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BY
ETHELBERT BLATTER, S.J., F.L.S.,
Professor of Botany at St. Xavier's College, Bombay.

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XLVIII.—HYDROCHARITACEÆ.

Fresh or salt-water herbs, with undivided submerged or floating leaves.

Flowers bisexual, monœcious or diœcious, enclosed in one or more spathes; sepals 3, green or petaloid, valvate or induplicate in bud; petals 3 or 0; stamens 3—15; anthers erect. Ovary inferior, 1-celled, or partially 3-celled by projecting parietal placentas; styles or style-arms 3—12, ovules numerous, parietal, pendulous, anatropous or orthotropous.

Fruit membranous or fleshy, often beaked; seeds few or many; endosperm 0; embryo various.

Genera 14; *species* about 40.

Distribution: Warm regions of the world.

Halophila Thouars.

Submerged, perennial, marine herbs; rootstock slender, creeping, branched; leaves in pairs at the nodes of the rootstock or on short branches, with a hyaline amplexicaule sheath at the base, oval oblong or linear.

Flowers very small, monœcious, axillary, in 2-leaved hyaline spathes. Male pedicelled; sepals 3, ovate, imbricate, hyaline; stamens 3, linear, 4-celled; pollen confervoid. Female flowers sessile; sepals 3 on the apex of the beak of the ovary, most minute; petals 0; ovary ovoid, membranous, produced into a slender erect beak, slightly dilated at the apex, 1-celled, full of viscous fluid; styles 3, capillary, caducous; ovules few or many, on 3 parietal placentas, anatropous.

Fruit a beaked utricle; seeds globose, translucent; testa membranous, minutely tubercled; embryo macropodous with the spirally coiled embryo in a pit at the top.

Species about 10.

1. **Halophila ovata** Gaudich in Freyc. Voy. Bot. 430 (1826); Hook. Fl. Brit. Ind. V, 663; Trim. Fl. Ceyl. IV, 128.

Halophila ovalis Hook. f. Fl. Tasm. II, 45; Miq. Fl. Ind. Bat. III, 230; Boiss. Fl. Or. V, 2; Benth. Fl. Austral. VII, 182; Aschers. in Nuov. Giornal. Bot. Ital. III, 301, et in Linnaea XXXV, 173.

Barkania punctata Ehrb. Symb. Phys. Bot. in Abhandl. Berl. Akad. I, 429.

Thalassia stipulacea Thw. Enum. 332 (non Koen.)

Caulinia ovalis R. Br. Prodr. 339.

Kernera ovalis Roem. et Schult. Syst. Veg. VII, 170.

Vol. VII, no. 3

Description :—Rootstock filiform, much-branched, branches often forming intricate masses, clothed with capillary root-hairs. Leaves solitary or in pairs at the nodes of the rootstock, 2—2½ inches long, from broadly oval to linear-oblong, glabrous, tip rounded or subacute, veins inter-marginal and the costae united by faint reticulating venules; petiole ¼—2 inches long, filiform, base hardly dilated.

Spathes about $\frac{1}{20}$-inch long. Male peduncled. Female sessile or peduncled; anthers subsessile, shortly oblong, obtuse; ovary $\frac{1}{12}$ inch long, ovules about 12.

Locality:—Aden (Defl.).

Distribution:—Shores of Red Sea, Indian Ocean, China, Malay Islands, Pacific Islands, Australia.

Note:—This is a very pretty little marine plant, varying in form and more so in size. In the type the blade is oval-oblong and about 1¼ inches long, but it is not seldom almost rotund and sometimes linear-strap-shaped.

XLIX.—SCITAMINACEÆ.

Deflers mentions the following plant as being cultivated at Shaik Othman.

Musa paradisiaca Linn. Sp. Pl. (1753) 1043; Trim. Fl. Ceyl. IV, 265; K. Schum. in Engl. Pflanzenr. IV, part 45 (1900) 19.

Musa paradisiaca var. normalis O. Kuntze Revis. Gen. II (1891) 692.

Musa Cliffortiana Linn. Sp. Pl. (1753) 1043 in syn.

Musa sapientum var. paradisiaca Baker in Ann. Bot. VII (1893) 213; Hook. Fl. Brit. Ind. VI, 262.

The well-known Banana or Plantain, called 'mooz' by the Arabs.

Native country uncertain, but probably of Asiatic origin.

Ibn el-Beithar gives some interesting notes on the medicinal properties of this plant (vol. III, 343—345).

L.—AMARYLLIDACEÆ.

Perennial herbs, rarely shrubs or undershrubs. Rootstock a bulb, tuber or corm, rarely an erect stock. Leaves radical. Scape naked or not.

Flowers few, often umbellate; bracts membranous or coloured, rarely herbaceous, the outer under the umbel 1—3 (rarely many -) involucrate; occasionally the inflorescence racemose or paniculate with scattered bracts. Perianth regular or irregular, 2-seriate, 6-lobed or -partite, sometimes with a corona at the mouth of the tube. Stamens 5, adnate

to the bases of the perianth-segments, rarely epigynous; filaments free or connate; anthers erect or versatile. Ovary 3-celled, inferior; ovules many, anatropous, 2-seriate on the inner angles of the cells; style slender; stigma simple or 3-cleft.

Fruit inferior, usually a loculicidal capsule, rarely fleshy and bursting irregularly. Seeds few or many; albumen fleshy, enclosing the small embryo.

Genera 64; *species* about 650.

Distribution :—Temperate and tropical regions.

Pancratium Linn.

Herbs with tunicate bulbs. Leaves linear or lanceolate, often bifarious.

Flowers large, umbellate or solitary, sessile or pedicellate, within one or two membranous spathes; bracteoles few, linear, hyaline. Perianth funnel-shaped; tube usually long, widened at the mouth; lobes 6, narrow, suberect, subequal. Stamens 6, shorter than the perianth, adnate to its throat; filaments filiform, but connate below in a petaloid membranous cup, the edge of which between the free filaments may be toothed or lobed; anthers oblong or shortly linear, dorsifixed. Ovary 3-celled; ovules many, 2-seriate in each cell; style long, filiform; stigma small, capitate.

Fruit a large, subglobosely 3-angled, loculicidally 3-valved capsule. Seeds many, angular; testa thick, lax, black.

Species about 14.

Distribution :—Widely spread through the subtemperate and tropical regions of the Old World.

Leaves much twisted	1. P. tortuosum.
Leaves not twisted	2. P. maximum.

1. Pancratium tortuosum Herb. in Ann. Nat. Hist. IV (1840) 28; Kunth Enum. Pl. V, 663; Roem. Syn. Amaryll. p. 178; Anders. Journ. Linn. Soc. V, Suppl. p. 37; Baker Handb. Amaryll. p. 120; Boiss. Fl. Or. V, 153; This.-Dyer Fl. Trop. Afr. VII, 406.

Pancratium tortifolium Boiss. Diag. Pl. Or. ser. I, XIII, 18.

Description :—Bulb globose, 1½—2 inches in diameter, with a long cylindrