Sabnis B498!, B509!); Sukkar (Sabnis B552!); Nasarpur, sandy plains (Sabnis B1049!); Umarnot, sandy plains (Sabnis B1211!); Sanghar (Sabnis B900!); Jamesabad (Sabnis B968!); Phuleli Canal, on banks (Sabnis B195!); Mirva Canal, sandy banks (Sabnis B258!); Khairpur forests (Sabnis B329!); Sita Road (Sabnis B367!); Sehwan to Laki, foot of hills (Sabnis B60!, B111!); Mirpur Sakro (Blatter and McCann D694!); Chuar Chemali (Blatter and McCann D695!); Indus Delta (Blatter and McCann D696!); Karachi (Cooke, Woodrow).—*Deccan*: College Garden, Poona (Garade!).

*Distribution*: Western Himalaya, Punjab, Upper Gangetic Plain, Sind, extending westwards to the Mediterranean.

*Uses*: The culms are used for making screens, etc. The leaves quickly decay and are therefore useless for thatching.

7. *Saccharum fastigiatum*, Steud. Syn. Gram. (1855), 409; Haines Bot. Bihar and Orissa, 1014. *Erianthus fastigiatus*, Nees ex Steud. l. c.; Hack. Monogr. Androp. 150; Hook. f. in F. B. I., vii, 125; Cke. ii, 949.

*Description*: Cke. l. c.

*Locality*: S. M. Country:—Belgaum (Ritchie 792).

*Distribution*: Sikkim, Khasia, Assam, Bengal, Chota Nagpur, Orissa, W. Peninsula.

### 23. SPODIOPOGON, Trin., Cke. ii, 947.

*Spodiopogon albidus*, Benth. in Journ. Linn. Soc. 19 (1881), 66; Hackel Monogr. Androp. 185; F. B. I. vii, 108; Cke. ii, 947.—*Andropogon rhizophorus* Steud. Syn. Gram. 381; Duthie Fodd. Grass. N. Ind. 26.—*Andropogon petiolatus*, Dalz. Bomb. Fl. (1861), 303.

*Description*: Cke. ii, 947.



*Locality*: *Khandesh*: Toranmal (McCann 9886 !, 9888);—*Konkan*: W. Ghats (Woodrow 157); Warsai, near Penn (Bhide !); Penn (McCann 5374A !); Below Palli Hill, Bandra (Ryan !); Tungar, Bassein (Bhide !); Salsette (Jacquesmont 708); Matheran (Cooke); Matheran, Harrison's Springs (D'Almeida A242 !).—*Deccan*: Lonavla (Bhide !, McCann !, Woodrow); Khandala, very common (McCann, 9401 !); Khandala to Karjat (Blatter and Hallberg 5325 !); Ganeshkhind Bot. Gardens, Kirkee (Gammie !); Sinhad Forest, Poona District (Bhide !); Lohagad, upper half (McCann 9437 !); Purandhar Fort (McCann 5004 !); Igatpuri, common (McCann 4327); Mahabaleshwar (Cooke); Mahabaleshwar to Pratapgad (Bhide 1182 !).—*S. M. Country*: Derikop, forest (Sedgwick 1862 !).—*Kanara*: (McCann !); Arbail Ghat (Sedgwick and Bell 3168 !); Suppa (Talbot, 279 !).

*Distribution*: Central Provinces, Rajputana, W. Peninsula.

#### 24. POGONATHERUM, Beauv., Cke. ii, 965.

1. Hairs of callus longer than the spikelet...1. *P. crinitum*.
2. Hairs of callus shorter than the spikelet...2. *P. saccharoideum*.

1. *Pogonatherum crinitum*, Kunth Enum. Pl. I (1833), 478; Hook. f. in F. B. I. vii, 141; Cke. ii, 965.—*P. saccharoideum* var. *monandrum*, Hack. Monogr. Androp. 193.—*P. polystachyum*, Kunth Revis. Gram. 493.—*P. refractum*, Nees in Hook. et Arn. Beechy's Voy. 239.—*Pollinia monandra*, Spreng. Syst. i, 288.—*Pogonopsis tenera*, Presl. Rel. Hænk. i, 133, t. 46.—*Ischæmum crinitum*, Trin. in Mem. Acad. Petersb. ser. vi, ii (1833), 298.—*Andropogon crinitus*, Thunb. Fl. Jap. 40, t. 7.—*A. monandrus* Roxb. Fl. Ind. i, 260.—*Pogonatherum*, Griff. Notul. iii. 81, Ic. Pl. As. t. 145, fig. 2.

*Description*: Cke. ii, 965.

*Locality*: *Kanara*: Sirsi (Gammie !); Sumpkund, in a cutting (McCann 9947 !, Woodrow !); Nilkhund Ghat on steep bank along roadside (Talbot 781 !); Gersoppa Falls (Talbot 2671 !, McCann, 9939 !).

*Distribution*: More or less all over India, Afghanistan, China, Malaya, New Hebrides.

\*2. *Pogonatherum saccharoideum*, Beauv. Agrost. 56, t. 11, fig. 11; Duthie Grass. N. W. Ind. 16, Fodd. Grass. N. Ind. 27; F. B. I. vii, 141; Cke. ii, 966; Haines Bot. Bihar and Orissa, 1017.—*P. saccharoideum* var. *genuinum*, Hack. Monogr. Androp. 193.—*P. polystachyum*, Roem. and Sch. Syst. ii, 497.—*Pollinia polystachys*, Spreng. Syst. i, 288; Kunth Rev. Gram. 493, t. 162.—*Saccharum panicum*, Lamk. Encycl. i, 595, illust. t. 40, fig. 31.—The Bamboo Grass.

*Description*: A much tufted, branched and very leafy elegant grass, 30–60 cm. high; stem firm or almost woody, slender, polished, from a perennial woodstock; nodes on stem glabrous or bearded. Leaves 2.5–6.5 cm. long up to 2.5 mm. broad, linear, acuminate, bearded at the base and margins of sheaths. Spikes 17 mm. to 5 cm. long, terminating all the branches; rachis compressed and pedicel bearded; each spikelet with 2 long fine scaberulous awns 15–25 mm. long. Sessile spikelet: Lower involucrel glume narrow-oblong, broadest above, faintly 2-4-nerved, tip bearded. Upper involucrel glume the largest, conduplicate, 2.5 mm. long, 1-nerved, keel produced into a long awn, tip densely ciliate. Lower floral glume sometimes absent. Pale of upper floral glume broadly ovate-oblong, much exceeding the minute ovary. Pedicelled spikelet about  $\frac{3}{4}$ – $\frac{2}{3}$  the length of the sessile.

*Locality*: Grown in gardens.

*Distribution*: Hilly parts of India from the Punjab to Bhutan, Burma and China, southwards to Central India and Ceylon, Malaya.

#### 25. EULALIA, Kunth; Stapf Fl. Trop. Afr. ix, 97.

(Formerly under *Pollinia*, Trin.—Cke. ii, 950).

Perennial. Culms simple, erect or ascending. Leaf-blades convolute when young, then flat, usually narrow, gradually passing into the sheath. Racemes often coloured, brown or purplish. Spikelets all alike or nearly so, one sessile, the other pedicelled on the articulate fragile rachis of 2-nate, digitate or fascicled spike-like racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rachis and the pedicel. Involucrel glumes equal or somewhat unequal, rigidly membranous to coriaceous, the lower dorsally flattened or shallowly concave (never grooved),

more or less 2-keeled with inflexed margins, the upper 1-3-nerved, keeled. Lower floral glume empty, sometimes much reduced, muticous, hyaline; upper floral glume very short, 2-lobed, awned, pale small or 0. Lodicules small, cuneate. Stamens 3. Stigmas linear, laterally exserted. Grain oblong; embryo almost half the length of the grain or longer; hilum basal, punctiform.

Species about 25, in the tropical and subtropical regions of the Old World.

1. Racemes many, 6-12.....1. *E. argentea*.
2. Racemes few, 2-4.....2. *E. fimbriata*.

1. *Eulalia argentea*, Brogn. Voy. Coq. Bot. 92; Haines Bot. Bihar and Orissa, 1018.—*Pollinia argentea*, Trin. in Bull. Sc. Acad. Petersb. i (1836), 71; Hackel Monogr. Androp. 162; Hook. f. in F. B. I. vii, 111; Cke. ii, 950.—*P. tristachya*, Thw. Enum. Pl. Zeyl. 368 (*partim*); Duthie Fodd. Grass. N.W. Ind. 26, t. 53.—*Erianthus hexastachyus*, Hochst. in Hohen. Pl. Ind. Or. no. 279.—*E. Roxburghii*, F. Muell. Fragm. Phyt. viii, 117.—*Andropogon tristachyus*, Roxb. Fl. Ind. i, 256.

*Description*: Cke. ii, 950.

*Locality*: *Khandesh*: Tapti Valley, railway line (Bhide!).—*Konkan*: Ratnagiri (Woodrow); Near Ratnagiri (Herb. Econ. Bot. Poona!); St. Xavier's College compound, Bombay (McCann 4510!); Parsik Hill (McCann 9715!); above Kenery Caves (McCann 9723!); Ghatkoper, Horse-shoe Valley (McCann 9891!); Marine Lines, Bombay (Hallberg 9889!); Bassein (McCann 9475!); Vetora (Sabis 33507!).—*Deccan*: Lonavla (Bhide!, McCann!, Woodrow, Lisboa); Khandala, very common (McCann 9716!); Lohagad, way up (McCann 9718!); Panchgani (Blatter 5388!, Blatter and Hallberg B. 1213!, McCann!); Mawal (Woodrow).—*S. M. Country*: Dharwar District (Sedgwick 2112!); Dastikop (Sedgwick 2088!); Castle Rock (Bhide!, McCann A. 304!).—*Kanara*: Suppa Taluka (Talbot 2257!); Jugglepet (Talbot 1569!); Yellapore (Talbot 1525!); Halyal (Talbot 2224!); Kumberwada (Talbot 2257!); Dandeli (Talbot 2267!).

*Distribution*: Throughout India, Ceylon, Malaya, Australia.

2. *Eulalia fimbriata*, Blatter and McCann, *comb. nova*.—*Pollinia fimbriata*, Hackel Monogr. Androp. 164; Hook. f. in F. B. I. vii, 112; Cke. ii, 950.

*Description*: Cke. i. c.

*Locality*: *Konkan*: Dahe Forest (Ryan 708!); Uran (McCann, 5123!); Trombay (McCann 305!); Matheran, Monkey Point (D'Almeida A. 254!, A. 255!).—*Deccan*: Lonavla (Chibber 11!, Woodrow 173); Khandala, common (McCann 5300!).

*Distribution*: W. Himalaya, W. Peninsula, Pegu.

26. SORGHUM, Pers. Syn. i, 101; Stapf Fl. Trop. Afr., ix, 104.

Annual or perennial, often robust, grasses. Leaf-blades convolute in bud, usually flat, herbaceous, often large. Panicles erect or nodding with verticillate or scattered branches, often large, in the spontaneous species mostly loose, in the cultivated forms frequently variously contracted to compact. Spikelets 2-nate, those of each pair differing in shape and sex, one sessile, the other pedicelled or represented by a pedicel only, on the articulate fragile or (in cultivated forms) tough rhachis of paniced few-(sometimes-1 or, the other extreme, 6-8-) jointed racemes, the sessile spikelet falling with the contiguous joint and the accompanying pedicelled spikelet or at least its pedicel. Florets 2, lower reduced to an empty valve, upper hermaphrodite in the sessile, male or neuter in the pedicelled spikelets, if present at all. Sessile spikelet: Involucral glumes equal, coriaceous, at least when mature, rarely permanently chartaceous, muticous. Lower with a broad flattened or convex back with the margins narrowly inflexed near the tips and elsewhere involute. Upper cymbiform with narrow hyaline, usually upwards ciliate margins. Lower floral glume empty, hyaline, ciliate, 2-nerved or nerveless. Upper oblong to ovate, 1-3-nerved, 2-lobed or dentate, with the lobes free or more or less adnate to a perfect or variously reduced awn or a mucro rising from the sinus, rarely entire and mucronate or muticous. Pale hyaline, often minute or 0. Lodicules 2, ciliate or glabrous. Stamens 3. Stigmas laterally exserted; styles terminal or subterminal. Grain in the wild species mostly obovoid, dorsally compressed, in cultivated forms frequently enlarged, globose or subglobose; embryo as long or slightly longer than half the grain. Pedicelled spikelets, if present, much narrower than the sessile, lanceolate to subulate, male or neuter

sometimes reduced to the glumes or one glume only or quite suppressed. Involucral glumes permanently herbaceous, awnless like the hyaline 2-1-nerved ciliate floral glumes.

According to Stapf (Fl. Trop. Afr., ix, 105) there are about 35 wild species in the tropical and subtropical regions of both hemispheres, very few extending into the temperate zones. One group of forms is widely cultivated in the tropics, particularly in Africa.

The classification of the material belonging to the section *Eu-sorghum* forms a difficult problem, which we are not prepared to tackle at present. The difficulties are well explained by Stapf (l.c.), and we cannot refrain from quoting the passage, though somewhat lengthy, because it may be a help to workers on this genus and induce them, at the same time, to subject the vast material available in the Presidency to a more scientific examination and exact taxonomic treatment, by which Botany as well as Agriculture will profit.

Those species, says Stapf, 'which come under consideration in this work (Flora of Tropical Africa) have with two exceptions (*S. purpureo-sericeum* and *S. versicolor*) been placed by Hackel in one vast species, *Andropogon Sorghum*, the leading idea being that they were all derived from one wild ancestor, the old *Holcus halepensis*, Linn. Piper, however, has recently advanced good reasons why this is extremely improbable. He has pointed out that the Linnean *Holcus halepensis* (*Andropogon Sorghum*, subsp. *halepensis*, var. *genuinus*, Hack.) is a perennial type almost confined to the Mediterranean region (*sensu lato*) and absent from tropical Africa which is the home of most of the spontaneous annual forms and probably also the cradle of most of the cultivated races known collectively as Guinea corn (*Andropogon Sorghum*, subsp. *sativus*, Hack.). To these spontaneous annuals and the cultivated forms he confines the name *Andropogon Sorghum*, and dealing in particular with the former he groups them under 11 subspecies, whilst he abstains from attempting to classify the latter. Most of Piper's subspecies are here recognized as definite units, but with the status of species, a procedure which seems to have the advantage of simplicity and directness, whilst it leaves the door open to any theoretical grouping which may in the future be desirable. The same reasoning has been applied to the cultivated forms. Hence the breaking up of Hackel's *Andropogon Sorghum*, var. *sativus*. Koernicke, who made the first comprehensive attempt to classify them, relied for that purpose exclusively on characters exhibited by mature infructescences, especially their degree of looseness or contraction and the colours of the ripe glumes and grains; but Hackel in his monograph introduced characters taken from the shape of the spikelets. The grain being in most cases the thing aimed at in the evolution of these very numerous races, it is clear that artificially introduced modifications must from the beginning have tended in the grain-state to obscure or repress the phylogenetically important features in so far as they were economically indifferent or undesirable. It seemed therefore, more promising to base the primary grouping on the comparison of the flowering stages, which might be expected to be more or less outside the influence of the artificially moulding forces of man. Within these primary groups, which are treated here as species, nothing more than a purely artificial arrangement can for the present be attempted. An exhaustive treatment of the hundreds of races which have been given distinctive popular names would, even if it were possible, be beyond the scope of a colonial flora.'

If Stapf, with all the facilities of Kew and the British Museum and other European herbaria at his disposal, complains about 'the very rudimentary state of our knowledge and of our collections' nobody can reasonably expect that we should bring order into the chaotic state of the *Sorghum* question in India. Years of intensive study of Indian and African forms are required to bring the intricate problem nearer its solution.

For the present we follow Haines in retaining the old species of *S. halepense* and *S. vulgare*. Of species not known from the Presidency before we add *S. subglabrescens*, Schweinf. & Aschers. and *S. nitidum*, Pers. This, we admit, is not quite satisfactory, but it is all we can offer at the present state of our knowledge and with the material at our disposal in India.

In order to enable Indian botanists to utilize Stapf's and Piper's investigations in the further study of the genus *Sorghum* we shall add, in the way of an appendix, the descriptions of those species which Stapf has described from tropical Africa and which have also been observed in India, whether in the

Presidency or outside it. It is only in this way that we shall be able to co-ordinate the knowledge obtained on so widely spread a genus like *Sorghum* and it would not help botanical science to start the investigations of Indian *Sorghums* on independent lines without constant reference to the work done in other fields. It might be easier and perhaps also more convenient for certain practical purposes, but on the whole certainly less scientific and in the long run more confusing.

A. Wild species

I. Racemes up to 4-noded

1. Primary branches of panicle divided

- |                                       |     |    |                              |
|---------------------------------------|-----|----|------------------------------|
| (a) Stems up to 4.5 m. high           | ... | 1. | <i>S. halepense.</i>         |
| (b) Stem about 75 cm. high            | ... | 2. | <i>S. subglabrescens.</i>    |
| 2. Primary branches of panicle simple | ... | 3. | <i>S. purpureo-sericeum.</i> |

II. Racemes 2-8-noded

B. Cultivated species

- |     |     |    |                    |
|-----|-----|----|--------------------|
| ... | ... | 4. | <i>S. nitidum.</i> |
| ... | ... | 5. | <i>S. vulgare.</i> |

I. *Sorghum halepense*, Pers. Syn. i (1805), 101.—*Andropogon halepensis*, Brot. Fl. Lusit. i (1804), 89; Hook. f. in F.B.I. vii, 182; Cke. ii, 983; Haines Bot. Bihar and Orissa 1033.

*Vern. Names*: Boru, baru; called Johnson Grass in America.

*Description*: Cke. I. c.

*Locality*: *Gujarat*: Ahmedabad (Gammie 16389!); Perim Isl., Gulf of Cambay (Blatter 3813!).—*Khandesh*: Toranmal (McCann 9643!); Khadgaum (McCann 9642!).—*Konkan*: Bassein Fort (Chibber 138!); Kase forest, Dhant Range (Ryan 1919!); Vetora (Sabnis 33072!); Trombay (McCann A. 269!); Byculla (McCann 9656!).—*Deccan*: Ganeshkhind Botanic Gardens (Herb. Econ. Bot. Poona!); Purandhar (McCann 5001!); Khandala, railway line near Rama's Bed (McCann 9426!); Panchgani (Blatter and Hallberg B. 1302!).—*S. M. Country*: Kunnur, 2,000 ft., rainfall 35" (Sedgwick and Bell 4984!); near Kilgerry (Talbot 2617!).—*Kanara*: Halyal Fort (Talbot 2006!).

*Distribution*: Most warm countries.

*Uses*: A good fodder grass. The grain is eaten. See Vinalle, H. N.: A study of the literature concerning poisoning of cattle by prussic acid in *Sorghum*, Sudan grass and Johnson grass, Journ. Amer. Soc. Agron. 13 (1921), 267-80. Gives remedies for hydrocyanic acid poisoning.

2. *Sorghum subglabrescens*, Schweinf. & Aschers. in Beitr. Fl. Aethiop. 302, 306; Stapf in Fl. Trop. Afr. ix, 137.—*Andropogon subglabrescens*, Steud. Syn. Pl. Glum. i, 393.—*A. Sorghum*, subsp. *salivus*, var. *subglabrescens* Hack. in Monogr. Androp. 519; Chiovenda in Ann. Istit. Bot. Roma vii, 25

*Description*: Annual. Culms (Stapf saw only a meagre specimen) slender almost simple, 75 cm. high, about 8-noded, internodes, except the uppermost, shorter than the sheaths. Leaf-sheaths finely pubescent at the nodes; ligules very short, shortly ciliate from the back; blades linear from a broad (middle and upper leaves) or slightly narrowed (lower leaves) base, long-attenuated upwards, up to 20 by 1.7 cm., green, flushed with red, quite glabrous. Panicle oblong, erect, 8.5 by almost 2.5 cm., contracted, moderately dense; branches scattered, erect, the longest not much over 2.5 cm., long and undivided for about 12 mm. from the base, almost simple, scabrous to spinulously ciliate, sparingly hairy at the base. Racemes tough, up to 4-noded and 8.5-10.6 mm. long, dense; joints rather stout, up to 2 mm. long, shortly whitish-ciliate; pedicels very similar, up to 1 mm. long. Sessile spikelet oblong, actue in flower, broad-ovoid or ellipsoid in fruit, 6.3 by 3.3 mm., at length variegated, awned; callus-beard scanty, 1 mm. long. Involucral glumes equal, gaping when mature, more or less coriaceous and glossy in the lower third, spongy-subcoriaceous and constricted about the middle, then papery, more or less whitish strigillose, at length sometimes almost glabrous; lower finely 13-nerved, nerves showing above the coriaceous base, keels rather sharp, scabrid, running into minute teeth, between which the minute hyaline tip protrudes, the coriaceous part rich maroon to almost black, followed by a pale transverse zone, then violet or purple across the middle, the broad triangular somewhat depressed tip straw-colour or reddish upwards; upper glume almost as broad as the lower, 9-nerved, slightly keeled, coloured like the lower. Floral glumes ciliate; lower broad-oblong, up to almost 5.3 mm. long; upper ovate, subentire, 3.3 mm. long, awn up to 12.7 mm. long, sharply bent, column stout, twisted, equalling the bristle. Grain exposed

upwards between the gaping glumes, equalling or slightly exceeding them, obovoid, 4.2 mm. long, more or less orange; embryo-mark and nerves obscure. Pedicelled spikelet neuter, persistent, linear-lanceolate, acute, 5.3 mm. long and more, reddish, lower involucrel glume up to 11-, upper 7-nerved.

*Locality*: Mahratta Country (Young, ex Stapf).

*Distribution*: Abyssinia, tropical Arabia.

*Note*: According to Stapf the specimen from India is a smaller variety of the type just described.

3. *Sorghum purpureo-sericeum*, Aschers. & Schweinf. in Schweinf. Beitr. Fl. Aethiop. 302, 306; Stapf in Fl. Trop. Afr., ix, 140.—*Andropogon purpureo-sericeus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii (1851), 469; Hack. in Monogr. Androp. 524; Hook. f. in F. B. I. vii, 185; Cke. ii, 984.

*Description*: Cke. l.c.

*Locality*: *Gujarat*: Garvi Dangs, in a field (Herb. Econ. Bot. Poona!).—*Khandesh* (Herb. Econ. Bot. Poona!); Bhusawal (McCann 5224!).—*Deccan*: Poona, above the Ghats (teste W. Burns).—*S. M. Country*: Kolhapur (Woodrow!); Belgaum (Ritchie 887).—*Kanara*: N. Kanara (Woodrow 40!).

*Distribution*: Central Provinces, W. Peninsula, tropical Africa.

4. *Sorghum nitidum*, Pers. Synops. i, 101; Haines Bot. Bihar and Orissa 1034.—*Andropogon nitidus*, Kunth, Revis. Gram. i, 166.—*A. serratus*, Thunb. Fl. Jap. 41; Hack. in Monogr. Androp. 520.—*Anatherum nitidum*, Spreng. Syst. i, 290.—*Andropogon fuscus*, J. S. Presl in C. B. Presl, Reliq. Haenk. i, 342.—*A. consimilis*, Steud. Syn. i, 394.—*A. pedicellatus*, Steud. l. c. 394.—*Holcus fulvus*, R. Br. Prodr. 199.—*Sorghum fulvum*, Beauv. ap. Roem. et. Schult. Syst. ii, 840.—*Chrysopogon fuscus*, Trin. in Steud. Nomencl. ed. 2, 360.

*Description*: A tall tufted grass, 1-2.4 m. high, densely villous at the nodes. Leaves 10-75 cm. by 8-20 mm., setaceously acuminate, glabrous or sparsely hairy on both surfaces, hairs often tubercle-based, midrib broad, prominent, white; sheaths terete below, keeled upward, more or less hairy; mouth silky-villous; ligule very short, truncate. Panicle 10-30 cm. long, oblong, lax, subsimple, rhachis glabrous, branches capillary, about equalling the spikes, glabrous or scaberulous, whorls distant. Spikes 8-37 mm. long, red-brown; joints and pedicels  $\frac{1}{2}$  to  $\frac{3}{4}$  the length of the sessile spikelets, margins shortly villous. Sessile spikelets broadly ellipsoid, callus rounded (Haines), or acute (Hook. f.). Lower involucrel glume coriaceous, broadly oblong or elliptic acute or obtuse, dorsally flattened with incurved margins, brown-hairy and keels hispid, 7-nerved, or about 3-nerved between keels, sometimes nearly black, polished. Upper involucrel glume broadly cymbiform with rounded back, lanceolate, acute, 1-nerved, hairy upwards. Lower floral glume as long as or shorter than the upper involucrel glume, hyaline, margins inrolled, 2-keeled, ciliate; upper floral glume linear-oblong, 2-lobed, awned or not. Pedicellate spikelet linear-oblong, pale or greenish with brown hairs. Lower involucrel glume oblong, rounded or sub-truncate, dorsally depressed and 2-nerved between the keels; upper equal, rather narrower, obtuse margins much inflexed, 3-nerved between keels. Lower floral glume hyaline, linear.

*Locality*: *Kanara*: Tinai (Talbot 2574!); Sambiani (Talbot 1337!); Sirsi to Sidderpur (Hallberg and McCann A 270!).

*Distribution*: India, Ceylon, Nicobars, Asia, tropical Australia.

5. *Sorghum vulgare*, Pers. Syn. i, 101; Haines Bot. Bihar and Orissa 1033.—*Andropogon Sorghum*, Brot. Fl. Lus. i, 88.

*Description*: Stout, usually tall annual grasses. Leaves broadly linear with a prominent white midrib. Panicle usually thyriform decompound with crowded whorls of erect branches and branchlets, rarely subeffuse. Rhachis of spike tenaceous, joints when forcibly separated leaving a ragged scar at the tip. Pedicelled spikelets usually neuter, pedicels short.

This is the Great Millet or Jowar, cultivated in most parts of the Presidency. (See H. H. Mann, Fodder Crops of W. India. *Dept. Agr. Bombay Bull.* 77 of 1916, and G. L. Kottur, Classification and Description of the Jowars of the Bombay Karnatik, *Dept. Agr. Bombay Bull.* 92 and others.)

After what we have said above we do not consider it advisable to enter into a description of the numerous varieties and forms. But we may mention in this place that a variety common in the Presidency, viz. *S. vulgare* var. *Roxburghii*, Hackel in Monogr. Androp. 510 has been described as a species by Stapf under

the name of *S. Roxburghii* in Fl. Trop. Afr., ix, 126. The description will be given in the following appendix to the genus *Sorghum*.

Species of *Sorghum* described from Africa by Stapf which also occur in India. All the information is taken from Stapf, mostly almost verbatim.

- A. Mature sessile spikelets deciduous with the adjoining joint of the rhachis and its pedicelled companion : spontaneous grasses
- B. Mature sessile spikelets persistent : cultivated grasses
  - I. Mature glumes wholly coriaceous or the lower with a herbaceous triangular tip, its nerves not visible on the back except at the tip, particularly when this is herbaceous
    - 1. Mature panicles more or less loose, usually with arched or drooping branches, never quite compact
      - (a) Sessile spikelets ovate or elliptic to lanceolate-oblong
        - \* Mature spikelets pale straw-colour, permanently more or less hairy; the grain embraced below by the tightly appressed glumes ... 1. *S. verticilliflorum*.
        - \*\* Mature spikelets bright tawny early glabrescent; the grain almost wholly exposed between the involute glumes... 2. *S. Roxburghii*, var. *semiclausum*.
        - (b) Sessile spikelets broadly obovate in outline ... 2. *S. Roxburghii*, var. *hians*.
        - ... 3. *S. bicolor*, var. *obovatum*.
      - 2. Mature panicles very dense to compact, rarely more or less loosened owing to the reduction of the primary axis and the consequent subdigitate arrangement of the branches ... 4. *S. Durra*.
  - II. Mature glumes thinly crustaceous to papery, the tips brittle and breaking irregularly. Back of spikelets longitudinally striate.
    - 1. Sessile spikelets 6.3-8.5 mm. long. Pedicelled spikelets 7.6-10 mm. long ... 5. *S. papyrascens*.
    - 2. Sessile spikelets 5-6.3 mm. long. Pedicelled spikelets up to 6.3 mm. long ... 6. *S. cernuum*.

\* 1. *Sorghum verticilliflorum*, Stapf in Fl. Trop. Afr. ix, 116.—*S. halepense*, Nees Fl. Afr. Austr. 88, non Pers.—*Andropogon verticilliflorus*, Steud. Syn. Pl. Glum. i, 393.—*A. Sorghum*, subsp. *halepensis*, var. *effusus*, Hack. in Monogr. Androp. 503 (*partim*).—*A. Sorghum verticilliflorus*, Piper in Proc. Biol. Soc. Wash. xxviii, 37.—*A. halepensis*, var. *effusus*, Stapf in Dyer, Fl. Cap. vii, 346 (*partim*).

*Description* : An annual. Culms 1.2-2.4 m. high, sometimes slightly pruinose below the nodes. Leaf-sheaths delicately silky-pubescent at the nodes; ligules up to over 2 mm. long, scarious, hairy on the back; blades linear from a broad rounded and often clasping base, long attenuated upwards, up to 45 cm. long, rarely over 25 mm. wide, green, sometimes slightly glaucous or flushed with purple, hairy just behind the ligule, otherwise glabrous. Panicle oblong to ovoid-oblong, often rather contracted and more or less nodding at first, then spreading out and more erect, up to 37 cm. long and ultimately 15-22 cm. wide; branches slender, flexuous, whorled, longest up to 22 cm. long and undivided to up to 5, rarely 7.5 cm. from the base, distantly branched, slightly and shortly hairy to villous at the base, like the branchlets more or less rough, at least upwards. Racemes fragile, up to 5-, but mostly 2- or 3-noded, rarely over 18 mm. long; joints slender, 3.3-4.2 mm. long, shortly ciliate, cilia dirty white or pale fulvous, often with a tinge of purple; pedicels similar, slightly shorter, their tips subdiscooid. Sessile spikelet ovate to ovate-lanceolate, shortly acuminate to acute, 3.7-4.5 mm. by 1.5-2.2 mm., straw-coloured, greenish towards the tips (at least when young), sometimes tinged with purple, ultimately

often turning bright or blackish-red particularly below; callus-beard less than 1 mm. long. Involucral glumes equal, coriaceous, slightly glossy below (more so when ripening), thinner upwards, lower usually slightly bulging below and somewhat depressed towards the tips, 11-13-nerved, with the nerves very obscure near the tips or more or less marked, sharply 2-keeled and scabrid to spinulously ciliate in the upper half or third, more or less strigillose, often glabrescent, rarely almost glabrous, hairs pale whitish or fulvous, loosely appressed, upper sharply keeled towards the tips with the keel rough, 7-nerved, more or less hairy. Floral glumes conspicuously ciliate, lower lanceolate, 5.3 mm. long, upper ovate, shortly 2-lobed, 2.2 mm. long; awn fine, 1.3-1.7 cm. long. Anthers 3.3 mm. long. Grain obovate-oblong, 3.3 mm. by 0.2 mm., fuscous, paler below; embryo-mark distinct, hardly exceeding the middle of the grain. Pedicelled spikelet male or neuter, early deciduous, subulate-lanceolate to linear, acutely acuminate, 6.3 mm. long, pale greenish, often tinged with red or purple; lower involucral glume 9-, upper 5-nerved.

*Distribution*: Nileland, Mozambique District, Natal, the Comoros, Seychelles, Madagascar, the Mascarenes. Introduced into India as Tabucki grass, also to Australia, Polynesia, and the West Indies.

\* 2. *Sorghum Roxburghii*, Stapf in Fl. Trop. Afr. ix, 126.

*Description*: Annual. Culms stout, tall, often slightly waxy, pruinose below the nodes. Leaf-sheaths softly pubescent at the nodes; ligules very short, scarios, hairy from the back; blades linear to linear-lanceolate from a broad clasping base, long-attenuated upwards, up to over 45 cm. long and up to 37 mm. wide, usually hairy to tomentose inside above the ligule and outside at the junction with the sheath, otherwise glabrous. Panicle oblong to ovoid-oblong, rarely subovate or elliptic in outline, erect, contracted and dense (rarely lax) in flower, somewhat to much loosened when mature; branches slender, flexuous, whorled or semiverticillate, the longest undivided for up to 12-25 mm. (rarely much more) from the base, more or less ciliate towards the base and often villous at the junction with the nodes, otherwise like their divisions glabrous or nearly so, finely scabrid upwards. Racemes tough, up to 4- (rarely 5-) noded, 8-12 mm. long; joints slender, 2-3.3 mm. long, distinctly and often densely ciliate, cilia white or purplish; pedicels similar but more slender, of about the same length or more often shorter with very slightly thickened tips. Sessile spikelet ovate, acute, with a small fine point, sometimes flattened on the back when young but soon convex, about 5.3 mm. by 2.7-3.3 mm., permanently pale or dull straw-coloured to tawny, at length slightly glossy; callus-beard, white. Involucral glumes equal, coriaceous, lower about 10-13-nerved, finely and often obscurely 2-keeled towards the tips with the keels slightly scabrid, transversely constricted at the base, more or less white-strigillose (to almost tomentose) when young, at length more or less glabrescent on the back, upper 7-9-nerved, finely keeled upwards, tip usually straight. Floral glumes distinctly ciliate, cilia up to 1 mm. long, lower broad-oblong, as long as the glumes, upper broad-ovate, 3.3-4 mm. long, middle nerve much thickened from the middle upwards, running out into a short straight mucro, lobes adnate to it almost all along. Anthers 2.7 mm. long. Grains elliptic or ovate-elliptic in outline, 3.8-4.8 mm. by 2.7-3.3 mm., dull white (in the African specimens). Pedicelled spikelet usually neuter, linear or linear-lanceolate, up to 4.2 mm. long, more often much reduced and quite small, persistent; lower involucral glume, if well developed, up to 9-nerved, upper 5-nerved.

Of this species Stapf describes two varieties which also occur in India.

(a) Var. *semiclausum*, Stapf in Fl. Trop. Afr. ix, 127.—*Holcus Sorghum minus* *et* *Sisna*, Wall. Cat. 8777 F. A.—*Andropogon Sorghum*, subsp. *salivus*, var. *Roxburghii* (?) and *fulvus*, Hack. in Monogr. Androp. 510 and 512.—*A. Sorghum*, var. *Usorum* (?). Stapf in Dyer Fl. Cap. vii, 348, *in nota*; Medley Wood, Natal Pl. ii, t. 120, *non* Koern. *neque* Hack.

*Description*: Panicles fairly dense, also when mature. Involucral glumes less coriaceous towards the tips and more or less showing the nerves in that portion, permanently more or less strigillose, their margins clasping the grain so that only its top or upper half is exposed.

*Distribution*: Nileland of tropical Africa, Mozambique District, Natal, Madagascar, India.

(b) Var. *hians*, Stapf l. c. 127.—*Holcus Sorghum nitidum*, Wall. Cat. 8777D.—*Andropogon Sorghum*, var. *hians*, Stapf in Hook. f. F. B. I., vii, 184.—*A. Sorghum*,

var. *Roxburghii*, K. Schum. in Engl. Pf. Ost. Afr. B, 48; C. t. iv, F-H; Busse and Pilger in Engl. Jahrb. xxxii, 184, *partim*.

*Description*: Panicles more or less loose with very flexuous and often drooping branches. Involucral glumes coriaceous to the tips with the nerves quite obscure, subglabrous and somewhat glossy on the back when mature, their margins involute, exposing the whole grain, which is often placed with its back and front parallel to the median line of the spikelet.

*Distribution*: Mozambique District; also in India.

\* 3. *Sorghum bicolor*, Moench Meth. 207, var. *obovatum*, Stapf in Fl. Trop. Afr. ix, 127.—*S. bicolor*, Willd. Enum. Hort. Berol. 1036.—*S. nigrum*, Roem. & Schult. Syst. ii, 837.—*S. vulgare bicolor*, Pers. Syn. i, 101.—*S. vulgare*, var. *obovatum*, subvar. *nigrum*, Rendle in Cat. Afr. Pl. Welw. ii, 151.—*S. rubens*, Willd. Enum. Hort. Berol. 1036.—*Holcus bicolor*, Linn. Mant. Alt. 301.—*H. Sorghum*, Mieg. in Act. Helv. viii, 129, t. 4. f. 4.—*H. niger*, Ard. in Sagg. sc. e lett. acad. Padova, i, 134, t. 5.—*H. saccharatus*—Gaertn. Fruct. ii, 3, t. 80. fig. 2 (?), *non aliorum auctorum*.—*Andropogon niger*, Kunth. Enum. i, 501.—*A. rubens*, Kunth l. c. 502.—*A. Sorghum*, subsp. *sativus*, var. *obovatus*, Hack. in Monogr. Androp. 514.—*A. Sorghum*, var. *bicolor*, Koern. in Bull. Herb. Boiss. ii, 226.

*Description*: An annual. Culms stout, up to 4 m. high, many-noded. Leaf-sheaths mostly overlapping, finely pubescent at the nodes; ligules short, ciliate from the back; blades linear to lanceolate-linear from a broad and rounded or slightly narrowed base, up to 50 cm. long and 7.5 cm. broad, pubescent to tomentose inside above the ligules and less so or glabrous on the back at the junction with the sheath. Panicles erect, contracted and more or less dense, or loose and oblong or oblong-ellipsoid or obovate to oblanceolate in outline 7.5-30 cm. by 5-9 cm.; branches erect or obliquely erect, rather rigid, finally sometimes slightly drooping, the longest often more than half the length of the panicle and undivided for 12 mm. to 7.5 cm. from the base, like the branchlets very rough, spinulously ciliate or ciliate, particularly upwards, slightly hairy, rarely villous at the base. Racemes tough, compact, frequently 3- or 4- (rarely 5-) noded; joints somewhat stout, flattened, 1.6-2.7 mm. long, shortly whitish or fulvously ciliate; pedicels similar, about 1 mm. long. Sessile spikelet more or less broadly obovate even in flower, with very short broad and depressed tips, 4.8-5.8 mm. by 3.3-4.2 mm., straw-coloured to tawny, finally darker, often with red or brown or purple spots or blotches or turning altogether fuscous, chestnut-brown or quite black, closed when mature or only slightly gaping, usually awned; callus-beard scanty. Involucral glumes equal, firmly coriaceous except at the papery to membranous tips, unevenly strigillose particularly and mostly persistently on the tips or almost glabrous; lower up to 16-nerved, nerves very faint, keels short, usually obscure, tips very short, broadly triangular with a hyaline point, depressed; upper broad, 9-nerved, obscurely keeled close to the tip, otherwise broadly rounded on the back. Floral glumes ciliate, lower broad-elliptic, about 4.2 mm. long, upper broad-ovate, 3.3 mm. long, 2-lobed, awn about 10.6 mm. long, sometimes much reduced. Anthers up to 4.2 mm. long. Grain tightly enclosed in the glumes or the top slightly exposed, obovate-oblong in outline, 3.3-3.8 mm. by 2-2.4 mm., brown; embryo-mark distinct; nerves obliterated. Pedicelled spikelet neuter, persistent, lanceolate to linear-oblong, acute, about 4.2 mm. long, reddish; lower involucral glume 9-10., upper about 7-nerved.

*Distribution*: Lower Guinea. Occasionally cultivated in the Mediterranean region from Madeira to India, also introduced into Australia, the West Indies and Brazil.

\* 4. *Sorghum Durra*, Stapf in Fl. Trop. Afr. ix, 129.—*Holcus Durra*, Forsk. Fl. Aeg.-Arab. 174.—*H. Duna* (sphalm.), Gmelin Syst. 173.—*Andropogon Sorghum*, var. *aegyptiacus*, Koern. in Aschers. & Schweinf. Ill. Fl. Egypte 164.—*A. Sorghum*, subsp. *sativus*, var. *Durra* and *aegyptiacus*, Hack. in Monogr. Androp. 516.—*A. Sorghum*, subsp. *sativus* var. *Durra*, Chiov. in Ann. Istit. Bot. Roma, viii, 24.—*A. Sorghum*, var. *niloticus* and *Schweinfurthianus*, Koern. in Aschers. & Schweinf. l. c. 778, 779.—*A. Sorghum*, var. *arabicus* and *rubrocernuus*, Koern. in Bull. Herb. Boiss. ii, App. ii, 12 (*probabiliter*).

*Description*: An annual. Culms stout, up to 4 m. high and even more, 20-40-noded. Leaf-sheaths finely pubescent at the nodes; ligules very short, shortly ciliate; blades up to 40 cm. by 5 cm., quite glabrous (? always). Panicle usually quite compact, ovoid or ellipsoid, erect or sometimes recurved, 10-15 cm.



by 5-10 cm.; branches erect, more or less flexuous, rather slender, rough to spinulosely ciliate, particularly upwards, ciliate to subvillous at the base, the longest up to one half or one-third the length of the panicle, divided from very long down. Racemes compact, tough, about 8.5 mm. long (in flower), mostly 3- or 4-noded; joints somewhat stout, flattened, 1 to almost 2 mm. long, whitish-ciliate; pedicels similar, but still shorter. Sessile spikelet rhombic-obovoid, subacute (in flower), greenish or straw-coloured with greenish tips, ultimately whitish or variously brown, dark red or black, awned or awnless, callus-beard scanty. Involucral glumes equal, coriaceous up to beyond  $\frac{1}{2}$  or  $\frac{2}{3}$ , then papery, unevenly strigillose, particularly at the tips and sides; lower with a broad triangular greenish strongly nerved tip, about 12-nerved with 3 or 4 finer nerves interspersed, 2-keeled upwards (keels rough), more or less flattened out and very broad to rotundate when mature with the tips worn off and the back glossy; upper broad, 9-nerved with some additional finer nerves, slightly keeled upwards. Floral glumes ciliate; lower ovate-elliptic, over 4.2 mm. long; upper broad-ovate, 2-toothed, 4.2 mm. long, awn up to 7.5 mm. long, mostly much shorter and then hardly twisted and differentiated into column and bristle or quite suppressed. Anthers over 2 mm. long. Grain subglobose, slightly compressed, with a broad rounded much exposed top, white, yellow or variously reddish, 5.3 by 5.3 mm., nerveless, embryo-mark faint. Pedicelled spikelet neuter (? always), persistent; lanceolate to linear-oblong, subacute, up to 6.3 mm. long, greenish or reddish, lower 11-, upper 7-nerved.

*Distribution*: Nileland of Tropical Africa, Arabia, Afghanistan, India.

\*5. *Sorghum papyrascens*, Stapf in Fl. Trop. Afr. ix, 134.

Only mature panicles were known to Stapf. Culms up to 12 mm. across at the base of the panicle. Panicle erect, oblong to oblanceolate in outline, contracted, dense, up to over 30 cm. by 10-13 cm.; branches more or less whorled, often many to a whorl, erect, the longer slightly arching, rather robust, like the branchlets rough to spinulosely ciliate upwards and softly ciliate or pubescent in addition, villous at the base or 12 mm. above it, following (longest) up to 15 cm. long and undivided for 5-7½ cm. from the base. Racemes tough, up to 4-noded and 18 mm. long, dense, much crowded; joints moderately slender, up to over 3.3 mm. long, shortly white-ciliate; pedicels similar, 1-2.7 mm. long. Sessile spikelet oblong (in flower), at length ovoid or oblong-ovoid, tight or somewhat inflated, closed, up to 9.5 mm. long, permanently pale straw-coloured or reddish; callus-beard very short. Involucral glumes equal, papery and transparent throughout; lower up to 16-nerved with numerous transverse veins, very obscurely keeled upwards or keelless, nerves raised from the base upwards, softly pubescent to almost villous, very imperfectly glabrescent or at length almost glabrous, hairs white; upper broad, about 13-nerved, very obscurely keeled upwards, much less hairy. Floral glumes conspicuously ciliate; lower broad-elliptic, 5.3 mm. long; upper broad-ovate, entire and awnless or shortly 2-lobed, with a mucro or an awn up to 6.3 (rarely 10.6) mm. long, usually slightly bent and hardly twisted. Lodicules densely ciliate. Grain completely enclosed by the glumes or partly exposed by their breaking up, obovate to orbicular-obovate in outline, compressed, biconvex, dull white or orange; embryo-mark faint, elliptic, slightly exceeding the middle of the grain. Pedicelled spikelet neuter, reduced to the involucral glumes, persistent, linear or linear-lanceolate, acute, pale straw-coloured or reddish, 6.3-8.5 mm. long, lower 11-13-, upper 9-nerved, shorter.

*Distribution*: Nileland of tropical Africa. Also known from India.

\*6. *Sorghum cernuum*, Host. Gram. Austr. iv, t. 3; Reichb. Ic. Fl. Germ. (1845.) t. 80, fig. 466; Stapf in Fl. Trop. Afr. ix, 136.—*Holcus Sorghum*, Linn. Sp. Pl. ed. 1, 1047 (*partim*); Mant. ii, 500.—*H. Dora*, Mieg. in Act. Helv. viii (1777), 125, t. 4, fig. 3.—*H. cernuus*, Ard. in Saggi sc. e lett. Acad. Padova i, 128, t. iii, fig. 1 and 2.—*H. compactus*, Lam. Encycl. iii, 140.—*Andropogon compactus*, Brot. Fl. Lus. i, 88.—*A. cernuus*, Roxb. Fl. Ind. i, 273.—*A. Sorghum* var. *cernuus*, Koern. in Koern. & Wern. Handb. Getreideb. i, 314.—*A. Sorghum* subsp. *sativus*, var. *cernuus*, Hack. in Monogr. Androp. 515.

*Description*: An annual. Culms stout, 3-4 m. high and more, 20-30-noded. Leaf-sheaths minutely pubescent at the nodes; ligules very short, densely ciliate from the back; blades linear-lanceolate, over 30 cm. by 6 cm., pale green, pubescent to tomentose inside above the ligule and outside at the junction with the sheath. Panicle erect or recurved, ovoid to oblong, very compact or

somewhat loose, 10-25 cm. by 5-7.5 cm.; branches rather stout below, rigid, spinulously ciliate, particularly upwards, softly ciliate to villous at the base, branches divided almost from the base, the longest 5-7.5 cm. long. Racemes compact: up to 3- or 4-noded, up to 10.6 (rarely 12.7) mm. long; joints stout, compressed, 1 mm. long, more or less white-silky-villous; pedicels very similar, of about the same length. Sessile spikelet ovate with rather broad tips, 5.3 mm. by 3.3-3.8 mm., pale straw-coloured with greenish tips, whitish when mature, awned. Involucral glumes equal, coriaceous about up to the middle or at the base only, otherwise papery and often partly spongy, white-silky-villous all over or glabrous on the coriaceous portion of the back; lower 12-nerved (with the nerves distinct upwards and sometimes with a few very delicate additional nerves interspersed), sharply 2-keeled upwards with the keels spinulously ciliate and abruptly ending, forming minute teeth between which the hyaline end of the tip protrudes; upper very broad, about 12-nerved, slightly keeled upwards. Floral glumes very densely ciliate; lower broad-ovate, 2-lobed, 4.2 mm. long; upper broad elliptic-oblong, awn about 8.5 mm. long with the bristle half the length of the long-exserted column or more or less reduced. Anthers 3.3 mm. long. Grain equalling the glumes or more or less exserted, orbicular or orbicular-obovate in outline, more or less compressed, 4.2-5.3 mm. by 4.2 mm., white, dull; embryo-mark indistinct. Pedicelled spikelet neuter, linear-lanceolate, 4.2 mm. long, pubescent, lower involucral glume 11-, upper 10-nerved.

*Distribution*: Upper Guinea, North Central Tropical Africa, N. Africa, the Orient to Turkestan and N. India as far as Manipur.

(To be continued)





With author's compliment

REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY.

Part V. By E. BLATTER, S.J., Ph.D., F.L.S.

Gram

1928

III

Christchurch to Agulhas  
p 400-600



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., Ph.D., F.L.S.

PART V

GRAMINEÆ

BY

E. BLATTER and C. McCANN

(Continued from page 298 of this Volume.)

27. *CLEISTACHNE*, Benth. in Hook. Ic. Pl. xiv, 60, t. 1379; Stapf in Fl. Trop. Afr. ix, 154.

Tall, rather coarse grasses, annual according to Stapf, perennial according to Hook. f. Leaves long, narrow, flat, with stout midribs. Panicles narrow, more or less contracted, greyish or fulvously hairy. Spikelets solitary, all alike, hermaphrodite, pedicelled on the tough rhachis of racemously arranged or panicled racemes, falling entire from the thickened tips of the pedicels. Florets 2, lower reduced to an empty glume, upper hermaphrodite. Involucral glumes equal, very similar, with involute margins, more or less coriaceous, delicately 7-9-nerved, mucicous. Floral glumes hyaline, lower 2-nerved, upper 2-dentate or subentire, 3-nerved, with a twisted flexuous awn from the sinus or tip; pale very minute, ciliate. Lodicules 2, broad-cuneate, sparingly ciliate. Stamens 3. Stigmas laterally exserted, plumose. Grain oblong to obovoid-oblong, very obtuse or truncate; embryo half the length of the grain.

Species 3, one in West India and 2 in tropical Africa.

1. *Cleistachne Stocksii*, Hook. f. in F. B. I. vii, 163.

*Description*: Stem tall, stout, simple. Leaves 30-40 cm. by 12 mm., finely acuminate, softly hairy, midrib stout, margins slightly thickened, ciliate, sheath terete, ligule oblong, coriaceous. Panicle 15-20 cm. long, long-peduncled, sub-erect; rhachis and branches sparsely ciliate, pedicels of spikelets strigose with bright yellow hairs. Spikelets 5 mm. long, crowded, dark brown, callus short, bearded. Lower involucral glume dark brown, obscurely many-nerved, hirsute, shining, upper like lower, but narrower nearly glabrous. Lower floral glume 2-nerved, margins infolded, tip hispid, upper a twisted awn 16-25 mm. long, dilated at the base into a hyaline, entire, 3-nerved membrane, embracing the minute, ovate, obtuse pale.

*Locality*: Tungar forest, Bassein (Bhide!).

*Distribution*: So far only found in Malabar on the Bababoodan Hills.

28. *VETIVERIA*, Thouars ex Virey in Journ. de Pharm. 1. ser., xiii, 499; Stapf in Fl. Trop. Afr. ix, 156.

Coarse, perennial, glabrous grasses; rhizomes stout; culms stout, more or less compressed below. Leaf-blades firm to hard, conduplicate in bud, then flattening out, at least upwards, gradually passing into the sheath; lower sheaths much compressed, flabellate-imbricate. Panicles erect, long, of many-rayed whorls of slender simple or rarely compound racemes, glabrous except for the frequently bearded calli. Spikelets 2-nate, of each pair subsimilar, differing in sex, one sessile, the other pedicelled, on the articulate fragile rhachis of copiously whorled (rarely panicled) peduncled 3-to many-jointed racemes, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelet or at least the accompanying pedicel; joints and pedicels slender, slightly and gradually thickened upwards. Florets 2, lower reduced to an empty glume, upper hermaphrodite in the sessile, male in the pedicelled spikelets. Sessile spikelet laterally slightly compressed, awned or

awnless. Involucral glumes equal, lower more or less coriaceous or chartaceous with a broad rounded back and subinflexed margins, usually mucicous, upper boat-shaped, keeled upwards, with broad hyaline ciliate margins, mucicous, mucronate or aristulate. Floral glumes hyaline, of lower floret 2-nerved, of upper minutely 2-dentate, mucicous or mucronulate or with a perfect or imperfect awn from the sinus. Pale minute, hyaline, nerveless. Lodicules 2 glabrous. Stamens 3. Stigmas laterally exerted; styles subterminal. Grain oblong, slightly oblique at top. Pedicelled spikelet dorsally compressed; involucral glumes much thinner than in the sessile, like the floral glumes usually awnless.

Species about 7 in the tropics of the Old World.

1. Leaves 5-13 cm. long. Panicle 15-18 cm. long ... 1. *V. Lawsoni*.

2. Leaves 30-90 cm. long. Panicle up to over 30 cm. long ... 2. *V. zizanioides*.

1. *Vetiveria Lawsoni*, Blatter & McCann, *nov. comb.*—*Andropogon Lawsoni*, Hook. f. F.B.I. vii, 187.

*Description*: Rootstock stout, horizontal. Stem erect, simple, slender, internodes very long. Leaves chiefly subradical, 5-13 cm. by 5 mm., exactly linear, rigid, curved, acute or obtuse, tips serrulate, base not contracted, margins ciliate, nerves 4-8, strong; sheaths compressed, of lower very short, of cauline very long, striate; ligule a ridge of hairs. Panicle 15-18 cm. long, narrow, elongate, branches or peduncles of spikes opposite and fasciated, branchlets slender, puberulous with a white scurf. Spikes 6-12 mm. long, pale reddish, erect; joints 6-8, very obliquely truncate, tips obscurely ciliate, pedicels nearly equalling the spikelet, slender, compressed. Sessile spikelets 4 mm. long, linear-lanceolate, callus bearded with silky hairs. Lower involucral glume linear, rigid, coriaceous, tip obtuse, bristly, keels muricate, scabrous margins inflexed, upper involucral glume cymbiform, tip 2-fid, awn longer than the glume, base ciliate, keel pectinately ciliate above the middle. Lower floral glume oblong, ciliate, nerveless, upper arched, linear, obtusely 2-dentate, awn very slender. Pale oblong, ciliate, nerveless. Anthers long. Pedicelled spikelets male, longer and narrower than the sessile, callus naked; lower involucral glume 3-nerved, awned, keels pectinately ciliate, upper acuminate, awned. Floral glumes oblong, obtuse, ciliate.

*Locality*: *S. M. Country*: Dharwar District, very common (Sedgwick 2170!); Dharwar (McCann A277!).

2. *Vetiveria zizanioides*, Stapf in Kew Bull. (1906), 346-49, 362, in Fl. Trop. Afr. ix, 157.—*V. odorata*, Virey in Journ. de Pharm. 1. ser. xiii, 499.—*V. arundinacea et muricata*, Griseb., Fl. Brit., W. Ind. 559, 560.—*Phalaris zizanioides*, Linn. Mant. Alt., 183.—*Andropogon muricatus*, Retz., Obs. iii, 43; Roxb. Fl. Ind. i, 265. Grah. Cat. Bomb. Pl. 238; Griff. Ic. Pl. As. t. 139, f. 57, t. 155, f. 1; Dalz. and Gibs. Bomb. Fl. 302; Duthie Grass. N. W. Ind. 90, Fodd. Grass. N. Ind. 36, t. 24.—*A. Festucoides*, J. S. Presl in C. B. Presl Reliq. Haenk. i, 340.—*A. squarrosus*, Hack. (*non* Linn. f.) var. *genuinus*, Hack. in Monogr. Androp. 542-44.—*A. squarrosus*, Hook. f. (*non* Linn. f.) in F. B. I. vii, 186.—*A. squarrosus*, Cooke (*non* Linn. f.) in Fl. Bomb. Pres. ii, 991.—*Agrostis verticillata*, Lam. Ill. Gen. i, 162.—*Anatherum muricatum*, Beauv. Agrost. Expl. Planch. 15.

J. D. Hooker and Cooke and many others have followed Hackel in calling this plant *Andropogon squarrosus*, Linn. f. Stapf (in Kew Bull. 1906, 347) has explained that this name applies to quite a different plant: 'No notice was taken of Scheuchzer's description or of Petiver's and Du Bois's specimens, and when Linnæus, about 1770,<sup>1</sup> received the grass from Koenig he described it as something new under the name *Phalaris zizanioides*. Koenig, however, also sent specimens of the grass to Retzius, who published it as *Andropogon muricatus*<sup>2</sup> in 1783. This name, which was suggested by Koenig himself, was subsequently adopted by Roxburgh and most other botanists. More recently,<sup>3</sup> however, it has been replaced by *Andropogon squarrosus*, a name adopted by the younger Linnæus<sup>4</sup> for a plant, also communicated by Koenig, who found it

<sup>1</sup>Linnæus, Mant. Alt. (1771), 183.

<sup>2</sup>Retz. Observ. iii (1783), 43.

<sup>3</sup>Hackel, Andropog. in DC. Monogr. Phaner. vi (1889), 542.

<sup>4</sup>Linn. f. Suppl. (1781), 433.



"circa Zeylonam natans supra stagna profundiora," and entirely distinct from *Andropogon muricatus*. The specimen is still in Linnaeus' herbarium and was correctly identified by R. Brown<sup>1</sup> with his *Panicum abortivum*, that is *Chamaeraphis spinescens*, a characteristic floating grass of the Indo-Malayan region. Retzius<sup>2</sup> himself is responsible for the erroneous reduction of *Andropogon squarrosus* to *Andropogon muricatus*, which recently has been revived, although Roxburgh<sup>3</sup> long ago drew attention to the confusion. "*Zizanioides*" being the earliest specific epithet, it will have to be adopted for the "Khas Khas," so that its name under *Veliveria* must be *V. zizanioides*.'

*Vern. Names:* Vala, Ushir, Valo, Bala, Khas Khas of the Anglo-Indians.

*Description:* A densely tufted perennial grass. Rootstock branching with spongy aromatic roots. Culms stout, up to over 1.8 m. high, usually sheathed all along. Leaf-sheaths compressed, especially the lower which are sharply keeled and fan-like, imbricate, very smooth, firm; ligules reduced to a scarious rim; blades narrowly linear, acute, 30-90 cm. long, 4.2-10.6 mm. wide, erect, rigid, firm or somewhat spongy, usually glabrous, rarely more or less hairy downwards on the face, pale green, midrib slender, lateral nerves close, 6 or more on each side, rather stout, slightly prominent, margin spinously rough. Panicle oblong up to over 30 cm. long, usually contracted; rhachis stout, smooth; whorls 6-10 with up to 20 rays; branches oblique to suberect, naked for up to 5 cm., filiform, slightly rough. Racemes up to 5 (rarely 7.5) cm. long, very slender; joints about as long as the sessile spikelets or sometimes distinctly exceeding them, smooth or more or less rough, minutely and unequally ciliolate at the slightly oblique tips; pedicels similar, but shorter. Sessile spikelet linear-lanceolate to almost linear, acute or subacute, 4.2-4.8 mm long, yellowish, olive or violet-brown or purplish to almost black; callus obtuse, under 1 mm. long, glabrous. Involucral glumes, acute, coriaceous, lower muriculate all over the back, 5-nerved, lateral nerves close, very fine; upper spinulously muricate on the keel. Lower floral glume as long as the involucral glumes, acute, reversedly ciliolate, upper up to 3.3 mm. long, narrow, oblong-lanceolate, mucronulate, ciliate. Lodicles 2, quadrate and conspicuous, though small. Styles and stigmas short. Stigmas purple. Anthers 2-3.3 mm. long. Pedicelled spikelet sparingly aculeolate or almost smooth; upper floral glume entire, acute.

*Locality:* Gujarat: Road to Lasandra (Chibber!); Daman (Bhide!); Ahmedabad, common in damp valleys (Sedgwick!).—Konkan: Ghatkoper, Horse-shoe Valley (McCann 9957!).—N. Kanara: Dandeli (Talbot 2209!).

Cke. l.c. classes this species amongst non-indigenous plants. We are of opinion that it is indigenous in most parts of the Presidency.

*Distribution:* Practically over the whole of India, and eastwards to Burma. Occasionally cultivated. Lower Guinea in Tropical Africa. Throughout the Malayan region only cultivated or as an escape. Introduced into the Mascarenes, the West Indies and Brazil.

*Early history and economic uses:* See Stapf in Kew Bull., l.c.

29. CHRYSOPOGON, Trin. Fund. Agrost. 187; Stapf in Fl. Trop. Afr., ix, 159.

Perennial (at least in the Old World). Leaf-blades narrow. Panicles usually lax, of whorls of simple or basally divided filiform branches, rarely the branches 2-nate or solitary. Spikelets in threes at the ends of the branchlets of terminal panicles, one sessile, the other 2 pedicelled, the three falling entire from the thickened, nearly always bearded, oblique tips of the peduncles; exceptionally 2-nate in 2-jointed racemes, one sessile, the other pedicelled, each sessile spikelet falling with the contiguous joint and its pedicelled companion, pedicels and joints, if present linear-filiform, never longitudinally grooved or appendaged. Florets 2, lower reduced to an empty glume, upper hermaphrodite in the sessile, male or neuter in the pedicelled spikelet. Sessile spikelets usually laterally compressed, awned. Involucral glumes subequal; lower coriaceous or chartaceous, involute with a rounded

<sup>1</sup>R. Brown Prodr. Fl. Nov. Holl. (1810), 193.

<sup>2</sup>Retz., l. c., v (1789), 21.

<sup>3</sup>Roxburgh Fl. Ind. ed., Carey and Wall. I (1820), 270.

back or complicate and more or less keeled upwards, upper boat-shaped, more or less keeled. Floral glumes hyaline, lower 2-nerved, upper linear, entire or 2-dentate with a usually perfect awn from the sinus. Pale 0 or small, hyaline, nerveless. Lodicules 2, small, glabrous. Stamens 3. Stigmas exerted laterally low down. Grain linear, laterally compressed; embryo half the length of the grain; scutellum linear-oblong. Pedicelled spikelet dorsally compressed, awnless or aristulate.

Species about 18 in the hot parts of the Old World, only a few entering the temperate zone. One in Florida and Cuba.

Cooke (ii, 934-986) describes 4 species of *Andropogon* belonging to the section *Chrysopogon*: *A. aciculatus*, Retz., *A. lancearius*, Hook. f., *A. monticola*, Schult., and *A. Aucheri*, Boiss.

To these we add 4 species not noted from the Presidency before: *Chrysopogon Wightianus*, Ness, *Ch. asper*, Heyne, *Ch. polyphyllus*, Blatter and McCann, and *Ch. Gryllus*, Trin.

- A. Pedicels of the upper spikelets half as long as the sessile spikelets or longer
- I. Pedicels of upper spikelets glabrous or nearly so
1. Stems erect. Leaves 15-45 cm. long ... 1. *C. Gryllus*.
  2. Stems creeping below. Leaves 2-13 cm. long ... 2. *C. aciculatus*.
- II. Pedicels of upper spikelets villous with rusty rarely pale hairs
1. Lower involucrel glume of pedicelled spikelets long-awned, upper not or very shortly awned
    - (a) Callus long villous all round ... 3. *C. asper*.
    - (b) Callus glabrous in front ... 4. *C. lancearius*.
  2. Involucrel glumes of pedicelled spikelets both awned ... 5. *C. Wightianus*.
- B. Pedicel of upper spikelets not half as long as the sessile spikelets
- I. Lower sheaths compressed ... 6. *C. montanus*.
- II. Lower sheaths terete
1. Leaves, peduncle and branches of panicle glabrous ... 7. *C. polyphyllus*.
  2. Leaves, peduncle and branches of panicle not glabrous ... 8. *C. Aucheri*.

1. *Chrysopogon Gryllus*, Trin. Fund. Agrost. 188; Nees Gen. Fl. Germ. Monocot. i, t. 93; Beath. Fl. Austral. vii, 537.—*Andropogon Gryllus*, Linn. Cent. Pl. ii, 33; Hack. Monogr. Androp. 550; Host. Gram. Austr. ii, 1, t. 1; Sibth. Fl. Græc. i. t. 67; Duthie Grass. N. W. Ind. 22, Fodd. Grass. N. Ind. 40; Hook. f. in F. B. I. vii, 187; Collett Fl. Siml. 602, fig. 191.—*A. echinulatus*, *glabratus* et *Royleanus*, Steud. Syn. Gram. 395, 397.—*Chrysopogon glabratus*, Trin. in Mem. Acad. Petersb. ser. 6, ii (1833), 318.—*Rhaphis Gryllus*, Desv. Opusc. 69.—*R. echinulata*, Nees in Royle III. Bot. Himal. 417.—*Pollinia Gryllus*, Spreng. Pugill. ii, 10; Reichb. l. c. Fl. Germ. t. 54.—*Apluda Gryllus*, Presl. Cyp. & Gram. Sic. 55.—*Holcus gryllus* et *pallidus*, Br. Prodr. 199.

*Description*: Stems simple, forming dense hard tufts, erect, 15 cm. to 1.5 m. high; nodes smooth. Leaves 15-45 by 4-8 mm., linear, acute, glabrous or hirsute, margins serrulate; sheath keeled above, glabrous or pubescent. Panicle large, 12-20 cm., rhachis angular, scabrid, axils bearded. Branches long, 5-10 cm., capillary, spreading, simple or branched, usually very many in a whorl and bearing 2-4 spikes, tips obliquely truncate and densely bearded. Sessile spikelets 5-8 mm., callus straight, acute. Lower involucrel glume coriaceous, 2-toothed, dorsally rounded with 2 muricate or mamillate keels or channels, shining, smooth or scaberulous, margins broadly involute, upper chartaceous, hyaline, lanceolate, mucronate or aristulate, awn equalling the spikelet or shorter, keel and sides bristly above the middle. Lower floral glume linear-oblong, obtuse, nerveless, upper linear, minutely 2-toothed, awn minute or 12-35 mm. long. Pale small, oblong, glabrous. Pedicelled spikelets rather longer than the sessile, terete, lanceolate, acuminate; pedicels glabrous or ciliolate. Lower involucrel glume acuminate or aristulate, 5-9-nerved keels

ciliate above, upper lanceolate, acuminate, ciliate. Floral glumes narrower, ciliate, awn of upper half the size of the glume.

*Locality* : *N. Kanara* : Halyal (Talbot 2088!).

*Distribution* : Temperate Himalaya from Kashmir to Sikkim, 4,000-9,000 ft. Khasia Hills, 4,000-5,000 ft., westwards to N. Africa and S. Europe, Australia.

2. *Chrysopogon aciculatus*, Trin. Fund. Agrost. 188; Duthie Grass. N. W. Ind. 22 (*acicularis*), Fodd. Grass. N. Ind. 39; Benth. Fl. Hongk. 424, Fl. Austral. vii, 538.—*Andropogon aciculatus*, Retz. Obs. v (1789), 22; Roxb. Fl. Ind. i, 262; Grah. 238; Hack. Monogr. Androp. 562; Hook. f. in F. B. I. vii, 188; Cke. ii, 984.—*A. acicularis*, Willd. Sp. pl. iv, 906.—*Rhaphis acicularis*, Desv. Opusc. 69.—*R. trivalvis*, Lour. Fl. Cochinch. 553; Trin. Sp. Gram. Ic. t. 8, 9.—*Centrophorum chinense*, Trin. Fund. Agrost. 106, t. 5.—Rheede Hort. Mal. xii, t. 43.

*Description* : Cke. l. c.

*Locality* : *Konkan* : Alibag, sandy shore (Ezekiel!).—*N. Kanara* : Karwar, sea-shore (Sedgwick and Bell 5070!); Jog, hills (Hallberg and McCann A272!).

*Distribution* : More or less throughout India, Ceylon, Tropical Asia, Australia, Polynesia.

*Uses* : According to Haines the leaves which lie close to the ground escape to a large extent the lips of cattle. The plant is a pest on account of the sharp callus and small awns sticking to the clothes.

3. *Chrysopogon asper*, Heyne ex Wall. Cat. n. 8784.—*Andropogon asper*, Heyne in Herb. Rottler ex Hook. f. in F. B. I. vii, 189.

*Description* : Stem 30-90 cm., leafy below, very slender above. Leaves distichous, 30-45 cm. by 12-18 mm., broadly linear, acute, cordate, coriaceous, flat, smooth, 11-nerved, midrib very slender, spinulose beneath, margins spinulosely serrulate, and with a few long tubercle-based cilia towards the broad semi-amplexicaul base; sheaths broad, compressed, laxly hirsute, lower ones 12 mm. broad, keeled, armed with scattered tubercle-based hairs. Panicle 18 cm. long, narrow, of many whorls of short, unequal, simple, smooth, erect branches bearing solitary rarely 2 erect spikes, tips very shortly bearded. Sessile spikelets 6 mm. long, pale, coriaceous, callus up to 2 mm., long villous all round. Lower involucrel glume hispid beneath, the tip strongly compressed above; upper with the keel and sides more or less hispid above the middle, awn as long as the glume or shorter. Lower floral glume shorter than the upper involucrel, narrow, obtuse, 2-nerved, ciliate, upper consisting of the linear, hyaline, 3-nerved base of the awn, awn 35-50 mm. long. Pedicelled spikelets 8 mm. long, narrowly lanceolate, 7-nerved, pale, shining, keels ciliate; pedicels very shortly rufous-villous on both margins, excised at the tip in a semi-circle; lower involucrel glume thin, tip 2-dentate, nerves strong, sub-equidistant, or the 3 lateral on each side submarginal, margins narrowly incurved, keels ciliate from base to tip, upper lanceolate, acuminate, 3-nerved, ciliolate. Lower floral glume linear-oblong, 2-nerved, ciliate, upper narrowly lanceolate, 1-nerved.

*Locality* : *N. Kanara* : Tinai (Talbot 2564!).

*Distribution* : Madras : Pulicat Hills.

4. *Chrysopogon lancearius* Haines in Haines Bot. Bihar and Orissa 1036.—*Andropogon lancearius*, Hook. f. in F. B. I. vii, 190; Cke ii, 985.

*Description* . Cke. l. c.

*Locality* : *Deccan* : Panchgani (Blatter and Hallberg B 1230);.—*S. M. Country*: Castle Rock (Woodrow). Seems to be very rare in the Presidency.

*Distribution* : Sikkim Himalaya, Behar, Chota Nagpur, Orissa, W. Peninsula.

*Uses* : A good fodder according to Haines.

5. *Chrysopogon Wightianus*, Nees ex Steud. Syn. Gram. 397.—*Andropogon Wightianus*, Steud. Syn. Gram. 395; Hook. f. in F. B. I. vii, 191.—*A. aristulatus*, Hochst. ex Steud. Syn. Gram. 397; Hack. in Monogr. Androp. 556.—*A. breviaristatus*, Steud. l. c. 396.—*Rhaphis orientalis*, Desv. Opusc. 69.—*R. Wightianus*, Nees ex Steud. l. c.

*Description* : Very variable in habit. Stems short or long, erect or ascending from a short stout creeping stock. Leaves 7-25 cm. long, linear, acute, rigid, from glabrous to pubescent on both surfaces and with sometimes tubercle-

based hairs, spinulose serrulate; sheaths glabrous, lower ones compressed; ligule very short, villous. Panicle 7-13 cm. long, contracted, lower branches long, few in a whorl, rachis and branches minutely hairy; spikes solitary, green or brownish. Sessile spikelets subcylindric, 4 mm. long, callus long, densely bearded with rusty hairs all round. Lower involucre glume laterally compressed above, minutely truncate, glabrous below, hispid above, obscurely 4-nerved, tip 2-dentate, upper chartaceous, hispid above on the keel and sides, tip 2-lobed, awn as long as the glume or shorter. Lower floral glume linear-oblong, 2-nerved, ciliate, upper consisting of an awn with a narrowly dilated 2-lobed base, awn 50-65 mm. long, column hispid. Pedicelled spikelets nearly 12 mm. long, lanceolate, pubescent; pedicel truncate, margins shortly villous. Lower involucre glume glabrous or pubescent, 7-nerved, awn longer than the glume, keels ciliate, upper lanceolate, 3-nerved, awn as long as the glume or shorter. Lower floral glume oblong, 2-nerved, ciliate, upper very narrow, ciliate, nerveless.

*Locality*: S. M. Country: Castle Rock (Bhidi!), — N. Kanara: Jog to Sidderpur, open grass land (McCann A273!).

*Distribution*: Madras, Nilgiris, Burma, Assam. (Hackel mentions a specimen gathered in Ceylon but, according to Hooker f., it seems to be a starved specimen of *Chrysopogon zeylanicus*, Thw.).

6. *Chrysopogon montanus*, Trin. in Spreng. Neue Entdeck. ii, 93; Haines Bot. Bihar and Orissa 1037.—*Andropogon monticola*, Schult. Mant. (1824), 665—Kunth Enum. Pl. i, 506; Steud. Syn. Gram. 395; Hack. Monogr. Androp. 557 (excl. var. *velutinus*); Hook f. in F. B. I. vii, 192, *cum omnibus var.*: Cke. ii, 985; Hole in Ind. Forest Mem. i (1911), 108.—*A. Sprengelii*, Kunth Rev. Gram. 166.—*Pollinia fulva*, Spreng. Pugill. ii, 93.—*Andropogon Trinii*, Steud. Syn. Gram. 395; Hack. Monogr. Androp. 558.—*A. ciliolatus cæruleus et increscens*, Steud. l. c.—*Chrysopogon ciliolatus*, Boiss. Fl. Or. v. 458 (excl. var. *Aucherii*, Boiss.); Duthie Grass. N. W. Ind. 22.—*C. cæruleus*, Duthie l. c. 23, Fold. Grass. N. Ind. 39, t. 60.—*C. increscens*, Nees ex Steud. l. c. 396.—*C. Wightianus* var. *leucanthus*, Thw. Enum. Pl. Zeyl. 366.—*C. serrulatus*, Trin. in Mem. Ac. Petersb. ser. 6, ii (1833), 318, Spec. Gram. t. 331.—*C. Esenbeckii*, Arn. in Steud. Syn. 395.—*Raphis ciliolata et cærulea*, Nees ex Steud. Syn. 396, 395.

This synonymy requires an explanation. *Chrysopogon montanus*, Trin. as understood in this place comprises Hackel's two species *Andropogon monticola* Schult. and *A. Trinii*, Steud., and is identical with Hook. f.'s *A. monticola*, Schult. with all its varieties.

Hackel has two species and he distinguishes them by the following characters:

*A. monticola*: Upper involucre glume of sessile spikelet keeled, the keel from the base up to  $\frac{2}{3}$ - $\frac{3}{4}$  of its length densely pectinate ciliate with long, rigid, rufous hairs, shortly white hispid in the upper  $\frac{1}{4}$ .

*A. Trinii*: Upper involucre glume of sessile spikelet keeled below the apex only, keel white-ciliate, the lower  $\frac{2}{3}$ - $\frac{3}{4}$  not keeled and glabrous.

Hook. f. in F. B. I. makes of these species two varieties: var. *monticola* proper and var. *Trinii*, and includes them under *A. monticola*, Schult., adding a third variety: var. *robustus*.

At the same time Hooker confesses: 'I am unable to classify the varieties of this common and variable plant in accordance with geographical areas or other considerations. This, if possible, must be effected by field-botanists in India. There is every gradation from the coarsely hirsute keel of *monticola*, to the perfectly smooth of some states of *Trinii*; from the awnless to long awned gl. I of the pedicelled spikelets, and from the glabrous to the pubescent of the same organ; the colour of which affords no character; nor does its length, or that of the cilia on its keels.'

Cooke (ii, 985) has adopted the name *A. monticola*, Schult. with Hooker's description and evidently also the latter's varieties. But his opinion does not count in this case as he has not seen any specimens from the Presidency and 'was therefore' as he says himself, 'unable to fix definitely the variety to which the Bombay species belong. They will probably belong to var. *Trinii* H. f.' What induced Cooke to say that they probably belong to var. *Trinii* we cannot understand, especially as Hooker came to the conclusion that he was not able to classify the varieties according to geographical areas.

We have examined a great number of specimens from all parts of the Presidency, except Sind, Cutch and Kathiawar and we have been able to separate

many into the two varieties. They exhibit almost the same distribution and often both are found in the same locality, with this exception that var. *Trinii* has not been observed in N. Kanara, Gujarat and the Konkan. But we must also mention, and this is the most important point, that we saw many specimens all over the country which could not be classed under either variety, and it would require many new varieties if we wanted to give a name to all the different variations. And even then they would be forms only and not varieties.

Haines seems to have felt the same difficulty when he tried to classify the *montanus* material of Bihar and Orissa. He distinguishes five forms. If we wanted to follow the same method for our area, we doubt whether double the number of forms would yield satisfactory results.

Stapf describes the specimens from Tropical Africa under the name of *C. montanus* var. *tremulus*, Stapf. He calls it 'one of the several races which constitute the rather polymorphic species *C. montanus*, Trin., whose area includes Southern Africa, Madagascar and India. The var. *tremulus* approaches very closely the var. *elatior*, Stapf, a large-spikeleted parallel to the var. *serrulatus*, Stapf (*Chrysopogon serrulatus*, Trin.) and differs from it apparently only in the almost quite smooth rhachis and branchlets (a few sharp-pointed hairs may be found under a high power) and the pedicels, which are glabrous almost up to the middle, and not ciliate from the base.' It seems to us (it may look like presumption on our part to criticize our veteran and highly merited agrostologist) that it is somewhat risky to found new varieties of a protean species on a few specimens only.

According to Hole all the 3 varieties mentioned by Hooker 'appear to vary greatly, as regards their habit and vigour of growth, in response to the moisture conditions of the habitat and also according as whether, or not, the plants are habitually grazed, cut for fodder, or periodically burnt. The colour of the cilia of glume II of the sessile spikelet (pale or white in *robustus* and rufous in *monticola*), accordingly, appears to be the chief difference in the habit, and these forms appear to have different and fairly defined areas of distribution (*monticola* occurring chiefly in Central and Southern India, while *robustus* is mainly found in N. India, in the outer N. W. Himalayas and Sub-Himalayan tract).' Hole who studied the varieties *robustus* and *Trinii* both from herbarium specimens and in the field has observed that the plant at Dehra Dun gradually and imperceptibly passes from the typical *robustus* to the typical *Trinii*. We are justified in stating that a similar transition takes place between *monticola* and *Trinii* in Western India. (Of Central and Southern India we have no experience). We have therefore a gradual transition from *robustus* to *Trinii* at Dehra Dun, and from *Trinii* to *monticola* in W. India and consequently, we are not allowed to consider Hooker's varieties as good varieties.

*Vern. Names:* Sunthia Khad (Dohad), Agiva, Gogar, Ghora, Dand, Pandhari Kusal (Poona), Kare Hullu (Bijapur).

*Description:* A very variable perennial grass. Stems usually slender, erect or geniculately ascending, glabrous, sometimes robust, simple or branched, 30 cm. to 1.2 m., but often attaining 2 m., slightly compressed, solid, developing usually axillary leafy and flowering branches from all the upper nodes except the one next below the panicle. (The branches growing within the sheaths push the latter away from the stem which often results in a characteristic fan-shaped appearance.) Blade of uppermost leaf of flowering stem usually mucroniform, but attaining 8 cm., of lower leaves up to 43 cm. long and 8 mm. broad, linear acuminate, tapering from the base, scabrid on margins, sometimes also scabrid dorsally on midrib, and scaberulous above, especially towards the apex, often ciliate towards the base with tubercle-based hairs, at least when young; sheath glabrous, compressed, keeled, especially of the lower leaves, shorter or longer than the proper internode; ligule a minute membranous rim. Panicle 5-15 cm. long, ovate to subcylindric, yellowish to purplish, of several whorls of few or many capillary flexuous very unequal branches bearing solitary spikes, branches of flowering panicle more or less horizontally spreading, of the fruiting panicle erect and closely appressed to the rhachis, rhachis and branches smooth or scaberulous. Spikelets in clusters of 3, a central sessile hermaphrodite one with 2 lateral pedicelled male ones, the clusters being terminal and solitary on the capillary branches of the panicle. Sessile spikelets laterally compressed, 4-7 mm. long, tip of peduncle brown-bearded, clavate, callus short, with oval

scar and dense beard. Lower involucreal glume laterally compressed, narrow-oblong, embracing the margins of the upper, chartaceous 2-4-nerved, hispidly ciliate dorsally on keel towards the apex or almost glabrous, often scaberulous dorsally on nerves and minutely pubescent with appressed hairs dorsally near margin, apex subtruncate or 2-dentate. Upper involucreal glume laterally compressed, broader than lower, obtusely keeled, subcoriaceous, 3-nerved, margins broad, hyaline, membranous, ciliate or not, very variable with regard to its hairiness, sometimes almost glabrous, at other times hispidly ciliate dorsally on keel with long white or rufous hairs more or less from base to apex, sometimes also pubescent, or minutely villous dorsally on keel and lateral nerves, awned, awn 2.5-6 mm. long, apex entire or 2-lobed. Lower floral glume  $\frac{1}{2}$  the length of to subequal the upper involucreal glume, linear, hyaline, ciliate, nerveless or indistinctly 1-3- or more-nerved, apex obtuse. Upper floral glume consisting of the narrow 3-nerved base of the awn, basal  $\frac{1}{2}$  or  $\frac{3}{8}$  hyaline, membranous, upper portion chartaceous, awn geniculate, 10-18 mm. long, but also reaching 37 mm. (including the twisted column), margins ciliate or not, apex entire or 2-lobed. Pale sometimes present, very narrow, 1.25 mm. long. Lodicules 2, cuneate, glabrous. Anthers 3, up to 3 mm. long, yellow or purple. Stigmas 2, laterally exerted at base of spikelet, yellow. Pedicelled spikelet dorsally compressed, subequal the sessile spikelet; pedicel less than half the sessile spikelet, usually about  $\frac{1}{3}$  the spikelet, densely ciliate on both margins with stiff rufous or white hairs, the upper of which are shorter than to subequal the spikelet. Lower involucreal glume lanceolate, membranous, 5-7-nerved, minutely pubescent with appressed hairs dorsally, especially towards the apex, or almost glabrous, sometimes ciliate dorsally on midrib and marginal nerves, especially towards the apex acute or shortly awned. Upper involucreal glume subequal to the lower, 3-nerved, margins incurved, long ciliate, apex acute or mucronate, glabrous dorsally. Floral glumes linear, hyaline, ciliate, nerveless or indistinctly nerved. Pale sometimes present, as in sessile spikelet, but slightly longer, very narrow.

The flowers are much visited by small bees.

*Locality*: Gujarat: Mahal-Dangs, elevation 800 ft., rainfall 100" (Sedgwick and Bell 5391!) —Khandesh: Tapti River (Blatter and Hallberg 5476!); Bhusawal (McCann 5224 A!); Nandgaum, Bori River (Blatter and Hallberg 3827!); Bori, Tapti Island (Blatter and Hallberg 5146!); Amalner, Bori River (Blatter and Hallberg 4455!).—Konkan: Sion Creek (Sabnis A 231!); Matheran (D'Almeida 9958!).—Deccan: Khandala to Karjat (Blatter and Hallberg A 232!); Kirkee (Talbot!); Pashan (Gammie!); Mangiri, 8 miles E. of Poona (Gammie!); Katraj (Gammie!); Pasarni Ghat (Blatter and Hallberg B 1209!).—S. M. Country: Dumbai (Talbot 2317!); Badami (Talbot 2926!); N. W. of Dharwar (Sedgwick 3141!); Dharwar, dry pasture land, elevation 2,400 ft., rainfall 34" (Sedgwick 1817!); Konankeri, elevation 1,800 ft., rainfall 35" (Sedgwick and Bell 4439!); Haveri (Talbot 2189!).—Kanara: Jog to Siddhapur, open grass land (Hallberg and McCann A274!). This species forms patches of many individuals, or combines with other individuals to form associations of a few species.

*Distribution*: Throughout India, especially in hilly tracts, from the N.W. Himalaya southwards, ascending to 6,000 ft., extends to Ceylon, Burma, Afghanistan, Tropical and S. Africa, Madagascar.

*Uses*: In Bihar and Orissa this grass is considered to be a valuable fodder, and Hole, writing of the Siwalik Division, calls it one of the most valuable fodder grasses. In Mount Abu, according to Lisboa, it is reckoned as a good fodder grass and the grain is used as food by the natives. But the same writer, under the name of *Andropogon serrulatus*, Trin. (= *Chrysopogon montanus* var. *Trinii*) remarks: 'Said to be good fodder, used much in Poona, but reports from other places unfavourable.' (J. C. Lisboa, List of Bombay Grasses, Bombay (1896), 81).

The last statement might find an explanation by a suggestive note made by Hole (l. c. 111): 'So far as the local (Dehra Dun) plant is concerned specimens with the more hairy glume II tend to occur in localities where there is a scarcity of available moisture, both on the dry ridges and slopes of the Siwalik Hills and also (rarely) on water-logged soil, and the writer believes that the characters which have been utilized to define these varieties vary in response to the factors of the habitat and particularly in response to the available water supply. Provided that the development of the plants has not been interfered

with by grazing, grass-cutting, or other agency, those plants with the more hairy glume II are usually less robust and less coarse, or rank, than the others, and they are therefore as a rule most valued for fodder and are distinguished locally by the vernacular name of *dhaula*, whereas the coarser plants with smooth glume are called *gurla*. As this grass affords a valuable fodder and is sometimes cultivated, in consequence, it is important to determine the extent to which its characteristics are constant. If, as suggested above, they depend on the available moisture, it is obvious that cultivation of this grass on good agricultural land, with a large quantity of available moisture, would result in producing an inferior class of rank, coarse fodder.'

7. *Chrysopogon polyphyllus*, Blatter & McCann, *comb. nov.*—*Andropogon polyphyllus*, Hook. f. in F. B. I. vii, 194 (*qui habet* Hack. mss. in Herb. Duthie).—*A. Aucheri*, var. *polyphyllus*, Hack. in Herb. Duthie.

*Description* : Stem 60-90 cm. high, as thick as a crow-quill or more, stiff, simple or fastigiate branched, quite glabrous. Leaves crowded or not, 15-25 cm. by 2-4 mm., narrow, rigid, acuminate, flat, pale glaucous-green, glabrous on both surfaces, coriaceous, midrib and nerves very slender, margins minutely scaberulous; sheaths terete, appressed, hard. Panicle 10-13 cm. long, oblong, subsecund, dense-flowered, very pale, branches 6-12 mm., very unequal, in many closely approximate whorls, smooth, peduncle slender, quite glabrous. Sessile spikelets 4 mm. long drooping, white or pale purplish, callus long, 1½ mm. long, obtuse, bearded at the very base only with long fulvous hairs. Glumes as in *C. montanus*. Lower involucre glume obtuse, glabrous, keel ciliate towards the tip; upper not awned, keel glabrous or ciliate. Upper floral glume with an awn 3-8 mm. long, nearly straight, pale. Pedicelled spikelets narrowly lanceolate, acuminate, glabrous, 7-nerved, eciliate, not awned, rather longer than the sessile; pedicels naked, villous at the tip only.

Can easily be distinguished from *C. montanus* by the stout naked callus which is bearded at the base only, and by the naked pedicels which are long-villous only at the tip.

It differs from the next species, *C. Aucheri* by its size, the long, glabrous glaucous leaves and the glabrous peduncle and branches of the panicle.

*Locality* : Gujarat : Porbandar (Bhide !); Dohad (Bhide !); Watrak River on rocks (Sedgwick 1165 !); Daman (Bhide).—Deccan : Dhond, river-bank (Bhide !).

*Distribution* : Central Provinces. W. Peninsula.

8. *Chrysopogon Aucheri*, Stapf in Kew Bull. (1907), 211.—*Andropogon Aucheri*, Boiss. Diag. ser. 1, fasc. 5 (1844), 77; Hook. f. in F. B. I. vii, 195; Cke. ii, 986.—*A. Aucheri*, var. *genuinus*, Hack. Monogr. Androp. 560.—*Chrysopogon ciliolatus*, var. *Aucheri*, Boiss. Fl. Or. v, 458.

*Description* : Cke. l. c.

Stapf thinks that *C. Aucheri* comprises several geographical races and that the one from which the species was first described extends from Arabia through Southern Persia and Baluchistan to Sind. He characterizes it 'by the lower glume of the pedicelled spikelet being usually awnless or in any case much more shortly awned than the upper, by the glume awns not being ciliate or ciliate only at the base, and by the longer beards of the pedicels.'

*Locality* : Sind : Gizri (Sabnis B777 !); Jemadar ka Landa near Karachi (Stocks).

*Distribution* : Sind, Baluchistan, Afghanistan, S. Persia, Arabia (not Africa).

### 30. ARTHRAXON Beauv. Agrost. 111; Cke. ii, 967.

Species about 20, in the tropical and subtropical regions of the Old World.

We retain the 6 species mentioned by Cke. l. c. His *A. lanceolatus*, Hochst. will be slightly restricted under the name of *A. serrulatus*, Hochst., the name *A. lancifolius*, Hochst. will be substituted for *A. microphyllus*, Hochst., and *A. quartintianus*, Nash, will take the place of *A. ciliaris*, Beauv.

Key as in Cke.

1. *Arthraxon inermis*, Hook. f. in F. B. I. vii, 145; Cke. ii, 968.

*Description* : Cke. l. c.

*Locality* : Konkan : Okda Forest, Thana District (Ryan 718 !); Wada Range, Thana District (Ryan 692 !); Matheran (Woodrow !); Marmagoa (McCann !).—Deccan : Mahabaleshwar (Sedgwick and Bell 4513 !, Woodrow); Purandhar

(McCann 5592!); Khandala (McCann 9950!, 9740!).—*S. M. Country*: Derikop woods (Sedgwick 1845!); Castle Rock (Gammie 15678!).

*Distribution*: W. Peninsula, apparently endemic.

2. *Arthraxon serrulatus*, Hochst. in Flora (1855), 188; Stapf in Fl. Trop. Afr. ix, 163.—*A. lanceolatus*, Hack. in Monogr. Androp. 348 (excl. var. *echinatus*); Duthie, Grass. N. W. Ind. 17; Hook. f. in F.B.I. vii, 143 (*partim* excl. *Batrathrum echinatum*, Nees in Edinb. Phil. Journ. xviii, (1835) 181; *Andropogon echinatus*, Heyne ex Steud. Nomencl. ed. 2, 91; *Arthraxon echinatus*, Hochst. in Flora (1856), 188; *Andropogon lanceolatus*, Roxb. Fl. Ind. i, 257); Cke. ii, 968 (*partim*). *A. lanceolatus* var. *genuinus*, subvar. *serrulatus*, Schweinf. in Bull. Herb. Boiss., 2. ser. ii, 10.—*Andropogon serrulatus*, Link Hort. Berol. i, 241 (*quoad specimen, descriptio partim erronea*?); A. Rich. Tent. Fl. Abyss. ii, 458.—*A. prionodes*, Steud. Syn. Pl. Glum. I, 383.—*Batrathrum lanceolatum*, Nees in Edinb. New Phil. Journ. xviii (1835), 181.—*B. serrulatum*, Hochst., ex Steud. l.c.

This species includes all the material of the Nileland of Tropical Africa, of tropical Arabia and the greater part of the Indian specimens which, up to now, were ranged under *Arthraxon lanceolatus*, Hochst., as understood by most authors.

It has been pointed out by Stapf that *Arthraxon lanceolatus*, Hochst., was founded on *Andropogon lanceolatus*, Roxb., a Coromandel plant, which has larger and wider long-awned spikelets with the lower involucreal glume very minutely muricate towards the tips only. Neither of these names can, consequently, be mentioned as synonyms of *Arthraxon serrulatus*.

*Description*.—A perennial grass; rhizome short, emitting fascicles of closely set culms and innovation shoots, which are more or less thickened below and covered with reddish silky cataphylls. Stems rather slender, up to 90 cm. high, many-noded, usually finely pubescent, sometimes glabrous, with vegetative branches below and usually solitary flowering branches above, the latter subfastigiate. Leaf-blades lanceolate to ovate-lanceolate, setaceously acuminate, with a caudate amplexicaul base glaucous or greenish, 2.5–5 cm. long, 12–18 mm. wide, margins cartilaginous, ciliate with the cilia springing from tubercles, smooth, very finely pubescent below or glabrous, primary lateral nerves about 8–11 on each side, fine, slightly raised below; ligule 1–2 mm. long, rounded, membranous; sheaths terete, tight, slightly shorter than the internodes or exceeding them in the leafy shoots, more or less hairy with tubercle-based hairs and often softly pubescent at the nodes, the uppermost frequently glabrous. Racemes 2–5 nate, slender, greenish or suffused with purple or violet, 3-over 5 cm. long on a short common axis, the fascicles borne on a slender peduncle, shortly or far exerted from the supporting bladeless or almost bladeless sheath; rachis fragile shortly bearded at the nodes; joints narrowly linear, 3.3–6.3 mm. long, hairy on the back and sides, or the lowest almost glabrous, hairs increasing upwards to more than 2 mm.; pedicels very similar, but much shorter and more slender. Sessile spikelets narrowly lanceolate-linear to linear slightly tapering upwards up to 7.4 mm. long (not including the awn), glabrous; callus very short, puberulous. Glumes 4. Lower involucreal glume chartaceous, 6 mm. long, lanceolate, with a minutely truncate hyaline tip, very convex on the back, which is smooth or more often muricate along the 4 indistinct or faintly raised inner, spinulosly muricate along the outer nerves, margins hyaline, comparatively wide; upper linear-lanceolate in profile, membranous, 3-nerved, glabrous or nearly so. Lower floral glume linear, acute, up to 4 mm. long, hyaline, nerveless or obscurely 1-nerved at the base; upper membranous at the base, hyaline upwards, narrowly lanceolate-linear in profile, 2-dentate, with the teeth minute, sometimes produced into short capillary bristles, delicately 3-nerved, awned from near the base, awn 8–15 mm. long, very fine, kneed about the middle, twisted below. Anthers up to 3 mm. long. Grain bacilliform about 4.2 mm. long. Pedicelled spikelet male, linear-lanceolate, acute, about 5 mm. long. Involucreal glumes subequal, lower herbaceous-chartaceous, acute, scaberulous along the outer and slightly so on the 4–5 inner nerves or almost smooth, upper slightly shorter, membranous, otherwise as in the sessile spikelet. Lower floral glume as in the sessile spikelet, upper linear-oblong, obtuse, nerveless, mucous.

*Locality*: *Sind*: (Stocks 642).—*Gujarat*: Morvi, Kathiawar (Woodrow).—*Deccan*: Lonavla (Woodrow); Pashan, tank (Gammie!). Panchgani (Blatter



and Hallberg B1277!).—*S. M. Country*: S. W. of Dharwar (Sedgwick and Bell 4436!); Derikop (Sedgwick 2022!); Belgaum, Fort wall (Sedgwick 3013!).

*Distribution*: More or less throughout India, Tropical Arabia and Tropical Africa (Nileland).

3. *Arthraxon Meeboldii*, Stapf in Cke. ii, 969, in Kew Bull. (1908), 449.

*Locality*: *Western Ghats*: Khandala, in open grassland on a hillside, 600 m. (Meebold 9132); Khandala, common (McCann 9949!, 9948!); Lonavla, common (Bhide!, McCann!); Panchgani (Blatter and Hallberg B1238!, B1225!), Tableland (Blatter 3804.); Mahableshwar (Sedgwick and Bell 4523).—*N. Kanara*: Tinai (Talbot 2569!).

*Distribution*: W. Peninsula, apparently endemic.

4. *Arthraxon lancifolius*, Hochst. in Flora (1856), 188; Stapf in Fl. Trop. Afr. ix, 165.—*A. microphyllus*, Hochst. in Flora (1856), 188; Hack. Monogr. Androp. 351, *incl. var. lancifolius*; Hook. f. in F.B.I. vii, 147; Cke. ii, 970; Haines Bot. Bihar and Orissa 1026.—*A. Schmidtii*, Hochst. (1856), 189.—*A. minor*, Hochst. l.c. 188, *partim*.—*A. Schimperii*, Hochst. l.c. *partim*.—*A. molle*, Balf. f. Bot. Socotra 315.—*A. ciliaris*, Henriq. in Bolet. Soc. Brot. xiii, 133, *non* Beauv.—*Andropogon lancifolius*, Trin. in Mem. Acad. Petersb. 6 ser., ii (1833), 271.—*A. molle*, Duthie Grass. N.W. Ind. 17.—*A. multicaulis*, Steud. Syn. Pl. Glum. i, 383.—*Batratherum molle*, Nees & Arn. in Edinb. New Phil. Journ., xviii (1835), 181; Aitchis. Cat. Panj. Pl. 174.—*B. Schimperii*, Nees ex Hochst. l.c. 179.—*Psilopogon Schimperii*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 447.—*Pleuroplitis ciliata*, J. Schmidt Beitr. Fl. Cap. Verd 152.—*P. Schimperii*, Regel in Bull. Acad. Petersb. x (1866), 369.—*Lucæa ciliata*, Steud. l.c. 414.

*Description*: Cke. l.c.

*Locality*: *Gujarat*: Surat (Herb. Dehra Dun!, Cooke!).—*Konkan*: Tun-gar hill, Thana District (Herb. Econ. Bot. Poona!); Parel (Herb. Econ. Bot. Poona!); Kurla (Garade!); Salsette (Jacquemont 713).—*Deccan*: Trimbak, Nasik District (Herb. S. X. C., Bombay!).—*S. M. Country*: Belgaum Fort walls (Sedgwick 3012!); W. of Dharwar, banks of road, in forest (Sedgwick 1851!); Castle Rock (Bhide!).—*Kanara*: Karwar (Talbot 1308!) Yellapore (Talbot 2084!).

*Distribution*: More or less throughout India, Ceylon to Tonkin and S. W. China, tropical Africa (Upper Guinea, Nileland).

5. *Arthraxon quartinianus*, Nash in North Americ. Fl. xvii (1912), 99, Merrill in Phillip, Journ. Sc. Bot. vii (1912), 229; Stapf in Fl. Trop. Afr. ix 166.—*A. major*, Hochst. in Flora (1856), 188.—*A. coloratus*, Hochst. l.c.—*A. plumbeus*, Hochst. l.c. 189.—*A. violaceus* Hochst. l.c.—*A. Schimperii*, Hochst. l.c. *partim*.—*A. ciliaris*, Rendle in Cat. Afr. Pl. Welw. ii, 138, *non* Beauv.—*A. ciliaris*, subsp. *quartinianus*, Hack. Monogr. Androp. (*excl. vars. Hookeri et glabrescens*).—*Alectoria quartiniana*, A. Rich. Tent. Fl. Abyss. ii, 448, t. 99.—*Lucæa major*, Steud. Syn. Pl. Glum. i, 414; Hochst. l.c. 179.—*L. plumbea et violacea*, Steud. l.c.—*L. Schimperii*, Hochst. in Flora (1856), 180 (the genuine).—*Pleuroplitis plumbea*, Nees ex Steud. l.c.—*P. violacea*, Nees ex Steud. l.c.—*P. major*, Regel in Bull. Acad. Petersb. (1866), 369, *partim*.—*P. quartiniana*, Regel l.c. 376, *partim*.—*Andropogon violaceus*, Heyne ex Steud. l.c.—*A. Alectoria*, Steud l.c. 383.

We wish to substitute *A. quartinianus*, Nash in place of *A. ciliaris*, Beauv. This latter species which was described in 1812 has been emended repeatedly since then, and that to such an extent that it is scarcely possible to recognize the original plant. Hackel made five subspecies: *Langsdorffii*, *submuticus*, *nudus*, *Quartinianus*, and *Vriesii*, and nine varieties. The subspecies were arranged by him in two leading groups:

1. Joints of rhachis glabrous, or with a few scattered hairs towards the tip (*Langsdorffii*, *submuticus*, *nudus*).

2. Joints of rhachis, at least the upper, more or less ciliate (*Quartinianus*, *Vriesii*).—To these two groups Hooker f. added a third one (F.B.I., vii, 146):

3. Spikes silkily villous, spikelets 5-7 mm. long, lower involucrel glume entire or minutely 2 toothed, awn 12 mm. or more. (This is *Arthraxon cuspidatus*, Hochst., considered by Hackel as a distinct species.)

*Arthraxon quartinianus*, Nash, and adopted by Stapf l. c., covers part of the subspecies *Quartinianus* in Hackel's group 2, including var. *Quartinianus*

s. *str.* and var. *coloratus*, but excluding var. *Hookeri* and var. *glabrescens*. Quartin's specimen No. 14, collected in Abyssinia, and representing a form with large spikelets, has, according to Stapf, to be considered as the basis of the species, whilst Schimper's 1532, the type of *Arthraxon coloratus*, stands for the other extreme.

*Arthraxon quartinianus*, Nash, includes all the material of the Bombay Presidency that has come under our observation.

The rest of *A. ciliaris*, Beauv. *et auctororum* has to be studied separately, but as the material lies outside the Presidency we leave it to other botanists to work out their respective material.

*Description*: Annual. Stems very slender, ascending from a branched, sometimes prostrate and rooting base, from 8-30 cm. high, smooth, glabrous or finely puberulous below the inflorescence, with solitary or 2 to 3-nate branches above, internodes mostly exerted. Leaf-blades ovate-lanceolate to oblong-lanceolate from a cordate amplexicaul base, finely acuminate, 25 to over 50 mm. long by 6-12 mm. broad, flaccid, with scattered tubercle-based hairs on both sides, ciliate towards the base, primary lateral nerves 3-4 on each side, very fine; ligules membranous, ciliolate, short, truncate; sheaths lax, the upper very often more or less inflated and bladeless, more or less hirsute in the upper part with tubercle-based hairs and densely ciliate along the upper margins, nodes shortly bearded. Racemes 1 to about 9, in fascicles, born on filiform, ultimately long exerted peduncles, 2.5-15 cm. long, very slender, flexuous; rachis fragile; joints 3.3 mm. long, usually shortly ciliate, but the uppermost cilia sometimes up to 1.6 mm. long, sometimes glabrous or nearly so; pedicels reduced to a minute point or subule. Spikelets solitary, sessile, oblong-lanceolate in profile, somewhat oblique, laterally compressed, including the very minute glabrous or minutely puberulous callus, 3.3-4.2 mm. long. Involucral glumes subequal, lower subchartaceous, acute, scaberulous along the very slender 7-9 nerves or almost smooth towards the base, upper obliquely lanceolate to linear-lanceolate in profile, acute or minutely mucronate, 3- (rarely 5-) nerved, eciliate. Lower floral glume oblong, obtuse, hyaline, obscurely 2-nerved, shorter by  $\frac{1}{3}$  than the involucral glumes, upper narrowly linear-lanceolate in profile, 2-2.7 mm. long, awn from near the base, usually 6.3 mm. long, more rarely down to 4.2 or up to 8.5 mm. long, very delicate, kneed and twisted below the middle. Stamens 2.

*Locality*: *Gujarat*: Chamargaon (Woodrow).—*Khandesh*: common (McCann!).—*Konkan*: very common (McCann!).—*Deccan*: Mahabaleshwar (Sedgwick and Bell 4501!); Panchgani (Blatter and Hallberg B1244!, B1252!, B1257!, B1266!, B1273!, B1290!) Khandala, very common (McCann!).—*S. M. Country*: S. W. of Dharwar (Sedgwick and Bell 4434!); Dharwar (Sedgwick 3098!); Gadag (Talbot 2304!); Belgaum (Ritchie 796A).—*Kanara*: Halyal (Talbot 2161!); Yellapore (Talbot 1057!).

*Distribution*: From Bihar southwards to Ceylon, Tropical Africa (Nileland, Upper and Lower Guinea, Mozambique District), introduced into Jamaica and Guadeloupe.

6. *Arthraxon jubatus*, Hack. Monogr. Androp. (1889), 358; Hook. f. in F. B. I. vii, 147; Cke. ii, 970.

*Description*: Cke. l.c.

*Locality*: *Konkan*: (Law, Stocks).—*Deccan*: Kori Fort, 12 miles south of Lonavla (Woodrow); Khandala, damp rocks (Hallberg 9788!); Lohagad Fort, top (McCann 9789!).

*Distribution*: W. Peninsula, apparently endemic.

### 31. CAPILLIPEDIUM, Stapf in Fl. Trop. Afr. ix, 169.

Annual or perennial grasses. Stems slender, simple or branched, sometimes very copiously, often bearded at the nodes. Leaf blade with a rather conspicuous white midrib. Panicles delicate, when much divided the branchlets at length more or less divergent. Spikelets small, 2-nate, one sessile, the other pedicelled, similar in shape but differing in sex, in 1-2- (rarely up to 8-) jointed racemes at the ends of the capillary primary and secondary and often tertiary or even quaternary branches of a loose panicle; joints and pedicels finely filiform, longitudinally grooved and hyaline in the groove, disarticulating horizontally; sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. Florets 2 in the sessile spikelet, lower reduced to

an empty glume or quite suppressed in the pedicelled spikelets, upper hermaphrodite; one male or neuter, in the pedicelled spikelet. Sessile spikelet dorsally compressed, awned, callus small, shortly bearded. Involucral glumes equal, membranous to subherbaceous; lower 2-keeled, with narrow inflexed margins; upper boat-shaped, 3-nerved, keeled, grooved on both sides along the obtuse keel. Lower floral glume hyaline, nerveless, upper consisting of a hyaline, linear stipe, firmer upwards, passing into a slender awn. Pale 0. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exerted laterally, longer than the styles. Grain oblong-ellipsoid or oblong, dorsally slightly compressed; embryo exceeding  $\frac{1}{2}$  of the grain. Pedicelled spikelet awnless, glume, if present, hyaline, nerveless.

Species 6, in tropical and subtropical Asia, Polynesia and Australia, tropical Africa.

Three species, described by Cooke (ii, 981, 982) under *Andropogon assimilis*, Steud., *A. Hugelii*, Hack., and *A. filiculmis*, Hook. f. belong to this genus.

- I. Stems more or less suffrutescent below, stiff, erect
1. Nodes of stem glabrous; callus shortly bearded ... 1. *C. assimilis*.
  2. Nodes of stem bearded; callus densely villous ... 2. *C. Hugelii*.
- II. Stems decumbent and interlaced, very weak, filiform ... 3. *C. filiculmis*.

1. *Capillipedium assimile*, A. Camus, Graminées in H. Lecomte. Fl. Générale de l'Indo-Chine 7 (1922) 314; Haines Bot. Bihar and Orissa (1924), 1028 (*A. Camus prior fecit combinationem novam*).—*Andropogon assimilis*, Steud. in Zoll. Syst. Verz. (1854), 58; Syn. Gram. (1855), 397; Hook. f. in F. B. I. vii, 179; Cke. ii, 981.—*A. montanus*, Benth. Fl. Hongk. 423, non Roxb., excl. syn.; Hack. Monogr. Androp. 490, excl. syn.—*Chrysopogon pictus*, Hance in Ann. Sc. Nat. ser. 5, v (1866), 252.—*C. glaucopsis*, Duthie Grass. N. W. Ind. 22.—*Raphis repens*, Nees ex Steud. l. c.

*Description*: Cke. l. c.

*Locality*: Khandesh: Toranmal, growing among Strobilanthus (McCann 9671!).—Konkan: Above Kenery Caves (McCann 9959!).—Deccan: in dry forest, between Mahableshwar and Panchgani, at 4,000 ft. (Sedgwick and Bell 4738!).—Kanara: Jugglepet, road side, common (Talbot 1386!).

*Distribution*: Temperate Himalaya, Khasia, Behar, N. Bengal, Rajputana, Central India, W. Peninsula, Java, China, Japan.

2. *Capillipedium Hugelii*, Blatter & McCann, nov. comb.—*Andropogon Hugelii*, Hack. Monogr. Androp. 492; Hook. f. in F. B. I. vii, 180; Cke. ii, 982.

*Description*: Cke. l. c.

*Locality*: Khandesh: Toranmal (McCann 9672!).—Konkan: Mulgaum (McCann 3664!).—Deccan: Khandala, St. Xavier's Villa (McCann 9423!); dry forests between Mahableshwar and Panchgani (Sedgwick 4738!); Panchgani (Blatter and Hallberg B1321!, McCann!).—S. M. Country: Deciduous forests west of Dharwar (Sedgwick 4498!).—Kanara: Halyal (Talbot 2082!); Ecumbi to Mungod (Hallberg and McCann A288!).

*Distribution*: Rajputana, Central Provinces, Central India, W. Peninsula.

3. *Capillipedium filiculme*, Blatter & McCann, nov. comb.—*Andropogon filiculmis*, Hook. f. in F. B. I. vii, 181; Cke. ii, 982.

*Description*: Cke. l. c.

*Locality*: Konkan: Trombay (McCann A286!).—Deccan: Khandala to Karjat (Blatter and Hallberg A287!); Igatpuri (Blatter and Hallberg 5117!); Poona, in rocky places (Jacquemont 310); Donshi, Mawal Districts (Woodrow 26); Purandhar (McCann 5570!).—S. M. Country: forests near Dharwar (Sedgwick 1854!).

*Distribution*: W. Peninsula, apparently endemic.

### 32. AMPHILOPHIS, Nash in Britt. Man. Fl. N.U.S. ed. i, 71; Stapf in Fl. Trop. Afr. ix, 171.

Perennial grasses. Stems slender, simple or branched, bearded or beardless at the nodes. Panicles mostly subdigitate with a short primary axis, rarely the racemes on branches of the second order; racemes always shortly peduncled.

Spikelets small, 2-nate, one sessile, the other pedicelled, similar in shape or the pedicelled reduced and smaller, the latter always different in sex except sometimes the lowermost pair which may be homogamous (male or neuter), on the fragile rhachis of many-jointed shortly peduncled racemes; joints and pedicels filiform, longitudinally grooved and hyaline in the groove, disarticulating horizontally; sessile and pedicelled (always ?) spikelets deciduous, the former with the adjacent joint and pedicel. Florets 2 in the sessile spikelets, lower reduced to an empty glume, upper hermaphrodite, 2 or 1 in the pedicelled spikelet, the lower male or neuter, the upper neuter or usually quite suppressed. Sessile spikelet dorsally compressed, awned; callus small, shortly bearded. Involucral glumes equal, thinly chartaceous to membranous; lower 2-keeled, with narrow sharply inflexed margins; upper boat-shaped, 3-nerved, acutely keeled. Lower floral glume hyaline, nerveless, upper a hyaline linear stipe, firmer upwards, passing into a slender awn. Pales 0 or very minute. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exerted laterally usually low down, longer than the styles. Grain oblong, obtuse, dorsally slightly compressed; embryo about half the length of the grain. Pedicelled spikelet awnless, glumes, if present, hyaline, nerveless.

Species probably over 25, mostly in Tropical Asia.

Cke. (ii, 977-981) mentions 8 species which belong to the section *Amphilophis* of *Andropogon*: *Andropogon compressus*, Hook. f., *A. Woodrowii*, Hook. f., *A. pertusus*, Willd., *A. Kuntzeanus*, Hack., *A. ensiformis*, Hook. f., *A. concanensis*, Hook. f., *A. intermedius*, Cooke (non R. Br.), *A. odoratus*, Dna. Lisboa. All these are now being transferred to the new genus *Amphilophis*, Nash.

*Key to the species (after Cke.)*

- A. Racemes digitate or fasciculate, the lower longer than the rhachis of the inflorescence
- I. Lower involucral glume of sessile spikelets villous below the middle
1. Lower involucral glume not pitted
    - (a) Upper involucral glume mucronulate ... 1. *A. compressa*.
    - (b) Upper involucral glume obtuse ... 2. *A. Woodrowii*.
  2. Lower involucral glumes pitted ... 3. *A. pertusa*.
- II. Lower involucral glume of sessile spikelets glabrous below the middle (sparsely silky in *A. ensiformis*)
1. Nodes of stem densely bearded ... 4. *A. Kuntzeana*.
  2. Nodes of stem glabrous
    - (a) Leaves reaching 12 mm. broad ... 5. *A. ensiformis*.
    - (b) Leaves reaching 3 mm. broad ... 6. *A. concanensis*.
- B. Racemes panicle, the lower branches shorter than the rhachis of the inflorescence
- I. Non-aromatic; sheaths terete ... 7. *A. glabra*.
  - II. Aromatic; sheaths compressed ... 8. *A. odorata*.
1. ***Amphilophis compressa***, Blatter & McCann, *comb. nov. Andropogon compressus*, Hook. f. in F.B.I. vii (1896), 172; Cke. ii, 977.  
*Description*: Cke. l. c.  
*Locality*: Deccan: Khandala, plain behind the Saddle (Hallberg 9657 !, Bhide !); Lonavla (McCann 9433 !); Mawal (Woodrow !); Poona (Woodrow).
- Distribution*: Western Peninsula, apparently endemic.
2. ***Amphilophis Woodrowii***, A. Camus. *Andropogon Woodrowii*, Hook. f. in F.B.I., vii (1896), 173; Cke. ii, 978.  
*Description*: Cke. l. c.  
*Locality*: Deccan: Khorbasa, Mawal Districts (Woodrow); Pand, 20 miles W. of Poona (Woodrow !).  
*Distribution*: Western Peninsula, apparently endemic.
3. ***Amphilophis pertusa***, Stapf in Fl. Trop. Afr. ix, 175; Haines Bot. Bihar and Orissa 1030.—*Holcus pertusus*, Linn. Mant. Alt. 301.—*Andropogon pertusus*, Willd. Sp. Pl. iv, 922; Beauv. Agrost. 131, t. 23, fig. 2; Roxb. Fl. Ind. i, 258; Hack. Monogr. Androp. 479 (vars. *genuinus et Wightii*); Duthie

Grass. N.W. Ind. 21 (*excl. Syn.*), Fodd. Grass. N. Ind. 38, t. 25; Boiss. Fl. Or. v. 464; Balf. f. Bot. Socotra 316; Hook. f. F.B.I. vii, 173; Cke. ii, 978.—*Lepeocercis pertusa*, Nees ex Steud. Syn. Pl. Glum. i, 364.

*Vern. Names*: Ghanga, marvel (Satara, Sholapur, Poona), payen, palva, palvan.

*Description*: Cke. ii, 978. A very variable plant. We must confess we find it impossible to follow various authors who have described a number of varieties. It would be easy to increase their number on merely morphological grounds, but the results would be highly unsatisfactory. It is only from genetical tests that we can expect to get an insight into the natural variations of this and other species of this genus.

*Locality*: *Gujarat*: Perim Island, Gulf of Cambay (Blatter 3814!).—*Konkan*: Daman (Bhide!); St. Xavier's College compound, Bombay (McCann 9630!, 9631!).—*Deccan*: Nasik (Bourke 11!); Rahuri (Nana A278!); Khandala, Campoli (McCann 9961!); Pashan (Gammie!); Lonavla (Woodrow); Agricultural College, Kirkee (Bhide!); Poona (Cooke); Panchgani (Blatter and Hallberg B1236!), on edge of Tableland (Blatter 9962!), on roadside 4,000 ft. (Sedgwick and Bell 4699!); Satara (Lisboa); Sholapur (Lisboa); Joonur (Talbot!).—*S.M. Country*: W. of Dharwar, elevation 2,000 ft., rainfall 35" (Sedgwick and Bell 4494!); Dharwar, elevation 2,400 ft., rainfall 34" (Sedgwick and Bell 4488!); Kunur, elevation 2,000 ft., rainfall 35" (Sedgwick and Bell 4953!); Badami (Talbot 2944!); Haveri (Talbot 2233!); Gokak (Sheodye!).—*Kanara*: Halyal (Talbot 2080!, 2106!).

*Distribution*: More or less throughout India, chiefly in the drier parts, Ceylon, Afghanistan, Arabia, tropical Africa (Upper Guinea, Nileland, Mozambique District).

*Uses*: A good fodder grass. (See W. Burns, L. B. Kulkarni and S. R. Godbole: A study of some Indian grasses and grasslands. Mem. Dept. Agr. in India, xiv (1925), 47, 48.)

4. *Amphilophis Kuntzeana*, Haines Bot. Bihar and Orissa 1031.—*Andropogon Kuntzeanus*, Hack. Monogr. Androp. 478; Hook. f. F.B.I. vii, 175; Cke. ii, 979.

*Description*: Cke. i. c.

*Locality*: *Konkan*: (Stocks).—*Deccan*: (Woodrow 153!); Mawal (Woodrow!).

*Distribution*: Bihar, Central Provinces, W. Peninsula.

5. *Amphilophis ensiformis*, Blatter & McCann, *comb. nov.*—*Andropogon ensiformis*, Hook. f. in F. B. I. vii, 175; Cke. ii, 979.

*Description*: Cke. i. c.

*Locality*: *Deccan*: Lonavla (Woodrow!).

*Distribution*: W. Peninsula, apparently endemic.

6. *Amphilophis concanensis*, Blatter & McCann, *comb. nov.*—*Andropogon concanensis*, Hook. f. in F. B. I. vii, 174; Cke. ii, 980.

*Description*: Cke. i. c.

*Locality*: *Konkan*: Matheran (Woodrow!).—*Deccan*: Yenna River, Lingmala, Mahabeshwar, 4,000 ft. elevation, 200" rainfall (Sedgwick and Bell 4652!); Lingmala, Mahabeshwar (Blatter and Hallberg B1328!); Khandala, in water courses, common (McCann 9651!); Manmad, river-bed (Blatter A283!);—*Kanara*: Kalanadi River, Supa, on rocks, elevation 2,000 ft., rainfall 100" (Sedgwick and Bell 4857!); Halyal (Talbot 2221!); Goond (Talbot 2202!); Gersoppa Falls, on rocks in river bed (Hallberg and McCann A279!).

*Distribution*: W. Peninsula, apparently endemic.

7. *Amphilophis glabra*, Stapf in Fl. Trop. Afr. ix, 172.—*Andropogon glaber*, Roxb. Fl. Ind. i, 271; Steud. Syn. Pl. Glum. i, 392.—*A. punctatus*, Trin. Ic. t. 328, *non* Roxb.—*A. intermedius* var. *punctatus*, subvar. *glaber*, Hack. Monogr. Androp. 487.—*A. intermedius*, K. Schum. in Engl. Pf. Ost.-Afr. C. 98; Hook. f. in F. B. I. vii, 175; Cke. ii, 980.—*A. intermedius*, var. *punctatus*, Stapf in Dyer, Fl. Cap. vii, 345.—*Amphilophis glabra*, Haines Bot. Bihar and Orissa 1028, *non* Stapf and *partim*.

It will be seen from the above synonymy that Stapf considers *Andropogon glaber*, Roxb. as the type of the species. Of *Andropogon intermedius*, R. Br. as

conceived by Hackel he includes only the var. *punctatus*, subvar. *glaber*. Haines in his Bot. Bihar and Orissa, 1928, adopts Stapf's name *Amphilophis glabra* with the following synonyms: *Andropogon intermedius*, R. Br. *inc.* *A. glaber*, Roxb., *A. punctatus*, Roxb. and *A. montanus*, Roxb.?

This is evidently not Stapf's *Amphilophis glabra*. Haines includes *Andropogon intermedius*, R. Br., whilst Stapf confines his species to var. *punctatus*, Haines has *A. punctatus*, Roxb. as a synonym, Stapf excludes it expressly.

Haines' description is much wider than that given by Stapf and includes Hackel's vars. *genuinus*, *Hænkei*, *punctatus* and *glaber*, and one of his own var. *hirta*. He says in a foot-note (p. 1029): 'These varieties are after Hackel and were described before I consulted Stapf's Gramineæ in Fl. Trop. Africa, where he reduces Hackel's *intermedius* to Roxburgh's *glaber*. The names (e.g. *genuinus*) in some cases become inapplicable if Roxburgh's *glaber* is the type. Var. *Hænkei* is, I think, a distinct species and easily distinguished in the field. It should be called *Amphilophis Hænkei*.'

Haines seems to overlook the fact that Stapf's *glabra* is restricted to one of Hackel's varieties of *Andropogon intermedius*, viz., *punctatus* and that, consequently not all of Hackel's names can be applicable.

In our opinion Haines is not justified in calling his species *Amphilophis glabra*, Stapf. As it includes practically the whole of *Andropogon intermedius*, R. Br. taken in Hackel's sense he might have called it *Amphilophis intermedia*, Haines, if that name had not been preoccupied by Stapf (Fl. Trop. Afr. ix, 174).

We are not arguing the point whether Stapf or Haines is right in the treatment of *Andropogon intermedius*, R. Br. *et auctorum*; good reasons can be adduced for both cases. All we wish to say is that Haines' *Amphilophis glabra* is not *A. glabra*, Stapf.

Those who prefer to adopt Haines' *A. glabra* and Hackel's varieties might consider a remark made by Hackel himself (l.c. 487): '*A. fascicularis* Thwaites Enum. Pl. Zeyl. p. 437 non Roxb. complectitur varietates  $\beta$  [*Hænkei*] et  $\delta$  [*punctatus*] formis *intermediis* (*spiculis in eadem panicula mixtis*) *conjunctas*. *Etiam in Bengalìa transitus et ipsa varietas*  $\beta$  [*Hænkei*] *proveniunt*; *in Himalaya, e. gr. pr. Simlah formæ inter*  $\delta$  [*punctatus*] *et*  $\infty$  [*genuinus*] *intermediæ inveniuntur*.'

We adopt Stapf's conception of *A. glabra* together with his description. Dr. Stapf was kind enough to name some of our Bombay specimens.

*Description*: Perennial. Rhizome very short, hard, innovations extravaginal, cataphylls ovate to lanceolate, acute, hard, smooth. Stems tufted, erect or shortly ascending, to over 1 m. high, rather stout below, glabrous, 5-7-noded, simple or very sparingly branched. Leaf-sheaths terete, glabrous, smooth, the intermediate and upper mostly shorter than the internodes, nodes glabrous or the upper bearded. Blades linear, long-tapering to a setaceous point, hardly broader, not or slightly contracted at the base, up to over 30 cm. by 8.5 mm. (mostly narrower), pale green, often turning reddish or purplish, glabrous, rarely with very fine, long, spreading, white hairs at and above the ligule, smooth except at the margins, midrib rather stout to very stout downwards, lateral nerves 3-4 on each side; ligules truncate, very short, scarious. Panicle narrowly oblong, 10-23 cm. by 25-38 mm., erect, primary axis much longer than the lowest racemes, somewhat stout and (at least when mature) stiff, smooth, shortly bearded at the branch axils, otherwise glabrous and smooth; branches whorled, up to 6 in a whorl or semiverticillate, or 2-nate or solitary from the weaker nodes, straight, 25-75 mm. long, the longer divided from 12 mm. above the base, few to 7-noded, secondary branches simple. Racemes 12-38 mm. long, straight or flexuous, usually purplish, inconspicuously white-villous; joints and pedicels 2-3.3 mm. long, ciliate, uppermost cilia much longer than the rest, up to 1 mm. long. Sessile spikelet pale green or purplish throughout, including the small minutely bearded callus 3.3-3.8 mm. long. Involucral glumes equal; lower truncate, slightly concave on the back, chartaceous-membranous, hairy below the middle, more rarely glabrous, keels rigidly ciliolate upwards, intracarinar nerves 4-5, very fine, evanescent upwards with or without a pit above the middle; upper lanceolate, acute, 3-nerved, keel scabrid upwards, margins sparingly ciliate. Lower floral glume oblong, 2.7 mm. long, hyaline, nerveless, ciliate, upper an awn 6.3-12.7 mm. long, brown below, pale above the bend. Pedicelled spikelet neuter, mostly reduced to the glumes, narrowly linear-oblong to linear, 2.7-3.3 mm. long.

glabrous, of the same colour as the sessile. Lower involucre glume rigidly and minutely ciliolate, 5-9-nerved, often rolled in, not pitted, upper hyaline, nerveless, often minute.

*Locality*: *Konkan*: Penn (McCann A282 !).—*Deccan*: Pimpalgam, on the brink of a stream (Bhide !); Lonavla (Hallberg 9955 !); Khandala, St. Mary's Ravine, on a water course (McCann 9435 !).

*Distribution*: More or less throughout India, Tropical Asia, N.E. Australia, Tropical Africa (Upper and Lower Guinea, Mozambique District, Nileland) Madagascar.

8. *Amphilophis odorata*, A. Camus. *Andropogon odoratus*, Dna. Lisboa in Journ. Bomb. Nat. Hist. Soc. iv, (1889), 123, *cum ic.* and vi (1891), 68, 203; Hook.f. in F.B.I. vii, 177; Cke. ii, 981.

*Description*: Cke. l.c.

*Locality*: *Khandesh* (Lisboa).—*Konkan*: Khardi (Mrs. Lisboa).—*Deccan*: Igatpuri (McCann A281 !), Lonavla; (Mrs. Lisboa, Bhide !); plain at foot of Lohagad (McCann 9456 !); Pand, 20 miles W. of Poona (Herb. Econ. Bot. Poona !); Mawal, Poona District (Woodrow).

*Distribution*: W. Peninsula, apparently endemic.

33. *DICHANTHIUM*, Willemet in Usteri Ann. xviii (1796), 11; Stapf in Prain Fl. Trop. Afr. ix, 177.

Perennial or annual. Stems simple or branched, usually many-noded, bearded or beardless at the nodes. Panicles usually subdigitate with a short or very short primary axis, rarely the latter elongated; racemes always shortly peduncled. Spikelets small, 2-nate, one sessile, the other pedicelled, similar in shape, different in sex, except the lowermost 1 or 2 pairs (sometimes 3 or 4) of each raceme which are (with occasional exceptions in *D. annulatum*) homogamous (male or neuter), in many-jointed, shortly peduncled, subdigitate, rarely subpanicled or racemosely arranged, racemes; joints and pedicels filiform, solid, disarticulating subhorizontally except the lowest barren pairs; fertile sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. Sessile spikelet dorsally compressed, awned except the basal homogamous ones; callus small, shortly bearded. Involucral glumes equal, thinly chartaceous, lower usually very obtuse, 2-keeled, with narrow sharply inflexed margins, upper boat-shaped, 3-nerved, acutely keeled. Lower floral glume hyaline, nerveless, upper reduced to the hyaline base of a slender awn; pale minute or absent. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exerted laterally at or above the middle or near the tips. Grain oblong, obtuse, dorsally compressed; embryo rather more than half the length of the grain. Pedicelled spikelet awnless. Lower involucre glume oblong, many nerved, upper flat with sharply inflexed margins closing over the hyaline lower floral glume if present and the stamens, upper floral glume usually 0, never awned.

Species 10 in the tropical and warm-temperate regions of the Old World.

So far 4 species were known from the Presidency and described by Cooke under *Andropogon armatus*, Hook. f., *A. Cookei*, Stapf, *A. caricosus*, Linn. and *A. annulatus*, Forsk. To these we have added 2 new species: *Dichanthium panchganiense*, Blatter & McCann, and *D. McCannii*, Blatter.

*Key to the species*

- A. Racemes digitate (sometimes solitary in *D. caricosus*), 25 mm. long or longer
  - 1. Lower involucre glumes of pedicelled spikelets armed with marginal bulbous-based bristles
    - 1. Lower involucre glume of pedicelled spikelet always pitted ... 1. *D. panchganiense*.
    - 2. Lower involucre glume of pedicelled spikelet not pitted
      - (a) Ligule absent ... 2. *D. armatum*.
      - (b) Ligule present ... 3. *D. McCannii*.

II Lower involucreal glumes of pedicelled spikelets not armed with marginal bristles

1. Nodes of stem glabrous; ligule a shortly ciliate small membrane ... 4. *D. caricosum*.  
 2. Nodes of stem bearded; ligule large, membranous ... 5. *D. annulatum*

B. Racemes solitary, less than 25 mm. long ... 6. *D. serrafalcoides*.

1. *Dichanthium panchganiense*, Blatter & McCann in Journ. Bomb. Nat. Hist. Soc. xxxii (1927), 381.

*Locality: Deccan: Panchgani (McCann!)*

*Distribution: W. Peninsula, apparently endemic.*

2. *Dichanthium armatum*, Blatter & McCann, *comb. nov.—Andropogon armatus*, Hook. f. in F. B. I. vii, 197: Cke. ii, 987.

*Description: Cke. l. c.*

*Locality: Konkan: Stocks (teste Hook. f.).—Deccan: Kalsabai Hills, Nasik District (Patwardhan 1183!); Gira Hill, Khandala (McCann 9430! 9431!); Lohagad (McCann 3871!); Panchgani (Blatter and Hallberg B1212!); Pasarni Ghat (Blatter and Hallberg B1304!).*

*Distribution: W. Peninsula, apparently endemic.*

3. *Dichanthium McCannii*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii (1927), 381.

*Locality: Deccan: Panchgani (McCann!).*

*Distribution: W. Peninsula, apparently endemic.*

4. *Dichanthium caricosum*, *A. Camus*: Note sur le genre *Dichanthium* Willemet in Bull. Mus. Hist. Nat. (Paris) 27 (1921), 549.—*Andropogon caricosum*, Linn. Sp. Pl. ed. 2 (1763), 1480; Hack. Monogr. Androp. 567; Hook. f. in F. B. I. vii, 196; Cke. ii, 987; Haines Bot. Bihar and Orissa, 1039.—For further synonyms see Hook. f. l. c.

Three authors have made the new combination *Dichanthium caricosum*: (a) *A. Camus* l. c. (b). Stapf in Ridley Fl. Malay Penins. v (1925), 210. (c) Haines in Bot. Bihar and Orissa (1924), 1039. *A. Camus* has therefore to be adopted as authority for *D. caricosum*.

We are not trying to describe varieties or forms of this very variable species.

*Vern. Names: Marvel (Mar.), Zinzvo (Guj.).*

*Description: Cke. l. c.*

This species can, according to Burns and others<sup>1</sup> be distinguished from *D. annulatum*, Stapf by the following characters:—

	<i>Dichanthium caricosum.</i>	<i>Dichanthium annulatum.</i>
Habit:	Big and tufted with terminal and axillary inflorescences.	Medium size with terminal inflorescences.
Nodal hairs on stem:	Short.	Long.
Colour of inflorescence:	Light purplish-green.	Purple.
Hairs of inflorescence:	Short.	Long.

Haines l. c. believes there is no single character by which *D. caricosum* can be distinguished from *D. annulatum*. 'I have,' he says, 'tested all those given in the F. B. I. and found them fail on specimens named by Sir J. D. Hooker himself; the key characters in Bengal plants are also unworkable as applied to the same specimens, many of which have bearded nodes, and the character of spiral or subdistichous spikelets is difficult to apply. Linnæus described *Andropogon caricosus* as with solitary spikes, and Willdenough (sic!) adds 'leaves with sparse hairs and sheaths hirsute at the base' (probably he refers to the nodes).'

In his key-characters Haines says that in *D. caricosum* the callus is glabrous. This seems to be a mistake. Hackel calls the callus *Brevissime barbatus*, Cooke has 'bearded,' Rangachari describes it as 'short and shortly hairy below.' We have always found it bearded.

*Locality: Gujarat: Surat, road sides (Sedgwick 315!).—Khandesh: Toranmal (McCann 9669!); Tapti, N. E. of Bhusawal (Hallberg 5111!);*

<sup>1</sup> W. Burns, L. B. Kulkarni and S. R. Godbole: A Study of Some Indian Grasses, in *Mem. Dept. Agr. Ind.*, xiv (1925), 46.



N. slope of Chanseli (McCann 9968!).—*Konkan*: Parsik, railway tract (McCann 9633!).—*Deccan*: Junnar (Mamlatdar of Junnar!); Shevgaon (Mamlatdar of Shevgaon!); Lohagad, half-way up (McCann 9627!); Agricultural College Farm, Poona (Herb. Econ. Bot. Poona!); Khed (Mamlatdar of Khed!); Purandhar (McCann 5570!); Bairawady, Purandhar (McCann 5075!); Panchgani (Blatter 3803!, Blatter and Hallberg B1223!); between Mahableshwar and Panchgani, elevation 4,000 ft. (Sedgwick and Bell 4743;).—*S. M. Country*: Dharwar, elevation 2,400 ft., rainfall 34" (Sedgwick 1828!).—*Kanara*: Halyal (Talbot 2427!).

*Distribution*: India, Burma, Ceylon, Mauritius, China.

*Uses*: A good fodder grass.

5. *Dichanthium annulatum*, Stapf in Prain Fl. Trop. Afr. ix, 178; Haines Bot. Bihar and Orissa 1039.—*Andropogon annulatus*, Forsk. Fl. Aegypt.-Arab. (1775), 173; Duthie Fodd. Grass. N. Ind. 33, t. 20; Hack. Monogr. Androp. 570; Hook. f. F.B.I. vii, 196; Cke. ii, 988.—For further synonyms see Hook. f. l. c.

*Vern. Names*: Zinjoo, handi daroya, daroya (Surat), dhrow (Broach), zinzma (Charodi), jinjva (Panch-Mahals), marvel (Poona), sheda, sam-payen palvan-hullu, marwalyan-hullu (Dharwar).

*Description*: Cke. l. c.

*Locality*: *Sind*: Jamesabad (Sabnis B972!); Mirpurkhas (Sabnis B1028!, B1185!); Hyderabad (Sabnis B51!); Pad-Idan (Sabnis B515!); Larkana (Sabnis B462!); Nasarpur (Sabnis B1140!); Tatta, Kullian Kote Lake (Blatter and McCann D667!); Tatta, tombs (Blatter and McCann D668!).—*Gujarat*: Kabirwad (Chibber!); Nadiad Farm (Herb. Econ. Bot. Poona!).—*Khandesh*: Amboli, Bori River (Blatter and Hallberg 5148!); Dadgaum (McCann 9665!); Toranmal (McCann 9670!); Bor, Bori River (Blatter and Hallberg 4428!); Umalla, Tapti Bank (Blatter and Hallberg 5228!).—*Konkan*: Sion (McCann 3672!); Sewri (McCann 3587!); Parsik, railway line (McCann 9654!); Campoli (McCann 5356!).—*Deccan*: Kirkee to Poona, railway line (Garade 83!); College Garden, Poona (Garade!); Chattarshinji Hill, Poona (Ezekiel); Trimbak (Chibber!); Khandala, very common (McCann 5297!); Manmad (Blatter 9970!); Purandhar, north foot (McCann 9421!).—*S.M. Country*: Devikop, elevation 1,800 ft., rainfall 40" (Sedgwick 3984!).—*Kanara*: Halyal (Talbot 2081!); Kulgi (Talbot 2299!).

*Distribution*: Tropical Africa (Nileland, Mozambique District), from Morocco through North Africa, the Orient and India to China and Australia, Pacific Islands.

*Uses*: Considered good fodder.

6. *Dichanthium serrafalcoides*, Blatter & McCann, *nov. comb.*—*Andropogon Cookei*, Stapf ex Woodrow in Journ. Bomb. Nat. Hist. Soc. xiii, 438 (*nomen tantum*); Cke. ii, 986 (*descriptio*).—*A. (Dichanthium?) serrafalcoides*, Cooke et Stapf in Kew Bull. (1908), 450.

The systematic position of this species is somewhat doubtful. Cooke already found that it does not agree with Hackel's subgenus *Dichanthium*, but he adds: 'It is the only subgenus into which it will fit at all.' Cooke and Stapf, when describing the same species under a different name, remark: '*Ob spiculas secundarias infimas saepissime neutras caeterum eadem forma ac fertiles si vis ad Dichanthium referendus, sed nulli speciei arcte affinis spiculis maiusculis in racemos spiculis Serrafalcici haud dissimiles congestis insignis.*' Following this suggestion we have put it under *Dichanthium*.

*Description*: Cke. ii, 986.

*Locality*: *Deccan*: Lonavla (Bhide!); Khandala, Echo Point (McCann 9403!); Kalanbai Hills (Patwardhan!); Sakar-Pathar near Lonavla (Woodrow!); Mahableshwar (McCann!); Panchgani (McCann!, Blatter and Hallberg B1250!).

*Distribution*: W. Peninsula, apparently endemic.

### 34. EREMOPOGON, Stapf in Prain Fl. Trop. Afr. ix (1917), 182.

Perennial or annual grasses. Stems slender, simple below, more or less branched above, the branches often gathered in fastigate bundles, each supported by a bladeless sheath and terminated by a solitary raceme. Spikelets small, 2-nate, one sessile, the other pedicelled, similar in shape, different in sex, on the fragile rhachis of many-jointed solitary spatheate racemes which are

frequently gathered in fastigiate bundles, rarely the lowermost 1-3 pairs homogamous; joints and pedicels filiform, compressed, solid or slightly grooved, disarticulating horizontally; spikelets deciduous, the sessile with the adjacent joint and pedicels. Sessile spikelet dorsally compressed, awned; callus small, shortly bearded. Involucral glumes equal, thinly chartaceous to membranous, lower 2-keeled, with narrow inflexed margins, upper boat-shaped, 3-nerved, acutely keeled. Lower floral glume hyaline, nerveless, upper reduced to a hyaline upwards firmer linear stipe passing into a slender awn. Stamens 3. Stigmas exerted laterally near the middle of the spikelet, longer than the styles. Pedicelled spikelet awnless; somewhat similar to the sessile.

Species about 5, in the tropical and warm-temperate parts of the Old World.

Cooke knew one species from the Presidency which he described under the name of *Andropogon foveolatus*, Del. We add *Eremopogon Paranjpyeanum*, Blatter and McCann.

- |   |                            |
|---|----------------------------|
| 1. Lower involucral glume of sessile spikelet 4-nerved ... ..           | 1. <i>E. foveolatus</i> .  |
| 2. Lower involucral glume of sessile spikelet faintly 5-7-nerved ... .. | 2. <i>E. Paranjpyeanum</i> |

1. *Eremopogon foveolatus*, Stapf in Prain Fl. Trop. Afr. ix (1917), 183.—*Andropogon foveolatus*, Del. Fl. Egypte 16, t. 8, fig. 2; Duthie Fodd. Grass. N. Ind. 35, t. 22; Hack. Monogr. Androp. 402; Hook. f. F. B. I. vii, 168; Cke. ii, 977.—*A. strictus*, Roxb. Fl. Ind. i, 260.—*A. monostachyus*, Spreng. Pug. ii, 9.—*Hypogynium foveolatum*, Haines Bot. Bihar and Orissa (1924), 1041.

*Description*: Cke. l. c.

*Locality*: *Sind*: Sehwan to Laki, foot of hills (Sabnis B 651!).—*Gujarat*: Road to Lasandra (Chibber!); Bhuj Hill, Cutch (Blatter 3765!).—*Khandesh*: Umalla, Tapti Bank (Blatter and Hallberg 5222!); Bhusawal (McCann 4243!); Bor, Bori River (Blatter and Hallberg 4309!); Naradana (Blatter and Hallberg 5180!);—*Konkan*: Parel, poor specimen (McCann 5373!).—*Deccan*: Panchgani, roadside, elevation 4,000 ft., rainfall 60" (Sedgwick and Bell 4735!); Yeola (Herb. Econ. Bot. Poona!); Arangaon, Ahmednagar (Ryan!); Chattarshinji Hill (Ezekiel!); Deolali (Blatter 4550!); Manmad (Blatter A261!); Panchgani (Blatter and Hallberg B1245!).—*S. M. Country*: Dharwar, elevation 2,400 ft., rainfall 34" (Sedgwick 1825!); Haveri (Talbot 2229!).

*Distribution*: Tropical Africa (Upper Guinea, Nileland), Canaries, from Egypt and Tropical Arabia to the drier parts of India.

2. *Eremopogon Paranjpyeanum*, Blatter & McCann, *comb. nov.*—*Andropogon Paranjpyeanum*, Bhide in Journ. and Proc. Asiat. Soc. Beng., New series, vii (1911), 514.

*Description*: A delicate-looking grass. Stems slender, erect, 30-45 cm. high; upper nodes pubescent; leaves 2.5-7.5 cm. by 2 mm., subcordate at base, long-hairy on both sides, the margins thickened and minutely irregularly repand and spinulosely serrulate; sheaths glabrous; ligule a short erose membrane. Racemes solitary, 12-25 mm. long (without the awns), on a very slender peduncle. Sessile spikelets 3 mm. long. Lower involucral glume oblong, obtuse, faintly 5-7-nerved, glabrous, margins narrowly incurved, keels shortly ciliate at the apex, upper just a little longer than the lower, 3-nerved, oblong, apiculate. Lower floral glume shorter than the involucral glumes, hyaline and with ciliate margins, epaleate, upper floral glume consisting of the narrow base of the awn, just a little more than half as long as the lower involucral glume, obscurely margined and 1-nerved with 2 obscure narrow lobes at the apex, and an interposed slender, twisted, scabrid awn about 4 cm. long, bearing a bisexual flower. Pedicelled spikelets about 4 mm. long. Lower involucral glume oblong, obtuse, 7-9-nerved, margins incurved and broadly winged at the keels, wings shortly ciliate towards the apex, upper involucral glume a little shorter than the lower, oblong, acute, 3-nerved, margins ciliate. Lower floral glume shorter than the upper involucral, hyaline, ciliate, faintly 3-5-nerved, epaleate, male. Joints and pedicels compressed, obliquely truncate,  $\frac{1}{2}$ - $\frac{2}{3}$  as long as the sessile spikelets and ciliate with short white hairs on both sides.

*Locality*: *S. M. Country*: Castle Rock (Bhide!).

*Distribution*: So far endemic.

35. SCHIZACHYRIUM. Nees Agrost. Bras. 331. Stapf in Prain  
Fl. Trop. Afr. ix. 1184.

Annual or perennial grasses, rarely suffrutescent, never very tall. Stems slender. Leaf-blades folded in bud, usually narrow. False panicles varying from very loose and scanty to densely fascicled; spathes mostly very narrow, scarious, membranous or lower down herbaceous. Spikelets 2-nate, of each pair differing in sex and mostly also more or less in shape and in size one sessile the other pedicelled, on the articulate fragile rachis of many-pointed solitary racemes terminating the culms and their branches, supported by spathes and often collected into a false panicle, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelets; joints and pedicels thickened upwards, often rather stout with a scarious cupuliform and more or less dentate terminal appendage. Sessile spikelets dorsally compressed or sometimes in their lower half almost terete, awned; callus short with a short beard at the very base. Involucral glumes equal or subequal, lower chartaceous to subcoriaceous, more or less convex or flat on the back with at least from the middle upwards, sharply inflexed and mostly narrow margins, 2-keeled, the keels running out into teeth or mucros, upper thinner to membranous, narrowly boat-shaped to dorsally flattened, keeled (at least upwards), 1-3 nerved, the delicate margins ciliolate. Floral glumes, ciliolate, hyaline, lower membranous downwards and often purplish, 2-nerved, upper usually 2-fid or 2-dentate, rarely entire, awned, awn from the sinus or continuing the entire valve, Pale 0 or a microscopic hyaline scale. Lodicules 2, minute, glabrous. Stamens 3, rarely 2. Stigmas laterally exerted low down; style terminal. Grain narrowly linear in outline or tapering upwards, subterete; embryo short. Pedicelled spikelet similar to the sessile, but usually relatively broader and flatter, or more or less reduced and then sometimes quite small. Involucral glumes, or more or less membranous, the lower aristulate or mucicous. = Floral glumes, if present hyaline, ciliate, mucicous.

Species about 50, in the tropics of both hemispheres.

1. *Schizachyrium brevifolium*, Nees Agrost. Bras. 332; Miq. Fl. Ind. Bat. iii, 495; Stapf in Prain Fl. Trop. Afr. ix, 187; Haines Bot. Bihar and Orissa 1042. — *Andropogon brevifolius*, Sw. Prodr. Veg. Ind. Occ. 26, Fl. Ind. Occ. i, 209; Hack in monogr. Androp. vi, 363 (excl. var. *fragilis*); Duthie Grass. N.W. Ind. 19, Fodd. Grass. N. Ind. 34; Hook. f. F.B.I. vii, 165. — *A. obtusifolium*, Poir. Encycl. Suppl. i, 583. — *A. parvifolius*, Roxb. Fl. Ind. i, 277. — *A. stenellus*, Presl. Rel. Hænk. i, 335. — *A. debilis*, Kunth Enum. Pl. i, 488. — *A. floridus*, Trin. in Mem. Acad. Petersb. 6 ser. ii, 265. — *Pollinia brevifolia*, Spreng. Syst. i, 288.

*Description*: Annual. Stems weak, up to 60 cm. long, usually ascending from a decumbent base, rarely erect many-noded, branched from most of the nodes; branches often 2-4-nate and dividing again, very slender to filiform, geniculate, glabrous, the lower internodes usually much compressed. Leaf-blades linear, constricted at the junction with the sheath, the lower and those of the primary branches obtuse or sub-obtuse or suddenly narrowed to a sharp point, 25-38 mm. long and 2-6.3 mm. wide, the upper and those of the secondary and tertiary branches much narrower and more acute, often glaucescent, smooth except along the margins and the lower side of the midrib, nerves very fine. Ligules membranous, very short, ciliolate. Sheaths compressed, the lower keeled, somewhat lax, glabrous, smooth, the uppermost spathe-like; leaves like the spathe of the inflorescence ultimately turning reddish. Spathes on subcapillary curved or flexuous branchlets, very narrow, acute, reaching to the base of the racemes or slightly exceeding them; racemes borne on filiform upwards clavate peduncles, slender from less than 12 mm. to slightly over 25 mm. long, 5-11-jointed; joints 2-2.7 mm. long, widening upwards from a slender base, tips 2-dentate glabrous, smooth pedicels as long as the joints, very slender and only slightly thickened upwards. Sessile spikelets linear-lanceolate, acuminate, more or less convex on the back, pale green, about 3.3 mm. long including the minute callus, which is more or less shortly bearded, at least on the sides. Involucral glumes equal lower thinly chartaceous, 2-dentate, scaberulous along the keels, with very fine intracarinal nerves, smooth or very minutely scaberulous on the back; upper boat-shaped, acute 1-nerved, ciliolate. Lower floral glume elliptic, obtuse, hyaline, nerveless, ciliolate, upper 2-fid almost to the base, 1.6 mm. long, segments linear-oblong, sub-

obtuse, sparingly ciliate, awn 8.5–12.7 mm. long. Anthers 0.5 mm. long, deep red or purple. Grain sublinear, tapering upwards. Pedicelled spikelet reduced to a minute glume, often passing indistinctly into the pedicel and produced into a bristle-like awn, about 4.2 mm. long.

*Locality*: *S. M. Country*: Badami (Talbot 2930!).

*Distribution*: Widely distributed throughout the tropics.

### 36. ANDROPOGON, Linn.; Stapf in Prain Fl. Trop. Afr. ix, 208.

After the restoration of Hackel's subgenera to the rank of genera, the general characters of *Andropogon* itself must be modified in many ways:

Mostly perennial grasses of various habit. Spikelets 2-nate, the sessile and pedicelled differing from one another in sex and more or less heteromorphous, all pairs similar, or if the lowest sessile spikelet male or imperfect then resembling the others. Spikes (spiciform racemes) many-jointed, fragile, paired (very rarely solitary) or corymbose. (digitate or subdigitate) on terminal peduncles, embraced below by a spathe-like leaf (spatheole), frequently 2 or more pairs with their spathes subtended by a common spathe and so on to more composite branching, the whole forming a false panicle; the sessile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels filiform or thickened upwards and then the tips frequently more or less cupular or auricled. Sessile spikelets dorsally or laterally compressed, nearly always awned; callus short, mostly quite obtuse, shortly bearded. Involucral glumes equal or subequal, subcoriaceous to membranous, lower flat or concave or channelled on the back, with at least from the middle upwards sharply inflexed margins, 2-keeled; upper more or less boat-shaped, keeled upwards, 3–1-nerved, sometimes aristulate. Floral glumes ciliate or ciliolate, rarely glabrous, lower hyaline, 2-nerved, upper 2-fid or 2-dentate, hyaline or firmer and sometimes substipitiform below the insertion of the awn. Pale a hyaline nerveless scale or 0. Lodicules 2, minute, glabrous. Stamens 3. Stigmas laterally exerted; styles terminal. Grain narrowly lanceolate to oblong in outline, subterete to planoconvex; embryo about half the length of the grain. Pedicelled spikelets often very different from the sessile in shape and less so in size, always more or less compressed dorsally, never concave or channelled on the back, sometimes reduced and then often small or quite suppressed. Involucral glumes herbaceous-chartaceous to membranous, the lower mucicous or very rarely aristulate. Floral glumes, if present, hyaline, ciliate, mucicous.

Species about 100, mostly in the tropics of both hemispheres.

1. *Andropogon pumilus*, Roxb. Fl. Ind. 1 (1832), 273; Steud, Syn. Gram. 388; Hook f. in F.B.I. vii, 170; Cke. ii, 976; Haines Bot. Bihar and Orissa 1044.—*A. demissus*, Steud, l.c.—*A. pachyarthurus*, Hack. Monogr. Androp. 449; Duthie Grass. N. W. Ind. 21, Fodd. Grass. N. Ind. t. 39.

*Vern. Names*: Zinzvo (Surat), bærkî, gondwal, lalgavat, tambrut, gondal, chiman chara, malakava.

*Description*: Cke. l.c.

*Locality*: *Gujarat*: Nadiad farm (Herb. Econ. Bot. Poona!); Surat (Dalzell).—*Khandesh*: Bhusawal (McCann 5451!)! Bor, Bori River (Blatter and Hallberg 5116!); to Naradana (Blatter and Hallberg 5207!).—*Deccan*: Pashan (Gammie!); Bairawadi, Purandhari (McCann 5054!); Manmad (Blatter A262!); Shiuda (Sabnis A260!); Panchgani (Blatter and Hallberg B1268!, B1274!, B1326!).—*S. M. Country*: Haveri (Talbot 2230!); Dumbal (Talbot 2318!); Harsol (Sedgwick 1083!).—*Kanara*: Karwar (Lisboa).

*Distribution*: Nepal, Bihar, Rajputana, Central Prov., W. Peninsula.

### 37. CYMBOPOGON, Spreng.; Stapf in Prain Fl. Trop. Afr. ix, 265.

Perennial, densely tufted and usually aromatic grasses. Leaves often very coarse. Panicles frequently much compound and contracted, spatheate. Spikelets 2-nate, those of each pair differing in sex and more or less in shape—except those of lowest pair of the lower or of both racemes which are homogamous (male or neuter)—one sessile, the other pedicelled on the articulate fragile rhachis of many-jointed paired racemes, terminating the culms and their branches; raceme-pairs supported by a spatheole, collected into often decompound or supra-decompound spatheate panicle; the fertile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels filiform

or linear with frequently more or less cupular or auricled tips, those of the lowest pair (raceme-base) often conspicuously swollen, oblong or barrel-shaped and hard. Sessile spikelets (above the lowest) female or hermaphrodite, dorsally, rarely, laterally, compressed, awned (normally); callus very short, obtuse, shortly bearded. Involucral glumes equal or subequal, more or less chartaceous, lower almost flat or slightly depressed or narrowly grooved on the back, with at least from the middle upwards sharply inflexed margins, 2-keeled, upper more or less boat-shaped, keeled upwards, usually 1-nerved. Floral glumes ciliate or ciliolate (sometimes obscurely), lower entire, hyaline, 2-nerved, upper 2-fid or 2-lobed, hyaline, rarely firmer and almost stipe-like below the insertion of the awn; column of awn, if any, smooth. Pale 0. Lodicules 2, minute, glabrous. Stamens 3. Stigmas laterally exerted; styles terminal. Grain oblong in outline, subterete to plano-convex in cross-section; embryo about half the length of the grain. Pedicelled spikelets usually slightly different in shape and size from the sessile, but never depressed or grooved on the back. Involucral glumes muticous, lower chartaceous to sub-chartaceous upper thinner. Lower floral glume hyaline, 2-nerved, upper 0, but usually a male flower present.

Species about 36, in the tropical, more rarely in the subtropical regions of the Old World.

Cooke mentions one indigenous (*Andropogon Jwarancusa*, Jones) and one cultivated species (*Andropogon Schœnanthus*, Linn.) belonging to this genus. We add two indigenous species and a cultivated one:

*Key, mainly after Stapf :*

A. Blades long, hard, rough-edged throughout, filiform to linear; lower involucral glume of sessile spikelet flat or concave between the keels

I. Raceme-joints villous all over, hairs long, more or less concealing the sessile spikelets; awn usually a straight, very short bristle

1. Basal leaf-sheaths in dense tufts, tightly clasping, thickened below; blades more or less filiform and flexuous, except when very short; raceme-fascicles more or less simple ...

1. *C. Schœnanthus.*

2. Basal leaf-sheaths ultimately loosened and curled; blades flat; raceme-fascicles compound ...

2. *C. Jwarancusa.*

II. Raceme-joints bearded along the sides, but hairs not concealing the sessile spikelets; fertile spikelets awnless ...

3. *C. citratus.*

B. Blades flat, 5-30 mm. wide, rounded to subcordate and stem-clasping at the base, of a soft texture, with smooth edges, at least in the lower part; lower involucral glume of sessile spikelet with a narrow groove from the middle downwards corresponding to a keel inside

I. Blades 10-30 mm. wide (rarely under 10 mm.), somewhat fat, rich green, at least above; panicles 10-30 cm. long, turning reddish when mature ...

4. *C. Martini.*

II. Blades 2-6 mm. wide, thin, glaucous; panicles 10-20 cm. long, glaucous or straw-colour when mature ...

5. *C. cœsius.*

1. *Cymbopogon Schœnanthus*, Spreng. Pug. ii (1815), 15, non Schult.; Stapf in Kew Bull. (1906), 303-313, 352-353, in Prain Fl. Trop. Afr. ix, 268.—*C. arabicus*, Nees ex Steud. Syn. Pl. Glum. i (1855), 387.—*C. Arriani*, Aitch. Cat. Punj. Pl. (1869), 174.—*C. Circinnatus*, Hochst. ex Hack. in Monogr. Androp. 599.—*Andropogon Schœnanthus*, Linn. Sp. Pl. ed. 1 (1753), 1046 (non Hackel et plurimorum auct.).—*A. bicornis*, Forsk. Fl. Aegypt.—Arab. (1763), 173, non Linn.—*A. laniger*, Desf. Fl. Atl. ii (1800), 379; Boiss. Fl. Or. v, 465; Balfour Bot. Socotra, 316; Hack. in Monogr. Androp. 598; Benth. in Hook. Ic. Pl. t. 1871.—*A. Olivieri*, Boiss. Diagn. Pl. Or. ser. i,

fasc. v (1844), 76.—*A. circinnatus*. Hochst. et Steud. Syn. Pl. Glum. i (1855), 387.—*A. Arriani*, Edgew. in Journ. Linn. Soc. vi (1862), 208.—*A. Jwarancusa*, subsp. *laniger*, Hook.f. F.B.I. vii. 203; Cke. ii, 976 (*var. tantum*).—*Gymnanthelia lanigera*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 306 (*nomen tantum*).

For a discussion of the foundation of this species see Stapf in Kew Bull. (1906), 303-305.

*Description*: Perennial, compactly caespitose, with numerous intravaginal innovations, 15-45 cm. high. Culms erect, slender, few—to 4-noded and simple below the inflorescence, terete, glabrous, very rarely with a few small hairs at the nodes. Leaf-blades semiterete, filiform, wiry, flexuous, very firm and often circinate upwards, rounded on the back, channelled on the face, or those of the culms somewhat flatter and shorter, up to more than 23 cm. long, 1 mm. in diameter, glabrous, finely scaberulous on the nerves below, though often smooth to the touch, pale, glaucous, evenly 7-9-nerved, the midrib showing only above as a broad, white band. Ligules membranous to scarious, oblong, truncate, ciliate, up to 3.3 mm. long. Sheaths very firm, smooth, glabrous, tight, those of the innovations and base of the culms widened at the base, very tough and long-persistent, straw-coloured, up to 13 cm. long. Spatheate panicle narrow, 8-30 cm. long, few—to 7-noded lower internodes 5-7.5 cm. long, upper rapidly decreasing in length, slender, glabrous; lowest primary branch rarely undivided at the base, 3-2-noded and up to 15 cm. long, usually forming up to 4-rayed tiers; lowest subtending sheaths with foliaceous blades; rays finely filiform, 2.5-3.7 cm. long, rarely to over 5 cm., glabrous; spathes narrowly lanceolate, subherbaceous, often tinged with pale purple, with a short blade or the upper bladeless and produced into a setaceous point, 3.7-4.3 cm. long, glabrous. Spatheoles very narrow, acute or with a setaceous point, 12-25 mm. long, pale or straw-coloured; peduncles finely filiform, widened upwards 3.3-4.2 mm. long, tips truncate. Racemes 2-nate, more or less divaricate, at length epinastically deflexed, 1-2 mm. long, white-villous, pale or tinged with purple, one subsessile, the other with a bare base, 1-2 mm. long, bases puberulous to pubescent in the fork, ciliate-bearded upwards, with minutely cupular and denticulate tips, that of the subsessile raceme as well as the adjacent pedicel stout, elliptic to elliptic-oblong in outline and convex on the back, ultimately more or less glabrescent and glossy; fertile joints filiform, slightly widened towards the oblique subcupular auricled tips, 2.7-3.3 mm. long, densely hairy to vilious from the back and the angles; adjacent pedicels similar to the joints but more slender. Homogamous pair of spikelets one at the base of the sessile or of both racemes; the sessile spikelet of the lowest but one of the sessile raceme intermediate and imperfectly awned. Fertile spikelets linear-lanceolate, more or less acuminate, acute, including the callus 5.3-6.3 or even 7.4 mm. long, glabrous, pale green below, reddish upwards; callus short obtuse, shortly bearded. Involucral glumes equal, chartaceous, lower nerveless and shallowly concave between the acute scaberulous keels, minutely 2-denticulate, upper lanceolate-oblong in profile, acute, slightly curved on the back, 1-nerved, margins broadly hyaline upwards, ciliate. Lower floral glume linear-oblong, nerveless, hyaline, ciliate, slightly shorter than the involucral glumes, upper very narrow, shortly 2-fid, cuneate-linear and chartaceous below the insertion of the awn, less than 3.3 mm. long, lobes broadly lanceolate, ciliate, awn up to 1 cm. long, very fine, more or less keeled at and slightly twisted below the middle; column smooth. Anthers 2 mm. long. Pedicelled spikelets male, linear-oblong, 4.2-6.3 mm. long, glabrous, more reddish than the sessile; involucral glumes subchartaceous, with 5-9 evenly distant intracarinal nerves, the upper thinner, 3-nerved; lower floral glume linear-oblong, sub-2-nerved, ciliolate, 4.2 mm. long; upper floret reduced to a male flower, or its glume present as a microscopic scale.

*Locality*: *Sind*: (Stocks 816, Woodrow); Jemadar ka Landa near Karachi (Stocks).

*Distribution*: From Morocco through N. Africa, Arabia, Persia, Afghanistan, Baluchistan, Punjab, Sind.

*History and Uses*: See Stapf in Kew Bull. (1906), 305-313, 353.

2. *Cymbopogon Jwarancusa*, Schult. Mant. ii (1824), 458; Stapf in Kew Bull. (1906), 354; Haines Bot. Bihar and Orissa 1045.—*Andropogon Jwarancusa* Jones in Asiat. Research. iv (1795), 109; Cke. ii, 976.—*A. Jwarancusa* var.

*genuinus*, Hack. Monogr. Androp. 599.—*A. I.* subsp. *Jwarancusa proper*, Hook. f. F. B. I. vii, 203.—*A. laniger*, Duthie Fodd. Grass. N. Ind. t. 23.

*Vern. Names* : Jwarankusa (i.e. fever-restrainer) (Sanskrit.), khavi (Hindust.)

*Description* : Usually a tall grass, up to 1·8 m. high, with very aromatic roots, densely tufted, the stems from clusters of firm, persistent, finally loose and open and tortuous leaf-sheaths, more or less widened below. Leaves flat, up to 60 cm. long and 5 mm. broad, narrowly linear, filiform above and ending in a long capillary tip, ligule 0·5 mm. long, membranous. Panicles long, narrow interrupte, with very compressed, short, fascicled branches bearing spathes about 5 cm. long and spatheoles 6–18 mm. long. Racemes 1·4–1·8 cm. long, often 5 joined, joints half as long as the uppermost villi. Spikelets 3–4 pairs, green, half hidden by the 5 mm. long villi, on the joints and pedicels. Sessile spikelets 5 mm. long; lower involucre glume flat or concave between the keels, which are neither winged nor margined (omitting of course, the ordinary inflexed margins of the glume common to the genus) or sometimes narrowly margined, scabrid or ciliolate, nerves 2–4 or 0 between the keels. Joints of rachis and pedicels subclavate, with toothed tips. Pedicelled spikelets equal or rather longer than the sessile, narrowly lanceolate, purplish; lower involucre glume 7–9 nerved.

*Note*.—This species is nearly related to *C. Schoenanthus* and the two, as pointed out by Hackel (l. c. p. 600), are not always distinguishable with certainty. 'At high altitudes,' says Stapf (l. c. 314), 'as in Kumaon and Spiti, or in the dryer parts of the Punjab, it (*C. Jwarancusa*) becomes dwarfed and narrow-leaved and forms a "transition state" to *C. Schoenanthus*. The latter is a characteristic desert plant, able to exist with a minimum supply of water. On the other hand, *C. Jwarancusa* is dependent on an, at least temporarily, abundant supply of water, and prefers the neighbourhood of rivers, or actually grows in the beds of torrents. It is not impossible, that the distinguishing characters of *C. Jwarancusa* as compared with *C. Schoenanthus*, that is the robust state, the long, flat and relatively broad leaves, and the more composite panicles, are mainly due to eolaphic conditions.'

*Locality* : *Sind* : Karachi (Dalzell and Gibson); Bholari (Bhide!); Shikarpur (Bhide!); Umerkot, sandy plains (Sabnis B1082!); Gharo (Blatter and McCann D669! D670!); Gholamalla (Blatter and McCann D671!).—*Gujarat* : Ahmedabad (Dalzell and Gibson).

*Distribution* : Outer hillzone of the United Provinces, Kumaon, Garhwal (up to 3,000 m. or over) and westwards as far as Peshawar, Jodhpur and Jaisalmer States, Sind, Bihar.

*Uses* : Stapf is of opinion that this grass is very probably used along with *C. Schoenanthus*. See also Stapf (l. c. 313–314).

\*3. *Cymbopogon citratus*, Stapf in Kew Bull. (1906), 357 in Prain Fl. Trop. Afr. ix, 232.—*Andropogon Schoenanthus*, Linn. Syst. ed. x (1759), 1304, not of Sp. Pl.; Roxb. Fl. Ind. ed. Carey and Wall. i (1820), 278.—*A. citratus* DC. Cat. Hort. Monsp. (1813), 78; Nees in Allgem. Gartenz. iii (1835), 266.—*A. citriodorum* (sic!) Desf. in Tabl. Ecole Bot. ii (1815), 15.—*A. Roxburghii*, Nees in Wight Cat. (1833), no. 1699 (*nomen tantum*); Steud. Syn. Pl. Glum. i. (1855), 395.—*A. ceriferus* Hack. in Mart. Fl. Bras. ii, pt. iii (1883), 281.—*A. nardus*, var. *ceriferus*, Hack. Monogr. Androp. (1889), 605. *Schoenanthus amboinicum*, Rumph. Herb. Amboin. v, 181, t. 72.

For the taxonomic position of this species see Stapf in Kew Bull. (1906), 330–333.

*Vern. Names* : Oletu cha, hirva cha (Mar.), lili cha (Guj.), vasane-hullu, kavance hullu, majjige hullu (Canarese).

*Description* : A tall perennial, throwing up dense fascicles of leaves from a short, oblique annulate, sparingly branched rhizome, usually barren, but occasionally giving rise to a stout erect culm up to over 1·8 m. high, 7–8-noded and simple below the panicle. Leaf-blades linear, long-attenuated towards the base and tapering upwards to a long setaceous point, up to over 90 cm. long by 16–18 mm. wide, very firm, glaucous-green, glabrous, smooth or more or less rough upwards and along the margins; midrib somewhat stout below, whitish on the upper side; primary lateral nerves 4–6 on each side, raised particularly above with 2–4 secondary nerves between them. Ligules very short, scarious, rounded or truncate. Sheaths terete, those of the barren shoots much widened at the base, and tightly clasping each other, narrow and separating upwards, with rounded shoulders at the mouth, 10–30 cm. long,

subcoriaceous, quite glabrous and smooth, more or less cinnamon-coloured or russet on the inside; sheath of the culms tight, shorter than the internodes, finely pubescent or velvety at the nodes. Spatheate panicle decomposed to subdecompound, loose, 30 to over 60 cm. long, nodding; internodes 4 to over 6, the longest up to 20 or 22 cm. long, rapidly, decreasing in length upwards; lowest primary branches undivided at the base, up to over 45 cm. long, and up to 5- or 6-noded, the following forming mixed tiers of very unequal variously compound and simple rays, ultimate tiers up to 4-rayed; rays filiform and glabrous; spathes narrow-lanceolate, acute or acuminate, 2.5-5 cm. long with narrow membranous margins. Spatheoles very narrow, linear-lanceolate to almost subulate when inrolled, 14-18 mm. long, acute or finely acuminate, reddish to rich russet. Peduncles 6-10 mm. long, glabrous. Racemes 2-nate, finally spreading at right angles or epinastically deflexed, moderately dense, 14-25 mm. long, pale, variously tinged with dull purple, loosely villous, one sessile, the other with a slender filiform bare base, almost 2 mm. long and hairy, the pedicel of the homogamous pair also slender, though short; fertile joints filiform, slender, 2-3 mm. long, ciliate on both sides, tips obliquely auriculate and cupular, adjacent pedicels very similar. Homogamous pair of spikelets 1 at the base of the sessile raceme, its sessile member usually slightly differing in shape from the fertile spikelets. Fertile spikelets linear to linear-lanceolate, acutely acuminate, 5-6 mm. long, reddish, glabrous; callus short, obtuse, minutely bearded. Involucral glumes subequal, lower subchartaceous, slightly depressed towards the base, otherwise flat on the back, keels acute, scaberulous above, intracarpal nerves 0 or 1, short or indistinct, upper boat-shaped, slightly curved on the back, acute, keeled upwards. Lower floral glume hyaline, linear-oblong or almost linear, sub-2-nerved, ciliolate above, slightly shorter than the involucral glumes, upper narrowly linear, acute, about 4 mm. long, usually entire and awnless, rarely more or less 2-fid with a small bristle from the sinus. Anthers 2 mm. long. Pedicelled spikelets male or neuter, linear to subulate-lanceolate, as long as the sessile, reddish, glabrous; lower involucral glume 5-9-nerved, upper 3-nerved; lower floral glume shorter to much shorter than the involucral glumes, hyaline, ciliolate, upper very narrowly linear, nerveless if present at all.

*Locality:* Gardens in Bombay.

*Distribution:* This grass is only known in the cultivated state. Probably of Indian origin, and now widely distributed over the tropics of both hemispheres. See Stapf in Kew Bull. (1906), 334.

*History and uses of the Lemon-grass:* Stapf l.c. 322-330. 334, 358.

4. *Cymbopogon Martini*, Stapf in Kew Bull. (1906), 359; Haines Bot. Bihar and Orissa 1046.—*C. Martinianus*, Schult. Mant. ii (1824), 459.—*Andropogon Martini*, Roxb. Fl. Ind. i (1820), 280.—*A. pachnodes*, Trin. in Mem. Acad. Petersb. ser. 6, ii (1833), 284, and Spec. Gram. Ic. (1836), tab. 327.—*A. Calamus aromaticus*, Royle, Essay Antiq. Hind. Med. (1837), 33 (*nomen tantum*), Illustr. Bot. Himal. (1840), tab. 280.—*A. nardoides*,  $\alpha$  Nees, Fl. Afr. Austr. (1841), 116.—*A. Schœnanthus*, Fluck. and Hanb. Pharmacogr. (1874), 660 (*non* Linn.).—*A. Schœnanthus*, var. *genuinus*, Hack. Monogr. Androp. (1889), 609 (*partim*).—*A. Schœnanthus*, var. *Martini*, Hook f. in F. B. I. vii (1897), 204 (*exclus. synonym. referentibus ad plantas Africanas*).—For the foundation of this species and its synonymy see Stapf in Kew Bull. (1906), 335-337.

*Vern. Names:* Geranium grass, Rusa grass; rohisha, rosem (Sansk.); rusa, gandh-bel, mirchia gandh, tikhari (Hindust.); rohish, roshgavat (Mar.); rhonse, rauns (Guj.); eunthi hullu, khasi hullu (Kann.).

*Description:* A tall, perennial sweet-scented grass, 1.5-2.4 m. high. Stems glabrous, straw-coloured, leafy. Leaves flat, usually broad, rounded or subcordate at the base, more or less glaucous beneath, those below the inflorescence rarely under 23 cm. long by 1 cm. wide at the base, but often 2.5 cm. wide below, tapering from a little above the base or from the middle to a firm tip, glabrous except for the scabrid margins, margin sometimes smooth near the base. Spikes 2-nate, 12-18 mm. long, oblique or divaricate or less often deflexed. Peduncle about half the length of the 18-25 mm. long spatheole, several spatheoles and their peduncles from a spathe of lower order, these arranged in long usually narrowly oblong panicles not more than 3.5-5 cm. wide, but sometimes panicle with many branches and broader. Joints and pedicels slenderly clavate (excluding the much thickened lowest), about half as



long as the sessile spikelets, tips with a lanceolate tooth or 3-toothed, margins long-villous, 3-5 mm. long. Lower involucreal glume (above the lowest spikelet) with lanceolate centre becoming oblanceolate or oblong from the keels being membranously winged above the middle, back with a vertical median depression below the middle corresponding to a ridge inside; upper cymbiform with the dorsal keel winged above, minutely ciliate below.

*Locality*: *Gujarat*: Champanir (Chibber!); Ahmedabad, dry hills (Sedgwick 310!); Junagad, Kathiawar (Blatter 3783!); Bhuj-Rhodir-Maha, Cutch (Blatter 3649!); Anjar, Cutch (Blatter 3741!).—*Khandesh*: Road to Chinchpada (Chibber!); Toranmal (McCann A235!).—*Konkan*: Wada Range (Ryan 488!); Gokhirva, Bassein (Ryan 41!); Keltan (Ryan 392!); St. Xavier's College compound (McCann 4461!).—*Deccan*: Ganeshkhind Botanic Gardens (Garade 435!); Purandhar (Bhide!); Pashan (Gammie!); Modasa (Sedgwick and Saxton!); Khandala, very common (McCann!); Igatpuri (Blatter and Hallberg 4432!); Purandhar (McCann 5010!); Kasara, Igatpuri Ghat (McCann 4343A!); Panchgani (Blatter and Hallberg B1248!, B1282!, B1297!, B1324!).—*S. M. Country*: Haveri (Talbot 2180!); Dharwar (Talbot 2616!); Badami (Talbot 2928!). [According to Malcolmson, 'the Rusa grass in the Deccan affects particularly the trap, more or less avoiding the granite, so much so that he was able to trace the green-stone dykes across the granite by the luxuriance of the grass' (ex Stapf)].

*Distribution*: From the Afghan frontier to the Rajmahal Hills in Bengal and from the subtropical zone of the Himalaya to about 12° N., excluding the desert region of the Punjab and the greater part of the northern Carnatic.

Stapf excludes also the outer slopes of the Western Ghats, but the localities given above show that the grass is well represented in that region. For the history and uses of the Rusa grass oil *Oleum Palmarosæ seu Geranii Indici* (Palmarosa oil) see Stapf in Kew Bull. (1906), 338-341, 360.

5. *Cymbopogon caesius*, Stapf in Kew Bull. (1906), 360, in *Prain Fl. Trop. Afr. ix*, 287.—*Andropogon caesius*, Nees in Wight. Cat. (1833) nos. 1700b (*nomen tantum*) and in Hook. and Arn. Bot. Beech. Voy. 244 *cum descriptione (partim)*.—*A. Schœnanthus*, var. *caesius*, Hack. in Monogr. Androp. 610; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 14; Hook. f. in F.B.I. 205, *exlus. fere omnibus synon.*

For foundation of this species see Stapf in Kew Bull. (1906), 344.

*Description*: A perennial, tufted grass, up to 1 m. high, with intra- and extravaginal innovation-shoots from a short rhizome. Culms erect or geniculate-ascending, slender, more or less wiry, frequently branched below, the branches often in fascicles from the knees, often many-noded, terete, glabrous, smooth. Leaf-blades linear from a scarcely narrowed rarely slightly rounded base, tapering to a long setaceous point, those of the culms up to over 15 (sometimes almost 30) cm. long, 2-6 (sometimes 10) mm. broad, of the innovations usually much shorter, flat, bluish-glaucous, glabrous, smooth, midrib slender, primary lateral nerves very fine, 3-4 on each side. Ligules very short, rounded, scarious. Sheaths rather firm, tight, the lowest mostly short, those placed at branching nodes at length thrown aside, inrolling or deciduous, glabrous, smooth, usually much shorter than the internodes. Spathaceous panicle narrow, mostly 7-15 cm. long, rarely much longer, sometimes reduced and small, dense or interrupted; internodes usually 4-6, the lowest rarely exceeding a third of the panicle, the following gradually decreasing; lowest primary branch shortly exerted from its sheath, undivided at the base, or like the following forming mixed or (upwards) simple-rayed tiers; rays of ultimate tiers 5-3, finely filiform. 7-10 cm. long, glabrous; lowest subtending sheaths with foliaceous blades: spathes lanceolate, acuminate—2.5-4 cm. long, subherbaceous, glaucous, sometimes turning reddish. Spatheoles narrowly lanceolate, acuminate, 14-16 mm. long, subherbaceous to scarious, turning dirty straw-colour or slightly reddish; peduncles filiform 5-6 mm. long, glabrous. Racemes 2-nate, obliquely erect. 12-14 mm. long, greenish, more or less white-villous, one subsessile, the other with a bare base, over 2 mm. long, finely pubescent on the inner side, ciliate and thickened upwards, base of the subsessile raceme swollen, hard, fused with the equally swollen and hard adjacent pedicel; fertile joints filiform, about 2 mm. long, glabrous on the back, densely ciliate on the sides, cilia snow-white, tips often cupular with a crenulate margin or auricle; adjacent pedicels very similar. Homogamous pair 1 at the base of

the sessile raceme. Fertile spikelets oblong, slightly wider above the middle, subobtuse, 4 mm. long, greenish, glabrous; callus very small, obtuse, minutely bearded. Involucral glumes equal, subchartaceous, lower minutely truncate, flat on the back with a fine median groove in the lower half, keels narrowly winged from the middle upwards, intracarinal nerves 1 on each side towards the keels, very fine; upper narrow in profile, very acute, very narrowly winged above the middle with 1 delicate nerve on each side near the margin. Lower floral glume delicate, oblong, minutely truncate, ciliolate, nerveless, upper substipitiform, almost 3 mm long, 2-fid to the middle, segments subulate, ciliolate, awn very fine, 10-14 mm. long, bent at and twisted below the middle. Anthers almost 2 mm. long. Pedicelled spikelets male, linear to lanceolate-oblong, subobtuse, 4 mm. long, green, glabrous; lower involucral glume slightly convex on the back, subherbaceous, about 10-nerved, the inner 6 nerves prominent, upper subhyaline, 3-nerved; floral glume oblong, truncate, sub-2-nerved, almost 4 mm. long.

*Locality: Gujarat:* On sandy and gravelly hills and banks, Ahmedabad and Prantij.

*Distribution:* Throughout the Carnatic, Gujarat, Arabia, Somaliland.

For *history and uses* see Stapf Kew Bull. (1906), 342-345, 361.

(To be continued)





REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY. Part VI

By E. BLATTER, S.J., Ph.D., F.L.S.

1920

IV

*Heteropogon to Echinops*



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., PH.D., F.I.S.

PART VI

GRAMINEÆ

BY

E. BLATTER and C. McCANN

(Continued from p. 435 of this Volume)

38.- HETEROPOGON, Pers. ; Stapf in Prain Fl. Trop. Afr. ix, 410.

Perennial or annual grasses, with simple or more often upwards branched culms ; branches few to many, mostly flowering and gathered into a spatheate panicle ; racemes conspicuously dorsiventral, the bases of the male (or neuter) spikelets subimbricate on the back of the raceme, their upper parts bending forward around the sides, forming a hollow in which the fertile spikelets are enclosed, with their awns exerted anticously and often intertwined. Spikelets 2-nate, those of the lower (1 to many) pairs alike in sex and shape, male or neuter, of the upper pairs differing in sex and shape, one of each pair sessile, the other pedicelled on the many-jointed rhachis of solitary racemes, terminating the culms and their upper branches ; rhachis, tough or upwards tardily disarticulating and glabrous between the homogamous pairs, readily disarticulating above them ; homogamous pairs long-persistent, the spikelets of the heterogamous pairs falling separately, the pedicelled with the pedicel, the sessile with the adjacent joint and the adjacent pedicel or its base. Sessile spikelets subcylindric, awned ; callus long, pungent, densely bearded upwards. Involucral glumes equal, the lower coriaceous rarely chartaceous, more or less tightly involute, quite keelless ; nervés obscure, often connected by few transverse nerves in the upper part ; upper with a deep longitudinal groove on each side, coriaceous, rarely chartaceous, between them, thinner towards the margins, membranous at the tips, 3-nerved. Lower floral glume hyaline, nerveless, upper stipitiform from a hyaline very slender base, cartilaginous upwards and passing into a usually stout geniculate awn. Pale small or absent. Lodicules large or more or less reduced, to very minute. Stamens 3, often rudimentary or absent. Stigmas exerted terminally or laterally. Grain more or less linear in outline, subterete, slightly dorsally compressed ; embryo somewhat exceeding the middle of the grain. Pedicelled spikelets male or neuter, dorsally flattened, usually slightly asymmetric, and often somewhat twisted, muticous, imbricate. Lower involucral glume herbaceous, many-nerved, winged upwards from one or both keels ; upper membranous, lanceolate-oblong, acute, 3-nerved. Floral glumes hyaline, 1-nerved, well developed or more or less reduced. Stamens 3 or 0.

Species about 6, in the tropical and subtropical regions of the whole world. Cke. describes four species under *Andropogon*, viz. *A. polystachyos*, Roxb., *A. triticeus*, R. Br., *A. Ritchiei*, Hook. f., and *A. contortus*, Linn. We transfer these to *Heteropogon* and add *Heteropogon oliganthus*, Blatter & McCann.

A. Not more than 30 cm. high

- |   |     |     |                             |
|---|-----|-----|-----------------------------|
| I. Upper involucral glume of pedicelled spikelet 1-3-nerved | ... | ... | 1. <i>H. oliganthus</i> .   |
| II. Upper involucral glume of pedicelled spikelet 5-nerved  | ... | ... | 2. <i>H. polystachyos</i> . |

- B. More than 40 cm. high
- I. Lower involucrel glume dorsally deeply grooved ... .. 3. *H. insignis*.
  - II. Lower involucrel glume not dorsally grooved
    1. Ligule of several narrow membranous segments ... .. 4. *H. Ritchiei*.
    2. Ligule truncate, ciliolate ... .. 5. *H. contortus*.

1. *Heteropogon oliganthus*, Blatter & McCann, *nov. comb.*—*Andropogon oliganthus*, Hochst. ex Steud. Syn. Gram. 368; Hook. f. in F.B.I. vii, 201.

*Description*: A dwarf annual. Stems 7-15 cm. high, tufted, slender, sometimes creeping below, geniculate. Leaves 5-7.5 cm. long, quite flat, subsensiform, acuminate, softly hairy, margins thickened, cartilaginous, sheaths compressed; ligule very short, membranous. Spikes usually very shortly exerted from the long, narrow, glabrous spathes; peduncle curved, puberulous. Spikes 8-16 mm. long, with 3-6 pairs of glumes, lower spikelets neuter. Joints and pedicels about half as long as the sessile spikelet, long-ciliate. Sessile spikelet 5 mm. long, oblong; callus short, obtuse. Lower involucrel glume obtuse, chartaceous, dorsally villous toward the base, not dorsally channelled, shining, faintly nerved, with narrowly involute margins, ciliolate towards the truncate tip, callus bearded, upper involucrel glume obtuse, apiculate. Lower floral glume very short, broadly oblong, ciliate, upper with a shining awn 3-4 cm. long, column of awn glabrous. Pale very small. Anthers 1 mm. long. Pedicelled spikelet, neuter, larger than the sessile, ovate-oblong. Lower involucrel glume herbaceous, obovate-oblong, truncate, distinctly 9-13-nerved, subemarginate, keels scabrous, margins ciliolate, hardly incurved, upper shorter by  $\frac{1}{2}$ , membranous, oblong, obtuse, 1-3-nerved, ciliate. Pale of upper floral glume very small.

Hackel, l.c., is of opinion that this species is intermediate between *Dichanthium* and *Heteropogon*, but comes nearer the *Heteropogons*, because the sessile spikelets differ from the pedicelled ones in shape, nervation and the dorsal furrow.

*Locality*: Deccan: Kalsubai (Patwardhan!); Mahableshwar, open edge above the precipices looking from Dhobi's Waterfall path to Elphinstone Point, elevation 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4608!); Panchgani (Blatter & Hallberg B1221!, McCann!).

*Distribution*: Nilgiris.

2. *Heteropogon polystachyos*, Blatter & McCann. *comb. nov.*—*Andropogon polystachyos*, Roxb. Fl. Ind. i (1832), 261; Steud. Syn. Gram. 367; Hook. f. in F.B.I. vii, 989; Dalz. and Gibs. 301; Cke. ii, 989.—*A. pumilus*, Roxb. Ic. ined. t. 2021 (ex Hook. f.).

*Description*: Cke. l.c.

*Locality*: Deccan: Khandala (Woodrow); Mahableshwar, western side of hill (Dalzell & Gibson). We have not seen this species.

*Distribution*: Peninsular India.

3. *Heteropogon insignis*, Thw. Enun. Pl. Zeyl. 437; Benth. Fl. Austral. vii, 517.—*Andropogon triticeus*, R. Br. Prodr. (1810), 201; Hack. Monogr. Androp. 588; Steud. Syn. Gram. 368; Hook. f. in F.B.I. vii, 200; Cke. ii, 989.—*A. ischyranthus et liananthus*, Steud. l.c. 367.

*Description*: Cke. l.c.

*Locality*: Konkan: Above Kenery Caves (McCann 9634!).—Deccan: Around Vital Hills, Poona (Bhide 782!); Chattarshinji Hill, Poona (Ezekiel!); Khandala, very common on open hillside composed of rock fragments (McCann 9425!); Igatpuri (McCann 4338!); Mawal, Poona District (Woodrow).—S. M. Country: Manoli (Talbot 3978!).—Kanara: Anmod, bare hillsides, elevation 2,000 ft., rainfall 200 inches (Sedgwick 3324!).

*Distribution*: India (Burma, C. Provinces, W. Peninsula), Ceylon, Malaya, Australia.

4. *Heteropogon Ritchiei*, Blatter & McCann, *comb. nov.*—*Andropogon Ritchiei*, Hook. f. in F.B.I. vii, 201; Cke. ii, 990.

*Description*: Cke. l. c.



*Locality*: Deccan: Katraj Ghat, eleven miles S. E. of Poona (Gammie 1037 !); hills near Poona (Woodrow).—*S. M. Country*: Belgaum (Ritchie teste Hook. f.)

*Distribution*: W. Peninsula, apparently endemic.

5. *Heteropogon contortus*, Roem. & Schult. Syst. Veg. ii, 836; Stapf in Prain; Fl. Trep. Afr. ix, 411.—*Andropogon contortus*, Linn. Sp. Pl. (1753), 1045; Hack. Monogr. Androp. 585 (excl. *A. polystachyus*, Roxb.); Hook. f. in F.B.I. vii, 199; Cke. ii, 990. For other synonyms see Hook. f. and Stapf l. cc.

*Vern. Names*:—Sunkhali, Nani Sunkhali (Dohad); Survalu (Charodi); Kursali (Poona); Kusal, Sukhli kursali, Ganjali hullu (Belgaum) (ex Burns). Known to Anglo-Indians as Spear grass.

*Description*: Cke. l. c.

*Locality*: Gujarat: Sevalia (Chibber !); road to Lasandra (Chibber !); Sungiri (Gammie 15586 !); Junagad Kathiawar (Blatter 3789 !).—*Khandesh*: Bhusawal (Gammie !); Toranmal (McCann 9640 !).—*Konkan*: Dahe forests (Ryan 717 !); Osarvira forest, Mokhada range (Ryan 190 !); Mamber hill (McCann 3620 !); Mulgaum (McCann 4245 !); Parsik, railway line (McCann 9655 !); above Kenery Caves (McCann 9662 !).—*Deccan*: Katraj Ghat, 11 miles S. E. of Poona (Shevade !); Trimbak (Chibber !); Khandala, very common all over the hills (McCann 9422 !); Bairawadi, Purandhar (McCann 5059 !); Rahuri (Nana A264 !); Chattarshinji Hill, Poona (Ezekiel !); Manmad, river bed (Blatter A269 !); Igatpuri (McCann 4328 !); Panchgani (Blatter & Hallberg B1246 !, B1296 !, B1308 !).—*S.M. Country*: Dharwar, elevation 2,400 ft., rainfall 34 inches (Sedgwick 1820 !); Castle Rock (Gammie 15686 !); Badami (Talbot 2925 !).—*Kanara*: Yellapore (Talbot 734 !).

*Distribution*: Mediterranean region and tropics and subtropics generally.

*Uses*: For an interesting account of this grass see W. Burns, L. B. Kulkarni and S. R. Godbole: A study of some Indian Grasses and Grasslands, in *Mem. Dept. Agr. India* xiv (1925), 28-44.

*Varieties*: Hackel (l.c.) distinguishes two varieties and, excluding *polystachyus*, 5 subvarieties. His first variety *genuinus* is characterized by the male spikelets being more or less covered on the back or at least above or towards the margins with white, patent tubercle-based bristles. This character together with the degree of ramification of the culms forms the foundation of four subvarieties: *typicus*, *Roxburghii*, *hispidissimus* and *secundus*.

The second variety *glaber* has the male spikelets glabrous. Both varieties are represented in India, and all the subvarieties except *secundus*.

To Hooker f. (l. c.) these varieties and subvarieties appear 'to be too inconstant for definition', and, according to Stapf (l.c.) the inconstancy of those characters 'is so evident that it is not worth while to discriminate between the forms corresponding to them.' Haines, too, has abstained from distinguishing varieties and forms.

Burns and others in the paper quoted above (p. 40) wrote in 1925: 'In our observations at Kalas and elsewhere we noticed variability within the species, and early came to the conclusion that there must be definite varieties of *Andropogon contortus*. We can say with confidence that there are at least two varieties, differing markedly in size, habit, longevity, and in morphological characters. One is small and annual, the other large and perennial.' Since then Patwardhan and Hedge have published a paper<sup>1</sup> in which they describe in detail the morphology, anatomy, physiology and ecology of the two varieties. As the authors themselves identify their perennial variety with Hackel's subvariety *typicus*, and their annual variety with Hackel's *hispidissimus*, we shall refer to them in the following under Hackel's names. The description is taken entirely from the paper just mentioned.

*Key to the varieties.*

1. Lower involucreal glume of pedicelled spikelet sparsely hairy with long tubercle-based deciduous hairs on the back, in the upper part and towards the margins; lower part glabrous ... (a) var *genuinus*, subv. *typicus*.

<sup>1</sup> G. B. Patwardhan and G. R. Hedge, Two varieties of *Andropogon contortus*, Linn. In Journ. Ind. Bot. Soc., vi (1927) 213.

2. Lower involucrel glume of pedicelled spikelet densely hairy with tubercle-based persistent hairs all over the back; hairs in lower part shorter than in upper ... ..

(b) var. *genuinus*, subv. *hispidissimus*.

(a) var. *genuinus*, subv. *typicus*, Patwardhan and Hedge l. c.; Hack. in Monogr. Androp. 586 (sub *Androp.*).

*Description*: Perennial. Stems densely tufted, 45 cm. to 1.2 m., suberect or decumbent, about 3 mm. thick at the base and much flattened, glabrous, simple or subfastigiately branched from the nodes of the upper half; internodes not much longer than the leaf-sheaths. Leaves crowded at the base; sheaths smooth, compressed, keeled, shortly auricled at the mouth; ligule short, truncate, ciliate; lamina 5-35 cm. long, acuminate or abruptly so, at first folded inward, afterwards flat, rigid, suberect, ciliate or sparingly hairy on the upper surface, with tubercle-based hairs towards the base, rough to the touch on both surfaces. In semi-dry or dry specimens the leaves may be vinaceous to deep vinaceous in colour. Spike solitary, terminal, 2.5-7.5 cm. long excluding the awn, with closely imbricating pairs of sessile and pedicelled spikelets. Spikelets subsecund, pedicelled ones all male or neuter; of the sessile spikelets the lower 2 to 8 male or neuter awnless, the upper awned, female; the lower awnless spikelets persistent, the upper awned ones deciduous. Sessile spikelet: Lower involucrel glume narrow, linear-oblong, truncate or rounded, brownish, many-nerved, hispid with short sparse hairs, margin incurved, tip membranous; upper involucrel glume linear, obtuse, coriaceous dark brown, hispidulous, 3-nerved, margins incurved. Lower floral glume oblong, hyaline, thin, nerveless, short, truncate, paleate; upper empty, reduced to an awn about 7.5 cm. long, column slightly hairy, callus long, pointed, with a tuft of reddish brown hairs. Ovary linear, stigmatic branches from 6-8 mm. long, with thick-set hairs, carmine in colour, fading towards the tips. Pedicelled spikelet: Lower involucrel glume lanceolate, obliquely twisted, sparsely hairy with long, tubercle-based, deciduous hairs on the back in the upper part and towards the margins, lower part glabrous, margins unequally winged; upper involucrel glume oblong-lanceolate, acuminate, 5-nerved, ciliate towards the tip, margins hyaline. Lower floral glume oblong-hyaline, 1-nerved, ciliate, epaleate, containing stamens; upper empty, obovate, lanceolate, hyaline, ciliate, nerveless. Stamens 3, filaments 3 mm. long; anthers oblong-lanceolate, cordate at base, pale yellow when young, light purplish vinaceous; pollen grains round, not sculptured, dull grey. The sessile male spikelets in the lower part are similar to the pedicelled spikelets above. Fruit 5-8 mm. long, thinly hispid, dark brown with 2 deep furrows on the ventral side, armed with a pointed callus below and a long lash-like awn above.

*Locality*: Tegur (ex Burns and others).

*Distribution*: Tropics and subtropics generally, N. W. Himalaya, Afghanistan (ex Hackel).

(b) var. *genuinus*, subv. *hispidissimus*. Patwardhan and Hedge l. c.; Hack. in Monogr. Androp. 587 (sub *Androp.*).—*Andropogon hispidissimus*, Hochstett. in Schimper Pl. Abyss. un. it. no. 1219.—*A. besukiensis*, Steud. in Zoll. Syst. Verz. 59.

*Description*: Annual. Stems little tufted, 15-60 cm. high, erect or slightly decumbent below, slender and slightly compressed near the base, glabrous, simple or subfastigiately branched from the upper 2 or 3 nodes; internodes much longer than the leaf-sheaths. Leaves little crowded at the base; sheaths smooth, slightly keeled, shortly auricled at the mouth; ligule short, truncate and ciliate; lamina 2.5-20 cm. by 2.5-5 mm. wide, linear, acuminate or abruptly so, ciliate or hairy on the upper surface up to nearly half its length from the base with tubercle-based hairs, rough to the touch on both surfaces, in semi-dry or dry specimens straw to very light purple in colour. Spike solitary, terminal, 1-5 cm. long excluding the awns, with closely imbricating pairs of sessile (lower) and pedicelled spikelets. Spikelets subsecund, pedicelled, all male or neuter; of sessile the lower 2-5 male or neuter, awnless, upper 4-12 female, awned. Those which are male or neuter persistent, the upper 4-12 pairs which include both males and females deciduous. Sessile spikelet: Lower involucrel glume narrow, linear-oblong, truncate or rounded, brownish,

many-nerved, densely hairy with whitish long hairs, margins incurved, tips membranous; upper involucreal glume linear, obtuse, coriaceous, dark brown, hispidulous, 3-nerved with incurved margins. Lower floral glume oblong, hyaline, thin, nerveless, short, truncate, epaleate, upper empty, reduced to an awn, 5.1 cm. long, column densely hairy with whitish hairs, callus long, pointed, bearded with light brown hairs. Ovary linear, stigmatic branches 4-5 mm. long with thinly set ox-blood red hairs. Pedicelled spikelet: Lower involucreal glume lanceolate, obliquely twisted, densely hairy with tubercle-based, persistent hairs all over the back, hairs on lower part shorter than in upper; upper involucreal glume oblong-lanceolate, acuminate, 5-nerved, ciliate, tip hairy, margins hyaline. Lower floral glume oblong, hyaline, 1-nerved, ciliate, upper oblong or obovate-lanceolate, hyaline, nerveless. Stamens 3, filaments 4 mm. long; anthers oblong, sagitate, pale yellow when young, sulphur yellow when mature; pollen grains round, smooth, dull grey. The sessile spikelets in the lower part are similar to the pedicelled spikelets above. Fruit 5-8 mm. long, densely hairy with whitish soft hairs, light brown with two deep furrows on the ventral side, armed with a pointed callus below and a long, lash-like awn above.

*Locality*: 'Usually found on the very shallow parts of Deccan soils' (ex Burns and others, l. c.).

*Distribution*: Malabar, tropical Africa, Madagascar, Java, Philippines.

### 39. *ISEILEMA*, Hack. ; Cke. ii, 995.

Cke. has described two species: *I. Wightii*, Anders. and *I. laxum*, Hack. We add a third one, *I. anthephoroides*, Hack.

The following key is after Hole<sup>1</sup>:—

- |  |                                   |
|--|-----------------------------------|
| A. Lower involucreal glume of hermaphrodite spikelet dorsally appressed, hairy at base and ciliate on margins in basal $\frac{1}{4}$ | ... 1. <i>I. anthephoroides</i> . |
| B. Lower involucreal glume of hermaphrodite spikelet glabrous dorsally at base and on margins in basal $\frac{1}{4}$ .               |                                   |
| I. Spathe and upper floral leaf not tubercled on keel  | ... 2. <i>I. laxum</i> .          |
| II. Spathe and upper floral leaf tubercled on keel   | ... 3. <i>I. Wightii</i> .        |

1. *Iseilema anthephoroides*, Hack. Monogr. Androp. 683; Hook. f. in. F.B.I. vii, 219; Haines Bot. Bihar & Orissa, 1054.

*Description*: A much tufted annual grass, very leafy below, with many stems 30-80 cm. high, sometimes pink, nodes glabrous. Leaves mostly short, the longer ones about 13 cm. by 5 mm., subobtuse, ciliate at base and tip of sheaths, cilia with small tubercle-bases, blades with scabrid margins, nerves usually fine and uniform; ligule of short fine hairs. Panicles long, rather strict, but some of the spatheoles divergent, lower spathes foliaceous, upper with shorter blades, base of blade and top of sheath with very long cilia; spathes often with many tubercles on the margins. Spatheoles cymbiform, not acuminate, smooth and glabrous or minutely tubercled and scaberulous, margins scarios, several spatheoles from each spathe or leaf-sheath. Peduncle of cluster very short, 2.5-5 mm. long. Cluster scantily bearded at the base. Involucreal spikelets broadly oblong, 4 mm. long, rounded at tip, not or very sparsely ciliate, their pedicels about 1 mm. long and nearly as broad at top, compressed, bearded. Glumes 2 only. Lower involucreal glume with narrowly inflexed margins, strongly 2-nerved on the back and almost sulcate on either side of midrib, 2 other partial nerves between the strong ones, upper involucreal glume nearly as long, flat, oblong, obtuse, 1-nerved; floral glume absent. Anthers yellow. Sessile spikelet 5-6 mm. long, suddenly tapering part or beak rather longer than the lower broader part. Lower involucreal glume 2-cuspidate at tip, 4-nerved between keels, hispid-hairy on the back on the wider portion, the beak scabrid or scabrellous; upper involucreal glume as long,

<sup>1</sup> R. S. Hole, The Indian Species of *Iseilema*, Agric. Journ. of India, Special Ind. Sc. Congress Number (1917), 125-131. See also A. Camus, Le genre *Iseilema*, in Bull. Soc. Bot. France, series 4, xxiii (1923), 493.

narrowly lanceolate with prominent ciliate keel on lower third, scabrelous above, margin inflexed. Lower floral glume very narrow, 2-nerved, ciliate, upper reduced to the membranous base of the awn, awn 12-14 mm. long, very slender, nearly smooth.

*Locality*: *Khandesh*: Near Naradana (Blatter & Hallberg 5206!).—*Deccan*: Katraj Ghat (Gammie 929!); Deoñali (Blatter & Hallberg A316!); Chattarshinji Hill, Poona (Ezekiel!); Pashan (Gammie!).—*S. M. Country*: Black soil fields E. of Hubli (Sedgwick & Bell 5295!); Yelvigi (Sedgwick 2085!).

*Distribution*: W. India and Deccan.

*Uses*: A smaller yielder and an inferior fodder plant than *I. laxum*. See W. Burns Bull. 78, Dept. Agric. Bombay, p. 11.

2. *Iseilema laxum*, Hack. Monogr. Androp. 682; Hook. f. F.B.I. vii, 218; Cke. ii, 996. For synonyms see Hook. f. l. c

*Description*: Cke. l. c.

*Locality*: *Gujarat*: Red upland near Talod (Sedgwick!).—*Khandesh*: Bor, Bori River (Blatter & Hallberg 4429!); Toner, Tapti bank (Blatter & Hallberg 5167!); Dadgaum (McCann A322!).—*Konkan*: Sion (McCann 3668!); Thana (McCann 8728!); Parsik Hill (McCann A321!); Bhandup, rice field (McCann A323!); Trombay (McCann A324!).—*Deccan*: Grasslands between Mahableshwar and Panchgani (Sedgwick & Bell 4742!); Nasik (Bourke!); Lohagad, half way up (McCann A320!); Poona (Jacquemont 439).—*S. M. Country*: Dastikop (Sedgwick 2059!); Dharwar (Sedgwick 1826!); Belgaum (Ritchie 799).—*Kanara*: Halyal (Talbot 2087!); Sirsi (Kulkarni!).

*Distribution*: Upper Gangetic Plain, Orissa, Deccan, W. Peninsula.

*Uses*: Considered to be the best fodder grass in Central and S. India.

3. *Iseilema Wightii*, Anders. in Nov. Act. Soc. Sc. Upsala ser. 3, 2 (1858), 251; Hack. Monogr. Androp. 679; Hook. f. F. B. I. vii, 218; Cke. ii. 996. For synonyms see Hackel and Hook. f. 11. cc.

*Vern. Names*: Mabid (Dohad), Moshi (Surat), Gandhi (Charodi), Gandheñ (Panch Mahals), Sona, Tambrut, Tambit, Gondval, Gamsi, Mussau (ex Burns).

*Description*: Cke. l.c.

*Locality*: *Gujarat*: Kharaghoda (Saxton 503C!); in a very marshy valley between Wastrapur and Thaltij (Sedgwick 322!); Morvi, Kathiawar (Woodrow).—*Khandesh*: Antroli, Bori River (Blatter & Hallberg 5150!).—*Deccan*: Panchgani (Blatter & Hallberg B1294!); Poona (Woodrow).—*S. M. Country*: Kunnur (Sedgwick & Bell 4922!); Rhanibennur (Bhide!); Haveri (Talbot 2254!); Dharwar (Nana A325!); Belgaum (Woodrow).—*Kanara*: Halyal (Talbot 2143!).

*Distribution*: Throughout India.

*Uses*: A fair fodder.

#### 40. *THEMEDA*, Forsk.; Cke. ii. 992.

Species about 16, in the tropical and subtropical regions of the Old World, chiefly Indo-Malayan.

Cooke describes 4 species: *T. imberbis*, *T. Cooke*, *T. ciliata*, Hack., *T. cymbaria*, Hack., and *T. tremula*, Hack. Following the laws of priority we have to substitute for the first two: *T. triandra*, Forsk. and *T. quadrivalvis*, O. Kuntze.

##### I. Involucral spikelets truly verticillate

- |   |     |     |                             |
|---|-----|-----|-----------------------------|
| 1. Involucral spikelets glabrous or more or less irregularly beset with tubercle-based hairs  | ... | ... | 1. <i>T. triandra</i> .     |
| 2. Involucral spikelets always with a row of stiff bristles along the flexures near the tips, the bristles arising from coarse pale tubercles | ... | ... | 2. <i>T. quadrivalvis</i> . |

##### II. Involucral spikelets in closely superposed pairs

- |  |     |                         |
|--|-----|-------------------------|
| 1. Inflorescence a decomposed thyriform panicle. Lower involucral glume of bisexual spikelets not channelled | ... | 3. <i>T. cymbaria</i> . |
|--|-----|-------------------------|

2. Inflorescence a racemiform panicle.  
 Lower involucreal glume of bisexual  
 spikelets deeply channelled ... .. 4. *T. tremula*.

1. *Themeda triandra*, Forsk. Fl. Aegypt. Arab. cxxiii et 178; Schweinf. in Bull. Herb. Boiss. ii, Append. ii, 16, 95; K. Schum. in Engl. Pf. Ost.—Afr. A. 51; Rendle in Cat. Afr. Pl. Welw. ii, 161; Pilg. in Engl. Pflanzenw. Afr. ii, 151, fig. 114; Pilg. in Mildbr. Wiss. Ergebn. Deutsch. Zentr.—Afr. Exped. ii, 45; Eyles in Trans. Roy. Soc. S. Afr. v. 288; Stapf in Prain Fl. Trop. Afr. ix, 416, *partem tantum nostræ speciei amplectens*.—*Themeda Forskalii*, Hack. in Monogr. Androp. 659, *excl. syn. Anthistiria hispida*, Thunb. *quæ est Tristachya leucolthrix*, Trin. *sec. Stapf.*; Duthie Fodd. Grass. N. Ind. 43; Durand & Schinz Consp. Fl. Afr. v. 731; K. Schum. l.c. A. 23, 56, 79; Engl. Hochgebirgssfl. Trop. Afr. 115; Batt. & Trab. Fl. Anal. Algér. et Tunis 355; Stapf in Kew Bull. (1907), 212; Pilg. in Engl. Pflanzenw. Afr. ii, 119.—*Anthistiria imberbis*, Retz. Obs. iii, 11; Desf. in Journ. de Phys. xl, 293, t. 1; Thunb. Fl. Cap. i, 402, ed. Schult., 107; Kunth Enum. i, 481; Steud. Syn. Pl. Glum. i, 401; Stapf in Dyer Fl. Cap. vii, 366; Wood Natal Pl. ii, t. 133; Burt Davy in Transvaal Agric. Journ. iii, 287, t. 52; Hook. f. in F.B.I. vii, 211; Trin. Fl. Ceyl. v, 248; Prain Beng. Pl. 1207.—*A. glauca*, Desf. Fl. Atlant. ii, 380, t. 254 *excl. syn.—Stipa paleacea*, Vahl; Coss. & Durieu Expl. Scient. Algér. ii, 52.—*A. Desfontainii*, Kunth Rev. Gram. i, 161.—*A. ciliata*, Retz. l.c. (*non* Linn. f.); Lamk. Ill. t. 841, f. 2; Cav. Ic. 5, t. 459; Nees in Linnaea vii, 284 et in Fl. Afr. Austr. 121; Anders. in Peters Reise Mossamb. Bot. 562; Oliv. in Trans. Linn. Soc., xxix, 176; Roxb. Fl. Ind., i, 247; Grah. Cat. Bomb. Pl. 239; Dalz. & Gibs. Bomb. Fl. 304; Thw. Enum. Pl. Zeyl. 366; Trim. Cat. Ceyl. Pl. 108. Benth. Fl. Austr. vii, 542.—*A. Forskahlîi*, Kunth Rev. Gram. i, 162, Enum. Pl. 481.—*A. vulgaris*, Hack. in Engl. & Prantl. Natürl. Pflanzenfam. ii, pars 2, 29.—*A. punctata*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 448.—*A. paleacea*, Ball. in Journ. Linn. Soc. Bot. xvi, 734.—*A. australis*, R. Br. Prodr. 200.—*A. cuspidata*, Anders. in Nov. Act. Upsal. 2 (1856), 229.—*A. cæspitosa*, Anders. l.c. 241.—*A. argentea*, Nees Fl. Afr. Austr. 124.—*A. depauperata*, Anders. l.c. 243.—*A. syriaca*, Boiss. Diagn. Pl. Or. ser. i, fasc. 13, 72.—*Themeda polygama*, Gmel. Syst. 149.—*Stipa arguens*, Thunb. Prodr. 20 (*non* Linn.).—*Calamina imberbis*, Roem. & Schult. Syst. ii, 810.—*Themeda imberbis*, T. Cooke in Cke. ii, 993.—*T. imberbis*, Haines in Bot. Bihar & Orissa, 1049.

Hooker f. who deals with this species under *Anthistiria*, Linn., says in a preliminary remark (F.B.I., vii, 211): 'The species of this genus are most difficult of discrimination, of which the best proof is the irreconcilable conclusions of two excellent botanists, both experts in the order of *Gramineæ*, Anderson (in Nov. Act. Upsal iii, ii (1856) ) and Hackel (Monogr. Androp.)'

He then criticizes Hackel for having restored Forskahl's name of *Themeda* 'because of its having four years of priority, and of Linnaeus' description of *Anthistiria* being very inaccurate.' He admits the claim of priority, but as to the other reason he rightly adds that if inaccurate description has to be considered, a host of the genera of old authors would have to be invalidated. Hooker finally decides in favour of *Anthistiria* because this genus 'had for upwards of a century been adopted by all botanical writers.' This reason, however, does not hold good in view of the present rules of nomenclature. Hackel restored *Themeda* in 1889 and since then most systematists have followed his example. It was easy to settle this point, but the real difficulty comes in when we have to define and give a name to all the material gathered by Hackel (l. c. 659-664) under his *Themeda Forskalii*, and by Hooker f. under *Anthistiria imberbis*, Retz. (F.B.I. vii, 211).

A glance at Hackel's synonymy and localities shows that he has included all the forms of this highly variable grass which are found in the tropical, sub-tropical and sometimes in the temperate regions of the Old World. The same applies to Hooker's *A. imberbis*, except that he separated Hackel's var. *dubia laxa* and restored it to its former specific rank of *A. laxa*, Anders. But this is of minor importance in this connection. It does not change the fact that both Hackel and Hooker describe the same material and of the same area though under different names.

Hackel justifies the adoption of the specific name *Themeda Forskalii* in this way: '*Themeda triandra*, Forsk. Fl. Aeg.-arab. p. 178, *Anthist. Forskalii* Kunth Revis. Gram. 1, p. 162, generis typus, a Forskalio prope Bulgose in

Arabia felici lecta, probabiliter etiam varietas est Th. Forskalii meae; sed descriptio rem dubiam relinquit, specimina authentica desiderantur. Nec hucusque ullam hujus generis speciem in Arabia felici lectam vidi, etsi probabile est, Th. Forskalii varietates in Syria Abyssiniaque crescentes etiam in Arabia inveniri. Itaque nomen specificum "triandra" tamquam dubium et rem indicans quae in hoc et plerisque Graminearum generibus nullius est momenti, sepositi, "Forskalii" a Kunthio datum non minus quidem dubium, sed generis auctorem commemorans recepi.

Hooker does not agree with Hackel, 'The earliest names of this plant are *Themeda triandra*, Forsk., and *Anthistiria imberbis*, Retz. Hackel has abandoned both, substituting first *Anthistiria vulgaris*, and then *Themeda Forskalii*, on the ground that *A. imberbis* was perhaps not Forskahl's *T. triandra* (why then call it *Forskalii*?) of which no type specimen exists, and because *triandra* indicates a character of no individual value in grasses. In so doing he overlooked Gmelin's name of *T. polygama* (Syst. 149). Having regard to the wide range of *A. imberbis*, from Australia to Africa, its presence in Arabia might well be anticipated; and that it is a native of that country is now proved by Schweinfurth's finding Hackel's var. *glauca* in that country. This makes the var. (which is local, and not Indian) the type of the species, and if Forskahl's name of *Themeda* is to be retained, necessitates a re-arrangement of the varieties. To me it appears most expedient to retain Retz.'s name which applies to the prevalent form over the area of distribution as the specific one.'

Hooker's reasons against Hackel's view are certainly valid, but his own *Anthistiria imberbis* does not rest on a firmer foundation. The fact that the var. is local and not Indian should not prevent us from making it the type of the species, and the other circumstance that a re-arrangement of the varieties will become necessary if the name *Themeda* is retained, can only be a reason of expediency.

So far we come to the conclusion that Hackel and Hooker deal with the same material, but that neither name is satisfactory.

We come now to the latest publication affecting our question. Stapf l.c. has adopted the name *Themeda triandra*, Forsk. (1775) instead of *T. Forskalii* (1889), 'as there is no doubt that the type of Forskal's species, which apparently has been lost, was one of the forms covered by the description given by Stapf' (see Schweinfurth in Bull. Herb. Boiss. ii, App. II, 16).

But here Stapf creates a new difficulty. His description applies only to the 'African share of Hackel's *T. Forskalii*'. In order not to be open to misstatements we quote the whole passage in which Stapf explains his position: 'The species, as defined here, is, however, taken in a sense somewhat narrower than Hackel's; this restriction requires a short explanation. Hackel in his monograph of the *Andropogoneae* distinguishes eleven varieties and as many sub-varieties or forms within his *T. Forskalii*, whilst other authors have at various times described more than a dozen species, all of which come within the compass. There can be no doubt as to the close affinity of these forms and the question of their status is mainly one of expediency. A careful examination of the large amount of material at Kew and the British Museum has led to the conclusion that for the present it will be most useful to detach, firstly, those forms that are fairly uniform, and at the same time exclusive, over a large area; and secondly, those that, though of a limited range, stand out from the remainder by some character or characters. This leaves a residuum much less homogeneous than any of the segregates just referred to. It consists apparently of more or less fixed races, mutants, hybrids and edaphic forms which from herbarium material are the less separable because they are to a high degree independent of geographical areas. At the same time, however, they are all African with an extension into Arabia, Syria and the south-eastern corner of Asia Minor, and, taken as a whole, represent practically the African share of Hackel's *T. Forskalii*. It is to this aggregate that the description and synonymy given above apply.'

From the above it is evident that Stapf's *T. triandra*, Forsk. is not identical with Hackel's *T. Forskalii* and Hooker's *A. imberbis*, Retz., as it comprises only the African element including 'an extension into Arabia, Syria, and the south-eastern corner of Asia Minor.' Stapf's synonymy leads to the same conclusion, except for the inclusion of *T. imberbis*, T. Cooke (Fl. Bombay ii, 993). The Australian element *Anthistiria australis*, R. Br. has been separated by the same author as *Themeda australis*, Stapf. It seems to us that Stapf's treatment

of *T. Triandra* is somewhat arbitrary. We quite agree that the name should remain and that it is the only correct name, but we cannot agree to its being restricted to the African element only, and it is difficult to understand why the Indian specimen should not go by the same name. If we could distinguish groups of varieties or forms that are confined to more or less definable geographical areas, it would be admissible to speak, e.g. of an African group and call it *T. triandra*, because Arabia exhibits one of those African forms, or of an Indian or Australian group, and name them accordingly. But experience shows that with regard to the material under review there are no such geographical areas which contain a group of varieties or forms that are peculiar to one area exclusively. A glance at the localities given by Hackel under the different varieties and sub-varieties will confirm our statement.

We are, therefore, of opinion that the name *Themeda triandra*, Forsk. should embrace all the material that was described by Hackel under *T. Forskalii*, by Hooker under *A. imberbis*, and by Cooke under *T. imberbis*.

Haines describes the material from Bihar and Orissa under the name of *T. imberbis*, T. Cooke, and adds in brackets 'partly'. His species, therefore, is not Cooke's *T. imberbis*, but must be given some other specific name as long as Cooke's name stands. But if botanists adopt our *T. triandra*, Forsk. Haines' name will be merged in it, and his material may be treated as a form or group of forms under that species.

*Description*: See Hackel, Hook. f. and Cooke ll. cc.

*Locality*: *Gujarat*: Ahmedabad (Gammie 16391 !).—*Khandesh*: Toranmal (McCann 9813 !).—*Konkan*: Mokhada range (Ryan 2626 !); Mahaluxmi (Sabnis A297 !); Bhandup (McCann 9810 !); Bassein (McCann 4475 !).—*Deccan*: Ganeshkhind Botanic Gardens (Garade !); Panchgani (Blatter 3806 !, Blatter & Hallberg B1326 !); Khandala, common (McCann A291 !); Bairawadi, Purandhar (McCann 5069 !); Igatpuri (McCann 4322 !); Poondra (Talbot 4307 !).—*S. M. Country*: Devaranji, elevation 1,800 ft., rainfall 90 inches, (Sedgwick & Bell 4427 !); Castle Rock (Gammie 15728 !); Dudsagar Falls (McCann A298 !); Dharwar (Nana A289 !).

*Distribution*: Africa, Indo-Malaya, Australia.

2. *Themeda quadrivalvis*, O. Kuntze Rev. Gen. Pl. II, 794; Stapf in Prain Fl. Trop. Afr. ix, 420; Haines in Bot. Bihar & Orissa 1050.—*Andropogon quadrivalva*, *err. typog.*, Linn. Syst. ed. 13, 758.—*Themeda ciliata*, Hack. in Monogr. Androp. 664; Cke. ii, 994.—*Anthistiria ciliata*, Linn. f. Suppl. 113; Gaertn. Fruct. ii, 465, t. 175; Lam. Ill. t. 841, fig. 1; Beauv. Agrost. t. 23, f. 7; Kunth Enum. i, 481; Steud. Syn. Pl. Gum. i, 401; Baker Fl. Maurit. 448; Balf. f. Bot. Socotra 317 (*partim*); Duthie Grass. N. W. Ind. 42; Hook. f. in F. B. I. vii, 213; Stapf in Dyer Fl. Cap. vii, 368.—*A. scandens*, Roxb. Fl. Ind. i, 248; Duthie Fodd. Gr. N. W. Ind. t. 61.—*A. semiberbis*, Nees. Fl. Afr. Austr. 125.—*Andropogon nutans*, Linn. Mant. ii, 303.

*Vern. Names*: Bongrut (Sholapur); Bhatu (Surat); Bhati, Zini bathi, Mothi bathi (Dohad); Bhattharu (Broach) (ex Burns).

*Description*: Cke. l. c.

*Locality*: *Gujarat*: Ahmedabad (Gammie 16391 !).—*Khandesh*: Toranmal (McCann 9817 !).—*Konkan*: Parsik, railway line (McCann 9808 !); Alibag, water-works (Ezekiel !); S. Konkan (Stocks teste Cooke, Law); Salsette (Jaquemont 717 teste Cooke).—*Deccan*: Pashan, near Poona (Gammie !); road, Mahabaleshwar to Pratapgad (Bhide 1170 !); Purandhar (McCann 5571 !), Bairwadi, Purandhar (McCann 507A !); Panchgani (Blatter & Hallberg B1311 !, B1325 !).—*S. M. Country*: Konankeri, elevation 2,000 ft., rainfall 40 inches (Sedgwick & Bell 4943 !); Dharwar, elevation 2,400 ft., rainfall 34 inches (Sedgwick & Bell 4486 !); Dastikop elevation 2,500 ft., rainfall 35 inches (Sedgwick & Bell 2060 !); Castle Rock (Gammie 15729 !); Belgaum (Ritchie 886 teste Cooke).—*Kanara*: Halyal (Talbot 2115 !).

*Distribution*: N. W. India, Bengal, C. Provinces, W. Peninsula, Tenasserim. Introduced in tropical and S. Africa.

3. *Themeda cymbaria*, Hack. in Monogr. Androp. 668; Cke. ii, 994.—*Anthistiria cymbaria*, Roxb. Hort. Beng. (1814), 6, et Fl. Ind. i, 251 (*excl. syn.*); Kunth Enum. Pl. i, 482 (*excl. syn.*); Grain. Cat. Bomb. Pl. 219; Dalz & Gibs. Bomb. Fl. 304; Hook. f. in F. B. I. vii, 215; Trim. Fl. Ceyl. v, 249.

*Description*: Cke. l. c.

*Locality*: Khandesh: Dadgaum (McCann 9815!); Toranmal (McCann 9818!).—*Konkan*: common (Cooke); I am doubtful (McCann).—*Deccan*: Lonavla (Garade!).—*S. M. Country*: Castle Rock (Gammie 15634!).—*Kanara*: Mirjan (Hallberg & McCann A295!).

*Distribution*: W. Peninsula, Ceylon.

4. *Themeda tremula*, Hack. Monogr. Androp. 667; Cke. ii, 995.—*Anthistiria tremula*, Nees ex Steud. Syn. Gram. 401; Hook. f. in F.B.I. vii, 214.—*Androscepiya tremula*, Anders. in Nov. Act. Upsal. ser. iii, ii (1856), 247.

*Description*: Cke. l. c.

*Locality*: *Konkan*: Trombay (McCann A293!); Ghatkoper, Horse-shoe Valley (McCann A327!).—*Deccan*: Khandala (McCann 5359!); Igatpuri (Blatter & Hallberg 5484!); Purandhar, northern foot (McCann 5041!); Poona (Woodrow teste Cooke).—*S. M. Country*: Devaranji, elevation 1,800 ft., rainfall 90 inches (Sedgwick & Bell 4428!); Castle Rock (Gammie 15687!).—*Kanara*: Devimani Ghat (Kulkarni!); Jugglept (Talbot 1568!); Tinai Ghat (Sedgwick & Bell 3196!); Sirsi to Siddhapur (Hallberg & McCann A294!).

*Distribution*: From the Central Provinces and the Konkan southwards, Ceylon.

#### 41. PSEUDANTHISTIRIA, Hook. f.; Cke. ii, 992.

Species 4.—Indian.

Cooke has described one species: *P. hispida*, Hook. f. We add two others: *P. umbellata*, Hook. f. and *P. heteroclita*, Hook. f.

##### I. Ligule exauriculate

- |  |                            |     |     |                            |
|--|----------------------------|-----|-----|----------------------------|
| 1. Ligule a truncate glabrous membrane, much divided to the base, the tips minutely ciliate. | Sessile spikelets glabrous | ... | ... | 1. <i>P. hispida</i> .     |
| 2. Ligule short, membranous. Sessile spikelets not glabrous                                  | ...                        | ... | ... | 2. <i>P. heteroclita</i> . |

II. Ligule auricled

...	...	...	...	3. <i>P. umbellata</i> .
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##### 1. *Pseudanthistiria hispida*, Hook. f. in F. B. I. vii, 219; Cke. ii, 992.

*Description*: Cke. l. c.

*Locality*: *Gujarat*: Surat (Garade!).—*Konkan*: Dahe Forest (Ryan 705!); Matheran (D'Almeida A329!); Ghatkoper, Horse-shoe Valley (McCann A326!); Sion (McCann 5247!); St. Xavier's College compound, Bombay (McCann 4524!); Kalyan (Woodrow).—*Deccan*: Lonavla (Gammie!); Purandhar Fort (Gammie 1010!); Igatpuri Ghats (McCann 4343!); Khandala, common, railway line (McCann A331!); Panchgani (Woodrow).—*S. M. Country*: Castle Rock (Gammie 15634, McCann A328!); Derikop (Sedgwick 2061!); Londa (Gammie 15863!, Woodrow).—*Kanara*: Birchy (Talbot 2096!); Yellapore (Talbot 1522!); Devimani Ghat (Kulkarni!).

*Distribution*: C. Provinces, W. Peninsula.

2. *Pseudanthistiria heteroclita*, Hook. f. in F. B. I. vii, 219.—*Andropogon heteroclitus*, Nees Fl. Afr. Austr. 115; Steud. Syn. Gram. 389; Hack. in Monogr. Androp. 400.—*A. monomerus*, Hochst. in Hohen. Pl. Ind. Or. no. 183.—*Anthistiria heteroclita*, Roxb. Fl. Ind. i. 249.

*Description*: Stems 30–80 cm. high, geniculate, slender, terete, smooth, subsimple or branched. Leaves linear, 15–30 cm. long, 3–5 mm. broad, glabrous or more or less ciliate on both surfaces, nerves distinct, margins with long, tubercle-based hairs or nearly glabrous; sheaths much shorter than the internodes, quite glabrous; ligule short, membranous, exauriculate. Panicles 20–30 cm. long, leafy, compound, with many shortly peduncled fascicles, fascicles of spikes about 12 mm. broad, proper spathes 7–10 mm. long, hardly longer than the spikes, towards the margin with long, tubercle-based bristles; spikes 6–8 mm. long. Sessile spikelets 3–4 mm. long, linear-oblong, hispidulous all over. Lower involucre glume furrowed. Upper floral glume awned, awn 18–24 mm. long, thin. Pedicelled spikelets lanceolate, with a few long, tubercle-based bristles, keel ciliate.

*Locality*: Konkan (Law ex Hook. f.).

*Distribution*: Bengal, Konkan, S. Kanara.

3. *Pseudanthistiria umbellata*, Hook. f. in F. B. I. vii, 220.—*Andropogon umbellatus*, Hack. Monogr. Androp. 401.



*Description*: A very slender, glabrous plant with filiform, prostrate, creeping branched stems, rooting at the nodes, stems 30-60 cm. long, compressed. Blade 2-5 cm. long, distant, linear-oblong, acute, rounded at base, sessile or short-petioled, nerves distinct, very slender, with a few scattered cilia on both surfaces, nearly smooth; sheaths shorter than the blade, often with tubercle-based hairs above, rarely glabrous; ligule passing at the sides into 2 short, herbaceous, fimbriate auricles of the sheath. Panicle leafy, very lax, interrupted, 12-20 cm. long; fascicles of spikelets few, axillary, 6-12 mm. broad, glabrous or with a few tubercle-based cilia on simple, rarely branched capillary peduncles shorter than the leaves; lower peduncles sometimes elongate, 2.5-7.5 cm. long and bearing several fascicles; outer spathes 8-25 mm. long; spikes 3-6 in a fascicle, proper spathe 10-12 mm. long, rather longer than the spikes, glabrous or towards the margin with a few bulbous-based hairs. Sessile spikelets 3-4.5 mm. long, linear, scaberulous. Lower involucrel glume dorsally concave; awn of upper floral glume 12-14 mm. long, very thin. Pedicelled spikelets linear-lanceolate, naked, awn 12-18 mm. long.

*Locality*: *S. M. Country*: Londa (Gammie 15869!).—*Kanara*: Birchy (Talbot 2073!).

*Distribution*: Deccan and W. Peninsula, Ceylon.

42. *DIGITARIA*, Hall. Hist. Stirp. ii (1768), 244; Stapf in Prain Fl. Trop. Afr. ix, 422.

Species more than 100, in the warm parts of the whole world, but chiefly in the Old World.

Cke. (ii, 940-942) describes 6 species. All are retained in this place, but the name of *Digitaria sanguinalis* will be replaced by *D. marginata*.

Key as in Cke.

1. *Digitaria ternata*, Stapf in Dyer Fl. Cap. vii, 376, *et* in Prain Fl. Trop. Afr. ix, 452; Cke. ii, 940.—*Paspalum ternatum*, Hook. f. in F. B. I. vii, 17.—*Panicum ternatum*, Hochst. in Flora xxiv (1841), 1, Intell. 19; Hack. in Oest. Bot. Zeitschr. (1901), 331.—*P. phænocarpum*, var. *gracile*, Nees Fl. Afr. Austr. 23.—*Cynodon ternatum*, A. Rich. Tent. Fl. Abyss. ii, 405.

*Description*: Cke. l. c. Occasionally long fine hairs are found on the peduncles.

*Locality*: Deccan: Purandhar Fort (Bhide!).—*S. M. Country*: Belgaum (Herb. Bot. Gard. Cal.).

*Distribution*: India (Khasia Hills, Burma, W. Peninsula), Yunnan, tropical and S. Africa.

2. *Digitaria marginata*, Link Hort. Berol. i, 229; Stapf in Prain Fl. Trop. Afr. ix, 439.

*Description*: Annual, 30 cm. to 1 m. high. Stems tufted, usually ascending from a geniculate or prostrate base, simple or branched from the lower nodes, glabrous, few to many-noded. Leaves 5-15 cm. by 4-8 mm., linear or linear-lanceolate from a slightly contracted and rounded base, acute, flat, flaccid, glabrous or sparingly hairy particularly towards the mouth, margins finely cartilaginous, rough and often crisp, midrib very slender, whitish; sheaths thin, subherbaceous, loose, glabrous, or more or less beset with spreading tubercle-based hairs often forming a loose beard at the base; ligules truncate, membranous, up to over 1 mm. long. Spikes mostly 4-9, sessile, subdigitate, solitary or 2-3-nate on a short, scaberulous common axis, erect or spreading, rather slender, strict or slightly flexuous 5-15 cm. long, often finely pubescent at the base; rhachis almost straight, triquetrous, lateral angles winged, herbaceous, scabrid, internodes up to more than 2 mm. long. Pedicels 2-nate, one very short, the other up to 1.5 mm. long, angular, scabrid. Spikelets appressed, lanceolate, acutely acuminate, 2-4 mm. long, pale greenish, rarely tinged with purple, variously hairy, rarely quite glabrous. Lower involucrel glume an ovate, obtuse to subacute membranous scale, usually not over 0.3 mm. long, sometimes obsolete or quite suppressed; upper ovate-lanceolate, acute, equalling or considerably exceeding half of the upper floral glume, rarely distinctly shorter, 3-nerved, with fine lines of hairs between the nerves and along the margins, rarely quite glabrous. Lower floral glume corresponding in outline and size to the spikelet, firmly membranous, 7-nerved, rarely quite glabrous, usually with fine lines of hairs between the inner side-

nerves (of each half) and along the margins; upper floral glume oblong-lanceolate, acutely acuminate, almost as long as the spikelet, thinly chartaceous, pale or slightly purplish, brownish when ripe. Grain oblong, plano-convex, whitish, scutellum less than half the length of the grain.

This species is not identical with *Paspalum sanguinale*, Lamk. of the F. B. I. or with *Digitaria sanguinalis*, Scop. in Cooke's Flora or in Haines' Bot. of Bihar & Orissa. *D. sanguinalis*, Scop. (*sensu stricto*) is a plant of S. Europe and has not been found either in India or tropical Africa, as was pointed out by Pilger (in Engl. Jahrb. xxx, 118) and Stapf. Most of the numerous synonyms given by Hook. f. in the F. B. I. would have to be mentioned under the different varieties. Here we have to deal only with one variety which was described by Cooke as var. *ciliaris*, Prain and which was called var. *fimbriata* by Stapf.

var. *fimbriata*, Stapf, l. c. 440.—*Digitaria fimbriata*, Link Hort. Berol. l. c. 226.—*D. commutata*, Schult, Mant. ii, 262.—*D. chrysolephora*, Fig. & De Not. in Mem. Acc. Tor. ser. ii, xiv, 364.—*Digitaria ciliaris*, var. *quadrastachya*, Wight.—*D. sanguinalis*, var. *ciliaris*, Rendle in Cat. Afr. Pl. Welw. ii, 163, and in Journ. Linn. Soc. Bot. xl, 228.—*Digitaria sanguinalis*, var. *ciliaris*, Prain Beng. Pl. 1181; Cke. ii, 940—*Panicum ciliare*, Retz. Obs. iv, 16; Kunth Enum. i, 82; Roxb. Fl. Ind. i, 290; A. Rich. Tent. Fl. Abyss. ii, 360; Dalz. & Gibs. Fl. Bomb. 290; Duthie Indig. Fodd. Grass. t. 9.—*P. fimbriatum*, Presl Rel. Haenk. i, 298; Kunth Enum. i, 81.—*P. sanguinale* var. *ciliare*, Franch. Contr. Fl. Congo Franc. 46.—*P. sanguinale* var. *blepharanthum*, Hack. in Durand & Schintz Consp. Fl. Afr. v, 762.—*P. sanguinale*, var. *macrostachyum*, Hack. l. c. 763.—*Paspalum sanguinale* var. *ciliare*, Hook. f. in F. B. I. vii, 15.

*Description*: Upper involucrel glume usually much exceeding the middle of the fertile floret and frequently equalling  $\frac{2}{3}$  of its length. Indumentum of spikelets uniform or more often more or less varied in the same inflorescence; hairs of the upper involucrel glume and lower floret partly in fine lines, all of one kind, very fine, thin-walled, obtuse-tipped, partly more thick-walled with slightly clavate tips, and up to 1 mm. long, spreading out at maturity and forming a rigid double fringe on each side of the spikelet, the inner fringe often mixed with a varying number of tubercle-based acute yellow bristles which ultimately also spread out at right angles.

It is well to remember what Stapf says in a note, l. c. 441: 'The peculiar indumentum of the spikelets, which in the mature state leads to the formation of spreading fringes, may extend to all spikelets alike or it may be, at least in its perfect development, confined to the long-pedicelled member of each pair of spikelets or only to some of them, in which case the indumentum of the fringeless spikelets approaches more or less that of var. *Linkii*.' Var. *Linkii*, Stapf is Hooker f.'s var. *commutatum* of *Paspalum sanguinale* in F. B. I. vii, 15.

*Vern. Names*: Tara (Surat); Shikaol or Arotaro (Dohad); Chansarietu (Broach); Taro, Modhan (Sind); Fakri, Fakria, Kurad, Suka, Revga, Dinohi, Shikar koli, Kalam hullu (Bijapur); Shimpigyan hullu (Belgaum) (ex Burns).

*Locality*: *Sind*: Sanghar (Sabnis B903!); Mirpurkhas, in cultivated fields (Sabnis B1209!); Bughar, Indus River (Blatter & McCann D686!); Ghulamalla, garden (Blatter & McCann D687!).—*Gujarat*: Cutch (Blatter 8742!); Ahmedabad (Herb. Econ. Bot. Poona!).—*Khandesh*: N. slope of Chanseli (McCann 9535!); Bor, Tapti Island, on sand and mud (Blatter & Hallberg 5463!); Muravat, Tapti Bank (Blatter & Hallberg 3839!); Umalla (Blatter & Hallberg 5178!); Amalner (Blatter & Hallberg 4443!); Sumit (Blatter & Hallberg 5188!); Bor, Bori River (Blatter & Hallberg 5213!); Dadgaum (McCann 9531!).—*Konkan*: Victoria Gardens, Bombay (McCann 9831!); Versova, Salsette (McCann 4308!); Malabar Hill (McCann 4300!); very common through the Islands of Bombay and Salsette (McCann!); Parsik, railway line (McCann 9530!); Bassein (McCann 4485!); Alibag, sandy shore (Ezekiel!).—*Deccan*: Khandala (McCann 3650!); Igatpuri (McCann 9833!); Purandhar (McCann 5606!); Chattarshinji (Ezekiel!); Pashan (Gammie!); Deolali (Blatter & Hallberg 4556!); Gangapur (Blatter & Hallberg 4581!); Panchgani, Maratha Well (Blatter & Hallberg B1233!).—*S. M. Country*: Haveri, dry ground, compound of P. W. D. (Talbot 2228!); Dharwar (Sedg-

wick !); Belgaum (Herb. Bot. Gard. Cal. !).—*Kanara*: Karwar (Talbot 1294 !); Haiyal (Talbot 2153 !); Kulgi (Talbot 2279 !).

*Distribution*: Tropics of both hemispheres, rarely found beyond the tropics.

3. *Digitaria pennata*, Chiov. in Result. Scient. Miss. Stefanini—Paoli i, 183; Cke. ii, 941, *erronee ascribens nomen Hookerof.*; Stapf in Prain Fl. Trop. Afr. ix, 472.—*Panicum pennatum*, Hochst. in Flora xxxviii (1855), 197; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 18.—*Paspalum pennatum*, Hook. f. in F.B.I. vii, 16.

*Description*: Cke. l. c.

*Locality*: *Sind*: Karachi (Stocks *teste* Hook. f.); Jemadar ka Landa, near Karachi (Stocks); Tatta, Kullian Kote (Blatter & McCann D684 !); Tatta (Blatter & McCann D685 !).—*Gujarat*: Porbandar (Bhide !); Morvi, Kathiawar (Woodrow).

*Distribution*: Baluchistan, tropical Arabia and Africa.

4. *Digitaria pedicellaris*, Prain Beng. Pl. (1903), 1181; Cke. ii, 941; Haines in Bot. Bihar & Orissa 1009.—*Paspalum pedicellare*, Trin. ex Steud. Nom. ed. 2 (1841), 272; Hook. f. in F.B.I., vii, 19.—*P. pedicellatum*, Nees & Arn. in Wight Cat. 2310; Duthie Grass. N. W. Ind. I.—*Milium sanguinale*, Roxb. Fl. Ind. i, 315 (*excl. syn. Burm.*).

*Description*: Cke. l. c.

*Locality*: *Konkan*: Thana (McCann 8725 !); Sion (Herb. S. X. C. !); Mulgaum (McCann 3663 !).—*Deccan*: Chattarshinji Hill, Poona (Ezekiel !).—*S. M. Country*: Hubli, elevation 2,000 ft., rainfall 30 inches (Sedgwick & Bell 4229 !).

*Distribution*: Throughout India.

5. *Digitaria longiflora*, Pers. Syn. i (1805), 85 (*non Trin.*); Cke. ii, 941; Stapf in Prain Fl. Trop. Afr. ix, 469; Haines in Bot. Bihar & Orissa 1008.—*Digitaria Pseudo-Durva*, Schlechtend. in Linnæa, xxvi, 458.—*D. linearis*, Schult. f. Mant. ii, 264 (*non Roem. and Schult.*).—*D. tenuiflora*, Stapf in Dyer Fl. Cap. vii, 380 (*non P. Beauv.*).—*Paspalum longiflorum*, Retz. Obs. iv, 15 (*non Trin.*); Baker Fl. Maurit. 431; Hook. f. in F.B.I. vii, 17 (*partim*).—*P. brevifolium*, Fluegge Gram. Monogr. 150.—*P. Pseudo-Durva*, Nees Fl. Afr. Austr. 21.—*P. filiculme*. Nees ex Thw. Enum. Pl. Zeyl. 358.—*Panicum longiflorum*, Gmel. Syst. 158.—*P. parvulum*, Trin. Pan. Gen. 117.—*P. argyrorichum*, Durand & Schintz Consp. Fl. Afr. v, 741 (*non Anders.*).—*Milium filiforme*, Roxb. Fl. Ind. i, 314.

*Digitaria tenuiflora*, P. Beauv. given as a synonym by Cke. seems to be a different species. It is apparently a perennial of erect habit and with long narrow leaves.

*Description*: Cke. l. c.

*Locality*: *Deccan*: Deolali (Blatter & Hallberg 9835 !).—*S. M. Country*: Dry uplands, Dharwar, elevation 2,400 ft., rainfall 34 inches (Sedgwick 2653 !); Belgaum (Herb. Bot. Gard. Cal.).—*Kanara*: Haiyal (Talbot 2310 !); Londa (Bhide !).

*Distribution*: Throughout India, Ceylon, tropical and S. Africa, Madagascar, Mascarenes, Malaya.

6. *Digitaria Royleana*, Prain Beng. Pl. (1903), 1181; Cke. ii, 942; Haines in Bot. Bihar & Orissa 1008.—*Paspalum Royleanum*, Nees ex Thw. Enum. (1864), 358; Hook. f. in F.B.I. vii, 18; Trin. Fl. Ceyl. v, 125.

*Description*: Cke. l. c.

*Locality*: *Konkan*: St. Xavier's College compound (McCann 4533 !); Mulgaum, Salsette (McCann 9523 !).—*Deccan*: Khandala (McCann 3651 !); Lonavla (Herb. Econ. Bot. Poona !); Purandhar Fort (Bhide !); Lina Hill, Nasik District (Blatter & Hallberg 4542 !); Lohagad, way up (McCann 9512 !); Katraj Ghat, 11 miles S.E. of Poona (Bhide !); Panchgani, slopes below Third Tableland (Blatter & Hallberg B1229 !); Panchgani, Maratha Well (Blatter & Hallberg B1224 !, B1281 !); Mahableshwar, in a garden, elevation 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4584 !); Suvasni Ghat (Woodrow).—*S. M. Country*: Dharwar, elevation 1,600 ft., rainfall 34 inches (Sedgwick 2843 !); Belgaum (Herb. Bot. Gard. Cal. !).—*Kanara*: (Talbot !)

*Distribution*: Hilly districts throughout India, Ceylon; apparently not in tropical Africa.

43. ALLOTEROPSIS, Presl, emend. Hitchc. in Contrib. U. S. Nat. Herb. xii, 210; Stapf in Prain Fl. Trop. Afr. ix. 482. (*Axonopus*, Beauv. ; Cke. ii, 925).

Stapf (l. c. 483) explains why he adopts *Alloteropsis*, Presl, as emended by Hitchcock. 'As Hitchcock (Contrib. U. S. Nat. Herb. xii, 210) has pointed out, Presl's description and analyses of *Alloteropsis* are based on a composition of a Panicoid and an Andropogonoid grass, whilst the original in Presl's herbarium is undoubtedly the plant described here as *A. semialata*, and so is also the habit figure (1) in Presl's plate. The genus is therefore accepted here with Hitchcock's emendation.'

'Another member of this genus, *A. cimicina*, was included by Palisot de Beauvois (Agrost. 12) in his genus *Axonopus* under its earliest synonym *Milium cimicinum* and as "*A. cimicinus?*" on p. 154, and this led J. D. Hooker (Fl. Brit. Ind. vii, 64) to use the name *Axonopus* in preference to *Alloteropsis*, a view which was adopted by myself in Fl. Cap. vii, 418. From P. Beauvois' diagnosis however, and from the fact that he quotes in the first place *Milium compressum* as example for *Axonopus*, there can be no doubt that he had primarily *Milium compressum* in view when establishing his genus *Axonopus*, and it is in that sense that the genus is understood in this work. *A. cimicina* also forms the basis of another genus, *Coridochloa*, Nees in Edinb. New Phil. Journ. xv, 381. A. Chase (in Proc. Biol. Soc. Washington, xxiv, 157) maintains this genus as distinct from *Alloteropsis*, and I followed her when drawing up the key of the genera of Tropical African grasses (p. 13); but I have since come to the conclusion that the species referable to these two groups are so similar in the peculiar structure of their spikelets that they are better merged into one genus for which *Alloteropsis* has priority over *Coridochloa*.'

We have, therefore, to add the characteristics of the genus as given by Stapf:

Perennial or annual. Leaf-blades flat or more or less convolute; ligules membranous, ciliate or ciliolate, short or reduced to a mere rim. Racemes sessile or peduncled, often more or less compound towards the base, digitate or subdigitate on a more or less elongated common axis. Spikelets ovate or elliptic to lanceolate-oblong; acute or acuminate, mostly awned, slightly or conspicuously compressed from the back, falling entire from the pedicels, 2-nate or fascicled, subsecund and abaxial on the triquetrous rhachis of more or less spiciform racemes. Lower floret usually male, upper hermaphrodite. Involucral glumes unequal, lower smaller, membranous to hyaline, 3-1-nerved, very acute, often mucronulate, upper equal or subequal to the spikelet, membranous to chartaceous, 5-nerved, with the outer nerves submarginal, densely ciliate along them. Lower floral glume resembling the upper involucral glume, but ciliate, pale short, deeply 2-fid with conspicuously auricled flaps, upper floral glume chartaceous, glabrous, delicately ciliolate upwards, 5-nerved, produced into a straight awn or mucronate, pale equal to the glume, 2-keeled, with broadly auricled flaps. Lodicules 2, broadly cuneate. Stamens 3. Styles distinct, stigmas laterally exerted. Grain enclosed by the glume and pale, elliptic-oblong, dorsally much compressed; scutellum about half the length of the grain; hilum basal, punctiform.

Species about 5.—In the tropics and the warm temperate zone of the Old World, 2 in India.

In the Bombay Presidency there is only one species:

1. *Alloteropsis cimicina*, Stapf in Prain Fl. Trop. Afr. ix, 487; Haines in Bot. Bihar & Orissa 1009.—*Milium cimicinum*, Linn. Mant. Alt. 184.—*Panicum cimicinum*, Retz. Obs. iii, 9; Roxb. Fl. Ind. i, 295; Steud. Syn. Pl. Glum. i, 43.—*P. conjugatum*, Dalz. & Gibs. Bomb. Fl. 291.—*Axonopus cimicinus?*, Beauv. Agrost. 154; Hook. f. in F. B. I. vii, 64; Hook. f. in Trim. Fl. Ceyl. v, 166; Cke. ii, 925.—*Urochloa cimicina*, Kunth Rev. Gram. i, 31, t. 103; Dalz. & Gibs. l. c. 289.—*Coridochloa cimicina*, Nees in Edinb. N. Phil. Journ. xv (1833), 381; A. Chase in Proc. Biol. Soc. Wash. xxiv, 158.—*C. fimbriata*, Nees ex Wight Cat. no. 1656; Aitchis. Cat. Panjab, Pl. 158.

*Description*: Cke. l. c.

*Locality*: Konkan: Sewri (McCann 3586 !); Mulgaum (McCann 3654 !).—Deccan: Sinhagad forests (Bhide !); Lina Hill, Nasik District (Blatter &

Hallberg 4583 !; Panchgani (Hallberg !).—*S. M. Country*: Dharwar (Sedgwick 2032 !, Woodrow); Gokak (Shevade !); Badami (Woodrow).—*Kanara*: Halyal (Talbot 2294 !); Kulgi (Talbot 2434 !).

*Distribution*: Tropical Africa, Madagascar, throughout India to Java.

44. *ERIOCHLOA*, H. B. & K.; Cke. ii, 944.

Species about 25.—In the warm parts of the whole world.

Cooke describes one species: *E. polystachya*, H. B. & K. which name has to cede to *E. ramosa*, O. Kuntze.

1. *Eriochloa ramosa*, O. Kuntze Rev. Gen. Pl. ii, 775; Hack. in Bull. Acad. Int. Bot. xvi, 19; Merrill in Philipp. Journ. Sc. i, Suppl. 348; Stapf in Prain Fl. Trop. Afr. ix, 498; Haines in Bot. Bihar & Orissa 1006.—*E. annulata*, Kunth Rev. Gram. i, 30, and Enum. i, 73; Duthie List Grass. N. W. Ind. 2; Benth Fl. Hongk. 409; Hack. in Engl. Jahrb. vi, 233.—*E. polystachya*, Duthie, Ill. Indig. Fodd. Grass. Ind. t. 41; Fodd. Grass. N. Ind. 2; Hook. f. in F.B.I. vii, 20; Cke. ii, 944; Rendle in Journ. Linn. Soc. Bot. xxxvi, 320 (non H. B. & K.!).—*Milium ramosum*, Retz. Obs. vi (1791), 22; Roxb. Fl. Ind. i, 317; Griff. Notul. iii, 15; Ic. Pl. Asiat. t. 139, f. 60.—*Agrostis ramosa*, Poir. Encycl. Suppl. i, 257.—*Paspalum annulatum*, Fluegge Monogr. Pasp. 133; Trin Sp. Gram. Ic. t. 133.—*Helopus lævis*, Trin. ex Spreng. Neue Entdeck. ii, 49, fig. 4.—*H. annulatus*, Steud. Syn. Glum. i, 99 (non Nees).—*Pipatherum annulatum*, Presl, Rel. Haenk i, 221 (non Raddi).

*Note*.—Masaja Honda in his Revisio Graminum Japoniæ (Bot. Mag. Tokyo 37 (1923), 113-124) is of opinion that *Eriochloa ramosa*, O. Kuntze, has to be partly emended and changed to the new species *Eriochloa Hackelii*. Details are wanting to form an opinion on this point.

*Description*: Cke. l. c.

*Locality*: *Sind*: Umerkot, in a garden (Sabnis B718 !); Jamesabad, on banks of a watercourse (Sabnis B967 !); Bughar, Indus River (Blatter & McCann D691 !); Tatta, Kullian Kote Lake (Blatter & McCann D692 !); Tatta (Blatter & McCann D693 !).—*Gujarat*: Ahmedabad (Gammie 16408 !).—*Konkan*: Bassein (Bhide !); Antop Hill (McCann 3613 !); Alibag, rice field (Ezekiel, !); Bandra, on walls and in ditches (McCann !); Bombay (Hallberg A141 !); Bombay, near Mahim (Woodrow, Lisboa); Bhandup, in an old distillery compound, in a ditch (Hallberg A19 !).—*S. M. Country*: Shiggaon, elevation 2,000 ft., rainfall 34 inches (Sedgwick 2356 !); Kunnur, elevation 2,000 ft., rainfall 35 inches (Sedgwick & Bell 4937 !); Ranibenur (Bhide !); Dharwar (Sedgwick !).—*Kanara*: Halyal (Talbot !).

*Distribution*: Tropics of the Old World, introduced into Ascension Island, St. Helena, Cuba.

45. *BRACHIARIA* Griseb. in Ledeb. Fl. Ross. iv, 469; Stapf in Prain Fl. Trop. Afr. ix, 505.

(Sect. *Brachiaria* and part of sect. *Paspaloideæ* of *Panicum* of the F.B.I.).

Perennial or annual. Leaf-blades linear to lanceolate, usually flat; ligules reduced to a narrow ciliate or ciliolate rim. Racemes usually subsessile and solitary on a common axis, sometimes bare at the base owing to the arrest of spikelets, rarely truly peduncled and panicle, simple or compound near the base, rarely to or beyond the middle; rhachis filiform, triquetrous or more or less flattened and herbaceous with a wavy or zig-zag midrib, which projects as a mostly acute keel on the face; pedicels solitary or in pairs, alternately to the right and the left of the facial angle or the midrib, if solitary all short or very short, if paired, the primary slightly to very much longer; spikelets closely appressed, always biseriate in the plane, but frequently becoming 1-seriate by the dovetailing of the alternate spikelets of the closely approximate ranks, more or less contiguous with their sides or imbricate, forming dense, spike-like racemes, or distant by almost their own length or more, glabrous or hairy. Spikelets more or less elliptic or oblong, more or less flattened or slightly depressed, convex on the base, falling entire from the pedicels, 1-2-, rarely more-nate, secund and adaxial (with lower involucre glume towards the axis and the convex side of the upper floral glume away from the axis), closely appressed to and 2-seriate on the triquetrous or flat rhachis of spiciform racemes; lower floret male or barren with a usually well-developed pale, very

rarely the latter suppressed. Involucral glumes dissimilar and mostly very unequal in length. Lower involucral glume shortest; upper resembling and more or less equalling the lower floral glume, 5-7- (rarely 9-) nerved. Lower floral glume 5-, rarely 7-nerved, the lateral nerves placed towards the margins and distant from the middle nerve; pale usually only slightly shorter than the valve with well-developed inflexed flaps, or the latter vanishing above the middle; upper floral glume oblong to elliptic in outline, emucronate, though sometimes contracted into an apiculus, crustaceous or subcoriaceous with firm involute margins, faintly 5-nerved; pale almost as long as the glume, 2-keeled, its sides tightly embraced by the valve. Lodicules 2, small, broadly cuneate. Stamens 3. Styles distinct; stigmas plumose, laterally exerted from the upper part of the spikelet. Grain tightly enclosed by the glume and pale, more or less flattened on both faces; hilum subbasal, punctiform; embryo half to over  $\frac{2}{3}$  the length of the grain.

Species about 80. In the warm parts of the whole world, but chiefly in Africa.

Cooke mentions 3 species which belong to this genus: *Panicum Isachne*, *P. ramosum* and *P. muticum*. To these we add *Brachiaria distachya* (*Panicum distachyum*).

- |  |     |                          |
|--|-----|--------------------------|
| A. Spikelets 0.5 mm. long or slightly more ... | 1.  | <i>B. Isachne</i>        |
| B. Spikelets 2.5-4 mm. long                    |     |                          |
| I. 90 cm. to 1.8 m. high ...                   | ... | 2. <i>B. mutica</i> .    |
| II. Less than 80 cm. high                      |     |                          |
| 1. Spikes 5-many ...                           | ... | 3. <i>B. ramosa</i> .    |
| 2. Spikes 2-4 ...                              | ... | 4. <i>B. distachya</i> . |

1. ***Brachiaria Isachne***, Stapf in Prain Fl. Trop. Afr. ix, 552; Haines in Bot. Bihar & Orissa 1004 (*habet Roth per errorem*).—*B. cruciformis*, Griseb. in Ledeb. Fl. Ross. iv, 469.—*Panicum Isachne*, Roth ex Roem. & Schult. Syst. ii, 458; Roth Nov. Pl. Sp. 54; Schult. Mant. ii, 252; Steud. Syn. Pl. Gl. i, 57; Hook. f. in F.B.I. vii, 28; Stapf in Dyer Fl. Cap. vii, 390; Cke. ii, 931.—*P. cruciforme*, Sibth. & Sm. Fl. Græca i, t. 59; Baker Fl. Maurit. 434; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 19; Duthie Grass. N.W. Ind. 3; Indig. Fodd. Grass. t. 43, Fodd. Grass. N. Ind. 6; Boiss. Fl. Or. v, 437.—*P. caucasicum*, Trin. Sp. Gram. Ic. t. 262.—*P. Wightii*, Nees Fl. Afr. Austr. 29.—*P. pubinode*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 363.—*Echinochloa cruciformis*, Koch in Linnæa, xxi, 437; Reichb. Ic. Fl. Germ. i, t. 29, fig. 1413.

*Description*: Cke. ii, 931.

*Locality*: *Sind*: (Herb. Econ. Bot. Poona!).—*Gujarat*: Surat (Chibber!, Dalzell teste Cooke).—*Khandesh*: Sungiri (Gammie 16552!); Dhulia Farm (Chibber!); Chanseli (McCann A92!); Nimb, Tapti Bank (Blatter & Hallberg 9571!); Dadgama (McCann 9562!); Tapti, Bhusawal (Blatter & Hallberg 5156!); Umalla village (Blatter & Hallberg 5159!); Bor, Bori River (Blatter & Hallberg 4424!).—*Konkan*: Clerk Rd., Bombay, along brackish water (Sabnis 9565!); very common in Bombay and Salsette Islands (McCann!).—*Deccan*: Yeola (Herb. Econ. Bot. Poona!); Mangiri, 8 miles E. of Poona (Gammie!); Sholapur (D'Almeida A91!); Deolali (Blatter 9570!, 9569!); Khandala, common (McCann 9566!); Purandhar, N. foot (McCann 9568!); Panchgani, below Sidney Point (Blatter & Hallberg 1271!).—*S. M. Country*: Nelogi, elevation 1,800 ft., rainfall 30 inches (Sedgwick 2134!); Haveri (Talbot 2150!).—*Kanara*: Halyal (Talbot 2150!).

*Distribution*: Throughout the plains of India in damp places, Ceylon, westwards to Italy and tropical and S. Africa.

\*2. ***Brachiaria mutica***, Stapf in Prain Fl. Trop. Afr. ix, 526.—*Panicum muticum*, Forsk. Fl. Aegypt.—Arab. 20; Link Hort. Berol. I, 206; Hook. f. in F. B. I. vii, 34, and in Trim. Fl. Ceyl. V, 140.—*P. numidianum*, Lam. III. I, 172; Boiss. Fl. Or. v, 438.—*P. purpurascens*, Raddi ex Opiz in Flora (1822), 266.—*P. barbinode*, Trin. Sp. Gram. Ic. t. 318; Duthie List Grass. N. W. Ind. 2.—*P. sarmentosum*, Benth. in Hook. Niger Fl. 561 (*non* Roxb.).—*P. equinum*, Steud. Syn. Pl. Glum. i, 73.—*P. molle*, Griseb. Fl. Brit. West Ind. 547 (*excl. syn.*); Baker Fl. Maurit. 436.

In adopting Forskal's name '*muticum*' for this species Stapf, according to his own words, has relied on Ascherson's identification (Asch. & Schweinf. Ill. Fl. Egypt 160) of the type with the Algerian *P. numidianum*.

**Popular Names :** Water Grass, Mauritius Grass, Para Grass, Scotch Grass, Buffalo Grass.

**Description :** Perennial 1-2.5 m. high. Stems ascending from a sometimes prostrate and copiously rooting base, stout, terete, usually many-noded and sheathed high up, simple or sparingly branched, glabrous, often waxy, pruinose below the nodes. Leaf-blades linear, up to 30 cm. long, 6-10 mm. broad glabrous or rarely more or less hirsute, margins scabrid. Panicle oblong to ovate-oblong in outline subsecund or almost quaquaversal, 6-20 cm. long; common rhachis terete to semiterete, more or less deeply channelled or triquetrous upwards, scabrid along the angles, glabrous. Racemes numerous, solitary or irregularly approximate, sometimes paired or in false whorls, shortly peduncled or subsessile, obliquely spreading, 7 (rarely 12) to 2.5 cm. long, mostly compound, glabrous, greenish or tinged with purple; rhachis flat, with a slender, raised midrib up to 1 mm. wide, villosulous at the base, otherwise glabrous; secondary racemes usually very short, and 6-3-spiculate; pedicels solitary or paired, very short, or if paired then the longer up to 1 mm. long, frequently with a few setules. Spikelets laterally contiguous or discontinuous, those of the secondary racemes often imbricate, oblong or lanceolate-oblong, acute, 3-3.5 mm. long, glabrous. Involucral glumes dissimilar, lower broad-ovate, acute to subacute, from less than  $\frac{1}{2}$  to not quite  $\frac{1}{2}$  the length of the spikelet, faintly 3-5-nerved, often tinged with purple; upper corresponding in outline and size to the spikelet, 5-7-nerved. Lower floral glume as long as the upper involucral glume and similar to it; pale narrowly oblong, subacute, almost as long as the glume, with narrow flaps; anthers 2 mm. long; upper floral glume slightly shorter than the spikelet, mostly 3 mm. long, oblong, subacute or minutely apiculate, pale yellowish, glume and pale crustaceous, very finely transversely wrinkled or almost smooth. Stigmas blackish-purple, very conspicuous.

**Locality :** Cultivated at Kirkee and Surat (Woodrow) and very likely in other places.

**Distribution :** A native of S. America and W. Africa, but introduced elsewhere (Stapf).

**Uses :** A fodder grass. See Kew Bull. (1894), 354.

3. *Brachiaria ramosa*, Stapf in Prain Fl. Trop. Afr. ix, 542; Haines Bot. Bihar & Orissa 1005.—*Panicum ramosum*, Linn. Mant. (1767), 29; Steud. Syn. Pl. Glum. i, 97; Hook. f. in F.B.I. vii, 36 (*partim*); Trim. Fl. Ceyl., v, 140; Prain Beng. Pl. 1175; Cke. ii, 932.—*P. arvense*, Kunth Rev. Gram. i, 391, t. 109.—*P. Petiveri*, Dis. ii, 144. (*partim*); Baker Fl. Maurit. 434; Aitchis. Cat. Panjab Pl. 160; Duthie Grass. N. W. Ind. 6, Fodd. Grass. N. Ind. 11; Boiss. Fl. Or. v, 439.—*P. brachylachnum*, Steud. l.c. 62.—*P. cognatissimum*, Steud. l.c. 69.—*P. patens*, Boj. Hort. Maurit. 365 (*non* Linn.).—*P. pygmaeum*, Boj. l.c.—*P. Helopus*, Watt. Dict. Econ. Prod. vi, part 1, 10 (*partim*).—*P. umbrosum*, Retz. Obs. 4 (1786), 16; Roxb. Fl. Ind. i, 297.

**Description :** Cke. ii, 932.—Stapf points out that this species occurs in a glabrous and a pubescent state, and that the original specimen in Linnæus' herbarium represents the former. 'The pubescence,' he says, 'if present, extends generally to the culms, the leaves, the axes of the inflorescence and the spikelets, the upper glume [upper involucral glume] and lower valve [lower floral glume]. On the blades it may be scanty and disappear with age. It does not seem to be correlated with any other character, and the area of the glabrous and pubescent states overlap completely, in fact both have been taken in the same collecting.'

He mentions another curious modification in which the lower floral glume is more firmly membranous to crustaceous and faintly transversely rugose and thus more or less resembles the upper floral glume (not the upper involucral glume as is normally the case). It has been collected in India and W. Africa.

**Locality :** *Sind*: Chachra (Mamlatdar of Chachra!); Shahabander (Karachi P.O.C. of Shahabander!); Sangarh (Sabnis B901!, B887!); Nasarpur, clayey soil (Sabnis B1057!).—*Gujarat*: Ahmedabad (Herb. S.X.C. 2165!); Mausari (Mamlatdar of Mausari!); Sumrasar, Cutch (Blatter 3756!).—*Khandesh*: Tamer, Tapti bank (Blatter & Hallberg 5172!); Antroli, Bori River (Blatter & Hallberg 5149!); Toranmal (McCann A142!).—*Konkan*: Malabar Hill (McCann!); Versova (McCann 9588!); Byculla (McCann 9586!); Sion (McCann 8689!); Bandra Hill, in fallow fields (Vakil A115!).—*Deccan*: Khandala (Sedgwick 2631!); Poona (Woodrow!); Lina Hill, Nasik District

(Blatter & Hallberg A145!).—*S. M. Country*: Dharwar, garden weed (Sedgwick 2651!); Haveri (Talbot 2231!); Badami (Woodrow teste Cooke).

*Distribution*: Throughout India, Ceylon, Afghanistan, tropical Africa (Upper Guinea, Cape Verd Islands).

4. *Brachiaria distachya*, Haines in Bot. Bihar & Orissa 1004 (*per errorem distachyum*).—*Panicum distachyum*, Linn. Mant. i, 138; Retz. Obs. iii, 17; Lamk. Ill. t. 43, f. 2; Steud. Syn. Gram. 41; Aitchis. Cat. Panjab, Pl. 159; Duthie Grass N. W. Ind. 3; Indig. Fodd. Grass. t. 42, Fodd. Grass. N. Ind. 6; Benth. Fl. Austral. vii, 478; Hook. f. in F.B.I. vii, 37.—*P. subquadriparum*, Trin. Gram. Panic. 145, Sp. Gram. Ic. t. 186.—*Digitaria distachya*, Pers. Syn. i, 85.

*Description*: A slender, creeping grass, glabrous or panicle sparsely hairy. Stems 30-60 cm. high. Leaves linear or lanceolate or linear-lanceolate, acuminate, 5-15 cm. by 3-6 mm., widest at the rounded or amplexicaul base, flat; sheaths ciliate or not on the margins, mouth hairy. Spikes 2-4, distant, 2.5-6.5 cm. long, rarely more than 10 cm., erect, at last spreading; rachis slender, glabrous. Spikelets variable in size, pale green, 3-4 mm. long, solitary, subsessile, spikately arranged in 2 (-1) series, ellipsoid, glabrous. Lower involucre glume embracing the spikelet and margins overlapping below,  $\frac{1}{3}$  to nearly  $\frac{1}{2}$  the spikelet, 5-7-nerved, obtuse or subacute; upper involucre glume ovate, acute, 7-nerved, paleate or not, pale if present narrow, neuter. Lower floral glume 5-nerved, upper ellipsoid, obtuse or rounded, 2 mm. long, brown and minutely transversely lineolate or obscurely rugulose when ripe.

*Locality*: *Gujarat*: Ahmedabad, banks and margins of fields around Ahmedabad (Sedgwick 239!).—*S. M. Country*: Dharwar (Sedgwick 2840!).

*Distribution*: India, Ceylon, China, Malaya, Australia.

46. *PASPALUM*, Linn. Syst. Nat. ed. x, 855; Cke. ii, 943.

Species over 200, chiefly in tropical America, only a few in the Old World. Cooke describes 3 species: *P. scrobiculatum*, Linn., *P. compactum*, Roth, and *P. distichum*, Linn., to which we add *Paspalum dilatatum*, Poir. *P. distichum* has to be replaced by *P. vaginatum*, Sw., for reasons detailed below.

I. Leaves over 14 cm. long

- |                         |     |     |                              |
|-------------------------|-----|-----|------------------------------|
| 1. Plant 60-90 cm. high | ... | ... | 1. <i>P. scrobiculatum</i> . |
| 2. Plant 1-1.5 m. high  | ... | ... | 2. <i>P. dilatatum</i> .     |

II. Leaves less than 11 cm. long

- |   |     |     |                          |
|---|-----|-----|--------------------------|
| 1. Leaves 2.5-7.5 cm long, 8-12 mm. broad | ... | ... | 3. <i>P. compactum</i> . |
| 2. Leaves 5-10 cm. long, 1.2-4 mm. broad  | ... | ... | 4. <i>P. vaginatum</i> . |

1. *Paspalum scrobiculatum*, Linn. Mantiss. (1767), 29; Hook. f. in F. B. I. vii 10; Cke. ii, 943; Haines in Bot. Bihar & Orissa 1000.—*P. scrobiculatum*, Linn. var. *Commersonii*, Stapf in Prain Fl. Trop. Afr. ix, 573.—*P. scrobiculatum*, Linn. var. *frumentaceum*, Stapf l. c. 575.—*P. scrobiculatum*, Linn. var. *polystachyum*, Stapf l. c. 576.—For further synonyms see Hook. f. and Stapf ll. cc. Hook. f. gives *P. orbiculare*, Forst. Prodr. 7 as a synonym, but Stapf considers it as a distinct species of the Polynesian and Indo-Malayan regions with an extension into New Zealand and Australia. Of Hook. f. syn. in the F. B. I. we wish to enclose only those which apply to spontaneous forms of the Old World.

As can be seen from the above synonymy we are not following Stapf in distinguishing several varieties or rather forms. He takes the cultivated forms of India to be the original *P. scrobiculatum* of Linnæus and calls it *P. scrobiculatum* var. *frumentaceum*. All the spontaneous forms of *P. scrobiculatum* as understood by most post-Linnæan authors are put by Stapf under *P. scrobiculatum*, Linn. var. *Commersonii*, the type for this combination being *P. Commersonii*, Lam. Ill. i, 175, t. 43, fig. 1. The third form var. *polystachyum* does not seem to occur in India.

*Description*: Cke. l. c.

*Locality*: *Sind*: Jamesabad, in bed of watercourse (Sabnis B979!); Bohara (Blatter & McCann D689!).—*Konkan*: Victoria Gardens, Bombay (McCann 4297!); Mulgaum, Salsette (McCann 3607!); Parsik, between stones of railway track (McCann 9516!); Vihar Lake, Salsette (McCann 9517!).—*Deccan*:



Khandala, in watercourse, on sandy soil (McCann 9824 !).—*S. M. Country*: Konankeri, Dharwar District, elevation 1,800 ft., rainfall 40 inches (Sedgwick & Bell 4966 !); W. of Dharwar, elevation 2,000 ft. rainfall 40 inches (Sedgwick & Bell 4452 !); Dastikop, elevation 2,500 ft., rainfall 35 inches (Sedgwick 2109 !); Dharwar (Garade !); Belgaum (Herb. Bot. Gard. Cal. !).—*Kanara*: Halyal (Talbot 2297 !); Karwar (Herb. Econ. Bot. Poona 2297 !, 618 !); Castle Rock (Gammie !).

*Distribution*: Tropics of the Old World.

\*2. *Paspalum dilatatum*,<sup>1</sup> Poir. Encycl. v, 35; New South Wales Agric. Gaz. x (1899), 32, with plate; Trin. Diss. 11, 113, with plates; Agric. Grass. U. S. 31-32; H. H. Mann in Dept. Agric. Bomb. Bull. 77, 68.—*P. ovatum*, Nees ex Trin. Gram. Panic. 113.—*P. pratense*, Spreng Syst. i, 247.—*P. Selloi*, Spreng. ex Nees Agrost. Bras. 43.

*Popular Names*: Golden Crown Grass, Hairy-flowered Paspalum.

*Description*: A tall, erect grass, about 1-1.5 m. high. Culm developing from a thick rootstock with 3-5 leaves; leaf at base of culm often about 30 cm. long, 8-12 mm. broad, smooth on both sides, rugose along the margins. Raceme 12-30 cm. long, having 5-10 somewhat spreading spikes, which are 7 cm. or more in length, 2.5-5 cm. apart, upper ones gradually shorter. Spikelets closely arranged in 4 rows, two on each side of the narrow and nearly straight axis in alternate pairs, 1.5-2 mm. wide, and 3-4 mm. long, ovate, acutely pointed, crowded and overlapping each other, compressed, margins clothed in silky hairs. Involucral glumes ovate, acute, 5-nerved, nearly smooth except the fringe of white hairs on the margin. Floral glumes thick, hard, and firm, very minutely punctate. Pale fitting inside the flowering glume and enclosing the stigmas and styles. Anthers linear. Styles 2; stigmas blackish-purple, plumose.

*Locality*: Cultivated. See Mann, l. c.

*Distribution*: Virginia, Mississippi, Louisiana, Texas, S. America, especially Brazil.

*Uses*: One of the best fodder grasses in N. America and is extensively cultivated there. For a full account see Kew Bull. (1902), 1-4.

3. *Paspalum compactum*, Roth Nov. Pl. Sp. (1821), 36; Kunth Enum. Pl. i, 61; Steud. Syn. Gram. 31; Hook. f. in F. B. I. vii, 12; Cke. ii, 943.—*P. militaria*, C. Muell. in Bot. Zeit. xix (1861), 325.—*P. Canaræ*, Steud. l. c. 58.—*P. imperfectum*, Roxb. ex Kunth l. c.

*Description*: Cke. l. c.

*Locality*: Konkan: Tiwari-Pada, Bassein (Herb. Econ. Bot. Poona 1690 !); Matheran, to Louisa Point (D'Almeida A243 !).—*Deccan*: Khandala, growing in gravelly soil, very common (McCann 9823 !); Igatpuri, very common (McCann 4587 !); Panchgani, First Tableland (McCann B1300!, B1265 !), Second Tableland (McCann B1242 !, B1292 !); Mahableshwar (Cooke, Woodrow).—*S. M. Country*: Londa (Bhide !); Belgaum (Hole 15 !).—*Kanara*: Yellapore (Talbot 657 !); Tinai (Talbot 2566 !); Castle Rock, elevation 1,900 ft., rainfall 250 inches (Sedgwick 2752 !); Karwar, Bingy Ghat (a very villious form, McCann) (Talbot 1529 !); Devimani, elevation 1,300 ft. (McCann A17 !).

*Distribution*: W. Peninsula of India.

4. *Paspalum vaginatum*, Sw. Prodr. Veg. Ind. Occ. 21, Fl. Ind. Occ. i, 135; Trin. Gram. Pan. 94, Panic. Gen. 53, Sp. Gram. Ic. t. 120; Kunth Enum. i, 52; Steud. Syn. Pl. Glum. i, 20; Hitchcock & Chase in Contrib. U. S. Nat. Herb. xviii, 307 (*non* P. Beauv. Fl. Owar.) ; Stapf in Prain Fl. Trop. Afr. ix, 570.—*P. vaginatum, forma longipes*, Lange in Vidensk. Medd. Naturh. Foren. Kjöbenh. (1854), 42, Pug. Pl. Hisp. i, 28.—*P. distichum*, N. L. Burm. Fl. Ind. 23; Gaertn. Fruct. ii, 2, t. 80; Kunth l. c.; Steud. l. c. 29; Baker Fl. Maurit. 431; Benth. Fl. Austr. vii, 460; Hack. in Forschungsgr. S. M. S. 'Gazelle' iv, 6; Hook. f. in F. B. I. vii, 12; Rendle in Journ. Linn. Soc. Bot. xxxvi, 319; Cke. ii, 943; Ridley Mat. Fl. Mal. Pen. iii, 124; Stapf in Dyer Fl. Cap. vii, 371; Merrill in Philipp. Journ. Sc. i, Suppl. i, 346 (*non* Linn.).—*P. distichum, var. vaginatum*, Griseb. Fl. Brit. W. Ind. 541.—*P. littorale*, R. Br. Prodr. 188; Trin.

<sup>1</sup> We have to thank Mr. K. Biswas, the Curator of the Herbarium of the Sibpur Botanic Garden, for most of the information contained under this species.

Gram. Pan. 95, Sp. Gram. Ic. t. 112.—*P. longiflorum*, P. Beauv. Fl. Owar. ii, 46, t. 85, fig. 2; Grah. Cat. Bomb. 234 (non Retz.).—*P. brachiatum*, Trin. ex Nees Agrost. Bras. 62.—*P. foliosum*, Kunth Rev. Gram. i, 25.—*P. squamatum*, Steud. l. c. 21.—*P. inflatum*, A. Rich. in Ram. de Sagra Fl. Cub. iii, 298.—*P. kleinianum*, Presl Rel. Haenk. i, 209.—*P. Boryanum*, Presl l. c.—*Digitaria foliosa*, Lag. Gen. et Sp. Nov. 4.—*D. vaginata*, Philippe Fl. d. Pyren. ii, 415.—*D. paspaloides* var. *longipes*, Lange ex Willk & Lange Prodr. Fl. Hisp. i, 45.—*Sanguinaria vaginata*, Bub. Fl. Pyren. iv, 258.

To explain the change of name from *P. distichum*, Linn. to *P. vaginatum*, Sw., and to elucidate certain points of the above synonymy taken from Stapf, it will suffice to quote the short explanation given in the Fl. Trop. Afr. p. 572: 'Frequently confused with *Paspalum distichum*, Linn. (Herb. Linn.!) which has broader and flatter leaves, mostly sessile or subsessile lateral spikes and spikelets with firmer sides and a more convex upper glume, which is appressedly and silky pubescent.'

*Description*: Cke. ii, 943.

*Locality*: *Gujarat*: Marshy edge of the Bokh, Prantij (Herb. Econ. Bot. Poona!).—*Konkan*: Marine Lines, Bombay (Hallberg 9514!); sea-shore, Bombay (Woodrow); Malabar Hill, Bombay (McCann 3609!); St. Xavier's College compound (McCann 9830!); Alibag, sandy shore (Ezekiel!); Malwan (Woodrow).

*Distribution*: Tropics of the whole world, mostly on the sea-shore; introduced into Galicia (Spain) and the Western and Central Pyrenees.

47. PASPALIDIUM, Stapf in Prain Fl. Trop. Afr. ix (1917), 15 *clavi et l. c.* (1920), 582.

(Sect. *Paspaloideæ* in F. B. I. *partim*).

Perennial, semiaquatic or terrestrial. Leaves linear, flat or involute. Ligule a ciliolate rim. Racemes sessile or sub-sessile and secund on the alternate notches of a triquetrous common axis of a false compound spike, more or less appressed to the more or less hollowed-out flanges of the latter. Rhachis ending in a subulate point. Spikelets mostly conspicuously 2-seriate, nearly always quite glabrous, ovate to ovate-oblong or ovate-lanceolate (when seen in front view), awnless, falling entire from the pedicels, solitary, secund and abaxial on the rhachis. Involucral glumes mostly dissimilar and very unequal in length; lower reduced to a small scale or up to, rarely over, half the length of the spikelet, upper mostly almost equalling the spikelet, 5-7-nerved with the nerves evenly distributed, rarely both glumes much reduced. Lower floral glume similar to the upper involucral glume with the inner side-nerves more distant, pale if present only slightly shorter than its glume with well developed inflexed flaps; upper floral glume oblong to elliptic in outline, acute to apiculate; emucronate, crustaceous with firm involute margins, faintly 5-nerved, pale almost as long as its glume, 2-keeled, its sides tightly embraced by the glume all along. Lodicles 2, small, broadly cuneate. Stamens 3. Styles distinct; stigmas plumose, laterally exerted from the upper part of the spikelet. Grain tightly enclosed by the more or less hardened glume and pale.

Species about 12.—In the warm countries of the whole world. Six are confined to Australia and New Caledonia.

Cooke (ii, 929) describes 3 species belonging to this genus: *Panicum flavidum*, Retz., *P. punctatum*, Burm., and *P. fluitans*, Retz. We retain all, but substitute the older name *geminatum* for *fluitans*.

- |      |   |   |     |     |     |                          |
|------|---|---|-----|-----|-----|--------------------------|
| I.   | Lower spikes shorter than the internodes.               | Upper involucral glume shorter than the upper floral glume        | ... | ... | ... | 1. <i>P. flavidum</i> .  |
| II.  | Lower spikes as long as or longer than the internodes.  | Upper involucral glume about $\frac{1}{2}$ the upper floral glume | ... | ... | ... | 2. <i>P. punctatum</i> . |
| III. | Lower spikes as long as or shorter than the internodes. | Upper involucral glume mostly as long as the upper floral glume   | ... | ... | ... | 3. <i>P. geminatum</i> . |

1. *Paspalidium flavidum*—A. Camus in Lecomte Fl. l'Indo-Chine, vii 1, 419; Haines in Bot. Bihar & Orissa 1001 (*erronee attribuens combinationem Stapfio*).—*Panicum flavidum*, Retz. Obs. iv (1786), 15; Griff. Notul. iii, 33; Ic. Pl. As. t. 139, fig. 67; Duthie Grass. N. W. Ind. 3, Indig. Fodd. Grass. t. vi,

Fodd. Grass. N. Ind. 7; Benth. Fl. Austr. vii, 474; Hook. f. in F.B.I. vii, 28; Cke. ii, 929.—*P. brizoides*, Jacq. Eclog. Gram. (1813), 2, t. 2; Roxb. Fl. Ind. i, 293; Dalz. & Gibs. Bomb. Fl. 290; Duthie Grass. N. W. Ind. 2; Aitchis. Cat. Panjab Pl. 159; Baker Fl. Maurit 433.—*P. floridum* Royle III. Bot. Himal. 420.

*Description*: Cke. ii, 929.

*Locality*: *Sind*: Sanghar (Sabnis B762!).—*Gujarat*: Near Surat (Dalzell & Gibson *teste* Cooke); Morvi, Kathiawar (Woodrow *teste* Cooke); Porbandar, Kathiawar (Woodrow *teste* Cooke).—*Konkan*: Mulgaum (McCann 9579!); Thana (McCann 8726!); N. & S. Konkan (Laws *teste* Cooke).—*Deccan*: Poona (Bhide!); Mr. Gammie's compound, Kirkee (Bhide 894!); Khandala (Woodrow *teste* Cooke!).—*S. M. Country*: Konankeri, in a small tank, elevation 1,800 ft., rainfall 40 inches (Sedgwick & Bell 4964!); Belgaum (Herb. Econ. Bot. Poona!).—*Kanara*: Yellapore (Talbot!); Halyal (Talbot 2095!).

*Distribution*: Plains of India, Ceylon, tropical Asia (not in tropical Africa as reported by Hook. f. and Cooke).

2. *Paspalidium punctatum*, A. Camus in Lecomte Fl. l'Indo-Chine, vii, 419; Haines in Bot. Bihar & Orissa 1001 (*erronee attribuens combinationem Stapfio*).—*Panicum punctatum*, Burm. Fl. Ind. (1768), 26; Hook. f. in F.B.I. vii, 29; Cke. ii, 929.

*Description*: Cke. l.c.

*Locality*: *Deccan*: Poona (Woodrow, Lisboa); Ahmednagar (Woodrow).

*Distribution*: Throughout India in marshes, Ceylon, Malaya (not in tropical Africa).

3. *Paspalidium geminatum*, Stapf in Prain Fl. Trop. Afr. ix (1920), 583; Haines in Bot. Bihar & Orissa 1002.—*Panicum geminatum*, Forsk. Fl. Aegypt.—Arab. 18; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 19; Hack. in Bull. Herb. Boiss. iv, App. iii, 14; Hitchcock & Chase in Contrib. U.S. Herb. xv, 30.—*P. fluitans*, Retz. Obs. iii, 8 et v, 18; Willd. Sp. Pl. i, 338; Kunth Enum. i, 78; Steud. Syn. Pl. Glum. i, 59; Miq. Fl. Ind. Bat. iii, 455; Baker Fl. Maurit. 433; Cke. ii, 929.—*P. brizoides*, Lam. Ill., 1, 170 (*non* Retz.).—*P. paspaloides*, Pers. Syn. i, 81; Kunth Enum. i, 77; Steud. l.c. 60; Boiss. Fl. Or. v, 436; Balfour f. Fl. Socotra 310; Hook. f. in F.B.I. vii, 30, in Trim. Fl. Ceyl. v, 135.—*P. beckmanniaeforme*, Mikán ex Trin. in Spreng. Neue Entdeck. ii, 83; Spreng. Syst. i, 309.—*P. truncatum*, Trin. Diss. ii. 130, et Sp. Gram. Ic. t. 168.—*P. affine*, Nees Agrost. Bras. 113.—*P. brizaeforme*, Presl Rel. Haenk. 302; Steud. l.c. 60.—*P. numidianum*, Sieb. ex Schult. Mant. ii, 267 (*non* Lam.).—*P. carnosum*, Salzmann ex Steud. l.c.—*P. appressum*, Doell. in Mart. Fl. Bras. ii, 184.—*P. glomeratum*, Buckl. Prel. Rep. Geol. Agr. Surv. Tex. app. 3 (*non* Moench.).—*P. turgidum*, Cheval. Sudania 25.—*Paspalum appressum*, Lam. Ill. i, 176.—*Digitaria appressa*, Pers. l.c. 85.—*D. affinis*, Roem. & Schult. Syst. ii, 470.

*Description*: Cke. ii, 929.

*Locality*: *Sind*: Munchar Lake (Stocks *teste* Cooke); Tatta (Blatter & McCann D611!, D612!).—*Gujarat*: Porbandar (Bhide!); Lasundra (Chibber!); Ahmedabad, canal banks (Sedgwick!); Cutch, Anjar, tank (Blatter 3745!).—*Khandesh*: Dhulia (Chibber!); Borod, growing in water, partly submerged (McCann A97!).—*Konkan*: Mahaluxmi (Sabnis 5449!); opposite Kantwadi, sandy shore, Bandra (Vakil A99!); Victoria Gardens (McCann A100!); common in Bombay Isl. (McCann!).—*Deccan*: Bund Gardens, Poona (Garade 343!); sides of stream Dangar Guy, Ahmednagar (T. Cooke 6!); Manmad, river bed (Blatter A94!); Sholapur Tank, in water (D'Almeida A95!); Pashan (Gammie!); Iगतपुरी (Blatter & Hallberg 5492!).—*S. M. Country*: Dharwar (Sedgwick 3692!); Shiggaon (Sedgwick 2081!).—*Kanara*: Halyal (Talbot 2149!).

*Distribution*: More or less throughout India, Ceylon, Afghanistan, Arabia, tropical Africa and America.

48. UROCHLOA, Beauv. Agrost. 52, t. xi, fig. 1; Stapf in Prain Fl. Trop. Afr. ix, 586.

Perennial or annual. Leaves linear to lanceolate, flat; ligules a ciliate rim. Racemes sessile or subsessile on a common axis, simple or nearly so; rhachis more or less triquetrous with a low almost straight or zigzag facial angle or keel,

rarely strap-shaped; pedicels solitary or in pairs, alternately to the right and the left of the facial angle, usually reduced to short disc-tipped stumps, or if binate the primary slightly longer. Spikelets close, contiguous or slightly discontinuous, 2 or irregularly pluri-seriate, glabrous or hairy, broad-ovate to elliptic or lanceolate-oblong, awiless, usually more or less flattened or slightly depressed abaxially, convex on the back, falling entire from the pedicels, solitary or binate or in fascicles of 3-4, second and abaxial on the rachis, involucrel glumes similar and subequal or more often dissimilar and very unequal in length, the lower being the shorter, upper resembling and more or less equalling the lower floral glume, 5-11 (mostly 7-) nerved. Lower floral glume 5-7-, rarely more-nerved the inner lateral nerves somewhat distant from the midnerve, pale subequal to the glume, with well-developed inflexed flaps and sharp sometimes marginate keels; upper floral glume elliptic to rotundate-elliptic in outline, very obtuse, with usually scabrid or barbellate mucro, narrowly involute, 5-7-nerved, pale almost as long as the glume, 2-keeled, the sides tightly embraced by the valve all along. Lodicules 2, small, broadly cuneate. Stamens 3; styles distinct; stigma plumose, laterally exerted upwards. Grain tightly enclosed by the glume and pale, broadly to rotundate-elliptic, dorsally compressed.

Very similar to *Brachiaria*, but with the orientation of the spikelets inverted and a short fine mucro from the very obtuse apex of the fertile valve. Although very similar in general appearance, none of the species of *Urochloa* can be said to approach closely members of the genus *Brachiaria*. Their affinities are clearly *inter se*, suggesting a distinct line of evolution. The occurrence of parallel states, one with glabrous, the other with pubescent spikelets, but otherwise indistinguishable, runs almost through the whole genus. To this may be added the presence of a submarginal fringe in the lower floret, almost normal in some and very rare in other species, and apparently in no case correlated with other characters." (Stapf l.c.).

Species about 18.—Hot parts of the Old World, one in America, but perhaps introduced.

Cooke describes 3 species of *Panicum* which belong here: *Panicum prostratum*, Lamk., *P. setigerum*, Retz., and *P. javanicum*, Poir., to which we add *Urochloa marathensis*, Henrard.

- |  |     |     |                            |
|--|-----|-----|----------------------------|
| A. Spikelets up to 2 mm. long                | ... | ... | 1. <i>U. reptans</i> .     |
| B. Spikelets 2.5-5 mm. long                  |     |     |                            |
| I. Spikelets lanceolate, acuminate           | ... | ... | 2. <i>U. setigera</i> .    |
| II. Spikelets ovate to elliptic-oblong       |     |     |                            |
| 1. Leaves about 3 cm. long. Racemes 2 cm.    |     |     |                            |
| long ...                                     | ... | ... | 3. <i>U. marathensis</i> . |
| 2. Leaves 3.5-15 cm. long. Racemes 2.5-5 cm. |     |     |                            |
| long ...                                     | ... | ... | 4. <i>U. Helopus</i> .     |

I. *Urochloa reptans*, Stapf in Prain Fl. Trop. Afr. ix, 601; Haines in Bot. Bihar & Orissa 1003.—*Panicum reptans*, Linn. Syst. Nat. ed. x, 870; Hitchc. & Chase in Contrib. U. S. Nat. Herb. xv, 36, fig. 17, excl. *P. grossarium*.—*P. repens*, N. L. Burm. Fl. Ind. 26, t. 11, f. 1; Rottl. in Neue Schrift. iv, 182; Roxb. Fl. Ind. i. 302; Boj. Hort. Maur. 364 (non Linn.).—*P. prostratum*, Lam. III. i, 171; Miq. Fl. Ind. Bat. iii, 446; Griseb. Fl. Brit. W. Ind. 546; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 20; Baker Fl. Maur. 435; Duthie List. Grass. N. W. Ind. 6; III. Indig. Fodd. Grass. t. 45; Fodd. Grass. N. Ind. 11; Boiss. Fl. Or. v, 438; Dalz. & Gibs. 290; Hook. f. in F.B.I. vii, 33; Cke. ii, 932; Merrill in Philipp. Journ. Sc. i, 355.—*P. barbatum*, Lam. l. c.—*P. caespitosum*, Sw. Fl. Ind. Occ. i, 146.—*P. Sieberi*, Link. Hort. Berol. i, 207.—*P. procumbens*, var. Nees Agrost. Bras. 109.—*P. crispum*, Llanos, Fragm. 42.—*P. insularum*, Steud. Syn. Pl. Glum. i, 61.—*P. calaczenze*, Steud. l. c. 65.—*P. aurelianum*, Hale in Wood Classb. ed. iii, 787.—*P. viaticum*, Salzm. ex Doell in Mart. Fl. Bras. ii, ii, 155.—*P. marginatum*, Vahl ex. Hook. f. l. c.—*Brachiaria prostrata*, Griseb. in Abh. Ges. Wiss. Goett. vii, 263.

Description: Cke. ii, 932, under *Panicum prostratum*.

Locality: Gujarat: Ahmedabad, famine grass plot, Bedar (Herb. Gujarat College!); Ghad, on black soil (Sedgwick 1124!).—Khandesh: Nandurbar, (Mamlatdar of Nandurbar!); Umalla, Tapti bank (Blatter & Hallberg 5229!); Bor, Tapti (Blatter & Hallberg 4417!).—Konkan: Vasco da Gama (Bhide!); Matunga, salt pans (Sabis 9572!); Byculla (McCann 9577!).—Deccan: Kirkee

(Bhide!); Poona (Herb. Econ. Bot. Poona!); Deolali (Blatter A107!); Sholapur (D'Almeida A108!, A109!).—*S. M. Country*: S. W. of Dharwar, elevation 1,800 ft., rainfall 90 inches (Sedgwick & Bell 4437!); Dharwar, under trees on black soil, elevation 2,400 ft., rainfall 34 inches (Sedgwick 2882!).

*Distribution*: Plains of India, Ceylon, Tropics generally, subtropical America, also tropical Arabia and the Mascarenes.

2. *Urochloa setigera*, Stapf in Prain Fl. Trop. Afr. ix, 598; Haines in Bot. Bihar & Orissa 1003.—*Panicum setigerum*, Retz. Obs. iv, 15; Roxb. Fl. Ind. i, 299; Kunth Enum. i, 90 (*excl. syn. nonnullis*); Hook. f. in F. B. I. vii, 37; Trim. Fl. Ceyl. v, 141; Cke. ii, 933.—*P. affine*, Poir. Encycl. Suppl. iv, 273 (ex Kunth).

*Description*: Cke. ii, 933, under *Panicum setigerum*.

*Locality*: *Sind*: Mirpur Sakro (Blatter & McCann D609!); Gharo (Blatter & McCann D610!).—*Gujarat*: Rajkot, Kathiawar (Woodrow 45 teste Cooke!).—*Khandesh*: Dhulia (Herb. Econ. Bot. Poona!).—*Konkan*: Bassein (Paranjpe!).—*Deccan*: Ganeshkhind Bot. Gardens (Herb. Econ. Bot. Poona!); Mangiri Farm, 11 miles S. E. of Poona (Herb. Econ. Bot. Poona!).

*Distribution*: India, Ceylon, Mauritius, tropical and S. Africa.

*Note*: We do not think there is any good reason for retaining Hook. f.'s var. *tomentosa* which was also mentioned by Cke. l. c. We refer to the note given above after the general characteristics of the genus and add what Stapf says with regard to this species in particular: 'The African specimens have glabrous spikelets. In India, however, the pubescent form appears to be prevalent.'

3. *Urochloa marathensis*, Henr. in Mededeel. Rijks Herb. 43 (1922), 1-3, pl. 1.—*Panicum marathense*, Henr. in Herb. Lugd. Bat.

*Distribution*: Annual, dwarf and robust, glaucous, branching from the lower geniculations. Stems low, striate, quite glabrous, few-noded, nodes pubescent. Leaf-sheaths terete or slightly compressed, striate, lower ones gaping, upper ones tight, shorter than the internodes, hirsute with bulbous-based hairs. Ligule very short, covered with long hairs. Blade cordate at the base, linear-lanceolate, gradually acuminate, more or less 3 cm. long, 5-7 mm. broad, flat, on both sides but especially on the upper sparingly covered with spreading bulbous-based hairs, margin thickened, distinctly undulate, fimbriate with long tubercular hairs. Racemes 2-3, distant from each other more or less 1 cm., 2 cm. long, stout, erect-patulous or finally reflexed; rachis subtrigynous, pilose at the base, more than twice as narrow as the spikelets slightly undulate, the angles scaberulous, otherwise glabrous, giving off solitary pedicels. Spikelets biseriate, broadly elliptic, very acute, 4 mm. long, anteriorly almost flat, posteriorly very convex, green, glabrous. Involucral glumes very unequal. Lower almost  $\frac{1}{2}$  of the spikelet, subobtusate, 5-nerved, upper as long as the spikelet, very acute, distinctly 7-9-nerved. Lower floral glume equal in shape to the upper involucral glume, flat, 5-nerved, glabrous on the back tubercular-echinulate near the margin, except near the tip and base, paleate. Upper floral glume shorter than the preceding glumes, elliptic with a rounded tip, rigid, opaque, brown-straw-coloured, rugulose, long caudate, 5-nerved, bullate below.

*Locality*: S. M. Country and N. Kanara (A. P. Young ex Henrard). We have not seen the specimen.

*Distribution*: So far endemic.

*Note*: Henrard has a variety from the same localities: var. *Velutina*, which differs from the type by the densely pubescent spikelets. What we said in a note under the previous species can be applied here.

4. *Urochloa Helopus*, Stapf in Prain Fl. Trop. Afr. ix, 595; Haines in Bot. Bihar & Orissa 1002.—*U. pubescens*, Kunth Rev. Gram. i, 31, Enum. Pl. i, 74.—*U. panicoides*, Schult. Mant. ii, 595 (*non Beauv.*).—*Panicum Helopus*, Trin. in Spreng. Neue Entdeck. ii, 84; Panic. Gen. 150, et Gram. Ic. et Descr. ii, t. 183; Nees Agrost. Bras. 117; Steud. Syn. Pl. Glum. i, 57; Duthie List Grass. N. W. Ind. 4, Fodd. Grass. N. Ind. 8.—*P. Helopus* var. *glabrescens*, K. Schum. in Engl. Pf. Ost.—Afr. C. 101; Stapf in Dyer Fl. Cap. vii, 392.—*P. hirsutum*, Koen. ex Roxb. Fl. Ind. i, 300.—*P. Koenigii*, Spreng. Syst. i, 311.—*P. hochstetterianum*, A. Rich. Tent. Fl. Abyss. ii, 369.—*P. geminatum* Hochst. ex A. Rich. l.c. (*non Forsk.*).—*P. controversum*, Steud. Syn. Pl.

Glum. i, 60; Schweinf. in Bull. Herb. Boiss. II, ii, 19.—*Setaria? hirsuta*, Kunth Rev. Grain. i, 47, Enum. Pl. i, 157.—*S. pilifera*, Spreng. Syst. iv, Cur. Post. 33.—*Panicum javanicum*, Hook. f. in F.B.I. vii, 35 (*non* Poir, *partim*); Cke. ii, 933 (*partim*).

This is the species which was described by Hook. f. and many others, amongst them by Cooke, under the name of *Panicum javanicum*, Poir. According to Stapf *P. javanicum*, frequently confused with *U. Helopus*, is *U. panicoides*, Beauv., a distinct species. A number of synonyms and references have, according to the same authority, to be excluded from the F.B.I. under *Panicum javanicum*: Bentham's Flora of Australia (vii, 476) mentions *Panicum Helopus*, but it is partly *Brachiaria notochlona*, Stapf (*Panicum notochlona*, Domin) and partly *Brachiaria ramosa*, Stapf. T. 7 in Duthie's Fodd. Grass. does not represent *Panicum Helopus*, but *Brachiaria ramosa*, Stapf. *Urochloa panicoides*, Beauv. is a synonym of *Panicum javanicum*, Poir. *P. trichopus*, Hochst. is *Urochloa trichopus*, Stapf.

As a number of foreign elements have crept into the usual descriptions of our species we give Stapf's description of *P. Helopus*.

Annual. Stems tufted, 30–60 cm. high, erect or geniculately ascending from a short sometimes rooting base, frequently sparingly branched from the lower nodes, 4–10-noded, intermediate internodes like the uppermost (peduncle) very sparingly pubescent or almost glabrous. Leaf-blades lanceolate to linear-lanceolate from a wider and semi-amplexicaul base, 3.5–15 cm. by 8–12 mm rarely up to 25 cm. and then linear and narrowed towards the base, soft, flat, pale or yellowish-green, loosely and often finely hirsute with tubercle-based hairs, rarely almost glabrous, margins usually crisped or wavy and more or less ciliate. Sheaths somewhat loose, pale, striate, densely ciliate upwards, more or less shortly hirsute with the hairs tubercle-based, nodes pubescent to subvillous. Ligules a densely ciliate rim. Inflorescence of mostly 4–7 erect or at length more or less spreading stiff or slightly flexuous sessile or subsessile spiciform secund racemes; common axis 1.2–5 (rarely 7.5 cm.) long, subsemiterete below, much flattened upwards, pubescent. Racemes moderately dense, 2-seriate, simple, 2.5–5 cm. long, solitary or here and there approximate and then unevenly distributed; rachis straight or slightly wavy, flat on the back, about 1 mm. wide, villous at the base, glabrous upwards, rarely sparingly hairy, angles scabrid; internodes up to 1 mm. long; pedicels solitary, reduced to short stout stumps with discoid tips, frequently bearing some long spreading hairs. Spikelets laterally contiguous or subcontiguous ovate to elliptic-oblong, very acute, 4–5 mm. long, greenish, glabrous or pubescent. Involucral glumes dissimilar; lower broad-ovate, subobtusely to acute, clasping at the base, 1.5–2 mm. long, glabrous or sparingly and minutely pubescent, 5-nerved upper one corresponding in size and outline to the spikelet, prominently 7–11 (mostly 9-) nerved, glabrous or pubescent. Lower floral glume very similar to the upper involucral glume, but flat or slightly depressed, 5–7-nerved with the inner side-nerves distant, glabrous or pubescent, pale oblong, acute, slightly shorter than its glume. Anthers 2 mm. long. Upper floral glume rotundate-elliptic, greenish to pale brown, 2.5–3 mm. long, pale finely transversely rugose or granular, mucro up to 1 mm. long, sparingly barbellate. Grain rotundate-elliptic on outline, much compressed, about 2 mm. long, yellowish or greenish.

*Locality*: Gujarat: Baroda (Cooke teste Cooke).—*Deccan*: Katraj Ghat, 11 miles S. E. of Poona (Shevade!); Poona (Woodrow!); Deolali (Blatter A110!); Ganeshkhind Bot. Gardens (Patwardhan!); Chattarshinji (Bhide!); Mangiri, near Poona (Gammie 15344!); Akola (Mamlatdar of Akola!); Dapuri near Poona (Jacquemont 482!).—*S. M. Country*: Dharwar, elevation 2,500 ft., rainfall 35 inches (Sedgwick 2157!); Kilgerry (Talbot 2419!); Haveri (Talbot 2284!); Bijapur (Meebold 11201!); Badami (Woodrow teste Cooke).—*Kanara*: Kulgi, elevation 2,000 ft. (Talbot 2283!); Nundgod (Mamratdar of Nundgod).

*Distribution*: Plains of India, Ceylon, tropical and S. Africa, Mauritius.

49. ECHINCHLOA, Beauv. Agrost. 53, t. 11, fig. 2; Stapf in Prain Fl. Trop. Afr. ix, 604.

Annual or perennial. Leaf-blades from a slightly constricted or equally wide rarely much attenuated base. Ligules 0 or represented by a transverse fringe of hairs. Panicles of crowded or loosely arranged secund spiciform branches

mostly bearing spikelets from the base or near it. Spikelets ovate to elliptic- or lanceolate-oblong, usually cuspidate or awned, very convex on the back, flat or slightly depressed in front, falling entire from the pedicels, 2-nate or clustered, second and abaxial on the triquetrous rachis of racemously arranged false spikes. Involucral glumes unequal, membranous, the lower much shorter, more or less ovate from a clasping base, 3-5-nerved, often mucronate, the upper corresponding in length and outline to the spikelet (as seen from the back), very concave, 5-7-nerved, acute, cuspidate or cuspidate, rarely produced into a short awn. Lower floret equalling the upper glume (excluding cusps or awns); lower floral glume very similar to the upper involucral glume, but flat or depressed on the back and often with a more pronounced cusp or an awn; pale equal to the body of the valve, or in barren florets more or less reduced, hyaline, finely 2-keeled. Upper floral glume ovate to elliptic-oblong, apiculate or obtuse, very convex on the back, subcoriaceous or crustaceous, polished, faintly 5-nerved, margins firm, involute up to near the tip, then flat, not embracing the tip of the pale, pale sub-equal to the glume and similar in substance, with rounded keels and flaps which thin out towards the flat slightly recurved tips. Lodicules 2, cuneate, fleshy. Stamens 3. Styles distinct; stigmas plumose, exserted from near the tips. Grain broad-elliptic dorsally flat, ventrally convex; hilum punctiform, subbasal.

Species about 20-25.—The warm regions of both hemispheres.

*Note:* It will be useful to remember what Stapf says regarding this genus l.c. 605: 'The segregation of the numerous forms which make up the genus *Echinochloa* and their reduction to more or less well definable species is still unsatisfactory, mainly owing to their apparently endless variability and the difficulty, if not impossibility, of discriminating between stable and unstable modifications and the effects of hybridization. Here, as in other cases, observation in the field and experiment will have to decide.'

Cooke describes under *Panicum* 2 species which have to be referred to *Echinochloa*: *P. colonum* and *P. stagninum*. We add *E. Crus-Galli* which Cooke thought did not occur anywhere in the Bombay Presidency.

- |   |     |                           |
|---|-----|---------------------------|
| I. Lower involucral glume and upper floral glume<br>equally acute or cuspidate  | ... | 1. <i>E. colona</i> .     |
| II. Lower involucral glume and upper floral glume<br>cuspidate or produced into an awn, the latter<br>more than the former. |     |                           |
| 1. Ligule 0   | ... | 2. <i>E. Crus-Galli</i> . |
| 2. Ligule a fringe of stiff hairs or absent in the<br>uppermost leaves  | ... | 3. <i>E. stagnina</i> .   |

1. *Echinochloa colona*, Link Hort. Berol. ii, 209; Parl. Pl. Nov. 40; Hitchc. in Gray Man. Bot. ed. 7, 118, et in Contrib. U. S. Nat. Herb. xii, 213, xvii, 256, xviii, 345; Stapf in Prain Fl. Trop. Afr. ix, 607; Haines in Bot. Bihar & Orissa 997.—*E. zonalis*, Parl. Pl. Panorm. i, 119.—*Panicum colonum*, Linn. Syst. Veg. ed. 10 (1759), 870, Sp. Pl. ed. ii, 84; Jacq. Eclog. Gram. t. 32; Roxb. Fl. Ind. i, 299; Nees Agrost. Bras. 119; Steud. Syn. Pl. Glum. i, 46; Benth. Fl. Hongk. 411, et Fl. Austral. vii, 478; Griseb. Fl. Brit. W. Ind. 545; Baker Fl. Maurit. 438; Duthie List Grass. N. W. Ind. 3, Indig. Fodd. Grass. t. 4, Fodd. Grass. N. Ind. 4; Boiss. Fl. Or. v, 435; Balf. f. Bot. Socotra 310; Hack. in Bol. Soc. Brot. vi, 140; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 20, 95; Hook. f. in F.B.I. vii, 32; Cke. ii, 931.—*P. arabicum*, Nees ex Steud. Nomencl. ed. ii, 252, et Syn. Pl. Glum. i, 63 (*partim*).—*P. brizoides*, Linn. Mant. ii, 184.—*P. tetrastichon*, Forsk. Fl. Aegypt.—Arab. 19.—*P. cuspidatum*, Roxb. Fl. Ind. i, 301; Duthie Grass. N. W. Ind. 3; Steud. l. c. 47.—*P. pseudocolonum*, Roth. Nov. Sp. 47; Steud. l.c. 46.—*P. zonale*, Guss. Ind. Sem. H.R. Bocc. 1825, et Fl. Sic. Prodr. i, 82.—*P. numidianum*, Presl. Cyp. & Gram. Sic. 19 (*non* Lam.).—*P. Daltoni*, Parl. ex Webb in Hooker Niger Fl. 185.—*P. equitans*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 365.—*P. Crus-Galli* var. *colonus*, Coss. Glum. Expl. Alger. 28.—*P. Petiveri*, Kotsch. ex Griseb. l.c. (*non* Trin.).

*Description:* Cke. ii, 931.

*Locality:* *Sind:* Karachi (Nankad!); Mirpurkhas (Bhide!, Sabnis B1176!); Sind (Blatter!); Larkana, barren plains (Sabnis B93!, B95!, B457!); Sanghar (Sabnis B899!, B894!); Nasarpur, clayey soil (Sabnis B1048!); Mirva Canal, Khairpur Mirs (Sabnis B263!); Khairpur Mirs (Sabnis B337!); Sehwan to

Laki (Sabnis B63!); Hyderabad (Sabnis B49!); Pad-Idan (Sabnis B516!); Chuar Ch. (Blatter & McCann D616!, D621!); Baghar (Blatter & McCann D617!); Mirpur Sakro (Blatter & McCann D618!, D620!); Ghulamalla (Blatter & McCann D619); Shikarpur (Woodrow).—*Gujarat*: Lasundra (Chibber!); Anjor (Cutch), brackish water (Blatter 3743!); Ahmedabad (Cowper!); Morvi, Kathiawar (Woodrow).—*Khandesh*: Muravad, Tapti bank (Blatter & Hallberg 4435!); Bor, Tapti Island (Blatter & Hallberg 4439!); Dadgaum (McCann A104!); N. slope of Chanseli (McCann A105!).—*Konkan*: Bombay, salt swamps (Woodrow!); Vetora (Sabnis 33589!); Charni Road, Bombay (Sabnis 4292!); Bombay, very common (McCann!); Alibag, rice fields (Ezekiel!).—*Deccan*: Purandhar Fort (Bhide!, McCann 5520!); Nira Canal, Poona District (Chibber!); Khandala, very common (McCann A101!); Sholapur (D'Almeida A102!); Igatpuri (Blatter & Hallberg 5487!; McCann 4331!); Deolali (Blatter A103!); Poona, canal (Ezekiel!).—*S. M. Country*: Dharwar (Sedgwick 2655!); Castle Rock (McCann A106!); Londa (Woodrow).—*Kanara*: Dongi Nallah (Talbot!); Karwar (Talbot 614!).

*Distribution*: Throughout the plains of India, Ceylon, all over the tropics and the warm-temperate regions of the world. Probably of African and Indian origin according to Stapf.

The same author is of opinion that *Panicum frumentaceum*, Roxb. which is grown in India as a grain crop, is evidently descended from *Echinochloa colona*. Roxburgh's species may, therefore, be treated as a variety:

✓ var. *frumentacea*, Blatter & McCann.—*Echinochloa frumentacea*, Link. Hort. Berol. i, 204; Aitchis. Cat. Panjab Pl. 161.—*Panicum frumentaceum*, Roxb. Fl. Ind. i, 304; Schult. Mant. ii, 230; Trin. Sp. Gram. Ic. t. 164; Duthie Grass. N. W. Ind. 4, Field & Gard. Crops 3. t. 24, Fodd. Grass. N. Ind. 8.—*P. Crus-Galli*, var. *frumentaceum*, Trin. Cat. Ceyl. Pl. (1885), 104.—*Echinochloa Crus-Galli*, var. *frumentacea*, Haines in Bot. Bihar & Orissa 998.—*Panicum stagninum*, Retz. var. *frumentacea*, Cooke in Cke. ii, 931.—*Oplismenus frumentaceus*, Kunth Rev. Gram. i, 45, Enum. Pl. i, 146; Dalz. & Gibs. Bomb. Fl. Suppl. 98.

*Description*: Tall, robust. Stems erect, from 60 to 120 cm. high. Panicle often nodding. Spikes secund, incurved, crowded. Spikelets mostly 3-nate, unequally pedicelled, one at least sessile, varying from hispidulous to almost glabrous, and from acute to cuspidate or rarely distinctly cuspidate.

*Locality*: Cultivated in and near the Ghat districts.

2. *Echinochloa Crus-Galli*, P. Beauv. Agrost. 161; T. Nees Gen. Fl. Germ. Monocot. i, t. 21; Reichenb. Ic. Fl. Germ. i, t. 29, fig. 1411, 1412; Hitchc. in Contr. U.S. Nat. Herb. xii, 213; Stapf in Prain Fl. Trop. Afr. ix, 610; Haines in Bot. Bihar & Orissa, 998.—*E. commutata*, Schult. Mant. ii, 267.—*E. hispidula*, Nees in Royle III. Bot. Himal. 416; Dalz. & Gibs. Fl. Bomb. Suppl. 98.—*Panicum Crus-Galli*, Linn. Sp. Pl. ed. i, 56; Fl. Dan. t. 1564; Host. Gram. Austr. ii, 15, t. 19; Knapp Gram. Brit. xi, Trin. Sp. Gram. Ic. t. 161, 162; Nees Fl. Afr. Austr. 58; Steud. Syn. Pl. Glum. i, 47; Benth. Fl. Austr. vii, 479 (*partim*); Duthie List. Grass. N.W. Ind. 3 (*partim*) t. A. fig. 1; Boiss. Fl. Or. v, 435; Hook. f. in F.B.I. vii, 30 (*partim*); Stapf in Dyer Fl. Cap. vii, 397.—*P. hispidum*, Forst. Prodr. 7; Nees Agrost. Bras. 257.—*P. hispidulum*, Retz. Obs. v, 18; Lam. III. i, 171; Roxb. Fl. Ind. i, 306; Nees Fl. Afr. Austr. 57; Royle l. c. 420; Steud. Syn. Pl. Glum. i, 47.—*P. oryzinum*, Gmel. Syst. i, 157.—*P. stagninum*, Host. Gram. Austr. iii, t. 51 (*non Retz.*).—*P. Hostii*, Marsch. Bieberst. Fl. Tauro-Cauc. iii, 57.—*P. limosum*, Presl ex Nees Agrost. Bras. 257.—*Milium Crus-Galli*, Moench Meth. 202.—*Oplismenus Crus-Galli*, Dumort. Agrost. Belg.; Kunth Rev. Gram. i, 44, et Enum. i, 143 (*excl. syn. P. zonale*).—*O. limosum*, Presl. Rel. Haenk. i, 321; Kunth Enum. i, 144.—*Orthopogon Crus-Galli*, Spreng. Syst. i, 307.—*O. Retzii*, Spreng. l.c.

*Description*: Annual, up to 1 m. high. Stems geniculate ascending, branched below, compressed towards the base, glabrous and smooth, internodes enclosed or exerted. Leaf-blades linear, base scarcely narrowed, narrowed to an acute point, 7-25 cm. by 6- over 12 mm., flat, subflaccid, glabrous, more or less dull greyish-green, smooth or scaberulous below, particularly towards the tip, margins finely cartilaginous, scabrid to almost smooth. Sheaths somewhat loose, the lower often compressed, whitish and



thin, the upper subherbaceous, all smooth, glabrous and striate except the basal which are pubescent above their insertion. Ligules 0, junction of blade and sheath glabrous inside marked by a brown zone. Panicles erect, strict or flexuous, at length exerted, 7.5-20 cm. long; axis triquetrous, scabrid; branches few to about 15, solitary or 2-nate, suberect or spreading, distant except the uppermost or all more or less approximate forming a 'lobed' panicle, the lower 2.5-6.2 cm. long, forming rather stout dense mostly many-ranked simple or subcomposite subsecund sessile false spikes; rhachis triquetrous, scabrid, coarsely bristly, particularly near the nodes; pedicels fascicled or 2-nate, very short, up to 1 mm. long, scabrid, bristly at the base, tips subdiscoid. Spikelets crowded, ovate-elliptic in outline, acute, cuspidate or awned 2.5-3 mm. long, greenish or tinged with purple. Lower involucre glume membranous, very broadly ovate, clasping at the base, obtuse to subcuspidate, 1 mm. long, 5-nerved scaberulous; upper herbaceous-membranous, very broadly ovate-oblong, concave, acute, cuspidate, as long as the spikelet, 5- or (near the tip) 7-nerved, rigidly pubescent between the scabrid and spinulose nerves. Lower floral glume similar to the upper involucre glume, but flat or depressed on the back, cuspidate or produced into a scabrid often long flexuous awn, 7-nerved (at least at the tip), pale elliptic, shorter by  $\frac{1}{4}$  than its glume, keels scaberulous upwards; upper floret hermaphrodite, elliptic-ovate in outline, cuspidate, over 2 mm. long, whitish or yellowish, polished, glume and pale subcoriaceous. Anthers oblong. Grain broad-elliptic in outline, 1.5 mm. long.

*Locality*: *Sind*: Mirpurkhas (Bhide!); Ghulamalla (Blatter & McCann D613!); Keti (Blatter & McCann D614!).—*Gujarat*: Stream near Prantij (Sedgwick!); the Bokh, Prantij Taluka (Sedgwick 1144!).—*Deccan*: Poona (Woodrow!).—*S. M. Country*: Aluarar, elevation 2,000 ft., rainfall 35 inches (Sedgwick 3096!); Bidi, elevation 2,500 ft., rainfall 50 inches (Sedgwick 3076!).—*Kanara*: Halyal (Talbot 2167!).

*Distribution*: Common throughout the greater part of India and Malaya; as a weed throughout the warm temperate countries of the northern hemisphere, rather rare in the tropics of Africa and the New World and south of the Tropic of Capricorn (Stapf).

*Uses*: See Duthie, Fodd. Grass. N. Ind. 6; Vasey Agric. Grass. Unit. States ed. ii, 27; Maiden Man. Grass. N. S. Wales, 38-41; Yearbook U. S. Dept. Agric. (1902), 580-582.

3. *Echinochloa stagnina*, P. Beauv. Agrost. 161; Stapf in Prain Fl. Trop. Afr. 617.—*E. scabra*, Roem. & Schult. Syst. ii, 479.—*Panicum stagninum*, Retz. Obs. v, 17; Roxb. Fl. Ind. i, 295; Grah. Catal. 237; Nees Agrost. Bras. 261; Trin. Pan. Gen. 128, et in Mém. Acad. Pétersb. 6me sér. iii, 216; Steud. Syn. Pl. Glum. i, 47; Stapf in Dyer Fl. Cap. vii, 394; Cke. ii, 930.—*P. scabrum*, Lam. Ill. i, 171, et Encycl. iv, 744; Nees l. c.; Steud. l. c.—*P. Galli*, Thunb. Prodr. 18, et Fl. Cap. ed. i, 389, ed. Schult. 103.—*P. Crus-Galli*, Woodrow in Journ. Bomb. Nat. Hist. Soc. xiii (1901), 433 (*non* Linn.).—*P. Crus-Galli*, var. *stagninum*, Fenzl. in Ind. Sem. Hort. Berol. 1850; Hook. f. in Trim. Fl. Ceyl. v, 136; Prain Beng. Pl. 1174.—*P. Crus-Galli*, vars. *maximum*, *submuticum* et *leioslachyum*, Franch. Contr. Fl. Congo Franc. in Bull. Soc. Hist. Nat. Autun. viii, 347.—*P. pictum*, Nees Fl. Afr. Austr. 59 (*non* Agrost. Bras.).—*P. Burgu*, A. Cheval. in Rev. Cult. Colon. vii, 513-520.—*P. Lelievrei*, A. Cheval. l. c. 516.—*P. oryzetorum*, A. Cheval. l. c.—*Orthopogon stagninus*, Spreng. Syst. i, 307.—*Optismenus stagninus*, Kunth Rev. Gram. i, 44, et Enum. i, 144 (*partim*); Dalz. & Gibs. Fl. Bomb. 292.—*O. scaber*, Kunth Rev. Gram. l. c. 44, Enum. l. c. 145.

*Description*: Cke. ii, 930, under *Panicum stagninum*.

*Locality*: *Sind*: Ghulamalla (Blatter & McCann D615!).—*Konkan*: Virar, on bank of a tank (McCann 9585!, 9584!).—*Deccan*: Igatpuri (Blatter & Hallberg 5473!); Khandala, in water in the smaller village tank (McCann 27441!); Panchgani (Blatter & Hallberg B1241!).—*S. M. Country*: Hulkop, elevation 2,000 ft., rainfall 50 inches (Sedgwick 3175!); Chikkerur, Taluka Kod, water hole by road (Sedgwick 1969!); Bomigatti tank (Sedgwick 3830!); common in the Carnatic (Sedgwick).—*Kanara*: Pardhani (Talbot 3136!).

*Distribution*: More or less throughout India, Ceylon, tropical and S. Africa.

*Uses*: Considering tropical African conditions Stapf observes (l. c. 619): 'This grass deserves every attention on account of its locally abundant supply

and high sugar-content. Chevalier states that it is the most useful of all the plants growing in a wild state in the neighbourhood of Timbuctu. Every part of it is utilized. It yields excellent fodder, material for thatching and caulking, is burned to produce a salt used in the manufacture of soap and indigo, the grains are eaten and the canes are gathered for extracting sugar or preparing vinagre or a beverage resembling cider. Sir John Kirk also describes it as one of the richest of fodder grasses. Although typically a perennial with long rhizomes creeping in the mud of swamps, lakes and rivers, it seems on temporarily flooded land to flower frequently the first year and then to behave as an annual.<sup>9</sup>

*(To be continued).*

With the authors complete

REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY.

Part VII. By E. BLATTER, S.J., PH.D., F.L.S.

- V 1921

*Pseudochinolaena* to  
*Periclitum*



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., PH.D., F.L.S.

PART VII

GRAMINEÆ

BY

E. BLATTER and C. McCANN

(Continued from p. 649 of Volume XXXII)

50. PSEUDECHINOLÆNA, Stapf in Prain Fl. Trop. Afr. ix, 494.

Annual. Culms very slender with a prostrate rooting base. Leaf-blades lanceolate, soft. Spikelets very irregularly armed or quite unarmed, obliquely ovoid, laterally compressed and mostly conspicuously gaping, falling entire from the pedicels, binate or more often subsolitary or solitary, secund on the flat or subtriquetrous slender rhachis of spiciform racemously arranged racemes. Involucral glumes herbaceous, of about the same length and almost as long as the spikelet, or the lower distinctly shorter, heteromorphous. Lower more or less flat, 3-nerved, smooth or almost so; upper boat-shaped, gibbous downwards, 7-nerved, with longitudinal rows of more or less transparent spots between the nerves and with or without shorter or longer, stout, hooked hairs or bristles from the centre of the spots. Lower floret male or barren, as long as the spikelet; glume oblong-lanceolate with a minutely truncate tip, laterally compressed, but rounded on the back, chartaceous, with membranous margins and a delicate hyaline area at the base, smooth, pale almost as long as the glume, more or less convolute, faintly 2-nerved. Upper floret hermaphrodite, shorter than the lower; glume broad-lanceolate to oblong, subacute, very convex on the back, chartaceous, faintly 5-nerved pale similar to the valve in texture, tightly clasped by it when mature. Lodicules 2, cuneate. Stamens 3. Styles free at the base, capillary; stigmas plumose, subterminally exerted. Grain oblong in face-view, semi-obovate in profile, back very convex; scutellum elliptic, almost half the length of the grain; hilum subbasal, punctiform.

Species 1.—Tropics of the whole world.

The only species of this genus was originally described under *Echinolæna*. This genus, however, is exclusively American which, according to Stapf, differs from *Pseudechinolæna* in many ways, 'as in its densely packed spikes, the many-nerved lower glume, the "eglandular" always unarmed upper glume, the uniformly papery 5-nerved lower valve [lower floral glume] which is accompanied by a sharply 2-keeled flat valvule [pale], the basally appendaged fertile valve [upper floral glume] and the acutely auricled or toothed flaps of its valvule [pale], and finally the flatter grain which is marked with a panduriform line on the face extending through its full length and possesses a slender linear hilum.'

*Pseudechinolæna polystachya*, Stapf in Prain Fl. Trop. Afr. ix, 495 — *Echinolæna polystachya*, H. B. & K. Nov. Gen. et Sp. i, 119, vii, t. 679; Kunth Enum. i, 172, Suppl. 127; Hitchcock Mex. Grass. in Contr. U. S. Nat. Herb. xvii, 223; A. Chase in Proc. Biol. Soc. Wash. xxiv, 118. — *E. Trinii*, Moritzii Syst. Verz. Zoll 102 — *Lappago aliena*, Spreng. Neue Entdeck. iii, 15. — *Panicum uncinatum*, Raddi Agrost. Bras. 41; Trin. Gram. Panic. 240, and Sp. Gram. Ic. t. 216; Kunth Enum. i, 172; Steud. Syn. Pl. Glum. i, 60; Hook. f. in F.B.I. vii, 58; Trim. Handb. Fl. Ceyl v, 160. — *P. glandulosum*, Nees ex Trin. Gram. Pan. 174, and Agrost. Bras. 128. — *P. nemorosum*,  $\beta$  Trin. l.c. — *P.*

*heteranthum*. Link Hort. Berol. i, 212, Kunth l.c. 92.—*P. echinatum*, Willd. ex Doell in Mart. Fl. Bras. II, ii, 193.—*P. polystachyum*, K. Schum. in Engl. Pf. Ost.—Afr. C. 103 (*non aliorum*).

*Description*: Perennial. Culm about 60 cm. long, of which about half is rising above ground, and the other half prostrate, giving off numerous short or long branches, growing into secondary culms, their bases often finely filiform, all many-noded and rooting from the nodes near the ground; erect or ascending portion above the last branch 5-8-noded with as many perfect leaves; internodes exserted, terete, glabrous. Leaf-blades lanceolate from a shortly contracted or rounded and usually slightly oblique base, acutely acuminate, from less than 12 mm. (lowest) to up to over 6 cm. by 4-12 mm., dark green, glabrous, with scattered or very fine stiff hairs above, finely and appressedly pubescent underneath, midrib very fine, whitish or straw-coloured, lateral nerves fine, numerous, crowded. Sheaths tight, terete, strongly striate, more or less appressedly hairy and ciliate along the margin or only ciliate. Ligules thin, membranous, rounded or truncate, ciliate, under 2 mm. long. Inflorescence up to over 15 cm. long, with up to 6 or even 8 racemes, mostly much shorter and with fewer racemes, occasionally reduced to a solitary raceme; common axis subterete, almost smooth, glabrous, 0.5 mm. in diam.; racemes appressed to the common axis or obliquely spreading, the lowest up to 35 mm. long, sometimes quite short; rachis filiform, triquetrous, minutely puberulous; pedicels filiform, angular, pruinously scaberulous, lateral up to 2 mm. long, often much shorter. Spikelets often unequally developed, the lower of each raceme or the lower (secondary) of each pair often reduced in a varying degree, if perfect about 4 mm. long. Involucral glumes dull or brownish green; lower oblong- to ovate-lanceolate, acuminate, as long as the spikelet or shorter, glabrous or sparingly and minutely scaberulous, nerves stout; upper semi ovate in profile, acute with the tip laterally compressed, armature vary variable in the same raceme, from short asperities to sharply pointed hairs bent at a right angle near the base, then appressed and directed forwards, or short or long (to over 1 mm.), cylindrical or stoutly subulate protruberances bearing terminally at a right angle a fine very sharp bristle pointing mostly forwards, outermost lateral nerves marginal. Lower floral glume pale, greenish only at the tip, very delicately scaberulous, hyaline basal area oblong, 1 mm. long; upper slightly over 2 mm. long, straw-coloured smooth, shining. Grain 1.6 by 0.6 mm., pale.

*Locality*: Kanara: Siddhapur, evergreen forest (Talbot 1081!).

51. OPLISMENUS, P. Beauv. Fl. Owar. ii, 14; Stapf in Prain Fl. Trop. Afr. ix, 630.

Species about fifteen, in the warmer parts of the world, but mostly tropical. We retain the two species mentioned by Cooke ii, 926, 927.

1. *Oplismenus compositus*, P. Beauv. Agrost. (1812), 54; Roem. & Schult. Syst. ii, 484; Kunth Enum. i, 141; Aitchis. Cat. Panjab Pl. 161; Duthie Grass. N. W. Ind. 81; Hook. f. F.B.I., vii, 66; Cke. ii, 926; Haines Bot. Bihar & Orissa 999; Stapf in Prain Fl. Trop. Afr. ix, 634. For syn. see Hook. f. and Stapf ll. cc.

*Description*: Cke. l.c. A very variable plant.

*Locality*: Khandesh: Toranmal (McCann 9593!).—Konkan: At the foot of the Ghats under the shade of trees (Dalzell & Gibson); Bassein (Chibber 164!); Kenery Caves (McCann 9445!); Sion, woods (Blatter 9591!); Matheran, to Louisa Point (D'Almeida A244!, Woodrow); Thana (Lisboa).—Deccan: Igatpuri (McCann 4342!); Khandala, common in forests (McCann 5335!); Lonavla (Lisboa); Panchgani, Tiger path (Blatter & Hallberg B1253!).—S. M. Country: Bidi, shade of trees (Sedgwick & Bell 2962!); forests W. of Dharwar (Sedgwick & Bell 1853!); Castle Rock (Bhide!, McCann!); Londa (Woodrow!).—Kanara: Yellapore (Talbot 736!); Karwar (Talbot 1322!); Goond (Talbot 2204!); Amshi Ghat (Talbot 2192.); Kadgal (Woodrow).

*Distribution*: Throughout India, Ceylon, tropical and subtropical Asia. Australia and Polynesia.

2. *Oplismenus Burmanni*, P. Beauv. Agrost. (1812), 54; Roem. & Schult. Syst. II, 482; Kunth Rev. Gram. i, 44, and Enum. i, 139; Duthie Grass. N. W. Ind. 8, Ill. Indig. Fodd. Grass. t. 47, Fodd. Grass. N. Ind. 13; Hook.

f. F. B. I. vii, 68; Cke. ii, 927; Haines Bot. Bihar & Orissa 999; Stapf in Prain Fl. Trop. Afr. ix, 636.—For syn. see Hook. f. and Stapf ll. cc.

*Description*: Cke. l.c.

*Locality*: *Gujarat*: Surat, shady places (Sedgwick 314 !).—*Konkan*: Versova (McCann 4313 !); Alibag, sandy shore, on the roots of coconut tree (Ezekiel !); Bombay Isl. (McCann !); Parel (Herb. Dehra Dun !, Woodrow).—*Deccan*: Chakan (Gammie !); Khandala, very common, forming carpets under trees (McCann 9592 !); Lonavla (McCann 3898 !); Igatpuri (McCann !); Panchgani (Woodrow).—*S.M. Country*: S. W. of Dharwar (Sedgwick & Bell 4438 !); Dharwar, shade of trees (Sedgwick 1837 !); Londa (Gammie 15826 !); Castle Rock (Gammie 15696 !).—*Kanara*: Halyal (Talbot 2085 !); Karwar (Talbot 1295 !).

*Distribution*: Widely distributed throughout the tropics of both hemispheres.

52. PANICUM, Linn. Stapf in Prain Fl. Trop. Afr. IX, 638.

Annual or perennial grasses, rarely suffrutescent, of various habit and size. Leaves mostly linear to linear-lanceolate, but also ovate or filiform to subulate. Ligules usually reduced to a ciliate rim or a fringe of hairs, rarely a distinct membrane or 0. Panicles usually much divided and at least temporarily open. Spikelets usually loosely scattered, glabrous or hairy, lanceolate to oblong, elliptic or orbicular in outline, symmetrical in profile, rarely somewhat oblique, falling entire or almost so from the often elongated pedicels of a compound or decomposed panicle, without a definite orientation towards the axis. Involucral glumes more or less herbaceous-membranous, lower usually shorter than the upper, often very much so, rarely equalling it, usually with 1 or more nerves, or if very small, nerveless; upper as long as the spikelet, rounded on the back, 5-9-nerved. Lower floral glume very similar to the upper involucral glume and equally rounded and curved on the back, 5-9-, rarely 3- or 11-nerved, male or neuter, pale thinly membranous to subhyaline, subequal to the lower floral glume or more or less reduced, rarely suppressed. Upper floral glume subcoriaceous to coriaceous with firm margins, obtuse to subacute, mucronate, faintly nerved, hermaphrodite, pale subequal to the glume and of similar substance, tightly embraced by the more or less involute margins of the glume. Lodicules 2, broadly cuneate. Stamens 3. Styles distinct; stigmas laterally exerted near the tip of the floret. Grain tightly enclosed by the hardened valve and valvule, dorsally compressed, biconvex to almost planoconvex; scutellum elliptic to ovate-elliptic, about half as long as the grain; hilum subbasal, punctiform.

Species about 400. In the tropical and subtropical regions of both hemispheres, few in the warm-temperate regions.

Cooke mentions 20 indigenous and 4 cultivated species.

Of the 24 species we have put *Panicum flavidum*, Retz., *P. punctatum*, Burm., and *P. fluitans* under *Paspalidium*.

*Panicum stagninum*, Retz. and *P. colonum*, Linn. have been transferred to *Echinochloa*.

*Panicum Isachne*, Roth, *P. ramosum*, Linn. and *P. muticum*, Forsk. belong to *Brachiaria*.

*Panicum prostratum*, Lamk., *P. setigerum*, Retz. and *P. javanicum*, Poir. have been described under *Urochloa*.

*Panicum interruptum*, Willd. and *P. myosuroides* will be dealt with under *Sacciolepis*.

*Panicum patens*, Linn. will be transferred to *Cyrtococcum*.

New to the Presidency are *P. psilopodium*, Trin. and *P. auritum*, Presl.

A. Lower involucral glume as long as the lower floral glume or nearly so ... 1. *P. turgidum*.

B. Lower involucral glume shorter than the lower floral glume

I. Annuals

1. Leaves less than 12 mm. broad

a. Panicle about 35 cm. long ... 2. *P. obscurans*.

b. Panicle not more than 25 cm. long

aa. Spikelets gaping ... 3. *P. trypheron*.

bb. Spikelets not gaping ... 4. *P. psilopodium*.

2. Leaves more than 12 mm. broad  
 a. Spikelets 4·5-5 mm. long ... .. 5. *P. miliaceum*.  
 b. Spikelets 2·3-2 mm. long ... .. 6. *P. miliare*.
- II. Perennials
1. Lower involucreal glumes very minute, one or rarely both often obsolete .. 7. *P. subeglume*.
2. Lower involucreal glumes distinctly evident
- a. Culms up to 3 m. high ... .. 8. *P. maximum*.  
 b. Culms less than 1·7 m. high
- aa. Culms not more than 90 cm. high... 9. *P. paludosum*.  
 bb. Culms more than 90 cm. high
- + Spikelets laxly clustered on the branches... .. 10. *P. antidotale*.  
 ++ Spikelets solitary ... .. 11. *P. montanum*.  
 +++ Spikelets fascicled, subsecund, sessile or shortly pedicelled ... 12. *P. auritum*.

1. *Panicum turgicum*, Forsk. Fl. Aegypt.—Arab. (1775), 18; Del. Fl. Egypte 19, t. 9, fig. 2; Trin. Diss. Gram. Pan. 189, Gram. Icon. & Descr. ii 227, Pan. Gen. 221, and in Mém. Acad. Pétersb. sér. vi, iii, 307; Kunth Enum. i, 97; Steud. Syn. Pl. Glum. i, 88; Boiss. Fl. Or. v, 441; Duthie Fodd. Grass. N. Ind. 13; Balf. f. Bot. Socotra 310; Hook. f. F.B.I. vii, 44; Stapf in Kew Bull. (1907), 214; Muschler. Man. Fl. Egypt i, 57; Cke. ii, 935; Stapf in Prain Fl. Trop. Afr. ix, 706.—*P. nubicum*, Fig. & De Not. in Mem. Ac. Torin. ser. 2, xiv, t. 21, fig. 1-12.

*Description*: Cke. l.c.

*Locality*: *Sind*: (Duthie teste Cooke); Sehwan, sand hills (Bhide!).—*Gujarat*: Rajkot, Kathiawar (Woodrow teste Cooke).

*Distribution*: Tropical Africa, Egypt, Cyprus, S. Palestine, Arabia, Socotra, S. Persia, Baluchistan, Sind, Gujarat.

*Uses*: An excellent fodder for camels.

2. *Panicum obscurans*, Woodr. in Journ. Bom. Nat. Hist. Soc., xiii (1901), 434; Cke. ii, 935.—*Isachne obscurans*, Woodr. in Gard. Chron. 23, ser. 3 (1898), 161.

*Description*: Cke. l.c.

According to Woodrow the whole inflorescence breaks off and is driven about by the wind.

Stapf says that the tropical African *Panicum hippothrix*, K. Schum. is very similar and perhaps identical with *P. obscurans*, but he adds that the blades of the latter are much wider, measuring up to 14 mm. and that the panicle 'is perhaps on the whole more open with slightly larger spikelets.' (In Prain Fl. Trop. Afr. ix, 699.) These are scarcely differences to justify specific distinction, but as we have not seen the African plant, we do not venture to decide the point. If the identity between the two species should be established, Woodrow's specific name, being of a later date by four years, will have to cede to *P. hippothrix*.

*Locality*: *Deccan*: Mangiri Farm (Herb. Econ. Bot. Poona!); Jeur near Sholapur (Woodrow).

*Distribution*: Endemic.

3. *Panicum trypheron*, Schult. Mantiss. ii (1824), 244; Hook. f. in F.B.I. vii, 47; Prain Beng. Pl. 1176; Cke. ii, 936; Haines in Bot. Bihar & Orissa 995.—*P. miliare*, Wall. Cat. No. 8712 (*partim*) E.—*P. mucronatum*, Heyne in Wall. Cat. No. 8717 (*partim*).—*P. Neesianum*, Wight & Arn. ex Steud. Syn. Gram. 74.—*P. Roxburghii*, Spreng. Syst. i, 320; Kunth Enum. Pl. i, 126; Steud. l.c. 98.—*P. tenellum*, Roxb. Fl. Ind. i, 306; Duthie Grass. N. W. Ind. 7.

Stapf in Prain Fl. Trop. Afr. ix, 712 has separated *P. porphyrrhizos*, Steud. from *P. trypheron*, Schult. as understood by Hook. f. in F.B.I. l.c., and with it all the material covered by the following synonyms: *P. confine*, Hochst. ex Steud. Syn. Pl. Glum. i, 72.—*P. jumentorum*, A. Rich. Tent. Fl. Abyss. ii, 373 (*non* Jacq.).—*P. trypheron*, therefore, does not occur in tropical Africa.

*Description*: Cke. l.c.

*Locality*: *Gujarat*: On the Idar Frontier, Prantij Taluka, sandy waste (Sedgwick!).—*Konkan*: Malabar Hill (Lisboa teste Cooke).—*Deccan*: Poona



(Woodrow *teste* Cooke); Jeur (Woodrow *teste* Cooke); Malhargad (Woodrow *teste* Cooke).—*S. M. Country*: Dharwar (Garade!); Dharwar, on pastures and dry hills (Sedgwick 6144!).

*Distribution*: Punjab, Bengal, W. Peninsula, Ceylon, China, Borneo.

4. *Panicum psilopodium*, Trin. Gram. Panic. 217; Kunth Enum. Pl. i, 100; Steud. Syn. Gram. 83; Aitchis. Cat. Panjab Pl. 161; Duthie Grass. N.W. Ind. 6, Field and Gard. Crops i, t. 23, Fodd. Grass. N. Ind. 10 (*in nota*); Hook. f. F.B.I. vii, 46; Saxton & Sedgwick, Plants of N. Gujarat in Rec. Bot. Surv. Ind. vi (1918), 312; Haines in Bot. Bihar & Orissa 993.

*Description*: An annual, tufted grass. Culms erect or quickly ascending, 30-60 cm. high, rather slender, simple or branched, usually leafy up to the panicle. Leaves rather broadly linear, acute or somewhat acuminate, 7-30 cm. by 4-8 mm. glabrous or with few short spreading hairs towards the base, rarely thinly hairy all over. Sheaths often with spreading hairs which leave minute raised dots after falling, more usually glabrous, loose, striate. Ligule a narrow row of hairs. Panicle spreading, 5-20 cm. long, with very capillary branches and slender pedicels which are often 10 mm. long. Spikelets 2-3 mm. long, geminate, narrowly elliptic, with abruptly acute tip. Lower involucrel glume very broadly ovate-acute, about  $\frac{1}{3}$  the spikelet, base amplexicaul but not overlapping itself in front, 5-nerved. Upper involucrel glume oblong-ovate, as long as spikelet, minutely cuspidate, 9- (11-) nerved. Lower floral glume similar, with delicate, oblong, margined pale. Upper narrow-ellipsoid, acute, very smooth and polished as is its pale.

*Locality*: Gujarat: Ahmedabad and elsewhere in shady wet places in the monsoon (Saxton & Sedgwick).

*Distribution*: India, Burma, Malacca, Ceylon.

\*5. *Panicum miliaceum*, Linn. Sp. Pl. (1753), 58; Forsk. Fl. Aegypt.—Arab. civ; Host. Gram. Austr. ii, 16, t. 20; Kunth Enum. i, 104, Suppl. 81; Trin. Pan. Gen. 194, Sp. Gram. Ic. t. 221; Reichb. Ic. Fl. Germ. vii, t. 82; Steud. Syn. Pl. Glum. i, 77; Duthie Grass. N. W. Ind. 5, Field and Gard. Crops t. 23, Fodd. Grass. N. Ind. 9; Hook. f. F.B.I. vii, 45; Watt. Dict. Econ. Prod. Ind. vi, 12; Cke. ii, 939; Stapf in Prain Fl. Trop. Afr. ix, 696.—*P. asperinum*, Fisch. Cat. Hort. Govenk. ex Jacq. Eclog. Gram. 46, t. 31; Nees Agrost. Bras. 199.—*P. Milium*, Pers. Syn. i. 83.—*Milium esculentum*, Moench Meth. 203.—*M. Panicum*, Mill. Gard. Dict. ed. viii, no. 1.

*Vern. Names*: Common Millet; cheno (Guj.); vari (Decc.); gajro (Panch Mahals); sava (Mar.); chinee (Sind).

*Description*: A tufted annual, 0.6-1.2 m. high. Stems erect or geniculately ascending, terete, stout or slender, 4-5-noded, simple or sparingly branched, more or less softly hirsute below the nodes, the uppermost internode usually quite glabrous. Leaf-blades linear from an equally wide or slightly contracted and rounded base, long-tapering to a slender point, 15 to over 30 cm. by 6-20 mm., flat, flexuous, usually glabrous except for the often ciliate lower margins and hispidulous dorsal midrib, rarely sparsely hairy all over, hairs long and fine, midrib somewhat stout and prominent below in large leaves, primary lateral nerves 3-6 on each side, very slender. Sheaths terete, somewhat loose or the upper tight, closely striate, spreadingly hirsute with tubercle-based hairs, pubescent or loosely bearded at the nodes, longer or slightly shorter than the internodes. Ligule a narrow ciliate rim. Panicles contracted and rather dense or open, narrowly oblong, nodding, often with their base permanently enclosed in the uppermost sheath or only shortly exerted, up to 30 cm. long in spontaneous specimens usually scantier, looser and at length more open, divided up to the fourth or in cultivated specimens the fifth degree, all the divisions filiform, angular and scabrid; primary axis slender or somewhat stout below, subterete, striate or grooved and smooth towards the base; primary branches more or less approximate below, more distant upwards, often much divided from low down; branchlets relatively long, the lower divided again in the same manner or like the remainder from much higher up with spikelets in small loose racemes of 2 (rarely 3) towards the summit; pedicels hardly thickened upwards, with truncate tips, the lateral from less than 2-6 mm. long. Spikelets ovate-oblong to ovate-lanceolate, apiculate-acuminate, turgid, 4.5-5 mm. long, glabrous, green or brownish green. Involucrel glumes persistent, unequal, strongly and prominently nerved; lower broad-ovate, acute,

from  $\frac{1}{2}$ - $\frac{2}{3}$  the length of the lower floret, 5-nerved, upper corresponding in size and outline to the spikelet, broadly rounded on the back, 11-nerved, tip contracted, apiculate to shortly rostrate. Lower floral glume barren, very like the lower involucreal glume, pale ovate to ovate-oblong, truncate or emarginate, up to about  $\frac{1}{2}$  the length of the glume. Upper floret hermaphrodite, elliptic-oblong in outline, subacute, very convex on the back, up to over 3 by 2 mm., variously coloured (white, yellow, red, brown or black), very smooth and polished, glume and pale crustaceous. Grain white.

*Locality*: Cultivated in many parts of the Presidency, chiefly in Gujarat and on the Ghats.

*Distribution*: Supposed to have originated in India. But see DeCandolle, Origin of Cultivated Plants, p. 376, London 1909.

*Uses*: Cultivated for its grain and as a good fodder.

\*6. *Panicum miliare*, Lamk. Ill. Gen. i (1791), 173; Roxb. Fl. Ind. i, 309; Kunth Enum. Pl. i, 104; Aitchis. Cat. Panjab. Pl. 159; Duthie Grass. N. W. Ind. 5, Field and Gard. Crops 7, t. 26, Indig. Fodd. Grass. t. 46, Fodd. Grass. N. Ind. 10; Hook. f. in F.B.I. vii, 46; Cke. ii, 939 (*partim*); Haines in Bot. Bihar & Orissa 993.

*Description*: An annual grass. Culms 30-90 cm. high, rather slender, erect or base geniculate, simple or branched, usually leafy up to the panicle. Leaves linear, 15-60 cm. by 12-25 mm., gradually tapering from a broad base, glabrous or finely hairy, sheaths glabrous, rarely hirsute with tubercle-based hairs. Panicles very compound, contracted or thyriform, and often nodding, 10-25 cm. long (without the subsidiary axillary panicles which are often developed). Spikelets glabrous, rather flattened, suddenly acute or slightly cuspidate, 2-3.2 mm. long, mostly paired on unequal pedicels, but often solitary at the ends of the branchlets, lanceolate in flower, elliptic or broadly elliptic in fruit. Lower involucreal glume very broadly ovate, subtruncate, then suddenly acute, or scarcely acute, about  $\frac{1}{2}$  the spikelet, white, membranous, 3-5-nerved, nerves arching and anastomosing. Upper involucreal glume herbaceous, ovate-lanceolate, 11-13-nerved. Lower floral glume 9-nerved, neuter, pale as long as its glume. Upper floral glume narrow-elliptic or elliptic-oblong to broadly ovate, acute, shining, white or pale brown, or dark brown, often 3-5-streaked dorsally.

*Locality*: Cultivated occasionally in some parts of the Presidency.

*Note*.—*P. miliare* is in all probability a cultivated form of *P. psilopodium*. It is not always easy to distinguish between the two. Hooker already felt this difficulty. 'If I remember aright,' he says, '*P. miliare* was conjectured by Munro to be a cultivated form of *P. psilopodium*; and except in the greater size, more contracted panicle, rather larger spikelets and usually shorter pedicels of *P. miliare* I failed to find characters whereby to separate them, and these are not very reliable. In its common state the grain of *miliare* is broader than in any form of *psilopodium* and much darker coloured.' (F.B.I. vii, 46). Duthie was unable to distinguish *P. miliare* from *P. psilopodium* (Fodd. Grass, N. Ind. 10). Stapf, however, is inclined to think that they are separable. In his opinion the true *P. psilopodium* has nearly always glabrous leaves, smaller spikelets and a shorter lower involucreal glume. Prain in his Bengal Plants gives as the characters of *P. miliare*: 'Leaves hairy; cultivated', and of *P. psilopodium*: 'Leaves glabrous; wild.' But he has nevertheless, as Haines points out 'named most of the glabrous-leaved forms in the Calcutta Herb, as *miliare*, and I have myself noticed whole crops with glabrous leaves, whereas I have collected *psilopodium* with hairy leaves.'

The same author, after discussing the various statements, sums up his own observations: 'Although absolutely the leaves of *miliare* are often broader than in *psilopodium*, yet they are relatively narrower and much more alternate. Moreover the cultivated *miliare* and its feral forms always appear to have more or less contracted panicles in contrast to the shorter, always quickly effuse, panicle of *psilopodium*. The grain of *miliare* is, as would be expected, rather larger, being '08-1' in. long as compared with '07 in. long in *psilopodium*.'

7. *Panicum subglume*, Trin. in Mém. Acad. Pétersb. sér. 6, iii, pt. 2 (1835), 292; Steud. Syn. Gram. 82; Hook. f. F.B.I. vii, 51; Cke. ii, 936.—*P. arcuatum*, Br. ex Nees in Wight Cat. no. 1639 (*non* Br. Prodr.).—*P. Brownianum*, Wight & Arn. ex Steud. l.c. 98.—*P. Torreyanum*, Wight & Arn. ex Steud. Nom. ed. 2, ii, 264.—*Milium capillare*, Roth. Nov. Sp. 39; Kunth

Enum. Pl. i, 67.—*M. tomentosum*, Koen. ex Rottl. in Ges. Naturf. Fr. Neue Schr. iv (1803), 220; Steud. Syn. Gram. 34; Kunth l.c. 66.

*Description*: Cke. l.c.

*Locality*: S. M. Country: Badami (Woodrow teste Cooke; Bhide!).

*Distribution*: W. Peninsula.

\*8. *Panicum maximum*, Jacq. Ic. i, 2, t. 13; Collect. i, 76; Trin. Pan. Gen. 180, and in Mém. Acad. Pétersb. 6 sér. iii, 268; Nees Fl. Afr. Austr. 36; Steud. Syn. Pl. Glum. i, 72; Griseb. Fl. Brit. West Ind. 549; Doell in Mart. Fl. Bras. ii, ii, 202; Aitchis. Cat. Panjab Pl. 159; Baker Fl. Maurit. 436; Boiss. Fl. Or. v, 439; Hook. f. F.B.I. vii, 49; Trim. Fl. Ceyl. v, 153; Stapf in Dyer Fl. Cap. vii, 404; Cke. ii, 939; Haines in Bot. Bihar & Orissa 995; Stapf in Prain Fl. Trop. Afr. ix, 655.—*P. maximum* var. *hirsutissimum*, Oliv. in Trans. Linn. Soc. xxix, Bot. 171.—*P. maximum* var. *obtusissimum*, Stapf in Cheval. Sudania 161, 163.—*P. polygamum*, Sw. Prodr. Ind. Occ. 24.—*P. laeve*, Lam. Ill. i, 172.—*P. jumentorum*, Pers. Syn. i, \*3; H.B. & K. Nov. Gen. & Sp. i, 104; Duthie Grass. N. W. Ind. 5, Fodd. Grass. N. Ind. 9.—*P. altissimum*, Brouss. Elench. Hort. Monsp. (1805), 42 (*non* Meyer); Dalz. & Gibs. Bomb. Fl. Suppl. 98.—*P. trichocondylum*, Steud. Syn. Pl. Glum. i, 74.—*P. pamplemoussense*, Steud. l.c. 71.—*P. hirsutissimum*, Steud. l.c. 72.—*P. giganteum*, Mez in Engl. Jahrb. xxiv, 143.

*Vern. Name*: Guinea Grass.

*Description*: A perennial, densely tufted grass, up to 3 m. high. Culms erect or geniculate-suberect, usually stout, 3-4 noded, simple or sparingly branched with the branches erect, terete or compressed below, usually quite glabrous and smooth, more rarely more or less hirsute and rough from the tubercular hair-bases. Leaves glabrous or more or less softly hairy or coarsely hirsute with tubercle-based hairs. Sheaths rather firm, the lower compressed, the others terete and tight, often bearded at the mouth and usually so at the nodes, rarely the nodes quite glabrous. Ligule membranous, very short, ciliate usually with dense hairs from behind it. Blades linear from an equally wide or very gradually narrowed and shortly contracted base, long-tapering to a fine point, 10-60 cm. by 4-18 or even 25 mm., flat, margins scaberulous to spinulously scabrid, midrib prominent below, whitish and shallowly channelled above, primary nerves up to 9 on each side. Panicle erect or nodding, contracted or open, from 10 to over 45 cm. long, glabrous or more often villosulous at the lower nodes and motile branch bases, divided to the 4th or 5th degree, all the divisions filiform to capillary, often more or less wavy, angular and scabrid or the larger smooth downwards; primary axis comparatively slender, smooth, terete and often fluted below, scaberulous upwards; lower primary branches whorled, suberect or spreading, up to 30 cm. long, mostly remotely divided from 2.5-7.5 cm. above the base, their lower branchlets often up to 7.5 cm. long, flexuous and remotely divided or like the rest rather short and contracted; penultimate divisions usually closely 2-3-spiculate with the lateral pedicels shorter than the clustered spikelets, more rarely loose to very loose with the pedicels several times longer, all the pedicels very fine with small subcupular tips. Spikelets oblong, subobtuse to acute, somewhat turgid, broadly rounded on the back, 3-4.5 or sometimes 4 mm. long, light green or tinged with purple, glabrous or rarely more or less densely pubescent. Involucral glumes dissimilar, faintly nerved. Lower rounded or shortly acute or minutely apiculate, about  $\frac{1}{2}$  to  $\frac{1}{4}$  the length of the spikelet, hyaline, 3-1-nerved or almost nerveless. Upper corresponding in shape and size to the spikelet, membranous, 5-nerved. Lower floral glume male, like the upper involucral glume, 7-nerved, pale slightly shorter, oblong, obtuse. Upper floret hermaphrodite, oblong, shortly acute up to almost 3 mm. long, whitish, glume and pale thinly crustaceous, finely transversely rugose except on the flexures. Anthers 1-1.5 mm. long. Grain over 1 mm. long.

*Locality*: Widely cultivated, chiefly in Gujarat and Sind.

*Distribution*: Indigenous in tropical and S. Africa, Madagascar, the Mascarenes and in Yemem. Introduced into India and America.

*Uses*: An excellent fodder grass.

9. *Panicum paludosum*, Roxb. Fl. Ind. i (1832), 307 (*non* Nees); Wall. Cat. no. 8711; Griff. Notul. 37, Ic. Pl. Asiat. t. 139. f. 127; Duthie Fodd. Grass. N. Ind. 11.—*P. proliferum*, Hook. f. in F.B.I. vii, 50 (*nou* Lam.)—*P. proliferum*,

var. *paludosum*, Cooke in Fl. Bomb. ii, 937 (*non* Stapf).—*P. proliferum* Haines in Bot. Bihar & Orissa 995 (*non* Lam.).—*P. proliferum*, Prain in Beng. Plants 1176 (*non* Lam.).—*P. decompositum* var. *paludosum*, Trim. Cat. Ceyl. Pl. 105.

The explanation for the above synonymy is contained in a note given by Stapf (in Prain Fl. Trop. Afr. ix, 719) to justify his new species *Panicum longijubatum*, Stapf of tropical Africa which, on a previous occasion, he had described as var. *longijubatum* of *P. proliferum* (in Dyer Fl. Cap. vii, 406).

The *P. proliferum* of authors covers a number of allied yet clearly distinct species. The name is Lamarck's, but since Hitchcock (in Contrib. U. S. Nat. Herb. xii, 147) has shown that his plant so named is identical with *P. miliare*, Lam., *P. proliferum* becomes a synonym unconnected with any of the forms so far referred to it. Of these, one, namely Hooker's *P. proliferum* (Fl. Brit. Ind. vii, 50), is identical with Roxburgh's *P. paludosum* (Roxb. Fl., Ind. ed. Carey, i, 307), another, a native of America, is *P. dichotomiflorum*, Michx. (Fl. Bor. Am. i, 48). Both appear to me sufficiently distinct from the African plant described above; *P. paludosum* mainly by its conspicuously larger and more finely acuminate spikelets; *P. dichotomiflorum* by its pronounced branching habit and the smaller number of nerves of the upper glume (mostly 7) and lower valve (5-7, mostly 5).

*Description*: Cke. l.c.

*Locality*: *Konkan*: Byculla (McCann A140!); Sewri (McCann 3641!); Salsette (Lisboa *teste* Cooke).—*Deccan*: Khandala (McCann 5310!); Poona (Lisboa *teste* Cooke); Lonavla (Lisboa *teste* Cooke).—*S. M. Country*: Devarayi (Sedgwick 4118!).—*Kanara*: Gersoppa Falls, on rocks in river bed, common (Hallberg & McCann A139!); Karwar (Hallberg & McCann A124!).

*Distribution*: India, Ceylon. (It certainly does not occur in tropical and S. Africa, but whether it extends eastwards beyond India we are not able to say).

10. *Panicum antidotale*, Retz. Obs. fasc. 4 (1786), 17; Hook. f. in F.B.I. vii, 52; Cke. ii, 937; Blatter Fl. Aden 372.—For other references and synonyms see Hook. f. l.c.

*Description*: Cke. l.c.

*Locality*: *Sind*: (Stocks 659 *teste* Cooke); Karachi to Landi (Burns!); Laki (Bhide!); Sukkur (Woodrow *teste* Cooke); Clifton, near Karachi (Sabnis B797!); Umerkot, sand dunes (Sabnis B1080!); Mirpurkhas (Bhide!); Mirpurkhas, in fallow fields (Sabnis B1208!); Jamesabad, in fields (Sabnis B1154!); Sanghar (Sabnis B769!); Gharo (Blatter & McCann D506!, D608!).—*Gujarat*: Bhuj, Rhodi Maka, Cutch (Blatter 3751!); Sumrasar, Cutch (Blatter 3760!); Kathiawar (Woodrow *teste* Cooke).—*S. M. Country*: Dharwar (Garade!); Londa (Woodrow *teste* Cooke).

*Distribution*: Arabia, Afghanistan, Punjab, Upper Gangetic Plain, W. Peninsula, Ceylon, Australia.

11. *Panicum montanum*, Roxb. Fl. Ind. i (1832), 313 (*excl. descr. gluma sup. floralis*); Kunth Enum. Pl. 126; Benth. Fl. Hongk. 412; Hook. f. F. B. I. vii, 53; Cke. ii, 938; Haines Bot. Bihar & Orissa, 996.—*P. courtallense*, Nees & Arn. ex Wight Cat. no. 2342; Steud. Syn. Gram. 83.—*P. euchroum*, Steud. l.c. 98.

*Description*: Cke. l.c.

*Locality*: *Konkan*: Pen, hills (Bhide!); Kenery Caves (McCann A134!, A136!).—*Deccan*: Lohagad, half way up (McCann A137!); Khandala (McCann A136!); Lonavla (Garade!).—*S. M. Country*: Castie Rock, on hill behind station (Bhide!).—*Kanara*: Dandeli (Talbot 2243!); Kala Nuddie (Herb. Econ. Bot. Poona!); Karwar, hillside in shade of trees (Hallberg & McCann A135!, Talbot!); Sumpkhund (Hallberg & McCann 9935!).

*Distribution*: Hotter hilly parts of India, Ceylon, Penang, Malaya, China, Philippines.

12. *Panicum auritum*, Presl ex Nees Agrost. Bras. 176; Rel. Haenk. i, 305; Tria. Pan. Gen. 176; Kunth Enum. Pl. i, 113; Steud. Syn. Gram. 70; Baker Fl. Maurit. 437; Miq. Fl. Ind. Bat. iii, 455; Hook. f. F. B. I. vii, 40; Haines Bot. Bihar & Orissa. 996.—*P. insulicola*, Steud. l. c. 78.—*P. javanum*, Nees

and Bühse in Miq. Pl. Jungh. 376 ; Miq. Fl. Ind. Bat. l.c. 453.—*P. patens*, Bojer Hort. Maurit. ex Baker l.c.

*Description* : A perennial, tall, erect grass. Culm 0.9-1.6 m. high, soft. Leaves linear-lanceolate, broadly cordate at base, 20-35 cm. by 24-30 mm. glabrous or sparsely hairy beneath. Sheath glabrous or sparsely hairy with villous mouth. Ligule very short. Panicle long contracted or more or less effuse, 20-45 cm. long, fastigiately branched, branches erect, 5-12 cm. long, branchlets and fascicles of spikelets subsecund. Spikelets green, glabrous, 1.7-2.5 mm., sessile or shortly pedicelled, strongly nerved, subacute. Lower involucreal glume broadly ovate,  $\frac{1}{3}$  -  $\frac{1}{2}$  the length of the lower floral, obtuse or acute, nerves 3-5 arching, upper involucreal and lower floral subequal, ovate-oblong, acute or acuminate, 5-nerved, pale of lower floral glume small, neuter. Upper floral glume as long as the lower, lanceolate-acuminate, smooth, white, thinly coriaceous.

*Locality* : S. M. Country : Castle Rock (Gammie 15717 !).

*Distribution* : India, Ceylon, Malay Peninsula, Malaya, China.

### 53. HYMENACHNE, Beauv. Agrost. (1812), 48, t. 10, f. 8.

Rather stout grasses. Leaves broadly linear. Panicles thyrsoid, branches erect, appressed with spiciform branchlets and very numerous crowded narrowly lanceolate acuminate secund spikelets, articulate on their minute pedicels. Lower involucreal glume cuspidate, keeled, membranous, shortest, upper with sheathing amplexicaul base on the long internode of the rachilla between it and the lower floral glume, prominently 3-nerved, cuspidate or awned. Lower floral glume longest, lanceolate-acuminate, passing gradually into the awn, with three strong nerves meeting in the base of the awn and two lateral weaker ones, empty; upper longer than upper involucreal glume, oblong, membranous in flower scarcely hardened in fruit, smooth, faintly 2-nerved, embracing the pale except at the tip, pale similar and as long. Lodicules minute. Stamens 3. Styles free.

This genus is not represented in Cooke. The following species is described in the F.B.I. under *Panicum myurus*, H.B. & K.

1. *Hymenachne myuros*, Beauv. Agrost. (1812), 49, t. 10, fig. 8 (*excl. syn. Lam.*) ; Nees Agrost. Bras. 275 ; Griseb. Fl. Brit. West Ind. 553 (*excl. syn.*) ; Steud. Syn. Gram. 78 ; Haines Bot. Bihar & Orissa 991.—*Panicum myurus*, H.B. & K. Nov. Gen. & Sp. i, 98 (*excl. syn. Lam.*) ; Kunth Rev. Gram. i. 33. Enum. Pl. i, 86, Suppl. 65 ; Duthie Fodd. Grass. N. Ind. 10 (*excl. syn.*) ; Benth. Fl. Austral. vii, 480 (*excl. syn. interruptum*) (*Excl. in omnibus syn. Lam.*, Rudge, Richard, Trin.) ; Hook. f. in F.B.I. vii, 39.—*P. acutiglumum*, Steud. Syn. Gram. 66.—*P. auritum*, Hassk. Pl. Rar. Java. 22 (*non Presl.*)—*P. Hasskarlii*, Steud. in Zoll. Syst. Verz. 54, Syn. Gram. 70 ; Miq. Fl. Ind. Bat. iii. 456.—*P. myurum*, Meyer Fl. Esseg. 50 (*excl. syn. Lam. & Rudge.*)—*P. mangaloricum*, Steud. l. c. 78.—*P. serrulatum*, Roxb. Fl. Ind. i. 307 ; Kunth. Enum. Pl. i, 126.—*Agrostis monostachys*, Poir. Encycl. Suppl. i, 256, ex Kunth l.c.

*Description* : Culm stout, tall, 0.6-1.8 m. high, spongy below, rooting at the nodes of the prostrate base, erect, leafy. Leaves 20-50 cm. by 18-25 mm. flat, tapering from a broad cordate base to a fine point, margin serrulate ; sheath smooth, glabrous or ciliate ; ligule very short, rounded, hyaline. Panicle very dense, narrow, very compound with closely appressed branches, 15-30 cm. long, rarely 25 mm. diam., often interrupted, sometimes quite cylindrical. Spikelets variously grouped, shortly and unequally pedicelled, secund on the erect branches of the panicle, 4-6 mm. long, narrowly lanceolate, pale green. Lower involucreal glume  $\frac{1}{3}$  of the lower floral glume, narrow from an amplexicaul base, aristulate, hispidulous on keel and cusp ; upper narrowly lanceolate, subaristate, hispidulous, 3-nerved. Lower floral glume much longer than upper involucreal glume, narrowly lanceolate, gradually tapering into the awn as long as spikelet, strongly 3-nerved, hispidulous on nerves, pale imperfect or 0 ; upper small, thin, narrow, finely acuminate, almost embraced by the lower, shorter than the upper involucreal glume, enclosing its pale on the edges. Styles distinct.

*Locality* : S. M. Country : Tadas, tanks, elevation 2,000 ft., rainfall 35 inches (Sedgwick & Bell 4917 !).

*Distribution* : Tropical Asia, Australia and America.

54. *CYRTOCOCCUM*, Stapf in Prain Fl. Trop. Afr. ix, 745.

Perennial. Culms weak, rising from a decumbent or creeping and rooting base. Leaf-blades flat, linear-lanceolate or almost linear. Ligules membranous, short. Spikelets on long to very long and capillary or short pedicels, widely scattered or approximate, obliquely obovate to semi-obovate, laterally much compressed, falling entire from the pedicels of very loose and open or contracted and dense panicles. Involucral glume thinly membranous, unequal to subequal, 3-5 nerved. Lower floret barren with or without a pale, glume similar to the upper involucral glume, pale, if present, narrow, 2-nerved. Upper floret about as long as or almost as long as the lower, hermaphrodite, glume narrowly boat-shaped, papery to subcrustaceous with firm very narrowly involute margins, obsoletely 5-nerved; pale subequal to the glume, with a narrow convex back, of the same substance as the valve, with fine keels and thin flaps. Lodicules two, minute, broadly cuneate. Stamens three. Styles distinct; stigmas sublaterally exerted high up. Grain not known.

Species 6 or 7. Tropical Africa, Indo-Malaya.

None of the species here described were mentioned by Cooke. Hook. f. in F.B.I. has them under *Panicum*, sect. *Gibbosæ*.

## I. Spikelets shortly pedicelled

- |                          |     |     |                         |
|--------------------------|-----|-----|-------------------------|
| 1. Leaves 2.5-5 cm. long | ... | ... | 1. <i>C. trigonum</i> . |
| 2. Leaves 5-15 cm. long  | ... | ... | 2. <i>C. pilipes</i> .  |

## II. Spikelets on capillary pedicels which are much longer than the spikelets

...	...	3. <i>C. patens</i> .
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1. *Cyrtococcum trigonum*, A. Camus in Bull. Mus. Hist. Nat. 27 (1921), 118.—*Panicum trigonum*, Retz. Obs. iii, 9 (*excl. syn.* Burm.); Kunth Enum. Pl. i, 116; Nees Agrost. Bras. 206; Roxb. Fl. Ind. i, 305; Hook. f. F.B.I. VII, 56.—*P. difforme*, Roth. Nov. Sp. 52.—*P. radicans*, Böhse in Miq. Pl. Jungh, 375; Miq. Fl. Ind. Bat. iii, 453 (*non* Retz.).—*P. gibbum*, Steud. Syn. Pl. Glum. 87.

*Description*: Perennial. Culms decumbent, branching, interlaced below; branches erect. Leaves 2.5-5 cm. long, linear-lanceolate, glabrous or laxly hairy. Sheath glabrous or margin ciliate. Ligule rounded. Panicle 25-35 mm. long, contracted, rhachis and short, suberect branches glabrous. Spikelets 1.5 mm. long, very shortly pedicelled, hispidulous. Lower involucral glume about  $\frac{1}{2}$  the length of the lower floral glume, obtuse or acute, 3-nerved, pale brown; upper pale brown. Lower floral glume 5-nerved, pale brown; upper naked or bearded at the tip.

*Locality*: Konkan: Matheran, Harrison's Springs and Monkey Point (D' Almeida A251!, A252!).

*Distribution*: India, Ceylon, Java.

2. *Cyrtococcum pilipes*, A. Camus in Bull. Mus. Hist. Nat. 27 (1921), 118.—*Panicum pilipes*, Nees & Arn. ex Böhse in Miq. Pl. Jungh. iii, 376; Miq. F. Ind. Bat. iii, 453; Hook. f. F. B. I. vii, 57.—*P. hermaphroditum*, Steud. Syn. Gram. 67; Benth. Fl. Austral. vii, 485.—*P. oxyphyllum*, Hochst. ex Steud. l.c. 65.

*Description*: Perennial. Culms 30-60 cm. high, geniculately ascending from a slender, creeping, branching base, lower nodes rooting, upper subpubescent. Leaves 5-15 cm. long, 8-35 mm. broad, glabrous or sparsely hairy above, puberulous beneath, finely acuminate, base narrow. Sheath glabrous or ciliate, mouth hairy. Ligule rounded. Panicle 7-13 cm. long, contracted, branches short, rather remote, erect or spreading with short fastigiate branchlets, often slender hairs on the pedicels. Spikelets 1.5 mm. long, brown, very shortly pedicelled, glabrous. Lower involucral glume about  $\frac{1}{2}$  the length of the lower floral glume, obtuse, 3 nerved. Lower floral glume 5-nerved; upper white, its pale narrow, patent, hard.

*Locality*: Konkan: Above Kenery Caves (McCann A133!); Matheran (D'Almeida A132!, Woodrow!).—*Deccan*: Mahableshwar, in forests, elevation 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4801!); Pratapgad Fort (Bhide 1207!).—*S. M. Country*: Castle Rock, in shade of trees (McCann A131!, Bhide!).—*Belgaum* (Herb. Bot. Gard Cal.).—*Kanara*: Coastal forests, Karwar (Sedgwick & Bell 5113!); deciduous forests, Kirwatti (Sedgwick 3130!); Halyal (Talbot!); Supa, elevation 2,000 ft. (Talbot 2091!); Yellapore (Talbot 907!); Devimani Ghat (Hallberg & McCann A128!);

Gersoppa Falls (Hallberg & McCann A125 !); Anmod, forests (Sedgwick 3252 !); Kulgi, elevation 2,000 ft. (Talbot).

*Distribution*: Mascarene Islands, Madagascar, India, Malaya, Australia, Pacific Islands.

3. *Cyrtococcum patens*, A. Camus in Bull. Mus. Hist. Nat. 27 (1921), 118.—*Panicum patens*, Linn. Sp. Pl. 86; Burm. Fl. Ind. t. 10, f. 2; Spreng. Syst. i, 322 (*excl. syn. multinode*); Kunth Enum. Pl. 1, 126 (*excl. syn. Roxb.*); Hook. f. F. B. I. vii, 57.—*P. accrescens*, Trin. Sp. Gram. Ic. t. 88, *et corrig.* vol. iii; Kunth l.c. 116.—*P. obliquum*, Roth. Nov. Sp. 51; Kunth l.c. 103; Miq. Fl. Ind. Bat. iii, 452.—*P. radicans*, Retz. Obs. iv, 18; Nees Agrost. Bras. 206; Kunth l.c. 216.

*Description*: Culms 30–90 cm. high, creeping and rooting and branched below, leafy, nodes glabrous. Leaves 5–15 cm. by 6–8 mm., ovate to linear-lanceolate, finely acuminate, thin, glabrous or ciliate below with tubercle-based hairs. Sheath with the margins and mouth ciliate. Ligule rounded. Panicle 5–13 cm. long, contracted or effuse, usually inclined with spreading glabrous or puberulous branches naked below, and very long distant spreading branchlets, rachis, branches and pedicels capillary. Spikelets 1.5 mm. long. Lower involucreal glume  $\frac{1}{3}$ – $\frac{2}{3}$  the length of the lower floral glume, ovate, obtuse, 3-nerved. Upper involucreal and lower floral glume glabrous or with ciliate tips.—A very variable plant.

*Locality*: Konkan: Vasco da Gama (Bhide !); Vetora (Sabnis 33440 !).—*S. M. Country*: Tadas, in shade of trees, elevation 2,000 ft., rainfall 35 in. (Sedgwick 2102 !); Castle Rock (Gammie 15579 !), very large specimen (McCann A144 !).—*Kanara*: Nagargalli, forests, very abundant (Sedgwick 2892 !); Gersoppa Falls (Hallberg & McCann A126 !, Chibber !); Malamani, elevation 1,600 ft. (Talbot 2676 !); Kulgi (Talbot 2280 !); Guddhalli, Karwar (Hallberg & McCann A127 !).

*Distribution*: Tropical Asia, Malaya, Pacific Islands.

55. *SACCIOLEPIS*, Nash in Brit. Man. Bot. 89; Stapf in Prain Fl. Trop. Afr. ix, 747.

Annual or oftener perennial grasses. Leaf-blades linear and flat or filiform-convolute, or filiform-subulate. False spikes often very dense, dark or variegated. Spikelets mostly very small, oblong to ovate-oblong or elliptic or lanceolate, subterete or laterally compressed, usually somewhat turgid, falling entire from the short finely filiform pedicels of a spiciform, very rarely open panicle. Involucreal glumes similar in structure but unequal. Lower much shorter, softly or rigidly membranous, with a narrow hyaline margin or hyaline tip, stiffened by the hardening of the prominent and often rib-like nerves, or more or less dissimilar owing to the reduction of the lower glume to a small hyaline scale, or its differentiation into a narrow, hardened obscurely nerved back and broad hyaline margins. Upper with a curved or basally gibbous or saccate back, always much concave, mostly 7- or 9-, rarely 5- or up to 13-nerved. Lower floral glume male or barren, very dissimilar to the upper involucreal glume and of the same or almost the same length, but with a straighter back; pale narrow, hyaline, finely 2-keeled, shorter than the glume, sometimes reduced or quite rudimentary. Upper floral glume hermaphrodite, oblong in outline seen from the back, very convex, chartaceous, ultimately subcrustaceous, with firm narrowly involute margins, obscurely 5-nerved; pale almost the length of the glume, tightly embraced by it all along and of the same texture, 2-nerved, hardly keeled. Lodicules two, small, broadly cuneate. Stamens three. Styles distinct; stigmas long, loosely plumose, exerted terminally or subterminally. Grain tightly enclosed by the glume and pale, elliptic in outline, dorsally compressed, with an almost flat back and convex face; hilum punctiform.

Species over 30.—Tropics of the whole world.

I. Lower involucreal glume 3-nerved

- |   |                            |
|---|----------------------------|
| 1. Spikes 1–5 cm. long. Spikelets lanceolate-ovoid, hispid, 2–2.5 mm. ... | 1. <i>S. indica</i> .      |
| 2. Spikes 5–23 cm. long. Spikelets ovoid, 1.3–2.1 mm. long                | 2. <i>S. myosuroides</i> . |
| II. Lower involucreal glume 5-nerved                                      | 3. <i>S. interrupta</i> .  |

1. *Sacciolepis indica*, Chase in Proc. Biol. Soc. Wash. xxi (1908), 8; Haines Bot. Bihar & Orissa 990.—*Panicum indicum*, Linn. Mant. ii, 184; Retz. Obs. iii, 9; Kunth Enum. Pl. i, 133; Steud. Syn. Gram. 84; Roxb. Fl. Ind. i, 285; Benth. Fl. Hongk. 413, Fl. Austral. vii, 480; Hook. f. F. B. I. vii, 41 (*partim, excl. aliquibus syn.*).—*Hymenachne indica*, Bühse ex Miq. Fl. Ind. Bat. iii, 458.

*Description*: A slender grass, 15–60 cm. high. Leaves linear-acuminate, 5–13 cm. long, up to 4 mm. wide, glabrous or hirsute, base narrow; sheath not auricled. Panicle spiciform, oblong or cylindric, dense-flowered, green or slightly purplish, 1–5 cm. long by about 4 mm. diam., branches very short. Spikelets longer than their pedicels, 2–2.5 mm. long, crowded, ovoid, acute or acuminate, straight or curved, shortly or hispidly hairy, or glabrous. Lower involucre glume ovate,  $\frac{1}{3}$ – $\frac{1}{2}$  of the lower floral glume, lanceolate from a broad base, acute, 3-nerved; upper usually subcymbiform, curved, obtuse, 7–11-nerved, 2–5 mm. long. Lower floral glume as long as the upper involucre glume, broadly ovate, obtuse, 9-nerved, pale minute; upper narrowly ellipsoid, very acute, white, smooth, polished, sides overlapping the margins of the similar pale, base obtuse, mucronulate with remains of the rachilla.

*Note*.—Stapf has separated *Panicum angustum*, Trin. Sp. Gram. Ic. t. 334 from *Panicum indicum*, Linn. as conceived by Hook. f., and named it *Sacciolepis angusta*. In his opinion the various varieties given in the F. B. I. are mostly referable to *S. angusta*, Stapf.

*S. indica* is not a well-defined species. It appears to pass insensibly into *S. mysuroides* and *S. interrupta*. According to Hook. f., the former differs in its caudiform spike and more minute rounded spikelets, the latter in its stouter habit.

Haines thinks it is better to confine *S. indica* to those specimens with hairy spikelets. We have not followed him in this.

*Locality*: *S. M. Country*: Khanapur, elevation 2,500 ft., rainfall 70 inches (Sedgwick 3080!); Castle Rock (Bhide!).—*Kanara*: Tank near Yellapore (Talbot!); Kulgi (Talbot 2291!); Siddhapur to Sirsi (Hallberg & McCann A118!); Karwar (Talbot 1297!, Hallberg & McCann A116!).

*Distribution*: Tropical Asia and Australia.

2. *Sacciolepis mysuroides*, Haines Bot. Bihar & Orissa 990.—*Panicum mysuroides*, R. Br. Prodr. (1810), 189; Kunth Enum. Pl. i, 77; Steud. Syn. Gram. 56; Benth. Fl. Austr. vii, 480 (*excl. syn. angustum*); Duthie Fodd. Grass. N. Ind. II; Hook. f., F. B. I. vii., 42; Trim. Fl. Ceyl. v, 148; Prain Beng. Pl. 1175; Cke ii, 934.—*P. curvatum*, Roxb. Fl. Ind. i, 286 (*non Linn.*).

*Description*: Cke. l.c.

*Locality*: *Konkan*: Savantvadi (Woodrow); Alibag (Lisboa).—We have not seen any specimen.

*Distribution*: India, Ceylon, Malay Peninsula, China, Australia.

3. *Sacciolepis interrupta*, Stapf in Prain Fl. Trop. Afr. ix, 757; Haines Bot. Bihar & Orissa 991.—*Panicum interruptum*, Willd. Sp. Pl. i, 341; Kunth Enum. i, 87; Nees Fl. Afr. Austr. 51; Roxb. Fl. Ind. i, 286; Griff. Notul. iii, 26, and Ic. Pl. Asiat. t. 139, fig. 22I, t. 146, fig. 2; Dalz. & Gibs. 316; Steud. Syn. Pl. Glum. i, 66; Hook. f. F. B. I. vii, 40; Stapf in Dyer Fl. Cap. vii, 413.—*P. uliginosum*, Roth Nov. Pl. Sp. 50.—*P. inundatum*, Kunth Rev. Gram. i, 34, and Enum. i, 88; Steud. l.c. 66.—*Hymenachne interrupta*, Bühse in Miq. Pl. Jungh. i, 377; Miq. Fl. Ind. Bat. iii, 458; Steud. l.c. 101.—*P. indicum*, Hack. in Bolet. Soc. Brot. v, 210 (*non Linn.*).

*Description*: Cke. l.c.

Very variable in size and shape, especially the panicle which varies a good deal as to colour.

*Locality*: *Sind*: (Woodrow teste Cooke).—*Konkan*: Bassein, tank (Burns!); Wada, tank (Ryan 453!); Nagotna (Gammie 16074!); Borivli-Kanary, in water (McCann A120!); Bhivandi (Chibber!); Vihar (Sabnis!); Gokura Creek, Bassein (Garade 1708!); Virar, on bank of a tank (McCann 9583!); Panvel (Woodrow); Vengurla (Woodrow); margins of tanks throughout the Konkan (Dalzell & Gibson).—*Deccan*: Tingerwadi, Igatpuri (Blatter & Hallberg 3825!).—*S. M. Country*: Tadas, tanks (Sedgwick & Bell 4916!); Londa, in water (Gammie 15854!); Hulkop (Sedgwick & Bell 3174!); Belgaum (Herb.



Econ. Bot. Poona !).—*Kanara*: Sirsi-Siddhapur (Hallberg & McCann A117 !); Tinai Ghat (Gammie 15791 !).

Usually inhabiting marshy and swampy places such as rice fields and the banks of tanks.

It is doubtful as to whether Woodrow's plant from Sind was correctly named as this grass is one of moist regions.

*Distribution*: Tropical and S. Africa, India, Ceylon, Malaya.

56. *SETARIA*, P. Beauv. *Agrost.* 51, t. xiii, fig. iii; Cke. ii, 918.

(In 1897 F. Lamson Scribner (in U. S. Dept. Agr. Div. *Agrost.* Bull. iv, 38) proposed the name *Chytocloa* for the grasses generally known as *Setaria*. Stapf has given convincing reasons why the old name should be retained. See Kew Bull (1920), 124-127.

Species about 100.—Warm regions of the World, a few species common as weeds in the more temperate parts. Cooke has 5 indigenous and 1 cultivated species. We retain them all.

*Key*:

A. Leaves more or less plicate

- |  |                             |
|--|-----------------------------|
| I. Perennial. Culm reaching 2·4 m. ... | 1. <i>S. plicata</i> .      |
| II. Annual. Culm reaching 0·6 m. ...   | 2. <i>S. rhachitricha</i> . |

B. Leaves flat, not plicate

AA. Bristles not retrorsally barbellate

- |                                  |                        |
|----------------------------------|------------------------|
| I. Upper floral glume smooth ... | 6. <i>S. italica</i> . |
| II. Upper floral glume rugose    |                        |

1. Panicle spiciform, continuous; bristles 6 or more... ..	3. <i>S. glauca</i> .
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2. Panicle interrupted or subpyramidal; bristle 1 on pedicel and usually 3-4 below pedicel ... ..	4. <i>S. intermedia</i> .
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BB. Bristles retrorsally barbellate ...	5. <i>S. verticillata</i> .
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1. *Setaria plicata*, T. Cooke in Fl. Bomb. ii, 919.—*Panicum plicatum*, Lam. III. 1 (1791), 171; Jacq. *Eclog. Gram.* i. t. 1; Trin. *Gram. Panic.* 183, Gen. Pan. 161, Sp. *Gram. Ic.* t. 223; Kunth *Enum. Pl.* i, 94; Griff. *Notul.* iii, 24, Ic. *Pl. Asiat.* t. 139, fig. 229; Duthie *Grass. N. W. Ind.* 6, Fodd. *Grass. N. Ind.* 11; Benth. *Fl. Hongk.* 411; Hook. f. *F. B. I.* vii, 55; Trim. *Fl. Ceyl.* v, 157.—*P. amplissimum*, Steud. *Syn. Gram.* 54.—*P. asperatum*, Kunth *Rev. Gram.* i, 39, *Enum. Pl.* i. c. 39; Miq. *Fl. Ind. Bat.* iii, 456.—*P. excurrens*, Trin. *Pan. Gen.* 131, 249, Sp. *Gram. Ic.* t. 49; Benth. *Fl. Hongk.* 412 (*excl. syn.*).—*P. nepalense*, Spreng. *Syst.* 321; Dalz. & Gibs. 291; Aitchis. *Cat. Panjab Pl.* 160.—*P. nervosum*, Roxb. *Fl. Ind.* i, 311.—*P. neurodes*, Schult. *Mant.* II, 228; Duthie *Grass. N. W. Ind.* 5.—*P. Wallichianum*, Nees *Fl. Afr. Austr.* 49.

*Description*: Cke. ii, 919.

*Locality*: *Konkan*: Victoria Gardens, Bombay (McCann 5376 !); Parel (Lisboa); western side of the Ghats (Dalzell & Gibson).—*Deccan*: Lingmala, Mahableshwar, in forest (Sedgwick & Bell 4642 !); Panchgani, (Blatter & Hallberg B1234 !, B1235 ! McCann !).—*S. M. Country*: Belgaum Fort, common all over Belgaum in compounds (Sedgwick 3066 !).—*Kanara*: Kulgi (Talbot 2278 !); Halyal (Talbot 2408 !).

*Distribution*: India, Ceylon, Malay Peninsula and Islands, China.

*Uses*: Sometimes cultivated as an ornamental grass.

2. *Setaria rhachitricha*, T. Cooke in Fl. Bomb. ii, 919.—*Panicum rhachitrichum*, Hochst. in *Flora* 27 (1844), 254; Parlat. in Hook. *Niger Fl.* 187; Steud. *Syn. Gram.* 63; Hook. f. *F. B. I.* vii, 56; Prain *Beng. Pl.* 1176.—*P. chamaeraphis*, Nees ex. A. Braun *In. Sem. Hort. Berol.* (1853) *Append.* 20.—(*P. homonymum*, Steud. *l.c.* 48; Duthie *Grass. N. W. Ind.* 4 (*homonymum*)).

*Locality*: *S. M. Country*: Londa (Gammie ex Woodrow).

We doubt the occurrence of this species in the Presidency. Neither Cooke nor we have seen any specimens. There are none in Herb. Kew, neither do the herbaria of the Presidency contain any. Besides, the distribution of the species is not in favour of its presence in Bombay.

*Distribution*: India (subtropical Himalaya, Chota Nagpur, Calcutta), tropical Africa.

3. *Setaria glauca*, Beauv. Agrost. (1812), 51; Kunth Enum. Pl. i, 149, Suppl. 106; Griff. Notul. 44, Pl. Asiat. t. 149. f. 1; Dalz. & Gibs, 293; Aitchis. Cat. Punjab, Pl. 162; Miq. Fl. Ind. Bat. iii, 466; Duthie Grass. N. W. Ind. 8; Indig. Fodd. Grass. t. x, Fodd. Grass. N. Ind. 14; Boiss. Fl. Or. v, 442; Hook. f. F. B. I. vii, 78; Trim. Fl. Ceyl. v, 162; Prain Beng. Pl. 1170; Cke. ii, 920.—*Panicum glaucum*, Linn. Sp. Pl. 76; Trin. Sp. Gram. Ic. t. 195; Roxb. Fl. Ind. i, 285; Benth. Fl. Hongk. 411.—*P. lutescens*, Weig. Obs. (1772), 20.—*Setaria lutescens*, Hubbard in Rhodora xviii (1916), 232.—For other synonyms see Hook. f. l. c.

Mr. C. E. Hubbard of the Kew Herbarium informs us that he changed *Setaria glauca*, Auct. into *S. lutescens* on account of the synonym *Panicum lutescens*, Weigel Obs. (1772), 20. Dr. Stapf thinks that this name change is unnecessary and we quite agree with him after reading his MS. on this question which he kindly allowed Mr. Hubbard to put at our disposal. As Dr. Stapf is now about to publish his MS. we refrain from giving his arguments in this place.

*Description*: Cke. ii, 920.

*Locality*: *Gujarat*: Nadiad (Chibber!); Ahmedabad (Saxton 1063!); Baroda (Cooke).—*Khandesh*: Toranmal (McCann A149!, A150!); N. slope of Chanseli (McCann A151!).—*Konkan*: Bhandup (McCann 3606!); Mulgaum (McCann A147!); Bassein (McCann 9607!); Sion (McCann 3573!); Thana (Lisboa).—*Deccan*: Shivner Fort, Junnar (Paranipe!); Mahableshwar, common (Woodrow!, Dalzell & Gibson, Cooke); Panchgani, behind Maratha well (Blatter 3824!); Chattarshinji Hill, Poona (Ezekiel!); Shewapur, near Poona (Bhide 981!); Khandala, very common (McCann 8406!); Purandhar, foot (McCann 5603!); Lohagad, top (McCann 9501!); Nasik (Lisboa).—*S. M. Country*: Dharwar Dist. (Sedgwick 2173!); Dumbai, under trees (Talbot 2300!).—*Kanara*: Dandeli (Bell 4224); Halyal (Talbot 2144!); Onore (Talbot 1063!).

*Distribution*: All warm, temperate and tropical regions.

4. *Setaria intermedia*, Roem. & Schult. Syst. ii (1817), 489; Kunth Enum. Pl. i, 150; Aitchis. Cat. Panjab. Pl. 162; Duthie Grass. N. W. Ind. 9, Fodd. Grass. N. Ind. 14; Hook. f. F. B. I. vii, 79; Trim. Fl. Ceyl. v, 163; Cke. ii, 920; Haines Bot. Bihar & Orissa 989.—*S. glauca*, Hochst. Pl. Hohenack. no. 937.—*Panicum intermedium*, Roth. Nov. Sp. 47.

*Description*: Cke. ii, 920.

*Locality*: *Gujarat*: Doongri (Chibber!); Ahmedabad (Gammie 16351); Nadiad (Chibber!).—*Khandesh*: Toranmal (McCann A152!); Umalla village (Blatter & Hallberg 5184!).—*Konkan*: Dadar, very common in Bombay Isl. (McCann A153!); common in Salsette (McCann!).—*Deccan*: Purandhar Fort (Bhide!, McCann 5595!, 5022!); Chattarshinji, Poona (Bhide!); in cultivated fields about Poona (Jacquemont 355); Igatpuri, common (McCann 4320!); Khandala, common (Blatter 4410!, McCann!); Lonavla (McCann 4466!); Panchgani (Blatter & Hallberg B1227!, B1272!).—*S. M. Country*: Dharwar (Sedgwick 1839!); Belgaum (Ritchie 839).—*Kanara*: Yellapore (Talbot 1520!); Halyal (Talbot 2296!).

*Distribution*: Temperate and tropical regions.

5. *Setaria verticillata*, Beauv. Agrost. (1812), 51; Kunth Enum. Pl. I, 152; Dalz. & Gibs. 294; Aitchis. Cat. Panjab Pl. 162; Duthie Grass. N. W. Ind. 9, Fodd. Grass. N. Ind. 15; Reichb. Ic. Fl. Germ. t. 47; Hook. f. F. B. I. vii, 80; Trim. Fl. Ceyl. v, 163; Prain Beng. Pl. 1170; Cke. ii, 921; Haines Bot. Bihar & Orissa 989.—*S. respiciens*, Hochst. ex. Miq. Fl. Ind. Bat. iii, 467.—*Panicum adhaerens*, Forsk. Fl. Aegypt.—Arab. 20.—*P. verticillatum*, Linn. Sp. Pl. ed. ii, 82; Roxb. Fl. Ind. i, 301; Trin. Sp. Gram. Ic. t. 202.—*Pennisetum verticillatum*, Br. Prodr. 195.—Other synonyms in Hook. f. l. c.

*Description*: Cke. ii, 921.

*Locality*: *Sind*: Umerkot (Sabnis B748!); Sanghar (Sabnis B758!); Mirpurkhas, cultivated fields (Sabnis B701!); Bughar, Indus River (Blatter & McCann D640!); Ghulamalla, garden (Blatter & McCann D641!); Mirpur Sakro (Blatter & McCann D642!).—*Gujarat*: Ahmedabad (Sedgwick!); Cutch (Blatter 3744!); Baroda (Woodrow); Morvi, Kathiawar (Woodrow).—*Konkan*: Sion (Herb. S.X.C. 5236!); Juvem (Herb. S.X.C. 4237!); Malabar Hill (McCann 3626!); Eyculla (McCann!).—*S. M. Country*: In a village, Dharwar Dist. (Sedgwick 3109!).

*Distribution*: India, Ceylon, temperate and tropical regions.

\*6. *Setaria italica*, Beauv. Agrost. (1812), 51; Reichb. Ic. Fl. Germ. t 47; Aitchis. Cat. Panjab Pl. 162; Duthie Grass. N. W. Ind. 8, Field and Gard. Crops 5, t. 25, Fodd. Grass. N. Ind. 15; Miq. Fl. Ind. Bat. iii 467; Hook. f. F. B. I. vii, 78; Prain Beng. Pl. 1170; Haines Bot. Bihar & Orissa 988.—*Panicum italicum*, Linn. Sp. Pl. (1753), 56; Roxb. Fl. Ind. i, 302; Dalz. & Gibs. Suppl. 98.—*Pennisetum macrochaetum*, Jacq. Eclog. Gram. iii, 36, t. 25.—Rheede Hort. Malab. xii, t. 79—For other references see Hook. f. 1.c.

*Vern. Names* : Italian millet, foxtail millet, rala.

*Description* : Annual. Culms erect, tufted, 0.6—1.5 m. high. Leaves linear or lanceolate-linear, acuminate, 7—10 mm. broad or broader. Sheath densely ciliate on margin and mouth. Panicle 7—13 cm. long, 10 mm. wide or more, dense, inclined or nodding, simple, cylindrical or lobed or compound; rachis very hairy. Spikelets oval, 2—2.5 mm. long, in small clusters on the abbreviated branchlets of the panicle, with 2—3 bristles below each pedicel, bristles nearly smooth or microscopically barbellate, 5—8 mm. long, barbs suberect or spreading. Lower involucre glume oblong or subglobose, hyaline, smooth; upper ovate, obtuse or rounded, about  $\frac{2}{3}$  the length of the upper floral glume, 5-nerved. Lower floral glume hyaline, delicately 4—5-nerved, as long as and same shape as the upper floral glume, but not concave. Upper floral glume oval or elliptic or subglobose, concave, hardening, variable in length, not rugose but smooth and microscopically cancellate.

*Locality*: *Konkan*: Bombay, cultivated in compound of the Training College (McCann 4286 !); Bassein, Botanic Garden (Joshi !); Chowpatti, Bombay (Herb. S. X. C. 4299 !).—*Deccan* : Ganeshkhind Botanic Gardens (Patwardhan !).—*S. M. Country*: Dharwar, cultivated (Talbot 2014 !).

Extensively cultivated throughout as a food-grain.

*Distribution*: Most warm, temperate and tropical countries.

*Origin*: See DeCandolle, Origin of cultivated plants, p. 378.

57. *SPINIFEX*, Linn. Mant. ii, (1771), 163; Cke. ii, 913.

Species 4,—1 in India, 3 in Australia.

1. *Spinifex squarrosus*, Linn. Mant. (1771), 300; Lam. Ill. t. 840; Duthie Grass. N. W. Ind. 11; Benth. Fl. Hongk. 415; Miq. Fl. Ind. Bat. iii, 474; Hook. f. F. B. I. vii, 63; Grah. Cat. 240; Trim. Fl. Ceyl. v. 5; Prain Beng. Pl. 1168; Cke. ii, 913; Haines Bot. Bihar & Orissa 1010.—*Stipa littorea*, Burm. f. Fl. Ind. 29.—*Stipa spinifex*, Linn. Mant. i, 84; Rbeede Hort. Mal. xii, t. 75

*Description*: Cke. 1.c.

*Locality*: *Gujarat*: Near Domas (Cooke).—*Konkan*: Vengurla (Chibber !); Juven (McCann 4263 !); Versova (McCann 9827 !); Bandra (Blatter !); sandy shores near Bandra (Graham); Shrivardhan (Woodrow).—*Kanara*: Sandy sea shore, Karwar (Sedgwick & Bell 5057!, 5056!); Kumpta (Chibber!, Woodrow); Honavar, very common (McCann!, Chibber!); Onore (Talbot 1073 !).

*Distribution*: India, Ceylon, Java, China.

*Uses*: A valuable sand-binding plant.

58. *TRICHOLÆNA*, Schrad. in Schult. Mant. ii (1824), 163; Cke. ii, 924.

Species 10—12.—Chiefly African. The following 2 in the Bombay Presidency.

1. *Tricholæna Teneriffæ*, Parlat. in Welb. & Berth. Phyt. Canar. iii, pt. 2 (1848), 425; Hook. f. F. B. I. vii, 65; Cke. ii, 924.—*Saccharum Teneriffæ*, Linn. f. Suppl. 106.—For further synonyms see Hook. f. 1.c.

*Description*: Cke. 1.c.

*Locality*: *Sind*: Laki (Bhide !); Thanu-Bullo-Khan (Woodrow).

*Distribution*: Punjab, W. Peninsula; westward to Sicily and N. Africa.

2. *Tricholæna Wightii*, Nees ex Steud. Syn. Gram. (1855), 93; Lisboa in Journ. Bomb. Nat. Hist. Soc. v, (1890), 347; Hook. f. F. B. I. vii, 65; Cke. ii, 925.—*Rhynchelytrum Wightii*, Duthie Fodd. Grass. N. Ind. 21.—For further synonyms see Hook. f. 1.c.

*Description*: Cke. 1.c.

*Locality*: *Konkan*: Commonly cultivated in gardens in Bombay (McCann !); Sewri, probably an escape (Hallberg 3592!).—*Deccan*: Diva Ghat (McCann

5590 !); Malhargad (Woodrow); Poona (Woodrow); Mahableswar (Lisboa); Panchgani (Lisboa).—*S. M. Country*: Badami (Bhide 1, Woodow 23).

*Distribution*: India (Rajputana, W. Peninsula), Arabia, CapeVerd Islands.

5). PENNISETUM, Pers. Syn. i, (1805), 72; Cke. ii, 914.

Species about 40.—In most warm countries.

Cooke has 6 indigenous and 1 cultivated species. We add another cultivated species: *P. purpureum*, Schum. & Thoun. The name *P. cenchroides*, Rich. has to cede to *P. ciliare*, Link., and *P. typhoideum*, Rich. to *P. spicatum*, Roem. & Schult.

A. Anther-cells not bearded at the tips

I. Bristles of involucre free to the base

1. Inner bristles of involucre scaberulous, not ciliate

(a) Leaves 30-45 cm. long ... 1. *P. Alopecuros.*

(b) Leaves 7-15 cm. long ... 2. *P. dichotomum.*

2. Inner bristles of involucre ciliate below the middle, but naked at the base. Involucre striptate ...

... 3. *P. orientale.*

3. Inner bristles of involucre densely villous or ciliate below the middle, not naked at the base. Involucre sessile

(a) Inner bristles of involucre densely villous ... 4. *P. pedicellatum.*

(b) Inner bristles of involucre laxly ciliate with long silky hairs, not villous ... 5. *P. setosum.*

II. Inner bristles of involucre dilated below, their bases confluent in a coriaceous disk ...

... 6. *P. ciliare.*

B. Anther-cells more or less bearded at the tips  
Styles connate

I. Culms less than 2 m. high. Pale of upper floral glume truncate ...

.. 7. *P. spicatum.*

II. Culms more than 2 m. high. Pale of upper floral glume minutely 2-toothed ...

... 8. *P. purpureum.*

1. *Pennisetum Alopecuros*, Nees ex Steud Syn. Gram. (1855), 102; Duthie Grass. N. W. Ind. 10; Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1890), 338; Hook. f. F.B.I. vii, 84; Cke. ii, 914.—*P. Hohenackeri*, Hochst. ex Steud. l.c. 103.—*P. aureum*, Dalz. & Gibs. 294.—*Gymnothrix Alopecuros*, Nees in Wight Cat. no. 1663; Steud. l.c.—*G. cenchroides*, Roem. & Schult. Syst. ii, 499.

*Description*: Cke. l.c.

*Locality*: *Sind*: (Dalzell).—*Gujarat*: N. Sonasan, on dry sandy bank (Sedgwick !).—*Khandesh*: Toranmal, very common around lake (McCann 9862 !).—*Deccan*: Poona (Woodrow !, Lisboa, Jacquemont 407); near Poona (Gammie 15314 !); Nasik (Bource !, Blatter & Hallberg 9863 !, Lisboa); Purandhar, N. foot (McCann 5045 !); Lohagad, plain (McCann 9502 !); Panchgani (Blatter 3802 !, Blatter & Hallberg 1292 !, McCann !); Lonavla (Lisboa).—*S. M. Country*: Dharwar (Sedgwick 3718 !); Londa (Gammie 15827 !); Belgaum (Woodrow).—*Kanara*: Halyal (Talbot 2090 !).

Commonly found in clumps on sandy soil near streams and lakes. It is extremely tough and occupies sometimes large patches of land excluding almost everything else. *Dichanthium caricosum* is commonly found growing together with this grass.

*Distribution*: Rajputana, C. India, W. Peninsula.

*Uses*: 'In Poona brooms are said to be made of it, and at Mt. Abu it is employed in the manufacture of cordage.' (Lisboa).

2. *Pennisetum dichotomum*, Del. Fl. d'Egypt. (1813), 159, t. viii, fig. 1., Trin. Diss. ii, 66, Pan. Gen. 94; Kunth Enum. Pl. i, 161, Suppl. 110; Steud. Syn. Gram. 105; Boiss. Fl. Or. v, 444; Aitchis. Cat. Panjab Pl. 162; Duthie Grass. N. W. Ind. 10; Hook. f. F.B.I. vii, 85; Aschers.—Schweinf. Ill. Fl. d'Ég. 161, No. 1131; Cke. ii, 915.—*P. phalaroides*, Schult. Mant. ii, 147.—*Gymnothrix longiglumis*, Munro in Cat. Griff. etc. Pl. 56 (*nomen*).—*Cenchrus ramosissimus*

Poir. Encycl. vi, 51; Dalz. & Gibs. 294.—*Phalaris retacea*, Forsk. Fl. Aegypt. —Arab. 20.—*Panicum dichotomum*, Forsk. l.c.

*Description*: Cke. l.c.

*Locality*: *Sind*: On sand hills (Stocks, Woodrow); Bholari (Bhide!); Nasarpur, sandy plains (Sabnis B1050!); Sehwan, sand dunes (Sabnis B673!).—*Gujarat*: In hedges (Dalzell & Gibson).

*Distribution*: Punjab, N. W. Provinces, W. Peninsula, Afghanistan, Persia, Arabia, Syria, Sinai, Egypt.

*Uses*: Collected for fodder, one of the most valuable of desert plants.

3. *Pennisetum orientale*, Rich. in Pers. Syn. i (1805), 72; Boiss. Fl. Or. v, 445; Duthie Grass. N. W. Ind. 10; Hook. f. F.B.I. vii, 86; Cke. ii, 915; Muschler Fl. Egypt (1912), 66; Haines Bot. Bihar & Orissa 986.—*P. arenosum*, Edgew. in Journ. As. Soc. Beng. xxi (1852), 180; Aitchis Cat. Panjab Pl. 162; Duthie Grass. N. W. Ind. 10.—*P. persicum*, Boiss. & Bûhse in Nov. Mem. Soc. Nat. Mosc. xii (1860), 232.—*P. sinaicum*, Dcne. in Ann. Sc. Nat. ser. 2. ii (1834), 11; Aitchis. l.c.; Duthie l.c.—*P. tiberiadis*, Boiss. Diagn. ser. i, xlii, 43.—*Cenchrus orientalis*, Willd. ex Trin. Diss. ii, 69.—*Panicum orientale*, Willd. Enum. Hort. Berol. ii. 1031.

*Description*: Cke. ii, 915.

*Locality*: *Sind*: Hyderabad (Woodrow!); Mirpurkhas (Mankhad!).—*Konkan*: Victoria Gardens, Bombay (McCann 4385!).

*Distribution*: W. Himalaya, Punjab, W. Peninsula, Persia, Syria, Cilicia, Sinai, Egypt, Algeria.

4. *Pennisetum pedicellatum*, Trin. in Mém. Acad. Pétersb. sér. 6, iii, pt. 2 (1835), 184; Hook. f. F.B.I. vii, 86; Cke. ii, 916; Haines Bot. Bihar & Orissa 986.—*P. lanuginosum*, Hochst. in Flora xxv (1842), Beibl. i, 133; A. Rich. Tent. Fl. Abyss. ii, 385; Lisboa in Journ. Bomb. Nat. Hist. Soc. v (1890), 339.—For further synonyms see Hook. f.

*Description*: Cke. ii, 916.

*Locality*: *Gujarat*: (Lisboa); Rajkot (Woodrow).—*Khandesh*: Toranmal in watercourse (McCann 9868!).—*Deccan*: College Farm, Poona (Garade!).

*Distribution*: Bihar, Rajputana, W. Peninsula, tropical Africa.

5. *Pennisetum setosum*, Rich. in Pers. Syn. i (1805), 72; Hook. f. F.B.I. vii, 87, Cke. ii, 916; Haines Bot. Bihar & Orissa 986.—*P. barbatum*, Schult. Mant. ii, 147.—*P. holcooides*, Schult. l.c. 148; Duthie Grass. N.W. Ind. 10, Indig. Fodd. Grass. t. 49, Fodd. Grass. N. Ind. 17.—*P. purpurascens*, H. B. & K. Nov. Gen. & Sp. i, 113.—*Panicum barbatum*, Roxb. Fl. Ind. i, 282.—*Panicum holcooides*, Roxb. l.c. 285.

*Description*: Cke. ii, 916.—Our specimens from Khandesh have the bristles quite free from hairs.

*Locality*: *Sind*: Hyderabad (Woodrow).—*Gujarat*: Ahmedabad, No. 6 grass plot Bhadar (Sedgwick!).—*Khandesh*: To Toranmal (McCann 9869!); Chanseli Hill, S. slope (McCann 9867!).

*Distribution*: India (W. Bengal, Bihar, Upper Gangetic Plain, W. Peninsula), tropical Africa and America.

6. *Pennisetum ciliare*, Link. Hort. Berol. i (1827), 213; Boiss. Fl. Or. v, 445; Aschers.—Schweinf. Ill. Fl. d'Eg. 161, no. 1132; Sickenberg Contrib. Fl. d'Eg. 301; Muschler Fl. Eg. i, 65.—*Cenchrus ciliaris*, Linn. Mantiss. ii, 302; Desf. Fl. Atlant. ii, 387.—*Pennisetum cenchrroides*, Rich. in Pers. Syn. i (1805), 72; Beauv. Agrost. 59, t. 13, f. 5; Aitchis. Cat. Panjab Pl. 162; Lisboa in Journ. Bomb. Nat. Hist. Soc. v (1890), 338; Duthie Grass. N.W. Ind. 10, Indig. Fodd. Grass. t. 12, 13, Fodd. Grass. N. Ind. 17.

*Vern. Names*: Jiral, Anjan, Dhaman (Sind), Vaghuoru (Gujarat).

*Description*: Cke. ii, 916.

*Locality*: *Sind*: (Burns!); Mirpurkhas (Mankad!, Sabnis B1043!); Jacobabad (Deputy Commissioner!); Sanghar (Sabnis B892!); Clifton, near Karachi (Sabnis B805!); Jamadar ka Landa, near Karachi (Stocks); Sehwan to Laki (Sabnis B620!); Nasarpur (Sabnis B1056!); Umerkot, sand dunes (Sabnis B1079!); Tatta, Kullian Kote Lake (Blatter & McCann D630!, D631!, D633!), Tatta (Blatter & McCann D632!, D634!, D635!); Indus Delta (Blatter & McCann D636!).—*Gujarat*: Nadiad (Chibber!); Dohad, (Chibber!); Daman (Bhide!); Surat (Gammie!); Ahmedabad (Sedgwick!); near Madalpur,

Ahmedabad (Saxton 1065 !); Bhuj Hill, Cutch (Blatter 3767 !); Rajkot, Kathi-  
 awar (Woodrow).—*Khandesh*: Tapti bank, Muravad (Blatter & Hallberg  
 51651 !); Umalla, Tapti bank (Blatter & Hallberg 5208 !).—*Deccan*: (Lisboa !).  
 —*S.M. Country*: Gokak (Shevade !).

*Distribution*: India (Kashmir, Upper Gangetic Plain, W. Peninsula,  
 Deccan), throughout Africa, Sicily, Canaries.

7. *Pennisetum spicatum*, Roem. & Schult. Syst. Veg. ii (1817), 499.—*Panicum  
 spicatum*. Roxb. Fl. Ind. i, 283.—*Penicillaria spicata*, Willd. Enum. Hort.  
 Berol. 1037; Aitch's. Cat. Punjab Pl. 163.—*Holcus spicatus*, Linn. Syst. ed. x,  
 1305; Grah. Cat. Bomb. Pl. 238; Dalz. & Gibs. Suppl. 99.—*Pennisetum  
 typhoideum*, Rich. in Pers. Syn. i (1805), 72; Boiss. Fl. Or. v, 447; Duthie  
 Grass. N.W. Ind. II, Field and Gard. Crops 30, t. 71, Fodd. Grass. N. Ind.  
 18; Lisboa in Journ. Bomb. Nat. Hist. Soc. v (1890), 339; Hook. f. F B.I.  
 vii, 82; Prain Beng. Pl. 1169; Cke. ii, 917; Haines Bot. Bihar & Orissa  
 985.—*Panicum americanum*, Linn. Sp. Pl. i, 56.—*Pennisetum americanum*,  
 K. Schum. in Engl. Pflanzenw. Ost.-Afr. B. (1895), 51; Hitchc. in Bailey  
 Cyclop. Hortic. 2537.—*Holcus racemosus*, Forsk. Fl. Aegypt.—Arab. (1775),  
 175.—*Alopecurus indica*, Burm. Fl. Ind. 27.

In order to explain the above synonymy and the final adoption of the speci-  
 fic name *P. spicatum* we reproduce a MS. note kindly sent to us by  
 Mr. Hubbard:

"*Pennisetum typhoideum* L. Rich. in Pers. Syn. i. 72 (1805) has been changed  
 to *Pennisetum americanum* by K. Schum. in Engl. Pflanzenw. Ost.-Afr. B. 51  
 (1895), based on *Panicum americanum* L. Sp. Pl. ed. i. 56, (1753) *Panicum  
 americanum* L. in turn, is based on *Panicum americanum* Clusius Hist., ccxv  
 (1601). Hitchcock in Contr. U. S. Nat. Herb. xxii. 218 (1921) suggests that the  
 figure (in Clusius) is that of the 'common millet' (*Setaria italica*) and that the  
 description is based on more than one species. I do not think the figure is that  
 of the 'common millet', it is however very similar to a form of 'pearl millet'  
 cultivated in Spain; in addition Clusius says that his *Panicum americanum*  
 grows as tall as a man and has stouter, thicker stems than the common millet  
 which he calls *Panicum vulgare* and figures on the same page. In the second  
 edition of the Species Plantarum, 1484 (1763), Linnæus quotes *Panicum ameri-  
 canum* in synonymy under *Holcus spicatus* L. (first published in Syst. Nat. ed.  
 x. ii. 1305 (1759); this is the basis of *Pennisetum spicatum* Roem. et Schult.  
 Syst. Veg. ii. 499 (1817). It appears advisable to use this name in preference to  
*Pennisetum americanum* K. Schum., owing to the uncertainty as to what  
*Panicum americanum* Clusius really is and also the name 'americanum' is  
 misleading."

*Vern Names*: Bajri, bulrush millet, cat-tail millet, pearl millet.

*Description*: Annual. Culms tall, erect, stout, terete, 0.9—1.8 m. high, rooting  
 at the lower nodes, sometimes woolly, pubescent below the inflorescence.  
 Leaves 30—90 cm. by 6—50 mm., linear to linear-lanceolate from a rounded base,  
 acute, flat, more or less rough, glabrous, rarely hirsute; sheath terete, rather  
 inflated, glabrous except the bearded nodes and the often villous junction with  
 the blade, rarely hirsute, usually slightly rough, rather shorter than the internodes,  
 ligule a narrow, long and densely ciliate rim. Panicle spike-like, cylindrical,  
 very dense, 10—20 cm. long, often purplish; rhachis stout, villous;  
 branchlets reduced to a peduncled involucre cluster of 1—8 spikelets; peduncles  
 villous, straight, 2.5—5 cm. long, often horizontally spreading or partly  
 deflexed; involucre of very numerous ciliate often purplish bristles about as  
 long as the spikelets. Spikelets sessile or shortly pedicelled within the involucre,  
 readily deciduous when ripe, oblong, 5—6 mm. long, pale or purplish  
 upwards. Lower involucre glabrous minute or 0, half-orbicular or subquadrate,  
 1—3-nerved; upper variable in length, sometimes absent, usually  $\frac{1}{2}$ — $\frac{1}{3}$  the  
 length of the upper floral glume, subquadrate, truncate, obtuse or retuse,  
 3-nerved, very rarely as long as the upper floral glume and coriaceous. Lower  
 floral glume ovate-oblong, obtuse or truncate and apiculate, 5-nerved, epaleate  
 or paleate, male or neuter, rarely bisexual; upper coriaceous or herbaceous,  
 ovate, acute, 5—7-nerved, pale very broad, truncate, ciliate at the tip and  
 dorsally, nerves 2, approximate, excurrent. Lodicules 0. Anthers linear, 2.5  
 —3 mm. long, tips bearded. Styles connate. Grain oblong, obovoid, or pyriform,  
 smooth, free, top exposed.

*Locality*: Cultivated throughout the Presidency.

*Origin*: Unknown. See Leeke. Untersuchungen über Abstammung und Heimat der Negerhirse.

8. *Pennisetum purpureum*, Schum. & Thonn. Beskr. Guin. Pl. 44; Stapf in Kew Bull. (1912), 309.—*P. macrostachyum*, Hook. Niger Flora 563.—*P. Benthamii*, Steud. Syn. Pl. Glum. i, 105.—*P. nitens*, Hack. in Bol. Soc. Brot. vi (1888), 142.—*Gymnothrix nitens*, Anderss. in Peters Reise nach Mossamb. vi (1864), 552.—*Pennisetum itexispica*, K. Schum. in Engl. Pflanzenw. Ost.-Afr. C (1895), 105.

*Popular Name*: Elephant Grass.

*Description*: Perennial. Rhizome creeping. Culms erect, in tufts of up to 20, 2-3 m. or occasionally up to 7 m. high by 1.2-2.5 cm. diam. at the base; branches obliquely erect, terete, glabrous, smooth, excepting the upper part of the uppermost internode which is more or less hairy to tomentose, exerted parts sometimes covered with a glaucous bloom; nodes mostly exerted from the sheaths, all glabrous or most of them or only the uppermost with a ring of stiff, long, appressed hairs. Leaf-blade linear, inserted on the sheath with a very marked hinge-fold, tapering upwards to a fine point, 30-60, rarely to 90 cm. long by 2.5 cm. diam., with a strong midrib, rounded or the back with a shallow channel above towards the base, and in the larger leaves with 6 or 7 slightly prominent primary nerves on each side, dull green, sometimes slightly glaucous or tinged with purple, more or less rough on both sides, glaucous beneath, usually more or less hairy above, especially towards the base which sometimes becomes fringed, hairs fine, mostly rather stiff and long and often springing from small tubercles; margins spinulose scabrid. Sheaths terete, clasping the stem, striate, glabrous and smooth or pubescent to hirsute with tubercle-based hairs near the top. Ligule a narrow rim bearing a dense fringe of white hairs 2 or 3 mm. long. Inflorescence a dense, cylindrical, erect spike, 8-20 and even 30 cm. long and 1.5-3 cm. diam., yellow or tinged with brown, purple or quite blackish-purple, made up of deciduous spikelets or fascicles of spikelets, each spikelet or fascicle surrounded by an involucre of numerous bristles of unequal length, most of them 5-8 mm. long, one usually very much longer (1.2-2 or exceptionally to 4 cm. long), scabrid, one or several of the innermost and longest sparingly plumose towards the base, rarely all naked, often dark yellow, brownish or purplish towards the tips or blackish-purple from the base. Spikelets sessile or if in fascicles of 2-4, the lateral pedicelled, all lanceolate, more or less acuminate, 5-7 mm. long, glabrous, straw-coloured or tinged with brown or purple towards the tips of the florets, rarely blackish-purple all over, hermaphrodite or, if fasciated, the lateral male, rarely neuter or all hermaphrodite. Lower involucre glume suppressed or quite rudimentary, upper ovate to ovate-lanceolate, acute, 0.5-1, rarely to 2 mm. long, subhyaline, 1-nerved or nerveless. Lower floral glume male or more often barren, lanceolate, acute or acuminate, half as long to almost as long as the upper glume, 3-nerved, rarely 1- or 5-, or even 7-nerved, pale linear-lanceolate, 2-nerved, shorter than the glume or in the barren florets reduced or suppressed; upper hermaphrodite or in the lateral spikelets male, lanceolate, acuminate or rostrate-acuminate, scaberulous upwards, usually 5-nerved, pale narrow, linear-lanceolate, slightly shorter than the glume, tips minutely 2-toothed. Lodicules 0. Anthers 2.5-3 mm. long, tips very minutely penicillate. Styles united throughout; stigmas very slender, up to 4 mm. long, exerted from the top of the floret. Mature grain unknown.

A most variable plant as can be seen from Stapf's description given above. He refrains from subdividing the species.

*Popular Names*: Elephant Grass, Napier's Fodder.

*Locality*: Imported into Bombay in 1915. Has been grown at several centres in W. India: Agricultural College Farm, Poona, the Governor's Dairy Farm, Ganeshkhind, the Sewage Effluent Farm at Hadapsar in the Deccan, the Chharodi Cattle Farm in N. Gujarat, and the Willingdon Cattle Farm near Karachi.

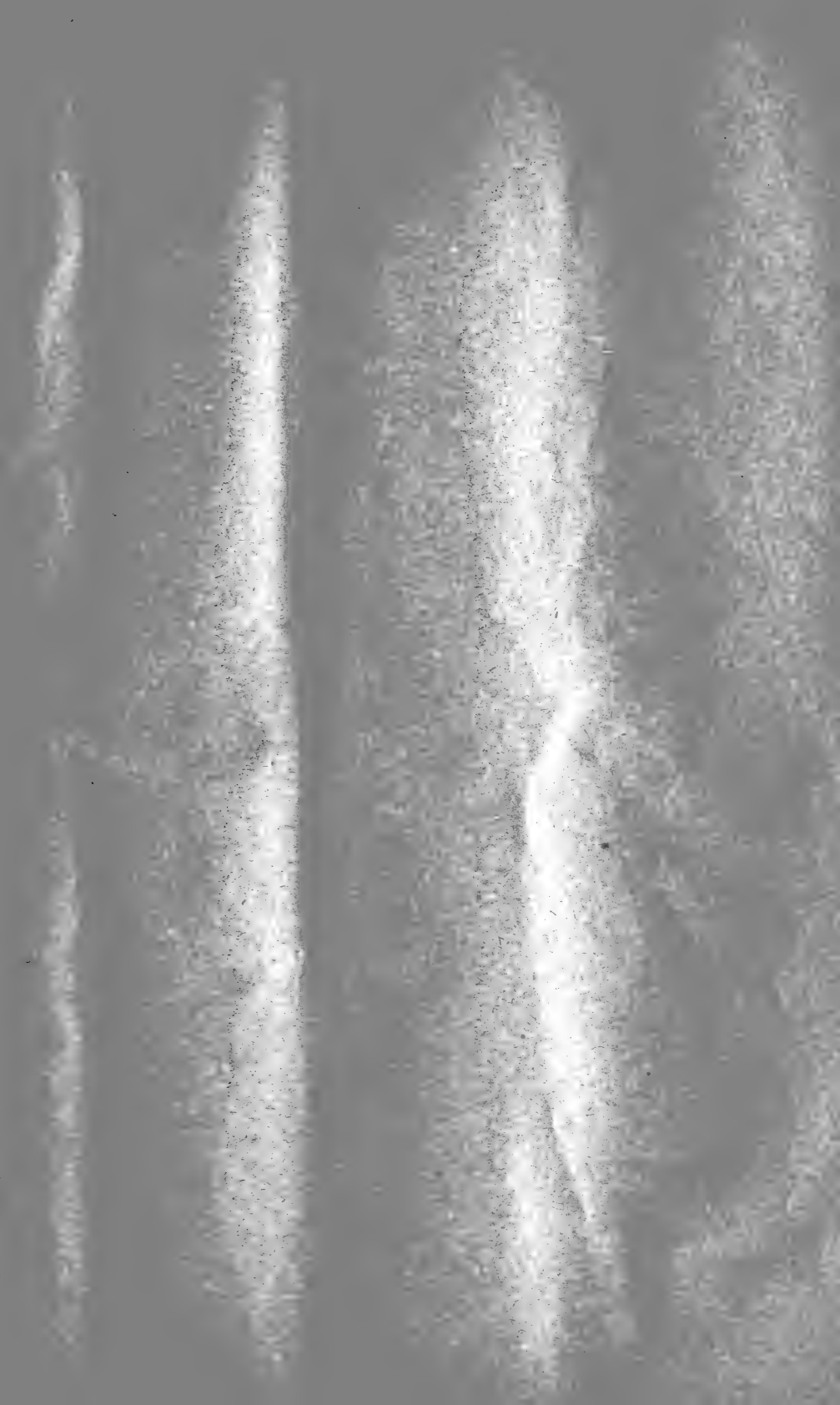
*Distribution*: Indigenous in tropical Africa between 10° N. Lat. and 20° S. Lat.

*Uses*: One of the best fodder-grasses. See Stapf Kew Bull. (1912), 313-316; H. H. Mann in Bull. 100 and 127 of the Dept. Agriculture, Bombay; Rhodesian Agric. Journ. vii (1910), 1398.

(To be continued)







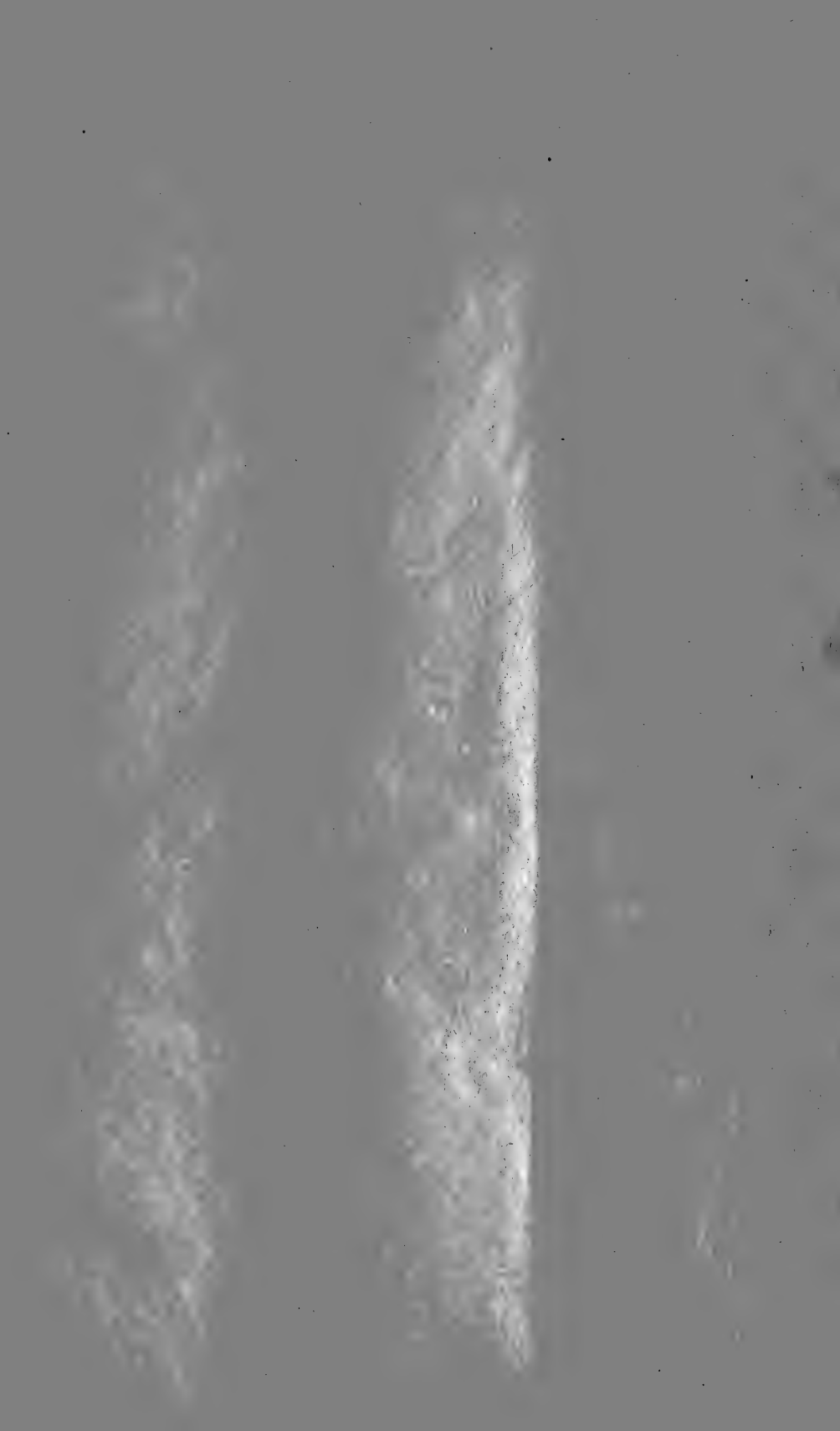


REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY.

Part VIII. By E. BLATTER, S.J., PH.D., F.L.S.

VII 1929

*Cinchona to Aristida*



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., PH.D., F.I.S.

PART VIII

GRAMINEÆ

BY

E. BLATTER and C. McCANN

(Continued from page 25 of this Volume.)

60. *CENCHRUS*, Linn.; Hitchcock and Chase in  
Contrib. U.S. Nat. Herb. xx (1920), 50.

Annual or perennial herbs. The inflorescences are spike-like racemes, consisting of involuclate clusters of shortly pedicellate spikelets jointed on a simple rhachis. Involucel consisting of hardened spike-like bristles, connate at the base into a short, coriaceous cup, which is surrounded by erect or squarrose bristles. Spikelets 1-3 in each involucl, mostly glabrous or nearly so, persistent, 1-2-flowered, with 3-4 glumes. Lower involucral glume 1-nerved, usually narrow, sometimes wanting; upper involucral glume and lower floral glume subequal, 5-7-nerved. Lower floral glume longer than the upper involucral, with or without male flower, paleate. Upper floral glume coriaceous, with a hermaphrodite or female flower. Lodicules 2. Stamens 3. Styles 2, stigmas plumose. Grain broad, oblong, dorsally compressed, with a punctiform hilum, free within the glume and pale.

Species about 25.—Tropical and subtropical.

- |                               |     |     |                            |
|-------------------------------|-----|-----|----------------------------|
| 1. Base of involucl rounded   | ... | ... | 1. <i>C. biflorus</i> .    |
| 2. Base of involucl turbinate | ... | ... | 2. <i>C. catharticus</i> . |

1. *Cenchrus biflorus*, Roxb. Fl. Ind. i (1832), 233; Cke. ii, 917; Achariyar S. Ind. Grass. (1921), 121.—For synonymy see Hook. f. in F.B.I. vii, 89.

*Description*: Cke. l.c.

*Locality*: *Sind*: Karachi (Woodrow); Jamadar ka Landa, near Karachi (Stocks); Jamesabad, in fields (Sabnis B1110!); Umerkot, sandy plains (Sabnis B1081!); Nasarpur, clayey soil (Sabnis B1051!); Mirpur Sakro (Blatter and McCann D627!); Tatta (Blatter and McCann D628!).—*Gujarat*: Kharaghoda, under trees (Saxton 1064!); Ahmedabad (Sedgwick!, Cooke); Morvi (Woodrow).—*Khandesh*: Bhusawal, Tapti (McCann 5154!); Umalla, Tapti Bank (Blatter and Hallberg 5158!); Kaperkhedo, Bori River (Blatter and Hallberg 4393!).

*Distribution*: Punjab, Rajputana, Gangetic Plain, W. Peninsula, Baluchistan, Arabia, Africa.

2. *Cenchrus catharticus*, Del. Cat. Hort. Monsp. (1838); Schlecht. Linnæa xiii (1839) Litt. p. 103; Cke. ii, 918; Hitchcock and Chase in Contrib. U.S. Nat. Herb. xx (1920), 53, fig. 8; Achariyar S. Ind. Grass. (1921), 122.—For synonyms see Hook. f. in F.B.I. vii, 90.

*Description*: Cke. ii, 918.

*Locality*: *Sind*: Karachi (Burns!); Gharo (Blatter and McCann D629).—*Gujarat*: Ahmedabad, sandy ground (Sedgwick!); Sumrasar, Cutch (Blatter 3762!); Perim Island, at the mouth of the Narbada River (Raoji).—*Khandesh*: Bor, Bori River (Blatter and Hallberg 5115!).

*Distribution*: Punjab, Gangetic Plain, W. Peninsula, Bellary, Nellore, Arabia, tropical Africa.

61. *Isachne*, R. Br. Prodr. Fl. Nov. Holl. (1810), 196 ;  
Cke. ii, 922.

For discussion of the genus see : Chase Genera Paniceæ. iv. Proc. Biol. Soc. Washington 24 (1911), 149 and Hitchcock North Americ. Species of *Isachne* in Contrib. U.S. Nat. Herb. 22 (1920), 115.

Key in Cke. ii, 922.

1. *Isachne Lisboæ*, Hook. f. in F.B.I. vii (1896), 22 ; Cke. ii, 922.

*Description* : Cke. l. c.

*Locality* : *Deccan* : Mahableshwar, elevation 4,000 ft., rainfall 270 inches (Sedgwick and Bell 4581 !), Fitzgerald Ghat, Mahableshwar (Woodrow !), common near the lake (McCann !); Panchgani, First Tableland (Blatter and Hallberg !), very common on Tableland (McCann !).

*Distribution* : This species is very local, inhabiting apparently only the Panchgani and Mahableshwar plateaux.

2. *Isachne elegans* Dalz. in Dalz. & Gibs. Bombay Fl. (1861), 291 ; Hook. f. in F.B.I. vii, 23 ; Cke. ii, 923.

*Description* : Cke. l. c.—We have found specimens reaching the following dimensions : Stem 90 cm. ; leaves 25 by 1 cm., or broader, sparingly hairy or almost villous ; panicle 25 by 15 or more cm.

*Locality* : *Konkan* : Pen, in inundated land (Dalzell).—*Deccan* : Margins of rivulets in the Deccan (Dalzell and Gibson) ; Mahableshwar, elevation 4,000 ft., rainfall 270 inches (Sedgwick and Bell 4583 !); Panchgani, Tableland, forming, large patches (Blatter 5080 !); Sinhagad forest (Bhide !); Nasrapur to Purandhar (Bhide 1001 !); Purandhar, N. foot (McCann 5048 !); Lohagad Fort, top (McCann 9560 !); Khandala, behind hotel (McCann 9555 !); Lonavla (Woodrow 175); Ganeshkhind Gardens (Herb. Econ. Bot. Poona !); between Poona and Karli (Jaquemont 556).—*S.M. Country* : Dharwar, rice fields, elevation 2,500 ft. (Sedgwick 1829!).—*Kanara* : Halyal, rice fields (Talbot 2305 !).—Usually forming large mats in damp soft soil, and then not growing very tall.

*Distribution* : So far endemic.

3. *Isachne australis*, R. Br. Prodr. (1810), 196 ; Cke. ii, 923.—For synonyms see Hook. f. in F.B.I. vii, 923.

*Description* : Cke. l. c.

*Locality* : *Gujarat* : (Lisboa).—*Konkan* : Nagotna, in dry plains (Gammie 16064 !); Kharda (Ryan 565 !); Bhandup (McCann 9841 !); Matunga to Mahim (McCann 9842 !); Andheri (McCann 5129 !); Sion (McCann 5244 !); Pen (McCann 5390 !); Alibag, rice fields (Ezekiel !); Mulgaum, tank (McCann 5103 !); Matheran, Charlotte Lake (D'Almeida A247 !).—*Deccan* : Khandala, common (McCann 9840 !); Sakarpathar, Lonavla (Gammie 15961 !); Igatpuri (Blatter and Hallberg 4308 !); Poona (Lisboa); Mahableshwar (Woodrow); Nasik (Lisboa).—*S.M. Country* : Dharwar District, rice fields, elevation 1,800 ft., rainfall 35 inches (Sedgwick 3737 !); Kunnur, marshes, elevation 2,000 ft., rainfall 35 inches (Sedgwick and Bell 4936 !); Londa (Bhide !).—*Kanara* : Karwar (Bell !); Gohann (Herb. Econ. Bot. Poona !); Halyal (Talbot 2160 !); Sirsi to Siddhapur (Hallberg and McCann A19 !); Yellapore (Talbot 1521 !); Kadgal (Herb. Econ. Bot. Poona !).

*Distribution* : All over India, Australia, New Zealand.

4. *Isachne miliacea*, Roth. Nov. Pl. Sp. (1821), 58 ; Cke. ii, 923.—For synonyms see Hook. f. in F. B. I. vii, 25.

*Description* : Cke. l. c.

*Locality* : *Konkan* : (Woodrow).—*Deccan* : Lonavla (Woodrow); Mahableshwar, in forests, fairly common in one spot (McCann !).—*Kanara* : Sulgeri, 500 ft., rainfall 200 inches (Sedgwick and Bell 4248 !); Yellapore (Talbot 1522 !); Gersoppa Falls, Mysore side (McCann & Hallberg A23 !).

*Distribution* : More or less throughout India, Ceylon, China, Malay and Pacific Islands, S. America.

62. *ARUNDINELLA*, Raddi Agrost. Brasil. (1823), 37 ; Cke. ii, 999.

Species about 55.—In the tropics.

Cooke describes 12 species from the Bombay Presidency. We retain them all except that we change *A. agrostoides*, Trin. into *A. ciliata*, Nees, and *A.*

*brasiliensis* into *A. hispida*, O. Ktze. To the 12 species we add another: *A. villosa*, Wight & Arn.

*Key after Cke. ii, 999.*

- A. Upper floral glume with 3 awns.
  - I. Leaves less than 10 cm. long Annuals
    - 1. A straggling grass. Leaves glabrous or sparsely hairy... 1. *A. avenacea*.
    - 2. An erect grass. Leaves hispid with bulbous-based hairs ... 2. *A. tuberculata*.
  - II. Leaves 15-30 cm. long. Perennials ... 3. *A. setosa*.
- B. Upper floral glume with 1 awn
  - I. Spikelets 1.5-2 mm. long ... 4. *A. tenella*.
  - II. Spikelets 2.5-3mm.
    - 1. Stem scarcely 15 cm. high. Leaves 2.5-4 cm. long ... 5. *A. pygmæa*.
    - 2. Stem exceeding 15 cm.
      - a. Stem reaching 45 cm. Leaves 2.5-10 cm. long; they and the sheaths clothed with long soft hairs ... 6. *A. ciliata*.
      - b. Stem reaching 90 cm. Leaves 10-15 cm. long; they and the sheaths glabrous or nearly so ... 7. *A. Metzii*.
      - c. Stem reaching 4 ft. Leaves 20-30 cm. long, sparsely hairy; sheaths glabrous or nearly so ... 8. *A. Lawii*.
- III. Spikelets 4-6 mm. long
  - 1. Panicle branched
    - a. Rootstock hard, creeping, not tuberous. Rhachis of panicle angular, glabrous ... 9. *A. hispida*.
    - b. Rootstock tuberous. Rhachis of panicle filiform, scaberulous ... 10. *A. capillaris*.
  - 2. Panicle spicate
    - a. Leaves 2.5-4 cm. long ... 11. *A. spicata*.
    - b. Leaves 10-20-30 cm. long ... 12. *A. villosa*.
- C. Upper floral glume without awn ... 13. *A. gigantea*.

1. *Arundinella avenacea*, Munro ex Thw. Enum. Pl. Ceyl. (1864), 362; Hook. f. in F. B. I. vii, 69; Cke. ii, 1000 (*arenacea per err.*).—*A. Campbelliana*, Lisb. in Journ. Bomb. Nat. Hist. Soc. v (1891), 346.—*A. malabarica*, Heyne ex Hook. f. in F. B. I. vii (1897), 69.—*Aira*, no. 3, Griff. Notul. iii, 55, Ic. Pl. Asiat. t. 146. f. iii.

*Description*: Cke. ii, 1000.—This grass in its young state resembles *A. spicata* so much, that it can easily be mistaken for that species.

*Locality*: *Konkan*: Ratnagiri (Woodrow).—*Deccan*: Mahableswar, very common, 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4510!, Lisboa); Panchgani (Blatter 5383!), Tiger's Path (Blatter & Hallberg B1255!); Khandala, very common (McCann 9604!); Tiger Leap near Lonavala (Woodrow).—*S. M. Country*: Ram Ghat (Ritchie 890).—*Kanara*: Castle Rock (McCann 9854!, Woodrow, Bhide!); Anmod, 1,800 ft., rainfall 200 inches (Sedgwick 3253!); Tinai Ghat, 1,869 ft., rainfall 250 inches (Sedgwick 3269!); Yellapore (Talbot 1035!); Supa (Talbot 2487!); Kumberwada (Talbot 2255!); Karwar (Talbot 1302!); Katgal (Hallberg & McCann A165!); Devimane (McCann 9936!).

*Distribution*: Khasia, Burma, W Peninsula, Ceylon.

2. *Arundinella tuberculata*, Munro ex Lisboa in Journ. Bomb. Nat. Hist. Soc. v (1891), 344; Hook. f. in F. B. I. vii, 69; Cke. ii, 1000: Janowski in Bot. Archiv i (1922), 24.

*Description*: Cke. i. c.

*Locality*: *Konkan*: Vasco da Gama (Bhide!).—*Deccan*: Panchgani, slopes below Third Tableland (Blatter & Hallberg 1232!); Pasarni Ghat (Blatter & Hallberg 1306!); Poona (Woodrow).—*S. M. Country*: Dry hills between Yelviggi and Savanur, 1,900 ft., rainfall 25-30 inches (Sedgwick 1959!).—

*Kanara* : Manoli (Talbot 3979 !); Jog to Siddhapur, open grass land, rocky soil (McCann 9856 !); Katgal, open grass land (Hallberg & McCann A164 !); Karwar, open grass land (Hallberg & McCann A163 !).

*Distribution* : Central India.

3. *Arundinella setosa*, Trin. Gram. Panic. (1826), 63; Hook. f. in F. B. I. vii, 70; Cke. ii, 1001; Duthie Grass. N. W. Ind. 13; Janowski in Bot. Archiv. i (1922), 24.—*A. hirsuta*, Nees ex Steud. Syn. Gram. 115; Hohen. Pl. Ind. Or. no. 920.—*A. stricta*, Nees in Hook. Kew Journ. ii (1850), 102; Dalz. & Gibs. 292.

*Description* : Cke. l.c.

*Locality* : *Konkan* : Near Bombay (Ritchie).—*Kanara* : Dandeli (Talbot 2266 !); Gersoppa Falls, on rocks in river bed (McCann A166 !, A162 !).

*Distribution* : W. Himalaya, Khasia Hills, Bihar, Central India, Nilgiris, Ceylon, Tonkin, China, Philippines.

4. *Arundinella tenella*, Nees & Wight ex Steud. Nom. ed. 2, pt. 1 (1840). 143; Dalz. & Gibs. 292; Duthie Grass. N. W. Ind. 13; Lisb. in Journ. Bomb. Nat. Hist. Soc. v (1891), 345; Hook. f. in F. B. I. vii, 71; Cke. ii, 1001.—*Anema. grostis tenella*, Wight ex Steud. Syn. Pl. Glum. i (1854), 115.—*Arundinella pumila*, Steud. l.c.—*Acratherum pumilum*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii (1851), 414, t. 100.

*Description* : Cke. ii, 1001.

*Locality* : *Khandesh* : Toranmal (McCann 9594 !).—*Konkan* : Pen (McCann 5502 !); Bombay (Lambert).—*Deccan* : Mahableshwar, 4,500 ft., rainfall 200 inches (Sedgwick & Bell 4522 !); common under the shade of trees (Dalzell, Cooke, Woodrow, Lisboa); Panchgani (Blatter 3798 !), Maratha Well (Blatter & Hallberg B1222 !); Karli and Khandala (Jacquemont 631); Khandala, very common (McCann 5354 !); Lonavla (Gammie!, Woodrow); Purandhar (McCann 5013 !); Igatpuri (McCann 5354).—*Kanara* : Yellapore, 2,000 ft., rainfall 100 inches (Sedgwick 3125 !); Haiyal (Talbot 2553 !); Dandeli (Talbot 2268 !); Tinai (Talbot 2576 !).—A very ornamental grass, found commonly throughout the hilly parts of the Presidency.

*Distribution* : W. Himalaya, Khasia Hills, Bihar, Central India, W. Peninsula, Abyssinia.

5. *Arundinella pygmaea*, Hook. f. in F.B.I. vii (1896), 72; Cke. ii, 1002; Janowski in Bot. Archiv i (1922), 25.

*Description* : Cke. l.c.

*Locality* : *Konkan* : Crest of W. Ghats (Woodrow).—*Deccan* : In public garden, Mahableshwar, 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4619 !); Khandala (McCann 5318 !); Igatpuri (Blatter & Hallberg 5143 !).—*Kanara* : N. Kanara (Lisboa).

*Distribution* : Endemic.

6. *Arundinella ciliata*, Nees ex Miq. in Verh. Nederl. Ind. iii, iv (1851), 30; Janowski in Bot. Archiv i (1922), 25.—*Holcus ciliatus*, Roxb. Fl. Ind. i (1820), 318.—*Arundinella agrostoides*, Trin. l.c. xxiii (1828-36) t. 265; Cke. ii, 1002.—*A. agrostoides* var. *ciliata*, Hook. f. in F.B.I. vii, 71.—*Brandtia holcooides*, Kunth. Rev. Gram. ii (1835), 127, t. 170.—*Perotis polystachya* Heyne ex Hook. f. l.c. 71.

*Description* : Cke. ii, 1002.

*Locality* : *Konkan* : (Wight).—We have not seen any specimens.

*Distribution* : India, Philippines.

7. *Arundinella Metzii*, Hochst. in Miq. Anal. Bot. Ind. pt. 2 (1851), 19; Steud. Syn. Gram. 116, *excl. syn.* Roxb.; Cke. ii, 1003.—*Agrostis fusca*, Heyne ex Hook. f. in F.B.I. vii, 72.—*Arundinella agrostoides*, Trin. var. *tenella*, Herb. Ind. Or. Hook. f. & Th. ex Hook. f. l.c.

*Description* : Cke. ii, 1003.

*Locality* : *Deccan* : Lonavla (Woodrow).—*S. M. Country* : Devarayi, 1,800 ft., rainfall 90 inches (Sedgwick & Bell 4474 !).—*Kanara* : Yellapore, 2,000 ft., rainfall 100 inches (Sedgwick 3469 !); Sunksal, rocky bank of a stream in evergreen forest 500 ft., rainfall 150 inches (Sedgwick & Bell 5040 !); Birchy (Talbot 2105 !, 2116 !, 2488 !); Dandeli (Talbot 2268 !).



*Distribution* : W. Peninsula.

8. *Arundinella Lawii*, Hook. f. in Trim. Fl. Ceyl. v (1900), 180; Cke. ii, 1003.—*A. agrostoides*, Hook. f. in F.B.I. vii (1896), 71, *partim*.

*Description* : Cke. l.c.

*Locality* : *Konkan* : (Woodrow 35 !); N. & S. *Konkan* (Law).

*Distribution* : W. Peninsula, Ceylon.

9. *Arundinella hispida*, O. Ktze Rev. Gen. (1891), 761; Janowski in Bot. Archiv i (1922), 26.—*Andropogon hispidus*, Willd. Sp. Pl. iv (1805), 908.—*Ischæmum hispidum*, H.B.K. Nov. Gen. et Sp. i (1815), 194.—*Arundinella brasiliensis*, Raddi Agrost. Brasil. (1823), 37, t. 1, fig. 3; Trin. Diss. ii, 62, Sp. Gram. Ic. t. 266; Hook. f. in F.B.I. vii, 73; Cke. ii, 1003.—*A. pallida*, Nees Agrost. Brasil. (1829), 465.—*Acratherium miliaceum*, Link Hort. Berol. ii (1841), 234.—*Orthopogon agrostoides*, Trev. ex Steud. Nom. ed. 2, ii (1841), 234.—*Andropogon virens*, Spreng. Syst. i (1825), 287.—*Arundinella Mikani*, Nees l.c. 465.—*Goldbachia Mikani*, Trin. in Spreng. Neue Entdeck. ii (1821), 81.—*Riedelia Mikani*, Trin. ex Kunth Enum. Pl. i (1833), 515.—*Aira brasiliensis*, Spreng. Syst. i (1825), 278.—*Ischæmum pallidum*, Kunth. Enum. Pl. i (1833), 515.—*Arundinella Ritchiei*, Munro ex Lisboa in Journ. Bomb. Nat. Hist. Soc. v (1891), 343.—*Holcus nervosus*, Roxb. Fl. Ind. i (1820), 318.—*Arundinella nepalensis*, Trin. Sp. Gram. (1828), t. 268; Duthie Grass. N. W. Ind. 13; Lisboa l.c. 343.

*Description* : Cke. ii, 1003.—A most variable plant. See Hook. f. in F.B.I. vii, 74.

*Locality* : *Deccan* : Mahableshwar, 4,500 ft., rainfall 270 inches (Dalzell & Gibson, Lisboa), in a stream (Sedgwick & Bell 4543 !); Panchgani (Woodrow); Khandala (Saxton 1205 !, Lisboa); Lonavla (Hallberg 9660 !, Garade !, Lisboa).—*Kanara* : Castle Rock, on banks of Duoki River, 1,900 ft. (McCann 4855 !); Kalanudi to Supa, 1,800 ft., rainfall 100 inches (Sedgwick & Bell 4872 !); Yellapore, in a gravelly stream bed, 2,000 ft., rainfall 100 inches (Sedgwick 3i26 !); Sumpkhund, in river bed (Hallberg & McCann A159 !); Dandeli (Talbot 2241 !).

*Distribution* : Throughout the hilly parts of India, China, Malaya, Australia tropical America.

10. *Arundinella capillaris*, Hook. f. in F.B.I. vii (1896), 74; Cke. ii, 1004.—*A. mutica*, Nees ex Steud. Syn. Gram. (1855), 116.—*Andropogon capillaris*, Herb. Heyne ex Hook. f. in F.B.I. l.c. 75.

*Description* : Cke. l.c.

*Locality* : *Konkan* : Parel, Bombay Island (Woodrow).—*N. Kanara* : Kalanudi (Woodrow).

We doubt the occurrence of this species in the Bombay Presidency. Woodrow gives two localities, but neither Cooke nor we have seen his specimens. Lisboa (Journ. Bom. Nat. Hist. Soc. v (1891), 8) calls this plant common all over Bombay. If it is really common it is strange that we should never have met it.

*Distribution* : W. Peninsula.

11. *Arundinella spicata*, Dalz. in Dalz. & Gibs. Bomb. Fl. (1861), 293; Hook. f. in F.B.I. vii (1896), 77, *sub speciebibus indeterminab.*; Cke. ii, 1004.

*Description* : Cke. l.c.

*Locality* : *Deccan* : Mahableshwar, common in open localities, 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4508 !), common on the Mahableshwar Hills (Dalzell & Gibson, Woodrow, Cooke); Panchgani, very common on the Tablelands (Blatter 3797 !, McCann !).

*Distribution* : W. Peninsula; so far endemic.

12. *Arundinella villosa*, Wight & Arn. ex Steud. Syn. Pl. Glum. i (1854), 115; Hook. f. in F.B.I. vii, 72 *cum omnibus varietatibus*.—*A. Hookeri*, Munro ex Hook. f. l.c. 73.

*Description* : Stem 30–40 cm. high, tufted, slender, stiff, leafy at the villous base, villous below the panicles. Leaves 10–20 cm. by 2–2.5 mm., strict, rather rigid, glabrous, tomentose or villous. Ligules of long hairs. Panicle very narrow, 5–10 cm. long, spiciform, rhachis villous; branches 12–18 mm. long,

brown. Spikelets subdistichously crowded, spreading or erect, 5-6 mm. long, setosely hirsute. Lower involucreal glume  $\frac{3}{4}$  of upper, long-pointed, 3-5 nerved, upper involucreal glume subaristately long-pointed, 5-nerved. Lower floral glume sharp-pointed, 5-nerved, neuter or male; upper oblong-lanceolate, very minutely scaberulous, rounded at the tip, sometimes 2-dentate, awn not twice as long as the spikelet, column of awn included, twisted.

The leaves vary a good deal as to their size. In addition to the measurements given above, the following have been observed: 30 cm. by 8 mm. and 5-15 cm. by 6-8 mm.

*Locality*: Deccan: Khandala (McCann 9602A!, 9002B!).

*Distribution*: E. Himalaya, Khasia Hills, Central India, Deccan Peninsula, Ceylon.

13. *Arundinella gigantea*, Dalz. in Dalz. & Gibs. Bomb. Fl. (1861), 293; Hook. f. in F.B.I. vii (1896), 76; Cke. ii, 1005.

*Description*: Cke. l.c.

*Locality*: Konkan: (Stocks); Kineshvar below the Ghats (Dalzell and Gibson).—S. M. Country: Londa (Bhide!); Devarayi (Sedgwick 4474!).—Kanara: Castle Rock, in shade (McCann 9853!, Gammie 15668!); Dudsagar Falls (McCann A174!); Nagergali, forests, 1,800 ft., rainfall 80 inches (Sedgwick 2921!); Birchy (Talbot 2250!); Dandeli (Talbot 2593!); Tinai Ghat (Talbot 2626!); Jugglepet (Talbot 1387!); Supa (Talbot 2493!); Karwar (Hallberg and McCann A161!); Gersoppa Falls, on rocks in river bed (Hallberg and McCann A160!); Yellapore (Sedgwick 3469!, Talbot!).

*Distribution*: W. Peninsula; so far endemic.

### 63. TRISTACHYA, Nees.

1. *Tristachya barbata*, Nees ex Steud. Syn. Pl. Gram. (1856), 238; Boiss. Fl. Or. v (1881), 552; Duthie Grass. N. W. Ind. 32; Hook. f. in F.B.I. vii, 272; Cke. ii, 1005.—*T. Stocksii*, Boiss. l.c.; Munro in Aitchis. Cat. Panjab Pl. 168; Duthie Fodd. Grass. N. Ind. 51.—*Laudetia barbata*, A. Braun in Flora xviv (1841) ii, 714.—*Sorghum barbatum*, Hochst. & Steud. Pl. Arab. Exsic. No. 783 ex Hook. f. l.c.

*Description*: Cke. l.c.

*Locality*: Sind: (Stocks 1217, 648 ex Cooke).

*Distribution*: Arabia, Nubia.

### 64. THYSANOLAENA, Nees in Edinb. N. Philos. Journ. xviii (1835), 180.

Cooke has one species: *Thysanolæna Agrostis*, Nees. We change it into *T. procera*, Mez.

1. *Thysanolæna procera*, Mez. in Janowski. Bot. Archiv i (1922), 27.—*Agrostis procera*. Retz. Obs. iv (1779), 19.—*Melica latifolia*, Roxb. Hort. Beng. (1814), 8.—*Agrostis latifolia*, Heyne ex Hook. f. in F.B.I. vii, 61.—*Agrostis maxima*, Roxb. Fl. Ind. i (1820), 319.—*Thysanolæna maxima*, O Ktze. Rev. Gen. ii (1891), 794.—*Panicum acariferum*, Trin. Sp. Gram. l.c. i (1828), 87.—*Thysanolæna acarifera*, Nees and Arn. in Nov. Act. Leopold. xix, Suppl i (1843), 181; Lisboa in Journ. Bomb. Nat. Hist. Soc. v (1890), 347; Duthie Grass. N. W. Ind. 13, Fodd. Grass. N. Ind. 21.—*T. Agrostis*, Nees in Edinb. N. Phil. Journ. xviii (1835), 180; Hook. f. in F.B.I. vii, 61; Cke. ii, 1006.—*Myriachaeta arundinacea*, Zoll. & Mor. Syst. Verz. Zoll. (1845-46), 101.—*M. glauca*, Mor. ex Steud. Syn. Pl. Glum. i (1854), 404.

*Description*: Cke. ii, 1006.

*Locality*: Gujarat: In bed of nalla (Sedgwick and Bell 5393!); Bansda, Surat District (Woodrow).—Khandesh: (Lisboa); Chanseli to Dadgaum, in a dry nalla (McCann 9589!); Dangs (Woodrow).—Konkan: Victoria Gardens, Bombay (McCann 9846!); Thana (Lisboa).—Deccan: Ganeshkhind Botanic Gardens (McCann 9847!); Nasik (Lisboa).

*Distribution*: Throughout India, Penang, eastwards to New Guinea.

### 65. \*AVENA, Linn. Sp. Pl. (1753), 79; Gen. Pl. Ed. 5 (1754), 34.

Annual or perennial herbs, low or moderately tall. Panicles narrow or open, usually rather few-flowered of usually large spikelets. Spikelets 2-several-

flowered; rhachilla bearded, disarticulating above the involucrel glumes and between the flowering glumes. Involucrel glumes about equal, membranous or papery, several-nerved, longer than the lower floret, usually exceeding the upper floret. Floral glumes indurate, except toward the summit, 5-9-nerved, bidentate at the apex, bearing a dorsal bent and twisted awn, which is straight and reduced in *Avena sativa*.

The genus as just described does not include *Trisetum*, Pers. as is the case in Hook. f.'s *Avena* in F.B.I. vii, 274.

Species about 55. Chiefly temperate regions. One species cultivated in the Presidency.

\*1. *Avena sativa*, Linn. Sp. Pl. (1753), 79.—The Common Oat.

An annual grass. Stems erect, tufted, smooth, 1.2 m. high. Blades flat, up to 30 cm. high and 12 mm wide, scabrous, especially on the margins; ligule membranaceous, truncate, 1-3 mm. long, toothed or serrate, decurrent along the margin of the sheath; sheaths smooth, striate, the lower rather papery. Panicle open or more or less contracted, erect or nodding, sometimes 1-sided, the pedicels thickened at the apex. Spikelets large, drooping, variable in size, but usually about 20-25 mm. long; involucrel glumes strongly several-nerved, membranaceous, acuminate, scabrous, containing usually 2 florets; floral glumes smooth or slightly hairy at the base, teeth acute but not awned, the dorsal awn absent or, if present, usually straight and not much longer than the involucrel glumes, often present only on the lower floret, pale enclosed by the inrolled margin of the glume, densely short-ciliate on the 2 keels.—The florets do not easily disarticulate, which condition is probably due to cultivation.

*Locality*: Very little cultivated in the Presidency. Has been grown at Hyderabad (Sind), also at military grass farms for military horses at Ahmednagar and elsewhere.

Grows best in the cold weather and always under irrigation.

For a useful introduction to the study of oats see: Herbert Hunter. Oats, their varieties and characteristics. London, 1924.

66. *COELACHNE*, R. Br. Prodr. (1810), 187.

A small, leafy, variable marsh grass. Leaves short, flat or convolute. Spikelets 2-flowered (both flowers perfect or upper imperfect) in open or contracted or spiciform panicles, not articulate on the pedicels, not awned. Rhachilla jointed at the base, produced between the lower and upper floral glume but not beyond the upper. Lower involucrel glume suborbicular, concave, obtuse and delicately nerved; upper smaller, more oblong, both persistent. Lower floral glume much longer, sessile, coriaceous, glabrous, except the shortly bearded callus, pale as long, coriaceous; upper much smaller and pale more or less hairy. Stamens 3; anthers long, narrow. Ovary ovoid; stigmas free. Grain free within the glume and pale.

Tropical Asia, Australia, Madagascar.

1. *Cœlachne pulchella*, R. Br. Prodr. (1810), 187; Hook. f. in F.B.I. vii, 270.

*Description*: Stems 15-45 cm. high, flaccid, decumbent or ascending, slender or rather stout, leafy up to the panicle. Leaves uniform throughout the stem, 1-2.5 cm. long, lanceolate, subulate, acuminate, distant or subequitantly sheathing, ecostate, minutely scaberulous above, nerves striate; ligule a few hairs. Panicle very various. Spikelets 1-2.5 mm. long, sessile or pedicelled, globose or ovoid. Lower involucrel glumes suborbicular or hemispheric, many-nerved, membranous or herbaceous. Lower floral glume hermaphrodite, coriaceous, dorsally rounded, nerves 0 or very obscure, pale, coriaceous; margins incurved; upper much the smallest, often imperfect, neuter or female.

*Locality*: *Deccan*: Mahableshwar, by the lake, 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4851 !).—*S. M. Country*: Roadside near Khanapur, 2,500 ft., rainfall 60 inches (Sedgwick 2960 !).—*Kanara*: Kumbmoada (Talbot 2273 !); Karwar, in wet fields (McCann !); Sirsi to Siddhapur, in fields (Hallberg & McCann A47 !); Castle Rock, in a marsh (Bhide !, McCann !).

*Distribution*: Of the genus.

67. *DANTHONIA*, Lam. & DC. Fl. Franc. 3 (1805), 32; Hitchcock Genera of Grass. of Unit. St. in Bull. 772 Unit. St. Dept. Agric. (1920), 118.

Annual or perennial grasses, tufted, low or moderately tall. Panicle few-flowered, open or spike like of rather large spikelets. Spikelets 3-many-flowered, with the uppermost florets reduced, erect, not jointed on their pedicels. Rhachilla hairy, readily disarticulating above the involucreal glumes and between the flowering glumes, produced beyond the uppermost glume. Lower involucreal glumes empty, subequal, as long as the whole spikelet, persistent, keeled, acute or acuminate, 3-9-(rarely 1-) nerved. Flowering glumes dorsally rounded, ciliate, 7-9-nerved, 2-fid, lobes acute, usually extending into slender awns, a stout awn arising in the sinus; awn flat, tightly twisted below, geniculate, exserted, including 3 nerves of the glume; pale broad. Lodicules 2, fleshy. Stamens 3. Styles free. Grain free within the membranous or hardened glume and pale.

Species about 100.—In the temperate regions of both hemispheres, especially abundant in S. Africa.

1. *Danthonia Gammiei*, Bhide in Journ. & Proc. As. Soc. Beng. new series, vii (1911), 513.

*Description*: Stem 10-60 cm. high, nodes glabrous. Leaves linear, glabrous below, sparsely long-ciliate above, 2.5-7.5 cm. by 2.5-3 mm., base rounded; ligule a very narrow, truncate, fimbriate membrane; sheaths glabrous; upper leaves very much reduced in size. Peduncle and rhachis hairy; panicle lax, racemose, 2.5-5 cm. by 12-16 mm. Spikelets few, short-pedicelled, about 18 mm. long excluding the awns. Involucreal glumes empty, lanceolate, acuminate, lower one strongly 5-nerved, dorsally rounded, glabrous, subscoriateous, margins membranous; upper one by  $\frac{1}{2}$  shorter than the lower, membranous, 3-nerved. Lower floral glume without the awns much smaller than the involucreal glumes, terete, convolute, 7-9-nerved, dorsally villous all over, 2-dentate with a stout broad median awn; column of awn golden yellow, twisted and shining, tail minutely scabrid, dorsally narrowly 2-channelled; teeth produced into small slender awns reaching as far as the column of the median awn, with a fringe of long white hairs at the junction of the lateral awns with the glume; rhachilla produced and terminating in a minute, ciliate, awned or awnless barren glume (upper floral glume); lodicules membranous, half as long as the anthers, oblong, emarginate. Stamens 3. Styles 2, distinct. Anthers and plumose stigmas protruding from the top of flowering glume.

*Locality*: *Kanara*: Castle Rock (Gammie!); Jog to Siddhapur, open grass land on rocky soil (McCann A50!, A51!); Mirjan, laterite flats (Hallberg A49!).

*Distribution*: So far endemic.

68. *PHRAGMITES*, Adans. Fam. Pl. ii (1763), 34, 559; Cke. ii, 1006 (*Phragmites*, Trin.).

Some European authors have taken up *Tirichoon*, Roth. Archiv. Bot. Roemer i, pt. 3 (1798), 37 as antedating *Phragmites*, Trin. Fund. Agrost. (1820), 134. The latter name, however, dates from Adanson (1763) and should be retained. Cf. M. L. Fernald. The Generic name *Phragmites* in *Rhodora* 24 (1922), 55-56. Also: Hitchcock. Genera of Grass. Unit. St. in Bull. 772 Unit. St. Dept. Agric. (1920), 64.

Species 3. One in tropical Asia, one in S. America and one cosmopolitan.

1. *Phragmites Karka*, Trin. ex Steud. Nom. ed. 2, pt. ii (1841), 324; Cke. ii, 1007.—For synonyms see Hook. f. vii, 304.

*Description*: Cke. l.c.

*Locality*: *Sind*: Keti (Blatter & McCann D652!, D653!); Tatta, Kullian Kote Lake (Blatter & McCann D654!). *Gujarat*: Mahals-Dangs, by a stream, 800 ft., rainfall 100 inches (Sedgwick & Bell 5390!); Anjar, Cutch (Blatter 3740!).—*Khandesh*: Bhusawal, N. E. Tapti River (Blatter & Hallberg 4436!); Chanseli Hill, N. slope, watercourse (McCann A44!, A45!)—*Deccan*: Dhond (Woodrow).—*S. M. Country*: Banks of Warda River, Bangalore Road, 1,800 ft., rainfall 33 inches (Sedgwick 2092!); Haveri (Talbot 2178!, 2198!).—*Kanara*: Supa, 2,100 ft. (Talbot 2195!).

*Distribution* : More or less throughout India, tropical Asia, Afghanistan, Japan, Australia, Africa.

\*69. *ARUNDO*, Linn. Sp. Pl. (1753), 81 ; Gen. Pl. ed. 5 (1754), 35.

Tall, stout, perennial grasses with broad linear blades and large plume-like terminal panicles. Spikelets 2-7-flowered, laterally compressed, in large decom-pound panicles; flowers mostly bisexual; rachilla disarticulating above the involucrel glumes and between the flowering glumes, joints short, glabrous. Involucrel glumes equal, broadly lanceolate, shortly acuminate, keeled, membranous, 3-5-nerved. Floral glumes more or less equalling the involucrel glumes ovate to lanceolate-ovate, acuminate, finely bifid or entire, long-hairy below, 5-9-nerved, 3 nerves more or less percurrent or excurrent, the rest short, the middle nerve often produced into a short, fine bristle; callus short, shortly bearded. Pales slightly exceeding  $\frac{1}{2}$  the length of the floral glume. 2-keeled. Lodicules 2, obovate, nerved, glabrous. Stamens 3. Ovary glabrous; styles distinct, almost as long as the laterally exerted plumose stigmas. Grain obovoid-oblong, broad, loosely enclosed in the floral glume and pale; hilum basal, punctiform; embryo occupying almost wholly one side of the grain.

\*1. *Arundo Donax*, Linn. Sp. Pl. (1753), 81.—For synonyms see Hook. f. in F. B. I. vii, 303.

*Description* : Stem creeping below, erect, 1-3 m. high, smooth, hollow, very many-noded, simple or scantily branched, internodes slightly exceeded by the sheaths, these very tight, firm, smooth. Blades linear-lanceolate from a broad base, long-tapering to a very fine point, more or less drooping, 30-60 cm. long, 2-5 cm. broad, smooth. Panicles erect, 30-60 cm. long; branches scaberulous, erect or drooping; spikelets 8-10 mm. long, light brown. Involucrel glumes glabrous; floral ones 6-10 mm. long; hairs 5-6 mm. long. Anthers 3 mm. long. Grain 2.5 mm. by almost 1 mm.

*Locality* : Often grown in gardens.

*Distribution* : Lower Himalaya, Punjab, Naga, Nilgiri and Coorg Hills, N. Asia, N. Africa, Europe.

70. *POLYPOGON*, Desf. Fl. Atlant. i (1798), 66 ; Hook. f. in F. B. I. vii, 245

Annual or perennial, usually decumbent grasses, with flat blades. Spikelets 1-flowered, minute, jointed (but persistent) on the pedicels, laterally compressed, keeled, densely crowded on the short branches of a spiciform or lobed panicle; rachilla not produced beyond the lower floral glume. Glumes 3. Involucrel glumes equal, concave, keeled, bifid, notched or entire, with a slender awn below the tip or in the sinus. Lower floral glume much smaller, hyaline, sessile, truncate, toothed, awned or not; pale small, 2-nerved. Lodicules 2, falcate. Stamens 1-3; anthers small. Ovary glabrous; styles free. Grain obovoid, free within the glume and pale.

Species about 10.—Temperate regions of the world, chiefly in the Eastern Hemisphere.

1. *Polygogon Monspeliensis*, Desf. Fl. Atlant. i (1798), 66.—For synonyms see Hook. f. in F. B. I. vii, 245.

*Description* : Stems tufted, 10-60 cm. high, stout or slender, leafy, base geniculate. Leaves 7-15 by 3-6 mm., green, ligule oblong. Panicle 1-15 cm. by 6-10 mm. broad, pale yellowish green, silky, sometimes lobulate from the projecting branches. Spikelets 1-2 mm. long, minutely pubescent, very shortly pedicelled. Involucrel glumes very variable in breadth, obovate-oblong, sides scaberulous, keels scabrid, margins ciliate, tip entire, notched or very shortly 2-fid; awns from the length of the glume to 8 mm. long, excessively delicate. Lower floral glume very small, oblong, glabrous, 2-fid, awned or not; pale oblong, tip notched. Anthers very minute, short. Ovary ovoid.

*Locality* : *Sind* : Sukkur (Bhide !). Shikarpur (Bhide !)

*Distribution* : Tropical and temperate regions.

71. *HELEOCHLOA*, Host. Gram. Austr. i (1801), 23 ; Cke. ii, 1011.

Species about 7.—Mediterranean-oriental.

1. Panicles less than 2.5 cm. long ... 1. *H. schaenoides*.

2. Panicles reaching 8 cm. ... .. 2. *H. dura*.

1. *Heleocholea schoenoides*, Host. Gram. Austr. i (1801), 23, t. 30; Cke. ii, 1011.—For synonyms see Hook. f. in F.B.I. vii, 235.

*Description*: Cke. 1 c.

*Locality*: *Sind*: Bhubak (Cooke!).

*Distribution*: Punjab, W. Himalaya, Kashmir, Bundelkhand, westwards to the Atlantic.

2. *Heleocholea dura*, Boiss. Fl. Or. v (1831), 477; Cke. ii, 1011.—For synonyms see Hook. f. in F.B.I. vii, 236.

*Description*: Cke. 1 c.

*Locality*: *Sind*: Salt-water creeks (Stocks 455); Gholam in Indus Delta (Blatter and McCann D688!).

*Distribution*: Arabia.

72. *GARNOTIA*, Brogn.; Cke. ii, 1012.

- |  |     |     |     |                        |
|--|-----|-----|-----|------------------------|
| 1. 5-20 cm. high, growing on trees. Leaves 2.5-5 | ... | ... | ... | 1. <i>G. arborum</i>   |
| cm. long   | ... | ... | ... |                        |
| 2. 30-60 cm. high. Leaves 7-20 cm. long          | ... | ... | ... | 2. <i>G. stricta</i> . |

1. *Garnotia arborum*, Stapf ex Woodrow in Journ. Bomb. Nat. Hist. Soc., xiii (1901), 439; Cke. ii, 1013.

*Description*: Cke. 1 c.

*Locality*: Igatpuri (McCann 4598!); Lonavla (Gammie 15501!); on trees at Nandgaon on the crest of the Ghats 10 miles S. of Lonavla (Woodrow 30); Kalsubai Hill, under a steep rock (Patwardhan 1189!).

*Distribution*: Apparently endemic.

2. *Garnotia stricta*, Brogn. in Duperr. Voy. Bot. (1829), 133, t. 21; Cke. ii, 1013.

*Description*: Cke. 1 c.

*Locality*: *Konkan*: Pen (McCann 5501!); Kalyan (Talbot!); between Neral and Karjat (Woodrow).—*Deccan*: Khandala, St. Mary's Villa, on roof (McCann A299!); Igatpuri (McCann 4589!); Panchgani (Blatter and Hallberg B1283!; B1305!).—*Kanara*: Top of Guddhelli (Hallberg & McCann A303!); Gersoppa Falls (Hallberg & McCann A300!).

*Distribution*: Himalayas, Khasia Hills, Bighar, W. Peninsula, Sandwich Islands.

73. *ARISTIDA*, Linn. Sp. Pl. (1753), 82; Cke. 1007.

Species about 150. In the warmer regions of the world.

We shall have to refer repeatedly to the splendid monograph by J. Th. Henrard: A Critical Revision of the Genus *Aristida* in Mededeelingen van s' Rijks Herbarium, Leiden, No. 54 (1926) and No. 54A (1927). So far 2 vols. have appeared.

Cooke describes 7 species. We retain them and add *Aristida mutabilis*, Trin. & Rupr., and *A. pogonoptila*, Boiss.

A. Awns without column

- |                                |     |     |                             |
|--------------------------------|-----|-----|-----------------------------|
| I. Involucral glumes not awned | ... | ... | 1. <i>A. Adscensionis</i> . |
| II. Involucral glumes awned    |     |     |                             |
| 1. Spikelets 17 mm. long       | ... | ... | 2. <i>A. setacea</i> .      |
| 2. Spikelets 10 mm. long       | ... | ... | 3. <i>A. Hystrix</i> .      |
| 3. Spikelets 6 mm. long        | ... | ... | 4. <i>A. mutabilis</i> .    |

B. Awns with a column

- |  |     |     |                            |
|--|-----|-----|----------------------------|
| I. Column of awn articulate on the floral glume      |     |     |                            |
| 1. Awn plumose                                       |     |     |                            |
| a. Glumes glabrous. Central awn without a naked tip  | ... | ... | 5. <i>A. pogonoptila</i> . |
| b. Glumes not glabrous. Central awn with a naked tip | ... | ... | 6. <i>A. hirtigluma</i> .  |
| 2. Awn not plumose                                   |     |     |                            |
| a. Stems less than 15 cm. high. Lower                |     |     |                            |

- involucral glume 5 mm. long ... 7. *A. hystricula*.  
 b. Stems reaching 2 ft. high. Lower involu-  
 lucral glume 22 mm. long ... 8. *A. funiculata*.  
 II. Column of awn not truly articulate on the  
 floral glume, though readily separating 9. *A. redacta*.

1. *Aristida Adscensionis*, Linn. Sp. Pl. (1753), 82; Kunth Enum. Pl. i, 190; S. eud. Syn. Gram. 139; Hook. f. in F. B. I. vii, 294, *excl. synonymis aliquibus*; Cke. ii, 1008.—*A. abyssinica*, Trin. & Rupr. Sp. Gram. Stip. in Act. Acad. Petrop. ser. vi, v (1842), 134.—*A. canariensis*, Willd. Enum. (1809), 99.—*A. modatica*, Steud. Syn. Pl. Glum. 1855), 139.—*A. curvata*, Nees var. *abyssinica*, Rich. Tent. Fl. Abyss. ii (1851), 392.—*A. divaricata*, Jacq. Eclog. Gram. (1813), 7, t. 6 (*non* Humboldt et Bonpl. *nec* Lagarca).—*A. Heymanni*, Regel in Act. Hort. Petrop. vii, 2 (1881), 649.—*A. hystrix*, Duthie Fodd. Grass. N. Ind, 47, t. 31 (*non* Linn. f.)—*A. aethiopica*, Trin. et Rupr. l.c. (1842), 134, *non* 167 *sicut* habet Hook. f.—*A. Adscensionis*, Linn. var. *aethiopica*, Hook. f. in F. B. I. vii, 225.—*A. Ehrenbergii* Trin. et Rupr. l.c. (1842), 136.—*A. Adscensionis*, Linn. var. *Ehrenbergii*, Henrard l.c. i (1926), 158.—*A. festucoides*, Poir. Encyclop. i (1810), 453.—*A. Adscensionis*, Linn. var. *festucoides*, Henrard l.c. i (1926), 177.—*A. Adscensionis*, Linn. var. *angustifolia*, Pilger in Henrard l.c. i (1926), 9.—*A. Adscensionis*, Linn. var. *typica*, Stapf in Hook. f. Fl. Brit. Ind. vii, 224.—*A. Adscensionis*, Linn. var. *bromoides*, Henrard l.c. i (1926), 62.—*A. coarctata*, H. B. K. Nov. Gen. & Sp. i (1815), 122.—*A. debilis*, Mez. in Fedde Rep. sp. nov. xvii (1921), 151.—*A. fasciculata*, Torrey in Ann. Lyc. Nat. Hist. New York i, pt. 1 (1824), 154.—*A. Grisebachiana*, Fournier Mex. Pl. pt. ii, Gram. (1881), 78.—*A. Adscensionis*, Linn. subsp. *guineensis*, Henrard l.c. i (1926), 216.—*A. Hermannii*, Mez in Fedde Rep. sp. nov. xvii (1921), 153.—*A. Adscensionis*, Linn. var. *humilis*, Henrard l.c. (1927), 247.—*A. inferrupta*, Cav. Ic. v. (1799), 45, t. 471, fig. 2.—*A. luzoniensis*, Cav. Ic. v (1799), 45, t. 470, fig. 2.—*A. Adscensionis*, Linn. var. *condensata*, Henrard l.c. ii (1927), 318.—*A. macrochloa*, Hochst. in Flora xxxviii (1855), 200.—*A. maritima*, Steud. Syn. Pl. Glum. (1855), 137.—*A. mauritiana*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii (1851), 392.—*A. mongholica*, Trin. & Rupr. l.c. (1842), 133.—*A. nana*, Steud. Syn. Pl. Glum. (1855), 137.—*A. nigrescens*, Presl. Reliq. Haenk. i (1830), 223.—*Chataria canariensis*, P. Beauv. Agrost. 30.

The above is a list of synonyms which have been included by Henrard under *A. Adscensionis*, Linn. either as representing the typical plant or as subspecies and varieties.

The following is a list of synonyms which Hook. f. in the F.B.I. (vii, 224, 225) had cited under *A. Adscensionis*, but which have to be excluded according to Henrard's recent investigations.

*Aristida cærulescens*, Desf. Fl. Atl. i (1798), 109, t. 21, f. 2, treated as a distinct species by Henrard i, 99.—*A. chatophylla*, Steud. Syn. Pl. Glum. (1855), 420, no. 108b.—*A. depressa*, Retz. Obs. iv (1786), 22 (*ex* Henrard i, 136).—*A. elatior*, Cav. Ic. vi (1799), 65, t. 581, fig. 1 (*non* Doell), put by Henrard (p. 161) under *A. cærulescens*, Desf.—*A. gigantea*, Linn. f. Suppl. (1781), 113. Henrard (i, 199) is doubtful about the identity of this species, as he has not seen the type.—*A. Jacquiniana*, Tausch in Flora ii (1836), 508, considered by Henrard (ii, 268) as a distinct species—*A. paniculata*, Forskal in Fl. Aegypt. —Arab. (1775), 25. Hook. f. considers it to be identical with *A. Adscensionis* 'ex descript.' Trinius, however, observes that Forskal's diagnosis agrees with nearly all the *Aristidas* with naked awns. Before we can find Forskal's type it will be impossible to place his plant with anything like certainty. (See Henrard ii, 418).—*A. mutabilis* var. *æquilonga*, Trin. & Rupr. l.c. (1842), 150. Henrard l.c. ii (1827), 366 retains *A. mutabilis* as a distinct species and considers the specimen mentioned under the variety *æquilonga* as the type-specimen of *A. mutabilis*.—*Chataria cærulescens*, P. Beauv. Roem & Schult. Syst. ii, 294, identical with *A. cærulescens*, Desf.—*C. depessa*, P. Beauv. Agrost. 30.—*C. elatior*, P. Beauv. Agrost. 30.—*C. gigantea*, P. Beauv. Agrost., doubtful.

*Description*: Cke. ii, 1008.

*Note*: Cooke includes under *A. Adscensionis* the plant called *A. depressa*, Retz. Obs. iv (1789), 22 by Dalz. & Gibs. in their Flora of Bombay, and stated by them to occur 'on dry hills'. Neither Cooke nor we have seen the specimen and so we cannot know whether it is the real *Aristida depressa* of Retz or

whether it belongs to *A. Adscensionis*. If it is Retz.'s species we would have to add *A. depressa*, Retz. to the Bombay Flora, as it is considered to be a species distinct from *A. Adscensionis*.

For the benefit of botanists who wish to clear up this point we quote from Henrard, p. 137, where he points out the difference between the two species. 'Well-developed plants (of *A. depressa*) have sterile innovation-shoots but the root-system is rather faint and much resembles that of annual grasses. The blades are thin and setaceously convolute and the panicles are very loose and open. The spikelets differ from those of *A. Adscensionis* in the very unequal length of the glumes, the lower glume is about  $\frac{2}{3}$  as long as the upper and both are moreover very acute, the lower distinctly awned, the upper without a bifid apex and slightly pointed.'

*Locality: Sind*: Laki (Bhide!); Sehwan to Laki, foot of hills (Sabnis B612!); Umerkot, sand dunes (Sabnis B1075!); Tatta (Blatter & McCann D626!), Kullian Kote Lake (Blatter & McCann D625!).—*Gujarat*: Ahmedabad (Saxton 1066!); Bhuj Hill, Cutch (Blatter 3769!); road to Lasandra (Chibber!); Sevalia (Chibber!); road to Gogka (Chibber!); Jétalsar, Kathiawar (Woodrow 43).—*Khandesh*: Bor, Tapti River (Blatter & Hallberg 5412!); Toranmal (McCann A230!).—*Deccan*: Pashan (Gammie!); Manmad (Blatter 9973!); Happy Valley, Ahmednagar District (Chibber!); Panchgani (Blatter & Hallberg B1315!); Poona (Cooke, Woodrow); Bowdhan Hill near Poona (Woodrow 38).—*S. M. Country*: Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick & Bell 4346!); Haveri (Talbot 2181!); Ranibennur (Jouvhat!); Gokak Hills (Bhide!).

*Distribution*: Most warm countries.

2. *Aristida setacea* Retz. Obs. iv (1786), 22; Hook. f. in F.B.I. vii, 225; Cke. ii, 1008; Haines Bot. Bihar & Orissa 977.

We are not in a position to say how far Hook. f.'s synonymy is correct.

*Description*: Cke. l.c.

*Locality: Gujarat*: Rajkot, Kathiawar (Woodrow).—*Khandesh*: Dadgaum (McCann 9764!).—*Konkan*: Vetora (Sabnis 33677!); Vengurla, sea coast (Chibber!); Salsette (Graham).—*Deccan*: Manmad (Blatter 229!); Khandala (Graham); Ganeshkhind Botanic Gardens (Patwardhan!).—*S. M. Country*: Kappatgudd Hills, 2,600 ft., rainfall 30 inches (Sedgwick & Bell 5217!); Dharwar, 2,500 ft., rainfall 34 inches (Sedgwick 1822!); dry hills and fields N. of Dharwar (Sedgwick 3778!); Byadgi (Talbot 1753!); Badami (Bhide!).—*Kanara*: Karwar, common (Sedgwick & Bell 5065!); Halyal (Talbot 2161!).

*Distribution*: Bihar, W. Peninsula, Mas. arene Islands.

3. *Aristida Hystrix*, Linn f. Suppl. (1781), 113 (*non* Thunbg.); Roxb. Fl. Ind. i, 350; Graham 335; Dalz. & Gibs. 295; Hook. f. in F.B.I. vii, 225; Cke. ii, 1009.

*Description*: Cke. l.c.—Hooker f.'s statement (l.c.) that the callus is naked is not correct. Cke. (l.c.), however, is right when saying that it is shortly villous.

*Locality: Gujarat*: Daman, on sand hills (Bhide!).—*S. M. Country*: Tadas, dry hillsides, 2,000 ft., rainfall 35 inches (Sedgwick 3823!); Dharwar (McCann!), Sedgwick!); Haveri (Talbot 2182!); Badami (Bhide!, Cooke, Woodrow).

*Distribution*: Central Provinces, W. Peninsula.

4. *Aristida mutabilis*, Trin. & Rupr. in Mem. Acad. Petersb. ser. vi (1842), 150; Hook. f. in F.B.I. vii, 226, *excl. aliquib. syn.*—*A. articulata*, Edgew. in Journ. Proc. Linn. Soc. vi (1862), 209; Aitchis. Cat. Panjab Pl. 164; Duthie Grass. N. W. Ind. 26, Fodd. Grass. N. Ind. 47.—*A. mutabilis*, Trin. & Rupr. var. *tangensis*, Henrard l.c. ii (1927), 368.—*A. longevadiata*, Steud. Syn. Pl. Glum. (1855), 140.—*A. hoggariensis*, Batt & Trib. Bot. Soc. Bot. Fr. Tome liii, série iv, Tome vi (1906), Sess. extraor. avril 1906, p. xxxii.—*A. mutabilis*, Trin. & Rupr. var. *hoggariensis*, Henrard l.c. ii (1927), 239

The following synonyms given by Hook. f. l.c. must be excluded: *Aristida Kunthiana*, Trin. & Rupr. in Mem. Acad. Petersb. ser. vi (1842), 151, a distinct species.—*Aristida meccana*, Hochst. *sp.* Trin. & Rupr. l.c. 152, a distinct species.



*Description*: An annual grass. Stems 15-30 cm. high, many ascending from the root, simple or proliferously branched, slender. Leaves 2.5-7.5 cm. long, very slender, curved, convolute, rigid, smooth. Panicle 7-15 cm. long, very narrow, subcylindric; branches very short, crowded or sometimes with a few remote lower down on the stem, ascending from a naked base and bearing a dense oblong fascicle of spikelets; rhachis smooth, branches scaberulous. Spikelets (excl. awns) 6 mm. long, very short-pedicelled, pale green or straw-coloured. Lower involucrel glume 5 mm. long, shortly awned, keel scaberulous: upper 6 mm. long, tip 2 toothed below the awn. Floral glume scaberulous, callus shortly bearded, awn obscurely articulate with the glume, column nearly as long as the glume, slender, smooth, branches capillary, rather short, central one about 12 mm. long.

*Locality*: Sind: Sehwan to Laki, foot of hills (Sabnis B235!).—*Khandesh*: W. Khandesh (Blatter!).

*Distribution*: Punjab, Sind, Rajputana, Khandesh, S. India, Arabia, tropical Africa.

5. *Aristida pogonopilla*, Boiss. Fl. Or. v (1884), 496; Henrard l.c. ii (1927), 456.—*Arthratherum pogonoptilum*, Jaub. and Spach Ill. Pl. Or. iv (1850-53), 56, t. 337.

*Description*: A perennial grass. Rhizome short, oblique, branching. Stems 15-45 cm. high, strict or geniculate, erect, simple or sparsely branching, slender, terete, glabrous, smooth, obsolete and finely striate, few-noded, leafy at the base and covered with imbricate sheaths. Uppermost internode at flowering time scarcely longer than the sheath; lower internodes longer than the sheaths. Nodes quite glabrous, mostly rufescent. Leaves glaucescent, thin, more or less flexuose or rarely rigid, keelless. on the back finely papillose, articulate on the sheath. Lower leaves 7-25 cm. long, the uppermost very often short (2.5-5 cm.). Lowest sheaths aphyllous, chartaceous, straw-coloured, persistent, subcomplicate, striate, ovate or oblong-lanceolate, mostly acuminate. Proliferous sheaths rotund-truncate, keelless, nerved, densely ciliate with long, white hairs at the apex, densely bearded at the mouth with a ring of short bristles, otherwise glabrous, the upper ones herbaceous, tubular-involute. No ligule. Panicle 7.5-15 cm. long, oblong, somewhat lax, simple and made up of many spikelets. Rhachis filiform, continuous, semiterete, scabrous, strict. Branchlets capillary, flexuose, scabrous, alternate, distichous; the spikelets arranged in racemes, pedicelled, mostly 3-5, unequal, getting shorter upwards; pedicels capillary, scabrous, thickened at the apex, most of them longer than the glume. Glumes 3. Involucrel glumes awnless, of unequal length, subnavicular, 3-nerved, glabrous or with scattered hairs on the back and the margins. Lower one shorter, usually fimbriolate at the apex; upper one inserted slightly higher up, narrower than the lower one and about 2 mm. longer, slightly narrowed at the base, emarginate at the apex. Floral glume (including the stalk and awn) about 5 cm. long. Stalk stout, turbinate, densely setulose, bearded-hirsute at the apex. Inner pale tubular-involute, thinly 3-nerved, chartaceous, keelless, oblong, glabrous, cinereous or black-violet, long awned, on the back papillose-scabrous, especially from the middle to the apex, obtusely emarginate after the awn has fallen. Awn deciduous, setaceous-subulate, far below the middle geniculate and trifurcate; the undivided part almost as long as the glume, contorted, erect, canaliculate, filiform, papillose-scabrous, near the apex conspicuously bearded-hirsute, otherwise naked, or laxly hairy; lateral awns capillary, naked, scabrous, more or less diverging, strict, about  $\frac{1}{2}$  the length of the central one and much thinner; central awn strict, long-plumose, at the base setaceous-filiform, upwards capillary. Inner pale minute, membranous, hyaline, nerveless, involute, keelless, glabrous, cuneate-obovate, truncate or rotundate at the apex, obsolete crenulate. Lodicules 2, submembranous, glabrous, finely striate, obliquely ovate, obtuse. Stamens 3. Filaments capillary. Anthers yellowish, glabrous, linear, elongate, emarginate at apex and base. Ovary obovate; quite glabrous. Styles 2, terminal, elongate, filiform, densely plumose, laterally exerted.

Hook. f. in F.B.I. vii, 228 included this species under *A. hirtigluma*, Steud. but, according to Henrard, it 'differs in the glabrous glumes, in the shorter column, more hairy and barbate at the point of insertion of the 3 awns and in the more loosely and longer plumose central awn, without a naked tip.'

*Locality* : Sind (ex Boiss.).

*Distribution* : Punjab, Sind, Baluchistan.

6. *Aristida hirtigluma*, Steud. Nom. ed. 2, pt. 1 (1840), 131, *et* Syn. Gram. (1855), 144; Trin. & Rupr. in Mem. Acad. Petersb. (1842), 171; Aitchis. Cat. Punjab Pl. 164; Duthie Grass. N. W. Ind. 26; Fodd. Grass. N. Ind. 47; Boiss. Fl. Or. v. 496; Hook. f. in F. B. I. vii, 227, *excl. aliquibus syn.*; Cke. ii, 1009.—*A. ciliata*, Steud. Hochst. herb. arab. un. it. no. 165 (*non* Desf.) ex Henrard.—*A. ciliata*, Steud. & Hochst. ex Steud. Nom. ed. 2, pt. 1 (1840), 131 (*non* Desf.).—*A. Schimperii*, Hochst. & Steud. ex Steud. l.c. 143.—*Arthratherum ciliatum*, Nees Fl. Afr. Austr. i, Gramineae (1841), 182, *excl. syn.*

The following synonyms cited by Hook. f. in F. B. I. vii, 228 have to be excluded :

*Aristida decorata*, Steud. Syn. Pl. Glum. (1855), 421, which is *A. Raddiana*, Savi.—*Aristida paradisea*, Edgew. in Journ. As. Soc. Beng. xvi, ii (1847), 1219, which is a distinct species. See Blatter Fl. Aden in Rec. Bot. Survey Ind. vii, 3 (1916), 380.—*Aristida pogonoptila*, Boiss. Fl. Or. v. (1884), 496, a distinct species.

*Description* : Cke. l.c.

*Locality* : Sind : Bholari (Bhide !); Sehwan, sand hills (Bhide !); Laki (Bhide !); hills near Bullo Khan (Woodrow !); Sehwan to Laki, foot of hills (Sabnis B614 !).

*Distribution* : Tunis, Upper Egypt, Sinai, Syria, Nubia, Abyssinia, Eritrea, Highlands of Somaliland, Arabia, Sind, Punjab.

7. *Aristida hystricula*, Edgew. in Journ. Linn. Soc. vi (1862), 208; Aitchis. Cat. Punjab Pl. 164; Duthie Grass. N. W. Ind. 26; Fodder Grass. N. Ind. 47; Hook. f. F. B. I. vii, 227; Cke. ii, 1009.

*Description* : Cke. l.c.—Henrard l.c. ii (1927), 251, points out that 'the most striking character, a character neglected by all the authors who studied the species, is the densely hairy bifid callus.' Hooker l.c., therefore, when saying that the callus is 'minute, glabrous' is not correct. Cooke does not describe the callus.—Apparently no Indian species has a naked callus.

*Locality* : Sind : Laki (Bhide !); Bholari (Bhide !); Hyderabad (Bhide !); Jamadar ka Landa near Karachi (Stocks 1187).

8. *Aristida funiculata*, Trin. & Rupr. in Mem. Acad. Petersb. ser. 6, vii (1849), 159; Aitchis. Cat. Punjab Pl. 164; Boiss. Fl. Or. v, 492 (*partim*); Duthie Fodd. Grass. N. Ind. 47; Hook. f. in F. B. I. vii, 226; Cke. ii, 1010.—*A. macrathera*, Rich. Tent. Fl. Abyss. ii (1851), 393; Boiss. l.c. 493 (*Macranthera*).—*A. Mallica*, Edgew. in Journ. Proc. Linn. Soc. vi (1862), 206.—*A. funiculata*, Trin. & Rupr. var. *mallica*, Henrard l.c. ii (1927), 328.—*A. paradoxa*, Steud. *ap.* Schmidt Fl. Cap. Verd. (1852), 140.—*A. funiculata*, Trin. & Rupr. var. *paradoxa*, Henrard l.c. ii (1927), 425.

*Description* : Cke. ii, 1010.

*Locality* : Sind : Mirpurkhas (Sabnis B1038 !); Gharo (Blatter & McCann D622 !); Tatta, tombs (Blatter & McCann D623 !); Ghulamalla (Blatter & McCann D624 !); Jam village (Woodrow 19).—*Gujarat* : Red earth upland N. of Taloda (Sedgwick !); dry waste land, Ahmedabad (Sedgwick !); Bhuj, Bhodir Maka, Cutch (Blatter 3728 !).—*Khandesh* : Bor, Tapti River (Blatter & Hallberg 4416 !); Amalner, Bori River (Blatter & Hallberg 5108 !).—*Deccan* : Poona (Lisboa); Dapuri near Poona (Jacquemont 489); Pashan near Poona (Gammie !); Kirkee to Poona, railway line (Garade 816 !); Katraj Ghat (Bhide 1041 !); Panchgani (Blatter & Hallberg B1310 !); Satara (Lisboa); Sholapur (Lisboa); Wai (Talbot 4483 !); Nasik (Bourke !); Bairawadi, Purandhar (McCann 5062 !); Rahuri (Nana A227 !).—*S. Country* : Dry fields Yelvigi 1,800 ft., rainfall 28 inches, (Sedgwick & Bell 4898 !); Belgaum (Woodrow); near Belgaum (Woodrow !); Badami (Bhide !).

*Distribution* : Punjab, Rajputana, W. Peninsula, Baluchistan, Arabia, tropical Africa.

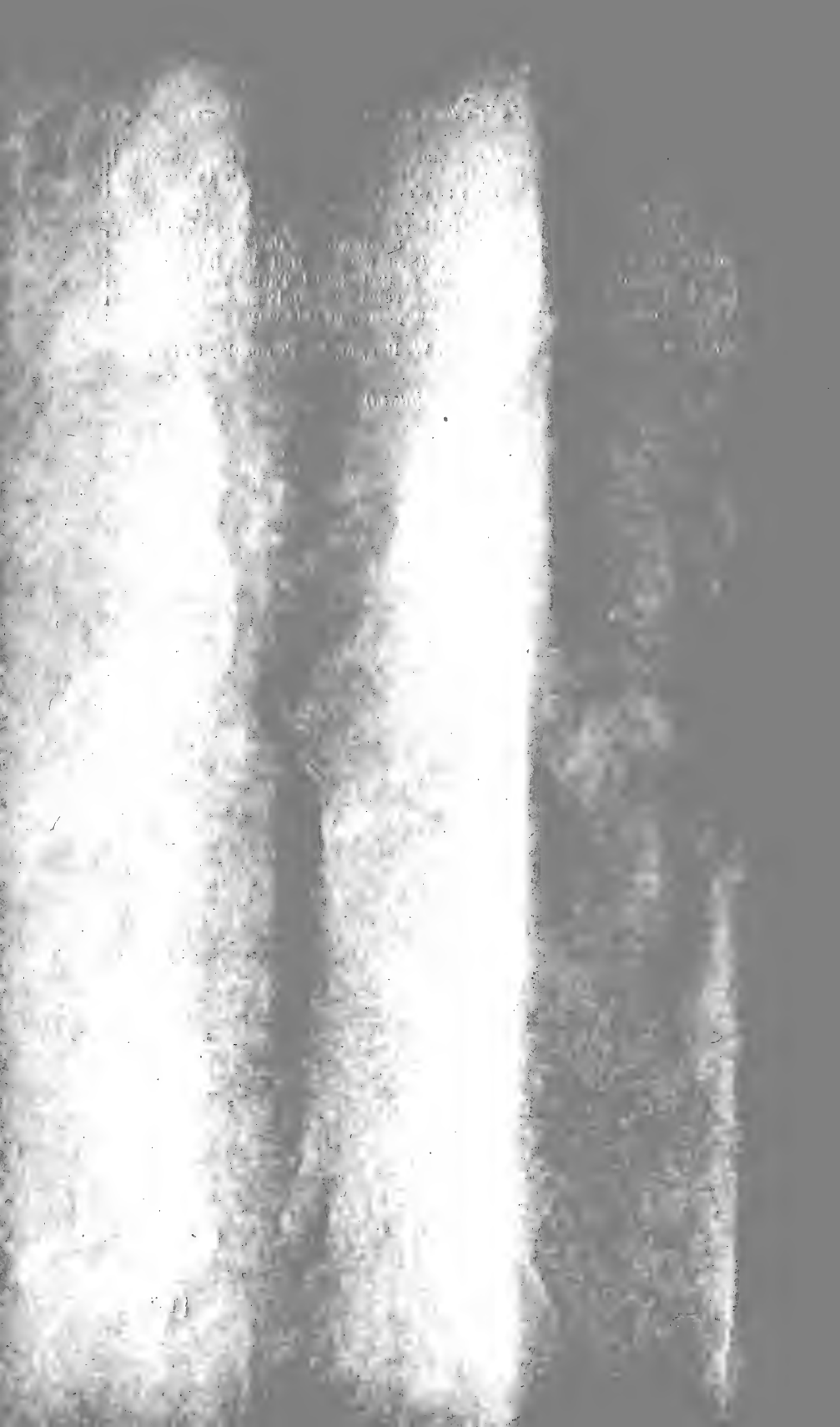
9. *Aristida redacta*, Stapf in Kew Bull. (1892), 85; Hook. f. in F. B. I. vii, 227; Cke. ii, 1010.—*Stipa aristoides*, Stapf ex Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 358; Prain Beng. Pl. 1211.

*Description* : Cke. l.c.

*Locality: Konkan:* Trombay, common on the hillside (McCann A212 !, A213 !); Kankeshwar hill, Alibag (Bhide !).—*Deccan:* Lonavla (Woodrow); Junnar, Poona District (Woodrow); Wai (Talbot 4484); Lohagad, plain (McCann 9503 !); Bairawadi below Purandhar (McCann 5063 !); Pashan (Gammie !); Panchgani (Blatter & Hallberg B1275 !).—*S. M. Country:* Hubli, barren hillside, 2,200 ft., rainfall 28 inches (Sedgwick & Bell 4929 !); Yelvigi, dry fields, 2,000 ft., rainfall 28 inches (Sedgwick & Bell 4897 !); Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick & Bell 4891 ! Talbot 2910); Haveri (Talbot 2216 !).—*Kanara:* (Law).—This species commonly grows on open hill sides among other plants by which it is supported as it is very weak and bends over.

*Distribution:* Central India, Nagpur, W. Bengal, W. Peninsula, S. Persia.

(To be continued)



REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY.

Part IX. By E. BLATTER, S.J., PH.D., F.L.S.

VII 1929

Trachyp to L. aff. trachyp.



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., PH.D., F.L.S.

PART IX

GRAMINEÆ

BY

E. BLATTER and C. McCANN

(Continued from page 243 of this Volume)

TRIBE IX. ZOYSIÆ

74. TRACHYS, Pers. ; Cke. ii, 1013.

1. *Trachys mucronata*, Pers. Syn. i (1805), 85; Beauv. Agrost. 107, t. 21, f. 7; Hook. f. F.B.I. vii, 96; Cke. ii, 1014.—*T. muricata*, (per errorem pro *mucronata*) Steud. Syn. Gram. 112.—*Cenchrus muricatus*, Linn. Mant. 302.—*C. tripsaceus*, Herb. Linn. ex Munro in Journ. Linn. Soc. vi (1862), 55.—*Trachystachys geminata*, A. Dietr. Sp. Pl. ii, 16.—*Tripsachum distachyum*, Herb. Linn. ex Munro l.c.—*Panicum dimidiatum*, Burm. Fl. Ind. 25, t. 8, f. 3.—*P. squarrosus*, Retz. Obs. iv (1786), 15, t. 1; Roxb. Cor. Pl. iii, t. 206; Fl. Ind. i, 288.

*Description* : Cke. ii, 1014.

*Locality* : S. M. Country : Badami (Bhide!, Cooke, Woodrow); Gokak (Talbot!); Dharwar (Woodrow).

*Distribution* : W. Peninsula, Ceylon.

75. NAZIA, Adans. Fam. Pl. ii (1763), 581; Hitchcock Genera of Grass. Unit. St. in Unit. St. Dept. Agric. Bull. 772 (1920), 165.

(*Tragus*, Haller Stirp. Helv. ii (1768), 203; Cke. ii, 1014).

The type species is *Cenchrus racemosus*, Linn. and the genus *Nazia*, Adans. is based on this species. As to *Tragus*, Haller, this author, according to Hitchcock, cites pre-Linnaean writers who connect *Tragus* with *Cenchrus racemosus*, Linn.

Species 3.—Tropical regions of both hemispheres.

1. *Nazia racemosa*, Kuntze Rev. Gen. Pl. iii, 357; Hitchcock Genera of Grass. Unit. St. in Unit. St. Dept. Agric. Bull. 772 (1920), 165.—*Tragus racemosus*, Scop. Introd. Hist. Nat. 73; Desf. Fl. Atlant. ii, 386; Duthie Grass. N. W. Ind. 13, Indig. Fodd. Grass. t. 14, Fodd. Grass. N. Ind. 22; Hook. f. in. F. B. I. vii, 97; Cke. ii, 1014; Haines Bot. Bihar & Orissa (1924), 979.—*T. brevicaulis*, Boiss. Diag. Pl. Or. Ser. i, xiii, 44.—*Lappago racemosa*, Honck. Syn. Pl. Germ. i, 440; Host. Gram. Austr. i, t. 36; Sibth. Fl. Graec. ii, t. 101; Reichb. Ic. Fl. Germ. i, t. 30; Thw. Enum. Pl. Zeyl. 362; Aitchis. Cat. Panjab Pl. 163; Benth. Fl. Austral. vii, 506; Miq. Fl. Ind. Bat. iii, 473.—*L. biflora*, Roxb. Fl. Ind. i (1832), 281; Grah. Cat. 234.—*L. allena*, Dalz. & Gibs. 295 (non Spreng.).—*L. occidentalis*, Nees in Schimp. Pl. Arab. Fel. ed. ii, No. 793.—*Cenchrus racemosus*, Linn. Sp. Pl. 1049.—*C. linearis*, Lam. Fl. Franc. iii, 631.—*Phalaris muricata*, Forsk. Fl. Aeg.—Arab. 302.

*Description* : Cke. ii, 1014.

*Locality: Sind:* Tatta, Tombs (Blatter & McCann D679!).—*Gujarat:* Ahmedabad, waste ground (Sedgwick!); Domas, near Surat (Graham); Rajkot, Kathiawar (Woodrow).—*Khandesh:* Bor, Tapti bank (Blatter & Hallberg 5467!).—*Konkan:* Salsette (Graham).—*Deccan:* Poona (Woodrow!, Jacquemont 386); Chhattarshinji Hill, Poona (Bhide!); Bijapur (Cooke, Woodrow).—*S. M. Country:* Dharwar (Sedgwick & Bell 4145!); Mallapur Hill, Bagalkot (Paranjpe!); Gokak (Shevade!); Badami (Woodrow!).

*Distribution:* Most warm countries.

#### 76. LATIPES, Kunth.

1. *Latipes senegalensis*, Kunth Rev. Gram. i, (1829), 261, t. 42; Enum. Pl. i, 171, Suppl. 125; Duthie Grass. N. W. Ind. 13, Fodd. Grass. N. Ind. 22; Hook. f. in F.B.I. vii, 97; Cke. ii, 1015.—*Lappago Latipes*, Steud. Syn. Gram. 112.—*Tragus senegalensis*, J. Gay ex Kunth Enum. Pl. i, 171.

*Description:* Cke, ii, 1015.

*Locality: Sind:* (Woodrow!); Karachi (Burns!); 20 miles N. of Karachi (Woodrow); Jamadar ka Landa, near Karachi (Stocks 1186).

*Distribution:* Baluchistan, Arabia, Abyssinia, Senegal.

#### 77. PEROTIS, Ait.; Cke. ii, 1016.

Species 2 or 3.—Tropics of the Old World and subtropical Australia.

1. *Perotis latifolia*, Ait. Hort. Kew i (1789), 85; Beauv. Agrost. t. 4, f. 9, Roxb. Fl. Ind. i, 239; Grah. Cat. Bomb. Pl. 237; Dalz. & Gibs. Bomb. Fl. 296; Duthie Grass. N. W. Ind. 13; Miq. Fl. Ind. Bat. iii, 479; Hook. f. in F.B.I. vii, 98; Cke. ii, 1016; Haines Bot. Bihar & Orissa (1924), 978.—For synonyms see Hook. f. l.c.

*Description:* Cke. ii, 1016.

*Locality: Gujarat:* Baroda (Cooke); Surat (Lisboa); Domas near Surat (Dalzell & Gibson); Daman, on sand hill (Bhide!); Ahmedabad (Saxton 1052!); Balsar (Herb. S. X. C.!).—*Konkan:* Juvem (McCann 4312!); Versova (McCann 4204!); Alibag, sandy shore (Ezekiel!); Bassein (Bhide!), Malwan (Woodrow).—*S. M. Country:* Mallapur Hill, Bagalkot (Paranjpe!); Gokak (Shevade!); Badami (Bhide!, Cooke, Woodrow); Londa (Bhiva!); Gokak Falls (Sedgwick!).—*Kanara:* Kalanudi (Sedgwick & Bell 4287!); Karwar (Talbot 1068!, McCann!); Honore (Talbot 1068!).

Usually growing on sandy shores. It is easily recognized by its purplish squirrel-tail-like inflorescence.

*Distribution:* More or less throughout India, Ceylon, S. Africa.

#### 78. OSTERDAMIA, Neck. Elem. Bot. iii (1790), 218.

(*Zoysia*, Willd. (1801); Cke. ii, 1016).

Species about 10, tropical Asia to Australia and New Zealand, Mauritius; in Japan alone there are 7 species (See: Honda Masaji Revisio Gram. Japoniae i, in Bot. Mag. Tokyo 37 (1923), 113-124).

1. *Osterdamia Matrella*, O. Ktze. Rev. Gen. Pl. ii (1891), 781; Hitchcock Genera of Grass. Unit. St. in Unit. St. Dept. Agric. Bull. 772 (1920), 166.—*Agrostis matrella*, Linn. Mant. ii, 185; Roxb. Fl. Ind. i, 317.—*Matrella juncea*, Pers. Syn. Pl. i (1805), 73.—*Zoysia pungens*, Willd. in Ges. Naturf. Fr. Neue Schrift. iii (1801), 441; Br. Prodr. x, 208; Beauv. Agrost. i, t. 4, f. 1; Miq. Fl. Ind. Bat. iii, 478; Hook. f. in F. B. I. vii, 99; Cke. ii, 1016; Haines Bot. Bihar & Orissa (1924), 979.

*Description:* Cke. ii, 1016.

*Locality: Gujarat:* Daman, on sand hills (Herb. Econ. Bot.!, Lisboa).—*Konkan:* Alibag, sandy shore (Ezekiel!); Juvem (McCann 4314!); Bombay, Walkeshwar, seashore, rocks (Sabnis!); Marine Lines (Hallberg 9873!); Versova, marsh (McCann 9875!).—*Kanara:* Karwar (Talbot 1531!, McCann!).

*Distribution:* Tropical Asia.



TRIBE X. SPOROBOLEÆ

79. SPOROBOLUS, R. Br. Fl. Nov. Holl. (1810), 169; Cke. ii, 1017.

Species about 95.—Warm regions of both hemispheres, most abundant in America.

Cooke describes 10 species. We retain all of them and add 3 others: *S. virginicus*, Kunth, *S. scabrifolius*, Bhide, and *S. tremulus*, Kunth.

A. Involucral glumes both shorter than the floral glume

I. Stamens 2

- 1. Culms 30–90 cm. high; panicle reaching 25 cm. ... .. 1. *S. diander*.
- 2. Culms scarcely 15 cm. high; panicle reaching 20–25 cm. ... .. 2. *S. indicus*.

II. Stamens 3

- 1. Panicle narrow, 12–20 mm. broad. Spikelets reaching 2.5 mm. long ... .. 3. *S. indicus*.
- 2. Panicle reaching 7.5 cm. broad
  - a. Panicle 30–45 cm. long. Spikelets 1 mm. long ... .. 4. *S. minutiflorus*.
  - b. Panicle 10–15 cm. long. Spikelets 2 mm. long ... .. 5. *S. ioclados*

B. Lower involucral glume as long as the floral glume or nearly so. Panicle interrupted

I. Spikelets 2.5 mm. long. Leaves very pale ... .. 6. *S. virginicus*.

- II. Spikelets 1.5 mm. long. Leaves glaucous. ... .. 7. *S. glaucifolius*.

C. Lower involucral glume much shorter than either of the two others

I. Panicle contracted

1. Perennials

- a. Margins of leaves smooth ... .. 8. *S. tremulus*.
- b. Margins of leaves serrulate ... .. 9. *S. orientalis*.
- 2. Annual... .. 10. *S. piliferus*.

II. Panicle effuse

- 1. Spikelets 2.5 mm. long ... .. 11. *S. arabicus*.
- 2. Spikelets 1–1.5 mm. long
  - a. Floral glume ovate, acute ... .. 12. *S. scabrifolius*.
  - b. Floral glume ovate-lanceolate, acuminate ... .. 13. *S. coromandelianus*.

1. *Sporobolus diander*, Beauv. Agrost. (1812), 26; Jacq. Eclog. Gram. t. 28; Link Enum. Hort. Reg. Berol. i, 87; Kunth Enum. Pl. i. 213; Griff. Notul. iii, 46, Ic. Pl. Asiat. t. 139, f. 85; Dalz. & Gibs. Bomb. Fl. 296; Aitchis. Cat. Panjab Pl. 165; Duthie Grass. N. W. Ind. 29; Fodd. Grass. N. Ind. 40, t. 63; Miq. Fl. Ind. Bat. iii, 375; Hook. f. in F.B.I. vii, 247; Cke. ii, 1017.—*Agrostis diandra*, Retz. Obs. v, 19; Roxb. Fl. Ind. i, 317.—*Vilfa erosa*, Trin. in Mem. Acad. Petersb. ser. vi, Sc. Nat. ii (1840), 86.—*V. Retzii*, Steud. Nom. ed. ii, ii, 768, Syn. Gram. 162.

*Description* : Cke. ii, 1017.

*Locality* : *Sind* : Jamesabad, fields (Sabnis B927 !).—*Gujarat* : Ahmedabad (Sedgwick !).—*Konkan* : Bombay (Blatter 5267 !).—*Deccan* : Deolali (Blatter 549 !); Khandala (McCann 5409 !); Chattarshinji Hill, Poona (Ezekiel !, Jacquemont 352); Katraj Ghat (Shevade !); Panchgani (Blatter & Hallberg B1318 !).—*S. M. Country* : Dharwar (Sedgwick 2658 !); Londa (Bhide !).—*Kanara* : Dandeli, 1,800 ft., rainfall 100 inches (Sedgwick & Bell 4221 !).

*Distribution* : India, Ceylon, Asia, tropical Australia.

2. *Sporobolus indicus*, Stapf in Cooke Fl. Bomb. ii, 1018.

*Description* : Cke. i. c.

*Locality* : *Sind* : 20 miles from Karachi (Woodrow).—We have not seen this species.

*Distribution* : So far endemic.

3. *Sporobolus indicus*, R. Br. Prodr. (1810), 170; Link Hort. Reg. Berol. i, 87; Kunth Enum. Pl. i, 211; Duthie Fodd. Grass N. Ind. 49; Hook. f. in F.B.I. vii, 248; Trim. Fl. Ceyl. v, 261; Prain Beng. Pl. 1213; Cke. ii, 1018; Haines Bot. Bihar & Orissa (1924), 974.—*Agrostis indica*, Linn. Sp. Pl. 63.—*A. elongata*, Lamk. Ill. i, 142.—*A. tenacissima*, Jacq. Collect. i, 85, Ic. Rar. 3, t. 16 (excl. syn.).—*Sporobolus tenacissimus*, Beauv. Agrost. 26; Duthie Fodd. Grass. N. Ind. 49. *Vilfa capensis* & *elongata*, Beauv. Agrost. 16; Trin. Gram. Diss. i, 154; Steud. Syn. Gram. 159.—*V. exilis*, Trin. in Mem. Acad. Petersb. ser. 6, Sc. Nat. ii (1840), 89.—*V. indica*, Trin. ex Steud. Nom. ed. ii, ii, 767, Syn. Gram. 162.—*V. tenacissima*, H.B. & K. Nov. Gen. & Sp. i, 138; Trin. Sp. Gram. Ic. t. 60.

*Description*: Cke. ii, 1018.

*Locality*: Deccan: Chattershinji Hill, Poona (Ezekiel!); Lina Hill, Nasik Dist. (Blatter A59!); Kolhapur (Woodrow).—Kanara: Castle Rock, 1,600 ft., rainfall 250 inches (Sedgwick 2851!).

*Distribution*: Most warm countries.

4. *Sporobolus minutiflorus*, Link Hort. Reg. Berol. i (1827), 88; Kunth Enum. Pl. i, 214, Hook. f. in F.B.I. vii, 248; Cke. ii, 1019.—*Vilfa minutiflora*, Trin. Gram. Diss. i, 158; Steud. Syn. Gram. 158.—*V. capillaris*, W. & A. ex Wight Cat. No. 2036 (non Miq.).—*V. mangalorica*, Hochst. ex Miq. Anal. Bot. ii, 24; Steud. l.c. 158.—*V. tenuissima*, Schult. Mant. ii, 47.—*Panicum tenuissimum*, Mart. ex Schrank in Denkschr. Bot. Ger. Regensb. ii (1822), 26.

*Description*: Cke. ii, 1019.

*Locality*: Konkan: Bombay Island, very common (McCann 4296!, 3635!), Parel (Woodrow); Mulgaum (McCann 3660!).—Kanara: Dandeli, 2000 ft., rainfall 100 inches (Sedgwick and Bell 4220!); Kumpta (Chibber!).

*Distribution*: W. Peninsula.

5. *Sporobolus ioclados*, Nees Fl. Afr. Austr. (1841), 161; Hook. f. in F.B.I. vii, 249; Cke. ii, 1019.

*Description*: Cke. l.c.

*Locality*: Sind (Stocks).

*Distribution*: S. Africa.

6. *Sporobolus virginicus*, Kunth Rev. Gram. i, 67, Enum. Pl. i, 210, Suppl. 167; Hook. f. in F.B.I. vii, 249.—*Agrostis virginica* Linn. Sp. Pl. 63; Labill. Pl. Nov. Holl. i, 20, t. 23.—*A. barbata*, Pers. Syn. i, 75.—*A. littoralis*, Lamk. Ill. 161.—*A. pungens*, Pursh Fl. Am. Sept. 64.—*Podosemum virginicum*, Link Enum. Hort. Berol. i, 85.—*Vilfa virginica*, Beauv. Agrost. 16; Trin. Diss. i, 155; Sp. Gram. Ic. t. 48; Baker Fl. Mauritius 449.—*V. barbata*, Beauv. l.c.—*V. littoralis*, Beauv. l.c.—*Sporobolus littoralis*, Kunth ll. cc. 68, 213.

*Description*: Perennial. Stems erect or ascending from a decumbent woody creeping base, branched, hard and often tortuous at the base, 15–30 cm. high. Leaves strict, close-set, distichous, erecto-patent, 2.5–7.5 cm. long or more, narrow and almost terete for the involute margins, pungent, very pale, glabrous or scaberulous above, striate; sheaths terete, short or long; ligule of long soft hairs. Panicle 2.5–10 cm. long, elongate, narrow, subspiciform, interrupted, very pale; branches very short. Spikelets 2.5–2 mm. long, very shortly pedicelled, crowded. Glumes 3, all 1-nerved, keels glabrous or obscurely scabrid towards the tip. Involucral glumes oblong-lanceolate, acute, the lower shorter than the upper. Pale oblong, narrowly truncate. Grain broadly obovoid, with a pericarp loosened if moistened.

*Locality*: Gujarat: Porbandar (Chibber!). Chibber was the first to find this species on the shores of continental India.

*Distribution*: India, Ceylon, westward to Africa and America, eastward to Australia.

7. *Sporobolus glaucifolius*, Hochst. in Flora xxv, pt. 1 (1842), Beibl. 133 (nomen nudum); Hook. f. in F.B.I. vii, 250; Cke. ii, 1019.—*Vilfa glaucifolia*, Steud. Syn. Gram. 154.—*V. scabrifolia*, Hochst. ex Edgew. in Journ. Linn. Soc. vi (1862), 196; Aitchis. Cat. Panjab, Pl. 165.—*Agrostis barbata*,  $\beta$ , sene.

*galensis*, Pers. Syn. i, 76.—*A. littoralis* β, Lamk. iii, 161; Poir. Encycl. Suppl. i, 251.

*Description*: Cke. ii, 1019.

*Locality*: *Sind*: Mirpurkhas (Bhide!), fallow fields (Sabnis B1191!); Jacobabad (Bhide!); Magarpir, near Karachi (Sabnis B224!); Karachi (Woodrow 18).—*Gujarat*: Porbandar (Woodrow 21!); road to Gogha (Chibber!); dry rice fields, Chandola, Ahmedabad (Sedgwick!).—*Konkan*: Bombay fore shore (Sedgwick 2568!); Sion (McCann 3677!).—*S. M. Country*: Khanapur, 2,500 ft., rainfall 60 inches (Sedgwick 3011!).

*Distribution*: Panjab, Sind, tropical Africa.

8. *Sporobolus tremulus*, Kunth Rev. Gram. i, 67, Enum. Pl. i, 210, Suppl. 166; Hook. f. in F.B.I. vii, 250; Sedgwick & Saxton in Rec. Bot. Surv. India vi, 219; Haines Bot. Bihar & Orissa (1924), 974.—*Agrostis tremula*, Willd. Sp. Pl. i, 372 (*excl. syn.*).—*A. juncea*, Lamk. Encycl. i, 60, Ill. t. 41, f. 2.—*A. tenacissima*, Roxb. Fl. Ind. i, 316 (*excl. syn.*).—*Vilfa tremula*, Trin. Diss. i, 155.—*V. geniculata*, Nees ex Steud. Syn. Gram. 156.—*V. orientalis*, Wight Cat. No. 1745 (*partim*).—*Sporobolus geniculatus*, Nees ex Aitchis. Cat. Panjab Pl. 165.—*S. orientalis*, Trim. Cat. Ceyl. Pl. 108 (*non Kth.*).

*Description*: A small grass, 2.5–30 cm. high, erect or prostrate, wiry, strict, often tufted, from a hard, knotted, stoloniferous stock; stolons 15–45 cm. long, stout or slender, leafy, flexuous. Leaves short, 1–5 cm. long, rigid, subulate or filiform, flat or convolute, pungent, narrowed from the usually hairy base to the tip, margins smooth. Ligule a few hairs. Panicle narrow, 2.5–10 cm. long, subspiciform sometimes longer, flexuous and interrupted, with erect branches, rarely a few spreading. Spikelets crowded, 1–5 mm. long, articulate on very short pedicels half their own length or less, very pale; rhachilla readily disarticulate above the lowest glumes and these also separately falling. Glumes all 1-nerved. Lower involucral glume about  $\frac{3}{4}$  of the floral glume, lanceolate; upper involucral glume and floral glume subequal. Pale as long as its glume. Stamens 3. Grain oblong.

*Locality*: *Gujarat*: Sides of the Chandola Tank which are submerged in the monsoon (Sedgwick!).—*S. M. Country*: Kunnur, margins of tanks, 2,000 ft., rainfall 35 inches (Sedgwick & Bell 4936!); Marrikop, margins of tanks, W. of Dharwar, 1,800 ft., rainfall 35 inches (Sedgwick & Bell 4495!); Ranibennur, grassy plains near water (Bhide!).

*Distribution*: India, Ceylon, Burma, Tonkin, Cambodia.

9. *Sporobolus orientalis*, Kunth Enum. Pl. i (1833), 211; Dalz. & Gibs. Bomb. Fl. 295; Hook. f. in F.B.I. vii, 251; Cke. ii, 1020; Duthie Fodd. Grass. N. Ind. 49; Trim. Fl. Ceyl. v, 263.—*Agrostis orientalis*, Nees Agrost. Bras. 393 (*excl. syn.* Roxb.).—*A. tenacissima*, Linn. f. Suppl. 107 (*excl. syn.* Jacq.).—*A. elongata*, Roth Nov. Sp. Pl. 41.—*Vilfa orientalis*, Nees ex Trin. in Mem. Acad. Petersb. ser. vi. Sc. Nat. ii (1840), 65; Steud. Syn. Gram. 156.—*V. diandra*, Trin. Diss. i, 154 (*excl. syn.* Retz.).—*Sporobolus humifusus*, Trim. Cat. Ceyl. Pl. 108 (*non Kunth*).

*Description*: Cke. ii, 1020.

*Locality*: *Gujarat*: Prantij Taluka, low grounds liable to inundation (Sedgwick!); Karie Roa, Cutch (Blatter 3771!); Umrat, on salt land (Woodrow!).—*Konkan*: Bassein (McCann 4481!).—*Kanara*: Karwar, borders of rice fields (Talbot 1531!).

*Distribution*: Punjab, W. Peninsula, Ceylon.

10. *Sporobolus piliferus*, Kunth Enum. Pl. i (1883), 211; Hook. f. in F.B.I. vii, 251; Cke. ii, 1020.—*Vilfa pilifera*, Trin. Diss. i, 157, ii, 23, Sp. Gram. Ic. t. 58.—*Sporobolus ciliatus*, Munro in Herb. Ind. Or. Hook. f. & T. ex Hook. f. in F.B.I. vii, 251; Duthie Grass. N. W. Ind. 29 (*non Vilfa ciliata*, Presl.).—*Triachyrum nilagiricum*, Steud. in Hohen. Pl. Ind. Or. no. 931.

*Description*: Cke. ii, 1020.

*Locality*: *Deccan*: Panchgani, Tableland, 4,300 ft., rainfall 60 inches (Sedgwick & Bell 4693!, Blatter & Hallberg B1319!, B1320!, McCann!).—*S. M. Country*: Dharwar (Bhide!); Belgaum (Ritchie 836).

*Distribution*: W. Himalaya, Khasia Hills, Nilgiris, W. Peninsula, Malacca.

11. *Sporobolus arabicus*, Boiss. Diagn. Pl. Or. ser. i, xiii, 47; Hook. f. in F.B.I., vii, 252; Cke. ii, 1020.—*S. pallidus*, Boiss. Fl. Or. v, 514 (non Lindl.); Aitchis. Cat. Panjab Pl. 165 (excl. syn.).—*Vilfa pallida*, Nees ex Trin. in Mem. Acad. Petersb. ser. vi, Sc. Nat. ii (1840), 62; Steud. Syn. Gram. 155.—*V. arabica*, Steud. l.c. 241.

Hook f. calls the synonymy of this plant a perplexing one, 'owing to the double use of the specific name *pallidus*, and to the fact of *Vilfa* being now regarded as a synonym of *Sporobolus*. This name (*pallidus*) was applied by Nees in 1840 to the Arabian plant described above, under *Vilfa*; and by Lindley in 1848 to a very different Australian one, under *Sporobolus*. Bentham (*Fl. Austral.* vii, 623) assuming that Nees had referred his plant to *Sporobolus*, renamed Lindley's *S. Lindleyi*. Lastly, Boissier, when he founded his *S. arabicus*, was not aware that it was Trinius's *Vilfa pallida*, which he erroneously cites in Fl. Orient., under *Sporobolus pallidus*, Trin. In this case the proper course appears to me to be to retain the name *Sp. pallidus*, Lindl., for the Australian plant, and *Sp. arabicus*, Boiss., for the Arabian and Indian.' Personally we are inclined to call this species *S. pallidus*, Boiss., as *Vilfa pallida*, Nees is the oldest name for the Indo-Arabian species.

*Description*: Cke. ii, 1020.

*Locality*: *Sind*: (Burns!); Laki (Bhide!); Mirpur Sakro (Blatter & McCann D672!, D677!, D678!); Gharo (Blatter & McCann D673!, D676!); Tatta (Blatter & McCann D674!, D675!); Jamadar ka Landa near Karachi (Stocks 663); Karachi (Woodrow); between Karachi and Magar Peer (Wykeham Perry).

*Distribution*: Punjab, Waziristan, Rajputana Desert, Afghanistan, Baluchistan, Arabia.

12. *Sporobolus scabrifolius*, Bhide in Journ. & Proc. As. Soc. Beng. new. ser. viii (1912), 312, pl. xxv.

*Description*: Stems erect, 20-75 cm. high. Nodes glabrous. Leaves 2.5-12 cm. long, 3-9 mm. broad, lanceolate, rounded or subcordate at the base, hairy on both surfaces with bulbous based hairs, margins slightly thickened and spinulosely serrulate; sheaths glabrous; ligule a fringe of hairs. Panicle 7.5-17.5 cm. long, 2.5-9 cm. diam.; branches whorled or fascicled, a few solitary ones or twigs intervening. Spikelets about 1 mm. long. Glumes 3, involucrel ones empty, ovate, acute, membranous, 1-nerved, the lower one  $\frac{2}{3}$  the size of the upper; flowering glume just a little shorter than the upper involucrel, ovate, acute, membranous, 1-nerved, paleate, bisexual; pale shorter than the glume. Stamens 3; styles 2; stigmas plumose. Grain rounded, slightly beaked at the extremities; lodicules minute.

*Locality*: *S. M. Country*: Ranibennur (Bhide!); Haveri (Talbot 2176!).

*Distribution*: So far endemic.

13. *Sporobolus coromandelianus*, Link. Hort. Reg. Berol. i (1827), 89 (*in nota*). Kunth Rev. Gram. i (1829), 68; Dalz. & Gibs. Bomb. Fl. 296; Hook. f. in F.B.I. vii, 252; Cke. ii, 1021; Haines Bot. Bihar & Orissa (1924), 975.—*Agrostis coromandeliana*, Retz. Obs. iv, 19; Vahl. Symb. i, 10; Roxb. Fl. Ind. i, 316.—*A. indica*, Forsk. Fl. Aeg.—Arab. 104.—*Vilfa coromandeliana*, Beauv. Agrost. 15; Trin. Sp. Gram. l.c. t 11 (*omittens glumam involucri interiorum*); Steud. Syn. Gram. 153.—*V. commutata*, Trin. Diss. i, 156.—*V. discospora*, Trin. in Mem. Acad. Petersb. ser. vi, Sc. Nat. ii (1841), 59.—*V. Roxburghii*, Nees ex Trin. l.c.—*V. Roxburghiana*, Nees ex Wight Cat. No. 1742; Steud. Nom. ed. ii, ii, 59.—*Sporobolus commutatus*, Kunth Enum. i, 214; Miq. Fl. Ind. Bat. iii, 376 (excl. syn. *pulchello*); Boiss. Fl. Or. v (1884), 513; Aitchis. Cat. Panjab Pl. 165; Duthie Grass. N. W. Ind. 29.—*S. discosporus*, Nees Fl. Afr. Austr. 158.—*Triachyrum cordofanum*, Hochst. ex Steud. Syn. Gram. 176.

*Description*: Cke. ii, 1021.

*Locality*: *Sind*: Jamadar ka Landa near Karachi (Stocks).—*Gujarat*: Shady places at Dhansura Madasa-Petha (Sedgwick!).—*Khandesh*: Bor, Bori River (Blatter & Hallberg 4426!)—*Konkan*: Kennedy Seaface, Bombay

(Sabnis 4295 !); Bombay (Law).—*Deccan* : Poona, College Farm (Khomne !); Gungapur (Blatter A56 !).—*S. M. Country* : Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick 2832 !).

*Distribution* : Punjab, Orissa, Burma, W. Peninsula, Ceylon, Afghanistan, Africa.

TRIBE XI. ERAGROSTÆ

80. *Desmostachya*, Stapf. in Haines Bot. Bihar and Orissa (1924), 962.

(*Eragrostis*, Beauv., *partim*).

This genus agrees with *Eragrostis*, Beauv., except in the following points : Spikelets very closely packed, imbricate, laterally very much compressed, second, sessile and articulate on the very short densely crowded branchlets of a tall narrow racemiform panicle, acute and deciduous; rhachilla sub-articulate.

Species 1.—India to Syria and N. Africa.

1. *Desmostachya bipinnata*, Stapf in Fl. Cap. vii, 632 —*Briza bipinnata*, Linn. Syst. Nat. x, 875.—*Uniola bipinnata*, Linn. Sp. Pl. ed. ii, 104.—*Leptochloa bipinnata*, Hochst. in Flora xxxviii (1855), 422.—*Eragrostis cynosuroides*, Beauv. Agrost. 71, 162; Steud. Syn. Gram. 264; Wight Cat. No. 1774, 1774b; Trin. in Mem. Acad. Petersb. ser. vi, i (1831), 415; Dalz. and Gibs. Bomb. Fl. 298; Aitchis. Cat. Panjab Pl. 169; Duthie Grass. N. W. Ind. 37, Fodd. Grass. N. Ind. 62, t. 40; Boiss. Fl. Or. v, 583; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 387; Hook. f. in F. B. I. vii 324; Cke. ii, 1028; Prain Beng. Pl. 1221.—*Poa cynosuroides*, Retz. Obs. fasc. iv, (1786), 20; Roxb. Fl. Ind. i, 333; Del. Fl. d'Egypt 159, t. 10; Gran. Cat. Bomb. Pl. 236; Kunth Enum. Pl. i, 227.—*Desmostachya cynosuroides*, Stapf in Haines Bot. Bihar and Orissa (1924), 962; Blatt., McCann and Sabnis in Journ. Ind. Bot. vi (1927), 76.—*Cynosurus durus*, Forsk. Fl. Aegypt.—Arab. 71.

*Description* : Cke. ii, 1028 (under *Eragrostis*).

*Locality* : *Sind* : Jacobabad (Bhide !); Hyderabad (Bhide !, Woodrow); Sukkur (Sabnis B550 !, Bhide !); Miani forest, Hyderabad (Bhide !); Larkana (Sabnis B100 !); Sehwan to Laki, foot of hills (Sabnis B66 !); Sehwan, sand dunes (Sabnis B674 !); Sita Road (Sabnis B360 !); Khairpur Mirs, forest (Sabnis B328 !); Phuleli Canal, on banks, at Hyderabad (Sabnis B181 !); Sanghar (Sabnis B895 !); Pad-Idan (Sabnis B517 !); Ghulamalla, fields (Blatter and McCann D643 !); Mirpur Sakro (Blatter and McCann D644 !, D646 !, D647 !); Gharo (Blatter and McCann D645 !, D648 !).—*Cutch* : (Blatter !).—*Gujarat* : Surat (Gammie !); Nadiad Farm (Supt. of Farm !); road to Lasundra (Chibber !); Charodi (Gammie 16526 !); Mandvi, Kathiawar (Woodrow).—*Konkan* : Palghar, Mahim (Ryan 2189); Bassein (Patwardhan !); Dahana, Thana Dist. (Burns !).—*Deccan* : Nasik (Lisboa).

*Distribution* : India, Syria, Egypt, Nubia.

81. *ERAGROSTIS*, Beauv. Ess. Agrost. (1812), 70, pl. 14.

f. 11; Cke. ii, 1021.

<sup>1</sup> Hitchcock ascribes the genus to Host because Host was the first to describe a species of *Eragrostis* (Gram. Austr. 4 (1809), 14, pl. 24). Host, however, did not give a diagnosis of the genus and so we retain Beauvois who first diagnosed the genus, l. c.

Species more than 100.—Tropical and temperate regions.

Cooke describes 15 species. Of these *Eragrostis cynosuroides*, Beauv. has been put under *Desmostachya* above. The other species are being retained, with the exception that *E. tenella*, var. *viscosa*, Stapf is considered as a distinct species (*E. viscosa*). Of two species the names had to be changed viz. *E. amabilis* is here called *E. unioloides*, and *E. maior* goes under the name of *E. Eragrostis*. *E. papposa* and *E. brachyphylla* are new to the Presidency.

Key, after Cooke.

A. Spikelets paniced.

AA. Rhachilla of spikelets more or less jointed and breaking up from above downwards

- I. Panicle spiciform, compact, 5-7.5 cm. by 8 mm.; rhachis bearded at the nodes; margins of flowering glumes ciliate ... 1. *E. ciliata*.
- II. Panicle open or more or less contracted; margins of flowering glumes not ciliate
  - 1. Spikelets 5 mm. long; panicle large, lax, thyriform, 20-50 by 10-15 cm. ... 2. *E. aspera*.
  - 2. Spikelets 2.5 mm. long; panicle short, compact, cylindric, 12-40 mm. long. 3. *E. ciliaris*.
  - 3. Spikelets 2.5-4 mm. long; panicles 5-20 cm. long
    - a. Grain ovoid. Stamens 3
      - aa. Not sweet-scented ... 4. *E. tenella*.
      - bb. Sweet-scented ... 5. *E. viscosa*.
    - b. Grain obovoid. Stamens 2 ... 6. *E. interrupta*.

BB. Rhachilla of spikelets tough, persistent; flowering glumes falling away from its base upwards

- I. Spikelets flat, ovate-elliptic or oblong; lateral nerves of flowering glumes very prominent, straight, almost percurrent; pales deciduous with their glumes ... 7. *E. unioloides*.
- II. Spikelets less compressed, linear or linear-oblong; lateral nerves less prominent. When spikelet compressed or lateral nerves prominent, then with persistent pales
  - 1. Spikelets more or less fascicled on the primary or secondary branches or shortly pedicellate in narrow racemes
    - aa. Leaves glaucous; grain oblong. 8. *E. gangetica*.
    - bb. Leaves not glaucous; grain globose or nearly so ... 9. *E. stenophylla*.
  - 2. Spikelets not fascicled; long pedicellate, more or less divaricate when ripe
    - a. Leaf-margins glandular
      - aa. Lower involucreal glume 1-3-nerved; upper 3-nerved ... 10. *E. Eragrostis*.
      - bb. Both involucreal glumes 1-nerved ... 11. *E. minor*.
    - b. Leaf-margins eglandular; involucreal glumes 1-nerved
      - aa. Spikelets versatile, 2.5 cm. long or longer, narrowly linear; branches of panicle solitary... 12. *E. tremula*.
      - bb. Spikelets small, 4 mm. long or less
        - § Mouth of leaf-sheath naked. 13. *E. tenuifolia*.
        - §§ Mouth of leaf-sheath bearded
          - † Perennial. Grain obovoid. 14. *E. papposa*.
          - †† Annual. Grain ellipsoid ... 15. *E. pilosa*.

B. Spikelets distichously spreading, secund, in a long, simple terminal spike

- 1. Keels of pale distinctly winged ... 16. *E. bifaria*.
- 2. Keels of pale not winged ... 17. *E. brachyphylla*.

1. *Eragrostis ciliata*, Nees Agrost. Bras. (1929), 512, Obs. 1 (*nomen nudum*); Wight Cat. No. 1788; Steud. Syn. Gram. 265; Dalz. and Gibs. Bomb. Fl. 298; Hook. f. in F. B. I. vii, 313; Cke. ii, 1022; Haines Bot. Bihar and Orissa (1924),

956.—*E. rupestris*, Steud. l. c.—*Poa ciliata*, Roxb. Fl. Ind. i, 334.—*P. rupestris*, Roth. Nov. Pl. Sp. 71.

*Description* : Cke. ii, 1022.

*Locality* : *Gujarat* : Domas, near Surat (Dalz. and Gibs.).—We have never come across this species.

*Distribution* : India, Cochin-China.

2. *Eragrostis aspera*, Nees Fl. Afr. Austr. (1841) 408 ; Lisboa in Journ., Bomb. Nat. Hist. Soc. vii (1893), 386 ; Hook. f. in F. B. I. vii, 314 ; Cke. ii, 1023.—*E. paniculata*, Steud. Syn. Gram. 278.—*Poa paniculata*, Roxb. Fl. Ind. i, 340.—*P. aspera*, Jacq. Hort. Vindob. iii, 32.

*Description* : Cke. ii, 1023.

*Locality* : *Konkan* : (Lisboa !).—*S. M. Country* : Hubli, in water hole, 2,500 ft., rainfall 30 inches ; (Sedgwick & Bell 4230 !) in a small tank near Dharwar, 2,500 ft., rainfall 34 inches (Sedgwick 1814 !) ; common in the water holes in the Naval Tract (Sedgwick) —*N. Kanara* : (Lisboa !).

*Distribution* : W. Peninsula, S. India, Ceylon, tropical and S. Africa, Isle of France.

3. *Eragrostis ciliaris*, Link Hort. Reg. Berol. i (1827), 192 ; Boiss. Fl. Or. v, 582 ; Baker Fl. Maurit. 456 ; Duthie Grass. N. W. Ind. 37, Fodd. Grass. N. Ind. 62 ; Aitchis. Cat. Panjab Pl. 169 ; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 380 ; Hook. f. in F. B. I. vii, 314 ; Cke. ii, 1023.—*Poa ciliaris*, Linn. Sp. Pl. 102.—*Eragrostis lobata*, Trin. in Mem. Acad. Petersb. ser. vi, i (1831), 396.—*E. lepida*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 424.—*E. plumosa*, Boiss. Fl. Or. v, 582 (*excl. syn.*)—*E. pulchella*, Parl. in Hook. Niger Fl. 186.—*E. arabica*, Jaub. & Spach Ill. Pl. Or. iv, 31, t. 322.—*Megastachya ciliaris*, Beauv. Agrost. 74.

Stapf (in Hook. f. F. B. I. l. c.) distinguishes 2 varieties :—

a. var. *ciliaris proper*, Stapf. Panicle spiciform, more or less lobed or interrupted.

b. var. *brachystachya*, Boiss. Fl. Or. v, 582. Panicle short, compact, cylindrical.

In our opinion the many intermediate forms make it practically impossible to keep up this varietal distinction. The above synonymy and the following description are such as to include both varieties.

*Description* : Annual. Stem 15-60 cm. high, procumbent below and geniculately ascending, slender, glabrous, smooth. Leaves very narrow, flat, tapering to a fine point ; sheaths striate, usually bearded at the mouth with long hairs ; ligule a fringe of short hairs. Panicle 1-15 cm. long, spiciform, more or less lobed or interrupted, or short, compact and cylindrical, appearing hairy from the long cilia of the pales ; branches very short, divided from the base, glabrous ; nodes of glabrous rhachis naked ; pedicels very short, glabrous. Spikelets 2.5 mm. long and broad, crowded, 6-12-flowered, strongly compressed, very pale ; rhachilla breaking up. Involucral glumes subequal, ovate-lanceolate, acute, 1.5 mm. long. Floral glumes about 1 mm. long oblong, subtruncate, mucronulate, spreading, lateral nerves submarginal. Pales equal to their glumes and falling with them, the keels with long rigid cilia. Stamens 3 ; anthers very short. Grain elongate-ovoid, about 0.5 mm. long.

*Locality* : *Sind* : Karachi (Burns !); Jamadar ka Landa, near Karachi (Stocks) ; Mirpurkhas (Sabnis B1175 !); Mirpurkhas Farm, Mankad (Herb. Econ. Bot. !); Jamesabad, in fields (Sabnis B1109 !); Nasarpur, clayey soil (Sabnis B1053 !); Sanghar (Sabnis B757 !); Tatta (Blatter & McCann D649 !).—*Cutch* : Bhuj Hill (Blatter !).—*Gujarat* : Baroda (Woodrow) ; Domas, near Surat (Bhide !); Porbander (Bhide !); Nadiad (Chibber !); Broach (Woodrow !); Sungiri (Gammie 16553 !); Perim Isl., Gulf of Cambay (Blatter !).—*Khandesh* : Taner, Tapti bank (Blatter & Hallberg 5166 !); Nim, Tapti bed (Blatter & Hallberg 5400 !); Tapti Isl. near Bor, on sand and mud (Blatter & Hallberg 4394 !); Bor, Bori River (Blatter & Hallberg 4423 !); Amalner, Bori River (Blatter & Hallberg 5114 !).—*Konkan* : St. Xavier's College, compound (McCann 4527 ! 4596 !); Alibag, sandy shore Ezekiel !.—*Deccan* : Trimbak, Nasik Dist. (Chibber !).—*Kanara* : Honavar (McCann !).

*Distribution* : India, Arabia, tropical Africa and America.

4. *Eragrostis tenella*, P. Beauv. ex Roem. & Schult. Syst. ii (1817), 576; Stapf in Hook. f. F. B. I. vii, 315; Cke. ii, 1023.—*Poa amabilis*, Linn. Sp. Pl. ed. i (1753), 68.—*Poa tenella*, Linn. Sp. Pl. ed. i (1753), 69.

A. Camus in Lecomte's Flore Général de l'Indo-Chine has adopted the name *Eragrostis amabilis* for this species. Mr. Hubbard of Kew has informed us that, according to the Vienna Rules of nomenclature (Art. 46) this does not seem to be correct. *Poa amabilis*, Linn. is the same as *Poa tenella*, Linn., and *Eragrostis tenella*, P. Beauv. ex Roem. & Schult. is based on *Poa tenella*, Linn. Apparently Stapf (in Hook. f. F. B. I. vii, 315) was the first to unite the two species; as the name first used when the species were united takes precedence over the other, we have to retain the name *E. tenella*, P. Beauv.

*Description*: Usually a small, very elegant and slender annual grass, very variable. rarely 45 cm. high. Stems many, slender, densely tufted. Leaves slender, narrow, acuminate, attaining 12 cm. by 5 mm., usually much less; sheaths long-ciliate near the mouth. Panicles decompound, excessively branched 2-8 in. long, contracted or spreading, pale green or purplish, oblong-ovate or cylindrical, never with the long interrupted rhachis and pseudo-verticillate branches of *E. interrupta*. Spikelets innumerable, minute to small on capillary brnchlets and pedicels, 1-4 mm. by 1 mm. or less, not strongly compressed, 3-9-flowered. Involucral glumes subequal or unequal. Flowering glumes oblique, not mucronate, lateral nerves remote from the margins; keels of pale usually obscurely ciliate. Stamens 3. Grain broadly ovoid, pale brown, polished.

*Var. plumosa*, Stapf in Hook. f. F.B.I. vii, 315; Cke. ii, 1024; Haines Bot. Bihar & Orissa (1922) 957.—*Eragrostis plumosa*, Link. Enum. Hort. Berol. i. (1827), 192 (*non* Boiss.); Duthie Grass. N. W. Ind. 38, Fodd. Grass. N. Ind. 64, t. 38, 77; Aitchis. Cat. Panjab Pl. 170; Lisboa in Journ. Bomb. Nat. Hist. Soc. vi (1893), 385.—*Poa plumosa*, Retz. Obs. iv, 20; Kunth Enum. Pl. i, 338; Roxb. Fl. Ind. i, 337.—*P. tenella*, Linn. Sp. Pl. ed. i, (1753), 69; Burm. Fl. Zeyl. t. 47, f. 3; Retz. Obs. V, 19.—*Eragrostis tenella*, P. Beauv. l. c.—*P. despiciens*, Link. Enum. Hort. Berol. i, 88.—*Eragrostis despiciens*, Schult. Mant. ii, 318.

*Description*: Stems tufted, sometimes reaching 40 cm. high and more, and as well as the panicle eglandular. Panicle delicate, open, often flexuous; branches capillary, rhachis bearded at the nodes; pedicels distinct, often long. Spikelets 1.2-4 mm. long, 3-9-flowered, rhachilla subarticulate. Involucral glumes unequal, the lower distinctly shorter than the upper. Floral glumes less than 1 mm. long. Keels of the pale pectinately ciliate with long hairs. Anthers minute. Grain ovoid, less than 0.5 mm. long.

*Locality*: *Sind*: Mirpurkhas, on banks of dry watercourse (Sabnis B1023!),—*Gujarat*: Surat (Bhide!, Woodrow),—*Khandesh*: Bor, Tapti Island, sandy mud (Blatter & Hallberg 4395!); Umalla, Tapti bank (Blatter & Hallberg 5230!); Chanseli (McCann 9978!).—*Konkan*: Common (Lisboa); Byculla, common in Bombay Island (McCann A1; Uran (Hallberg & McCann 5131!, 5124!)).—*Deccan*: Sholapur (D'Almeida 9977!); Poona (Cooke, Woodrow).—*S.M. Country*: Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick 2830!); Yelvigi, 1,800 ft., rainfall 30 inches (Sedgwick 2035!); Badami (Bhide!); Gokak (Shevade!).—*Kanara*: Halyal (Talbot 2383!).

*Distribution*: Throughout India and Ceylon.

*Var. riparia*, Stapf in Hook. f. F.B.I. vii, 315; Cke. i, 1024.

Cooke included this variety on the authority of Graham (Cat. Bomb. Pl. p. 236, under *Poa tenella*). Graham does not give any locality; Cooke has not seen any specimen from the Presidency and we have not found it anywhere in our area. We, therefore, drop this variety.

5. *Eragrostis viscosa*, Trin. in Mem. Acad. Petersb. ser. 6, i (1831), 397; Dalz. & Gibs. 298; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 386; Haines Bot. Bihar & Orissa (1922), 957.—*Poa viscosa*, Retz. Obs. iv (1786), 20; Roxb. Fl. Ind. i, 336; Grah. Cat. Bomb. Pl. 236; Kunth Enum. Pl. i, 336.—*Eragrostis tenella* var. *viscosa*, Stapf in Hook. f. F.B.I. vii, 315! Cke. ii, 1024.

*Description*: A tufted, sweet-scented-grass, 15-40 cm high, the panicles occupying the greater part of the plant. Stem and rhachis of panicle, pedicels and glumes with scattered microscopic glands. Leaves mostly convolute,



erecto-patent, 2.5-3.5 cm. long with rigid tips, base and mouth of sheath with very long cilia. Panicles dense, cylindric or oblong, 7-13 cm. long and up to 3.5 cm. broad. Branches very numerous, more or less spreading, equal, sometimes opposite or 2-nate, but never in interrupted whorls as in *E. interrupta*; rhachis usually glabrous, rarely obscurely bearded at the nodes. Spikelets 5-20-flowered, often purplish, usually about 3 mm. long; rhachilla readily breaking up. Involucral glumes nearly equal or the lower very slightly shorter than the upper. Floral glumes broadly ellipsoid, obtuse or rounded, with the keel minutely scaberulous. Pale nearly as long as the glume, rigidly ciliate on the keels. Grain pale brown, polished, about 0.5 mm. long.

*Locality: Gujarat*: Junagad, Kathiawar (Blatter 3282!, 3791!).—*Khandesh*: Bor, Bori River (Blatter & Hallberg 4430!); Amalner, Bori River (Blatter & Hallberg 5113!); Nim, Tapti bank (Blatter & Hallberg 3829!); Dadgaum (McCann All!).—*Konkan*: Malabar Hill, Bombay.—*Deccan*: Khandala; Panchgani (Blatter & Hallberg B1280!).—*S. M. Cuntry*: Dastikop fields, 2,500 ft. rainfall 35 inches (Sedgwick & Bell 1898!).—*Kanara*: Sulgeri, 500 ft., rainfall 200 inches (Sedgwick & Bell 4250!); Birchy (Talbot 2102!).

*Distribution*: From the Gangetic Plain southward, Ceylon, tropical and S. Africa.

6. *Eragrostis interrupta*, Beauv. Agrost. (1812), 71 (*non* Roem. & Schult. *neque* Trin.); Stapf in Hook. f. F.B.I. vii, 316; Cke. ii, 1024; Haines Bot. Bihar & Orissa (1924), 957.—*Poa interrupta*, Lamk. iii, i, 185; Poir. Encycl. v, 87; Heyne ex Roth Nov. Sp. 67; Koen. ex Roxb. Fl. Ind. i, 335.—*Poa Koenigii*, Kunth Enum. Pl. i, 346.—*Eragrostis Koenigii*, Link Enum. Hort. Berol. ii, 294; Steud. Syn. Gram. 266.—*Eragrostis interrupta*, Beauv. var. *Koenigii*, Stapf in Hook. f. F.B.I. vii, 316; Cke. ii, 1024; Haines Bot. Bihar & Orissa (1924), 957.—*E. hapalantha*, Trin. in Mem. Acad. Petersb. ser. vi, i (1839), 409 (*partim*).—*E. minutiflora*, Presl. Rel. Haenk. i, 274 (*excl. syn.*); Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893), 386.—*E. mossulensis*, Steud. Syn. Gram. 264.—*E. nutans*, Nees in Wight Cat. no. 1776; Steud. Nom. ed. ii, i, 563; Duthie Grass. N. W. Ind. 38, Fodd. Grass. N. Ind. 63, t, 76; Aitchis, Cat. Panjab Pl. 169; Lisboa l. c. 381; Boiss. Fl. Or. v, 583.—*E. Rothii*, Steud. Syn. Gram. 267.—*E. stricta*, Steud. l. c. 264.—*E. verticillata*, Nees in Wight Cat. no. 1784.—*Poa nutans*, Koen. ex Roth Nov. Sp. 64; Roxb. Fl. Ind. i, 335 (*non* Retz.).—*Poa diarrhena*, Schult. Mant. 616.—*Eragrostis diarrhena*, Steud. Syn. Gram. 266.—*E. interrupta*, var. *diarrhena* Stapf l. c.—*Poa diandra*, Roxb. Fl. Ind. i, 336 (*non* Br.).—*Eragrostis diandra*, Aitchis. Cat. Panjab Pl. 169 (*non* Steud.); Duthie Grass. N.W. Ind. 37.—*Diplachne elongata*, Hochst. ex Steud. Syn. Gram. 268.—*Eragrostis diplachnoides*, Steud. l. c.—*Eragrostis interrupta*, var. *diplachnoides*, Stapf l. c.—*E. caudata*, Nees ex Steud. l. c. 264; Duthie Grass. N. W. Ind. 37.—*E. japonica*, Trin. in Mem. Acad. Petersb. ser. vi, i. (1831), 405.—*E. tenella* B. Roem. & Schult. Syst. ii, 356.—*E. tenella*, Benth. Fl. Hongk. 431, Fl. Austral. viii, 643 (*non* Beauv.); Duthie Fodd. Grass. N. Ind. 65, t. 78.—*E. tenellula*, Steud. Syn. Gram. 279.—*E. tenuissima*, Schrad. ex Nees Fl. Afr. Austr. 409, 410.—*E. interrupta*, var. *tenuissima*, Stapf l. c.; Sedgwick and Saxton in Rec. Bot. Surv. Ind. vi, 219; Haines Bot. Bihar & Orissa (1924) 958.—*Poa Japonica*, Thumb. Fl. Jap. 31.—*P. tenella*, R. Br. Prodr. 181 (*non* Beauv.); Roxb. Fl. Ind. i, 337.—*P. tenellula*, Kunth Enum. Pl. i, 338.

We have examined a great number of specimens from all parts of the Presidency. Most of them cannot be classed under any of the 4 varieties mentioned by Stapf. If we wanted to classify them we would have to greatly multiply the number of varieties which could not be satisfactory neither from a theoretical nor practical point of view. Cooke puts the Bombay material under *E. interrupta*, var. *Koenigii*, Stapf. But then he has seen only one specimen from Surat. We have dropped all the varieties as can be seen from the above synonymy. The following description comprises them all.

*Description*: A very variable slender grass from 5-90 cm., annual or perennial. Stems smooth and polished, tufted, geniculate and ascending from the base, branched or not, nodes glabrous. Leaves slender, up to about 25 cm. long, narrow, flat, glabrous; sheaths glabrous, close; ligule a fimbriate membrane. Panicle exceedingly variable, up to 60 cm. long, either contracted with appressed branches or interrupted with many tiers of rather short

spreading subwhorled branches (either long narrow with short dense suberect or erecto-patent pseudo-whorls or long effuse or contracted with solitary or 2-3-nate branches, simple or if branched the whorl rarely overtopped by 1 or 2 branches, ultimate branches not divaricate or long loose narrow, usually stiff, branches pseudo-whorled, spreading, ramified from the base, branchlets and pedicels divaricate or long linear-oblong, branches up to 5 cm. long, hardly whorled, simple at the base, etc.). Spikelets usually very minute, from 1-6 mm. long, ovate to linear, few- to many-flowered. Flowering glumes obtuse, nerves slender, green or pale brown, rarely coloured, keels of pale scaberulous or smooth. Stamens 2. Grain obovoid.

*Locality: Sind:* Pad-Idan (Sabnis B513!); Mirpurkhas, fallow fields (Sabnis B1175!); Jamesabad (Sabnis B1164!); Ganja Hill, near Hyderabad (Sabnis B996!); Bhagar, Indus River (Blatter & McCann D650!).—*Gujarat:* In water holes (Dalzell & Gibson); Dangs, 800 ft., rainfall 100 inches (Sedgwick & Bell 5392!); Surat (Gammie 16436!, Woodrow, Cooke); Kabirwad, Broach Dist. (Chibber!); Nadiad (Chibber!); road to Lasandra (Chibber!).—*Khandesh:* Tapti, Bhusawal, N. E. (Blatter & Hallberg 4437!); Bor, Tapti Isl., sand and mud (Blatter & Hallberg 5475!); Nim, Tapti, left bank (Blatter & Hallberg 5221!); Amalner, Bori River (Blatter & Hallberg 4433!); Muravat, Tapti bank (Blatter & Hallberg 5151!, 5205!); Bor (Blatter & Hallberg 5488!); Chanseli Hill, northern slope (McCann 9986!); Umalla, Tapti bank (Blatter & Hallberg 5214!); Toramnal (McCann 9976!, 9995!).—*Konkan:* Tisgaon, near Kalyan (Garade!); Borivli to Kenery Caves (McCann 9939!); Vihar Lake (McCann 9996!); Pen (McCann 8556!); Kase Dohan, Thana Dist. (Ryan 1920!); Ghatkoper, Horse-shoe Valley (McCann 9994!); Parel (McCann 5417!); Sion (McCann 5246!); Bassein (Lisboa); Thana (Lisboa); Alibag, rocky river bed (Ezekiel!).—*Deccan:* Bhowdan, near Poona (Woodrow); Bahuli, 14 miles N.W. of Poona (Woodrow); Ganeshkhind Botanic Gardens (Gammie!); Trimbak (Chibber!); Dhond, along river (Bhide 1349!); Barsi River (Gammie 15766!); Khandala, very common in fields (McCann 9998!); Khandala to Karjat (Blatter & Hallberg 5322!); Igatpuri (Blatter & Hallberg 5193!); Bairawadi, Purandhar (McCann 5056!); Tangawadi, Igatpuri (Blatter & Hallberg 3834!); Lohagad (McCann 9987!); Vaslang, Sholapur (D'Almeida 9980!).—*S. M. Country:* Margin of tanks, Yelvigi, 1,800 ft., rainfall 28 inches (Sedgwick & Bell 3612!); Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick & Bell 4975!); Dastikop, 2,500 ft., rainfall 35 inches (Sedgwick 2135!).—*Kanara:* Halyal, 1,800 ft. (Talbot 2100!); Kincholi (Talbot 944!); Castle Rock, on banks of a tank (McCann 9993!).

*Distribution:* India, Ceylon, tropical Asia and Africa.

7. *Eragrostis unioides*, Nees ex Steud. Syn. Gram. 264; Trim. Cat. Ceyl. Pl. 109; Duthie Grass. N.W. Ind. 38; Fodd. Grass. N. Ind. 65; Aitchis. Cat. Panj. Pl. 170; Lisboa in Journ. Bomb. Nat. Hist. Soc. viii (1893), 363; Griseb. in Goett. Nachr. (1868), 76.—*Poa unioides* Retz. Obs. v, 19; Roxb. Fl. Ind. i, 330; Kunth Enum. Pl. i, 335; Grah. Cat. Bomb. Pl. 236.—*P. multiflora*, Roxb. Fl. Ind. i, 338.—*P. polymorpha*, R. Br. Prodr. 180.—*P. rubeus*, Lamk. Illustr. i, 184, t. 45, f. 2; Kunth l.c. 335.—*Eragrostis amabilis*, Wight & Arn. ex Nees in Hook. & Arn. Bot. Beech. Voy. 251 (*non* Linn.); Nees in Act. Acad. Nat. Cur. xix, Suppl. i (1843), 205; Stapf in Hook. f. F.B.I. vii, 317; Cke. ii, 1025; Haines Bot. Bihar & Orissa (1922), 958.—*E. polymorpha*, Trin. ex Steud. Nom. ed. ii, i, 364, 562.—*E. rubeus*, Hochst. ex Miq. Anal. Bot. ii, 26; Steud. Syn. Gram. 265.—*Briza rubra*, Lamk. Illustr. i, 187; Kunth l.c. 371.—*Uniola indica*, Spreng. Syst. i, 349; Dalz. & Gibs. Bomb. Fl. 298.—*Megastachya polymorpha*, Beauv. Agrost. 74.

Mr. Hubbard of Kew has helped us with regard to the synonymy of this species. He says in a letter: 'The combination *E. amabilis*, Wight & Arn. is based on *Poa amabilis*, Linn. but the majority of the references, the description and the specimens refer to a different plant which has for a long time been known under this name. It cannot, however, be called *E. amabilis*, Wight & Arn. and the next name for it is *Eragrostis unioides*, Nees (*Poa unioides*, Retz.). The fact that the name *E. amabilis* has been applied to a different species might be used as additional justification for rejecting it.'

*Description:* Cke. ii, 1025.

*Locality: Sind:* Mirpur Sakro (Blatter & McCann D651!).—*Konkan:* Penn (Bhide!, McCann!); very common in the Bombay and Salsette Islands

(McCann !); Alibag (Ezekiel !); Uran (Hallberg & McCann 5130 !); Parel, Bombay Island (Woodrow); Bassein (Woodrow).—*Deccan*: Igatpuri (Blatter & Hallberg 5192 !, McCann !); Bairawadi, Purandhar (McCann 8739 !); Lohagad, way up (McCann 9504 !); Khandala, very common (Blatter 4375 !, 5440 !, McCann !); Lonavla (Woodrow 165); Poona (Woodrow); Katraj Ghat (Bhide !); Panchgani (Blatter 5387 !, Blatter & Hallberg B1243 !); Mahableshwar (Talbot 4511 !).—*S. M. Country*: Marshes N. of Belgaum (Ritchie 846); Dharwar (Sedgwick 2114 !).—*Kanara*: Karwar, sandy fields by the sea (Sedgwick & Bell 5086 !); Castle Rock (Gammie 15723 !); Dudsagar Falls (McCann 9985 !).

*Distribution*: India, Ceylon, tropical Asia.

8. *Eragrostis gangetica*, Steud. Syn. Gram. (1855), 266; Trim. Fl. Ceyl. v, 293; Stapf in Dyer Fl. Cap. vii (1900), 617; Prain Beng. Pl. 1221; Cke. ii, 1025; Haines Bot. Bihar & Orissa (1924), 958.—*E. elegantula*, Stapf in Hook. f. F.B.I. vii (1896), 318 (*non* Nees).

*Description*: Cke. ii, 1025.

'Very similar to *E. stenophylla* in the character of the panicle and the slatey-blue spikelets, but the longer striolate grain is correlated in all the specimens with the longer usually more acuminate glumes and slightly stouter pedicels than occur in *stenophylla*.' Haines.

*Locality*: *Konkan*: Vihar Lake (McCann 5096 !); Campoli (McCann 9409 !).—*Deccan*: Igatpuri (Blatter & Hallberg 5198 !); Khandala (McCann A10 !); Khandala to Karjat (Blatter & Hallberg A3 !); Poona, Canal (Ezekiel !); Borkas, Mawal, Poona Dist. (Woodrow); Panchgani (Blatter & Hallberg B1218 !, B1276 !); Lingmala, Mahableshwar, 4,000 ft., rainfall 200 inches (Sedgwick & Bell 4654 !).—*S. M. Country*: Hirdridihal, on the margin of a tank, 2,000 ft., rainfall 30 inches (Sedgwick 3801 !); Havasbhari, edge of a tank, 2,000 ft., rainfall 35 inches (Sedgwick 2110 !); Tadas, tank, 2,500 ft., rainfall 35 inches (Sedgwick 1910 !); Dharwar, rice field (Talbot 2637 !); Londa (Bhide !).—*Kanara*: Karwar (Talbot !); Halyal (Talbot 2381 !); Tinai Ghat (Gammie 15808).

*Distribution*: India, Ceylon.

9. *Eragrostis stenophylla*, Hochst. ex Miq. Anal. Bot. Ind. ii (1851), 27; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 385; Stapf in Hook. f. F.B.I. vii, 318 (*excl. aliq. syn.*); Trim. Fl. Ceyl. v, 294; Prain Beng. Pl. 1221; Cke. ii, 1026; Haines Bot. Bihar & Orissa (1924), 959.—*E. Brownei*, Nees in Wight Cat. (1833) No. 1780 (*partim*); *E. elegantula*, Nees l.c. 1781,  $\alpha$ ,  $\beta$  (*non* Steud.); Duthie Grass N.W. Ind. 37, Fodd. Grass. N. Ind. 63, t. 74.

*Description*: Cke. ii, 1026.

*Locality*: *Khandesh*: Tapti Island, near Bor, on sand and mud (Blatter & Hallberg 5470 !); Umalla, Tapti, on sand (Blatter & Hallberg 5180 !).—*Konkan*: Uran (Hallberg & McCann 5134 !); Malwan (Woodrow).—*Deccan*: Khandala (McCann 5319 !); Igatpuri (Blatter & Hallberg 5142 !); Pashan, near Poona (Gammie !); Purandhar (McCann 5601 !); Panchgani (Blatter & Hallberg B1316 !); Barkas, Mawal, Poona Dist. (Woodrow).—*S. M. Country*: Hirbudihal, on the margin of a tank (Sedgwick 2081 !).—*Kanara*: Halyal (Talbot 2165 !); Kulgi (Talbot !).

*Distribution*: India, Ceylon, tropical Asia and Africa.

10. *Eragrostis Eragrostis*, Blatter & McCann, *nov. comb.* (*non* Karst. *quae est E. minor*, Host.).—*Briza Eragrostis*, Linn. Sp. Pl. 70; Schreb. Besch. Gräs. ii, 74.—*Poa Eragrostis*, Cav. Ic. i (1791), 63, t. 92; Sibth. Fl. Graec. t. 73.—*Megastachya Eragrostis*, Beauv. Agrost. (1812), 74.—*Briza oblonga*, Moench Meth. (1802), 185.—*Eragrostis maior*, Host. Gram. Austr. iv (1809), 14, t. 24; Hook. f. F.B.I. vii, 320; Cke. ii, 1026; Haines Bot. Bihar & Orissa (1924), 959.—*E. flexuosa*, Steud. Syn. Gram. 266; Duthie Grass. N.W. India 37.—*E. megastachya*, Link Enum. Hort. Berol. i (1820), 187; Kunth Enum. Pl. i, 333; Reichb. Ic. Fl. Germ. t. 91; Aitchis. Cat. Panjab Pl. 169; Duthie Grass. N.W. Ind. 38, Fodd. Grass. N. Ind. 63, t. 75; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 382; Boiss. Fl. Or. v, 580.—*E. multiflora*, Aschers. ex Boiss. l.c.—*Poa multiflora*, Forsk. Fl. Aeg.-Arab. lxi, no. 58, civ, no. 69, p. 21.—*Eragrostis pœoides*, Trin. in Mem. Acad. Petersb. ser. vi, i (1831), 404.—*E. vulgaris* var. *megastachya*, Coss. et Dur. Fl. Alger. 148.—*Poa*

*cilianensis*, All. Fl. Pedem. ii, 246, t. 91, f. 2.—*P. flexuosa*, Roxb. Fl. Ind. i, 339.—*P. Roxburghiana*, Schult. Mant. ii, 315.—*P. tortuosa*, Spreng, Syst. Veg. i (1825), 345.

*Description*: Cke. ii, 1026.

*Locality*: *Sind*: Sanghar (Sabnis B897!, B753!); Mirpurkhas, on bank of dry watercourse (Sabnis B1024).—*Gujarat*: Kabilwad, Broach (Gammie!); Morvi, Kathiawar (Woodrow).—*Khandesh*: Chauseli, N. slope (McCann A14!); Nim, Tapti bank (Blatter & Hallberg 5109!); Umalla, Tapti sand (Blatter & Hallberg 5177!); Bor, Tapti sand (Blatter & Hallberg 5187!).—*Konkan*: Mahalaxmi, Clerk Road, along brackish water (Sabnis A13!).—*Deccan*: Kannala, Sholapur Dist. (Mamlatdar of Kannala!); Purandhar (McCann 5039!); Khandala, road (Blatter 5445!); Kirkee (Gammie 896!); Poona (Jacquemont 349, Woodrow), Agricultural College Farm (Ezekiel!).—*S. M. Country*: Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick 2834!); Badami (Woodrow).—*Kanara*: Halyal (Talbot 2159!).

*Distribution*: India, Ceylon, westwards to the Mediterranean, tropical and subtropical Asia.

11. *Eragrostis minor*, Host Gram. Austr. iv (1809), 15 (*in nota*), *et* in Fl. Austr. i (1827), 135; Stapf in Hook. f. F. B. I. vii, 321; Cke. ii, 1027; Haines Bot. Bihar & Orissa (1924), 960.—*E. poæformis*, Link Hort. Berol. i, 188; Reichb. Ic. Fl. Germ. t. 91.—*E. poæoides*, Beauv. Agrost. 76; Duthie Grass. N. W. Ind. 38, Fodd. Grass. N. Ind. 65; Aitchis. Cat. Panjab Pl. 170; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 387; Boiss. Fl. Or. v, 580.—*E. poæoides*  $\beta$ , Trin. in Mem. Acad. Petersb. ser. vi, i (1831), 404.—*Poa Eragrostis*, Linn. Sp. Pl. 68 (*partim*!); Kunth Enum. Pl. i, 332; Schreb. Besch. Graes. ii, t. 38; Host Gram. Austr. ii, 50, t. 69.—*Briza Eragrostis*, Vill. Fl. Delph. ii, 50 (*non* Linn.).

*Description*: Cke. ii, 1027.—Stapf l.c. considers the glands on the leaf-margins as 'a very constant character'. It would be better to say that the margins are usually glandular.

*Locality*: *Sind*: Jamesabad, in fields (Sabnis B1111!); Pad-Idan (Sabnis B510!); Larkana (Sabnis B476!); Sanghar (Sabnis B751!, B752!).—*Gujarat*: Godra (Woodrow); Panch Mahals (Woodrow—*Khandesh*: Umalla, Tapti sand (Blatter & Hallberg 5180!); Tapti Island near Bor, on sand and mud (Blatter & Hallberg 4449!, 5470!); Manmad, Redmond's garden (Blatter A12!); Tapti Bhusawal, N. E. (Hallberg 5112!).—*Konkan*: Parel (McCann 5376!); Bombay (Lambert).—*Deccan*: Tangawadi, Igatpuri (Blatter & Hallberg 5835!); Purandhar (McCann 5601!); Bhimthadi, Poona Dist. (Mamlatdar of Bhimthadi!); Man, Satara Dist. (Mamlatdar of Man!); Poona (Jacquemont 350), Chhattarshinji Hill (Ezekiel!); Nasik (Lisboa).—*S. M. Country*: Dharwar, 2,400 ft., rainfall 34 inches (Sedgwick & Bell 4487!); Gokak hills (Shevade!).

*Distribution*: India, Afghanistan, tropical Africa.

12. *Eragrostis tremula*, Hochst. in Schimp. Pl. Abyss. no. 6, in Flora (1842) I, Reibl. 134; Duthie Fodd. Grass. N. Ind. 65, t. 79; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 382; Boiss. Fl. Or. v, 581; Prain Beng. Pl. 1221; Stapf in Hook. f. F. B. I. vii, 320; Cke. ii, 1027; Haines Bot. Bihar & Orissa (1924), 960.—*Poa tremula*, Lamk. Ill. i, 185.—*Eragrostis multiflora*, Trin. in Mem. Acad. Petersb. ser. vi, i (1841), 401; Dalz. & Gibs. Bomb. Fl. 298; Duthie Grass. N. W. Ind. 38; Aitchis. Cat. Panjab. Pl. 169.—*Poa multiflora*, Roxb. Fl. Ind. i, 338 (*non* Forsk.).—*Eragrostis rhachitricha*, Hochst. ex Miq, Anal. Bot. Ind. pt. ii (1851), 25; Watt Dict. Econ. Prod. iii, 256.

*Description*: Cke. ii, 1027.

*Locality*: *Cutch*: Sumrasar (Blatter!).—*Gujarat*: Sevalia (Chibber!); Perim Island, Gulf of Cambay (Blatter!); Gogo, Kathiawar (Dalzell & Gibson, Woodrow).—*Deccan*: Lonavia (Lisboa).—*S. M. Country*: Londa, on a rock in the river bed (Bhide!); Gadag (Bhide!).

*Distribution*: India, Afghanistan, tropical Africa.

13. *Eragrostis tenuifolia*, Hochst. in Flora 24 (1841) i, Intelligenz. 20 (*nomen nudum*); Stapf in Hook. f. F. B. I. vii, 322; Cke. ii, 1027; Prain Beng. Pl. 1221.—*Poa tenuifolia*, A. Rich. Tent. Fl. Abyss. ii, 425.—*E. collocarpa*, K. Schum. in Engler's Pflanzenzw. Deutsch-Ost Afr. C. 114.—*E. parviglumis*, Hochst. ex Steud. Syn. Gram. 268.

*Description*: Cke. ii, 1027.

*Locality* : Deccan : Panchgani (Blatter & Hallberg B1313 !, B1317 !).—*S. M. Country* : Belgaum (Ritchie).—*Kanara* : Dandeli, 1,800 ft., rainfall 100 inches (Sedgwick & Bell 4206 !).

*Distribution* : W. Peninsula, tropical Africa.

14. *Eragrostis papposa*, Steud. Nom. ed. ii, i, 564 ; Stapf in Hook. f. F.B.I. vii, 322.—*Poa papposa*, Desf. in Roem. & Schult. Syst. ii, 585.—*P. nigra*. Clem. ex Willk. & Lange Prodr. Fl. Hisp. i, 83.—*Eragrostis atro-virens*, Lange in Koebe. Vedinsk. Meddel. (1860) (*non* Desf.).—*E. rigidifolia*, Hochst. Herb. Mem. Div. Forsk. (*nomen*).—*E. speirostachya*, Coss. et Dur. ex Lange l.c.—*E. vulgaris*, var. *speirostachya*, Coss. et Dur. Fl. Alger. 148.—*E. verticillata*, Coss. ex Lange l.c. (*non* Cav.).

*Description* : An elegant perennial. Stems 30-50 cm. high, very slender, simple. Leaves short, strict, very narrow, convolute ; mouth of sheath bearded with long silky hairs. Panicle 10-20 cm. long, ovoid, very delicate, lax, open, sparingly branched ; rachis filiform, glabrous ; branches solitary, alternate, rarely binate, spreading, almost capillary, naked below, loosely branched beyond the middle with capillary, spreading, stiff branchlets ; pedicels long, capillary. Spikelets 4-8 mm. long, linear, 7-23-flowered, very pale yellow or dark or pale olive-grey ; rachilla tough. Involucral glumes subequal or lower shorter, hyaline ; lower involucral glume 1 mm. long, usually less, nerveless, upper slightly longer, faintly 1-nerved. Flowering glumes broadly ovate, margins above hyaline, about 1.5 mm. long ; pale rather shorter, obtuse, denticulate, persistent, keels scabrid. Stamens 3, anthers  $\frac{1}{2}$  mm. long. Grain obovoid, about  $\frac{1}{2}$  mm. long, dorsally grooved.

*Locality* : Sind (ex Agharkar).

*Distribution* : Punjab ; Trans-Indus districts, westward to Arabia, N. Africa, Spain.

15. *Eragrostis pilosa*, Beauv. Agrost. (1812), 71 ; Reichb. Ic. Fl. Germ. t. 91 ; Duthie Grass. N. W. Ind. 38, Fodd. Grass. N. Ind. 64 ; Aitchis. Cat. Panjab Pl. 170 ; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 381 ; Boiss. Fl. Or. v, 581 ; Stapf in Hook. f. F.B.I. vii, 323 ; Cke. ii, 1028 ; Haines Bot. Bihar & Orissa (1924), 960.—*Poa pilosa*, Linn. Sp. Pl. 68 ; Host Gram. Austr. ii, 168, t. 68.—*Eragrostis indica*, Steud. Syn. Gram. 264.—*E. parviflora*, Trin. in Mem. Acad. Petersb. ser. vi, i (1831), 411.—*E. pellucida*, Steud. l.c. 279.—*E. punctata*, Link ex Steud. Nom. ed. ii, i, 561, Syn. Gram. 264.—*E. verticillata*, Roem. & Schult. Syst. ii, 575 ; Reichb. Ic. Fl. Germ. t. 9 ; Aitchis. Cat. Panjab Pl. 170.—*Poa indica*, Koen. ex Rottl. in Ges. Naturf. Fr. Berl. Neue Schrift iv (1803), 194.—*P. parviflora* et *pellucida*, R. Br. Prodr. 180.—*P. punctata*, Linn. f. Suppl. 109 ; Kunth Enum. Pl. i, 330 ; Roxb. Fl. Ind. i, 338.—*P. verticillata*, Cav. Ic. i, 63, t. 93 ; Kunth Enum. Pl. 329.

*Description* : Cke. ii, 1028.

*Locality* : Sind : Sanghar (Sabnis B902 !).—*Konkan* : Byculla, common in Bombay Isl. (McCann A8 !); Karjat (Halberg 3602 !); Kalyan (Garade !).—*Deccan* : Lina Hill, Nasik Dist. (Blatter & Hallberg 9975 !); Khandala (McCann A7 !); Nasik (Lisboa); Deolali (Blatter & Hallberg 4559 !); Igatpuri (McCann 4590 !); Gangapur (Blatter & Hallberg 4578 !); Waghote, Mawal, Poona Dist. (Woodrow); Poona (Cooke), Chhattarshinji (Ezekiel !); Ganeshkhind Botanic Gardens (Supt. of the Gardens !); Bairawadi, Purandhar (McCann 5068 !).—*S. M. Country* : Dharwar (Sedgwick 2672 !, Woodrow).

*Distribution* : Most warm countries.

16. *Eragrostis bifaria*, Wight ex Steud. Nom. ed. 2, i (1840), 562, Syn. Gram. 264, Suppl. 282 ; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 387 ; Stapf in Hook. f. F.B.I. vii, 325 ; Cke. ii, 1029.—*Poa bifaria*, Vahl Symb. ii. 19 ; Roxb. Fl. Ind. i, 331 ; Kunth Rev. Gram. i, 334, t. 80, Enum. Pl. i, 327, Suppl. 282.

*Description* : Cke. ii, 1029.

*Locality* : *Konkan* : Bassein (Chibber !); Matheran (Gammie 16649 !); Parsik, hill (Ryan 1147 !); Wada range, Thana Dist. (Ryan 687 !).—*Deccan* : Sinhad, forests (Bhide !); Kirkee (Garade 479 !); Chhattarshinji Hill, Poona (Ezekiel !); Khandala (Woodrow).—*S. M. Country* : between Yelviggi and Savanur, dry hill side, 1,800 ft. (Sedgwick 2019 !); Hubli, dry hill sides, 2,000 ft.,

rainfall 28 inches (Sedgwick & Bell 4915 !); Badami (Talbot 2927 !); Haveri (Talbot 2179 !); Belgaum (Ritchie).

*Distribution* : W. Peninsula, tropical Africa.

17. *Eragrostis brachyphylla*, Stapf in Hook. f. F.B.I. vii, 327; Haines Bot. Bihar & Orissa (1924), 961.

*Description* : Perennial. Stem erect, slender, 25-45 cm. high, from a tuft of old fibrous leaf-sheaths. Leaves nearly all radical, 5-10 cm. long, 2.5 mm. broad, coriaceous, linear, flat or conduplicate, obtuse or subacute, glabrous above. Spikes 7-20 cm. long, slender. Spikelets 6-18 mm. long, close-set, linear or linear-oblong, secund, 2-seriate, slightly compressed, olive-green, about 20-flowered, lenticular in section. Glumes closely imbricate, involucrel ones subequal, up to 2 mm. long, lower one acute, acutely keeled, upper obtuse, dorsally rounded. Flowering glumes up to 2.5 mm. long, rather turgidly broadly ovate (when unfolded) with rounded tip or obtuse, lateral nerves very weak, midrib microscopically scabrid. Pale as large, somewhat obovate, concave towards rhachilla, keels scabrid, narrow. Grain very small, shortly ellipsoid, obscurely trigonous, epicarp coarsely reticulate.

*Locality* : *Gujarat* : Sevalia (Chibber !).—*S. M. Country* : Badami Fort (Bhide !).

*Distribution* : Bihar, Central Provinces, W. Peninsula.

## 82. HALOPYRUM, Stapf; Cke. ii, 1029.

Species 1.—Coasts of India and Ceylon, Arabia, tropical Africa.

1. *Halopyrum mucronatum*, Stapf in Hook. Ic. Pl. t. 2448; Hook. f. in F.B.I. vii, 328; Trim. Fl. Ceyl. v, 299; Cke. ii, 1029.—*Brizopyrum mucronatum*, Nees in Wall. Cat. no. 8898.—*Desmazeria unioloides*, Defl. Voy. Yemen 220.—*Eragrostis mucronata*, Trim. Cat. Ceyl. Pl. 109 (*non* Roem. & Schult.).—*Triticum repens*, Thw. Enum. Pl. Zeyl. 376.—*Aeluropus*, Aitchis. Cat. Panj. Pl. 169.—*Eragrostis* sp. *Sect. Sclerostachya*, Benth. in Gen. Pl. iii, 1187.

*Description* : Cke. ii, 1029.

*Locality* : *Sind* : Clifton, near Karachi (Sabnis B796 !); Manora Island, Karachi Harbour (Sabnis B832 !).—*Gujarat* : Porbandar (Bhide ! Bhiva).

## 83. DIPLACHNE, P. Beauv.; Cke. ii, 1030.

Species about 20.—Warm regions.—Only 1 species in the Presidency.

1. *Diplachne fusca*, Beauv. Agrost. (1812), 163; Boiss. Fl. Or. v, 561; Hook. f. F.B.I. vii, 329; Trim. Fl. Ceyl. v, 299; Cke. ii, 1030; Haines Bot. Bihar & Orissa (1924), 962.—*Festuca fusca*, Linn. Sp. Pl. 109; Del. Fl. d'Egypt. 24, t. xi, f. 1.—*Urolepis fusca*, Steud. Syn. Gram. 247.—*Diplachne indica*, Spreng. Syst. i, 351.—*Tridens indicus*, Nees in Wight Cat. No. 1794.—*Festuca indica*, Retz. Ots. iv, 21; Kunth Enum. 412.—*Eragrostis procera*, Steud. l.c. 266.—*Poa procera*, Roxb. Fl. Ind. i, 322.—*Urolepis Drummondii*, Steud. l.c.—*Triodia ambigua*, R. Br. Prodr. 183.—*Bromus polystachios*, Forsk. Fl. Aeg.—Arab. 23.

*Description* : Cke. ii, 1030.

*Locality* : *Sind* : Tatta, Kullian Kote Lake (Blatter & McCann D639 !).—*Konkan* : Parsik, side of railway line (McCann A24 !); Bassein (Bhide !); Sion (McCann 5238 !); Ailibag, rice fields near salt marshes (Ezekiel !); Lower Parel (Blatter 4283 !); Antop Hill (McCann 3614 !); Mahim to Matunga (McCann 5139 !); Matunga, near Bombay, in rice fields (Woodrow 10).—*Kanara* : Near Karwar, maritime marsh (Sedgwick & Bell 5095 !).

*Distribution* : Upper Gangetic Plain, Bengal, Orissa, W. Peninsula, Ceylon, Egypt, tropical Asia, Africa, and Australia.

## 84. LEPTOCHLOA, P. Beauv.

Annual grasses. Leaves flat or involute. Spikelets very minute, compressed, 1-many-flowered, sessile or shortly pedicelled, alternate and unilaterally 2-seriate on the very slender spiciform branches of a lax panicle, sessile or minutely pedicelled, not jointed at the base; rhachilla jointed at the base and beneath each glume, produced between each glume and often beyond the terminal. Glumes usually 2 (sometimes 1)-many-flowering, membranous.

Involucral glumes subequal or unequal, oblong, lanceolate, or almost linear-lanceolate, 1-nerved; lower and other flowering glumes ovate when unfolded, subacute or obtuse, 3-nerved, 1 nerve in the keel and usually 1 near each margin, nerves usually hairy; pale shorter, 2-nerved. Lodicules 2, cuneate, Anthers 3, short. Styles free. Grain subglobose, oblong, obovoid or 3-gonous closely invested by the glume or pale.

Species probably 20, in the warmer regions.

This genus is not represented in Cooke's Flora.

Key :

1. Spikes 1-7.5, rarely 10 cm. long, Spikelets 2-3-flowered, under 2.5 mm. long ... 1. *L. filiformis*.
2. Spikes 5-10 cm. long. Spikeletes 4-6-flowered, 2.5 mm. long ... 2. *L. chinensis*.

1. *Leptochloa filiformis*, Roem. & Schult. Syst. ii, 580; Kunth Enum. Pl. i, 270, Suppl. 220; Steud. Syn. Gram. 209; Duthie Grass. N. W. Ind. 192; Aitchis. Cat. Panj. Pl. 167; Hook. f. F.B.I. vii, 298; Haines Bot. Bihar & Orissa (1924), 972.—*Eragrostis chinensis*, Duthie Fodd. Grass. N. Ind. 59, t. 71.—*Aira filiformis*, Roxb. Fl. Ind. i, 326.—*Poa malabarica*, Klein ex Steud. Nom. ed. ii, 303, 60.—*P. contracta et panicea*, Retz. Obs. iii, 11.—*P. virgata*, Roth Nov. Sp. 66.

*Description*: A very slender grass, 30-70 cm. high. Stems tufted and geniculate ascending. Leaves flat, flaccid, 10-25 cm. long, finely acuminate, sometimes sparsely hairy on the nerves and on the sheaths; ligule short, erose or setosely lacerate. Panicle 10-20 cm. long, contracted or diffuse. Spikes 1-7.5 or up to 10 or even 12.5 cm. long, exceedingly filiform with 2-nerved rhachis. Spikelets about 1 mm. long, 2-3-flowered, distant nearly their own length on the rhachis on very short pedicels. Involucral glumes linear-or oblong-lanceolate. Flowering glumes 2-3, broadly ovate, rather shorter than the upper involucral glume, with median nerve and sub-marginal nerves microscopically hairy; pale rather shorter, reduplicate. Grain fusiform-oblong, pericarp adherent, but slightly produced each end.

*Locality*: *Gujarat*: Surat, near Athwa Farm (Bhide!); Ahmedabad in garden (Sedgwick!).—*Konkan*: Parel, Bombay Island (Talbot!); Victoria Gardens, Bombay Island (McCann 5351!, 5568!); Byculla, Bombay Island (McCann A40!).

*Distribution*: Throughout India and Burma, Ceylon, tropical Asia, Africa and America.

2. *Leptochloa chinensis*, Nees in Syll. Ratisb. i (1824), 4, Agrost. Bras. 432; Benth. Fl. Hongk. 430, Fl. Austral. vii, 617; Duthie Grass. N. W. Ind. 35 (*excl. syn.*), Fodd. Grass. N. Ind. 59, t. 71; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893), 372 (*excl. syn. tenerrima*); Hook. f. F.B.I. vii, 299; Haines Bot. Bihar & Orissa (1924), 972.—*Poa chinensis*, Linn. Sp. Pl. 69 (*excl. syn. Burm.*); Roxb. Fl. Ind. i, 332.—*P. malabarica*, Retz. Obs. v, 19.—*P. asthenes*, Roem. & Schult. Syst. ii, 574.—*P. decipiens*, R. Br. Prodr. 181.

*Description*: Stem tall, stout, 60-120 cm. high, erect or geniculate ascending. Leaves 15-45 cm. long, flat or convolute, scaberulous; sheaths loose; ligule short, lacerate. Panicle 15-25 cm. long. Branches numerous, slender, simple, opposite or alternate, suberect or spreading, 5-10 cm. long. Spikelets 4-6-flowered, about 2.5 mm. long, alternate, short-pedicelled, distant or approximated, narrow. Involucral glumes somewhat unequal, lanceolate, acute or subulate. Flowering glumes broader, lower apiculate with pilose nerves; nerves of pale pilose. Grain loose, obtusely trigonous, subrugose.

*Locality*: *Gujarat*: (ex Lisboa).—*Konkan*: Parel, Bombay Island (ex Lisboa).—*S. M. Country*: Kilgerry Tank (Talbot!).

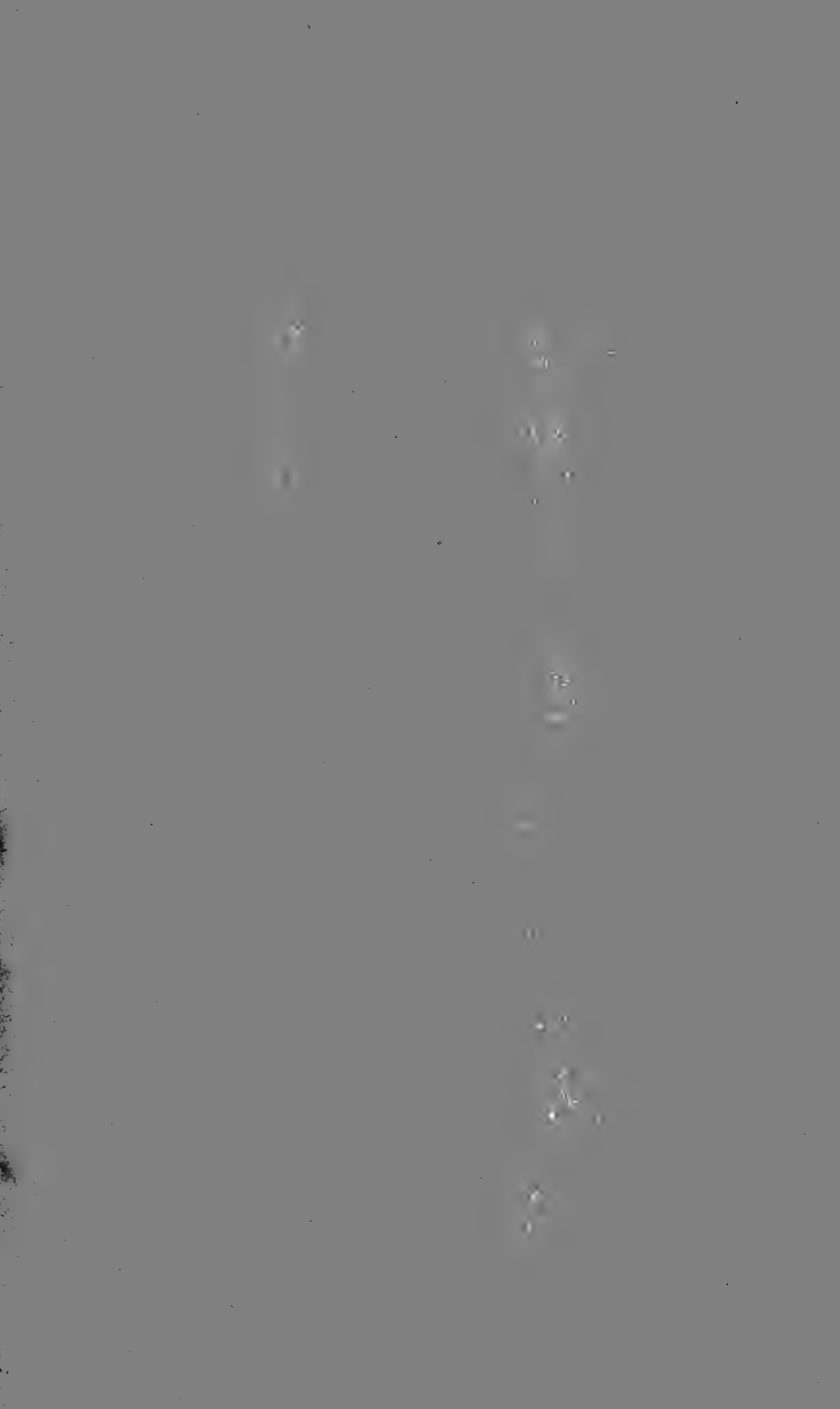
*Distribution*: Throughout India and Burma, Ceylon, Malaya, China, Japan, Australia.

*Note*: Haines thinks that the two species are scarcely more than varieties. We can't say how far this view is correct as we have seen only a few specimens.

(To be continued)









REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY. Part X.  
By Rev. E. Blatter, S.J., Ph.D., F.L.S.

*Chlorocarpus*

1927  
to Bombay

VI



REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., PH.D., F.L.S.

PART X

GRAMINEÆ

BY

E. BLATTER and C. McCANN

(Continued from page 496 of this Volume)

TRIBE XII. CHLORIDEÆ

85. OROPETIUM, Trin.; Cke. ii, 1045.

Species 6.—India, Ceylon, Algeria, S. Africa.

1. *Oropetium Thomæum*, Trin. Fund. Agrost. (1820), 98, t. 3; Kunth Enum. Pl. i, 464; Suppl. 375; Miq. Fl. Ind. Bat. iii, 403; Duthie Grass. N. W. Ind. 45, Fodd. Grass. N. Ind. 69; Hook. f. F. B. I. vii, 366; Cke. ii, 1046; Haines Bot. Bihar & Orissa 964.—*Nardus Thomæa*, Linn. f. Suppl. 105; Sm. in Trans. Linn. Soc. i, 116.—*Rotibellia Thomæa*, Koenig in Naturf. xxiii (1788), 210; Willd. Sp. Pl. i, 464; Roxb. Pl. Corom. ii, 17, t. 133, Fl. Ind. i, 357; Dalz. & Gibs. Bomb. Fl. 300.—*R. pilosa*, Willd. l. c. 465.

*Description*: Cke. ii, 1045.

*Locality*: Konkan: Trombay, on rocks (McCann A32!); Antop Hill (McCann 3611!, 2449!).—Deccan: Gungapur (Blatter A33!, 584!); Poona (Woodrow); Junnar near Poona (Woodrow).—S. M. Country: Dharwar Dist., dry uplands, 2,400 ft., rainfall 34 inches (Sedgwick 2656!); Badami, Fort (Bhide!, Talbot 2923!); Ranibennur (Chibber!).

*Distribution*: Throughout the plains of India, Ceylon.

86. MICROCHLOA, R. Br.; Cke. ii, 1031.

Species 7. One distributed throughout the tropics, 3 in Africa, 3 in Australia.

1. *Microchloa setacea*, R. Br. Prodr. (1810), 298; H. B. and K. Nov. Gen. & Sp. i, 84, t. 22; Beauv. Agrost. 115, t. 20, f. 8; Nees Agrost. Bras. 441; Fl. Afr. Austr. 247; Kunth Enum. Pl. i, 258; Doell in Mart. Fl. Bras. ii, iii, 76, t. 21; Steud. Syn. Gram. 202; Benth. Fl. Hongk. 428; Fl. Austral. vii, 608; Hook. f. in F. B. I. vii, 283; Cke. ii, 1031; Prain Beng. Pl. 1226; Haines Bot. Bihar & Orissa (1924), 964.—*Rotibellia setacea*, Roxb. Fl. Ind. i (1832), 357, Corom. Pl. ii, 18, t. 132.—*Nardus indica*, Linn. f. Suppl. 105.

*Description*: Cke. ii, 1031.

*Locality*: S. M. Country: Dharwar (Woodrow), on dry hill sides, 2,400 ft., rainfall 34 inches (Sedgwick 2908!); Dumbal (Talbot 2949!).—Kanara: Halyal (Talbot 2387!).—Usually growing on old walls.

*Distribution*: Tropics of the Old and New World.

87. CYNODON, Rich; Pers. Syn. Pl. i (1805), 85; Cke. ii, 1032.

Hitchcock (U. S. Dept. Agric. Bull. No. 792 (1920), 178) considers *Panicum dactylon*, Linn. as the type species. He justifies the change of *Cynodon* into *Capriola* in these words: " *Capriola* Adans., Fam. Pl. 2; 31, 532, 1763. The genera are indicated and distinguished by Adanson in a much abbreviated and often unsatisfactory manner. The tabular arrangement of the genera of *Phalarides*, his first section of the grass family or *Gramina*, includes *Capriola*

with the following diagnosis, interpreting the table: Summit of leaf sheath hairy; flowers in digitate spikes; glumes laterally compressed, lemma awnless. In the index there is given as a synonym under *Capriola*, '*Gramen dactylon* Offic.' The last phrase appears in the first edition of the *Species Plantarum*<sup>1</sup> in the synonymy under *Panicum dactylon* as '*Gramen dactylon, radice repente s. officinarum*, Scheuch. gram. 104,' thus connecting *Capriola* Adans. with *Panicum dactylon*.

"*Cynodon* Rich.; Pers. Syn. 1: 85, 1805. Only one species described, *C. dactylon*, based on *Panicum dactylon* L."

In spite of this we have to retain *Cynodon*. Mr. Hubbard of the Kew Herbarium informs us that *Cynodon* is on the list of *nomina conservanda* and according to International Rules must be used, although it is antedated by *Capriola*, Adans. (1763).

Species 3.—India, of which one is cosmopolitan.—Only one in the Bombay Presidency.

1. *Cynodon dactylon*, Pers. Syn. i (1805), 85; Cke. ii, 1032.—*Capriola dactylon*. O. Ktze. pt. ii (1891), 764.—For synonyms see Hook. f in F. B. I. vii, 288.

*Description*: Cke. ii, 1032.

*Locality*: *Sind*: Sita Road (Sabnis B361!); Jamesabad, fields (Sabnis B907!, B1108!); Sanghar (Sabnis B896!); near Phuleli Canal, cultivated fields (Sabnis B135!); Mirva Canal, sandy banks (Sabnis B265!); Sehwan to Laki, foot of hills (Sabnis B300!); Mirpurkhas, fallow fields (Sabnis B1190!); Gizri, near Karachi (Sabnis B783!); Larkana (Sabnis B458!, B477!); Baghar (Blatter & McCann D690!).—*Gujarat*: Junagad, Kathiawar (Blatter 3785!); Cutch (Blatter 8553!); Dakore (Chibber!).—*Khandesh*: Anka Hill (Blatter!); Bor, Bori River (Blatter & Hallberg 5482!).—*Konkan*: Very common in Bombay and Salsette Islands (McCann!); Parsik, railway line (McCann A181!); Vihar Lake (McCann 182!).—*Deccan*: Igatpuri (Blatter & Hallberg 5486!, McCann!); Devlali (Blatter & Hallberg 4570!); Khandala, very common (McCann 5433!, 5301!); Purandhar, N. foot and top (McCann 5042!, 5604! bis); Wai (Mamlatdar of Wai!); Panchgani (Blatter & Hallberg B1264!, B1270!, B1329!).—*S. M. Country*: Devarayi forests, 1,800 ft. (Sedgwick & Bell 4102!); Dharwar (Sedgwick!); Haveri (Talbot!).—*Kanara*: (McCann!).

*Distribution*: Cosmopolitan.

#### 88. GRACILEA, Koen.; Cke. ii, 1030.

Species 2.—India and Africa.

1. *Gracilea Royleana*, Hook. f. in F. B. I. vii (1896), 284; Prain Beng. Pl. 1226; Cke. ii, 1031; Haines Bot. Bihar & Orissa (1924), 965.—*Melanocentris Royleana*, Nees in Proc. Linn. Soc. i (1841), 95 (*nomen tantum*); Aitchis. Cat. Panjab Pl. 168 (*excl. syn.*); Duthie Grass. N. W. Ind. 33, Fodd. Grass. N. Ind. 54, t. 67; Lisboa in Journ. Bomb. Nat. Hist. Soc. viii (1893), 370.—*M. Jacquemontii*, Jaub. & Sp. III. Pl. Or. iv (1850-53), 36, t. 325.—*Pommereulla Royleana*, Steud. Nom. ed. ii, ii, 379.

*Description*: Cke. ii, 1031.

*Locality*: *Gujarat*: Daman (Bhide!); Bhuj Hill, Cutch (Blatter 3764!).—*Khandesh*: Toranmal, rocks (McCann A54!); Amalner, Bori River (Blatter and Hallberg 4451!); Tapti, Bhusawal (Blatter and Hallberg 5453!); To Naradana (Blatter and Hallberg 5212!).—*Konkan*: Bandra (Ryan 1432!); Parsik (Ryan 1215!); Trombay (McCann A52!); Worli Hill, common along sea shore (McCann 5516!); Antop Hill (McCann 3612!).—*Deccan*: Panchgani (Blatter & Hallberg B1278!); Katraj (Bhide!); Sinhad forest (Bhide!); Near Poona (Jacquemont 383); Poona (Woodrow!); Pashan, near Poona (Gammie!); Chattarshinji Hill, Poona (Ezekiel!); Kirkee (Gammie!); Khandala to Campoli (McCann A57!); Deolali (Blatter A53!, 4545!).—*S. M. Country*: Dharwar Dist., 2,000 ft., rainfall 35 inches (Sedgwick 2278!); Yelvigi, dry hill sides, 1,800 ft., rainfall 28 inches (Sedgwick & Bell 4902!); Dharwar (Talbot 2008!); Belgaum (Stocks, Ritchie 831).—*Kanara*: Yellapore (Talbot!); Karwar (McCann!).

*Distribution*: Bihar, Rajputana, W. Peninsula, Socotra, Nubia.

<sup>1</sup> L. Sp. Pl. 58, 1753.

**Var. plumosa**, Hook. f. in F. B. I. vii (1896), 284; Cke. ii, 1031.—*Melanocentris plumosa*, Jaub. & Sp. l. c. 37; Hochst. in Flora (1855), 273, 417.—*Penisetum plumosum*, Hochst. ex Steud. Syn. Gram. 201.—*Ptilonema plumosum*, Steud. l.c.—*Eutriana abyssinica*, R. Br. ex Fresen. in Mus. Senkenb. ii, (1837), 142.

*Description* : Clusters of spikelets larger, 1·2 cm. long including the awns.

*Locality* : Jemadar ka Landa near Karachi (Stocks 646).

89. ENTEROPOGON, Nees ; Hook. f. in F.B.I. vii, 284.

Tall, slender, perennial grasses. Leaves long, very narrow. Spikelets very narrow, 1-2-flowered (lower flower perfect, upper if present male or neuter) unilateral in a solitary terminal slender spike, not jointed at the base; rhachilla jointed at the base. Glumes 3 or 4. Lower involucre glumes unequal, narrow, hyaline, 1-nerved, persistent; lower floral glume much larger, linear, rigid, scabrid, dorsally rounded, 3-nerved, tip entire, or acutely bifid with a short erect awn in the cleft; callus bearded. Pale lanceolate, 2-toothed, keels scabrid. Lodicules 2. Anthers very long. Styles distinct. Grain narrow, free within the hardened glumes.

Species 3.—India, Africa.

1. *Enteropogon badamicum*, Bhide in Journ. & Proc. As. Soc. Beng. new series, vii (1911), 517.

*Description* : Stem 60-75 cm., slender, erect, glabrous. Leaves narrow, 10-18 cm. by 3-6 mm., tapering to a fine acumination, glabrous; sheath glabrous, finely long-ciliate at the mouth and sides; ligule a short membrane with a fine fringe of hairs. Spike solitary, terminal, 15 cm. long. Spikelets 2-seriate and second on a flattened, trigonous, slightly scabrid rhachis, subsessile or very shortly pedicelled. Involucral glumes persistent, empty, scarios, 1-nerved, glabrous or very minutely puberulous, the lower less than half of the upper, more or less unequal-sided and sometimes slightly lobed on one side, ovate, subacute and erose at the apex; upper shortly unequally 2-dentate at the apex with a short mucro between. Lower floral glume slightly longer than upper involucre, 2-dentate at the apex, 3-nerved with a dorsal stiff awn about as long as the glume, scabrid at the back and sides, ventrally grooved, the groove corresponding with the dorsal ridge which is continuous with the awn. Callus bearded with short white silky hairs. Pale a little longer than the glume, scabrid at the back and on the keels, 2-nerved, apex slightly bifid and erose, with a bisexual flower. Grain oblong, flattened, as long as the pale. Upper floral glume like lower, but smaller and also bisexual; rhachilla produced beyond the upper floral glume and bearing a sterile awned glume which is much smaller than the upper floral glume.

*Locality* : S. M. Country : Badami (Bhide ! Talbot 2924 !).

*Distribution* : So far endemic.

90. CHLORIS, Swartz Prod. Veg. Ind. Occ. (1788), 25;  
(Cke. ii, 1033).

Species about 75.—Tropical and subtropical regions of the Old and New World.

Cooke has 4 species. We add 5 more: *C. pallida*, *C. quinquesetica*, *C. virgata*, *C. montana* and *C. gayana*.

- |  |                           |
|--|---------------------------|
| A. Rhachilla not at all produced beyond the lower flowering glume ... ..               | 1. <i>C. pallida</i> .    |
| B. Rhachilla produced beyond the lower flowering glume                                 |                           |
| I. Rhachilla produced beyond the flowering glume and bearing 1 awn ... ..              | 2. <i>C. incompleta</i> . |
| II. Rhachilla produced beyond the flowering glume and bearing 1-4 reduced empty glumes |                           |
| 1. Spikes 1-3. Lower flowering glume broadly cuneiform ... ..                          | 3. <i>C. tenella</i>      |
| 2. Spikes 1-3. Lower flowering glume ovoid, hirsute all over ... ..                    | 4. <i>C. villosa</i> .    |

3. Spikes 2-10. Lower flowering glume bearded at the base and on the margins above the middle
- a. Rhachilla bearing 1-2-awned, tubular or inflated glumes
- \* Upper involucre glume awned. 5. *C. virgata*.
- \*\* Upper involucre glume awnless ... 6. *C. barbata*.
- b. Rhachilla bearing 3-4 empty glumes. Spikelets 4-awned altogether ... 7. *C. montana*.
4. Spikes 5-18
- a. Spikes 2.5-5 cm. long ... 8. *C. quinquesetica*.
- b. Spikes 6-10 cm. long ... 9. *C. gayana*.

1. *Chloris pallida*, Hook. f. in F.B.I., vii, 289; Haines Bot. Bihar & Orissa (1924), 967.—*Schoenfeldia pallida*, Edgew. in Journ. As. Soc. Beng. xxi (1852) 161, 183; Aitchis. Cat. Panjab Pl. 166; Duthie Grass. N. W. Ind. 32, Fodd. Grass. N. Ind. 52, t. 64.—*S. gracilis*, Kunth. Rev. Gram. i, 283, t. 53; Enum. Pl. i, 258; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 365.

*Description*: A slender tufted annual, 25-45 cm. high; stems simple or branched, almost filiform. Leaves 10-20 cm. long, linear, very narrow, flaccid, tips capillary, sparsely hairy inside towards the base; ligule of a few hairs. Spikes 1-3, erect, digitate, golden-yellow, 7-13 cm. long, up to 5 mm. broad, closely pectinate with the two rows of erect-patent long-awned spikelets. Spikelets narrow, tapering, about 2 mm. long without the awns subsessile. Involucral glumes ovate-lanceolate, subaristately acuminate, 1-nerved, keels ciliate, lower  $\frac{1}{2}$  shorter than the upper. Lower floral glume rather longer than the lower involucre, sessile, ovate, 1-nerved, hairy, base bearded, tip minutely notched, awn 15-25 mm. long, capillary, curved. Pale narrow, keels ciliate, tip 2-dentate. Grain linear, very slender, acute, pericarp loose. Rhachilla not produced beyond the lower floral glume. No rudimentary upper floral glume.

*Locality*: *Gujarat*: Sevalia (Chibber!); Lasundra (Chibber!); Khara-goda, dry salt ground (G.C.H. 537!).—*Deccan*: Lonavla (Gammie!); Charodi (Gammie 16531!).

*Distribution*: Bundelkhand, Bihar, Central India, W. Peninsula.

2. *Chloris incompleta*, Roth. Nov. Pl. Sp. (1821), 60; Steud. Syn. Gram. 207; Hook. f. in F.B.I. vii, 290; Cke. ii, 1034; Achariyar South Ind. Grass. (1921); 253; Haines Bot. Bihar & Orissa (1924), 968.—*Chloris digitata*, Steud. l. c.; Duthie Grass N. W. Ind. 23; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 369 (*excl. syn.*).—*C. radiata*, Heyne ex Roth l. c. 61.—*C. Roxburghii*, Edgew. in Journ. As. Soc. Beng. xxi (1853), 160, 183; Duthie Fodd. Grass. N. Ind. 54, t. 65; Lisboa l. c. 368.—*C. tetrameris*, Trin. Gram. Unif. 235; Steud. l. c. 206.—*Digitaria elongata*, Spreng. Syst. i, 271.—*Gymnopogon digitatus*, Nees in Wight Cat. No. 1753 (*ex Hook. f.*); Steud. Nom. Ed. ii, i, 713.—*Melica digitata*, Roxb. Fl. Ind. i, 326; Kunth Enum. Pl. t, 37.—*Clenium digitatum*, Spreng. Syst. i, 274.—*Cynodon elongatus*, Trin. in Spreng. N. Entdeck. ii, 64.

*Description*: Cke. ii, 1034.

*Locality*: *Gujarat*: Bulsar, in the shade of trees (Sedgwick 1114!).—*Kan-desh*: To Toranmal, in a stony watercourse (McCann 9773! 9774!).—*Konkan*: Thana (Lisboa).—*Deccan*: Nasik (Lisboa).—*S. M. Country*. Deciduous forests W. of Dharwar, 2,000 ft., rainfall 40 inches (Sedgwick & Bell 4499!).—*Kanara*: N. Kanara (Woodrow); Goond (Talbot 2203!); Halyal (Talbot 2382!, 2220!).

*Distribution*: Throughout the plains of India, Ceylon, China, Afghanistan.

3. *Chloris tenella*, Roxb. Fl. Ind. i (1832), 329; Kunth Enum. Pl. i, 267; Spreng. Neue Entdeck. iii, 126; Steud. Syn. Gram. 204; Dalz. & Gibs. Bomb. Fl. 296; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 368; Hook. f. in F. B. I. vii, 291; Cke. ii, 1033; Achariyar, South Ind. Grass. (1921), 259.—*C. triangulata*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 409; Steud l. c. 203; Duthie Grass. N. W. Ind. 33. *Clenium indicum*, Spreng



Syst. i, 274.—*Tetrapogon triangularis*, Hochst. Pl. Arab. Schweinf. No. 967 (ex Hook. f.).

*Description*: Cke. ii, 1033.

*Locality*: *Sind*: Jemadar ka Landa near Karachi (Stocks).—*Gujarat*: Surat, on the city walls (Dalzell).—*Khandesh*: W. Khandesh (Blatter!).—*Deccan*: Bijapur (Woodrow).—*S. M. Country*: Badami Fort (Bhide!).

*Distribution*: Rajputana, W. Peninsula, S. India, Arabia, Abyssinia.

4. *Chloris villosa*. Pers. Syn. i (1805), 87; Kunth Enum. Pl. i, 267, Suppl. 217, t. 16, f. 3; Jaub. & Sp. III. Pl. Or. iv, 40, t. 327; Coss. & Dur. Fl. Alger. 87; Aitchis. Cat. Panjab Pl. 167; Hook. f. in F. B. I. vii, 291; Cke. ii, 1034.—*Chloris tetrapogon*, Beauv. Agrost. (1812), 158.—*Tetrapogon villosus*, Desf. Fl. Atlant. ii, 388, t. 255; Trin. Fund. Agrost. 760; Boiss. Fl. Or. v, 555; Duthie Grass. N.W. Ind. 33, Fodd. Grass. N. Ind. 55, t. 68.

*Description*: Cke. ii, 1034.

*Locality*: *Sind*: Gharo (Blatter & McCann D655!).—*Gujarat*: Ahmedabad (Sedgwick!).—*S. M. Country*: Sluavar, on dry bunds, 2,000 ft., rainfall 35 inches (Sedgwick 3095!); Yelvigi, 2,000 ft., rainfall 30 inches (Sedgwick 1923!).

*Distribution*: Punjab, Rajputana, W. Peninsula, westwards to the Canaries.

5. *Chloris virgata*. Sw. Fl. Ind. Occ. i (1797), 203; Trin. Gram. Unif. 136; Doell. in Mart. Fl. Bras. ii, iii; Hook. f. in F. B. I. vii, 291; Achariyar South Ind. Grass. (1921), 260; Haines Bot. Bihar & Orissa (1924), 968;—*Rabdochloa virgata*, Beauv. Agrost. 84.—*Chloris compressa*, DC. Cat. Hort. Monsp. (1813), 94; Nees Agrost. Bras. 421, Fl. Afr. Austr. 240; Steud. Syn. Gram. 204.—*C. caudata*, Trin. ex Bunge Enum. Pl. Chin. Bor. 70.—*C. cryptostachys*, Steud. in Schmidt Fl. Cap. Virid. 148.—*C. decora*, Nees in Herb. Royle; Steud. l. c. 205.—*C. elegans*, Kunth Enum. Pl. i, 264.—*C. meccana*, Hochst. & Steud. ex Schult. Ind. Sem. Hort. Hal. (1843) 7; Steud. l. c.; Boiss. Fl. Orient. v, 544; Duthie Grass. N.W. Ind. 33.—*C. montana*, Griseb. in Goett. Nachr. (1868), 84, Abhandl. 300; Duthie l. c. (*non* Roxb.).—*C. pallida*, Link Hort. Berol. i, 56, ii, 223.—*C. penicillata*, Hort. ex Nees l. c. (*non* Poir.)—*C. polydactyla*, Durand Diss. Chlorid. (1808), 14, 22; Jacq. Eclog. Gram. 12, t. 9 (*non* Sw.).—*C. tetrastachys*, Hack. mss. (ex Herb. Duthie).—*Heterolepis elegans*, Ehrh. ex Boiss. l. c.

*Vern. Names*: Kharrut (*Sind*), Sikaliu, Gadhiu (*Surat*), Fulkalu (*Dohad*), Faliu (*Broach*), Khariu (*Charodi*), Gonde gavat (*Deccan*), Ganjali hullu (*Karnatik*).

*Description*: A tufted leafy annual grass, 30–60 cm. high. Stems somewhat flattened, erect, leafy at the base, occasionally with creeping stems rooting at the lower nodes. Leaf-blades rather narrow, linear flat, acute, glabrous when old, with scattered long hairs in the leaves of young branches, 5–25 and even 40 cm. long, 3 mm. or less broad. Sheaths glabrous, compressed, upper ones somewhat inflated, margins thin and membranous, mouth of sheath bearded with long hairs in the leaves of young branches, quite glabrous when old and in flower-bearing branches. Ligule a thin, narrow, membranous ridge. Spikes 6–15, erect, crowded at the end of the peduncle, 2.5–6 cm. long, rhachis fine, angular, scaberulous on the edges. Spikelets about 2.5 mm. long excluding the awns, 2-awned, short-stalked, consisting of 4 glumes. Lower involucral glume slender, subulate, glabrous, with the keel glabrous, 1-nerved, about half the upper; upper involucral glume oblong-lanceolate, 2-fid at the apex, glabrous except the scaberulous keel, nerve produced between the lobes into a scaberulous awn. Lower floral glume oblong-ovate, cymbiform and rather deep, bifid at the apex and awned in the sinus, margins slightly ciliate up to about the middle and then closely ciliate with long hairs almost to but not to the tip, awn about 6 mm. long, bearded at base, on each side of the dorsal nerve there is a shallow groove with short scattered appressed hairs. Pale much narrower and rather shorter, often reduplicate, toothed or notched. Rhachilla somewhat adnate to lower floral glume, shortly produced, bearing a curious semitubular or bucciniform truncate glume with 2 minute auricles at tip and an awn 8 mm. long. Grain fusiform, sometimes slightly curved, pericarp loose.

*Locality*: *Gujarat*: Sungiri (Gammie 16585!); Perim Island, Gulf of Cambay (Blatter 3816! 3820!).—*Khandesh*: Bor, Bori River (Blatter &

Hallberg 4425 !); Toranmal, S. E. slope (McCann A194 !).—*Konkan* : Lower Parel (Blatter 4279 !), very common in Bombay Isl. (McCann !); Parsik, railway line (McCann A195 !).—*Deccan* : Abundant on old walls of houses in Poona (Achariyar); Mangiri, near Poona (Gammie 15342 !); Katraj Ghat (Gammie 1042 !); Gangapur (Blatter & Hallberg 4574 !); Igatpuri (Blatter & Hallberg 5118 !, 5145 !); Lina Hill, Nasik Dist. (Blatter & Hallberg A190 !); Sholapur (D'Almeida A193 !).—*S. M. Country* : Hubli 2,000 ft., rainfall 30 inches (Sedgwick & Bell 4219 !); Dharwar, 2,500 ft., rainfall 34 inches (Sedgwick 1818 !).

*Distribution* : Kashmir (Ladak), Rajputana, Gangetic Plain, Bihar, Burma, W. Peninsula, Central & S. India, westward to Algeria; Mongolia, tropical and S. Africa and America.

6. *Chloris barbata*, Sw. Fl. Ind. Occ. i (1797), 200; Jacq. Eclog. Gram. 10, t. 8; Kunth Enum. Pl. i, 264, Suppl. 209; Trin. Diss. i, 232, Sp. Gram. Ic. t. 306; Nees Agrost. Bras. 421; Steud. Syn. Gram. 204; Roxb. Fl. Ind. i, 331; Grah. Cat. 234; Aitchis. Cat. Panjab Pl. 167; Duthie Grass. N.W. Ind. 33, Fodd. Grass. N. Ind. 53, t. 34; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 367; Griseb. Fl. Brit. W. Ind. 539; Benth. Fl. Hongk. 429, Fl. Austral. vii, 613 (*excl. syn. decora*); Doell in Mart. Fl. Bras. ii, iii, 67; Hook. f. in F.B.I. vii, 292; Prain Beng. Pl. 1227; Watt. Dict. Econ. Prod. ii, 269; Cke ii, 1035; Achariyar South Ind. Grass. (1921), 264; Haines Bot. Bihar & Orissa (1924), 969.—*Andropogon barbatus*, Linn. Pl. Jam. Pugill. 30, Mantiss. ii, 302. Rheede Hort. Malab. xii, t. 51.

*Description* : Cke. ii, 1035.

*Locality* : *Sind*: Mirpur Sakro (Blatter & McCann D656 !); Tatta (Blatter & McCann D657 !).—*Khandesh* : Nim, Tapti bank (Blatter & Hallberg 5399 !); to Naradana (Blatter & Hallberg 5163 !, 5182 !); Umalla, Tapti bank (Blatter & Hallberg A188 !).—*Konkan* : Parel, very common in Bombay Island (McCann 5381 !); Sion (McCann 5220 !, 5245 !).—*Deccan* : Chattarshinji Hill, Poona (Ezekiel !); Jeur, Ahmednagar Dist. (Woodrow !).—*S.M. Country* : *Dharwar* Dist., 2,000 ft., rainfall 35 inches (Sedgwick 1962 !); Haveri (Talbot 2215 !).—*Kanara* : Kulgi (Talbot 2311 !); Yellapore (Talbot 1524 !).

*Distribution* : Tropics generally.

7. *Chloris montana*, Roxb. Fl. Ind. i, 329; Kunth Enum. Pl. i, 265; Spreng. Neue Entdeck. iii, 127; Steud. Syn. Gram. 204; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 369; Hook. f. in F.B.I. vii, 292; Achariyar S. Ind. Grass. (1921), 270; Haines Bot. Bihar & Orissa (1924), 969.—*C. decora*, Thw. Enum 371 (*excl. syn.*).—*C. barbata* var. *decora*, Trim. Cat. Ceyl. Pl. 109.

*Description* : Perennial. Stems erect, tufted geniculately ascending from a creeping base, rooting at the nodes, quite glabrous, 10 cm. to 1-2 m. high. Leaf-blades narrow-linear, finely acuminate, rounded at the base, glabrous, folded flat inwards, 10-20 cm. long, 1.5-3 mm. broad; sheaths shorter than the internodes, flat, compressed, glabrous, with a few hairs or none at the mouth and with membranous margins, uppermost sheath spathiform, enclosing the inflorescence when young; ligule a thin ridge of short hairs densely arranged. Nodes glabrous, dark-ringed. Spikes 2-6, very rarely up to 9, 2.5-7.5 cm. long, connate at the base, erect and never spreading. Peduncle slender, long, glabrous, but copiously pubescent just below the base of the connate spikes; rachis angular, slender, scabrid. Spikelets about 3 mm. long excluding the awns, short-pedicelled, unilateral, biseriate, thin, slender, 1-flowered, pale or purple tinged, disarticulating above the 2 lower empty glumes which persist on the rachis, generally 4-, rarely 3- or 5-awned, awns pale or purple, 3-5 mm. long; pedicel short, angular, scaberulous with a few pilose hairs; rachilla produced, but is shorter than the flowering glume. Glumes usually 6, very rarely 5 or 7. Lower involucrel glume hyaline, awnless, white or lightly purplish, about 1.5 mm. long, lanceolate, finely acuminate, 1-nerved, and with a scabrid keel; upper twice as long as the lower, hyaline, oblong-lanceolate, finely acuminate or obtuse and shortly awned, 1-nerved. Lower floral glume broadly oblong, chartaceous, 3-nerved, bearded with long hairs along the margins from a little above the base and with a tuft of hairs at the base, awned at the apex; upper floral glume much smaller, cuneate, conduplicate, awned from

the truncate tip, embracing glumes v and vi; glume v cuneate or subglobose, small, enclosing the still smaller or minute glume vi, both awned. Pale oblong, a little smaller than its glume, folded along the margins. Stamens 3, anthers pale yellow. Styles white with purple stigmas. Lodicules narrowly cuneate.

*Locality*: Deccan: Nasik (Lisboa).

*Distribution*: Upper and Lower Gangetic Plain, southward to Ceylon, Coromandel Coast.

8. *Chloris quinquesetica*, Bhide in Journ. & Proc. As. Soc. Beng. (new series) viii (1912), 311.

*Description*: A glabrous, perennial grass, creeping and rooting at the lower nodes and there forming small tufts of leaves and an erect flowering stem 60 cm. high; nodes glabrous. Leaves 2-15 cm. long and 3-5 mm. broad, sparsely, delicately long-ciliate when young, ultimately glabrous, lanceolate, acuminate, truncate at the base, margins minutely scabrid; ligule a narrow fimbriate membrane. Spikes 5-18, 2.5-5 cm. long, crowded in a very short racemose fascicle the branches of which are often decurrent into the peduncle for a short distance and form ridges on it which are also studded with stray spikelets. Peduncle below the spikes and the rachises hairy. Spikelets 8 mm. long including the awns. Glumes 7: i and ii empty, iii flowering, awned, paleate, iv-vii barren, epaleate, gradually smaller and rounder, all awned. Lower involucreal glume 1.5 mm. long, elliptic-lanceolate, membranous, strongly 1-nerved, slightly oblique: upper  $1\frac{1}{2}$  times as long as the lower, elliptic-oblong, membranous, shortly mucronate, strongly 1-nerved. Lower floral glume without the awn as long as the upper involucreal, elliptic-obovate, cuneate, coriaceous, 3-nerved, and with a dorsoterminal awn 5 mm. long, lateral nerves densely bearded with long white hairs nearly from the base. Pale as long as the glume but narrower, slightly hairy at the back, very shortly 2-fid at the apex, 2-keeled, keels minutely ciliate. Stamens 3, styles 2, stigmas plumose. Grain plano-convex or trigonous. Lodicules minute.

*Locality*: Sind: Jamesabad, in fields (Sabnis B1116!).—*Gujarat*: Bhuj, Bhodir Maka, Cutch (Blatter 3748!); Runn of Cutch (Blatter 3732!).—*Konkan*: Versova (McCann A185!); Papadi, Bassein, growing on the bunds of rice fields, in semi-salt land (Bhide!); Colaba, near a swamp, on rocks, very common (McCann A198!, A199!, A200!).—*Kanara*: Karwar, on red mud near the shore (Hallberg & McCann A197!).

*Distribution*: So far endemic.

9. *Chloris gayana*, Kunth. Rev. Gram. i, 89, 293, t. 58, Enum. i, 267, Suppl. 216; Nees Fl. Afr. Austr. 240; Steud. Syn. Pl. Glum. i, 207; Oliv. in Trans. Linn. Soc. 29, 174; Durand & Schinz Consp. Fl. Afr. v, 861.—*C. abyssinica*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii, 406; Engl. Hochgebirgs Fl. Trop. Afr. 132; Schweinf. in Bull. Herb. Boiss. ii, App. ii, 32; Durand & Schinz Consp. l. c. 860.—*C. glabrata*, Anderss. in Peters Reise Mossamb. Bot. 557.

*Popular Name*: Rhodes Grass.

*Description*: Perennial or annual, 0.6-1.2 m. high; culms erect or geniculate ascending, or prostrate at the base, simple or branched, often emitting fascicles of barren shoots or short runners from the lower nodes, often robust, 3-9-noded, compressed below, glabrous, smooth, upper internodes usually exerted; sheaths glabrous or sparingly hairy near the mouth, smooth, the lower strongly compressed, keeled, keels sometimes scabrid, the uppermost sometimes tumid; ligules membranous, very short, long-hairy; blades linear, long-tapering to a fine point, 15-more than 30 cm. by 6-8 mm. when expanded, flat or folded, glabrous or hirsute near the base, green, smooth below, rough above on the margins. Spikes 6-15, umbelled, sessile, suberect, rarely spreading, 6-10 cm. long, greenish or brownish; rachis scabrid; spikelets 3 mm. long, 3-4-flowered, shortly 2-awned, glumes very unequal, the lower involucreal ovate-lanceolate, acute, subhyaline, 1-1.5 mm. long, the upper oblong, obtuse, mucronate, 2-3 mm. long, firmer, scaberulous; lower floral glume oblong, sub-obtuse or acute, minutely 2-toothed, ciliolate along the marginal nerves and shortly bearded below the tips or only finely bearded or almost glabrous, with a (sometimes minutely hairy) groove on each face; awn as long or slightly

longer than the glume, straight; callus minutely bearded, pale glabrous, keels scabrid. Anthers 1.5 mm. long; second floral glume with a male flower, like the preceding, but glabrous, 2 mm. long, awn 2 mm. long or less; vth and vith glume rudimentary, cuneate in profile, empty, awnless.

*Locality: Deccan:* Poona (Burns!).—See also Mann in Bull. 77, p. 72 of Dept. Agric. Bombay.

*Distribution:* S. and tropical Africa.

#### 91. DACTYLOCTENIUM, Willd Enum. Pl. (1809), 1029.

Annual or perennial; leaves flat, subflaccid; spikes in umbels of 2-6, erect or stellately spreading; tips of the rhachis barren, mucroniform, usually curved. Spikelets 3-5-flowered, laterally compressed, densely imbricate, biseriate, sessile, unilateral on a flattened rhachis, the uppermost reduced; rhachilla tardily disarticulating above the empty glumes, tough between the flowering glumes. Flowers bisexual, the uppermost rudimentary. Involucral glumes 2, unequal, strongly keeled, the lower ovate, acute, thin, persistent, the upper elliptic-oblong in profile, obtuse, mucronate or awned, firm, deciduous. Flowering glumes ovate, subacuminate, 3-nerved, mucronate or awned, deciduous with the grains. Pales about as long as the flowering glumes, 2-keeled, subsistent. Lodicules 2, cuneate, minute. Stamens 3. Ovary glabrous; styles distinct, very long, subterminally exerted. Grain subglobose, slightly laterally compressed, not grooved or hollowed, rugose or punctate; pericarp very delicate, irregularly breaking away; embryo scarcely equalling  $\frac{1}{4}$  the length of the grain; hilum basal, punctiform.

- |                             |     |     |                          |
|-----------------------------|-----|-----|--------------------------|
| 1. Annual; grain subglobose | ... | ... | 1. <i>D. aegyptium</i> . |
| 2. Perennial; grain ovoid   | ... | ... | 2. <i>D. sendicum</i> .  |

1. *Dactyloctenium aegyptium*, Richt. Pl. Europ. i (1889), 68; Muschler Fl. Egypt i (1912), 108 (*nomen attributum Willdenowio per error.*).—*Cynosurus aegyptius*, Linn. Sp. Pl. 72.—*Dactyloctenium aegyptiacum*, Willd. Enum. Pl. (1809), 1029; Beauv. Agrost. 72, t. 15, f. 2; Kunth Enum. Pl. i, 261, Suppl. ii. 204; Steud. Syn. Gram. 211; Grah. Cat. Bomb. Pl. 235; Dalz. & Gibs. Bomb. Fl. 297; Aitchis. Cat. Panjab. Pl. 167; Miq. Fl. Ind. Bat. iii, 384; Boiss. Fl. Or. v, 556; Griseb. Fl. Brit. W. Ind. 540; Baker Fl. Maurit. 452.—*Eleusine aegyptiaca*, Desf. Fl. Atlant. i (1798), 85; Roxb. Fl. Ind. i, 344; Griff. Notul. iii, 51, Ic. Pl. Asiat. t. 139, f. 79; Benth. Fl. Austral. vii, 615; Duthie Grass. N.W. Ind. 34, Fodd. Grass. N. Ind. 56, t. 35; Hook. f. in F.B.I. vii, 295; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 374; Prain Beng. Pl. 1229; Cke. iii, 1038; Achariyar S. Ind. Grass. (1921), 276; Haines Bot. Bihar & Orissa (1924), 970.—*E. ciliata*, Rafin. in Desv. Journ. Bot. iv (1814), 273.—*E. cruciata*, Lamk. Illustr. i, 203, t. 48, f. 2.—*E. mucronata*, Stokes Bot. Mat. Med. i, 150; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 376.—*E. pectinata*, Moench Meth. Suppl. 68.—*E. prostrata*, Spreng. Syst. i, 350.—*E. radulans*, R. Br. Prodr. 186.—*Dactyloctenium distachyum*, Bojer Hort. Maurit. 370.—*D. Figarei*, DeNot. in Ann. Sc. Nat. Ser. iii, ix (1848), 325.—*D. meridionale*, Ham. Prodr. Pl. Ind. Occ. 6.—*D. mucronatum*, Willd. l. c.; Trin. Sp. Gram. Ic. t. 69.—*D. prostratum*, Willd. l. c.—*D. radulans*, Beauv. Agrost. 72; Kunth ll. cc. 262, 204.—*Cynosurus distachyus*, Rottl. ex Steud. Nom. ed. ii, i, 465.—*Chloris mucronata*, Michx. Fl. Am. Bor. i, 59.—*Cenchrus aegyptius*, Beauv. Agrost. 157.—*Rhabdochloa mucronata*, Beauv. l. c.—*Aegilops saccharinus*, Walt. Fl. Carol. i, 249.—Rheede Hort. Mal. xii, t. 69.

*Vern. Names:* Gandhi (Sind); Anchi, Manchi (Kaira); Tagar sammi (Dharwar); Hakki kalin hullu (Karnatik).

*Description:* Cke. ii, 1038 (under *Eleusine aegyptiaca*).

*Locality:* Sind: Ghulamalla, garden (Blatter & McCann D599!); Tatta (Blatter & McCann D600!); Indus Delta (Blatter & McCann D601!); Karachi (Bhide!); Mirpurkhas (Bhide!, Sabnis B1170!); Umerkot (Sabnis R1001!); Hyderabad, cultivated fields (Sabnis B50!); Sukkar, cultivated fields (Sabnis B540!); Nasarpur (Sabnis B1138!, B1059!); Sanghar (Sabnis B888!).—*Gujarat:* Sumarasar, Cutch (Blatter 3759!); Perim Island, Gulf of Cambay (Blatter 3818!); Bhuj Hill, Cutch (Blatter 8551!).—*Khandesh:* Muravad, Tapti bank (Blatter & Hallberg 5164!); Bor, Bori River (Blatter &

Hallberg 5483 !).—*Konkan* : Wada Range, Thana Dist. (Ryan 685 !); Juvem (McCann 4264 !); Vetora (Sabnis 33592 !); Mulgaum (McCann A208 !); Versova (McCann A205 !); Uran (Hallberg & McCann 5135 !); Marine Lines, Bombay Isl. (Hallberg A206 !); very common in Bombay Isl. (McCann !); Ratnagiri (Woodrow 41).—*Deccan* : Poona (Jacquemont 399, 486), Agricultural College garden (Garade 665 !); Bopodi, near Poona (Gammie 15310 !); Manmad, riverbed (Blatter A211 !); Khandala to Campoli (McCann A209 !); Khandala (Gammie 15395 !, McCann !); Igatpuri (Blatter & Hallberg 5195 !, McCann !); Sharanpur, near Nasik (Woodrow).—*S. M. Country* : Yelvigi, 1,800 ft., rainfall 25–30 inches (Sedgwick 2002 !); Gokak (Shevade !); Badami (Woodrow 12).—*Kanara* : Dundeli, 1,800 ft., rainfall 100 inches (Sedgwick & Bell 4215 !); Halyal (Talbot 2306 !); Karwar, sea shore and near sea (Talbot 1298 !).  
*Distribution* : Spread throughout tropical and subtropical regions.

2. *Dactyloctenium scindicum*, Boiss. Diagn. Ser. 2, fasc. 4 (1859), 131, Fl. Or. v (1881) 557.—*Eleusine scindica*, Duthie Fodd. Grass. N. Ind. (1888), 58; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 377.—*Dactyloctenium glaucophyllum*, Courb. in Ann. Sc. Nat. Ser. iv, xviii (1862), 133.—*Eleusine glaucophylla*, Munro ex Benth. in Journ. Linn. Soc. xix (1881), 107.—*E. aristata*, Ehrenb. ex Boiss. Fl. Or. v (1881), 557; Hook. f. in F.B.I. vii, 296; Cke. ii, 1039.

*Description* : Cke. ii, 1039 (under *Eleusine aristata*).

*Locality* : *Sind* : Karachi, (Burns !), seeds grown, taken from a bird's crop (Ticehurst !); Sanghar (Sabnis B893 !); Indus Delta (Blatter & McCann D602 !); Mirpur Sakro (Blatter & McCann D603 !); Gharo (Blatter & McCann D604 !); Mundgiro (Stocks 637).—*Gujarat* : Ahmedabad (Woodrow), dry open hills (Sedgwick !); Sevalia (Chibber !);—*Konkan* : Ratnagiri (Woodrow).

*Distribution* : Punjab, Rajputana, W. Peninsula, Baluchistan, Afghanistan, Arabia, Nubia.

92. ELEUSINE, Gaertn. Fruct. & Sem. i (1788), 7, pl. 1, f. 11; Cke. ii, 1037 (*partim*).

Annual or perennial; leaves long, flat or folded, flaccid or firm; spikes in interrupted spikes or the upper or all in a terminal umbel, straight, suberect, spreading or deflexed; spikelets glabrous, 3–6-flowered, laterally compressed, densely imbricate, alternately biseriate, unilateral, sessile on a flattened rhachis, the uppermost terminal, perfect; rhachilla disarticulating above the involucrel glumes and between the flowering glumes, or tough, produced, sometimes terminating with a rudimentary glume. Flowers bisexual. Involucrel glumes 2, subequal, persistent, obtuse or obscurely mucronate, membranous, strongly keeled, 3–5 nerved, the lateral nerves close to the keel, the lower shorter, with the keel crested. Flowering glumes very similar, 3-nerved near the base; lateral nerves submarginal above, with 1–2 short additional nerves close to the keel. Pales slightly shorter than the glumes, 2-keeled, keels winged. Lodicules 2, minute, cuneate. Stamens 3. Ovary glabrous; styles slender from a broadened base, distinct; stigmas plumose, laterally exerted. Grain broadly oblong to globose, broadly grooved; pericarp loose, delicate, breaking up irregularly or almost circumscissile; seed finely striate; embryo suborbicular, basal; hilum punctiform, basal.

Species 6. In the warm regions of the E. hemisphere, 1 widely spread through the tropics.

Of the 5 species mentioned by Cook, 2 have been transferred to *Dactyloctenium* above, viz. *E. aegyptiaca* and *E. aristata*. We add 2 species new to the Presidency: *E. verticillata* and *E. brevifolia*.

A. Erect.

1. Spikes digitate

I. Spikes slender, nearly glabrous at base  
 Seed oblong, obtusely trigonous ... 1. *E. indica*.

2. Spikes stout, often incurved pubescent  
 at base. seed globose ... 2. *E. coracana*.

II. Spikes scattered or whorled ... 3. *E. verticillata*.

B. Prostrate or creeping and rooting

I. Ligule hairy. Spikes digitate ... 4. *E. flagellifera*.

II. Ligule obsolete. Heads of spikes globose... 5. *E. brevifolia*

1. *Eleusine indica*, Gaertn. Fruct. i (1788), 8; Lamk. Ill. i, 203, t. 48; Kunth Enum. Pl. i, 273, Suppl. 224, t. 16, f. 4; Steud. Syn. Gram. 211; Roxb. Fl. Ind. i, 345; Gräh. Cat. Bomb. Pl. 235; Griff. Notul. iii, 52, 53, Ic. Pl. Asiat. t. 119, f. 156 & t. 150, f. 1; Thw. Enum. Pl. Zeylan. 371; Trim. Cat. Ceyl. Pl. 109; Aitchis. Cat. Panjab Pl. 168; Duthie Grass. N. W. Ind. 34, Fodd. Grass. N. Ind. 57, t. 69; Miq. Fl. Ind. Bat. iii, 385; Boiss. Fl. Orient. v, 555; Benth. Fl. Hongk. 429, Fl. Austral. vii, 615; Nees Agrost. Brass. 439, Fl. Afr. Austr. 251; Griseb. Fl. Brit. W. Ind. 540.—*E. distachya*, Trin. ex Steud. Nom. Ed. ii, i, 549.—*E. distans*, Moench. Meth. 210.—*E. domingensis*, Sieb. ex Schult. Mant. ii, 323.—*E. Gouini*, *inaequalis*, *rigidifolia*, & *scabra*, Fourn. ex Hemsl. Biol. Centr. Amer. iii, 565.—*E. gracilis*, Salisb. Prodr. 19.—*E. marginata*, Lindl. in Mitch. Three Exped. i, 319; Steud. Syn. Gram. 212.—*E. tristachya*, Lamk. l.c.; Kunth Revis. Gram. i, 92, Enum. i, 273; Steud. l.c.; Hook. f. in F. B. I. vii, 293; Cke. ii, 1037; Acharyar S. Ind. Grass. (1921), 273, f. 206; Haines Bot. Bihar & Orissa 970.—*Cynosurus indicus*, Linn. Sp. Pl. 72.—*Panicum compressum*, Forsk. Fl. Aeg. Arab. 18.—*Paspalum dissectum*, Kniphof Cent. Bot. in Orig. t. 11.—*Triticum geminatum*, Spreng. Syst. i, 326.—*Agropyrum geminatum*, Schult. Mant. iii, 655.—Rheede Hort. Mal. xii, t. 69.

*Description* : Cke. ii, 1037.

*Locality* : *Gujarat* : Bhuj Hill, Cutch (Blatter 8549 !).—*Khandesh* : Umalla, Tapti bank (Blatter & Hallberg 5231 !); N. slope of Chauseli (McCann A202 !).—*Konkan* : Byculla (McCann A207 !); very common in Bombay and Salsette Isls. (McCann !); Alibag (Ezekiel !); Vetora (Sabnis 33595 !); Bassein (McCann 4478 !).—*Deccan* : Khandala, very common (McCann 9407 !); Khandala to Karjat (Blatter & Hallberg 5323 !); Igatpuri (Blatter & Hallberg 5199 !); Poona (Woodrow).—*S. M. Country* : Dhharwar, 2,400 ft., rainfall 34 inches (Sedgwick & Bell 4988 !).—*Kanara* : Yellapore (Talbot 1523 !); Halyal (Talbot 2103 !); Nencholi, near banks (Talbot 954 !).

*Distribution* : Throughout the plains of India, tropics of the Old World.

\* 2. *Eleusine coracana*, Gaertn. Fruct. & Sem. i (1788), 8, t. 1; Lamk. Illustr. t. 28; Schreb. Gram. ii, t. 35; Trin. Sp. Gram. Ic. t. 70; Steud. Syn. Gram. 211; Panz. in Muench. Denkschr. iv (1814) t. 8; Roxb. Fl. Ind. i, 342. Gräh. Cat. 235; Dalz. & Gibs. Suppl. 97; Aitchis. Cat. Panjab Pl. 168; Duthie Grass. N. W. Ind. 34; Fodd. Grass. N. Ind. 57, t. 69, Field & Gard. Crops 15, t. 28; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 373; Hook. f. in F. B. I. vii, 294; Cke. ii, 1039; Prain Beng. Pl. 1229; Haines Bot. Bihar & Orissa (1924), 970.—*Cynosurus coracanus*, Linn. Syst. Ed. ii, 875.—*Eleusine cerealis*, Salisb. Prodr. 19.—*E. sphaerosperma*, Stokes Bot. Mat. Med. i, 149.—*E. stricta*, Roxb. l.c. 343.—*E. Tocussa*, Fresen. in Mus. Senkenb. ii (1837), 141.—Rheede Hort. Mal. xii, t. 78.

*Vern. Names* : Nachni, Nagli, Ragi, Makra, Nanguli.

*Description* : Very like *Eleusine indica*, but stouter, up to 1.5 m. high. Leaves often far overtopping the stem, 5-6 mm. broad; sheaths compressed, loose; ligule of hairs. Spikes 4-7, suberect, with their ends or whole spike frequently incurved, rachis of spikes often pubescent at base, somewhat 3-gonous or back flattened. Spikelets much congested, awnless, 3-6-fld. Flowering glumes more broadly ovate than in *E. indica*, and often with 1-2 nerves in the sides, variable in size, up to 5 mm. long. Seed globose, dark brown, smooth in some varieties, in other cases somewhat rugose, with a depressed black hilum and slightly flattened on one side.—A cultivated form of *E. indica*.

*Locality* : Extensively grown in the hilly districts of the Presidency.

*Distribution* : Cultivated in the tropics of the Old World for its seed.

*Uses* : 'It is often said to be a good fodder. This is not my experience, the leaves though soft have very tenacious vascular strands and I have noticed animals frequently reject them after chewing a few times.' (Haines).

3. *Eleusine verticillata*, Roxb. Fl. Ind. i (1832), 346; Steud. Syn. Gram. 211; Aitchis. Cat. Panjab Pl. 168; Duthie Grass. N. W. Ind. 34, Fodd. Grass. N. Ind. 58, t. 70; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 377; Hook. f. in F. B. I. vii, 295; Saxton & Sedgwick Plants of N. Gujarat in Rec. Bot. Surv. Ind. vi (1918), 322.—*E. racemosa*, Heyne in Roth Nov. Sp. 80.—*Aerachne eleusinoides*, Wight & Arn. in Wight Cat. No. 1760; Nees ex Steud. l.c.—*A. verticillata*, Lindl. Introd. Nat. Syst. ed. ii, 381.

*Description* : An annual grass. Stems 30–90 cm. high, erect, stout or slender, simple or branched, soft. Leaves flat, rather broad, flaccid, acuminate, glabrous; sheath compressed; ligule a few hairs. Spikes few or many, scattered or whorled, or opposite or alternate, suberect, 2–7.5 cm. long, very many-flowered. Spikelets 4–6 mm. long, 8–12 flowered, shining; glumes small, acute, glabrous. Involucral glumes broadly ovate, finely acuminate or aristulate. Flowering glumes 2 mm. long, very broadly ovate, 3-nerved, keel excurrent, lateral nerves ending in small teeth. Grain rugose, pericarp caducous.

*Locality* : Gujarat : Ahmedabad, compounds, lanes and banks, common (Saxton and Sedgwick !)

*Distribution* : Tropics of the Old World.

4. *Eleusine flagellifera*, Nees in Linnæa xvi (1842), 220; Steud. Syn. Gram. 211; Duthie Grass. N. W. Ind. 34, Fodd. Grass. N. Ind. 57, t. 37; Boiss Fl. Or. v, 655; Hook. f. in F.B.I. vii, 294; Cke. ii, 1038. *E. arabica*, Hochst. ex Steud. l.c.; Aitchis. Cat. Panjab Pl. 167; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 377; Watt. Dict. Econ. Prod. iii, 241.

*Description* : Cke. ii., 1038.

*Locality* : Sind : Jacobabad (Bhide !); Mirpurkhas (Jhaveri !); Sanghar (Sabnis B889 !, A236 !); Umerkot, sand hills (Sabnis B1002 !, B1017 !); Sehwan to Laki, foot of hills (Sabnis B616 !); Pad-Idan (Sabnis B511 !); Gharo (Blatter & McCann D605 !).—*Khandesh* : (Lisboa).—*Gujarat* : Bhuj Hill, Cutch (Blatter 3746 !). *Deccan* : Poona (Lisboa).

*Distribution* : Punjab, W. Peninsula, Afghanistan, N. Africa.

5. *Eleusine brevifolia*, R. Br. in Wall. Cat. No. 3815; Hook. f. in F.B.I. vii 294; Achariyar S. Ind. Grass. (1921), 274.—*Koeleria brevifolia*, Spreng. Pugill. ii, 21.—*K. lagopoides*, Panz. ex Spreng. l. c.—*Dactylis brevifolia*, Koen. ex Willd. Sp. Pl. I 410 (*excl. syn.*); Roxb. Fl. Ind. i, 341.—*D. cynosuroides*, Koen. ex Roth. Nov. Sp. 74 (*non* Linn.).—*Poa brevifolia*, Kunth Rev. Gram. i, 111, Enum. Pl. i, 324.—*Aeluropus brevifolius*, Nees ex Steud. Nom. Ed. ii, i, 30. *A. laevis*, Trin. Fund. Agrost. 143, t. 12.—*A. pubescens*, Steud. Nom. l. c.—*Eragrostis brevifolia*, Benth. in Hook. Ic. Pl. xiv, 51.—*Triodia cynosuroides*, Spreng. Syst. Veg. i, 331.

*Description* : An annual grass. Stems creeping and spreading from the root, ascending from a decumbent base, generally slender and small, sometimes large and proliferously branched, leafy, 7–18 cm. long. Leaf-blade linear, acute, with a sub-cordate or rounded base, 2–5 cm. long, 3–4 mm. broad; sheath compressed and glabrous; ligule a very short membrane, ciliate at the margin or obsolete. Spikes usually many, sessile and crowded in globose heads, varying in diameter from 8–16 mm. Spikelets sessile, biseriate, ovate-oblong, 3–4 mm. long, 4–10-flowered. Involucral glumes membranous, ovate-oblong, acuminate, shortly awned, glabrous, the lower shorter than the upper, 1–3-nerved, the upper 3–5-nerved, and the nerves very close to the middle one in the keel. Lower floral glume and the succeeding ones ovate, cuspidately acuminate, 3-nerved, nerves villous below the middle and paleate. Pale oblong, lanceolate, truncate and minutely 2-toothed, keels villous below the middle. Anthers small. Lodicules small and cuneate. Styles long and slender. Grain orbicular to ovate, concavo-convex, red-brown, and transversely rugose.

*Locality* : S. M. Country : Ranibennur (Bhide !).

*Distribution* : Coromandel and Carnatic coasts.

93. *DINEBRA*, Jacq. Fragm. (1809), 77, t. 121, f. 1; Cke. ii, 1039.

Species about 10.—India, Ceylon, Afghanistan, westwards to the Mediterranean and tropical Africa.

Cooke describes one species : *Dinebra arabica*, which name has to cede to *Dinebra retroflexa*, Panzer.

1. *Dinebra retroflexa*, Panzer in Denkschr. Acad. Münch. (1814), 270, t. 12; Boiss. Fl. Or. v, 557; Muschler Fl. Egypt i (1912), 106.—*Cynosurus retroflexus*, Vahl Symb. ii, 20.—*Dinebra arabica*, Jacq. Fragm. (1809), 77; Beauv. Agrost. 98, t. 16, f. 2 (*Dinebra*); Duthie Grass. N. W. Ind. 34; Fodd. Grass. N. Ind. 55; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 372; Hook. f. in F. B. I. vii, 297; Prain Beng. Pl. 1230; Watt. Dict. Econ. Prod. iii, 115; Cke. ii,

1039; Achariyar S. Ind. Grass. (1921), 279; Haines Bot. Bihar & Orissa (1924), 971.—*Leptochloa arabica*, Kunth Rev. Gram. i, 91; Enum. Pl. i, 271, Suppl. 221; Wight Cat. No. 1756; Aitchis. Cat. Punjab Pl. 167.—*Dinæba aegyptiaca*, Del. Fl. d'Eg. 25, t. xi, f. 3.—*Leptochloa calycina*, Kunth II. cc. 91, 272; Dalz. & Gibs. Bom. Fl. 297.—*Eleusine calycina*, Roxb. Fl. Ind. i, 346.—*Dactylis paspaloides*, Willd. Enum. Hort. Berol. 111.

*Vern. Names* : Kali Kauli (Sind); Kharia (Broach); Lona (Poona, Sholapur); Halligyan hullu (Bijapur); Halgyan hullu, Ululgyan hullu, Nari baluda hullu (Karnatik).

*Description* : Cke. ii, 1039.—A more complete description in Achariyar 279.

*Locality* : *Gujarat* : Banks of the Tapti above Surat (Dalzell & Gibson); Surat (Woodrow); Morvi, Kathiawar (Woodrow).—*Khandesh* : Dadgaum (McCann A37!); Dhulia, Moti Tank (Chibber!); Antab, Bori River (Blatter & Hallberg 5147!); Bori, Bori River (Blatter & Hallberg 5490!); Bor, Tapti River (Blatter & Hallberg 5469!); Tapti River, Bhusawal (Blatter & Hallberg 5157!).—*Konkan* : Bandra, damp fields at Khar (Vakil A35!); Sion (McCann 5242!); Parel (McCann 5104!); Byculla (McCann A39!).—*Deccan* : Deolali (Blatter A34!); Sholapur (D'Almeida B36!); along the river, Dhond (Bhide 1346!); Bairawadi, Purandhar (McCann 5050!); Poona (Woodrow), Agricultural College Farm (Ezekiel!).—*S. M. Country* : Dharwar Dist. (Sedgwick 2101!); Kelgerry (Talbot 2623!); Haveri (Talbot 2184!).—*Kanara* : Yellapore (Talbot!).

*Distribution* : India, Ceylon, Afghanistan, westward to Egypt and Senegal.

94. *TRIPOGON*, Roth Nov. Sp. (1821), 79; Cke. ii, 1035.

Species about 13.—Tropical and subtropical Asia and Africa, one in America.

To the 4 species given by Cooke we add 3 others: *T. bromoides*, Roth, *T. filiformis*, Nees, and *T. Roxburghianum*, Bhide.

Key:

- A. Flowering glumes simply bifid with an interposed awn, the lobes awned or not
  - I. Awn as long or longer than its glume
    - 1. Under 8 cm. high. Leaves 2.5 cm. long. Ligule membranous, ovate ... 1. *T. pauperculus*.
    - 2. 15-45 cm. high. Cauline leaves 15-20 cm. long. Ligule a ridge ... 2. *T. capillatus*.
  - II. Awn shorter than its glume
    - 1. Lateral lobes of floral glume not awned
      - a. Leaves 30-60 cm. long. Spikelets 5-12-flowered. Lower involucre glume 2 mm. long, lanceolate ... 3. *T. Lisboæ*.
      - b. Leaves 5-20 cm. long. Spikelets 10-20-flowered. Lower involucre glume 3 mm. long with a projecting lobe at one side ... 4. *T. Jacquemontii*.
    - 2. Lateral lobes of floral glume mucronate ... 5. *T. Roxburghianum*.
- B. Flowering glumes 4-fid, outer lobes awned or not, inner membranous, sometimes very short or truncate
  - I. Upper involucre glume deeply notched or bifid at the apex ... 6. *T. bromoides*.
  - II. Upper involucre glume minutely 2-toothed below the tip ... 7. *T. filiformis*.

1. *Tripogon pauperculus*, Stapf in Hook. Ic. Pl. (1896) t. 2442 (*pauperulus per err.*); Hook. f. in F.B.I. vii, 285; Cke. ii, 1036.

*Description* : Cke. i. c.

*Locality* : *Konkan* : Matheran (Woodrow!).—*Deccan* : Mahabaleshwar, rocky summit of Sindola plateau (Sedgwick & Bell 4845!); Panchgani (McCann!); on the crest of the Western Ghats (1890 ft.) 8 miles south of Lonavla on *Ficus glomerata*, in company with mosses and *Utricularia orbiculata* (Woodrow 25);



Khandala, common on rocks (McCann A65!, A66!); near Karli on rocks (Woodrow!).—*S. M. Country*: Dud-sagar (Talbot 2568); Castle Rock, on rocks (Bhide!); Poondra (Talbot 4306!).—*Kanara*: On rocks on a hill near Nagangari 2,600 ft., rainfall 100 inches (Sedgwick 2895!).—This grass usually grows on rocks together with mosses and other small plants during the rainy season.

*Distribution*: Endemic in the W. Peninsula.

2. *Tripogon capillatus*, Jaub. & Spach Illustr. Pl. Or. iv (1850-53), 47, t. 332; Hook. f. in F.B.I. vii, 285; Cke. ii, 1036; Haines Bot. Bihar & Orissa (1924), 966.—*T. capitatus* (*per error.*) Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 371.

*Description*: Cke. i. c.

*Locality*: *Khandesh*: Toranmal, edge of plateau, 3,000 ft. (McCann A64!).—*Konkan*: On trees, Matheran (Woodrow!, Lisboa).—*Deccan*: Panchgani (Blatter & Hallberg B1247!, B1288!); on trees about Poona (Jacquemont 580); Khandala, common on trees and rocks (McCann A61!, Garade!).—*S. M. Country*: Castle Rock, 1,800 ft., rainfall 300 inches (Sedgwick & Bell 4332!); Belgaum, on trees on Samboti Hill (Ritchie 866); Anmod, on trees (Talbot 2621!).—*Kanara*: Sumpkhund to Sirsi, on trees (McCann!).

*Distribution*: Bihar, W. Peninsula, Mt. Abu.

3. *Tripogon Lisboae*, Stapf in Kew Bull. (1892), 84; Hook. f. in F.B.I. vii, 286; Cke. ii, 1036.—*Tripogon* sp. nov. Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 370.

*Description*: Cke. i. c.

*Locality*: *Konkan*: Parsik Hill (McCann A337!).—*Deccan*: Purandhar (McCann 5009!); Khandala, common, on rocks (McCann A334!, Bhide!); Karli, between Poona and Lonavla (Jacquemont 581); Panchgani, on Tableland (Blatter A338!). Generally forming large tufts and growing on rocks overhanging water-courses.

*Distribution*: Mt. Abu, W. Peninsula.

4. *Tripogon Jacquemontii*, Stapf in Kew Bull. (1892), 85; Lisboa in Journ. Bom. Nat. Hist. Soc. vii (1893), 370; Hook. f. in F.B.I. vii, 286; Cke. ii, 1037; Haines Bot. Bihar & Orissa (1924), 966.

*Description*: Cke. i. c.

*Locality*: *Gujarat*: Lasundra (Chibber!).—*Khandesh*: N. slope of Chanseli (McCann A335!).—*Konkan*: Bombay district, without precise locality (Lisboa); Matheran (Woodrow).—*Deccan*: Devlali (Blatter & Hallberg 4468!); Sholapur (Pinwill); near Ahmednagar (Miss Shatuck); Gangapur (Blatter & Hallberg A339!); Khandala (Blatter & McCann 3599!); Poona (Jacquemont 353, Woodrow); Agricultural College compound, Kirkee (Bhide!); Purandhar (McCann 5573!); Mahableshwar, W. side of plateau (Sedgwick!).—*S. M. Country*: Belgaum (Talbot!); Dharwar (Talbot 2301!); dry hill sides near Dharwar (Sedgwick 2896!).

*Distribution*: Bengal, Bihar, Central India, W. Peninsula.

5. *Tripogon roxburghianum*, Bhide in Journ. & Proc. As. Soc. Beng. (new series) vii (1911), 515.—*Lepturus Roxburghianus*, Hook. f. in F.B.I. vii, 365 (*fortassis* Steudel).

*Description*: 10-18 cm. high. Stems tufted. Leaves filiform, scarcely longer than 2.5 cm., ciliate with long hairs on the margin and at the ligule; sheaths glabrous, margins hyaline; ligule an oblong lacerated membrane. Spike solitary, 5-6 cm. long. Spikelets 3 mm. long, 1-2 flowered, with the rachilla jointed and produced beyond the upper flower and borne on a flattened rachis, the internodes of which are alternately concave and convex. Lower involucre glume hyaline, very oblique or slightly lobed on one side, broadly 1-nerved, remaining attached to the hollow in the rachis when the spikelet is removed. Upper involucre glume very coriaceous and thick, broadly 3-nerved, about  $2\frac{1}{2}$  times as long as the lower. Lower flowering glume a little shorter than the upper involucre, dorsally hairy in the lower part, membranous, 3-nerved, 2 toothed with a short mucro between, teeth also shortly

mucronate. Callus bearded. Pale nearly as long as the glume, 2-keeled, keels minutely scabrid. Stamens 3. Styles 2, distinct, stigmas plumose. Grain terete. Lodicules 2, cuneate. Upper flower also bisexual or imperfect or 0. When complete it is like the lower.

*Locality: Deccan: Chattarshinji Hill, Poona (Bhide!, Ezekiel!).—S.M. Country: Badami Fort (Bhide!); Dharwar, dry barren uplands, 2,400 ft. (Sedgwick!).*

*Distribution: So far endemic.*

6. *Tripogon bromoides*, Roth Nov. Sp. (1821), 79; Steud. Syn. Gram. 301; Stapf in Kew Bull. (1891), 85; Hook. f. in F.B.I. vii, 287.—*T. festucoides*, Jaub. & Spach Ill. Pl. Or. iv, 49, t. 333.—*T. lanatus*, Hochst. ex Steud. l.c.—*Plagiolytrum calycinum*, Nees in Proc. Linn. Soc. i, 95.—*Avena mysorensis*, Spreng. Syst. i, 337.

*Description: Stems 15-45 cm. high, stout or slender. Leaves usually short, but sometimes as long as the stem, flat or convolute, and filiform. Spike long or short, 7-20 cm. long. Spikelets very variable, 4-12 mm. long, few- or many-flowered, close or distant. Lower involucral glume ovate or lanceolate, deeply notched on one side, membranous, nerve stout; upper oblong-lanceolate, deeply bifid, with a short awn in the cleft, membranous or coriaceous, with broad membranous margins. Lower floral glume and following bearded at the base, broadly ovate, strongly 3-nerved, 4-fid, outer lobes small, placed low down and margined with their awns half as long as the glume or longer, inner lobes often half as long as the glume, much larger than in any other species, awn rarely as long as its glume.*

*Locality: Deccan: Poona, Agricultural College Farm (Chirka!); Katraj Ghat (Gammie!); Mahableshwar, 4,500 ft., rainfall 270 inches (Sedgwick & Bell 4567!); summit of Sindola plateau (Sedgwick & Bell 4841!).—S.M. Country: Belgaum Fort, walls, 2,600 ft., rainfall 50 inches (Sedgwick 2950); from Belgaum southwards (teste Hook. f.); Dharwar (Talbot 2301!); Bijapur Dist. (Talbot 2929!); Badami (Bhide!).*

*Distribution: W. Peninsula, Ceylon.*

7. *Tripogon filiformis*, Nees ex Steud. Syn. Gram. 301; Duthie Grass. N. W. Ind. 33; Hook. f. in F.B.I. vii, 288; Collett Fl. Simlensis (1902), 619, fig. 196.—*T. semitruncatus*, Nees et *T. unidentatus*, Nees ex Steud. l.c.; Duthie l.c.—*Plagiolytrum filiforme* et *unidentatum*, Nees in Proc. Linn. Soc. I, 95.—*Catopodium filiforme*, Nees ex Duthie l.c.

*Description: Stem 10-40 cm. high, very slender. Leaves filiform, as long as the stem. Spikes 4-25 cm. long. Spikelets crowded, 4-10-flowered, 3-8 mm. long. Lower involucral glume ovate, broadly lobed on one side; upper narrowly lanceolate, sharply toothed on one or both margins near the tip. Flowering glumes 2-toothed at the tip, teeth acute or jagged, a long awn inserted in the cleft and a shorter awn on the outer side of each tooth, the glume thus being 3-awned, middle awn twice as long as the glume or longer.*

*Locality: Deccan: Wai (Talbot 4485!).—S.M. Country: Belgaum (Talbot!).*

*Distribution: Temperate Himalaya, Khasia Hills, W. Peninsula.*

### TRIBE XIII. PAPPOPHOREÆ

#### 95. ENNEAPOGON, Desv.; Cke. ii, 1040.

Species about 6, in the dry warm regions of the Old World and in Australia; 1 species in Western N. America.

There is only one species in the Bombay Presidency.

1. *Enneapogon elegans*, T. Cooke in Cooke Fl. Bomb. Pres. ii, 1040.—*Pappophorum elegans*, Nees in Wight Cat. No. 1771 (1833); Hook. f. in F. B. I. vii, 301; Steud. Syn. Gram. 199; Duthie Grass. N. W. Ind. 35.—*Calotheca elegans*, Wight & Arn. ex Steud. l.c.

*Description: Cke. ii, 1040.*

*Locality: Sind: Laki (Bhide!); Karachi District (Woodrow).*

*Distribution: Peshawar, W. Peninsula, Burma.*

TRIBE XIV. ORYZÆ

96. ORYZA, Linn. (Cke. ii, 1042).

The spikelet of *Oryza* has been variously interpreted. Hook. f. has the following description: 'Glumes 2-3, i and ii much the smallest, empty, scale or bristle-like, rarely 0; iii chartaceous, obtuse, acute or awned, strongly 3-5-nerved; palea as long as the glume.'

Cooke speaks of 5 glumes, 'the 2 lower involucrel glumes below the articulation of the spikelet minute, scale-like (rarely absent); the 2 next involucrel glumes, above the articulation of the spikelet subulate; floral glume solitary, dimidiate-oblong, coriaceous or chartaceous, 5-9-nerved, awnless or with a short or long straight terminal awn; palea linear or lanceolate, as long as the glume, 3-5-nerved.'

Stapf thinks that the usual 2 outer empty involucrel glumes are absent, that the next 2 (scales or bristles) are empty florets (valves). He also takes the ivth-glume to be a pale.

Species about 17.—Tropical.—2 species in the Bombay Presidency.

1. Ligule very short, scarcely longer than broad, fringed with short hairs ... 1. *O. coarctata*.
2. The lower ligules very long, up to 4 cm., always much longer than broad ... 2. *O. sativa*.

1. *Oryza coarctata*, Roxb. Hort. Beng. (1814), 87, Fl. Ind. (1832), 206; Griff. Notul. iii, 8, Ic. Pl. Asiat. t. 142, f. 1; Miq. Fl. Ind. Bat. iii, 371; Hook. f. in F. B. I. vii, 93; Prain Beng. Pl. 1184; Cke. ii, 1042; Prodoehl *Oryzæ* in Bot. Arch. i (1922), 232.—*O. triticoides*, Griff. Notul. l.c.—*Sclerophyllum coarctatum* Griff. l.c.

*Description*: Cke. ii, 1042.

*Locality*: *Sind*: Karachi, in Herb. Kew without collector's name; covering large flats at the mouth of the Indus River (Blatter & McCann!); Shikarpur (Dr. King's collector); Keti (Blatter & McCann D666!); after Keti (Blatter & McCann D665!).—*Kanara*: Sulgeri (Sedgwick & Bell 4241!).—Forming dense mats and covering miles of flat land at the mouth of the Indus river within tidal influence, being covered at high tide.

*Distribution*: Sundribuns, W. Peninsula.

2. *Oryza sativa*, Linn. Sp. Pl. (1753), 333; Gaertn. Fruct. ii, 5, t. 80, f. 5; Host. Gram. Austr. iv, t. 325; Lamk. Encycl. t. 264; Kunth Enum. Pl. i, 7, Suppl. 4; T. Nees Gen. Fl. Germ. Monocot. i, 2; Roxb. Fl. Ind. ii, 200; Griff. Ic. Pl. Asiat. t. 139, f. 149; Duthie Grass. N. W. Ind. 12, Field and Gard. Crops 15, t. 4, Fodd. Grass. N. Ind. 20; Miq. Fl. Ind. Bat. iii, 368; Doell in Mart. Fl. Bras. ii, ii, 7, t. 1; Benth. Fl. Austral. vii, 550; Hook. f. in F. B. I. vii, 92; Cke. ii, 1043.—*O. communissima*, Lour. Fl. Coch. (1790), 267.—*O. glutinosa*, Lour. l.c. 267.—*O. montana*, Lour. l.c. 267.—*O. montana*, Ham. in Wall. Cat. (1828), 8633.—*O. praecox*, Lour. l.c. 267.—*O. perennis*, Mnch. Meth. (1794), 197.—*O. palustris*, Hamilt. Prodr. (1796), 25.—*O. latifolia*, P. Beauv. Agrost. (1812), 27 (*non* Desv.).—*O. parviflora*, P. Beauv. l.c.—*O. denudata*, Desv. ex Steud. Nomencl. ed. i (1821), 577.—*O. elongata*, Desv. ex Steud. l.c.—*O. marginata*, Desv. ex Steud. l.c.—*O. mutica*, Lour. ex Steud. l.c.—*O. pubescens*, Desv. ex Steud. l.c.—*O. rubribarbis*, Desv. ex Steud. l.c.—*O. emarginata*, Steud. Nomencl. ed. ii (1841), 234.—*O. pumila*, Host. ex Steud. l.c. 234.—*O. rufipogon*, Griff. Not. iii (1851), 5.—*O. glumæpātula*, Hochst. ex Steud. Syn. Pl. Glum. i (1854), 3.—*O. nepalensis*, Don ex Steud. l.c. 3.—*O. repens*, Herb. Ham. ex Steud. l.c.—*O. segetalis*, Russ ex Steud. l.c.—*O. sorghoides*, Desv. ex Steud. l.c.—*O. caudata*, Trin. ex Doell in Mart. Fl. Bras. ii, 2 (1871), 8.

*Description*: Annual. Stems creeping or floating, 60 cm. to 3 m. high. Leaves 30-60 cm. by 6-8 mm. or more, striate, scaberulous, 1-nerved; sheaths smooth; ligule long 2-partite. Spikelets loosely paniced, not imbricating, awn 7-13 cm. long, yellow or reddish, shining. Involucrel glumes  $\frac{1}{2}$ - $\frac{1}{3}$  the length of the floral glume, lanceolate; floral glume hispid above, dorsally spinescently ciliate, awn very long.

This is Hook. f.'s description prepared from the plant which Roxburgh and other Indian writers consider to be the indigenous Rice.

For a note on the inflorescence see: S. G. Bhalerao: The Morphology of the Rice Plant and of the Rice Inflorescence. In Journ. of Ind. Bot. Soc. v (1926), 13.

Much interesting information on *Oryza sativa* can be had in Watt, G.: Dictionary of Economic Products of India v (1891).

Watt, G.: Commercial Products of India (1908).

Heuzé: Les Pl. Aliment. des Pays Chauds (1899), 14-116.

Mollison: Textb. Ind. Agric. iii (1901), 32-44.

Semler: Trop. Agrik. iii (1903), 1-48.

Copeland, E. B.: Rice (1924).

Statistical Atlas of the Bombay Presidency, 1925.

Wild Rice: We possess little reliable information regarding the Wild Rices of the Presidency. S. G. Bhalerao (in Agric. Coll. Mag. xx (1928), 45) has published a paper on 'The Wild Rice (*Oryza sativa*) of the Bombay Presidency', which contains a number of interesting observations.

According to him the wild type of Rice 'occurs abundantly on the Western Ghats and occupies the zone where the rainfall is over 30-35 inches. As an annual aquatic, it occurs in marshy areas, in small pools and ponds and on the margins of the big tanks. It is rarely found in more than 3 feet depth of water and on land without any standing water as well.'

We have found a Wild Rice in pools on Tableland at Panchgani (rainfall 60 in.).

97. HOMALOCENCHRUS, Mieg. Act. Helv. Phys. Math. 4 (1760), 307.  
(*Leerseae*, Sw.)

*Description*: Cke. ii, 1041 (*Leerseae*).

We follow O. Kuntze (Rev. Gen.) and Hitchcock (Genera of Grass. Unit. St. in U.S. Dept. of Agric. Bull. 772 (1920), 205) in going back to the genus *Homalocenchrus*. Hitchcock says that one species is referred to the genus with certainty, another being doubtfully referred to it. No specific names are used, but under the first there are two citations which appear in the Species Plantarum under *Phalaris oryzoides*, Linn. which Hitchcock considers as type species.

Species 14.—Tropical and temperate regions.

Only one species in the Presidency.

1. *Homalocenchrus hexandrus*, O. Kuntze Rev. Gen. (1891), 777.—*Leersia hexandra*, Sw. Prodr. Veg. Ind. Occ. (1797), 131; Fl. Dan. t. 1744; Kunth Enum. Pl. i, 6; Host. Gram. Austr. t. 35; Engl. Bot. t. 2908; Reichb. Ic. Fl. Germ. i, t. 52; Duthie Grass. N.W. Ind. 12; Miq. Fl. Ind. Bat. iii. 367; Benth. Fl. Austral. vii, 549; Hook. f. in F.B.I. vii, 94; Cke. ii, 1042; Haines Bot. Bihar & Orissa (1924), 981.—*Asprella hexander*, Roem. & Schult. Syst. ii (1817), 267.—*Leersia australis*, R. Br. Prodr. (1810), 210; Kunth l. c. 6.—*Asprella australis*, Roem. & Schult. l. c.—*Oryza australis*, A. Br. ex Schweinf. Beitr. Fl. Aethiop. (1867), 300; Aschers.—Schweinf. Ill. Fl. d'Ég. 167, No. 1148.—*Leersia ciliata*, Roxb. Hort. Beng. (1814), 26; Aitchis. Cat. Panjab Pl. 157; Duthie l. c., Fodd. Grass. N. Ind. 21.—*L. ciliaris*, Griff. Not. iii, 2.—*L. glaberrima*, Trin. Oryz. 7; Miquel l. c. 368.—*L. mexicana*, H. B. & K. Nov. Gen. & Sp. i (1815), 195; Kunth l. c. 6 and ii, 2, Suppl. 2, Rev. Gram. 178, t. 1.—*Asprella mexicana*, Roem. & Schult. l. c.—*Oryza mexicana*, Doell. in Mart. Fl. Bras. ii, ii (1871), 10.—*Zizania ciliata*, Spreng. Syst. ii (1825), 136; Kunth Rev. Gram. i, 8; Griff. Not. iii, 1.—*Oryza hexandra*, Doell. in Mart. Fl. Bras. ii, ii (1871), 10.—*Pharus ciliatus*, Retz. Obs. v (1779), 23.—*Pseudoryza ciliata*, Griff. Ic. Pl. Asiat. t. 144, f. 1.—*Turraja nepalensis*, Wall. Cat. 8637D.—*Blepharochloa ciliata*, Endl. Gen. 1352.—*Hygroryza ciliata*, Nees ex Steud. Nomencl. ed. ii, i (1841), 783.—*Leersia brasiliensis*, Spreng. Nov. Prov. (1819), 47.—*Asprella brasiliensis*, Roem. & Schult. Mant. ii (1824), 153.—*Leersia contracta*, Nees Agrost. Bras. (1829), 516.—*L. luzoniensis*, Presl. Rel. Haenk. i (1830), 207.—*L. parviflora*, Desv. Opusc. (1831), 61.—*L. abyssinica*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii (1851), 356.—*Asprella purpurea*, Bory Hort. Maurit. (1837), 376.—*Leersia elongata*, Willd. herb. No. 1511 ex Trin. in Mem. Acad. Petersb. 6 ser. iii (1839), 172.—*L. mauritanica*, Salzm. ex Trin. l. c. 174.—*L. Triniana*, Sieb. ex Trin. l. c. 174.—*L. gracilis*, Willd. herb. No. 1512 ex Trin. l. c. 173.—*L. Griffithiana*, C. Mill. in Bot. Zeitg. xiv

(1856), 345.—*L. capensis*, C. Mill. l.c. 345.—*L. Gouini*, Fourn. ex Hemsl. Biol. Centr.—Am. Bot. iii (1885), 514 (*nomen*).—*Homalocenchrus Gouini*, O. Kuntze Rev. Gen. (1891), 777.—*Leersia ægyptiaca*, Fig. & De Not. in Mem. Ac. Torin. ser. ii, xiv, (1853), 317.—*L. terox*, Fig. & De Not. l. c. 319.

*Description* : Cke. ii, 1042, under *Leersia hexandra*.

*Locality* : *S. M. Country* : Devaraji (Sedgwick & Bell 4463 !); Sadambi Tank, Tadas (Sedgwick 2052 !); Sluavar, in tanks (Sedgwick 2289 !); Castle Rock, in rice field (Bhide !); Kunnur, margin of tank (Sedgwick 4930 !); Londa (Woodrow).—*Kanara* : (McCann !); Halyal Tank (Talbot 1345 !, 2147 !).

*Distribution* : More or less throughout India, Ceylon, Africa, America, Australia.

98. *HYGRORYZA*, Nees in Edinb. N. Phil. Journ. xv (1833), 380 ;  
Cke. ii, 1041.

Species 1.—India, Ceylon, Tonkin.

1. *Hygroryza aristata*, Nees in Edinb. N. Phil. Journ. xv (1833), 380 ; Duthie Grass. N. W. Ind. 12, Fodd. Grass. N. Ind. 20 ; Aitchis. Cat. Pan. Pl. 157 ; Hook. f. in F.B.I. vii, 95 ; Trin. Fl. Ceyl. v, 185 ; Prain Beng. Pl. 1185.—*Pharus aristatus*, Retz. Obs. v (1779-91), 23.—*Leersia aristata*, Roxb. Hort. Beng. (1814), 26, Fl. Ind. ii (1832), 207 ; Griff. Not. iii, 3.—*Zizania aristata*, Kunth. Rev. Gram. i (1830), 8 ; Enum. Pl. i, 10.—*Z. Retzii*, Spreng. Syst. ii (1825), 136.—*Potamochoa Retzii*, Griff. Journ. As. Soc. Beng. v, (1836), 571, t. 24, f. 2, Not. iii, 8, Ic. Pl. Asiat. t. 139, f. 147 & t. 140.—*Pharus natans*, Herb. Russell ex Wall. Cat. (1828) No. 8638 ; Rheede Hort. Mal. x, t. 12.

*Description* : Cke. ii, 1041.

*Locality* : *Gujarat* : Chikli (Woodrow).—*Konkan* : Bhiwandi, near Kalyan (Chibber !); Nagotna (Gammie 16063 !); Kurnul, pond (Ezekiel !); bank of Vihar Lake (McCann !).—*Deccan* : Poona, Agricultural College Garden (Bhide !, McCann !).

*Distribution* : Of genus.

TRIBE XV. FESTUCEÆ

99. *ELYTROPHORUS*, Beauv. ; Cke. ii, 1044.

Species 1.—Tropical Asia, Africa and Australia.

1. *Elytrophorus articulatus*, Beauv. Agrost. (1812), 67 ; Cke. ii, 1044.—For synonyms see Hook. f. in F.B.I. vii, 1044.

*Description* : Cke. l. c.

*Locality* : *Gujarat* : Godra (Woodrow).—*Konkan* : Alibag, rice field near water works (Ezekiel !); Pean (McCann 5504 !, 5509 !); Conditia (McCann 4242 !); Bhandup, in damp rice field (Nana A46 !); Kalyan (Woodrow).—*Deccan* : Khandala, Bushy Lake, in dry bed (McCann 9392 !); Matheran (Gammie 1664 !); Karjat, Honad Taluka (Bhonsle !); Igatpuri (Blatter & Hallberg 5144 !, 5494 !).—*S. M. Country* : Chabbi, rice field, 2,000 ft., rainfall 30 inches (Sedgwick 3705 !); Londa (Woodrow).—*Kanara* : Halyal (Talbot 1370 !).

*Distribution* : Of the genus.

100. *AELUROPUS*, Trin ; Cke. ii, 1045.

Species few.—From the Mediterranean and Caspian regions to the Punjab, Sind, and S. India.—Only 1 species in the Bombay Presidency.

1. *Aeluropus villosus*, Trin, ex L. Mey. Verz. Pflanz. Cauc. (1831), 18 ; Cke. ii, 1045. For synonyms see Hook. f. in F.B.I. vii, 334.

*Description* : Cke. l. c.

*Locality* : Sind : Near salt creeks in Sind (Stocks 506) ; Gharo (Blatter & McCann D659 !, D660 !); Mirpur Sakro (Blatter & McCann D658 !); Karachi (Bhide !, Woodrow) ; Laki (Bhide !); Kotri, banks of Indus (Sabnis B370 !); Sehwan, clayey plains (Sabnis B606 !); Sehwan to Laki, foot of hills (Sabnis B108 !); Sanghar (Sabnis B891 !).—*Gujarat* : Surat, mud-flats, mouth of

Tapti River (Hallberg A29 !); Porbandar (Bhide !); Dharasna (Chibber !); road to Gola (Chibber !); Karie Roa, Cutch (Blatter 3770 !, 3773 !); Kala, Pachan Isl., Cutch (Blatter 3739 !); (Runn of Cutch Blatter 3730 !, 3731 !).—*Konkan*: On the salt ground near the sea (Graham, Lisboa); Bandra, salt marsh (Vakil A28 !); Penn (McCann A31 !); Bassein Creek (Chibber !); Nagaon, Sion, salt marsh (McCann 5240 !); Saisette (Wight 53).

*Distribution*: Punjab, Sind, W. Peninsula, in salt ground, Ceylon, Afghanistan, Persia, Caspian region, Arabia, Mediterranean region.

#### 101. CENTOTHECA, Desv. ; Cke. ii, 1043.

Species doubtfully 3.—Tropical Africa, Asia, Australia.—One species in the Presidency.

1. *Centotheca lappacea*, Desv. in *Nouv. Bull. Soc. Philom.* ii (1810), 189, *et in Journ. Bot.* i (1813), 71; Cke. ii, 1043.—For synonyms refer to Hook. f. in *F.B.I.* vii, 332.

*Description*: Cke. l. c.

*Locality*: *Konkan*: Vetora (Sabnis 33564 !, 33727 !).—*Kanara*: Castle Rock, evergreen forests, 1,600 ft., rainfall 250 inches (Sedgwick 2714 !; Gammie 15693 !); Guddhalli, Karwar (Hallberg & McCann A25 !); Katgal (Hallberg & McCann A26 !); Devimani Ghat (Hallberg & McCann A27 !); on a fern stem (Woodrow !).

*Distribution*: Himalayas, Khasia Hills, Central India, Burma, W. Peninsula, Ceylon, Malaya, China, Polynesia, tropical Africa.

#### TRIBE XVI. HORDEÆ

#### 102. LEPTURUS, Br. ; Hook. f. in *F.B.I.* vii, 365.

Small, slender grasses. Leaves flat or convolute. Spikelets 1–2-flowered, sessile, solitary, half-immersed in hollows of the rachis of a simple, terminal, articulate or not-straight or incurved spike with the back of the lowest floral glume opposite the rachis; rachilla jointed. Glumes 3 or 4. Lower involucrel glume minute or 0, upper longer than the flowering glumes, linear, rigid, acute, 5-nerved, erect or at length deflexed; flowering glumes much shorter than the upper involucrel glume, hyaline; pale 2-keeled. Lodicules 2, cuneate, or lobed. Stamens 1–3. Ovary glabrous; styles short, distant. Grain narrow or oblong, glabrous, free.

Species 6.—The Old World.—One species in the Presidency, new to it.

1. *Lepturus repens*, R. Br. *Prodr.* (1810), 207; Brongn. in *Duperr. Voy. Bot.* 57, t. 16; Kunth *Enum. Pl.* i, 463, *Suppl.* 374; Steud. *Syn. Gram.* 357; Benth. *Fl. Austral.* vii, 668; Hook. f. in *F.B.I.* vii, 365.—*Rotboellia repens*, Forst. *Prodr.* 9.—*Monerma repens*, Beauv. *Agrost.* 117.—*Lepturus aciculatus*, Steud. *Syn. Gram.* 357.—*Lolium Coelorachis*, Forst. in *Herb. Paris*, Steud. *Nom.* ed. ii, ii, 64.

*Description*: A perennial grass. Stem elongate, woody, branched and widely creeping below. Leaves 7 to 15 cm. long, 3–6 mm. broad, spreading or erect, acuminate, glaucous; sheaths glabrous or mouth ciliate; ligule inconspicuous. Spikes shortly peduncled, fragile. Spikelets 2-fid; rachilla elongate, bearing an upper imperfect flower. Involucrel glumes 1 (or 2 in the uppermost spikelet) flat, rigid, 6–12 mm. long, closely appressed to the rachis; flowering glume, much shorter than the involucrel, elliptic, concave, 3-nerved. Pale 2-keeled. Lodicules fleshy, obliquely truncate or 2-lobed, glabrous. Grain oblong.

*Locality*: *Kanara*: 4 miles from Halyal (Bhide).

*Distribution*: N. Kanara, Ceylon, Malay and Pacific Islands, Australia.

#### 103. TRITICUM, LINN.

\* 1. *Triticum sativum*, Lam. *Fl. Fr.* ed. 1, iii (1778), 625.

We are not in a position to discuss the many varieties or forms that are cultivated in the Presidency. We refer to some literature which may help those who wish to make further inquiries into this very complicated question.

Hackel in Engler & Prantl. *Pflanzenfam.* ii, 80.

Murray in Watt Dictionary of Economic Prod. vi, pt. 4, 89.

Koerneck & Werner, Handbuch der Getreide Arten.

Howard, A. and Howard, G.L.C. The varietal characters of Indian wheats. Mem. Dept. Agr. Ind. (Bot. ser.) ii (1908), and many other papers on wheat which were mostly published by the Department of Agriculture in India.

Schulz, A. Die Abstammung des Weizens. Mitt. natf. Ges. Halle a. S. I. (1912), 14-17.

Percival, J. The wheat plant: a monograph. 463 p., 218 f. London 1921.

Huber, J. A. Ueber Abstammung und Systematik des Weizens. in Naturforscher iii, (1927), 577-582.

Cooke mentions 2 varieties which are chiefly grown in the Presidency :

- (a) Var. *spelta*. This is Linné's *Triticum Spelta*.
- (b) Var. *pilosa*. This is *Triticum pilosum*, Dalz. & Gibs.

#### 104. HORDEUM, LINN.

1. *Hordeum vulgare*, Linn. Sp. Pl. (1753), 84.

The following three varieties are grown in the Bombay Presidency.

- (a) Var. *hexastichon* = *Hordeum hexastichon*, Linn. Sp. Pl. (1753), 85.
- (b) Var. *distichon* = *H. distichon*, Linn. l.c.
- (c) Var. *nudum* = *H. nudum*, Arduini ex Schult. Mant. ii. (1824), 437.

We refer to :

Schulz, A. Die Abstammung der Saatgerste, *Hordeum sativum*. Mitt. Natf. Ges. Halle a. S.I. (1912), 18-27.

Wiggans, R. G. A classification of the cultivated varieties of Barley. Cornell Agr. Exp. Stat. Mem. 46 (1921), 365-456.

Blaringhem, L. Sur les caractères d'espèces élémentaires d'Orges (*Hordeum*). Bull. Soc. Bot. France 71 (1924), 623-27.

#### TRIBE XVII. BAMBUSEÆ

105. *BAMBUSA*, Schreb. Gener. Plant. (1789) no. 607. (Cke. ii, 1046).

Species 73.—Eastern Asia, Australia.—One species indigenous in the Presidency, and 2 commonly cultivated.

I. Stem and branches unarmed

- |   |                         |
|---|-------------------------|
| 1. Spikelet subcylindric; fertile flowers 5-9 ..                          | 1. <i>B. nana</i> .     |
| 2. Spikelet compressed, flattened, distichous,<br>fertile flowers 5-6 ... | 2. <i>B. vulgaris</i> . |

II. Stem and branches armed ... .. 3. *B. arundinacea*.

\* 1. *Bambusa nana*, Roxb. Hort. Beng. (1814), 25, Fl. Ind. ii, 190; Munro Monogr. Bamb. in Transact. Linn. Soc. xxv (1866), 89; Gamble Ind. Bamb. Ann. Roy. Bot. Gard. vii (1896), 40, t. 38; Brandis Ind. Trees 669; Camus, Bambusées (1913), 121, pl. 37, f. B.—*B. glaucescens*, Siebold Cat. ex Munro.—*B. glauca*, Lodd. Cat.—*B. caesia*, Sieb & Zucc. ex Munro.—*B. sterilis*, Kurz in Miquel Ann. Mus. Bot. Lugd. Bat. ii, 285.—*B. viridi-glaucescens*, Carrière in Revue Hortic. (1869), 292 (non Riv.).—*B. aurea*, Franchet & Savatier (non A. & C. Rivière).—*Ischurochloa floribunda*, Büse in Miq. Pl. Jungh 390; Miquel Fl. Ind. Bat. iii, 422.—*Arundinaria glaucescens*, P. Beauv. Agrost. 144; Ruprecht in Act. Acad. Caes. Petrop. (1840), 23, t. 1, fig. 3; Munro Monogr. l.c. 22.—*Panicum arborescens*, Linn.—*Triglossun arundinaceum*, Fisch. apud Roem. & Schult. Syst. 846.—*Ludolfia glaucescens*, Willd. in Mag. Gesell. N. F. Berlin (1808), 320.

*Description* : Stems densely tufted, 2-3 m. high, rarely more, 3 cm. in diam., glabrous, green when young, then yellow, unarmed, hollow, much branched from the base; branches fascicled, semiverticillate, often dichotomous. Sheaths of young shoots glabrous, striate, very long, attenuate, apiculate, lanceolate, truncate at the apex, surmounted by an imperfect limb rather long-acuminate and decurrent into 2 ciliate auricles. Leaves often small, 2.5-7.5 cm. long, the larger ones often attaining 14 cm. by 5-7 mm., rounded at the base, long-acuminate, smooth or pubescent below, scabrous on the margins, glaucous-bluish; secondary nerves 5-7 pairs, not tessellate, but provided with pellucid glands. Spikelets 12-45 mm. long, few clustered or solitary on the branches of short diffuse panicles, straw-coloured, shining,

5-9-flowered; sometimes with bractiform subfoliaceous scales at their bases; rachilla glabrous, flattened. Glumes all flowering or rarely the lowest empty, ovate, acute, many-nerved. Pale shorter than the glumes, keels minutely ciliate at or near the tip only. Stamens long-exserted, pendulous; anthers obtuse or finely apiculate, yellow. Ovary obovoid, pubescent at the apex. Style very short, divided from almost the base into 3 long and hairy stigmas. Grain elliptic, furrowed, shortly beaked, top hairy.

*Distribution*: China, Japan.—Cultivated in Manila, Luzon, Java, Malay Peninsula, India, Europe.

\* 2. *Bambusa vulgaris*, Schrad. *apud* Wendl. Collect. Pl. ii (1810), 26, t. xlvii; Rupr. in Act. Acad. Caes. Petrop. (1840), 137, t. xi, fig. 47; Munro, Monogr. 107; Bedd. Fl. Sylv. cccxxii; Brandis Ind. Trees 670; A. & C. Rivière Les Bambous 191; Gamble Ind. Bamb. 43, pl. 40 and in Hook. f. F. B. I. vii, 391. Camus Les Bambusées (1913), 122, pl. 76, f. fA.—*B. Thouarsii*, Kunth Not. Gen. Bambus. in Journ. Phys. (1822), 148; Rupr. Bambus. 48, t. xi, f. 48.—*B. surinamensis*, Rupr. in Act. Acad. Caes. Petrop. (1840), 49, t. xi, 49.—*B. Steberi*, Griseb. Fl. Brit. W. Ind. 528.—*B. humilis*, Reichb. ex Rupr.—*B. arundinacea*, Moon Cat. 26; Ait. Hort. Kew. ed. ii, 316.—*B. auriculata*, Kurz. *apud* Houz. de Lehaie.

*Description*: Stems unarmed, 6-15 m., 5-10 cm. in diam., first green, then yellow, or striped, polished; nodes hardly raised, with usually a ring of brown hairs; internodes 25-45 cm. long, walls rather thin. Stem-sheaths 15-25 cm. by 17-23 cm., often streaked with yellow, thickly hairy above, top rounded, retuse; blade 5-15 cm., appressed hairy on both surfaces, base rounded, decurrent with rounded, falcate, fimbriate auricles; ligule broad, toothed or fimbriate. Leaves linear-lanceolate, 15-25 cm. by 16-40 cm., pale, petioled, glabrous, tessellate by pellucid glands, tip twisted, scabrid, nerves 6-8; sheath laxly hairy; ligule short, ciliate, auricle rounded. Panicle large, leafy. Spikelets 15-20 mm., in bracteate clusters of 3-10 oblong, acute, bifid, empty glumes, 1-2 ovate, many-nerved with the tip ciliate; flowering glumes 6-10, larger. Pale as long as the glume, keels white, ciliate. Lodicules 3, winged, ciliate. Anthers obtuse, hairy, apiculate, purple. Ovary narrow, hairy; style long.

*Distribution*: Mauritius, Bourbon, Madagascar, Hawaii, Java.—Cultivated in other countries.

A handsome variety is grown in Indian gardens.

*Var. striata*, Auct. mult.—*Bambusa striata*, Lodd. ex Lindl. in Penny Cyclon. iii (1835), 357; Munro Monograph 121; Curtis Bot. Mag. xxx (1874) t. 6079.—*Var. vittata*, A. & C. Rivière l. c.—*B. vulgaris vel culmis variegatis*, Hort. Gall.—*B. variegata*, Hort.—*Var. aureo-variegata*, Hort.

Rather smaller in size. The stems are striped with yellow and green, the stripes alternating at every node; the branchlets are yellow and the leaves somewhat smaller and paler. On drying the stripes disappear.

*Distribution*: Probably the result of cultivation in China and Japan.

3. *Bambusa arundinaria*, Retz. Obs. v (1789), 24 *sub* Bambos; Willd. Sp. Pl. ii (1799), 245; Roxb. Corom. Pl. i, 56, t. 79, Fl. Ind. ii, 191; Poir. Encycl. viii, 701; Rupr. in Act. Acad. Caes. Petrop. (1840), 51, t. xiii, fig. 50; Munro, Monogr. 103; Brandis Ind. Trees 671; Bedd. Fl. Sylv. cccxi; Gamble Ind. Bamb. 52 *et in* Hook. f. F. B. I. vii, 395; Duthie Fodd. Grass. N. Ind. 70; Cke. ii, 1046; Camus Les Bambusées (1913), 128, pl. 75, f. A.—*B. Arundo*, Klein ex Nees in Linnæa ix (1834), 471; Rupr. Bamb. l. c. 53, t. 13, f. 53.—*B. Neesiana*, Arn. ex Munro l. c.—*B. orientalis*, Nees l. c. 475; Rupr. l. c. 52, t. 13, f. 51.—*H. pungens*, Blanco Fl. Filip. ed. i, 270.—*B. spinosa*, Roxb. Fl. Ind. ii, 198.—*Arundo Bambos*, Linn. Sp. Pl. 81.—*A. indica arborea*, Auct.—*Nastus arundinaceus*, Sm. in Rees Cycl. xxiv, no. 1.

*Description*: Cke. ii, 1046.

*Locality*: *Gujarat*: (Gamble); Dangs (Woodrow).—*Konkan*: Kanary Caves (McCann A215!, A216!); Wada Range (Ryan 494!); Vetora (Sabnis 33282!); Western Ghats (Gamble).—*Deccan*: Igatpuri (McCann A218!); Karli (Gammie 16169!); Khandala, St. Xavier's Villa (McCann A224!, A225!).—*Kanara*: Karwar (Hallberg & McCann A217!); 3 miles from Mirjan (Hallberg & McCann A 220!).

*Distribution*: India, Burma, Ceylon.—Often cultivated.



106. OXYTENANTHERA, Munro; Cke. ii, 1047.

Species 16.—Malay Peninsula, Siam, India, tropical Africa.—2 in the Bombay Presidency.

- |   |     |                         |
|---|-----|-------------------------|
| 1. Spikelets 1-flowered; style glabrous | ... | 1. <i>O. Ritcheyi</i> . |
| 2. Spikelets 2-flowered; style hairy    | ... | 2. <i>O. Stocksii</i> . |

1. *Oxytenanthera Ritcheyi*, *nov. comb.*—*Bambusa Ritcheyi*, Munro in Trans. Linn. Soc. 26 (1868), 113.—*Oxytenanthera monostigma*, Bedd. For. Man. in Fl. Sylv. (1873) cccxxiii, *et* Ic. Pl. Ind. Or. (1874), 56, t. 234; Gamble Ind. Bambus (1896), 74, t. 65; Brandis Ind. Trees (1911), 674; Talbot For. Fl. Bombay ii (1911), 571; Camus Bambusées (1913), 148; Troup Silvic. Ind. Trees iii (1921), 1006.—*Schizostachyum hindostanicum*, Kurz in Proc. As. Soc. Beng. 52, ii (1873), 252.

Why we made the change from *O. monostigma* to *O. Ritcheyi* is evident from the synonymy.

*Description*: Cke. ii, 1048.

*Locality*: *Konkan*: Ghats (Talbot, Woodrow).—*Deccan*: Sakhar-Pathar Hill near Lonavla (Woodrow); Satara Ghats (Brandis); Mahableshwar (Fagan); Poona District (Wroughton); Ahmednagar (Wilkins).—*S. M. Country*: (Ritchie 820).—*Kanara*: N. Kanara (Woodrow); Wuddermone (Talbot 905 !, 252 !); Arbail Ghat (Talbot 906 !); Arbail (Talbot 251 !, 857 !); Godhuli (Talbot 583 !); Supa (Talbot !).

*Distribution*: W. Peninsula.

2. *Oxytenanthera Stocksii*, Munro in Trans. Linn. Soc. xxvi (1868), 130, Bedd. For. Man. in Fl. Sylv. (1873), cccxxiii; Gamble Bamb. Brit. Ind. 75, t. 66, *et* in Hook. f. F.B.I. vii, 403; Cke. ii, 1048; Talbot For. Fl. Bombay ii. 570; Camus Les Bambusées (1913), 149.

*Description*: Cke. ii, 1048.

*Locality*: *Konkan*: (Stocks).—*Deccan*: Panchgani, planted (Woodrow).—*Kanara*: Kumpta, cultivated (Talbot 269 !, 3601 !); Karwar (Talbot 856 !); commonly cultivated along the coast; rare in the Ghat forests of N. Kanara (Talbot).

*Distribution*: W. Peninsula, Indo-China.

107. DENDROCALAMUS, Nees; Cke. ii, 1049.

Species 24.—Africa, Indo-Malaya, Philippines, China.

- |  |     |                          |
|--|-----|--------------------------|
| 1. Stem-sheaths 7-30 cm. long; leaves up to 25 by 3 cm.                      | ... | 1. <i>D. strictus</i> .  |
| 2. Stem-sheaths 50 cm. long, as broad at the base; leaves up to 50 by 10 cm. | ... | 2. <i>D. giganteus</i> . |

1. *Dendrocalamus strictus*, Nees in Linnæa 9 (1834), 476; Miq. Fl. Ind. Bat. ii, 421; Munro Monogr. 147; Bedd. Fl. Sylv. t. cccxxv; Brandis Ind. Trees 675; Duthie Fodd. Grass. N. Ind. 71; Gamble Bamb. Brit. Ind. 78, t. 68, 69 *et* in Hook. f. F.B.I. vii, 404; Cke. ii, 1049; Camus Les Bambusées (1913), 152 pl. 87, f. B.—For synonyms see F.B.I. vii, 404.

*Description*: Cke. ii, 1049.

*Locality*: *Sind*: Junnar Hill (Burns !).—*Gujarat*: Junagad, Datar Hill, Kathiawar (Chibber !); Panch Mahals (Woodrow).—*Khandesh*: To Toronmal (McCann 9791 !); base of Toranmal (McCann A221 !).—*Konkan*: Planted (Woodrow).—*Deccan*: Rocky hills (Gamble); Karli (Gammie 16167 !); Ganeshkhind Botanic Gardens (Patwardhan !).—*S. M. Country*: Byadgi, Dharwar Dist. (Talbot !).—*Kanara*: Karwar (Talbot !); Ambgaum (Talbot 1788 !); Dongi Nallah (Talbot 959 !).

*Distribution*: India, Java.

\*2. *Dendrocalamus giganteus*, Munro in Trans. Linn. Soc. xxvi (1868), 150; Kurz Ind. Forester i, 346; Gamble Bamb. Brit. Ind. 88, t. 76 *et* in Hook. f. F.B.I. vii, 406; Brandis Ind. Trees 678; Cke. ii, 1050; Camus Les Bambusées (1913), 159, pl. 85, f. A.—*Bambusa gigantea*, Wall. Cat. Bot. Gard. Calc. 79; Gardeners' Chronicle pl. Sept. 1892.

*Description* : Stems 20–30 m. by 20–25 cm. in diam., branched above ; nodes hairy, internodes rather short, grey-green, young with waxy scurf ; walls thin. Stem-sheaths 50 cm. long, as broad at the base, deciduous, thinly strigose with golden hairs, top depressed ; blade 12–40 by 9 cm., decurrent into glabrous, stiff, brown wavy auricles, narrowed above into a short point ; ligule 5–12 cm., stiff, black, margin serrate. Leaves up to 50 by 10 cm., oblong, cuspidately acuminate, tips twisted, young hairy beneath, midrib strong, nerves 12–16 pairs, with pellucid cross bars. Panicle very large, branchlets slender, curved ; heads up to 2.5 cm. diam., 1.2–2.5 cm. apart. Spikelets 12 mm. long, ovoid, acute, spinescent, puberulous, sometimes all flowering ; rhachilla produced with an imperfect glume. Involucral glume ovate, mucronate, striate ; flowering glumes 3–6, thin, mucronate, many-nerved. Anthers acuminate. Ovary ovoid and long style hairy ; stigma simple. Grain oblong, obtuse, hairy above.

*Distribution* : India (Tenasserim, Malay Peninsula, Penang, Malacca, Perak), Cochin-China. Cultivated in gardens of India, Ceylon and Europe.

#### 108. TEINOSTACHYUM, Munro.

Stems thin, overhanging, sometimes climbing. Stem-sheaths usually thin. Leaves various. Panicle spiciform, on leafy branches. Spikelets up to 7.6 cm. long, slender, many-flowered, sometimes pedunculate, in bracteate whorls, upper and lower flowers imperfect. Involucral glumes 1–2, mucronate ; flowering glumes similar, mucros longer. Pale convolute, keels ciliate. Lodicules 3, 3–9-nerved. Stamens 6, filaments free, slender. Anthers obtuse or obtusely apiculate. Ovary ovoid or depressed-globose, apex produced enclosing the style ; stigmas 2–3, plumose. Grain ovoid, acuminate, beaked, pericarp crustaceous.

Species 5.—India, Ceylon.—One species in the Bombay Presidency ; not mentioned by Cooke.

1. *Teinostachyum Wightii*, Bedd. Fl. Sylv. t. cccxxiii, Forest Man. ccxxxiii (*excl. syn.*) ; Gamble Bamb. Brit. Ind. 99, t. 87, *et in* Hook. f. F.B.I. vii, 410 ; Brandis Ind. Trees 679 ; Camus Les Bambusées (1913), 163.

*Description* : Stem 3–6 m. by 2.5–3 cm., semi-scandent ; branches pendulous ; nodes narrowly ringed ; internodes bright green, rough above ; walls thin. Stem-sheaths 25–30 by 2.5–3 cm., papery, hirsute with black-brown hairs, top truncate, not auricled ; blade subulate, 12–17 cm., decurrent on the sheath ; ligule 2.5 mm. Leaves 15–40 cm. by 2.5–5 cm., oblong-lanceolate, acuminate, tip scabrous, twisted, whitish and sparsely hairy beneath, midrib broad, yellowish, nerves 6–7 pair, tessellate by glands ; sheath glabrous ; ligule narrow. Panicle large, with spiciform drooping branchlets ; rhachis smooth, slender ; rhachilla of spikelets slender, flattened and concave below, thickened and ciliate above. Spikelets 12–25 mm. Involucral glume 1, ovate, mucronate, 5–7-nerved, dorsally hirsute ; flowering glumes 1 or 2, mucronate, nerved transversely. Lodicules ovate, short-ciliate, 3–5-nerved. Ovary stalked, depressed-globose, smooth, style included in the long beak of the ovary. Grain stoutly stalked, ovoid, beaked, glabrous.

*Locality* : Ghats of N. Kanara.

*Distribution* : Nilgiris, Anamalais, about 3,300–5,000 ft. altitude.

#### 109. OCHLANDRA, Thw. ; Cke. ii, 1050.

Species 11.—India, Ceylon, Malay Peninsula, Java, Madagascar.—Only one species in the Bombay Presidency.

1. *Ochlandra Talboti*. Brandis Ind. Trees (1911), 684 ; Talbot For. Fl. Bombay ii (1911), 572 ; Cke. ii, 1050 ; Camus Les Bambusées (1913), 181.—*O. stridula*, Woodr. Journ. Bom. Nat. Hist. Soc. xiii (1901), 442 (*non* Thw.).

*Ochlandra Rheedii* var. *Sivagiriana*, Gamble which Talbot (l. c.) identifies with *Ochlandra Talboti*, has been described as a distinct species by Camus under the name : *Ochlandra Sivagiriana* in Les Bambusées (1913), 181.

*Description* : Cke. ii, 1050.

*Locality* : Kanara : Gersoppa Falls (Talbot 3628 !, McCann !); Katgal (Talbot 3506 !, McCann !); Yellapore (Bell !); near Sulgeri (Bell 3357 !); Dadmune (Talbot !); common throughout the Kanara forests (McCann !); Honavar, at Alanki (McCann !).

*Distribution* : Endemic in N. Kanara.

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#### A CORRECTION.

In vol. 32 (1927), 27 we made a new combination *Hemarthria glabra*. Mr. Hubbard of Kew informs us that this combination is invalid and gives the following explanation :—

'R. Brown described the genus *Hemarthria* in his *Prod. Fl. Nov. Holl.* 207 (1812). He had two species *H. compressa* and *H. uncinata*. The first, *H. compressa*, is accompanied by a descriptive phrase of three words, then the letter J. denoting one of his specimens from Port Jackson or that neighbourhood (in Australia), followed by *Rottboellia compressa*, Linn. f. Suppl. 114; thus *Hemarthria compressa* was really based on *Rottboellia compressa*, Linn. f. The Australian plant which R. Brown cited, was incorrectly identified by him with *R. compressa*, Linn. f.; that together with all the Australian material is referable to his *Hemarthria uncinata*. *Rottboellia compressa*, Linn. f. was based on a plant collected in India; our Indian specimens all agree with this specimen and are all *Hemarthria compressa*, (Linn. f.) R. Br. We have no Indian material of *Hemarthria fasciculata*, (Lam.) Kunth and those specimens identified by Hooker in *Flora of British India* and by others as *Rottboellia compressa* var. *fasciculata*, (Lam.) Hack., are all typical *Hemarthria compressa*. *H. fasciculata*, Kunth is based on *Rottboellia fasciculata*, Lam., a species originally described from North Africa and now known to occur throughout Africa, in the Mediterranean region and in America.'

Our *Hemarthria glabra*, therefore, must be called *Hemarthria compressa*, (Linn. f.) R. Br.

The species is known from Afghanistan, India, China and Indo-China.

The other species, *Hemarthria fasciculata*, Kunth (xxxii (1927), 28 of this series) for which we had no locality, but which we included on the authority of others, must be excluded, as it has not been observed in India.

(To be continued.)

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REVISION OF THE FLORA OF THE BOMBAY PRESIDENCY. Part XI.  
By REV. E. BLATTER, S.J., Ph.D., F.L.S.

IX 1930

Gramineae - *Blatter*

Key to Genera

*Mc-*





REVISION OF  
THE FLORA OF THE BOMBAY PRESIDENCY

BY

E. BLATTER, S.J., PH.D., F.L.S.

PART XI

GRAMINEÆ

BY

E. BLATTER, S.J., PH.D., F.L.S., and C. McCANN

(Continued from page 775 of Volume XXXIII)

KEY TO THE GENERA

We follow, where possible, the systematic arrangement given by Stapf in the Flora of Tropical Africa. We add in brackets the reference to the genera in our series.

**SUB-FAMILY I: Panicoideae.**—Mature spikelets falling entire from their pedicels or with them, all alike or differing in sex and structure; perfect spikelets with two heteromorphous florets, the upper hermaphrodite, the lower male or barren; rhachilla not continued beyond the upper floret (Genera 1-61).

**TRIBE I: MAYDEÆ.**—Sexes in different inflorescences on the same plant, or the female spikelets at the base of the inflorescence, the male above them; spikelets never awned, the male and female very dissimilar (Genera 1-4).

1. Male and female spikelets in separate inflorescences; male spikelets in a large terminal panicle; the female spikelets in the axils of the leaves.

A. Female spikes distinct, articulated (vol. 32, 15) ... ..

B. Female spikelets grown together into a spongy more or less cylindrical body (vol. 32, 15) ... ..

2. Male and female spikelets in separate portions of the same spike, the female below.

A. Grain enclosed in the usually globose or ovoid ivory-like capsuliform supporting sheath (vol. 32, 17) ... ..

B. Grain enclosed in the hardened outer glumes (vol. 32, 17) ... ..

**TRIBE II: ANDROPOGONÆ.**—Spikelets usually in pairs, one sessile, the other pedicelled, very rarely both pedicelled, those of each pair alike as to sex (homogamous) or different (heterogamous), rarely 3-nate or solitary on the axis of a usually spike-like raceme. Involucral glume more or less rigid and firmer than the floral glumes, the lower always

1. *Euchlaena*.

2. *Zea*.

3. *Coix*.

4. *Polytoca*.

longer than the florets; floral glumes membranous, often hyaline, that of the upper floret usually awned or reduced to an awn (Genera 5-41).

1. SUB-TRIBE: *Dimerinæ*.—Spikelets homogamous, second on a slender inarticulate rhachis, 1-flowered, diandrous (vol. 32, 18) ... .. 5. *Dimeria*.
2. SUB-TRIBE: *Ischæminæ*.—Fertile spikelets 2-flowered; fertile floret awned from the sinus of the bifid or bidentate upper floral glume, sometimes awnless in *Apluda* (Genera 6-13).
  - A. *Group Ischæmastræ*.—Racemes several-to many-noded, espatheate; spikelets of each pair homogamous or more often heterogamous, usually similar in shape and nervation, rarely distinctly heteromorphous; fertile spikelets awned (Genera 6-12).
    - i. Margins of lower involucrel glume of sessile spikelet inflexed.
      - a. Stem not woolly below; joints and pedicels stout; spikelets heterogamous (Genera 6-8).
        - (1) Spikes clustered; lower involucrel glume not channelled (vol. 32, 19)... 6. *Ischæmum*.
        - (2) Spikes solitary; lower involucrel glume usually channelled (vol. 32, 22) ... .. 7. *Sehima*.
      - b. Rootstock and base of stem clothed with woolly sheaths; spikelets similar and homogamous (vol. 32, 25) ... 8. *Pollinidium*.
    - ii. Margins of lower involucrel glume of sessile spikelet not inflexed.
      - a. Spikes solitary; spikelets 2-nate, 1-2-flowered, 2-awned (vol. 32, 289) ... 9. *Pogonatherum*.
      - b. Spikes solitary or 2-nate; spikelets 2-flowered, diandrous; lower involucrel glume very broad truncate (vol. 32, 25) ... .. 10. *Apocopsis*.
      - c. Spikes digitate; spikelets 2-flowered; lower involucrel glume tubercled (vol. 32, 22) ... .. 11. *Thelepogon*.
      - d. Spikes 2-∞-nate; spikelets 2-nate, upper alone awned (vol. 32, 25) ... 12. *Lophopogon*.
  - B. *Group Apludastræ*.—Racemes 1-noded, reduced to 3 heteromorphous spikelets, the sessile with a male and a hermaphrodite floret and an inflated callus, one pedicelled with 2 male florets, the other rudimentary on a glume-like pedicel; fertile florets awned or awnless (vol. 32, 26) ... .. 13. *Apluda*.
3. SUB-TRIBE: *Rotboellinæ*.—Fertile spikelets 1- or 2-flowered; fertile florets awnless (Genera 14-21).
 

*Group Rotboelliastræ*.—Racemes at the ends of the culms and their branches in a false (rarely true) spatheate panicle or solitary and terminal on simple or sparingly branched culms.

  - A. Spikelets all alike, also as to sex; racemes tough or tardily disarticulating, much compressed, joints and pedicels fused (vol. 32, 26) ... .. 14. *Hemarthria*.

- B. Spikelets of each pair more or less dissimilar, at least as to sex, the pedicelled male, neuter or suppressed (Genera 15-21).
- i. Sessile spikelets small, globose, foveolate, 1-flowered, pedicelled very dissimilar; joints and pedicels fused (vol. 32, 28) ... 15. *Manisuris*.
  - ii. Sessile spikelets not globose (Genera 16-21).
    - a. Sessile spikelets winged from the transversely rugose or muricate lower involucreal glumes, 1-flowered, pedicelled very dissimilar; joints and pedicels fused (vol. 32, 29) ... 16. *Peltophorus*.
    - b. Sessile spikelets not winged (Genera 17-21).
      - (1) Racemes usually more or less villous, very rarely glabrous, never cylindrical, joints and pedicels moderately stout, gaping.
        - i. Spikelets 2-flowered, very villous all over, the sessile sometimes 2 at a node and sub-opposite (vol. 32, 30) ... 17. *Lasiurus*.
        - ii. Spikelets 1-flowered; racemes more or less villous from the joints and pedicels or the edges of the spikelets, rarely glabrous; lower involucreal glume with a transparent oil-duct inside each keel or a fringe of penicillate warts (vol. 32, 30) ... 18. *Elyonurus*.
      - (2) Racemes glabrous, cylindrical, particularly when the spikelets are closed (Genera 19-21).
        - i. Pedicels and joints fused.
          - (a) Racemes stout, few from each culm; sessile spikelets 2-flowered, pedicelled male or neuter (vol. 32, 31) ... 19. *Rotboellia*.
          - (b) Racemes slender in ample spatheate panicles; sessile spikelets 1-flowered (vol. 32, 31) ... 20. *Ophiurus*.
        - ii. Pedicels free from the joints; racemes usually in terminal and lateral spatheate fascicles or fastigiata panicles; coarse tall grasses (vol. 32, 32) ... 21. *Coelorrhachis*.
4. SUB-TRIBE: *Saccharinæ*.—All spikelets alike in shape and sex, or if different in sex, then the pedicelled female (Genera 22-25).
- A. Group *Saccharastræ*.—Racemes in more or less compound panicles or racemosely arranged on an elongated common axis; spikelets 1-flowered; awn from the sinus of the 2-dentate floral glume or from the tip of the entire valve or 0 (Genera 22-24).
- i. Rhachis quite tough; racemes in spike-like or thyrsoid solitary panicles; all spikelets pedicelled, mucicous (vol. 32, 281) ... 22. *Imperata*.
  - ii. Rhachis of racemes readily disarticulating.
    - a. Spikelets in a wide, often thyrsoid, more or less plumose and silvery panicle, 2-flowered, usually awned, rarely mucronate or awnless (vol. 32, 283) ... 23. *Saccharum*.

- b. Spikelets in paniced racemes, 2-flowered, awned (vol. 32, 288) ... 24. *Spodiopogon*.
- B. *Group Pollinistræ*.—Racemes digitate, rarely solitary; spikelets 1-2-flowered; awn from the sinus of the 2-fid or 2-dentate floral glume; spikelets dorsally compressed; callus short, obtuse (vol. 32, 289) ... 25. *Eulalia*.
5. SUB-TRIBE: *Andropogoninae*.—Spikelets of each pair different in sex and frequently also in shape and size, or if those of some pairs of a raceme are alike in sex, then both male or neuter; fertile spikelets 1-flowered (Genera 26-41).
- A. Racemes in more or less compound espatheate panicles; pedicels without a translucent middle line (Genera 26-29).
- Group Sorghastræ*.—Pedicelled spikelets male, neuter or suppressed (including the pedicel in *Cleistachne*); awn from the sinus of the 2-fid floral glume.
- i. Spikelets dorsally compressed, at least when in flower; lower involucral glume of the fertile spikelets firmly chartaceous to coriaceous.
- a. Spikelets in threes, one of them fertile, or in racemes of 2-8 pairs; the pedicelled male, neuter, or if quite suppressed, then at least the pedicels present (vol. 32, 290) ... 26. *Sorghum*.
- b. Spikelets solitary (vol. 32, 408) ... 27. *Cleistachne*.
- ii. Spikelets laterally more or less compressed.
- a. Racemes of many pairs of spikelets; primary branches of panicles in whorls of 6-20 (vol. 32, 408) ... 28. *Vetiveria*.
- b. Racemes usually reduced to 1 sessile hermaphrodite and 2 pedicelled male or barren spikelets, rarely of 2 or more but always few pairs (vol. 32, 410) ... 29. *Chrysopogon*.
- B. Racemes not in compound espatheate panicles or if so (*Capillipedium*), then the pedicels with a translucent middle line (Genera 30-41).
- i. Fertile floral glume awned from low down on the back.
- Group Arthraxonastræ*.—Sessile spikelets convex on the back and rounded on the sides, often muriculate, particularly along the sides; pedicelled usually rudimentary or 0, rarely male; racemes digitate (vol. 32, 416) ... 30. *Arthraxon*.
- ii. Fertile floral glume awned from the sinus of a 2-fid or 2-dentate valve or continuing the more or less stipitiform floral glume (Genera 31-41).
- a. Margins of the lower involucral glume of the fertile spikelet inflexed and the glume therefore sharply 2-keeled more or less all along with a short obtuse callus, rarely the keels rounded off downwards with the margins subinvolute, but then the

back of the glume deeply sunk between the keels and the callus short or long and acute; awn glabrous or scabrid, very rarely hirsute (*Andropogon* sp.); spikelets awned (Genera 31-37).

- (1) Awn forming a continuation of the stipitiform fertile floral glume.  
*Group Amphilophiastæ.*—Racemes digitate or racemosely digitate, and then usually very numerous, all more or less peduncled on simple or almost simple culms, or solitary at the end of the culms and their branches and sometimes gathered into a scanty spatheate false panicle, rarely in compound espatheate panicles (*Capillipedium*) (Genera 31-34).
- i. Racemes in compound espatheate panicles (vol. 32, 419) ... 31. *Capillipedium*.
- ii. Racemes not in compound espatheate panicles (Genera 32-34).
- (a) Racemes digitate, or many racemosely arranged on a common axis shorter than the raceme.
- A. Sessile spikelets of all pairs hermaphrodite, awned (vol. 32, 420) ... 32. *Amphilophis*.
- B. Sessile spikelets of the lowest 1-3 or 4 pairs male or neuter and awnless (vol. 32, 424) ... 33. *Dichanthium*.
- (b) Racemes solitary at the ends of the culms and branches (vol. 33, 426) ... 34. *Eremopogon*.
- (2) Awn from the sinus of the 2-fid or 2-dentate fertile floral glume (Genera 35-37).
- i. *Group Schizachyriastæ.*—Racemes solitary at the ends of the culms and their branches, the branches usually gathered into a narrow, lax, spatheate, false panicle; joints and pedicels thickened upward; pedicelled spikelets; male, neuter or suppressed (vol. 32, 428) ... 35. *Schizachyrium*.
- ii. *Group Andropogonastæ.*—Racemes 2-nate at the end of simple or almost simple culms or gathered into spatheate false or true panicles.
- (a) Racemes 2-nate on a slender peduncle arising from a flattened spathe; sessile spikelets alike in sex and form; joints opaque (vol. 32, 429) ... 36. *Andropogon*.
- (b) Racemes 2-nate, with a spathe supporting or surrounding each pair, gathered into often much decomposed spatheate panicles; the lowest pair of one of the racemes homogamous, male or neuter; all pairs of the other heterogamous; mostly aromatic grasses (vol. 32, 429) ... 37. *Cymbopogon*.

b. Margins of the lower involucrel glume of the fertile spikelets involute, inflexed and 2-keeled (if at all) only close to the tips, the spikelets, therefore, with rounded sides or quite terete; callus elongate and acute or pungent; awn more or less hirsute, from the stipitiform floral glume (Genera 38-41).

(1) *Group Heteropogonastræ*.—Racemes many-noded, solitary; all pairs of spikelets heterogamous and alike or the lowest 1-many homogamous and barren, very different from the fertile, not forming an involucre around them (vol. 32, 622) ... 38. *Heteropogon*.

(2) *Group Themedastræ*.—Racemes fasciculiform, solitary at the apex of the stem and branches. Spikelets dimorphic, the 4 lower sessile forming an involucre round the upper.

i. Rhachis articulate below the involucrel spikelets (vol. 32, 626) ... 39. *Iseilema*.

ii. Rhachis articulate above the involucrel spikelets (vol. 32, 627) ... 40. *Themeda*.

(3) *Group Pseudothemedastræ*.—Like *Themedastræ* above but without the involucrel spikelets of that group (vol. 32, 631) ... 41. *Pseudanthiria*.

TRIBE III: PANICEÆ.—Spikelets in usually continuous spikes, racemes or panicles. Involucrel glumes herbaceous or membranous, the lower generally smaller, very small or suppressed. Lower floral glume generally resembling the involucrel glumes in structure and nervation, the upper fertile firmer, at length rigid, often chartaceous or crustaceous, awnless, very rarely mucronate (*Urochloa*) (Genera 42-61).

1. SUB-TRIBE: *Panicinæ*.—Upper floret only fertile; lower floral glume usually resembling the upper involucrel glume, not indurated (Genera 42-60).

A. Undershrubs; flowers dioecious.

*Group Spinifexastræ*:—Male spikelets 2-flowered, articulate in rigid umbellate spikes; female in large globose heads of stellately spreading quill-like rhachis, one spikelet at the base of each (vol. 33, 21) ... 42. *Spinifex*.

B. Herbs; flowers not dioecious (Genera 43-60).

i. *Group Digitariastræ*:—Inflorescence of usually slender, spiciform, digitate or subdigitate or somewhat distant, very rarely solitary racemes; fruiting floral glume with usually flat, thin to hyaline margins, thinly cartilaginous, often brown or dark, with the usually minute, often microscopic, scale-like pale of the barren floret attached to the base.

a. Spikelets awnless; lower involucrel glume minute, rarely 0; lower floral glume usually with 5-7 close, straight, prominent nerves (vol. 32, 632) ... 43. *Digitaria*.

- b. Spikelets slender awned (vol. 32, 635). 44. *Alloteropsis*.
- ii. Inflorescence usually different (but see *Axonopus* and *Paspalum*); fruiting floral glume with more or less inrolled margins, usually crustaceous and straw-coloured or whitish; pale of the barren floret, if developed, not attached to the false fruit (Genera 45-60).
- a. Spikelet falling entire and singly from the persistent pedicels (Genera 45-58).
- (1) *Group Panicstræ* :—Spikelets not awned, or if awned, then sub-sessile in false second variously arranged spikes and with the awns from the entire tips of the upper involucre glume and lower floral glume (*Echinochloa* sp.) or from the tips of both involucre glumes or at least the lower (Genera 45-57).
- i. Inflorescence of variously arranged (rarely solitary) simple or compound, usually second, spike-like, dense (rarely loose) racemes, not an open or contracted and cylindric panicle; spikelets usually paired or sometimes particularly towards the base of the raceme in fascicles of 3 (rarely more) unequally pedicelled or solitary, alternately to the right and the left of the median line of a usually dorsiventral rhachis; fruit dorsally (very rarely laterally) compressed, its glume and pale crustaceous; racemes usually rather dense (Genera 45-52).
- (a) Back of fruit abaxial (Genera 45-47).
- A. Spikelets strongly laterally compressed, distant on long slender rhachises; lower involucre glume herbaceous, as long as the spikelet (vol. 33, 7) .. ... 45. *Pseudechinolæna*.
- B. Spikelets more or less dorsally compressed; lower involucre glume never herbaceous.
- (i) Lower involucre glume rudimentary with a swollen annular callus at the base of the rhachilla; fruit mucronate (vol. 32, 636) ... 46. *Eriochloa*.
- (ii) No swollen annular callus at the base of the spikelet. Lower involucre glume present; racemes racemosely arranged (vol. 32, 636). 47. *Brachiaria*
- (b) Back of the fruit adaxial (Genera 48-52).
- A. Lower involucre glume typically absent; spikelets usually conspicuously planoconvex, with the flat side turned away from the rhachis (vol. 32, 639) ... 48. *Paspalum*.
- B. Lower glumes developed; rhachis persisting, not articulate; spikelets falling from the pedicels (Genera 49-52).
- (i) Involucre glumes neither awned nor caudate; if shortly cuspidate-acuminate, then the fruiting floral valve obtuse with an imposed

- mucro and the margins inrolled all along.
- \* Fruiting flowering glume acute, not mucronate; spikelets solitary, closely biseriate, contiguous with their sides; false spikes rigid, not several times longer than the internodes of the long common axis; their lower parts more or less appressed to the alternately hollowed out flanges of the latter (vol. 32, 641) ... 49. *Paspalidium*.
  - \*\* Fruiting flowering glume obtuse, abruptly mucronate or aristulate; spikelets solitary or paired, when solitary contiguous with their backs; false spikes often flexuous or curved, usually several times longer than the internodes of the relatively short common axis, spreading from the base (vol. 32, 642) ... 50. *Urochloa*.
  - (ii) Glumes caudate-or cuspidate-acuminate or awned.
    - \* Glumes awned from the entire acute or acuminate tip, or caudate or cuspidate-acuminate; margins of the fruiting flowering glume flat upwards, not embracing the tip of the pale; racemes dense, more or less secund, often very numerous (vol. 32, 645) ... 51. *Echinochloa*.
    - \*\* Glumes awned from the slightly notched tips; racemes elongated or short to very short, secund, compact, spreading from the common axis (vol. 33, 8) ... 52. *Oplismenus*.
  - ii. Inflorescence an open panicle, rarely contracted, cylindrical and spike-like (*Sacciolepis*, *Setaria* sp.) (Genera 53-57).
    - (a) Spikelets not supported by bristle-like branches (Genera 53-56).
      - A. Spikelets not gibbous or, if slightly so, then not in cylindrical false spikes (Genera 53-55).
        - (i) Branches of panicle not adnate to the main axis.
          - \* Panicle much contracted, dense, very compound, with erect narrowly lanceolate spikelets; lower floral glume beaked, upper floral glume rather thin (vol. 33, 15)... 53. *Hymenachne*.
          - \*\* Panicle usually open; lower floral glume not beaked, upper floral glume crustaceous (vol. 33, 9) ... 54. *Panicum*.
        - (ii) Branches of panicles more or less adnate to the main axis so that the pedicels appear to spring more or less directly from the axis (vol. 33, 17) ... 55. *Sacciolepis*.
      - B. Spikelets distinctly gibbous, laterally much compressed (vol. 33, 16) ... 56. *Cyrtococcum*.



- (b) All the spikelets or only the upper of each branch supported by bristle-like branches (vol. 33, 19) ... 57. *Setaria*.
- (2) *Group Meliniastræ*.—Spikelets finely awned or mucronate from the notched tips of the upper involucre and barren floral glumes (or if mucicous, these at least slightly notched) delicately pedicelled, paniced; lower involucre glume very minute. Upper involucre glume and barren floral glume gibbous at or below the middle, both 5-nerved; nerves hidden by copious and long silky hairs and anastomosing below the obtuse tips (vol. 33, 21) ... 58. *Tricholaena*.
- b.* Spikelets falling in groups or if singly, then surrounded by an involucre of bristles or at least supported by 1 to several bristles.
- Group Cenchrastræ*.—Spikelets falling by an involucre of bristles or spines or bract-like scales, or at least supported by 1 to several bristles; or with the lower involucre glumes of each group forming a false involucre
- (1) Involucre of free naked or plumose bristles (vol. 33, 22) ... 59. *Pennisetum*.
- (2) Involucres of spines or rigid bristles united at the base into a hard cup (vol. 33, 229) ... 60. *Cenchrus*.
2. SUB-TRIBE: *Isachninae*.—Both florets fertile, or if the lower male, then its floral glume more or less resembling that of the upper floret and indurated.
- Group Isachnastræ*.—Florets very similar, spikelets more or less paniced (vol. 33, 230). 61. *Isachne*.
- SUB-FAMILY II: *Pooideae*.—Mature spikelets breaking up, leaving the persistent or subsistent glumes on the pedicel, or if falling entire, then not consisting of 2 heteromorphous florets as in *Panicoideae* (Genera 62–109).
1. Blades not articulated on the sheath, rarely (*Centotheca*) transversely veined (Genera 62–104)
- A.* Awn of the fertile floret, if present, kneed and twisted below the knee, or straight in reduced forms (Genera 62–78).
- i.* Florets 2 or more (Genera 62–69).
- TRIBE IV: *ARUNDINELLÆ*.—Florets 2, heteromorphous, the lower awnless, or barren. Rhachilla not continued beyond the upper floret. Lower floral glume awnless, rather resembling the involucre glumes; upper generally awned, at length firm or hard: awn from sinus between 2, sometimes minute or bristle-like, lobes, rarely from the entire obtuse tip, usually kneed and twisted below the knee.
- a.* Upper floral glume 2-setose, minutely 2-toothed or entire; awn sometimes reduced (vol. 33, 230) ... 62. *Arundinella*.
- b.* Upper floral glume always distinctly 2-toothed or 2-lobed; awn always kneed; spikelets in clusters of 3 (vol. 33, 234) ... 63. *Tristachya*.
- TRIBE V: *AVENÆÆ*.—Florets 2-many, all alike, except the uppermost which often are reduced. Floral glumes with hyaline shining margins or

- firmer, 5-or more nerved, rarely 3-nerved; awn, if present, from the back or sinus or between bristles,
- a. Floral glumes awnless or awned from the back; florets 2 or more, the uppermost reduced.
- (1) Spikelets 2- or more-flowered, awned (vol. 33, 234) ... 64. *Avena*.
- (2) Spikelets 2-flowered, awnless (vol. 33, 235) ... 65. *Coelachne*.
- b. Floral glumes awned from the sinus of the bifid tip; florets 3 to many, the uppermost reduced (vol. 33, 236) ... 66. *Danthonia*.
- TRIBE VI: ARUNDINÆ.—Florets 2-many, enveloped in very long hairs, springing either from the callus or from the back or margins of the floral glumes.
- a. Hairs springing from the margins of the upper floral glume (vol. 33, 234). 67. *Thysanolaena*.
- b. Hairs springing from the callus (vol. 33, 236) ... 68. *Phragmites*.
- c. Hairs springing from the involucrel glumes (vol. 33, 237) ... 69. *Arundo*.
- ii. Florets 1 (Genera 70-78).
- TRIBE VII: AGROSTÆ.—Floret 1. Rhachilla rarely produced beyond the floret; upper floral glume membranous, not changed when mature, usually 5-nerved, all the nerves or the outer side-nerves often slightly excurrent, parallel or at least not anastomosing. Spikelets awned or not.
- a. Spikelets in cylindric spike-like panicles, not awned (vol. 33, 237) ... 70. *Heleochloa*.
- b. Spikelets in open or contracted many-flowered panicles, awned.
- (1) Involucrel glumes acuminate or awned (vol. 33, 238) ... 71. *Garnotia*.
- (2) Involucrel glumes awned from the notched or lobed tips (vol. 33, 237)... 72. *Polypogon*.
- TRIBE VIII: STIPÆ.—Floret 1. Rhachilla not produced beyond the upper floral glume which is bisexual, hardened when mature, tightly enveloping the fruit; nerves joining or closely approaching at the tip. Awn terminal, rarely absent.
- Awns 3, from the entire tip, or 1, simple below and 3-branched above, very rarely quite simple (vol. 33, 238) ... 73. *Aristida*.
- TRIBE IX: ZOYSIÆ.—Floret 1. Mature spikelets falling entire and singly, or in clusters. Rhachilla not continued beyond the floret. Involucrel glumes equal or the lower much smaller or suppressed. Floral glume small, delicately membranous, 3-1-nerved; spikelets in slender spiciform panicles or racemes (Genera 74-78).
- a. Spikelets falling in clusters of 2-4, fasciated.
- (1) Fascicles secund on a broad articulate rhachis; glumes 4; upper involucrel glume not echinate (vol. 33, 480) ... 74. *Trachys*.
- (2) Fascicles all round a slender rhachis; glumes 3; upper involucrel glume echinate (vol. 33, 480)... 75. *Nazia*.
- b. Spikelets falling singly.
- (1) Lower involucrel glume with pectinate margins; upper involucrel

- glume spinulosely tuberculate: glumes 3 (vol. 33, 481) ... 76. *Latipes*.
- (2) Involucral glumes neither pectinate nor tuberculate.
  - i. Glumes 2; spikelets not awned (vol. 33, 481) ... 77. *Osterdamia*.
  - ii. Glumes 3; spikelets with a long awn (vol. 33, 481) ... 78. *Perotis*.
- B.* Awn of the fertile floret, if present, never kneed and twisted below the knee (Genera 79-104).
  - (i) Floral glumes typically 3-nerved (Genera 79-94).

**TRIBE X: SPOROBOLÆ.**—Floret 1. Involucral and floral glumes very similar; rhachilla not or rarely produced beyond the floret. Upper floral glumes membranous, acute or obtuse, not changed when ripe, 1-or more or less distinctly 3-nerved, awnless, usually olive-green or grey; side-nerves, if present, delicate, evanescent above. Seed often free in the delicate pericarp.

Spikelets small (vol. 33, 482) ... 79. *Sporobolus*.

**TRIBE XI: ERAGROSTÆ.**—Florets usually numerous and far exerted from the glumes. Spikelets variously paniced, sometimes spicate or subspicate; involucral and floral glumes somewhat similar in general appearance; floral glumes membranous or chartaceous, entire or 2-3-cleft, 3-nerved, the nerve evanescent above or excurrent into bristles; side-nerves usually submarginal, glabrous or pubescent or finely ciliate below; pales often persistent or subpersistent (Genera 80-84).

- a.* Floral glumes entire (Genera 80-83).
  - (1) Upper involucral glume 3-nerved (vol. 33, 486) ... 80. *Eragrostis*.
  - (2) Upper involucral glume 5-nerved (vol. 33, 495) ... 81. *Halopyrum*.
  - (3) Upper involucral glume 1-nerved.
    - i. Floral glumes ovate subacute or obtuse (vol. 33, 495) ... 82. *Leptochloa*.
    - ii. Floral glumes acute or acuminate (vol. 33, 486) ... 83. *Desmostachya*.
- b.* Floral glumes toothed (vol. 33, 495)... 84. *Diplachne*.

**TRIBE XII: CHLORIDÆ.**—Florets 1 to many. Spikelets usually in 2-ranked secund spikes or spike-like racemes, rarely distinctly pedicellate and paniculate; floral glumes usually membranous, truncate, emarginate or toothed, 3-nerved; nerves distant, subparallel, distinct, percurrent or excurrent, and often ciliate all along, the lateral submarginal (in *Eleusine* there are sometimes additional side-nerves close to the middle nerve of the glume). Awn, if present, straight, usually from a truncate or toothed tip (Genera 85-94).

- a.* Floral glumes entire, emarginate or more or less 2-dentate or 2-lobed, mucous or with the middle-nerve running out into an awn or mucro, or reduced in some species of *Tri-pogon* (Genera 85-93).
  - (1) Spikelets 1-flowered (genera 85-88).
    - i. Spikes solitary, terminal (see also *Chloris*) (genera 85-87).

- (a) Spikelets minute, more or less sunk in the rhachis, 1-3-flowered (vol. 33, 753) ... 85. *Oropetium*.
- (b) Spikelets not sunk in the rhachis
  - A. Spikelets awnless, minute, unilateral on flattened rhachis, 1-flowered (vol. 33, 753) ... 86. *Microchloa*.
  - B. Spikelets awned, 1-2-flowered in deciduous articulate clusters (vol. 33, 754) ... 87. *Gracilea*.
- ii. Spikes digitate (vol. 33, 753) ... 88. *Cynodon*.
- (2) Spikelets with several florets (Genera 89-93).
  - i. Spikelets with 1 (rarely 2, *Chloris* sp.) fertile and 1 or several imperfect florets above or below the fertile (see also *Microchloa*).
    - (a) Spikelets in long secund solitary spikes; floral glumes narrow, firm, glabrous or scaberulous, with a short erect awn from the notched or subentire tips (vol. 33, 755) ... 89. *Enteropogon*.
    - (b) Spikelets in digitate, rarely solitary or 2-nate spikes; the florets much widened upwards, or if narrow, then delicate and usually with a fine awn from below the tips, often ciliate; floral glumes or at least some of them awned, very rarely submuticous (vol. 33, 755) ... 90. *Chloris*.
  - ii. Spikelets with 2 or more fertile florets and without imperfections below them (See also *Chloris* sp.); floral glumes awnless or with a rigid mucro or very short awn from the acuminate tips (*Dactyloctenium* sp.), entire or subentire (Genera 91-93).
    - (a) Spikelets in digitate or subdigitate spikes.
      - A. Spikes terminated by a spikelet; involucrel and floral glumes emucronate or obscurely mucronate (vol. 33, 761) ... 91. *Eleusine*.
      - B. Spikes terminating with a sharp point; upper involucrel glume and floral glumes rigidly mucronate or shortly awned (vol. 33, 760) ... 92. *Dactyloctenium*.
    - (b) Spikelets in racemosely arranged spreading or deflexed, finally deciduous spikes (vol. 33, 763) ... 93. *Dinebra*.
- b. Floral glumes variously toothed or lobed with the middle and side-nerves running out into awns or mucros.
  - Spikes solitary and terminal on the culms; spikelets mostly olive-green or dark greyish; all 3 nerves or at least the middle-nerve running out into a fine short awn or mucro (vol. 33, 764) ... 94. *Tripogon*.
  - (ii) Floral glumes 5 to many-nerved, very rarely 3-nerved (genera 95-104).

TRIBE XIII: PAPPOPHORÆ.—Floral glumes broad 5-many-nerved, cleft into 3-many subulate lobes,

- with or without alternating fine straight awns from the sinuses.
- Floral glumes 9-cleft (vol. 33, 766) ... .. 95. *Enneapogon*.
- TRIBE XIV: ORYZÆ.—Spikelets all alike or more or less heteromorphous and unisexual. Fertile Floret 1, awned or not, terminal with 2 minute empty florets (floral glumes) below it or solitary. Involucral glumes very minute or confluent into an annular rim or suppressed; pale 3-9-nerved; stamens usually 6, rarely more, or 1-3.
- a. A floating glabrous grass; spikelets awned (vol. 33, 769) ... .. 96. *Hygorhiza*.
- b. Leafy tall grasses, not floating; spikelets usually awnless.
- (1) Keels of floral glume and pale pectinately ciliate; spikelets awnless (vol. 33, 768) ... .. 97. *Homalocenchrus*.
- (2) Keels of floral glume and pale not pectinately ciliate; spikelets rarely awned (vol. 33, 767) ... .. 98. *Oryza*.
- TRIBE XV: FESTUCEÆ.—Involucral glumes more, or less resembling the floral ones in general appearance. Fruiting florets 2 to many, very rarely 1, often much exerted from the glumes. Floral glumes 5-or more-nerved (rarely 1-3-nerved). Awns, if present, terminal or subterminal, never geniculate.
- a. Leaves narrow, not tessellately nerved; fruiting glumes without submarginal bristles.
- (1) Leaves reaching 30 cm. long or more, flaccid; inflorescence in long, often interrupted cylindric spikes (vol. 33, 769) ... .. 99. *Elytrophorus*.
- (2) Leaves less than 5 cm. long, rigid, pungent; inflorescence in short subcapitate spikes (vol. 33, 769)... .. 100. *Aeluropus*.
- b. Leaves broad, tessellately nerved; fruiting glumes with reflexed submarginal tubercle-based bristles (vol. 33, 770) ... .. 101. *Centotheca*.
- TRIBE XVI: HORDEÆ.—Spikelets sessile, singly or in clusters, more or less sunk in the hollows of the rhachis of a simple spike; florets 1 or more.
- a. Spikelets solitary at the nodes of the spike.
- (1) Spikelets with their median plane radial to the rhachis; florets 1-2; floral glumes membranous to subhyaline, 3-nerved (vol. 33, 770) ... .. 102. *Lepturus*.
- (2) Spikelets with their median plane tangential to the rhachis; floral glumes more or less ventricose, keeled upwards, 5-9-nerved (vol. 33, 770) ... .. 103. *Triticum*.
- b. Spikelets in groups of 3 at the nodes of a dense spike; floral glumes 5-nerved (vol. 33, 771) ... .. 104. *Hordeum*.
2. Blades articulate on the sheath and transversely veined.
- TRIBE XVII: BAMBUSEÆ.—Shrubs or trees; spikelets all of one kind; florets few to many (rarely 1); lower 2 or more glumes empty, gradually increasing in size up to the flowering, with sometimes small terminal imperfect ones; floral glumes subherbace-

ous to subcoriaceous, 5 to many-nerved, usually awnless; lodicules usually 3; stamens 3-6 or more; styles 2 or 3 (genera 105-109).

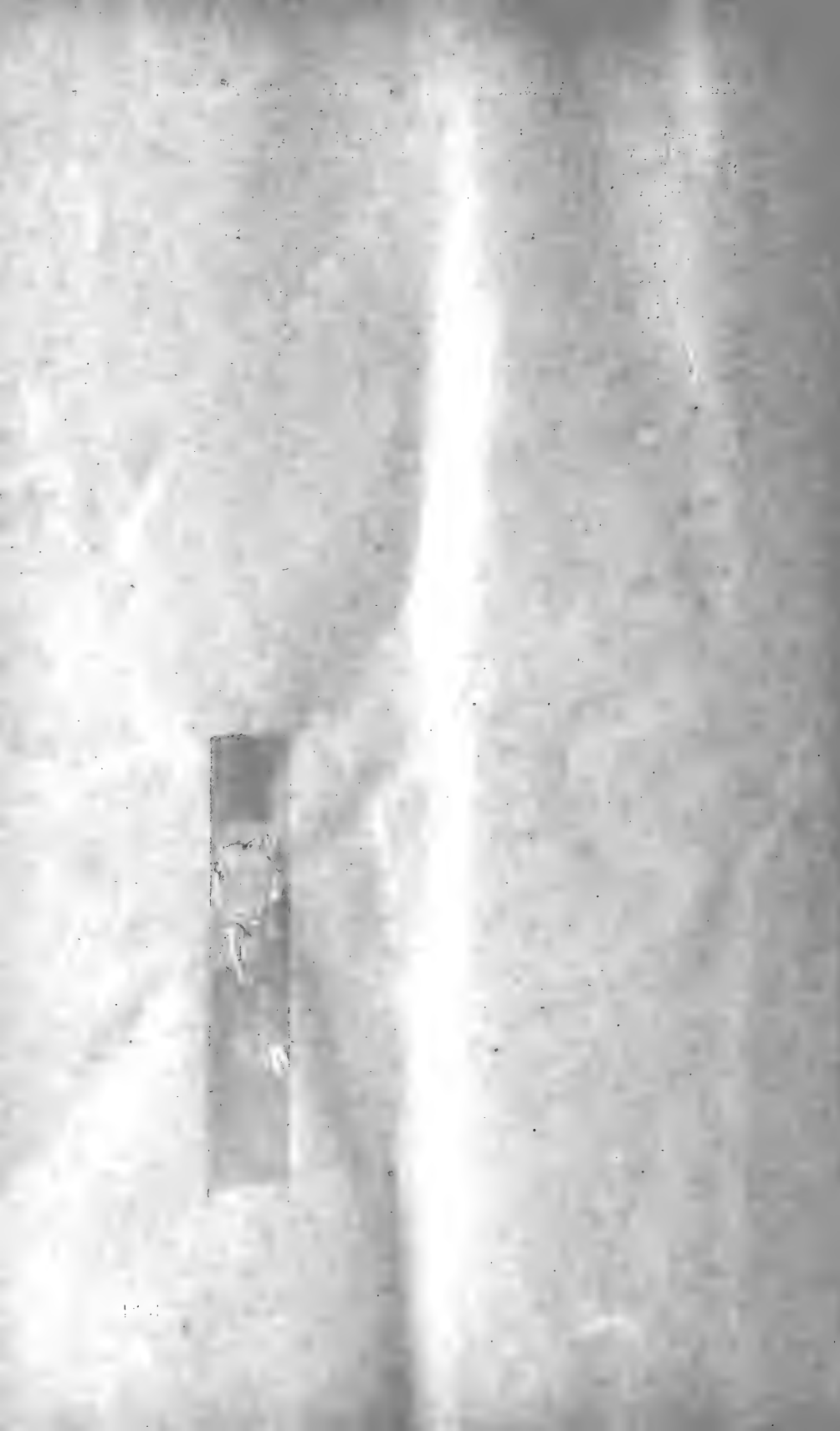
- A. Pericarp thin, adnate to the seed.
  - i. Pales all 2 to keeled; stamens 6; filaments free (vol. 33, 771) ... 105. *Bambusa*.
  - ii. Pales of upper flowers 0 or glume-like, not keeled; filaments connate (vol. 33, 773)... 106. *Oxytenanthera*.
- B. Pericarp fleshy or crustaceous, not adnate to the seed
  - i. Spikelets 2 to many-flowered; pale 2-keeled; lodicules none; stamens 6; pericarp crustaceous (vol. 33, 773) ... 107. *Dendrocalamus*.
  - ii. Spikelets many-flowered; pales 2-keeled; lodicules 3, conspicuous (vol. 33, 774)... 108. *Teinostachyum*.
  - iii. Spikelets 1-flowered; pale absent or glume-like; stamens 6-120; pericarp fleshy (vol. 33, 774) ... 109. *Ochlandra*.

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BY  
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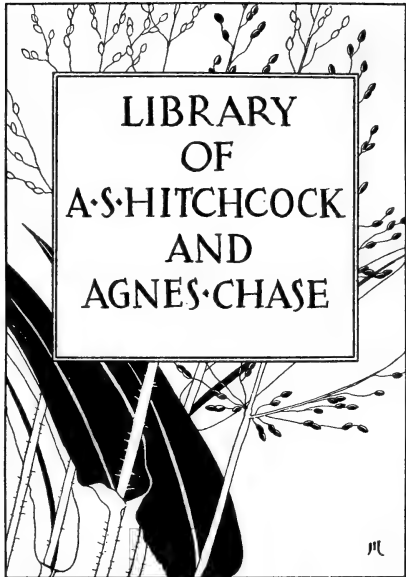
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## XCIX. GNETACEAE.

1. *Ephedra* Tourn. ex L.

1. *E. alata* Decne. Enum. pl. réc. par Bové. Ann. Sc. Nat. Isér. II (1835) 239, var. *Decaisnei* Stapf in Denkschr. d. Mathem.-Naturw. Classe d. Kais. Akad. d. Wissensch. Wien (1889) 37.

HABITAT: I. Arabia Petraea (McDonald!); Oasis Farrun, Wady Shellal, between Ras Abu Zenime and Wady Charandel, and between Wady Charandel and Wady Werdan (ex Kneuck.); Tih Desert (Boiss.); Sinai Valleys (Bové, Auch.).

2. *E. foliata* (Boiss.) Stapf in Denkschr. d. Mathem.-Naturw. Classe d. Kais. Akad. der Wissensch. Wien (1889) 49, t. 2 and 10, f. 1-11, var. *ciliata* Stapf l. c.—*E. ciliata* Aitchison Fl. Kurum Valley (1882) 187.—*E. foliata* Aitch. Bot. Affghan. Bound. Commiss. 112.—*E. Alte* Brandis For. Fl. 501, t. 69.—*E. peduncularis* Boiss. l. c. 717.—*E. asparagoides* Griff. Not. II, 340.

HABITAT: II. Aden (S. 106!, Thomson, Defl.!, Perry!).

FL.: Apr. 1878 (Perry), May 1886 (Defl.), Dec. 1888 (S.).

FR.: Feb. 1857 (Thomson), Apr. 1878 (Perry), May 1886 (Defl.), Dec. 1888 (S.).

DISTRIB.: Punjab, Sind, Persian Baluchistan, Turkestan and westwards to Syria.

3. *E. Alte* C. A. Mey. Monogr. d. Gattung Ephed. (1846) 75, t. 3, fig. 4; Boiss. Fl. Or. V (1884) 715.—*E. aphylla et distachya* Forsk. Fl. Aeg.-Arab. (1775) LXXVII.—*E. altissima* Del. Descr. de l'Ég. 110 (non Desf.).

HABITAT: I. Raphidim (Schimp. 280!); Bestam (Schimp. 316!); Sinai (Auch. 2873!); Mt. Catherine (Drake 2!); top of Mt. Sinai (Bové 214!).

FL.: June 1832 (Bové), July 1835 (Schimp.).

DISTRIB.: Egypt, Syria, Cyrenaica, Somaliland.

Vern. name: *Aelde-gammel* (Bové), *Alte* (Schimp.).

4. *E. fragilis* Desf. Fl. Atlant. II, 372.

HABITAT: I. Wady Arabah (Hart).

DISTRIB.: Mediterranean, Arabia.

## C. CONIFERAE.

1. *Cupressus* Tourn. ex L.

1. *C. sempervirens* L. Sp. Pl. 1002.

HABITAT: I. Jebel Musa, ca. 2,100 m., probably cult. (ex Kneuck.); Arabia Petraea (McDonald!) very likely planted.

DISTRIB.: N.-W. India, planted only. The horizontally branches variety is wild in N. Persia, Syria and Asia Minor.

## 2. *Juniperus* Tourn. ex L.

1. *J. procera* Hochst. ex Endl. Syn. Conif. 26.

HABITAT : II. Yaman (ex Fiori).

DISTRIB. : Tropical Africa.

2. *J. phoenicea* L. Sp. Pl. 1471.

HABITAT : I. Central Midian (Burton!).

DISTRIB. : Mediterranean region.

3. *J. macropoda* Boiss. Fl. Or. V, 709.

HABITAT : IV. Maskat, Gebel Akhdar (Auch. 5335).

DISTRIB. : Arabia, Persia, Himalayan region.

## B. MONOCOTYLEDONEAE.

### CI. HYDROCHARITACEAE.

#### 1. *Enhalus* C. A. Rich.

1. *E. acoroides* Steud. Nomencl. I, 554.—*Stratiotes acoroides* Linn. f. Suppl. 268.—*Enhalus acoroides* Boiss. Fl. Or. V (1881) 6.—*E. marinus* Griff. Not. Pl. As. III, 178, Ic. t. 249, 250.

HABITAT : II. Hodeidah (S. 149!).

FR. : Sterile in Dec. (S.).

DISTRIB. : Indian and Pacific Oceans, on the shores of Asia, Africa, Australia and Melanesia.

Vern. name : *Suram* (S.).

#### 2. *Halophila* Thouars.

1. *H. ovalis* (R. Br.) Hook. f. in Fl. Tasm. II (1860) 45; Boiss. Fl. Or. V (1881) 2; Balfour, The genus *Halophila* 47.—*Caulinia ovalis* R. Br. Prodr. Nov. Holl. 339.—*Halophila ovata* Gaud. in Freye. Voy. Bot. 429, t. 40, fig. 1.

HABITAT : I. Gulf of Suez (Frauenfeld, Aschers.).

II. Hodeidah (S. 150!); Aden (Balfour!); near Jedda (Hildebr. 107).

FR. : Dec. 1888 (S.).

DISTRIB. : Also known from the Persian Gulf, Indian Ocean, South Seas.

Vern. name : *Suram* (S.).

2. *H. stipulacea* Aschers. Sitzb. Naturf. Fr. Berlin (1867) 3.—*Zostera stipulacea* Forsk. Fl. Aeg.-Arab. (1775) Descr. 158.—*Thalassia stipulacea* Koenig Ann. Bot. II, 97,

HABITAT : I. Gulf of Suez (Del., Ehrenb.!, Schimp.!); near Tor (Ehrenb.!, Bové!).

DISTRIB. : Red Sea, Indian Ocean, islands of E. Africa.

### 3. *Thalassia* Solander.

1. **T. Hemprichii** (Ehrenb.) Aschers. in Boiss. Fl. Or. V (1884) 7.—*Schizotheca Hemprichii* Ehrenb. Symb. Phys. Bot. Tab. XI, 1; Act. Acad. Berol. (1832) t. 429.

HABITAT : II. Jedda (S.).

DISTRIB. : Indian and Pacific Oceans on the shores of Africa and tropical Asia, Indian Archipelago, Melanesia.

## III. ORCHIDACEAE.

### 1. *Holothrix* L. C. Rich.

1. **H. Vatkeana** Rehb. f. in Journ. Bot. XIV (1876) 346.

HABITAT : II. Spring el Mechader, near Menacha (S. 1431!).

FL. : Feb. 1889 (S.), Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

DISTRIB. : Tropical Africa.

### 2. *Habenaria* Willd.

1. **H. arabica** Blatter, *nov. comb.*—*Bicornella Arabica* Defl. Voy. Yemen 208, t. 6.

HABITAT : II. Yaman (Defl.!).

2. **H. macrantha** Hochst. in A. Rich. Tent. Fl. Abyss. II (1851) 294, t. 87.

HABITAT : II. At the Shibam near Menacha, 2,600 m. (S. 1768).

FL. : Mar. 1889 (S.).

DISTRIB. : Abyssinia.

3. **H. aphylla** R. Br. Prodr. 312, *in nota*.

HABITAT : Arabia (*non vidi*).

DISTRIB. : Arabia.

### 3. *Eulophia* R. Br.

1. **E. Schimperiana** Rich. Tent. Fl. Abyss. II (1851) 283.

HABITAT : II. Wolledje at the foot of Jebel Melhan, 700 m. (S. 735!).

FL. : Jan. (S.).

DISTRIB. : Abyssinia.

**2. E. Petersii** Reichb. f. in Flora XLVIII (1865) 186.

HABITAT : Arabia (ex Herb. Kew).

DISTRIB. : Tropical Africa.

#### 4. *Orchis* (Tourn.) L.

**1. O. palustris** Jacq. Coll. I, 75.

HABITAT : IV. Hufuf Oasis (Cheeseman).

DISTRIB. : Europe, N. Africa, Orient.

### CHIL. SCITAMINACEAE.

#### ZINGIBERACEAE.

##### 1. *Zingiber* Adans.

**1. Z. officinale** Rosc. Trans. Linn. Soc. VIII, 348.

HABITAT : II. Jebel Bura, cultivated in coffee plantations, 1,000 m. (S. 1882).

Vern. name : *Sengebil* (S.).

#### CANNACEAE.

##### 1. *Canna* L.

**1. C. indica** L. Sp. Pl. 1.

HABITAT : II. Jebel Bura, above Hille, 900 m. (S. 501); near Ussil in Wady Hedjan, 12 m. (S. 1272); Manod near Hodjela, 900 m. (S. 984); wild or run wild.

FL. : Jan. (S.).

Vern. name : *Jussr* (S.), *Schenef-el-diq* (S.).

#### MUSACEAE.

##### 1. *Musa* L.

**1. M. sapientium** L. Sp. Pl. 1477.

HABITAT : II. Jebel Bura, cultivated in coffee plantations, 900-1,000 m. (S. 1819).

### CIV. HAEMODORACEAE.

##### 1. *Sansevieria* Thunb.

**1. S. Ehrenbergii** Schweinf. in Baker Journ. Linn. Soc. XIV, 549; Kew Bull. (1892) 129; Oliv. in Bot. Mag. 2269.

HABITAT : II. Outliers W. of Jebel Melhan and in the plain of Tehama, 300-500 m. (S. 696!); W. of the foot of Jebel Bura, near Chalife, 400 m. (S. 190!).

DISTRIB. : Abyssinia.



**2. S. guineensis** Willd. Sp. Pl. II, 159.

HABITAT: II. Yaman (ex Fiori); Jebel Melhan near Wolledje, 600 m. (S. 696a !); Jebel Bura, above Hille, 800 m. (S. 378).

FL.: Feb.-Jan. 1889 (S.).

FR.: Feb.-Jan. 1889 (S.).

DISTRIB.: Tropical Africa.

Vern. name: *Dermeq, hharag* (S.).

**CV. IRIDACEAE.****1. Iris** Tourn. ex L.

**1. I. florentina** L. Sp. Pl. II, 55; Bot. Mag. t. 671.—*I. Forsk.* Fl. Aeg.-Arab. (1775) p. CIII.—*I. sp.* Defl. Voy. Yemen 209.

HABITAT: II. Top of Shibam, below the old castle; S. W. slope of the hill between el-Hausan and Hayjera, 2,850-2,200 m. (S. 1663).

FL.: Beginning of Mar. (S.).

DISTRIB.: Mediterranean.

**2. I. Sisyrinchium** L. Sp. Pl. 40.—*I. aegyptia* Del. in Labord. Voy. Arab. Petr. 82.

HABITAT: IV. From the neighb. of Koweit and here and there in hollows in the neighb. of Regat (Pelly!).

DISTRIB.: Mediterranean, Orient, Afghanistan, Baluchistan.

**3. I. Helenae** Barbey Herboris. au Levant (1880) 159, no. 841; Boiss. Fl. Or. V (1884) 132; Baker Handb. Irid. 19.

HABITAT: I. Desert between Egypt and Palestine near El-Arish (Barbey).

FL.: Mar. (Barbey).

**4. I. palaestina** Boiss. Fl. Or. V (1884) 122.—*Xiphium palaestinum* Baker in Seem. Journ. (1871) 108.

HABITAT: 1. Tel Abou Hereireh to Gaza (Hart).

FL.: Last week of Dec. (Hart).

DISTRIB.: Palestine, Syria, Mesopotamia.

**2. Gladiolus** L.

**1. G. segetum** Ker-Gawl. in Bot. Mag. (1804) t. 719; Boiss. Fl. Or. V (1884) 139; Baker Handb. Irid. 200; Musch. Fl. Egypt. I (1912) 238.

HABITAT: I. Arabia Petraea (ex Muschler).

DISTRIB.: Mediterranean to Persia and Turkestan.

**2. G. segetum** Ker-Gawl. var. **Guepini** (Koch) Boiss. Fl. Or. V (1884) 139; Musch. Fl. Egypt I (1912) 238.—*G. Guepini* Koch Flora XXIII (1840) 466.

HABITAT : I. Arabia Petraea (ex Muschler).  
DISTRIB. : Mediterranean.

## CVI. AMARYLLIDACEAE.

### 1. *Pancratium* Dill. ex L.

1. *P. maritimum* L. Sp. Pl. (1753) 291 ; Boiss. Fl. Or. V (1884) 152 ; Baker Handb. Amaryll. 118 ; Musch. Fl. Egypt I (1912) 235.

HABITAT : I. Arabia Petraea (ex Muschler).  
DISTRIB. : Mediterranean.

2. *P. tortuosum* Herb. in Ann. Nat. Hist. ser. I, IV (1840) 28 ; Baker Handb. Amaryll. 120.—*P. tortifolium* Boiss. Diagn. ser. I, XIII, 18.

HABITAT : II. Jedda (Zohrab 101 !, Fischer 94 !, Schimp. 876 ! ; Aden (Thomson !).

III. Dhofar Mts. (Bent 153).

FL. : Feb. (Fischer), Apr. 1861 (Thomson), Dec. 1835 (Schimp.).

DISTRIB. : Arabia, Egypt, Nubia.

3. *P. trianthum* Herb. in Ann. Nat. Hist. ser. I, IV (1840) 28.—*P. tenuifolium* Hochst. in A. Rich. Tent. Fl. Abyss. II (1851) 312.

HABITAT : II. Haifa, Wady Moaden (Defl.).

DISTRIB. : Tropical Africa, Arabia.

4. *P. Sickenbergerii* Aschers. & Schweinf. in Gartenzeitg. II (1883) 345 ; Boiss. Fl. Or. V (1884) 153 ; Baker Handb. Amaryll. 118.

HABITAT : I. Wady es Sheikh, Wady Barak and Wady Lebwel (Hart !); from Akaba to Ain Abon Weirideh (Hart); between Suez and Mt. Sinai (Boiss. !); Bir el Fachme (Sickenb.); Bir Abu Elfein (Barbey).

FL. : Nov. and Dec. (Hart).

DISTRIB. : Egypt, Sinai.

Vern. name : *Aissalan* (ex Boiss.).

5. *P. maximum* Forsk. Fl. Aeg.-Arab. (1775) Descr. 72 ; Schweinf. in Bull. Herb. Boiss. (1894) App. II, 82.

HABITAT : II. Jebel Melhan, near Wolledje, 600 m. (S. 699 !); Jebel Bura, above Hille, 900 m. (S. 352 !); Aden (S. 109 !); near Taes (Nichbur).

FL. : Dec. 1888 (S.).

DISTRIB. : S. Arabia, Nubia.

OBSERV. : Flowered at Aden on the 6th day after heavy rain (S.).

Vern. name : *Bassal er robach* (=bulb of the baboon) (S.).

2. *Crinum* L.

1. *C. yemense* Schweinf. Bull. Herb. Boiss. (1894) App. 81; Defl. Voy. Yemen (1889) 209; (*Deflers non descripsit plantam quare Schweinfurth consideramus speciei auctorem.*)—*Crinum yemense* Hort. Damman in Gard. Chron. I, 643.—*C. jemenicum* Hort. Damman.—*Non est C. latifolium* Linn. uti habet Index Kewensis. Vide Schweinf. l. c.

HABITAT: II. Haifa (Defl.!).

DISTRIB.: Arabia.

3. *Ixiolirion* Fisch.

1. *I. montanum* Herb. App. (1821) 37.—*Amaryllis montana* Labill. Ic. Pl. Syr. Dec. II, 5.

HABITAT: I. Gaza (Boiss.!, Barbey).

DISTRIB.: Syria, Palestine, Mesopotamia, Persia.

4. *Haemanthus* L.

1. *H. arabicus* Roem. et Schult. ex Schweinf. in Bull. Herb. Boiss. (1894) App. II, 80.—*H. coccineus* Forsk. Fl. Aeg.-Arab. (1775) Des. 75.

HABITAT: II. Hadie (Forsk.); Lokkeme Jebel Harassa, 2,000 m. (S. 1971!); Jebel Bura, 900 m. (S. 1841); Kahil near Menacha, 2,500 m. (S. 1441, 1701); Jebel Melhan, 900 m. (S. 756).

FL.: Jan. and Feb. 1889 (S.).

FR.: Feb. 1889 (S.), Mar. 1889 (S.).

DISTRIB.: Arabia.

Vern. name: *Bassal el hannesch* (S.) (means Snake-bulb).

2. *H. coccineus* L. Sp. Pl. 325; Defl. Ext. Bull. Société Bot. France XLIII (1896) 330.

HABITAT: II. Haifa, Serrya (Defl.).

DISTRIB.: S. Africa, Arabia.

5. *Polianthes* L.

1. *P. tuberosa* L. Sp. Pl. 316.

HABITAT: II. Jebel Bura, above Hille, cultivated, 1,000 m. (S. 1821).

FL.: Jan. 1889.

DISTRIB.: Mexico.

Vern. name: *Sambag*; *rengess* (S.).

6. *Vellozia* Vand.

1. *V. sp.* Schweinf. in Bull. Herb. Boiss. (1894) App. II, 94, under *Barbacenia*.

HABITAT: II. Jebel Bura, above Hille, 1,000 m. (S. 1872).

Vern. name: *Thalliq* (S.).

**2. V. (xerophyta) arabica** Baker in Kew Bull. (1894) 342 ; Ic. Plant. 2364.

HABITAT : III. Under the edges of rocks at Dobaibah, alt. 1,200 m. (Lunt 205 !).

FL. : Feb. 1894 (Lunt).

DISTRIB. : Arabia.

### 7. *Sternbergia* Waldst. & Kit.

**1. S. cholchiciflora** Waldst. & Kit. Pl. Rar. Hung. II (1805) 172, t. 159 ; Boiss. Fl. Or. V (1884) 147.—*Amaryllis cholchiciflora* Ker-Gawl. in Journ. Sc. & Arts II (1817) 345.—*Sternbergia aetnensis* Guss. Fl. Sic. Prodr. I (1832) 395.—*S. dalmatica* Herb. Amaryll. (1837) 413, t. 47, f. 2.—*S. Clusiana* Ker-Gawl. ex Schult. f. Syst. VII, 794.—*S. macrantha* J. Gay ex Boiss. Fl. Or. l. c. 148 ; Hart Bot. Sinai & S. Palest. in Transact. Roy. Irish Acad. (1885) 445.—*S. pulchella* Boiss. & Blanche Diagn. ser. II, IV, 97.—*S. Schuberti* Schenk Pl. Sp. Aegypt. (1840) 11.—*S. stipitata* Boiss. & Haussk. ex-Boiss. l. c. 148.

HABITAT : I. Mount Hor, especially about the summit (Hart !).

FL. : Early in Dec. (Hart).

DISTRIB. : S. Europe, Syria, Palestine, Persia.

## CVII. COLCHICACEAE.

### 1. *Androcymbium* Willd.

**1. A. palaestinum** Baker in Journ. Linn. Soc. XVII (1880) 445.

HABITAT : I. Wady Arabah (Hart).

DISTRIB. : Sinai, Palestine.

### 2. *Colchicum* L.

**1. C. montanum** L. Sp. Pl. 342.

HABITAT : I. Sinai (Holland !).

DISTRIB. : S. Europe.

**2. C. Steveni** Kunth Enum. Pl. IV, 144.

HABITAT : I. Jebel Catherine (Hart !); Mt. Hor and Petra (Hart !).

FL. : Second week of Dec.

DISTRIB. : Arabia, Syria.

**3. C. variegatum** L. Sp. Pl. 342.

HABITAT : I. Sinai.

DISTRIB. : S. Europe.

**4. C. velutinum** Bornm. et Kneuck. in Allg. Bot. Zeitsch. (1903) 63.

HABITAT : I. Jebel Catherine, ca. 2,450 m. (ex Kneuck.).

DISTRIB. : Sinai.

## CVIII. LILIACEAE.

1. *Littonia* Hook.

1. *L. obscura* Baker Ic. Plant. 2365.

HABITAT: III. Near Cosair, nearly sea level (Lunt 280!).

FL.: Mar. 1894 (Lunt).

DISTRIB.: Endemic.

2. *L. minor* Defl. in Bull. Soc. Bot. Fr. XXXII (1885) 353.

HABITAT: II. Little Aden (Defl. 517!); Wady el'anterich (Defl. 541!).

FL.: Apr. 1890 (Defl.).

FR.: Apr. 1890 (Defl.).

DISTRIB.: Arabia.

2. *Merendera* Ram.

1. *M. abyssinica* Rich. Tent. Fl. Abyss. II, 337.

HABITAT: II. Neighb. of Aden (Hunter 57!).

DISTRIB.: Abyssinia, Arabia.

Vern. name: *Shagorat-al-tair* (Hunter).

3. *Gagea* Salisb.

1. *G. reticulata* Schult. Syst. Veg. VII (1829) 552, var. *tenuifolia* Boiss. Fl. Or. V (1884) 238.

HABITAT: I. Towards top of Mt. Catherine (Schimp. 404!); N. Midian (Burton!).

FL.: Apr. 1835 (Schimp.).

Vern. name: *Betet hakjel* (Schimp.).

4. *Tulipa* L.

1. *T. montana* Lindl. in Bot. Regist. XIII (1827) t. 1106; Boiss. Fl. Or. V, 192; Baker in Journ. Linn. Soc. XIV (1873) 279.

HABITAT: I. Sinai.

DISTRIB.: Egypt, Sinai, Armenia, Persia, Kurdistan, Afghanistan.

5. *Hyacinthus* (Tourn.) L.

1. *H. flexuosus* Baker in Journ. of Botany XII (1874) 8.—*Bellevalia flexuosa* Boiss. Diagn. Plant. Or. Ser. I, fasc. XIII, 36.

HABITAT: I. N. Midian (Burton!).

DISTRIB.: Egypt, Sinai, Midian, Syria.

2. *H. colchicoides* Delile in Laborde Voy. Arab. Petr. 32.

HABITAT: I. Arabia Petraea (Herb. Kew!).

DISTRIB.: Arabia.

6. *Muscari* Tourn.

1. *M. comosum* (L.) Mill. Gard. Dict. ed. VIII (1768) no. 2; Baker in Journ. Linn. Soc. XI (1871) 414.—*Hyacinthus comosus* L. Sp. Pl. I, 318.—*Muscari Holzmanni* Boiss. Fl. Or. V, 293.—*Bellevalia comosa* Heldr. in Atti Congr. Fir. 228.

HABITAT: I. Sinai (Herb. Kew!).

DISTRIB.: Middle and south Europe and the other parts of the Mediterranean region, Egypt, Sinai.

7. *Urginea* Steinh.

1. *U. undulata* Steinh. in Ann. Sc. Nat. ser. 2, I (1834) 330; Baker in Journ. Linn. Soc. XIII (1873) 220.

HABITAT: I. Sinai (Herb. Kew!).

DISTRIB.: Egypt. All other parts of the Mediterranean region.

8. *Albuca* L.

1. *A. Yerburyi* Ridley in Journ. Bot. XXII (1884) 370.

HABITAT: II. Aden (Yerburyi!, Birdwood 126! Beever!).

DISTRIB.: Aden.

2. *A. abyssinica* Dryand in Vet. Acad. Nya. Handl. Stockh. (1784) 297.

HABITAT: II. Near Menacha, 2,900 m. (S. 1664); near Kahil above Menacha, 2,500 m. (S. 1439! 1753!); Jebel Bura above Hille, 1,000 m. (S.).

DISTRIB.: S. Africa, Abyssinia, Eritrea.

9. *Dipcadi* Medic.

1. *D. erythraeum* Webb. & Benth. Hist. Nat. Canar. III, pt. 2 (1840-1850) 341; Baker in Journ. Linn. Soc. XI (1871) 40.—*Uropetalum erythraeum* Boiss. Fl. Or. V, 286.—*Hyacinthus serotinus* Forsk. Fl. Aeg.-Arab. 209.

HABITAT: I. Desert, between Suez and El Tor (Schimp. 405!); N. Midian (Burton!).

II. Jedda (Fischer 96!).

IV. Found sprinkled all over the plain from Koweit to Regat (Pelly).

FL.: Feb. (Fischer), Mar. 1835 (Schimp.).

FR.: Mar. 1835 (Schimp.).

DISTRIB.: Egypt, Syria, Arabia.

2. *D. tacazzeanum* (Hochst.) Baker in Trans. Linn. Soc. II, ser. I, 247.

HABITAT: II. Yaman (Herb. Kew!).

DISTRIB.: Arabia, Eritrea.

**10. Allium (Tourn.) L.****1. A. ascalonicum** L. Amoen. Acad. IV, 454.

HABITAT : III. Cultivated at Shibam, 600 m. (Lunt 172 !).

FL. : Jan. 1894 (Lunt).

FR : Jan. 1894 (Lunt).

DISTRIB. : Cultivated everywhere.

Vern. name : *Busl* (Lunt).**2. A. sativum** L. Sp. Pl. 296.

HABITAT : III. Cultivated at Al Ghatan, 345 m. (Lunt 179 !).

DISTRIB. : Europe.

**3. A. cepa** L. Sp. Pl. I (1753) 431.

HABITAT : I. Sinai (Herb. Kew !).

II. Yaman (Herb. Kew !).

DISTRIB. : A cosmopolitan pot-herb.

**4. A. neapolitanum** Cirillo. Plant. rar. regn. Neap. I (1788) 13, t. IV.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Throughout the Mediterranean region.

**5. A. paniculatum** L. Sp. Pl. ed. II (1762) 428, var. **pallens** Boiss.  
Fl. Or. V (1884) 260.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Mediterranean region.

**6. A. nigrum** L. Sp. Pl. ed. II, 430.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Europe, Orient.

**7. A. sinaiticum** Boiss. Diagn. Ser. I, XIII, 31.

HABITAT : I. Between Mt. Sinai and Nuckl (Boiss.).

DISTRIB. : Arabia.

**8. A. stamineum** Boiss. Diagn. Ser. II, IV, 119.

HABITAT : I. Sinai and Mt. St. Catherine (Schimp. 258).

DISTRIB. : Mediterranean, Orient.

**11. Bulbine L.****1. B. asphodeloides** Spreng. Syst. II, 85.

HABITAT : II. Yaman (Herb. Kew !).

DISTRIB. : Abyssinia, South Africa.

**12. Asphodeline Reichb.****1. A. lutea** Reich. Fl. Germ. Excurs. 116.

HABITAT : Arabia (ex Baker).

DISTRIB. : Mediterranean region, Caucasus, Asia Minor,

13. *Asphodelus* (Tourn.) L.

1. *A. viscidulus* Boiss. Diagn. Pl. Or. ser. 1, fasc. VII (1846) 118.

HABITAT : I. Arabia Petraea (Schimp. 237 !); sandy plain of Ramleh between Sinai and Jebel Tih (Boiss. !).

FL. : Mar. 1835 (Schimp.), Mar. 1846 (Boiss.).

DISTRIB. : Egypt, Arabia, Syria.

2. *A. fistulosus* L. Sp. Pl. 309.

HABITAT : II. Jedda (Zohrab !); Taifa (Botta !).

DISTRIB. : Mediterranean region, Orient, India.

3. *A. fistulosus* L. var. *tenuifolius* Baker in Journ. Linn. Soc. XV (1877) 272.

HABITAT : I. Wady Hamme (Schimp. 206 !); N. Midian (Burton !); Wady Nasb (Lord !); Desert of Sinai (Bové 505 !); Arabia Petraea (McDonald !); Sinai, near Senned (Drake 85 !).

## IV. Neighbourhood of Koweit (Pelly !).

FL. : Apr. 1868 (Lord).

FR. : Mar. 1835 (Schimp.), Apr. 1868 (Lord), June 1832 (Bové).

Vern. name : *Baruak* (Schimp.), *Barwry* (Drake).

4. *A. fistulosus* L. var. *clavatus* Baker in Journ. Linn. Soc. XV (1877) 271.

HABITAT : III. Weed in cultivated crop near Shibam, 600 m. (Lunt 170 !).

FL. : Jan. 1894 (Lunt).

FR. : Jan. 1894 (Lunt).

DISTRIB. : Dhofar.

5. *A. pendulinus* Coss. et Dur. in Bull. Soc. Bot. Fr. IV (1857) 399, 497.

HABITAT : I. Arabia Petraea : Wady Mokateb (Boiss. !); Arabia Petraea (McDonald !).

FR. : Mar. 1846 (Boiss.).

DISTRIB. : Algeria, Arabia.

6. *A. tenuifolius* Cav. in Ann. Sc. Nat. III (1800) 46, t. 27, fig. 2, var. *micanthus* Boiss. Fl. Or. V (1884) 315.

HABITAT : I. Arabia Petraea (Boiss. !).

DISTRIB. : Mediterranean region, Arabia, Syria, Palestine, Nubia.

7. *A. microcarpus* Viv. in Linnaea I (1826) 500.

HABITAT : I. Beersheba (Lowne 306 !).

DISTRIB. : Mediterranean, Canaries.



14. *Dracaena* Vand.

1. *D. serrulata* Baker in Kew Bull. (1894) 342.

HABITAT : III. On hills near Dobaibah, about 1,200 m. (Lunt 206 !).

DISTRIB. : Arabia.

15. *Scilla* L.

1. *S. yemensis* Defl. Voy. Yemer (1889) 212.

HABITAT : II. Yaman (Defl.).

DISTRIB. : Arabia.

16. *Aloe* Tourn. ex L.

1. *A. trichosantha* Berger. in Engl. Bot. Jahrb. XXXVI (1905)

62.—*A. percassa* Schweinf. (1894) *non* Tod.

HABITAT : II. Yaman (ex Fiori).

DISTRIB. : Eritrea, Yaman.

2. *A. inermis* Forsk. Fl. Aeg.-Arab. (1775) 74.—*A. Luntii* Baker in

Kew Bull. (1894) 342 *et in* Bot. Mag. (1895) t. 7448.

HABITAT : II. Neighb. of Taz (Forsk.).

III. Hills near Dobaibah, 900 m. (Lunt 225 !).

FL. : Feb. 1894 (Lunt).

DISTRIB. : Arabia.

3. *A. menachensis* Schweinf. in Bull. Herb. Boiss. (1894) App. II

64 (*sub. var.*).

HABITAT : II. Near Menacha, 2,200 m. (S. 1685 !).

FL. : Mar. 1889 (S.).

DISTRIB. : Arabia.

4. *A. vaccillans* Forsk. Fl. Aeg.-Arab. 74.

HABITAT : II. Ussil, 1,400 m. (S. 1350); near Menacha, 2,300 m. (S. 1497, 1623).

FR. : Feb. 1889 (S.).

DISTRIB. : Arabia.

Vern. name : *Cher* (S.).

5. *A. sabaea* Schweinf. in Bull. Herb. Boiss. II. App. II (1894) 74.

HABITAT : II. Wady Madfar near Hodjela, 700 m. (S. 941 !); Aggara near Hodjela, 600 m. (S. 1010 !); Ussil, 1,400 m. (S. 1344 !).

FR. : Jan. 1889 (S.), Feb. 1889 (S.).

DISTRIB. : Arabia.

OBSERV. : Notizblatt König. bot. Gart. Berlin (1895) 425.

Vern. name : *Geschb.* (S.).

**6. A. rubroviolacea** Schweinf. in Bull. Herb. Boiss. II, App. II (1894) 71.

HABITAT : II. Top of Shibam near Menacha, 2,900 m. (S. 1658 !).

FL. : Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

OBSERV. : Figd. for Herb. Kew and for Bot. Mag. t. 7882.

Vern. name : *Ssabr* (S.).

**7. A. pendens** Forsk. Fl. Aeg.-Arab. 74 ; Bot. Mag. t. 7827.

HABITAT : II. Above Ussil, 1,500 m. (S. 1222 !); in Wady Nahemi above Attara, 2,000 m. (S. 1751); Jebel Bura, 900 m. (S. 363, 1845).

FL. : Feb. 1889 (S.).

DISTRIB. : Arabia.

Vern. name : *Arrar* (S.).

**8. A. tomentosa** Defl. Voy. Yemen (1884) 211.

HABITAT : II. Yaman (Defl. !).

DISTRIB. : Arabia.

**9. A. vera** L. Sp. Pl. 320, var. **officinalis** Forsk. descr. 72, 74.

HABITAT : II. Badjil, 200 m. (S. 531); foot of Jebel Bura near Hille, 600 m. (S. 360); at Chalife, 300 m. (S. 182); at the foot of Jebel Melhan, 600 m. (S. 658).

FL. : Jan. 1889 (S.).

DISTRIB. : Arabia.

**10. A. vera** L. var. **angustifolia** Schweinf. in Bull. Herb. Boiss. App. II (1894) 62.

HABITAT : II. Jebel Bura near Hille, 600 m. (S. 305).

FL. : Jan. 1889 (S.).

DISTRIB. : Yaman.

### 17. *Kniphofia* Moench.

**1. K. sumarae** Defl. Voy. Yemen, 210.

HABITAT : II. Yaman (Defl. !).

DISTRIB. : Arabia.

### 18. *Asparagus* Tourt.

**1. A. racemosus** Willd. Sp. Pl. II, 152.

HABITAT : II. Jebel Bura, 900-1,200 m. (S. 487).

III. Dhofar Mts., 480 m. (Bent 189 !).

DISTRIB. : India, Orient, tropical Africa, Australia.

**2. A. asiaticus** L. Sp. Pl. 313.

HABITAT : II. Jedda (Schimp. 914 !); Ussil, 1,400 m. (S. 1164); Menacha, 2,000-2,400 m. (S. 1613; 1505); western slope of Jebel Bura above Hille, 900 m. (S. 423),

FL. : Feb. (S.).

FR. : Dec. 1837 (Schimp.).

DISTRIB. : India, Orient, tropical and S. Africa.

**3. *A. stipularis*** Forsk. Fl. Aeg.-Arab. (1775) 72.

HABITAT : I. Sinai (Holland 111a !); Arabia Petraea (McDonald !).

DISTRIB. : Mediterranean region, Canary Islands.

**4. *A. africanus*** Lam. Encycl. I, 295.

HABITAT : III. Hills near Dobaibah, 1,200 m. (Lunt 217 !); South coast, el-Hami (S. 190).

DISTRIB. : Arabia, S. Africa.

**5. *A. officinalis*** L. Sp. Pl. 313.

HABITAT : II. Jebel Bura, cultivated in the coffee region, 1,000 m. (S. 488); Jebel Melhan, 1,000 m. (S. 864).

DISTRIB. : Europe, Caucasus, Siberia, Arabia.

Vern. name : *Ssáfel herr* (S.) *Cat's hair*.

**6. *A. scaberulus*** Rich. Tent. Fl. Abyss. II, 320.

HABITAT : II. Yaman.

DISTRIB. : Arabia, Abyssinia.

## CIX. COMMELINACEAE.

### 1. *Cyanotis* D. Don.

**1. *C. foecunda*** DC. ex Hassk. Commel. Ind. 110.

HABITAT : II. Arabia (Botta!).

DISTRIB. : Arabia, Abyssinia.

**2. *C. nyctitropa*** Defl. in Bull. Soc. Bot. Fr. XLIII, 234.

HABITAT : II. Yaman Haifan (Defl.).

DISTRIB. : Arabia.

### 2. *Ancilema* R. Br.

**1. *A. Forskalei*** Kunth Enum. IV, 71.—*Commelina tuberosa* Forsk. descr. 12.—*Ancilema Ehrenbergii* Clarke in DC. Mon. III, 227, 228.  
—*A. tacazeeanum* Hochst. in Clarke, DC. Mon. III, 222.

HABITAT : II. Jebel Bura, 600-900 m. (S. 289); foot of Jebel Melhan, 600 m. (S. 698); Regma near Hodjela, 900 m. (S. 944); Aggara near Hodjela, 600 m. (S. 1055).

FL. : Jan.-Feb. 1889 (S.).

DISTRIB. : Yaman, Eritrea.

**2. *A. aequinoctiale*** Kunth Enum. Pl. IV, 72.

HABITAT : II. Yaman (Botta !).

DISTRIB. : Tropical Africa, Arabia.

**3. *A. aequinoctiale*** Kunth, var. **minor** C. B. Clarke in DC. Monogr. III, 221.

HABITAT : II. Yaman (Botta !).

DISTRIB. : Arabia.

### 3. *Commelina* L.

**1. *C. albescens*** Hassk. in Schweinf. Béitr. Aeth. 210.

HABITAT : II. Aggara near Hodjela, 600 m. (S. 1073); near Badjil, 250 m. (S. 1783); S. of Jebel el Areys, 200-300 m. (Defl. 411 !); neighb. of Aden (Hunter 169 !).

III. Dhofar Mts. (Bent 123a !).

FL. : Mar. 1890 (Defl.).

FR. : Mar. 1890 (Defl.).

DISTRIB. : Tropical Africa, Arabia.

**2. *C. Forskalei*** Vahl Enum. II, 172.

HABITAT : II. Ussil, 1,200 m. (S. 1110, 1056); foot of Jebel Bura, 600 m. (S. 230); near Saiman and Wady Fatimah (Schimp. 763 !); Wady Fatimah (Fischer 93 !).

III. Stream, foot of Dhofar Mts. (Bent 123 !).

FL. : Feb. (Fischer), Nov. 1835 and Feb. 1836 (Schimp.).

FR. : Feb. (Fischer), Dec. 1888 (S.).

Vern. name : *Uelán, uolán* (Ussil), *gjelif* (Hille).

**3. *C. Forskalei*** Vahl var. **pterocarpa** Schweinf. Bull. Herb. Boiss. App. II (1894) 56.

HABITAT : II. Ravine near Hille, Jebel Bura, 700 m. (S. 283, 364); Aggara near Hodjela, 600 m. (S. 902).

FR. : Jan. 1889 (S.).

DISTRIB. : Arabia.

**4. *C. benghalensis*** L. Sp. Pl. 60, var. **hirsuta** Hassk. in DC. Monogr. III, 160.

HABITAT : II. Foot of Jebel Melhan, 600 m. (S. 753); Regma near Hodjela, 900 m. (S. 780).

FL. : Jan. 1889.

FR. : Jan. 1889.

DISTRIB. : Yaman, Eritrea.

**5. *C. benghalensis*** L., var. **fimbriata** Schweinf. Bull. Herb. Boiss. App. II (1894) 53.

HABITAT : II. Aggara near Hodjela, 600 m. (S. 1045).

FR. : Feb. 1889 (S.).

DISTRIB. : Arabia, Eritrea.

**6. C. Beccariana** Martelli Fl. Bogos. 87 (? *C. Krebsiana* Kunth Enum. IV, 40, 41; ?—*C. edulis* Rich. Tent. Fl. Abyss. II, 341).

HABITAT: II. Above Menacha, Wady Schurfa, 2,500 m. (S. 1758); in the north-west below Menacha, 2,000 m. (S. 1544).

FL.: Feb.-Mar. 1889 (S.).

DISTRIB.: Arabia, Eritrea.

**7. C. Petersii** Hassk. in Peters Mossamb. II, 522.

HABITAT: II. Ussil, 1,400 m. (S. 1259!).

DISTRIB.: Tropical Africa, Arabia.

**8. C. ussilensis** Schweinf. in Bull. Herb. Boiss. App. II (1894) 58.

HABITAT: II. Ussil, 1,800 m. (S. 1258!).

FL.: Feb. 1889 (S.).

DISTRIB.: Arabia.

## CX. JUNCACEAE.

### 1. *Juncus* (Tourn.) L.

**1. J. bufonius** L. Sp. Pl. 328.

HABITAT: I. Damp places of Sinai (Bové 31!).

FR.: Nov. 1832 (Bové).

DISTRIB.: Cosmopolitan.

Vern. name: *Kerbel* (Bové).

**2. J. bufonius** L., var. *subauriculata* Buchenau in Allg. Bot. Zeits. (1903) 165.

HABITAT: I. Oasis Firan (ex Kneuck.).

DISTRIB.: Arabia.

**3. J. bufonius** L., var. *fasciculatus* Koch Syn. Flor. German. I (1837) 732.

HABITAT: I. Arabia Petraea (ex Muschler).

DISTRIB.: Cosmopolitan.

**4. J. Fontanesii** Laharpe Monogr. Joncac. (1827) 130.—*J. articulatus* Desf. Fl. Atl. I, 313.—*J. pyramidatus* Laharpe Monogr. Joncac. (1827) 128.

HABITAT: I. Arabia Petraea (ex Muschler).

II. Menacha, 2,300 m. (S. 1577!).

FL.: Feb. 1889 (S.).

DISTRIB.: Mediterranean region, German E. Africa, British Central Africa, Nyassaland, Egypt, W. Asia.

**5. J. subulatus** Forsk. Fl. Aeg.-Arab. (1775) 75.

HABITAT: I. Arabia Petraea (ex Muschler).

DISTRIB.: Morocco to Syria.

**6. *J. glaucus*** Ehrh. Beitr. Zur Naturk. VI (1791) 83, var. **longicornis** Grogndt.

HABITAT : I. Raphidim (Schimp. 287 !).

FR. : July 1835 (Schimp.).

**7. *J. acutus*** L. Sp. Pl. I (1753) 325.—*J. spinosus* Forsk. Fl. Aeg.-Arab. 75.

HABITAT : IV. Maskat (Auch. 5475 !); Hufuf Oasis (Cheeseman).

DISTRIB. : Temperate region.

**8. *J. maritimus*** Lam. Encycl. III (1789) 264, var. **arabicus** Aschers. and Buch. in Boiss. Fl. Or. V (1884) 354.

HABITAT : I. Near Tor (Bové 29 !); Wady Farran (Lord !); Wadies Sudr, Ghurundel and Elain, Akaba; in the Arabah and Ghor es Safieh; S. Midian (Burton!).

FR. : Apr. 1878 (Burton), May 1868 (Lord), June 1832 (Bové).

DISTRIB. : Egypt, also known from Sinai, Palestine and Afghanistan.

**9. *J. puncterius*** L. Fl. Suppl. 208.

HABITAT : I. Mt. Sinai to Tor (Lord!).

FR. : May 1868 (Lord).

DISTRIB. : S. Africa, W. Asia.

**10. *J. puncterius*** L. f. var. **mauritanicus** Buchenau et Trabut in Monogr. Juncae. (1890) 278.

HABITAT : I. Arabia Petraea (ex Buchenau).

DISTRIB. : S. Africa, Somaliland, Eritrea, Abyssinia, Sinai, Baluchistan.

**11. *J. effusus*** L. Sp. Pl. 326.

HABITAT : I. Arabia Petraea, near Raphidim (Schimp.).

DISTRIB. : Europe, Siberia, Japan, India, N. America, Australia.

## CXI. PALMAE.

### 1. Phoenix L.

**1. *P. dactylifera*** L. Sp. Pl. I (1753) 1188.

HABITAT : Cultivated all over Arabia.

**2. *P. reclinata*** Jacq. Fragm. Bot. (1809) 27, t. 24.—*P. spinosa* Thonning in Videnskabernes Selskabs Afhandl. IV (1829) 211.

HABITAT : II. Aggara near Hodjela, 600 m. (S. 1037); Wady Madfar near Hodjela, 700 m. (S. 993); foot of Jebel Bura, 600 m. (S. 341).

DISTRIB. : Tropical Africa.

Vern. name : *Schottob* (Hodjela), *Schegja* (Ussil).

**2. Hyphaene Gaertn.****1. H. thebaica** Mart. Hist. Palm. III, 225.

HABITAT: II. Rare and only in the lowland, here and there cultivated. At Hodeidah in the sand of the coast region successfully cultivated.

DISTRIB.: Along the valley of the Nile in middle and upper Egypt; Shaikh Othman near Aden.

**3. Cocos L.****1. C. nucifera** L. Sp. Pl. I (1753) 1188.

HABITAT: II. Lahej (Defl.) cultivated.

III. South coast, near el-Hami, east of Schehr, planted in great quantities.

FR.: Feb. 1881 (S.).

DISTRIB.: Cosmopolitan in the tropics.

**4. Areca L.****1. A. catechu** L. Sp. Pl. 1189.

HABITAT: II. Yaman.

DISTRIB.: Exact native country of the Betel-nut Palm is uncertain.

**CXII. PANDANACEAE.****1. Pandanus Rumph. ex L. f.**

**1. P. tectorius** Soland. ex Parkinson Journ. Voy. H. M. S. Endeavour (1773) 46.—*P. odoratissimus* L. f. Suppl. (1781) 424.

HABITAT: II. In the ravine Offer, Jebel Bura near Hille, 600 m. (S. 314); Wady Chuoiel, 1,200 m. (S. 1181); Aggara near Hodjela, 600 m.

FL.: Female flowers Feb. 1889 (S.).

DISTRIB.: India, Arabia.

Vern. name: *Kadi* (S.).

**CXIII. TYPHACEAE.****1. Typha L.****1. T. angustifolia** L. Sp. Pl. 971.

HABITAT: II. Bahr-es-Sahan near Ammerieh, in the low country of the Tehama (S. 474); Spring near Bet-el-Mograb, not far from Menacha, 2,400 m. (S. 1707).

III. Stream of valley leading to Dhofar Mts. (Bent 94!).

DISTRIB.: Europe, N. America, Asia, also in tropical America.

Vern. name: *Hafe, haffa* (S.).

**2. T. angustata** Bory *et* Chaub. Nouv. Fl. Pelop. 4.

HABITAT : I. Between Tor and Sinai (Bové 35 !); Jebel Catherine (Drake 36 !); Wady Hebran (Schimp. 366 !); Arabia Petraea McDonald !).

FL. : June 1832 (Bové).

FR. : June 1832 (Bové), June 1835 (Schimp.).

DISTRIB. : Also found in the Mediterranean region, Orient, northern India, Nubia and Abyssinia.

Vern. name : *Halfa* (Drake).

**3. T. latifolia** L. Sp. Pl. I (1753) 971.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Almost cosmopolitan.

**CXIV. LEMNACEAE.****1. Lemna** L.**1. L. polyrrhiza** L. Sp. Pl. I (1753) 970.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Widely distributed in most warm and temperate regions.

**2. L. minor** L. Sp. Pl. I (1753) 970.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Widely distributed through the warm and temperate regions of the earth.

**3. L. paucicostata** Hegelmaier in Monogr. Lemnac. (1868) 139, t. VIII.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Widely distributed through the warmer parts of the earth.

**4. L. gibba** L. Sp. Pl. I (1753) 970.

HABITAT : I. Arabia Petraea (ex Muschler).

II. Wady Nahemi above Attara, 2,100 m. (S. 1744); near Menacha, 2,850 m. (S. 1662 !).

DISTRIB. : Tropical Africa, widely distributed in Europe, Asia and America.

Vern. name : *Bellessinan* (Menacha) (S.).

**CXV. ALISMATACEAE.****1. Damasonium** Mill.

**1. D. alisma** Mill., var. **compactum** Micheli in DC. Monogr. Phanerog. III (1881) 42.



HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Egypt, also common in the Mediterranean and Atlantic region.

## CXVI. ARACEAE.

### 1. *Arisaema* Mart.

1. *A. enneaphyllum* Hochst. ex A. Rich. Tent. Fl. Abyss. II (1851) 352; Defl. Voy. Yemen (1889) 215.

HABITAT : II. Yaman at the tops of Jebel Shibam near Menacha, 2,800 m. (Defl. 347); on the way from Shibam to the castle Kaukaban, 2,600-2,800 m. (Defl. 621); Wady Suleymen, 2,400 m. (Defl. 574); top of Jebel-el-Sumara, on the way from Yerim to Ibb, 2,800 m. (Defl.).

DISTRIB. : N. African Steppen Province, Abyssinia, Yaman.

2. *A. Bottae* Schott Prodr. (1860) 42; Engl. in DC. Mon. Phan. II (1879) 551.

HABITAT : II. Yaman, Ahl el caf (Botta !); Haifan (Defl.); Mt. Sabor (Botta !).

DISTRIB. : Abyssinia, Eritrea, Yaman.

3. *A. flavum* Schott Prodr. (1860) 40; Engl. in DC. Mon. Phan. II (1879) 548.—*Arum flavum* Forsk. Fl. Aeg.-Arab. p. CXX, n. 525 (1775) 157.

HABITAT : II. Neighb. of Aden (Hunter 268 !); near Taaes (Forsk. in Herb. Univers. Kiel.).

DISTRIB. : Abyssinia, Eritrea, Yaman, Afghanistan, Kurram Valley, subtropical western Himalaya, Garhwal.

### 2. *Colocasia* Schott.

1. *C. esculenta* Schott Meletem. (1832) 18.—*Arum esculentum* L. Sp. Pl. (1753) 965, ed. 2 (1763) 1369.

HABITAT : II. Yaman Manod near Hodjela, 900 m. (S. 946 !); foot of Jebel Bura near Hille, 600 m. (S. 334).

DISTRIB. : Cultivated in all hot countries.

Vern. name : *Kurkum* (Hills); ssandj (Ussil.).

## CXVII. NAIADACEAE.

### 1. *Cymodocea* Koen.

1. *C. isoetifolia* Aschers. Sitzb. Ges. Naturf. Fr. Berlin (1887) 3.

HABITAT : II. Hodeidah (S. 147 !); Aden (Defl. 317 !).

DISTRIB. : Red Sea, Indian and Pacific Ocean between the tropics.

**2. C. ciliata** Ehrbg. Sitzb. Ges. Naturf. Fr. Berlin (1867) 3.—*Zostera ciliata* Forsk. descr. 157.

HABITAT : I. Hamah Island (Slade !); Red Sea (Bové 540 !); near Suez (Schimp. 961 !).

II. Aden (Thomson !); Hodeidah (S. 787 !).

DISTRIB. : Widely distributed in the Red Sea and the Indian Ocean to N.-E. Australia.

Vern. name : *Suram* (S.).

**3. C. nodosa** Aschers. Sitzb. Ges. Naturf. Fr. Berlin (1867) 4.

HABITAT : II. Hodeidah (S. 148 !).

DISTRIB. : Mediterranean Sea, African Atlantic coast from Tanger to Senegambia.

**4. C. serrulata** Aschers. et Magnus Sitzb. Ges. Naturf. Fr. Berlin (1870) 84.

HABITAT : II. Hodeidah (S. 146 !).

DISTRIB. : Red Sea coasts and also known from Australian coasts.

**5. C. rotundata** Aschers. et Schweinf. Sitzb. Ges. Naturf. Fr. Berlin (1870) 84.

HABITAT : II. Hodeidah (S. 158a !); Aden (Balfour !).

DISTRIB. : Widely distributed in the Red Sea.

**6. C. Hemprichia** Ehrbg.

HABITAT : II. Aden (Balfour !); Aden Bir Ahmed (Defl.).

## 2. *Diplanthera* Thou.

**1. D. uninervis** Aschers. in Engl. Naturl. Pflanzenfam. Nachtr. (1897) 37.—*Zostera uninervis* Forsk. Fl. Aeg.-Arab. 157.—*Halodule uninervis* Aschers. in Boiss. Fl. Or. V. 24.

HABITAT : I. Tor (Ehrenb. !);

II. Hodeidah (S. 148); Aden (Balfour !).

DISTRIB. : Common in the Red Sea and in the Indian and Pacific Oceans.

## 3. *Naias* L.

**1. N. graminea** Del. Descr. Egypte Hist. Nat. II. (1813) 282, t. 50, fig. 3.

HABITAT : III. Dhofar Mts., river mouth, coast (Bent 217 !).

DISTRIB. : Generally distributed throughout the warmer parts of the Old World.

**2. N. minor** Ail. Fl. pedemont. II (1785) 221.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Also found in Europe, Asia Minor, Syria, Kurdistan, Persia, Afghanistan, India, Burma, Malacca and Manchuria.

**3. *N. marina*** L. Sp. Pl. ed. I (1753) 1015, var. **Ehrenbergii** A. Br. in Journ. of Bot. II (1864) 275.

HABITAT : II. Yaman (ex Rendle).

DISTRIB. : Arabia, Tunis, Socotra.

#### 4. *Zannichellia* Mich. ex L.

**1. *Z. palustris*** L. Sp. Pl. I (1753) 969.

HABITAT : I. Arabia Petraea.

DISTRIB. : Cosmopolitan species wanting only in Australia but found in New Zealand.

#### 5. *Ruppia* L.

**1. *R. rostellata*** Koch ex Reichb. Ic. Pl. Crit. II, 66.

HABITAT : I. Tor *ex aqua subdulci thermarum* (Ehrenb.!).

DISTRIB. : Common in brackish waters. In almost all temperate and subtropical countries.

**2. *R. maritima* L., var. *spiralis*** (L.) Aschers. in Boiss. Fl. Or. V (1884) 18.

HABITAT : I. Near el Tor (Schimp. 219!).

FR. : March 1835 (Schimp.).

DISTRIB. of type : Temperate and tropical regions.

#### 6. *Potamogeton* (Tourn.) L.

**1. *P. natans*** L. Sp. Pl. I (1753) 126.

HABITAT : III. Dhofar Mts., Derbat Lake, 240 m. (Bent 211!).

DISTRIB. : A widely dispersed plant, found in nearly all temperate climates.

**2. *P. natans* L., var. *serotinus*** Boiss. Fl. Or. V (1884) 16.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Distribution of type.

**3. *P. pusillus*** L. Sp. Pl. I (1753) 183.

HABITAT : II. Northern slopes of Jebel Shibam, above Menacha 2,500-2,600 m. (S. 1674! 1963).

DISTRIB. : Almost cosmopolitan.

**4. *P. Preussii*** A. Benn. in Fl. Trop. Afr. VIII (1902) 222.

HABITAT : II. Arabia, Yaman (Defl.).

DISTRIB. : Tropical Africa, Arabia.

**5. *P. coloratus*** Hornem. in Fl. Dan. t. 1449.

HABITAT : Arabia (Schimp. 893 !).

DISTRIB. : Europe.

## CXVIII. CYPERACEAE.

### 1. *Cyperus* L.

**1. *C. Fenzelianus*** Steud. Syn. Pl. Cyp. 33.

HABITAT : II. Wady Fatimah (Fischer 119 !).

III. Dhofar Mts. (Bent 134 !).

FL. : Feb. (Fischer).

DISTRIB. : Tropical Africa, Arabia.

**2. *C. rotundus*** L. Sp. Pl. 45.

HABITAT : I. Ghor es Safieh (Hart).

II. Jedda (Schimp. 916 !, Zohrab 3 !); Yaman (S. 897 ! *partim*); foot of Jebel Bura near Hille, 600 m. (S. 351); at the river of Aggara near Hodjela, 600 m. (S. 1060); Wady Fatimah (Fischer 119 !).

III. Dhofar Mts. : Hafu (Bent 41 !).

FL. : Feb. 1837 (Fischer); Jan.-Feb. 1889 (S.).

FR. : Jan.-Feb. 1889 (S.).

DISTRIB. : Cosmopolitan.

**3. *C. rotundus*** L., var. *macrostachyus* Boiss.

HABITAT : I. Arabia Petraea (Boiss. !).

DISTRIB. of type : Cosmopolitan.

**4. *C. falcatus*** Nees & Ehrbg. in Boeckl Cyp. I. 150, 151.

HABITAT : II. Aden (S. 14).

III. El Hami, east of Schehr (S. 210).

FL. : Mar. & Apr. 1881 (S.).

FR. : Mar. & Apr. 1881 (S.).

**4a. *C. falcatus*** Nees var. *hamiensis* Schweinf. Bull. Herb. Boiss. (1894) App. II, 47.

HABITAT : III. El. Hami, east of Schehr (S.).

FL. : Apr. 1881 (S.).

DISTRIB. : Arabia.

**5. *C. articulatus*** L. Sp. Pl. 44.

HABITAT : II. Aggara, Hodjela (S. 1036 !); Wady Garu (Ehrenb. !).

FL. : Feb. 1889 (S.), Feb. 1823 (Ehrenb.).

FR. : Feb. 1889 (S.), Feb. 1823 (Ehrenb.).

DISTRIB. : Tropics.

Vern. name : *Chaseqj* (S.).

**6. *C. flabelliformis*** Rottb. Desc. Nov. Pl. 42.—*C. gradatus* Forsk. Fl. Aeg.-Arab. 13.

HABITAT : II. Hodjela, Manod (S. 978) ; Jebel Bura, 900 m. (S. 513) ; Wady Chuoiat, 1,200 m. (S. 1168).

FR. : Jan. 1889 (S.)

DISTRIB. : Arabia, Abyssinia.

Vern. name : *Kuff el ma* (S.).

**7. *C. bulbosus*** Vahl Enum. II, 342.

HABITAT : II. Jedda (Zohrab 23 !, Fischer 54 !, Schimp. 809 !) ; Wady Adab near Shukra (Defl. 471 !).

FL. : Jan. 1837 (Fischer), Jan. 1836 (Schimp.), Mar. 1890 (Defl.).

DISTRIB. : Arabia, Africa, India orientalis.

**8. *C. conglomeratus*** Rottb. Desc. Nov. Pl. 21.

HABITAT : I. N. Midian (Burton !) ; Wady Ghurundel and Ramleh (Lord !) ; Desert of Tor (Bové 28 !).

II. Jedda (Schimp. 1042 !) ; Aden (Thomson !, Defl. 37 ! Perry !, S. !) ; Is. of Ketumbal (Ehrenb. !).

IV. Oman (Pilgrim !) ; Maskat (Bornm. 684 !) ; Central Arabia (Pelly !).

FR. : Jan. 1893 (Bornm.), Apr. 1868 (Lord), June 1832 (Bové), Nov.-Dec. 1888 (S.), Mar. 1881 (S.).

DISTRIB. : Generally in the tropics.

**9. *C. conglomeratus*** Rottb., var. *effusus* Boiss. Fl. Or. V, 369.

HABITAT : II. Near Dahab (Schimp. 301 !) ; near Noweba (Schimp. 733 !) ; Hanish Island (Slade !) ; Jedda (Fischer 55 !, Zohrab 13 ! 22 !, Schimp. 810 !) ; Aden (S. 15 !, Thomson !, Beever 50 !).

III. El Hami (S. 210 !).

FL. : Oct.-Feb. (Fischer), July 1835 (Schimp.), Nov. 1888 (S.).

FR. : Oct.-Feb. (Fischer), Nov. 1888 (S.).

DISTRIB. : Of type.

**10. *C. conglomeratus*** Rottb., var. *pumilus*.

HABITAT : II. Jedda (Zohrab 13a in H. K. !) ; Aden (Hook. 105 !).

III. Dhofar Mts. : Hafu (Bent 28 !).

IV. Oman (Pilgrim !).

DISTRIB. : Of type.

**11. *C. arenarius*** Retz. Obs. IV, 9.

HABITAT. : II. Neighb. of Aden (Hunter 113 !).

DISTRIB. : Tropical Asia.

**12. *C. eleusinoides*** Kunth Enum. Pl. II, 39.

HABITAT : II. Wady Hedjan, 1,200 m. (S. 1962 !).

FL. : Feb. 1889 (S.).

DISTRIB. : Generally in the tropics.

**13. *C. rubicundus*** Vahl Enum. Pl. II, 308.

HABITAT : II. Aggara near Hodjela, 600 m. (S. 897 !); Neighb. of Aden (Hunter 67 !); S.-W. of Jebel Nakhai, 800 m. (Defl. 490 !); foot of Jebel Bura, 600 m. (S. 386).

FL. : Jan.-Feb. 1889 (S.).

FR. : Jan. 1889 (S.), Feb. 1889 (S.), Mar. 1890 (Defl.).

DISTRIB. : India, tropical Africa, Arabia.

**14. *C. longus*** L. Sp. Pl. 45.

HABITAT : I. Arabia Petraea (ex Muschler); Ghor es Safieh (Hart).

DISTRIB. : Europe, Orient.

**15. *C. laevigatus*** L. Mant. II, 179.—*C. mucronatus* Rottl. Desc. Nov. Pl. 19.

HABITAT : I. Wady es-Sle, Oasis Firan (ex Kneuck.).

II. Zeyda (Defl.).

DISTRIB. : Cosmopolitan in the warmer regions.

**16. *C. laevigatus*** L. var. *distachyus* Coss. et D. R.

HABITAT : I. Arabia Petraea; Oasis Firan, Wady Ghurundel (ex Kneuck. *sub Acorello*).

DISTRIB. : Of type.

**17. *C. atronitens*** Hochst. in Flora, XXIV (1841) 1.

HABITAT : II. Jebel Shibam, above Menacha, 2,700 m. (S. 1679 !).

FR. : Mar. 1889 (S.).

DISTRIB. : Arabia, tropical Africa.

**18. *C. leptophyllus*** Hochst. ex Steud. Syn. Pl. Cyp. 33.

HABITAT : II. Western slopes of Jebel Bura, 900 m. (S. 387 !); Wady Hedjan, 1,200 m. (S. 1089); Shukra (Defl.).

DISTRIB. : Tropical Africa, Arabia.

Vern. name : *Schile* (Ussil).

**19. *C. obtusiflorus*** Vahl Enum. II, 308.

HABITAT : II. Yaman (Herb. Kew).

DISTRIB. : S. Africa, Madagascar, Arabia.

**20. *C. polystachyus*** Rottb. Desc. Nov. Pl. 39.

HABITAT : II. Yaman (Herb. Kew).

DISTRIB. : Everywhere in the tropics.

2. *Scirpus* (Tourn.) L.1. *S. setaceus* L. Sp. Pl. 49.

HABITAT : II. At Menacha, source Mechander, 2,300 m. (S. 1428 !).

FL. : Feb. 1889 (S.).

DISTRIB. : Australia, Asia, Europe.

2. *S. corymbosus* Heyne in Roth Nov. Pl. Sp. 28, var. *brachyceros* H. in Rich. Tent. Fl. Abyss. II, 496.

HABITAT : II. At Jebel Shibam, above Menacha, 2,500 m. (S. 1767 !).

FL. : Mar. 1889 (S.).

DISTRIB. of type : Africa, India.

3. *S. lacustris* L. Sp. Pl. 48.

HABITAT : I. Arabia Petraea.

DISTRIB. : Cosmopolitan.

4. *S. maritimus* L. Sp. Pl. 51.

HABITAT : I. Ghor es Safieh (Hart !).

DISTRIB. : Cosmopolitan.

5. *S. Holoschoenus* L. Sp. Pl. 49.

HABITAT : I. S. Midian (Burton !); Arabia Petraea (McDonald !); foot of Mt. Sinai (Schimp. 108 !); Mt. Sinai (Lord, Bové 21 ! 32 ! 33 !); Sinai, near Senned (Drake 86 !); Jebel Musa; Wady el Tihyeh to Jebel Hertih (Hart).

FL. : Mar.-Apr. 1878 (Burton), May 1835 (Schimp.).

FR. : Mar.-Apr. 1878 (Burton), May 1835 (Schimp.), June 1832 (Bové).

DISTRIB. : Cosmopolitan.

Vern. name : *Deess* (Drake).6. *S. littoralis* Schrad. Fl. Germ. I, 142, t. 5, fig. 7.

HABITAT : III. Brackish pool at Ghafyt, 180 m. (Lunt 91); Dhofar Mts., in streams near coast (Bent).

DISTRIB. : Europe, Asia, Egypt.

3. *Fimbristylis* Vahl.1. *F. spathacea* Roth Nov. Pl. Sp. 24.

HABITAT : II. S.-W. Arabia (Ehrenb. !).

III. Near the hot springs of el Hami (S. 158 !).

FL. : Apr. 1881 (S.).

FR. : Apr. 1881 (S.).

DISTRIB. : Warm regions.

2. *F. ferruginea* Vahl Enum. II, 291.

HABITAT : II. Above Menacha, 2,500 m. (S. 1709); Wady et-Tehm, 1,500 m. (S. 1245); Wady Shaari, foot of Jebel Melhan, 700 m. (S. 677);

Aggara near Hodjela, 600 m. (S. 1075); Zeyda (Defl.).

III. Near the hot springs of el Hami (S. 184! 199!).

IV. Maskat (Auch. 5480!).

DISTRIB. : All warm regions.

**3. F. cf. ferruginea** Vahl.

HABITAT : IV. Hufuf Oasis (Cheeseman).

**4. F. dichotoma** Vahl Enum. II, 287.

HABITAT : I. Ghor es Safieh (Hart).

DISTRIB. : S. Europe, N. Africa.

**4. Schoenus** L.

**1. S. nigricans** L. Sp. Pl. 43.

HABITAT : I. Arabia Petraea (Bové! Schimp.!).

DISTRIB. : Cosmopolitan.

**5. Carex** (Dill.) L.

**1. C. diluta** Bieb. Fl. Taur. Cauc. II, 388.

HABITAT : I. Foot of Mt. Sinai, Gauaje el Leestan (Schimp. 176!).

FL. : Apr. 1835 (Schimp.).

DISTRIB. : Southern Europe, temperate Asia.

Vern. name : *Dis el Muje* (Schimp.).

**2. C. diluta** Bieb. var. **Bottae** C. B. Clarke.

HABITAT : I. Mt. Sinai, Arabia Petraea (Figari!); Sinai (Botta 3!); damp places of Sinai (Bové 23!).

FL. : June-July (Figari).

FR. : June-July (Figari); June 1832 (Bové).

DISTRIB. : Of type.

**3. C. Burchelliana** Böckl. in *Linnaea* XLI (1877) 234., var. **leiocarpa** Schweinf. in *Bull. Herb. Boiss.* (1894) App. II. 51.

HABITAT : II. At Menacha, source Machader, 2,300 m. (S. 1424).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.).

DISTRIB. of type : South Africa.

**4. C. divisa** Huds. Fl. Angl. ed. I, 348.

HABITAT : I. Ghor es Safieh (Hart).

DISTRIB. : North temperate regions.

**5. C. stenophylla** Wahlenb. in *Vet. Akad. Nya. Handl. Stockh.* (1803) 142; var. **planifolia** Boiss.



HABITAT : I. Summit of Mt. Hor (Hart) ; from Wady Zewerah to Bir es Seba and Tel Abou Hereireh (Hart).

DISTRIB. of type : North temperate region.

**6. *C. distans* L.** Syst. ed. X, 1263.

HABITAT : I. Arabia Petraea.

DISTRIB. : Western Asia, N. America.

**CXIX. GRAMINEAE.**

**1. Imperata** Cyrill.

**1. *I. cylindrica*** Beauv. Agrost. 165, t. 5, fig. 1.

HABITAT : I. Desert of Sinai (Bové 16 !); Sinai (Holland !); Wadies Zelegah and Elain : Ghor es Safieh (Hart).

FR. : June 1832 (Bové).

DISTRIB. : The hotter parts of the Old World.

Vern. name : *Halfeh* (Bové).

**2. Saccharum** L.

**1. *S. biflorum*** Forsk. Fl. Aeg.-Arab. 16.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Egypt, Syria, Sinai, Palestine.

**2. *S. spontaneum*** L. Mant. (1771) 183.

HABITAT : II. Oasis of Lahadj (Defl. 147).

FR. : Dec. 1889 (Defl.).

DISTRIB. : Tropics of the Old World.

**3. *S. officinale*** L. Sp. Pl. 54.

HABITAT : II. Yaman (Herb. Kew !).

DISTRIB. : Cultivated in warm regions.

**4. *S. Ravennae*** L. Syst. ed. XIII, 88.—*Erianthus Ravennae* Beauv. Agrost. 162.

HABITAT : I. Ghor es Safieh (Hart).

DISTRIB. : Western Himalaya, Punjab, Upper Gangetic Plain, Sind, extending westwards to the Mediterranean.

**3. Rottboellia** L. f.

**1. *R. hirsuta*** Vahl Symb. Bot. I, 11.—*Coelorachis hirsuta* Brongn. in Duperr. Voy. Coq. Bot. 64, t. 14 (1829) 65, *in obs.*—*Saccharum hirsutum* Forsk. Fl. Aeg.-Arab. 16.

HABITAT : I. Desert of Sinai (Bové 18) ; Sinai (Bové !).

II. Perim Island (H. K. !); near Jedda (Schimp. 791 !);

Badjil (S. 873 !).

IV. Maskat (Auch. 5460 !).

FR. : Jan. 1889 (S.), June 1832 (Bové).

DISTRIB. : Tropical Africa, Arabia, Afghanistan.

Vern. name : *Tuham, ta'am* (S.).

**2. R. exaltata** L. f. Suppl. 114, var. **genuina** Hack. in DC. Monogr. VI, 294.

HABITAT : II. Aggara, near Hodjela, in maize fields, 600 m. (S. 1070 !).

FR. : Feb. 1889 (S.).

DISTRIB. : Tropics.

Vern. name : *Qoren* (S.).

#### 4. *Apluda* L.

**1. A. varia** Hack. in DC. Monogr. VI, 196, var. **aristata** Hack. l. c. 199.

HABITAT : II. Tropical Arabia (ex Stapf).

DISTRIB. : Tropical Asia to New Caledonia, tropical Arabia and Socotra.

#### 5. *Ischaemum* L.

**1. I. laxum** R. Br. Prod. 205.

HABITAT : II. Foot of Jebel Bura, 600 m. (S. 300).

FL. : Jan. 1889 (S.).

FR. : Jan. 1889 (S.).

DISTRIB. : Tropics of the Old World.

#### 6. *Elionurus* Humb. et Bonpl.

**1. E. hirsutus** (Forsk.) Munro ex Benth. in Journ. Linn. Soc. XIX (1881) 68.—*Saccharum hirsutum* Forsk. Fl. Aeg.-Arab. 16.

HABITAT : I. Sinai (Herb. Kew !); Arabia Petraea (Bové 18).

II. Yaman (ex Boiss.).

IV. Maskat (Auch. 5460).

DISTRIB. : Northern Punjab, Rajputana, westwards to Northern Africa.

**2. E. Royleanus** Nees ex Rich. Tent. Fl. Abyss. II, 474.

HABITAT : II. Mt. Sidr (Fischer 118 !); Wady Djara (Ehrenb. !).

FL. : Feb. (Fischer).

DISTRIB. : India, Arabia, tropical Africa.

#### 7. *Arthraxon* Beauv.

**1. A. lanceolatus** Hochst. in Flora XXXIX (1856) 188., var. **serrulatus** Hack. in DC. Monogr. VI, 348.

HABITAT : II. Regma, near Hodjela, 800 m. (S. 951) ; Ussil, 1,400 m. (S. 1953) ; Menacha, 2,300 m. (S. 1580) ; Hille, Jebel Bura (S. 361 !).  
 FL. : Feb. 1889 (S.).  
 FR. : Jan.-Feb. 1889 (S.).  
 DISTRIB. of type : India, Abyssinia, Arabia, Japan.

### 8. *Andropogon* L.

1. *A. sorghum* Brot. Fl. Lusit. I. 88, var. *rubrocernuus* Kcke.

HABITAT : II. Hodjela, 600 m. (S. 88) ; Ussil, 1,000-1,200 m. (S.).

Vern. name: *Kubri* (S.).

2. *A. sorghum* Brot. var. *saccharatus* Kcke. und Wern. Getr. I, 310.—*Holcus Dochna* Forsk. descr. 174.

HABITAT : II. Shukra, cultivated (S.).

3. *A. sorghum* Brot. var. *usorum* Nees Fl. Afr. Austr. 87 ; Kcke. und Wern. Getr. I, 312.

HABITAT : II. Above Menacha, 2,600 m., cultivated in the rainy season (S.) ; east of Marraua (S. 162, 164).

Vern. name : *Gjendab ahmar* (S.).

4. *A. sorghum* Brot. var. *yemensis* Kcke.

HABITAT : II. East of Marraua (S. 162) ; Shukra (S. 60).

5. *A. sorghum* Brot. var. *niger* Ard. in Saggi Sc. I, 134 ; Hack. in DC. Monogr. VI, 514.

HABITAT : II. At the foot of Jebel Bura (S.).

6. *A. sorghum* Brot. var. *albida* Kcke.

HABITAT : II. Ussil, 1,000-1,300 m., cultivated in the rainy season (S.).

Vern. name : *Ahnessi* (S.).

7. *A. sorghum* Brot. var. *bicolor* L. Mant. 2, 301.

HABITAT : II. Aden, cultivated as cattle fodder at Shaikh Othman (S.) ; east of Marraua (S. 163).

Vern. name : *Gherb* (S.).

8. *A. sorghum* Brot. var. *aethiops* Kcke. und Wern. Getr. 313.

HABITAT : II. In the lowland of the Tehama (S.).

9. *A. sorghum* Brot. var. *arabicus* Kcke.

HABITAT : II. Above Menacha, 2,600 m. cultivated in the rainy season (S.).

Vern. name : *Gia'aidi* (S.).

**10. A. sorghum** Brot. var. *subglabrescens* Hack. in DC. Monogr. VI, 519.

HABITAT : II. Oasis of Lahadj (Defl. 123 !).

FL. : Dec. 1889 (Defl.).

FR. : Dec. 1889 (Defl.).

**11. A. sorghum** Brot. var. *Ankolib* Hack. in DC. Monogr. VI, 519.

HABITAT : II. Yaman (S.).

OBSERV. : Lunt's 159 collected at Al Hawi in Hadramaut alt. 660 m. is aff. to this var.

**12. A. halepensis** Brot. Fl. Lusit. I (1804) 89.

HABITAT : I. Arabia Petraea (Herb. Kew !); Ghor es Safieh, cultivated (Hart).

DISTRIB. : Throughout the tropics.

**13. A. Aucheri** Boiss. Diagn. Ser. I, V, 77.

HABITAT : II. Yaman (Defl. !).

DISTRIB. : India, tropical Africa, Arabia.

**14. A. Aucheri** Boiss. var. *sorghum quinque plumis* Hack. in DC. Monogr. VI, 561.—*A. quinqueplumis* Hochst. ex A. Rich. Tent. Fl. Abyss. II, 450.

HABITAT : II. Badjil, 200 m. (S. 529); Taifa (Botta !).

III. El Hami (S. 203 !).

FL. : 10th Jan. 1889 (S.).

FR. : 10th Jan. 1889 (S.), Apr. 1881 (S.).

**15. A. hirtus** L. Sp. Pl. 1046.

HABITAT : I. Wady Zewerah (Lowne); summit of Mt. Hor (Hart).

IV. Maskat, Mt. Chebeck (Auch. 5462).

DISTRIB. : Tropics.

**16. A. hirtus** L. Sp. Pl. 1046, var. *genuinus* Hack. in DC. Monogr. VI, 619.

HABITAT : I. Arabia Petraea (McDonald !); Wady Farrun and neighb. (Lord !); Sinai (S. 114 !); Desert of Sinai (Bové 15 !); foot of Mt. Sinai (Schimp. 101 !); Mt. Sinai (H. K. !).

II. Jebel Bura, 600 m. (S. 278); Regma near Hodjela, 800 m. (S. 973); foot of Jebel Melhan, 600 m. (S. 654); Ussil, 1,400 m. (S. 1347); Menacha, 2,00-2,500 m. (S. 1538, 1708).

FL. : May 1835 (Schimp.).

FR. : Mar. 1886 (S.), May 1868 (Lord), May 1835 (Schimp.), June 1832 (Bové).

Vern. name : *Hambara* (Bové), *hamra* (Schimp.).

**17. A. caesius** Nees ex Hook. & Arn. Bot. Beech. Voy. 244.—*A. schoenanthus* L. Sp. Pl. 1046, var. *caesius* Hack. in DC. Monogr. VI. 610, 611.

HABITAT : II. Wolledje (S. 627).

FL. : Jan. 1889 (S.).

FR. : Jan. 1889 (S.).

DISTRIB. : Tropical Africa, Arabia, southern India.

Vern. name : *Qusseba* (S.).

**18. A. distachyus** L. Sp. Pl. 1046.

HABITAT : I. Sinai (Auch. 2954 !).

II. Above Menacha, 2,500 m. (S. 1435 !).

FR. : Feb. 1889 (S.).

DISTRIB. : Mediterranean.

**19. A. foveolatus** Del. Fl. Aeg. 160, t. 8, fig. 2.

HABITAT : I. Akaba (Hart); desert of Sinai (very rare) (Bové !).

II. Aden, Shukra, Serrya (Defl.); Aden (Birdwood 131 !, S. 79 !, Lunt 337 !); desert near Jedda (Schimp. 790 !); Jedda (Zohrab 216 !); El Gidam (Ehrenb. !).

III. El Hami (S. 173).

IV. Maskat (Auch. 5461 !).

FR. : Jan. 1825 (Ehrenb.), Apr. 1894 (Lunt), June 1832 (Bové), Nov. 1835 (Schimp.).

DISTRIB. : Africa and tropical Asia.

**20. A. pertusus** Willd. Sp. Pl. IV, 922.

HABITAT : II. Foot of Jebel Bura, 600 m. (S. 478); Aggara near Hodjela, 600 m. (S. 393); Menacha, 2,500 m. (S. 1959).

FL. : Jan., Feb., Mar. (S.).

FR. : Jan., Feb., Mar. (S.).

DISTRIB. : Sicily, tropical Asia, tropical Africa, Australia.

**21. A. annulatus** Forsk. Fl. Aeg.-Arab. 173.

HABITAT : II. Badjil, 190 m. (S. 1960); Aggara near Hodjela, 600 m. (S. 900).

IV. From the valley on the 3rd Mar. (Pelly !).

FL. : Jan. 1889 (S.).

FR. : Jan. 1889 (S.), Mar. (Pelly).

DISTRIB. : Northern Africa, Arabia, India, Australia.

**22. A. laniger** Desf. Fl. Atlant. II, 379.

HABITAT : II. Little Aden, Beyt-el-Amir, Massana (Defl.); Jedda (Schimp. 789 !); neighb. of Jedda (Fischer 132 !); Wady Saylet near Beyt-el-Amir (Defl. 241 !).

IV. Maskat (Bornm. 704 !, Auch. 5462 !).

FL. : Jan. & Feb. (Fischer), Jan. 1893 (Bornm.), Jan. 1890 (Defl.).

FR. : Jan. 1836 (Schimp.), Jan. & Feb. (Fischer), Jan. 1893 (Bornm.), Jan. 1890 (Defl.).

DISTRIB. : Orient, India, N. Africa.

**23. A. contortus** L. Sp. Pl. (1753) 1045.—*Heteropogon contortus* Roem. & Schult. Syst. Veg. II, 836.

HABITAT : II. Jebel Bura, 600-800 m. (S. 908) ; Wolledje (S. 760 !).

FL. : Jan. 1889 (S.).

FR. : Jan. 1889 (S.).

DISTRIB. : Mediterranean region and tropics and subtropics generally.

**24. A. Jwarancusa** Jones in As. Res. IV (1795) 109.—*Cymbopogon Jwarancusa* Schult. Mant. II (1824) 458.

HABITAT : Arabia (Herb. Kew !).

DISTRIB. : India, tropical Africa.

**25. A. sehima** Steud. Syn. Pl. Glum. I, 369.

HABITAT : II. Yaman (ex Stapf).

DISTRIB. : Tropical Africa, Yaman, tropical Arabia, Deccan Peninsula.

## 9. Themeda Forsk.

**1. T. triandra** Forsk. Fl. Aeg.-Arab. CXXIII et 178, var. **glauca** Hack. in DC. Monogr. VI, 663.

HABITAT : II. Menacha, 2,200 m. (S. 1499 !).

FR. : Feb. 1889 (S.).

DISTRIB. : Yaman.

## 10. Tragus Hall.

**1. T. racemosus** Scop. Introd. 73 ; All. Fl. Pedem. II, 241.

HABITAT : II. Yaman (Schimp. 792 !); desert near Jedda (Schimp. 793 !, Fischer 138 !, Zohrab 36 !); Aggara near Hodjela, 600 m. (S. 1050 !); Wady Bahara (Schimp. 792 !); Menacha, 2,200 m. (S. 1594).

FL. : Feb. (Fischer).

FR. : Jan. 1836 (Schimp.), Feb. 1889 (S.), Feb. 1837 (Schimp.).

DISTRIB. : Mediterranean region, Afghanistan.

**2. T. occidentalis** Nees Agrost. Bras. 286.

HABITAT : II. Ussil, 1,400 m. (S. 1049a).

DISTRIB. : Mediterranean.

**3. T. brevicaulis** Boiss. Diagn. Ser. I, XIII, 44.

HABITAT : II. Yaman (Boiss.).

DISTRIB. : Persia, Arabia.

**11. Latipes** Kunth.

**1. L. senegalensis** Kunth Rev. Gram. I, 261, t. 42 (1830).

HABITAT : II. Yaman (Ehrenb. 232 !); Shukra (S. 139 !).

III. Dhofar Mts. : Coasts Dhofar (Bent 52 !).

FR. : Mar. 1881 (S.).

DISTRIB. : Tropical Africa, Arabia.

**12. Eriochloa** H. B. & K.

**1. E. polystachya** H. B. & K. Nov. Gen. et Sp. I, 95.

HABITAT : II. Shaikh Othman (S. 123); Aggara near Hodjela, 600 m. (S. 1058).

FR. : Feb. 1889 (S.), Dec. 1888 (S.).

DISTRIB. : Mexico.

**2. E. acrotricha** Hack. ex Thell. in Viertelj. Naturforsch. Ges. Zürich, LII, 435.

HABITAT : II. Tropical Arabia (ex Stapf).

DISTRIB. : Tropical Africa, tropical Arabia, occasionally in India.

**13. Panicum** L.

**1. P. fatmense** Hochst. et Steud. ex Steud. Nom. ed. II, II, 256 ; et Syn. Pl. Gram. 100 (*Eriochloa* sp.).

HABITAT : II. Aggara near Hodjela in maize fields, 700 m. (S. 1058 !); Unsert, near Mecca (Schimp. 806 !); Wady Fatimah (Fischer 174 !); Jedda (Zohrab 241, 316 !).

FL. : Feb. (Fischer).

FR. : Feb. 1889 (S.).

DISTRIB. : India, Arabia.

**2. P. sanguinale** L. Sp. Pl. 57.—*Digitaria sanguinalis* Scop. Fl. Carn. ed. II, I, 52.

HABITAT : II. Wady Fatimah, near Mecca (Schimp. 803 !); Wady Fatimah (Fischer 120 !).

IV. Near Maskat (Last !).

FL. : Feb. (Fischer).

FR. : Feb. 1836 (Schimp.).

DISTRIB. : Cosmopolitan.

**3. P. sanguinale** L. var. **fenestratum** Schweinf. in Bull. Herb. Boiss. (1894) App. II, 18.

HABITAT : II. Foot of Jebel Melhan, 600 m. (S. 626); Aggara near Hodjela, 600 m. (S. 1049); Regma near Hodjela, 900 m. (S. 949).

FL. : Jan. and Feb. 1889 (S.).

FR. : Jan. and Feb. 1889 (S.).

DISTRIB. : Arabia, Eritrea.

**4. *P. sanguinale*** L. var. **horizontale** Schweinf. in Bull. Herb. Boiss. (1894) App. II, p. 18.

HABITAT : II. Jebel Bura, 600 m. (S. 1330); Aggara, 600 m. (S. 1081); Menacha, 2,200 m. (S. 1595).

FL. : Jan. and Feb. 1889 (S.).

FR. : Jan. and Feb. 1889 (S.).

DISTRIB. : Yaman.

**5. *P. leersioides*** Hochst. in Flora XXXVIII (1855) 196.

HABITAT : II. Foot of Jebel Melhan, 600 m. (S. 762); Ussil, 1,200-1,800 m. (S. 1133, 1196); Regma near Hodjela, 900 m. (S. 985); Aggara, 600 m. (S. 895); Hille, Jebel Bura (S. 322!).

FL. : Jan. and Feb. 1889 (S.).

FR. : Jan. and Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**6. *P. antidotale*** Retz. Obs. IV, 17.

HABITAT : II. Shaikh Othman (S. 122!).

FL. : Dec. 1888 (S.).

FR. : Dec. 1888 (S.).

DISTRIB. : Generally in warm regions.

**7. *P. atosanguineum*** Hochst. ex A. Rich. Tent. Fl. Abyss. II, 375.

HABITAT : II. Foot of Jebel Melhan, 600 m. (S. 769); Ussil, 1,200 m. (S. 1306).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**8. *P. colonum*** L. Syst. ed. X, 870.

HABITAT : I. Ghor es Safieh (Hart).

II. Shukra (S. 75!); Unsert near Mecca (Schimp. 804! 963!); Jedda (Zohrab 218! 220! 315!); Aggara near Hodjela, in maize fields (S. 906!); Yaman, W. Fatimah (Fischer 176!); Shaikh Othman, Lahej (S.); foot of Jebel Melhan, 600 m. (S. 759); Ussil, 1,100 m. (S. 1025).

IV. Near Maskat (Last!).

FL. : Jan.-Mar. (S.).

FR. : Jan. 1889 (S.), Feb. 1836 (Schimp.), Mar. 1881 (S.), Jan.-Mar. (S).

DISTRIB. : Warm regions.

**9. *P. coloratum*** L. Mant. I, 30.

HABITAT : II. Aggara, near Hodjela, 600 m. (S. 949).



FL. : Feb. 1889 (S.).  
 FR. : Feb. 1889 (S.).  
 DISTRIB. : N. Africa, Arabia.

**10. P. commutatum** Nees in Linnaea VII (1832) 274. *not in Linné*  
 HABITAT : II. Jebel Bura, above Hille, 800 m. (S. 396).  
 FL. : Jan. 1889 (S.).  
 FR. : Jan. 1889 (S.).

**11. P. commutatum** var. **nodosum** Hack. in Durand & Schinz,  
 Consp. Fl. Af. V, 744.  
 HABITAT : II. Tropical Arabia (ex Stapf).  
 DISTRIB. : Tropical Africa, Algeria, tropical Arabia, Afghanistan,  
 Punjab.

**12. P. controversum** Steud. Syn. Pl. Gram. 60.  
 HABITAT : II. Aggara, near Hodjela, 600 m. (S. 895a).  
 FL. : Jan. 1889 (S.).  
 FR. : Jan. 1889 (S.).  
 DISTRIB. : Abyssinia, Arabia.

**13. P. cruciforme** Sbth. & Sm. Fl. Graec. I. 44, t. 59. = *Burchardia*  
 HABITAT : II. Ussil, Wady Hedjan, 1,200 m. (S. 1278 !).  
 IV. Maskat (Auch. 5437 !).  
 FL. : Feb. 1889 (S.).  
 FR. : Feb. 1889 (S.).  
 DISTRIB. : Mediterranean region, India.

**14. P. geminatum** Forsk. Fl. Aeg.-Arab. 18.  
 HABITAT : II. Chalife, 200 m. (S. 210); Wady Fatimah (Fischer  
 191 !); Aggara near Hodjela (S. 893 !); near Unsert in Wady Fatimah  
 (Schimp. 807 !).

III. Dhofar Mts. : Coasts (Bent 26 !).  
 FL. : Feb. 1837 (Fischer).  
 FR. : Feb. 1889 (S.), Feb. 1836 (Schimp.), Feb. 1837 (Fischer).  
 DISTRIB. : Tropical regions.  
 Vern. name : *Thalig* (S.).

**15. P. repens** L. Sp. Pl. ed. II, 87.—*P. Hygrocharis* Steud. Syn.  
 Pl. Gram. 72.  
 HABITAT : II. Regma, near Hodjela, 850 m. (S. 950 !).  
 FL. : Jan. 1889 (S.).  
 FR. : Jan. 1889 (S.).  
 DISTRIB. : Warm regions.

**16. P. leucanthum** A. Rich. Tent. Fl. Abyss. II, 372.  
 HABITAT : II. Aden (Ellenbeck).  
 DISTRIB. : Yaman, Eritrea, Abyssinia.

- 17. P. maximum** Jacq. Ic. Pl. Rar. I, t. 13.  
 HABITAT : II. Foot of Jebel Bura, 600 m. (S. 362, 274); Aggara near Hodjela, 600 m. (S. 911); Menacha, Wady Ssarif, 1,800 m. (S. 1698 !); Ussil, 1,400 m. (S. 1166).  
 FR. : Mar. 1889 (S.).  
 DISTRIB. : Tropical America.
- 18. P. Meyerianum** Nees Fl. Afr. Austr. 32.  
 HABITAT : II. Aggara near Hodjela, in rivulets (S. 899 !).  
 FL. : Jan. 1889 (S.).  
 FR. : Jan. 1889 (S.).  
 DISTRIB. : S. Africa, Arabia.
- 19. P. miliaceum** L. Sp. Pl. 58.  
 HABITAT : II. Shukra, cultivated (S. 87 !, Defl.).  
 DISTRIB. : Warm regions.
- 20. P. pennatum** Hochst. in Flora XXXVIII (1855) 197 (*Paspali* sp.).  
 HABITAT : II. Aden (Lunt 306 !); Ussil, Wady Chuoiet, 950 m. (S. 1193 !).  
 FR. : Feb. 1889 (S.), Apr. 1894 (Lunt).  
 DISTRIB. : N. Africa, Arabia, W. Asia.
- 21. P. plicatile** Hochst. in Flora XXXVIII (1855) 198.  
 HABITAT : II. Jebel Bura, 900 m. (S. 458); Ussil, 1,200 m. (S. 1329).  
 FL. : Jan. and Feb. 1889 (S.).  
 FR. : Jan. and Feb. 1889 (S.).  
 DISTRIB. : Tropical Africa, Arabia.
- 22. P. prostratum** Lam. Ill. I, 171.  
 HABITAT : II. Near Unsert in Wady Fatimah (Schimp. 805 !); Wady Fatimah (Fischer 130 !); Wady Fatimah, near Mecca (Schimp. 805 !), Aggara, near Hodjela in maize fields (S. 1034 !); foot of Jebel Bura, Hille, 600 m. (S. 273).  
 FL. : Feb. 1889 (S.), Dec. 1888 (S.).  
 FR. : Feb. 1836 (Schimp.), Feb. 1889 (S.), Dec. 1888 (S.).  
 DISTRIB. : Tropics.
- 23. P. ramosum** L. Mant. I, 29.  
 HABITAT : II. Aggara near Hodjela, in maize fields (S. 2007 !); Jebel Bura, 600 m. (S. 397); foot of Jebel Melhan, 600 m. (S. 932); Regma near Hodjela, 900 m. (S. 966).  
 FL. : Jan. and Feb. 1889 (S.).  
 FR. : Jan. and Feb. 1889 (S.).  
 DISTRIB. : Arabia, Aethiopia, India.

**24. P. sagittifolium** Hochst. ex Steud. Syn. Pl. Gram. 54.

HABITAT : II. Aggara, near Hodjela, 600 m. (S. 1039).

FL. : Feb. 1888 (S.).

FR. : Feb. 1888 (S.).

DISTRIB. : Abyssinia, Arabia.

**25. P. abyssanicum** Hochst. in Flora (1841) I, Intell. 19.—*P. scalarum* Schweinf. Bull. Herb. Boiss. (1894) App. II, 20.

HABITAT : II. Menacha in Lucerne, 2,400 m. (S. 1472 !); Taifa (Schimp. 895 !).

FL. : Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

DISTRIB. : Tropical Africa and tropical Arabia.

**26. P. turgidum** Forsk. Fl. Aeg.-Arab. 18.

HABITAT : I. Wady Elain, and in the Arabah; Wady Zalegah; Akaba (Hart); Wady Zewerah (Lowne 149 !); N. & S. Midian (Burton !); Wady Gennah and neighb. (Lord !); Arabia Petraea (McDonald !); Wady Hebran (Schimp. 152 !); Wady Sewook and neighb. (Lord !).

II. Jedda (Zohrab 35 !); coast line near Hodeida (S.); Shukra (S. 106); Lahej, Shukra, Jebel Nakhai (Defl.); Little Aden (S.).

FR. : Apr.-May 1868 (Lord), Apr. 1835 (Schimp.).

DISTRIB. : N. Africa, Arabia, Orient.

Vern. name : *Zaram* (Burton).

*nocht* **27. P. Crus Galli** L. Sp. Pl. 56.

HABITAT : IV. Maskat (ex Boiss.).

DISTRIB. : The whole world except the Arctic regions.

**28. P. Teneriffae** R. Br. Prod. 189. *of Ind. Kew 2:*

HABITAT : I. Wadies Elain, Elihyeh and Arabah; Akaba (Hart); Arabia Petraea (Bové, Auch.); Wady Shaikh (Boiss.).

II. Aden, Shukra (Defl.).

IV. Maskat (Auch. 5447). *-Trie*

DISTRIB. : Mediterranean, Orient, Arabia, India.

**29. P. remotum** Retz. Obs. IV, 17.

HABITAT : II. Shukra, Serrya (Defl.).

DISTRIB. : Arabia, India.

**30. P. desertorum** A. Rich. Tent. Fl. Abyss. II, 365.

HABITAT : II. Tropical Arabia (Fischer 191, Schimp. 807, S. 893).

DISTRIB. : Tropical Africa, tropical Arabia.

**31. P. insculptum** Steud. Syn. Pl. Gram. 49.

HABITAT : II. Tropical Arabia (S. 895).

DISTRIB. : Tropical Africa, tropical Arabia.

14. *Cenchrus* L.

1. *C. montanus* Nees in Royle III. Bot. Himal. 416.

HABITAT: II. Jedda (Zohrab 37! 217!); in desert, near Jedda (Schimp. 796! 797!, Ehrenb. 235!); Gumfuda (Ehrenb. 235!); cult. ground near Shukra (Defl. 348!).

FR.: Feb. 1825 (Ehrenb.), Mar. 1890 (Defl.), Dec. 1835 (Schimp.).

DISTRIB.: Asia and tropical Africa.

15. *Pennisetum* Rich.

1. *P. cenchroides* A. Rich. in Pers. Syn. I, 72.

HABITAT: I. Wady Haroun, and the others leading into the Arabah from Edom; Wady Arabah and Ghor es Safieh (Hart); Wady Zewerah (Lowne!); Mt. Horeb (Auch. 2998!); Wady Arabah (Hart!); Wady Hebran (Schimp. 153!).

II. Jedda (Fischer 126!, Zohrab 19! 20! 29!); Wady Fatimah (Fischer 126!); Aden (Hook. 110!, Thomson!, Perry!); Menacha, 2,200 m. (S. 1951); Hodjela, 600 m. (S. 894); Moglaf, 300 m. (S. 605); foot of Jebel Bura, 600 m. (S. 392); Aden, Shaikh Othman (S. 1950); Shukra (S. 95, 938); Gumfuda (Ehrenb. 233!); Mor (Ehrenb. 234!); Aggara near Hodjela, 600 m. (S. 894!); neighb. of Shukra (Defl. 349! 409!); Jedda (Schimp. 973!).

III. Dhofar Mts., Hafa (Bent 45!); El Hami (S. 189, 172).

IV. Near Maskat (Last!).

FL.: Dec. 1888 (S.), Jan. and Feb. 1889 (S.).

FR.: Feb. 1889 (S.), Feb. 1857 (Thomson), Apr. 1835 (Schimp.), Mar. 1878 (Perry), Mar. 1881 (S.), Dec. 1888 (S.), Jan. and Feb. 1889 (S.), Dec. 1847 (Hook.).

DISTRIB.: Tropical regions.

Vern. name: *Ihbett* (Hille) (S.).

2. *P. depauperatum* Schweinf. Bull. Herb. Boiss. (1894) App. II, 26.

HABITAT: II. Kahil above Menacha, 2,500 m. (S. 1471!).

FR.: Feb. 1889 (S.).

DISTRIB.: Arabia.

3. *P. dichotomum* (Forsk.) Del. Fl. Eg. 159, t. 8, fig. 1.—*Panicum dichotomum* Forsk. Fl. Aeg.-Arab. p. 19.

HABITAT: I. Wadies Nasb and Elain; Debbet er Ramleh; frequent in the Arabah (Hart); Arabia Petraea (Bové); Mt. Horeb (Auch. 2999!); Wady Sewook (Lord!); Sinai (Figari!); Wady Nasb (Hart!); Sinai desert (Auch. 3000!); Wady Hebran (Schimp. 151!); Nakkeb (Schimp. 308!); Wady Farrun (Lord!).

II. Shukra (S. 62!); Oasis of Lahadj (Defl. 141!).

III. Sibeh, 240 m. (Lunt 11!).

IV. Maskat (Auch. 5432!).

FR. : Apr. 1835 (Schimp.), Apr. 1868 (Lord), Apr. and May (Figari), Mar. 1881 (S.), Dec. 1889 (Defl.).

DISTRIB. : Egypt, Arabia, India.

**4. *P. glaucifolium*** Hochst. in Flora, XXIV (1841) I. Intell. 19; *et ex* A. Rich. Tent. Fl. Abyss. II, 382.

HABITAT : II. Above Menacha, 2,700 m. (S. 1949).

FR. : Mar. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**5. *P. orientale*** Rich. in Pers. Syn. I, 72.—*P. sinaicum* Decne. in Ann. Sc. Nat. Ser. 2, II (1834) 11.

HABITAT : I. Neighb. of Sinai (Bové 7, 19!, Figari!, Drake 83!); Abu Maurad and Mt. Sinai (Schimp. 115!); Wady Hebran (Schimp. 100!).

II. Menacha, 2,200 m. (S. 1502!).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.), June 1832 (Bové).

DISTRIB. : Algeria, Arabia, Orient, India.

Vern. name : *Haussefe* (S.), *nassje* or *nessje* (Bové), *sabôte* (Drake), *haghni* (Schimp.).

**6. *P. quartinianum*** A. Rich. Tent. Fl. Abyss. II, 384.

HABITAT : II. Menacha, 2,200-2,500 m. (S. 1699)

FL. : Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**7. *P. spicatum*** Körnicke und Werner, Getr. I, 284.

HABITAT : II. In the lowland of the Tehama, generally cultivated (S. 174, 1071, 1952); Shukra (S.).

III. El Hami (S.).

Vern. name : *Dochn* (S.).

**8. *P. americanum*** (L.) K. Schum. in Engl. Pflanzenw. Ostaf. B. (1895) 51.—*P. typhoideum* Rich. in Pers. Syn. I, 72.

HABITAT : II. Lahadj (Defl. 183!), Shukra, Kamfer, Massana, Wady Moaden (cult.) (Defl.).

IV. Zor Hills (Cox and Knox).

FR. : Dec. 1889 (Defl.).

DISTRIB. : Tropics.

Vern. name : *Ilm* (Arabic, in Zor Hills).

**9. *P. villosum*** R. Br. Prod. in Salt. Abyss. App. 62, *nomen*; *et* in Fresen. Mus. Senckenh. II (1837) 134.

HABITAT : II. Northern slope of the Shibam, 2,600 m. (S. 1648);  
neighb. of Aden (Hunter 54 !); Menacha, 2,300 m. (S. 1582 !).

FR. : Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**10. P. Yemense** Defl. Voy. Yemen (1889) 217.

HABITAT : II. Yaman (Defl.).

DISTRIB. : Yaman.

**11. P. Ruppellii** Steud. Nom. ed. II, II, 298.

HABITAT : II. Haifan (Defl.); Jebel Bura, 600 m. (S. 247); foot  
of Jebel Melhan, 600 m. (S. 778); Menacha, 2,000-2,200 m. (S. 1502).

FL. : Dec. 1888 (S.), Jan. and Feb. 1889 (S.).

FR. : Dec. 1888 (S.), Jan. and Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

Vern. name : *Ghorizzi* (J. Bura); *haussefe* (J. Melhan); *silet-arej* (Menacha)  
(S).

**12. P. Prieurii** Kunth Rev. Gram. II, 411, t. 119.

HABITAT : II. Serrya (Defl.).

DISTRIB. : Tropical Africa, Arabia, India.

**16. Tricholaena** Schrad.

**1. T. longiseta** Hochst. ex Steud. Syn. Pl. Gram. 92.

HABITAT : II. Ussil, 1,300 m. (S.).

DISTRIB. : Abyssinia, Arabia.

**2. T. leucantha** Hochst. ex Steud. Syn. Pl. Gram. 92.

HABITAT : II. Below Ussil, 1,100 m. (S. 1283); foot of Jebel Melhan,  
600 m. (S. 792); foot of Jebel Bura, 600 m. (S. 399).

FR. : Jan. and Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**3. T. grandiflora** Hochst. in Flora XXIV (1841) Intell. 19, *nomen* ;  
*et ex A. Rich. Tent. Fl. Abyss. II, 445.*

HABITAT : II. Jebel Bura, Coffee region (S. 425).

DISTRIB. : Abyssinia, Arabia.

Vern. name : *Hammere* (Hille) (S.).

**4. T. Teneriffae** Parl. in Webb. & Bert. Phyt. Canar. III, 425.

HABITAT : I. Wady Zewerah (Lowne 230 !); Wady Hebran (Schimp.  
150! 990 !); Wady Gennah (Lord !); Sinai (Auch. 3811 !); Arabia  
Petraea (McDonald !); Central and S. Midian (Burton !).

II. Island of Ketumbae (Ehrenb. !); Aden (Thomson,  
Hook. 109 !, Perry !, S. 13 !); Mt. Sidr. (Fischer 123 !); Wady Hedjan,  
near Ussil (S. 1283 !); Aden (Defl. 56 ! S. 13 !).

## IV. Maskat (Auch. 5447 !).

FR. : Feb. 1889 (S.), Apr. 1835 (Schimp.), Nov. 1888 (S.).

DISTRIB. : Mediterranean, Orient.

**5. T. Wightii** Nees & Arn. ex Steud. Syn. Pl. Gram. 93.

HABITAT : II. Ussil, Wady Hedjan (S. 1340 !).

FR. : Feb. 1889 (S.).

DISTRIB. : India, Arabia.

**17. Setaria** Beauv.**1. S. verticillata** Beauv. Agrost. 51.—*Panicum adhaerens* Forsk. descr. 20.

HABITAT : I. Near monastery of Mt. Sinai, cult. ground (Schimp. 300).

II. Regma near Hodjela, 900 m. (S. 980); Ussil, 1,400 m. (S. 1947); below Menacha, 2,000 m. (S. 1592); Wady Fatimah (Schimp. 997 !); Jedda (Zohrab 235 !); Serrya (Defl.).

FR. : Feb. 1836 (Schimp.), July 1835 (Schimp.), Jan. and Feb. (S.).

DISTRIB. : Cosmopolitan.

**2. S. viridis** Beauv. Agrost. 51.

HABITAT : I. Sinai (Holland !).

IV. Maskat (Auch. 5434).

DISTRIB. : Cosmopolitan.

**18. Ehrharta** Thunb.**1. E. abyssinica** Hochst. in Flora XXXVIII (1855) 193.

HABITAT : II. Menacha, 2,500 m. (S. 1705!).

FL. : Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

DISTRIB. : Tropical Africa, Arabia.

**19. Oryza** L.**1. O. sativa** L. Sp. Pl. 333.

HABITAT : II. Yaman.

DISTRIB. : Cultivated.

**2. O. australis** (R. Br.) A. Br. ex Schweinf. Beitr. Fl. Aethiop. (1867) 300.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Tropical and subtropical regions.

**20. Lygeum L.**

- 1. L. spartum** Loeff. ex Linn. Cent. Pl. I, 4.  
 HABITAT : I. Arabia Petraea (ex Muschler).  
 DISTRIB. : Mediterranean.

**21. Phalaris L.**

- 1. P. canariensis** L. Sp. Pl. 54.  
 HABITAT : I. Arabia Petraea (Herb. Kew !).  
 DISTRIB. : Warm and temperate regions of Europe, N. Africa, W. Asia and America.

- 2. P. minor** Retz. Obs. III, 8.  
 HABITAT : I. Arabia Petraea (Herb. Kew !).  
 DISTRIB. : Greece, Orient, S. Africa.

- 3. P. minor** Retz. var. **gracilis** (Parl.) Aschers.—Schweinf. III. Fl. d'Egypt (1887) 167, n. 1149.  
 HABITAT : I. Wady Hamme (Schimp. 247 !, Boiss.).  
 DISTRIB. : Native of the Mediterranean countries ; introduced in many other parts of the World.  
 Vern. name : *Chappa* (Schimp.).

- 4. P. paradoxa** L. Sp. Pl. ed. II, 1665.  
 HABITAT : I. Arabia Petraea (Herb. Kew !).  
 DISTRIB. : Mediterranean, Orient.

**22. Aristida L.**

- 1. A. mutabilis** Trin. & Rupr. in Mém. Acad. Pétersb. Sér. VI, VII (1849) 150 (*excl.* var. *aequilonga*).

HABITAT : II. Aden (Birdwood 102a !, Hook. 112 !).

FR. : Dec. 1847 (Hook.).

DISTRIB. : Senegal, Kordofan, Egypt, Arabia, Punjab, Rajputana, Jodhpur, Southern India.

- 2. A. mutabilis** Trin. & Rupr. var. **meccana** Fenzl. in Kotschy Pl. Aeth. n. 103.

HABITAT : II. Mecca.

DISTRIB. : Yaman.

- 3. A. adscensionis** L. Sp. Pl. ed. I. p. 82.

HABITAT : I. Wady Hebran (Schimp. 159 !); neighb. of Mt. Sinai (Bové 12 !, Schimp. 368 !).

II. Aden ; Beyt el-Amir ; Shukra ; Serrya (Def.).

IV. Maskat (Auch. 5446 !).

FR. : Apr. 1835 (Schimp.), May 1835 (Schimp.), June 1832 (Bové).

DISTRIB. : Cosmopolitan.



**4. *A. adscensionis* L. var. *pumila* Coss.** in Coss. & Durieu Expl. Sc. Alger. II, 84.

HABITAT : I. Sinai desert (Auch. 2993 !); W. Sewook (Lord !); Wady Zewerah (Lowne !); foot of Jebel Musa, 1,500 m. (Kneuck. 2aI !); N. & Central Midian (Burton!).

II. Aden (Perry, Thomson, Hook. 112 !); Yaman (Ehrenb. ! Traill. !); Jedda (Zohrab 26 !).

FR. : Feb. 1837 (Thomson), Mar. 1878 (Perry), Apr. 1868 (Lord), Apr. 1902 (Kneuck.), Dec. 1847 (Hook.).

DISTRIB. : Common in most dry and hot countries.

**5. *A. acutiflora* Trin. et Rupr.** in Mém. Acad. Pétersb. Sér. VI, VII (1849) 167.

HABITAT : I. Arabia Petraea (Bové).

DISTRIB. : Egypt, Arabia.

**6. *A. hirtigluma* Steud.** Nom. ed. II, I, 131.

HABITAT : I. Wady Hebran (Schimp. 164 !); Mt. Sinai (Schimp. 161 !); Wady Farran (Boiss. !); Arabia Petraea (McDonald !); Wady Zewerah (Lowne 221 !); Wady Gennah & Sewook (Lord !).

FR. : Apr. 1868 (Lord), Apr. 1835 (Schimp.), May 1835 (Schimp.).

DISTRIB. : Egypt, Syria, Arabia.

**7. *A. brachypoda* Tausch** in Flora XIX (1836) 506.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Egypt, Arabia.

**8. *A. plumosa* L.** Sp. Pl. ed. II, 1666.

HABITAT : I. Arabia Petraea (Boiss. !, McDonald !); Wady Ghurundel & Ramleh (Lord !); El Tor (Schimp. 174 !); Ras Mohamemed, 60-80 m. (Kneuck. 487); Debbet er Ramleh; Wady el Tihyeh; Akaba, and along the Arabah to the Ghor (Hart).

FR. : Mar. 1846 (Boiss.), Apr. 1904 (Kneuck.).

DISTRIB. : Mediterranean region, Persia, Arabia.

**9. *A. lanata* Forsk.** Fl. Aeg.-Arab. (1789) p. LXI, no. 79 and p. 25.  
—*A. Forskalei* Tausch Flora (1836) 506.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Egypt, Sinai, Syria.

**10. *A. funiculata* Trin. et Rupr.** in Mém. Acad. Pétersb. Sér. VI, VII (1849) 159.

HABITAT : II. Shukra (Defl.); El Gidan (Ehrenb. !); Jedda (Zohrab 164 !).

DISTRIB. : N. Africa, Arabia, Baluchistan.

**11. *A. ciliata*** Desf. in Schrad. N. Journ. III (1809) 255.

HABITAT : I. Wadies Ghurundel and Arabah ; Ghor es Safieh (Hart) ; foot of Jebel Musa (Kneuck. 249 ! ) ; Jebel Musa, 1,500 m. (Kneuck.) ; Wady Hebran (S. 165 ! ) ; Mt. Horeb (Auch. 2989 ! ) ; Mt. Sinai (Schimp. 161 ! ) ; Wady Sewook (Lord ! ) ; Wady Mokateb (Boiss. ! ) ; Arabia Petraea (McDonald ! ) ; neighb. of Sinai (Bové 20 ! ).

## II. Aden, Khamfer (Defl.).

FR. : Mar. 1846 (Boiss.), Apr. 1868 (Lord), Apr. 1835 (Schimp.), Apr. 1902 (Kneuck.), May 1835 (Schimp.), June 1832 (Bové).

DISTRIB. : N. Africa, S. Africa, Arabia.

Vern. name : *Massjé* (Bové).

**12. *A. obtusa*** Del. Fl. Aeg. 175, t. 13, fig. 2.

HABITAT : I. Wadies Nasb, Sudr, and Ghurundel (Elain) ; Debbet er Ramleh (Hart) ; Wady Ghurundel (Post 49 ! ) ; Wady Hebran (Schimp. 163 ! ) ; Arabia Petraea (Figari ! ) ; Ramleh (Hart ! ).

## II. Yaman (ex Boiss.).

## IV. Central Arabia (Pelly ! ).

FR. : Mar. 1882 (Post), Apr. 1835 (Schimp.).

DISTRIB. : N. Africa, S. Africa, Arabia.

OBSERV. : Grows in tufts and forms the principal part of the grass of the desert (Pelly).

**13. *A. paradisica*** Edgew. in Journ. As. Soc. Beng. XVI (1847) II, 1219.—*A. caloptila* (Jaub. et Spach) ; Schweinf. in Boiss. Fl. Or. V (1884) 497.

HABITAT : I. Jebel Musa, 1,500 m. (Kneuck.) ; Arabia Petraea (McDonald ! ) ; Sinai Peninsula (Holland ! ).

II. Ghissan (Ehrenb. 241 ! ) ; Aden (Anders ! , Balfour ! , Perry ! , Thomson ! , Hook. 108 ! , Lunt 307 ! 336 ! , S. 28 ! 48 ! ).

III. Plains of Dhofar (Bent 49 ! ) ; El Hami (S. 202 ! ).

IV. At the Persian Gulf (Auch. 5445).

FR. : Mar. 1881 (S.), Apr. 1861 (Thomson), Apr. 1881 (S.), Nov. 1888 (S.), Dec. 1847 (Hook.).

DISTRIB. : Persia, Afghanistan, Egypt, Arabia.

**14. *A. pungens*** Desf. Fl. Atlant. I, 109, t. 35.

HABITAT : I. Sinai.

DISTRIB. : N. Africa, Arabia, Turkestan, Siberia, Nubia.

**15. *A. coerulescens*** Desf. Fl. Atlant. I, 109.

HABITAT : I. Wady el Tihyeh (Hart) ; Arabia Petraea (Schimp. 368).

DISTRIB. : Mediterranean, Nubia, Abyssinia, Senegal, Cape of Good Hope, India, New Holland.

**16. A. coerulescens** Desf. var. **breviaristata** Schweinf. Bull. Herb. Boiss. (1894) App. II, 27.

HABITAT : II. Jebel Bura, 600 m. (S. 323); Ussil (S. 1134); foot of Jebel Melhan, 600 m. (S. 683); Menacha, 2,200 m. (S. 1524); Regma near Hodjela, 900 m. (S. 981); Aden (S. 26).

FR. : Jan.-Mar. 1889 (S.).

DISTRIB. : Arabia, Aethiopia.

**17. A. coerulescens** Desf. var. **exilis** Schweinf.

HABITAT : II. Menacha, 2,300 m. (S. 1957!).

OBSERV. : Doubtful species according to Stapf in H. K.

**18. A. Schweinfurthii** Boiss. Fl. Or. V, 493.

HABITAT : Arabia (ex Muschler).

DISTRIB. : Arabia, Egypt, Nubia, Abyssinia, Eritrea.

**19. A. Schweinfurthii** Boiss. var. **Boissieri** Schweinf. Bull. Herb. Boiss. (1894) App. II, 28.

HABITAT : II. Jemma (Zohrab 24, 211!); Shukra (S. 94!).

FR. : Mar. 1881 (S.).

DISTRIB. : Arabia, Aethiopia.

**20. A. pumila** Decne. Ann. Sc. Nat. Ser. II, 85.

HABITAT : I. Arabia Petraea, Wady Shaikh (Boiss.); foot of Mt. Sinai (Auch. 2993).

DISTRIB. : N. Africa, Arabia.

### 23. *Stipa* L.

**1. S. arabica** Trin. & Rupr. in Mém. Acad. Pétersb. Sér. VI. Sc. Nat. V (1842) 77.—*S. barbata* Desf. Fl. Atlant. I, 97, t. 27.

HABITAT : I. Neighb. of Sinai (Bové 13!); foot of Mt. Sinai (Schimp. 107!); Arabia Petraea (McDonald!).

DISTRIB. : Mediterranean, Arabia.

Vern. name : *Hammara* (Bové).

**2. S. tortilis** Desf. Fl. Atlant. I (1798) 99, t. 31, fig. 1.

HABITAT : I. Wady Lebweh (Post 44!); Arabia Petraea (McDonald!); Wady Hamme (Schimp. 395!); N., Central and S. Midian (Burton!).

FR. : Mar. 1882 (Post), Mar. 1835 (Schimp.).

DISTRIB. : Mediterranean, Orient, S. Africa.

**3. S. parviflora** Desf. Fl. Atlant. I, 98, t. 29.

HABITAT : I. Arabia Petraea (McDonald!); Mt. Sinai (Schimp. 102!, Lord!).

FR. : May 1835 (Schimp.).

DISTRIB. : Mediterranean.

4. *S. capillata* L. Sp. Pl. ed. II, 116.

HABITAT : I. Arabia Petraea.

DISTRIB. : Southern Europe, Northern Asia.

5. *S. Lagascae* Roem. & Schult. Syst. II, 333.

HABITAT : I. Arabia Petraea (Boiss.).

DISTRIB. : Mediterranean, Orient, Arabia.

#### 24. *Oryzopsis* Michx.

1. *O. miliacea* (L.) Aschers.-Schweinf. Ill. Fl. d'Egypt 169, n. 1173.  
—*Piptatherum miliaceum* Coss. Plant. crit. p. 129.

HABITAT : I. Arabia Petraea (McDonald !); Raphidim (Schimp. 309 !); damp places of Sinai desert (Bové 14 !).

FR. : May 1835 (Schimp.), June 1832 (Bové).

DISTRIB. : Mediterranean, N. Atlantic Islands.

Vern. name : *Sab al Abu Hossein* (Schimp.).

2. *O. coerulescens* Hack. in Denkschr. Acad. Wien, I (1885) 75.

HABITAT : I. Arabia Petraea.

DISTRIB. : Asia Minor, Arabia.

3. *O. holciformis* Hack. in Denkschr. Acad. Wien, I (1885) 8.

HABITAT : I. Sinai region (Figari !); Mt. Catherine (Schimp. 312 !).

FR. : Mar. (Figari); May 1835 (Schimp.).

DISTRIB. : Arabia, Persia.

#### 25. *Piptatherum* Beauv.

1. *P. multiflorum* Beauv. Agrost. 18.

HABITAT : I. Wady es Sheikh; wadies on both sides of the Arabah and in the main valley (Hart); Arabia Petraea (Schimp. 309, Boiss.).

DISTRIB. : Europe, Siberia, Arabia.

#### 26. *Heleochoa* Host.

1. *H. dura* Boiss. Fl. Or. V, 477.

HABITAT : II. Yaman (Traill!).

III. Dhofar Mts., Hafa (Bent 32 !); near El Hami (S. 174 !).

FL. : Apr. 1881 (S.).

FR. : Apr. 1881 (S.).

DISTRIB. : Baluchistan, Arabia.

2. *H. schoenoides* (L.) Host. Gram. Austr. I (1801) 23, t. 30.

HABITAT : I. Sinai (Herb. Kew!).

DISTRIB. : Mediterranean, Persia.

**27. Sporobolus R. Br.**

**1. S. hamiensis** Schweinf. in Bull. Herb. Boiss. (1894) App. II, 29.

HABITAT : III. El Hami (S. 196).

FL. : Apr. (S.).

FR. : Apr. (S.).

DISTRIB. : Arabia.

**2. S. robustus** Kunth Rev. Gram. p. 425, t. 126 (1829-35) *et* Enum. Pl. I, 213, Suppl. p. 168.

HABITAT : II. Aden (Birdwood!).

DISTRIB. : Niger, Cape Verde Islands, Gaboon Coast, Abyssinia, Eritrea, Senegambia, Suakim.

**3. S. capensis** Kunth Enum. Pl. I, 212.

HABITAT : II. Plateau of Hagjera, 2,300-2,500 m. (near Menacha) (S. 1739! 1704).

FR. : Mar. 1889 (S.).

DISTRIB. : S. Africa, Arabia.

**4. S. minutiflorus** Link Hort. Berol. I, 88.

HABITAT : IV. Near Maskat (Last!).

DISTRIB. : India.

OBSERV. : Last's plant is near the above species.

**5. S. glaucifolius** Hochst. in Flora, XXV, part I (1842), Beibl. 133.

HABITAT : II. Aden (Birdwood!).

DISTRIB. : Tropical Africa, Punjab, Sind, W. Peninsula of India.

**6. S. indicus** R. Br. Prod. 170.

HABITAT : II. Menacha, 2,300 m. (S. 1739A!).

DISTRIB. : All warm countries.

**7. S. setulosus** (Trin.) Schweinf. Bull. Herb. Boiss. (1894) App. II, 28.

HABITAT : III. El Hami (S. 174!).

DISTRIB. : Arabia, Aethiopia.

**8. S. arabicus** Boiss. Diagn. ser. I, XIII, 47.

HABITAT : I. Arabia Petraea (Herb. Kew!).

IV. Maskat (Auch. 5425).

DISTRIB. : Arabia.

**9. S. spicatus** Kunth Rev. Gram. I, 67.

HABITAT : I. Ain Musa (Hart).

II. Aden (Birdwood 130!); Hodeidah (S. 157), Jedda

(Schimp. 826 !); Yaman (Bové !); El Gidan (Ehrenb. !).

III. At the hot springs of el Hami (S. 159 !); Gharbbabaja, 70 m. (Lunt 238 !).

IV. Near Maskat (Auch. 5420 !, Bornm. 701 !).

FR. : Apr. 1881 (S.).

DISTRIB. : N. Africa, Arabia, India.

Vern. name : *Elef* (S.).

**10. S. minutus** Schweinf. Bull. Herb. Boiss. (1894) App. II, 29.

HABITAT : II. Jedda (Zohrab 209).

DISTRIB. : Arabia, Aethiopia.

### 28. *Polygona* Desf.

**1. P. monspeliensis** (L.) Desf. Fl. Atlant. I, 66.—*Phalaris cristata* Forsk. Fl. Aeg.-Arab. p. 17.

HABITAT : I. Wady Farran (Lord !); Sinai (Auch. 2981 ! Holland !); Arabia Petraea (McDonald !); S. Midian (Burton !); Wady Elain; Ghor es Safieh (Hart).

FR. : May 1868 (Lord).

DISTRIB. : Mediterranean, Abyssinia.

**2. P. maritimus** Willd. in Ges. Naturf. Fr. Neue Schr. III (1801) 442.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Southern Europe, Mediterranean.

### 29. *Agrostis* L.

**1. A. alba** L. Sp. Pl. 63, var. *scabriglumis* Beiss. Fl. Or. V, 514.

HABITAT : I. Neighb. of Sinai (Bové 17 !).

FR. : June 1932 (Bové).

DISTRIB. : Northern temperate regions.

Vern. name : *Hammara* (Bové).

**2. A. hirtella** Hochst. ex Steud. Syn. Pl. Gram. 173.

HABITAT : II. Above Menacha, 2,500 m. (S. 1413).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**3. A. verticillata** Vill. Prosp. 16.

HABITAT : I. Arabia Petraea (McDonald !; Schimp. 289).

II. Ussil, 950 m. (S. 1167 !).

FR. : Feb. 1889 (S.).

DISTRIB. : Europe, Arabia,

4. **A. Schimperiana** Hochst. ex Steud. Syn. Pl. Gram. 170.

HABITAT : II. Above Menacha, 2,500 m. (S. 1413 !).

DISTRIB. : Abyssinia, Arabia.

### 30. *Lagurus* L.

1. **L. ovatus** L. Sp. Pl. 81.

HABITAT : I. Arabia Petraea (ex Muschler, Herb. Kew !).

DISTRIB. : Mediterranean.

### 31. *Crypsis* Ait.

1. **C. aculeata** (L.) Ait. Hort. Kew. I, 48.

HABITAT : I. Arabia Petraea (ex Muschler, Herb. Kew !).

DISTRIB. : Temperate and tropical countries.

### 32. *Trisetum* Pers.

1. **T. pumilum** Kunth Rev. Gram. I, 102.

HABITAT : I. Arabia Petraea (Auch. ex Cosson).

DISTRIB. : Mediterranean.

2. **T. glumaceum** Boiss. Fl. Or. V (1884) 534.

HABITAT : I. Sinai (Boiss. !).

DISTRIB. : Egypt, Arabia, Syria.

3. **T. arenarium** Labill. Ic. Pl. Syr. Dec. V, 10.—*Trisetaria linearis*  
Forsk. Fl. Aeg.-Arab. p. LX & 67.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Egypt, Arabia, Syria.

### 33. *Avena* L.

1. **A. sativa** L. Sp. Pl. 79, var. **abyssinica** Hochst. ex A. Rich.  
Tent. Fl. Abyss. II, 415.

HABITAT : II. E! Hausan near Menacha, 2,400 m. (S. 1769).

FL. : Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

2. **A. sterilis** L. Sp. Pl. ed. II, 118.

HABITAT : I. Arabia Petraea (Boiss.).

DISTRIB. : Mediterranean, Orient.

3. **A. barbata** Brot. Fl. Lusit. I, 108.

HABITAT : I. Arabia Petraea (McDonald! Schimp. 277); Sinai  
(Holland, Auch. 2924 !).

DISTRIB. : Mediterranean, Asia Minor, Arabia.

**4. A. Wiestii** Steud. Gram. p. 231.

HABITAT : I. Arabia Petraea (Boiss.).

DISTRIB. : Mediterranean, Orient.

**5. A. fatua** L. Sp. Pl. 80.

HABITAT : I. Arabia Petraea (Auch. 2924).

DISTRIB. : Central and Southern Europe, N. Africa, Abyssinia, Northern Asia.

### 34. *Tristachya* Nees.

**1. T. barbata** Nees Fl. Afr. Austr. 269.

HABITAT : II. Yaman, near Ferihe (Schimp. 788).

DISTRIB. : Arabia, Afghanistan.

### 35. *Danthonia* DC.

**1. D. Forskalii** Trin. Sp. Gram. t. 49.

HABITAT : I. Arabia Petraea, Ramla (Boiss.); between Tor and Sinai (Kneuck. 251); Wady Nasb; Debbet er Ramleh; Wady Arabah, near the Ghor (Hart).

II. Jedda (Zohrab 295 !); Wady Fatimah (Schimp. 1038 !); near Taifa (Schimp. 787 !).

IV. Central Arabia : From the sand ridges, 27th and 28th Feb. (Pelly !).

FR. : Feb. 1836 (Schimp.); Feb. (Pelly).

DISTRIB. : Egypt, Arabia.

Vern. name : *Chagaret-el-ghemel* (Bové).

### 36. *Cynodon* Rich.

**1. C. dactylon** Pers. Syn. Pl. I, 85.

HABITAT : I. Mt. Sinai (Schimp. 311 !); Wady Nasb (Drake 70 !); Ghor es Safieh (Hart).

II. Neighb. of Lahadj (Defl. 310 !); Jedda (Zohrab 9 !); Aggara near Hodjela, 600 m. (S. 1011).

FL. : Feb. 1889 (S.).

FR. : Jan. 1890 (Defl.), May 1835 (Schimp.).

DISTRIB. : Cosmopolitan.

Vern. name : *Nikil* (Schimp.), *Nejesel* (Drake), *Ohbell* (S.).

**2. C. dactylon** Pers. var.

HABITAT : I. Wady Ghurundel (Hart).

### 37. *Schoenefeldia* Kunth.

**1. S. gracilis** Kunth Rév. Gram. 283, t. 53 (1830).

HABITAT : II. Badjil, 190 m. (S. 595).

DISTRIB. : Tropical Africa, Arabia.



**38. Enteropogon Nees.**

**1. E. macrostachyum** Munro ex Benth. in Journ. Linn. Soc. XIX (1881) 101.

HABITAT: II. Jebel Bura, above Hille, 900 m. (S. 297); Ussil, 1,000 m. (S. 311); Wady Madfar, near Hodjela, 700 m. (S. 983); foot of Jebel Melhan, 600 m. (S. 703).

FL.: Jan. and Feb. 1889 (S.).

FR.: Jan. and Feb. 1889 (S.).

DISTRIB.: Abyssinia, Arabia.

**39. Chloris Sw.**

**1. C. virgata** Swartz. Fl. Ind. Occ. I, 203.—*C. barbata* L. var. *meccana* Aschers. et Schweinf. III. Fl. d'Egypt. 170, n. 1194.

HABITAT: II. Near Mecca (Schimp. 802!); Wady Fatimah in cult. ground (Fischer 127A!); Jedda (Zohrab 252!); Mt. Kessr (Fischer 129A!).

FL.: Feb. 1837 (Fischer).

FR.: Feb. 1837 (Fischer), Feb. 1836 (Schimp.).

DISTRIB.: Arabia, Egypt, S. Africa, S. America.

**2. C. leptostachya** Hochst. ex A. Rich. Tent. Fl. Abyss. II, 407.

HABITAT: II. Regma near Hodjela, 800 m. (S. 959!).

FR.: Jan. 1889 (S.).

DISTRIB.: Abyssinia.

**3. C. tenella** Koen. ex Roxb. Hort. Beng. 82.

HABITAT: II. Wady Djara (Ehrenb. 236!); Regma near Hodjela 800 m. (S. 967!).

FR.: Jan. 1889 (S.), Feb. 1825 (Ehrenb.).

DISTRIB.: Arabia, India.

**4. C. myriostachya** Hochst. in Flora XXXVIII (1855) 204.

HABITAT: II. Hille, 600 m. (S. 385!).

FR.: Jan. 1889 (S.).

DISTRIB.: Arabia, tropical Africa.

**40. Melanocenchris Nees.**

**1. M. plumosa** Hochst. in Flora XXXVIII (1855) 273.

HABITAT: II. Foot of Mt. Kessr near Harames (Schimp. 794!); foot of Mt. Kessr (Fischer 129!); cult. ground in Wady Fatimah (Fischer 127!).

FL.: Feb. 1837 (Fischer).

FR.: Feb. 1836 (Schimp.), Feb. 1837 (Fischer).

DISTRIB.: Abyssinia, Arabia.

**41. Lepidopironia A. Rich.**

**1. L. cenchrifomis** A. Rich. Tent. Fl. Abyss. II, 442, t. 101 (1850).

HABITAT: II. Jebel Bura, Hille (S. 385! 391); Aggara, near Hodjela, 600 m. (S. 898).

FR.: Jan. 1889 (S.).

DISTRIB.: Abyssinia, Arabia.

**42. Tetrapogon Desf.**

**1. T. villosus** Desf. Fl. Atlant. II, 388, t. 255.

HABITAT: I. Wady Zewerah (Herb. Kew!); Wady Gennah (Lord!); Arabia Petraea (McDonald!); Wady Hebran (Schimp. 155!); Mt. Sinai (Bové 2!, Figari!); Sinai desert (Auch. 3001!); Central Midian (Burton!).

II. Aden (Thomson, Lunt 349!, Balfour, Perry, Beevor 94!, S. 11); Mt. Sidr (Fischer 122!); Shukra (S. 133).

FL.: Feb. (Fischer).

FR.: Apr. 1894 (Lunt), Apr. 1835 (Schimp.), May 1868 (Lord), June 1833 (Bové).

DISTRIB.: N. Africa, Arabia.

Vern. name: *Kammara* (Bové).

**2. T. macranthus** Benth. in Journ. Linn. Soc. XIX (1881) 106.

DISTRIB.: Arabia (ex Index Kew.).

**3. T. triangularis** Hochst. Pl. Arab. Schweinf. n. 967.

HABITAT: II. Foot of Jebel Bura, 600 m. (S. 297); foot of Jebel Melhan, 600 m. (S. 799); Regma, near Hodjela, 900 m. (S. 967); Aggara near Hodjela, 600 m. (S. 1958).

FR.: Jan. 1889 (S.).

DISTRIB.: Arabia, Abyssinia, Rajputana, Sind, Khandesh, S. India.

**43. Dinebra Jacq.**

**1. D. retroflexa** (Vahl) Panzer in Denkschrift. Acad. Münch. (1814) 270, t. 12.—*D. arabica* Jacq. Fragm. Bot. p. 77, t. 121.

HABITAT: I. Arabia Petraea (Herb. Kew!).

DISTRIB.: Egypt, Arabia, India.

**44. Eleusine Gaertn.**

**1. E. verticillata** Roxb. Hort. Beng. 8.

HABITAT: II. Regma near Hodjela, 900 m. (S. 979!); at the foot of Jebel Melhan, 600 m. (S. 798).

FR.: Jan. 1889 (S.).

DISTRIB.: Cosmopolitan.

**2. *E. floccifolia*** Spreng. Syst. I, 350.—*Cynosurus floccifolius* Forsk. Descr. 21, 22.

HABITAT: II. Menacha, 2,300—2,900 m. (S. 1700 !); Jebel Shibam at Menacha, 2,900 m. (S. 1671).

FR.: Mar. 1889 (S.).

DISTRIB.: Arabia.

Vern. name: *Chassere* (S.).

**3. *E. flagellifera*** Nees in Linnaea XVI (1842) 220.

HABITAT: II. Jedda (Ehrenb. 230 !, Zohrab 10 !, Fischer 124 !); desert near Jedda (Schimp. 800 !).

IV. Maskat (Auch. 5468, 5469).

FL.: Dec. and Jan. 1837 (Fischer).

FR.: Jan. 1836 (Schimp.), Dec. and Jan. 1837 (Fischer).

DISTRIB.: W. Asia, tropical Africa.

**4. *E. glaucephylla*** Munro ex Benth. in Journ. Linn. Soc. XIX (1881) 107.

HABITAT: II. Aggara near Hodjela, 600 m. (S. 1174); foot of Jebel Bura at Hille, 600 m. (S. 477); Aden (Lunt 309 !, Hook. 107 !); Jedda (Fischer 206 !); Yaman' (Defl. 521 !); Mor (Ehrenb. 229 !).

III. Shukra (S. 71a).

IV. Maskat (Auch. 5468 !).

FL.: Jan. 1889 (S.), Mar. 1837 (Fischer).

FR.: Jan. 1889 (S.), Apr. 1894 (Lunt), Dec. 1847 (Hook.).

DISTRIB.: Tropical Africa, Arabia.

**5. *E. indica*** Gaertn. Fruct. I, 8.

HABITAT: II. Northern slope of Jebel Bura, 900 m. (S.).

IV. Maskat (Auch. 5466 !).

FL.: Jan. 1889 (S.).

FR.: Jan. 1889 (S.).

DISTRIB.: Cosmopolitan in tropics and subtropics.

**6. *E. coracana*** Gaertn. Fruct. I, 8, t. 1.

HABITAT: II. Jedda (Zohrab 314 !); near Shukra (S. 68 !, Defl. 347 !).

FR.: Mar. 1881 (S.), Mar. 1890 (Defl.).

DISTRIB.: S. America, India, Egypt.

Vern. name: *Keneb* (S.).

**7. *E. obtusiflora*** (Hochst.) Schweinf. Aschers. Beitr. Fl. Aeth. 299.

HABITAT: II. Jebel Bura at Hille, 600 m. (S. 195); Regma at Hodjela, 900 m. (S. 1289); below Ussil, 1,200 m. (S. 1202).

FL.: Jan.-Feb. 1889 (S.).

FR.: Jan.-Feb. 1889 (S.).

**8. E. multiflora** Hochst. in Flora XXIV (1841) I. Intell. 20 *nomen* ;  
*et in* A. Rich. Tent. Fl. Abyss. II, 412.

HABITAT : II. Above Menacha, near Kahil, 2,500 m. (S. 1462 !).

FR. : Feb. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**9. E. aristata** Ehrenb. ex Boiss. Fl. Or. V, 557.

HABITAT : II. Jedda (Zohrab 166 !); Shukra (S. 71 !); Aggara near  
 Hodjela, 600 m., in maize fields (S. 1174 !).

FR. : Jan. 1889 (S.), Mar. 1881 (S.).

DISTRIB. : Widely spread along the Red Sea within the tropics.

OBSERV. : “*Dactyloctenium glaucophyllum*, Courbon in Ann. Sc. Nat.  
 ser. 4, v, 18, (1862) p. 133, has the nodes densely and long pilose, its  
 stem ‘climbing’, etc. and can hardly have been the above species.”  
 (C. B. Clarke).

**19. E. Toccusa** Fresen. in Mus. Senckenb. II (1837) 141.

HABITAT : II. Wady Djara (Ehrenb. 227 !).

III. Lokham near Mokalla, 60 m. (Lunt 78 !).

DISTRIB. : Abyssinia, Arabia.

OBSERV. : Cultivated as food for cattle (Lunt).

Vern. name : *Dokhn* (Lunt).

#### 45. *Dactyloctenium* Willd.

**1. D. aegyptiacum** Willd. Enum. Hort. Berol. (1809) 1029.

HABITAT : II. Liht (Ehrenb. 231 !); Wady Djara (Ehrenb. 228 !);  
 Wolledje, Jebel Bura (S. 1928 !); Jebel Bura, 600 m. (S. 250); Jedda  
 (Zohrab 219 !); Aggara near Hodjela, 600 m. (S. 1024); Regma near  
 Hodjela, 900 m. (S. 1929); Wady Fatimah near Mecca (Schimp. 801 !);  
 Wady Fatimah (Fischer 130 !).

FL. : Feb. 1837 (Fischer), Dec. 1888 (S.), Jan.-Feb. 1889 (S.).

FR. : Jan. 1889 (S.), Feb. 1836 (Schimp.), Feb. 1837 (Fischer), Dec.  
 1888 (S.), Jan.-Feb. 1889 (S.).

DISTRIB. : Widely spread throughout the tropics.

Vern. name : *Kerssi* (S.).

#### 46. *Leptochloa* Beauv.

**1. L. uniflora** Hochst. ex A. Rich. Tent. Fl. Abyss. II, 409.

HABITAT : II. Ussil, 1,400 m. (S. 1348).

DISTRIB. : Abyssinia, Arabia.

**2. L. obtusifolia** Hochst. in Flora XXXVIII (1855) 203.

HABITAT : II. Hille, Jebel Bura (S. 495 !).

FR. : Jan. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

47. *Pappophorum* Schreb.

1. *P. molle* (Lehm.) Kunth Enum. Pl. I, 255.

HABITAT : II. Jebel Bura, Hille (S. 395 !); Ussil, 1,100 m. (S. 1341 !); Shukra (S. 134).

FR. : Jan. 1889 (S.), Feb. 1889 (S.).

DISTRIB. : S. Africa, Aethiopia, Arabia.

OBSERV. : According to Stapf S. 395 is near *P. elegans*.

2. *P. brachystachyum* Jaub. & Spach Illust. IV, 34.—*Enneapogon brachystachyum* Stapf in Fl. Cap. VII, 654.

HABITAT : I. S. Midian (Burton !); Sinai (Figari !).

II. Yaman (ex Boiss.).

FR. : Apr. (Figari).

DISTRIB. : N. Africa, Arabia.

3. *P. cenchroides* Lichst. in Roem. & Schult. Syst. II, 616; Schweinf. in Bull. Herb. Boiss. (1894) App. II, 36.

HABITAT : II. Below Ussil, 1,100 m. (S. 1341 !).

DISTRIB. : S. Africa, Arabia.

48. *Boissiera* Hochst. et Steud.

1. *B. Pumilio* (Trin.) Hack. in Denkschrft. Math.-nat. Classe Kais. Akad. Wiss. Wien (1885) II, 9.—*B. bromoides* Hochst. ex Steud. in Flora (1838) 25.

HABITAT : I. Foot of Mt. Sinai (Schimp. 402 !); Arabia Petraea (McDonald !); Sinai (Figari !).

FR. : Apr. 1835 (Schimp.).

DISTRIB. : Egypt, Arabia, Persia, Afghanistan.

49. *Arundo* Tourn.

1. *A. Donax* L. Sp. Pl. 81.

HABITAT : II. El Hausan, near Menacha, 2,400 m. (S. 1954).

DISTRIB. : Mediterranean, Orient.

Vern. name : *Hallal* (S.).

50. *Phragmites* Trin.

1. *P. maxima* Blatt. & McCann in Bomb. Grasses (in Press).—*Arundo maxima* Forsk. Fl. Aeg.-Arab. 24.

HABITAT : I. Wady el Ain (Hart !); N. Midian (Burton !).

III. Dhofar Mts : Stream near coast (Bent 204 !).

DISTRIB. : Cosmopolitan.

2. *P. maxima* Blatt. & McCann, var. *isiaca* (Del.) Cosson in Coss. Dur. Explor. Sci. Algér. II (1854-1867) 125.

HABITAT : I. W. es-Slô, W. Tarfa, forming gigantic tufts (ex Kneuck.).

DISTRIB. : Cosmopolitan.

**3. P. maxima** Blatt. & McCann, var. *stenophylla* Boiss. Fl. Or. V (1884) 563.

HABITAT : I. Sinai (ex Muschler).

DISTRIB. : Cosmopolitan.

#### 51. *Ammochloa* Boiss.

**1. A. palaestina** Boiss. Diagn. Pl. Or. Ser. I, XIII (1853) 51.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : N. Africa, Sinai, Syria.

#### 52. *Lamarckia* Moench.

**1. L. aurea** (L.) Moench. Meth. Pl. Marb. (1794) 201.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Mediterranean countries from the Canaries to the Punjab and Abyssinia.

#### 53. *Koeleria* Pers.

**1. K. phleoides** Pers. Syn. I, 97.

HABITAT : I. Arabia Petraea (Haussk.).

DISTRIB. : Mediterranean.

**2. K. sinaica** Boiss. Diagn. Ser. I, XIII, 53.

HABITAT : I. Sinai (Auch. 3061 !).

DISTRIB. : Arabia.

#### 54. *Melica* L.

**1. M. cupani** Guss. Suppl. Fl. Sic. Prodr. 17, var. *pannosa* Boiss.

HABITAT : I. Top of Mt. Catherine (Schimp. 104 !).

FR. : May 1835 (Schimp.).

DISTRIB. of type : Mediterranean region, Orient, Himalayas.

#### 55. *Sphenopus* Trin.

**1. S. divaricatus** (Gouan) Reichb. Fl. Germ. Excurs. I (1830) 45.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Mediterranean.

#### 56. *Halopyrum* Stapf.

**1. H. mucronatum** Stapf in Hook. Ic. Pl. t. 2448 (1896).—*Desmazeria uniloides* Defl. Voy. Yemen 220.

HABITAT : II. Eastern shore of the isthmus of Barriere Gate, on small dunes and sandhills forming large bushes with stolons often reaching 90 cm. and more (S. !); Hodeidah (Defl. 31 !); Yaman, in salt marshes (Bové 257 !).

Without locality (Defl. ! Birdwood !).

FR. : Jan. 1831 (Bové), Mar. 1887 (Defl.).

DISTRIB. : S. Arabia, N. India.

### 57. *Eragrostis* Host.

**1. *E. coelachyrum*** Benth. in Hook. Ic. Pl. t. 1368.

HABITAT : II. Near Jedda (Schimp. 799 !); Jedda (Fischer 133 !, Zohrab 18 ! 212 !).

FL. : Jan. 1837 (Fischer).

FR. : Jan. 1837 (Fischer), Dec. 1835 (Schimp.).

DISTRIB. : Egypt, Arabia.

**2. *E. pilosa*** (L.) P. Beauv. Essai Agrost. (1812) 71.

HABITAT : I. Ghor es Safieh (Hart).

II. Neighb. of Shukra, cult. ground (Defl. 351 !).

FR. : Mar. 1890 (Defl.).

DISTRIB. : Warm regions.

**3. *E. minor*** Host. Fl. Austr. I (1827) 135.—*E. poaeoides* P. Beauv. Essai Agrost. (1812) 71.

HABITAT : I. Ghor es Safieh (Hart); near Bestam (Schimp. 266 !).

II. Near Mecca (Schimp. 999 !).

IV. Near Maskat (Last !).

FR. : Aug. 1835 (Schimp.).

DISTRIB. : Throughout the Mediterranean region from the Canaries to Persia; also extending to middle Europe.

**4. *E. major*** Host. Gram. IV, t. 24.—*E. megastachya* Link Hort. Berol. I, 187.

HABITAT : I. Ghor es Safieh (Hart).

II. El-Gelil; Serrya (Defl.); Aden (Birdwood !); Aggara near Hodjela, 600 m. (S. 1029); Regma near Hodjela, 800 m. (S. 955); below Ussil, 950 m. (S. 1204, 1280); Jedda (Zohrab 12 ! 195 ! 200 ! 223 !) Shukra (S. 143).

FL. : Jan. 1889 (S.).

FR. : Feb. 1889 (S.), Mar. 1881 (S.).

DISTRIB. : Tropical and subtropical regions.

Vern. name : *Ssehégge* (Ussil).

**5. *E. bipinnata*** (L.) Muschler in Fl. von el-Tor in Verhdlg. Bot. Ver. Prov. Brdbg. IL (1907) 74.—*E. cynosuroides* (Retz.) Roem. & Schult. Syst. Veget. II (1817) 577.—*Cynosurus durus* Forsk. Fl. Aeg.-Arab. p. 21.

HABITAT : I. Wady Arabah (Hart !); Ain Fabal, near El Faba, Ghor es Safieh (Hart).

II. Lahej (Defl.); Aden (Birdwood 133 !).

DISTRIB. : Egypt to India and southwards to E. tropical Africa.

**6. E. decidua** Hochst. in Flora XXXVIII (1855) 324.

HABITAT : II. Menacha, 2,300 m. (S. 2008).

DISTRIB. : Abyssinia, Arabia.

**7. E. ciliaris** Link Hort. Berol. I, 192.

HABITAT : II. Aden (Anders. ! Hildebrandt !, Birdwood !); Jebel Melhan, 600 m. (S. 634); Shukra (S. 144A); Wolledje (S. 634 !); Jeddah (Fischer !); Gumfuda (Ehrenb. !).

FL. : Jan. 1889 (S.), Feb. (Fischer), Feb. 1825 (Ehrenb.).

FR. : Jan. 1889 (S.), Feb. 1825 (Ehrenb.).

DISTRIB. : Common throughout tropical Africa and America, and in N. India.

**8. E. ciliaris** Link var. **brachystachya** Boiss.

HABITAT : II. Jeddah (Zohrab 15 !, Schimp. 798 !); Gumfuda (Ehrenb. !).

III. El Hami (S. 176 !).

FL. : Feb. 1825 (Ehrenb.), Apr. 1881 (S.).

FR. : Jan. 1836 (Schimp.), Apr. 1881 (S.).

**9. E. plumosa** Link Hort. Berol. I, 192.

HABITAT : II. Yaman (ex Boiss.).

IV. Near Maskat (Last !).

DISTRIB. : Tropical Africa and Asia.

**10. E. Braunii** Schweinf. in Bull. Herb. Boiss. (1894) App. II, 38.

HABITAT : II. South western slope of Shibam near Menacha, 2,500 m. (S. 1948).

FL. : Mar.

DISTRIB. : Yaman, Eritrea.

Vern. name : *Thaf-thafu* (Schimp.).

**11. E. aulacosperma** Fres. Mus. Senckenb I. 144, 145, var. **perennis** Schweinf. in Bull. Herb. Boiss. (1894) App. II, 39.

HABITAT : II. Ussil, 1,100 m. (S. 1323); northern slope of Shibam near Menacha, 2,500-2,600 m. (S. 1452, 1654, 1946).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.).

**12. E. rigidifolia** Hochst. mssr. in sched. Schimp. Abyss. 1854, n. 374, 189.

HABITAT : II. Below Ussil, 950 m. (S. 1307).

FR. : Feb. 1889 (S.).

DISTRIB. : Aethiopia, Arabia.



**13. E. yemenica** Schweinf. in Bull. Herb. Boiss. (1894) App. II, 41.

HABITAT : II. Below Ussil, 1,100 m. (S. 1332).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.).

DISTRIB. : Yaman.

**14. E. mabrana** Schwein. in Bull. Herb. Boiss. (1894) App. II, 42.

HABITAT : III. El Hami (S. 208).

FL. : Apr.

DISTRIB. : Arabia.

**15. E. Barrelieri** Dav. in Morot. Journ. de Bot. VIII (1894) 289, & in Bull. Herb. Boiss. II (1894) 651.

HABITAT : II. Jedda (Zohrab !), Aden (Birdwood !).

### 58. *Aeluropus* Trin.

**1. A. arabicus** Steud. Nom. ed. II, I, 30.

HABITAT : I. Sinai (ex Muschler).

II. Aden, Sheikh Othman and Shukra (Defl., S. 127) ; Aden (Thomson, Anders., Hook. !, Lunt 343 !) ; Perim Island (Herb. Kew !) ; Hodeidah (S. 156) ; Shukra (S. 141).

FL. : Dec. 1888 (S.), Mar. 1881 (S.), Apr. 1894 (Lunt).

FR. : Dec. 1888 (S.), Mar. 1881 (S.).

DISTRIB. : Egypt, Abyssinia, Arabia.

Vern. name : *Schöchham* (Tehama).

**2. A. villosus** Trin. ex C. A. Mey. Verz. Pfl. Cauc. 18.

HABITAT : I. El Tor (Schimp. 204 !, Bové 9 !) ; N. Midian (Burton).

II. Yaman (Schimp. 1000 !) ; Yaman : Salt marshes (Bové 258 !) ; Jedda (Fischer 134 !, Zohrab 16 ! 210 !) ; Hodeidah (S. 155 !).

III. Common on salt ground, Ghail-babagir, 70 m. (Lunt 233 !).

FL. : Feb. (Lunt), Nov.-Jan. (Fischer), Dec. 1888 (S.).

FR. : Feb. (Lunt), Mar. 1835 (Schimp.), June 1832 (Bové), Dec. 1888 (S.).

DISTRIB. : Mediterranean and Caspian regions, Upper Egypt, Nubia, Central and S. Arabia, Persia, Afghanistan, Sind, Punjab, W. Peninsula of India, Ceylon.

Vern. name : *Neghil* (Bové).

**3. A. littoralis** Parl. Fl. Ital. I, 461.

HABITAT : II. Sandy plain between Barriere Gate and Shaikh Othman (Defl.).

DISTRIB. : Spain, France, Italy, Greece, Asia Minor, Algeria, Tunis, Egypt, Arabia (not Sind).

4. *A. littoralis* Parl. Fl. Ital. I, 461, var. *repens* Cosson Exp. Alg. 155.

HABITAT : I. Arabia Petraea (Bové, Schimp. 204).

### 59. *Dactylis* L.

1. *D. glomerata* L. Sp. Pl. 71, var. *hispanica* (Roth) Koch Syn. ed. I (1837) 808.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. of type : Europe, Northern Asia.

### 60. *Schismus* Beauv.

1. *S. marginatus* P. Beauv. Agrost. 74, t. 15.

HABITAT : I. Wady Sewook (Lord !); Arabia Petraea (McDonald !).

DISTRIB. : Southern Europe, Central Asia, S. Africa.

2. *S. arabicus* Nees Fl. Afr. Austr. 422.

HABITAT : I. Wady Zewerah (Lowne !); Sinai (Figari !); Wady es-Sle, Oasis Feiran (Kneuck. 267); Arabia Petraea (Schimp. 371).

FR. : May 1847 (Figari).

DISTRIB. : Egypt, Sinai, Syria, Palestine.

### 61. *Poa* L.

1. *P. alpina* L. Sp. Pl. 67.

HABITAT : I. Sinai (Auch. 2944 !).

DISTRIB. : Northern and Arctic regions.

2. *P. sinaica* Steud. Syn. Pl. Gram. 256.

HABITAT : I. Sinai (Figari !); Mt. Catherine (Schimp. 326 !).

FR. : May 1835 (Schimp.).

DISTRIB. : Arabia, Persia.

3. *P. annua* L. Sp. Pl. 68.

HABITAT : I. Ghor es Safieh (Hart).

II. Near Menacha, 2,500 m. (S. 1453 !); Taifa (Schimp. 968 !); Kahil near Menacha, 2,500 m. (S. 1453 !).

FL. : Feb. 1889 (S.).

FR. : Feb. 1889 (S.).

DISTRIB. : Cosmopolitan.

4. *P. pratensis* L. Sp. Pl. 67.

HABITAT : II. Above Menacha, near el Ejan, 2,500 m. (S. 1669 !).

FR. : Mar. 1889 (S.).

DISTRIB. : N. temperate regions.

**5. P. menachensis** Schweinf. in Bull. Herb. Boiss. (1894) App. II, 43.

HABITAT : II. North Western slope of Shibam, near Menacha, 2,000 m. (S. 1720).

FL. : Mar. 1889 (S.).

FR. : Mar. 1889 (S.).

DISTRIB. : Arabia.

**6. P. abyssinica** Jacq. Misc. II, 364.

HABITAT : II. Common weed in fields near Shukra (S. 144 !).

FR. : Mar. 1881 (S.).

DISTRIB. : Abyssinia, Arabia.

**7. P. persica** Trin. in Mém. Acad. Sc. Petérsb. Sér. VI, I (1831) 373.

HABITAT : I. Mt. Sinai (Schimp. 105!).

FR. : May 1835 (Schimp.).

DISTRIB. : Arabia, Persia, Caucasia.

**8. P. soongarica** Boiss. Fl. Or. V, 611.

HABITAT : I. Arabia Petraea (Schimp. 105, Boiss.).

DISTRIB. : Northern Asia, Arabia.

## 62. *Festuca* (Tourn.) L.

**1. F. myurus** L. Sp. Pl. 74.

HABITAT : I. Mt. Catherine (Schimp. 347!).

FR. : May 1835 (Schimp.).

DISTRIB. : Europe, Northern Asia, N. America.

**2. F. brevis** (Boiss. et Kotschy) Aschers.-Schweinf.-Muschler Fl. Egypt. I, 138.

HABITAT : I. Arabia Petraea (Herb. Kew!).

DISTRIB. : Egypt.

**3. F. brevis** Aschers.-Schweinf.-Muschler, var. **subdisticha** Aschers.-Schweinf.-Muschler Fl. Egypt. I, 138.

HABITAT : I. Arabia Petraea (Herb. Kew!).

DISTRIB. : Egypt.

**4. F. inops** var. **spiralis** Aschers.-Schweinf.-Muschler Fl. Egypt. I, 138.

HABITAT : I. Sinai (ex Muschler, Herb. Kew!).

DISTRIB. : Egypt, Cyrenaica, Syria.

**5. F. dertonensis** Aschers. & Graebner Syn. Mitteleurop. Fl. II, 1 (1898-1902) 559.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Europe, N. Africa, Asia.

**6. F. uniglumis** Sol. in Ait. Hort. Kew. ed. I, I, 108.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Europe, Mediterranean region.

**7. F. pectinella** Delile Ind. Sem. Hort. Monsp. (1836) 24.

HABITAT : I. Sinai (Herb. Kew !).

DISTRIB. : Egypt, Algeria, Syria, Palestine.

**8. F. divaricata** Desf. Fl. Atlant. I, 89, t. 22.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Mediterranean region.

### 63. *Scleropoa* Griseb.

**1. S. maritima** Parl. Fl. Ital. I, 468.

HABITAT : I. Arabia Petraea (Herb. Kew !).

DISTRIB. : Mediterranean region.

**2. S. memphitica** Boiss. Diagn. Ser. I, XIII, 62.

HABITAT : I. Arabia Petraea (Auch. 3037).

DISTRIB. : Northern Africa, Syria.

### 64. *Cutandia* Willk.

**1. C. scleropoides** Willk. in Bot. Zeit. XVIII (1860) 130.

HABITAT : I. Arabia Petraea (Pinard, Boiss. !); Oasis Firan, 600-650 m. (Kneuck. 259); Sinai (Auch. 3037 !).

DISTRIB. : Mediterranean.

### 65. *Bromus* Dill. ex L.

**1. B. maximus** Desf. Fl. Atlant. I, 95, t. 26.

HABITAT : I. Oasis Firan (ex Kneuck.).

DISTRIB. : Europe, Mediterranean region and Caucasus.

**2. B. cognatus** Steud. Syn. Pl. Gram. 321.—*B. adoënsis* Hochst. ex Steud. Syn. Pl. Gram. 326.

HABITAT : II. Menacha and slopes of Shibam, 2,000-2,500 m. (S. 1459, 1578, 1711, 1714).

FL. : Feb. and Mar. 1889 (S.).

FR. : Feb. and Mar. 1889 (S.).

DISTRIB. : Abyssinia, Arabia.

**3. B. Japonicus** Thunb. ssp. **Sinaica** Hackel in Allg. Bot. Zeitschr. (1903) 167. "*Differt a typo spiculis lineari-oblongis, glumis fertilibus lanceolatis marginibus leniter et regulariter arcuatis nequaquam angulatis, apice acuto acute bidentatis.*"

*Dividitur in varietates 2 :*

$\alpha$  **Sinaicus genuinus**, *panicula contracta, ramis brevibus erecto patulis*, etc., l. c.

HABITAT : I. W. es-Slé, plain of Râha, W. esch-Sheth (ex Kneuck.).

$\beta$  **incanus**.

HABITAT : I. W. Tarfa, plain of Râha, Oasis Firan (ex Kneuck.).

DISTRIB. : Japan.

**4. B. tectorum** L.  $\times$  **Japonicus** Thunb.

HABITAT : I. W. Tarfa, ca. 1,100 m. (ex Kneuck.).

**5. B. fasciculatus** Presl Cyp. et Gram. Sic. 39.

HABITAT : I. Sinai region (Figari !).

FR. : May 1849 (Figari).

DISTRIB. : Eastern Mediterranean.

**6. B. rubens** L. Cent. Pl. I, 5.

HABITAT : I. Oasis of Firan, 600-650 m. (Kneuck. 291); Arabia Petraea (Boiss.).

FR. : Apr. 1902 (Kneuck.)

DISTRIB. : Mediterranean region.

**7. B. matritensis** L. Cent. Pl. I, 5.

HABITAT : I. Arabia Petraea (Neerg.).

DISTRIB. : Europe, N. Africa, Orient.

**8. B. patulus** Mert. & Koch in Roehl. Deutschl. Fl. I, 685, var. **villosa**.

HABITAT : I. Foot of Mt. Sinai (Schimp. 1766 !); Arabia Petraea (McDonald !).

DISTRIB. : Europe, Orient, Afghanistan.

**9. B. pulchellus** Fig. & Not. Agr. Fragm. 16.

HABITAT : I. Sinai (Figari ex Boiss. vol. V, 656).

DISTRIB. : Arabia.

**10. B. hordaceus** L. Sp. Pl. 77, var. **glomeratus** Aschers.-Schweinf.-Muschler Fl. Egypt. I, 146.

HABITAT : I. Arabia Petraea (Muschler).

DISTRIB. : Throughout the Mediterranean region,

**11. B. tectorum** L. Sp. Pl. 77.

HABITAT : I. Mt. Sinai (Bové 6 !); Wady Nasb (Drake 50 !); foot of Mt. Sinai (Schimp. 175 !); Wady Farrun and Wady Gennah (Lord !); Arabia Petraea (McDonald !).

IV. Central Arabia (Pelly !).

FR. : Apr. 1835 (Schimp.), May 1868 (Lord), June 1832 (Bové).

DISTRIB. : Europe, Orient, Northern Asia.

Vern. name : *Sufsouf* (Bové).

**12. B. tectorum** L. var. **anisantha** Hack. in Denkschrift. Akad. Wiss. Wien L., p. 77 (1885).

HABITAT : I. Foot of Jebel Musa, 1,500 m. (Kneuck. 290).

**66. Brachypodium** Beauv.

**1. B. flexum** Nees Fl. Afr. Gram. 456.

HABITAT : II. Shibam, above Menacha, 2,600 m. (S. 1655).

FL. : Feb. and Mar. 1889 (S.).

FR. : Feb. and Mar. 1889 (S.).

DISTRIB. : S. Africa, Arabia, Eritrea.

**2. B. distachyum** Beauv. Agrost. 101.

HABITAT : I. Raphidim (Schimp. 252 !).

FR. : July 1835 (Schimp.).

DISTRIB. : Mediterranean, Orient.

**3. B. ramosum** Roem. & Schult. Syst. II, 737.

HABITAT : I. Arabia Petraea.

DISTRIB. : Mediterranean.

**67. Lolium** L.

**1. L. multiflorum** Lam. Fl. Fr. III, 621.

HABITAT : I. Arabia Petraea (Boiss. !).

FR. : Apr. 1846 (Boiss.).

DISTRIB. : Temperate regions of Europe and Asia.

**68. Agropyrum** J. Gaertn.

**1. A. squarrosus** Link Hort. Berol. I, 32.

HABITAT : I. Bestam (Schimp. 157 !).

DISTRIB. : Mediterranean.

**2. A. orientale** Roem. & Schult. Syst. II, 757.

HABITAT : I. Arabia Petraea (Figari !).

DISTRIB. : Orient, N. Africa.

69. *Triticum* L.

1. *T. vulgare* Vill. Hist. Plant. Dauph. II (1787) 133, var., Baker in Kew Bull. (1894) 343.

HABITAT: III. Cult. under date palms (Lunt 148!).

Vern. name: *Burr* (Lunt).

2. *T. vulgare* Vill. var. *caesium* Alef. l. c. 330; Koern.-Werner. l. c. I, 47; Schweinf. l. c. 45.

HABITAT: II. Menacha (S. 1770b! 1581).

FL.: Mar. 1889 (S.).

Vern. name: *Berr maissenii* (S.).

3. *T. vulgare* Vill. var. *ferrugineum* Alef. Landw. Flora 330; Koern.-Werner l. c. I, 47; Schweinf. l. c. 45.

HABITAT: II. Menacha (S. 1770a!).

FL.: Mar. 1889 (S.).

OBSERV.: Winter wheat of four months duration (S.).

Vern. name: *Berr damâri* (S.).

4. *T. vulgare* Vill.; Koern.-Werner Handb. Getreid. I, 40, var. *erythrosperrum* Koern. l. c. 46; Schweinf. in Bull. Herb. Boiss. (1894) App. II, 45.

HABITAT: II. Menacha, 2,300 m. (S. 1771!).

FL.: Mar. 1889 (S.).

DISTRIB.: Cosmopolitan.

OBSERV.: Winter wheat of four months duration (S.).

Vern. name: *Berr halba* (S.).

5. *T. durum* Desf. Fl. Atlant. I (1798) 114; Koern.-Werner Handb. Getreid. I, 64, var. *Megapolitana* Koern. ?; Kneuck. in Allg. Bot. Zeitsch. IX (1903) 167.

HABITAT: I. Cult. in Oasis Firan (Kneuck.).

OBSERV.: Not quite sure, as ripe fruit is wanting (Kneuck.).

70. *Aegilops* L.

1. *A. bicornis* (Forsk.) Jaub. et Spach Ill. Pl. Orient. IV (1850) t. CCCIX.

HABITAT: I. Arabia Petraea (ex Muschler).

DISTRIB.: Cyrenaica, Marmarica, western Asia eastward to Mesopotamia.

2. *A. ovata* L. Sp. Pl. I (1753) 1050.

HABITAT: I. Arabia Petraea.

DISTRIB.: Europe, Arabia.

**71. Lepturus R. Br.**

**1. L. incurvatus** Trin. Fund. Agrost. (1820) 123.

HABITAT : I. Oasis Ain Musa (Kneuck. 528).

DISTRIB. : Throughout the Mediterranean region.

**72. Hordeum (Tourn.) L.**

**1. H. vulgare** L. Sp. Pl. 84.

HABITAT : I. Arabia Petraea (McDonald!).

IV. Zor Hills (Cox and Knox).

DISTRIB. : Cultivated.

Vern. name : *Hantah* (Arabic in Zor Hills).

**2. H. vulgare** L. subsp. **tetrastichum** Kcke. *et* Wern. Getr. I, 156  
var. **pallidum** Al.

HABITAT : II. Menacha, 2,400 m. (S. 1568).

**3. H. vulgare** L. subsp. **hexastichum**, var. **brachyurum**.

HABITAT : II. Near Menacha, 2,200 m. (S. 1684).

Vern. name : *Schair maissani* (S.).

**4. H. vulgare** L. subsp. **distichum** var. **deficiens** Steud.

HABITAT : II. At Menacha, on terraces, 2,300 m. (S. 1490); at Ejan,  
on the northern slope of the Shibam, 2,700 m. (S. 1644).

FR. : Feb. 1889 (S.).

Vern. name : *Schair habhuri* (S.).

**5. H. vulgare** L. var. **spontaneum** Kcke. Brauw. V (1882) 206.

HABITAT : I. Arabia Petraea (ex Muschler).

DISTRIB. : Everywhere in the Orient from Palestine to Persia.

**6. H. murinum** L. Sp. Pl. 85.

HABITAT : I. Plain of Râha, J. Arribe, Oasis Firan (ex Kneuck.).

DISTRIB. : Europe, N. Africa, Arabia, Orient.

**7. H. maritimum** With. Arr. Brit. Pl. 172.

HABITAT : I. Mt. Catherine, cult. ground (Schimp. 383 !); N. Midian  
(Burton!).

FR. : July 1835 (Schimp.).

DISTRIB. : Europe, N. Africa, Arabia, Orient.

**8. H. ithaburense** Boiss. Diagn. Ser. I, XIII, 70.

HABITAT : I. Arabia Petraea (Boiss.).

DISTRIB. : Asia Minor, Arabia, Orient.



**73. Elymus L.**

**1. E. Caput-Medusae** L. Sp. Pl. 84.

HABITAT : I. Desert of Sinai (Bové 10!).

FR. : June 1832 (Bové).

DISTRIB. : Southern Europe, N. Africa, Orient.

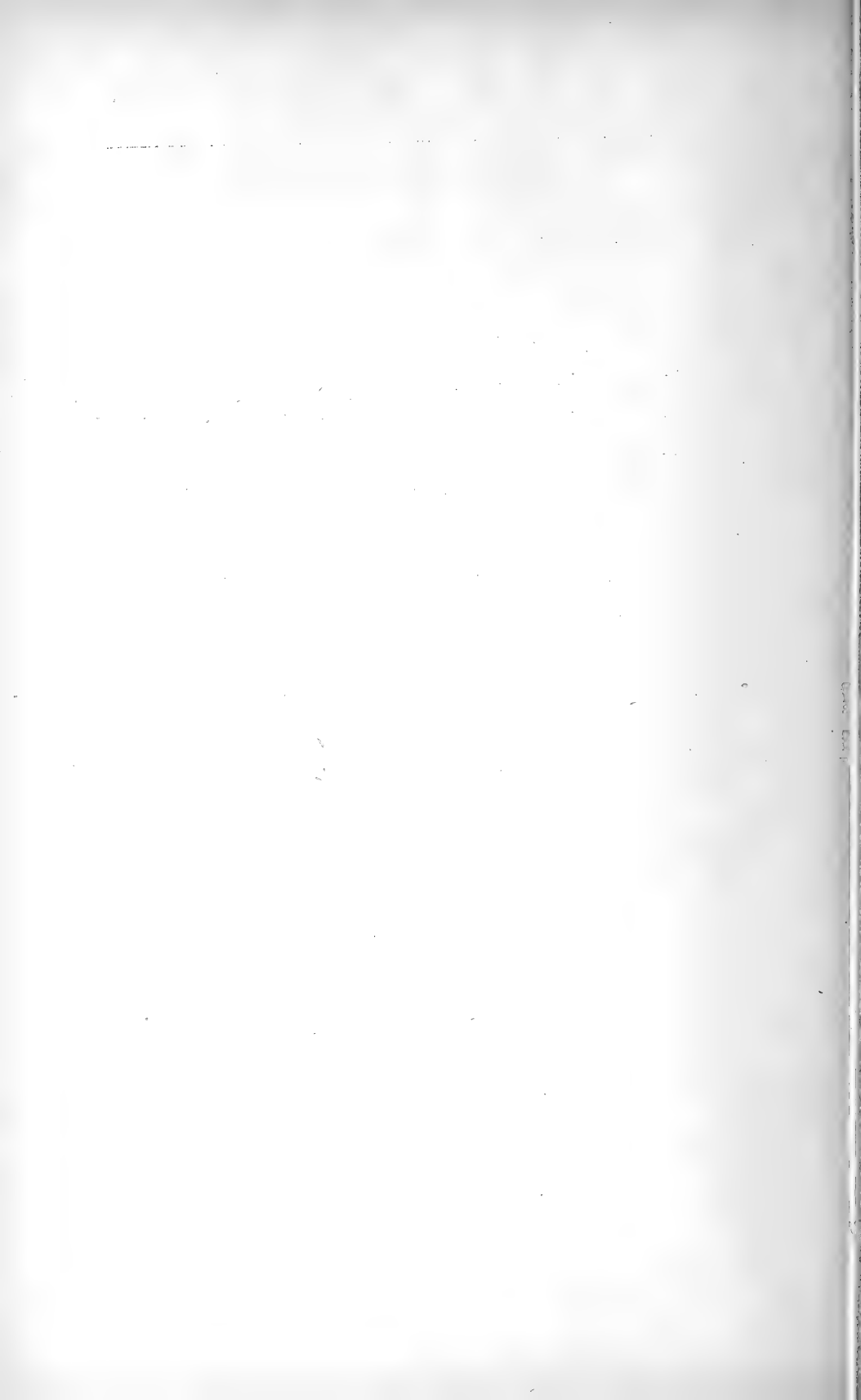
**74. Zea L.**

**1. Z. mays** L. Sp. Pl. ed. I, 971.

HABITAT : II. Cultivated at Shaikh Othman (Yerbury *ex litt.*);  
Mokha (Yerbury).

DISTRIB. : Cultivated.

Vern. name : *Hind* (Yerbury).



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 and the sixth section  
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 appendix. The  
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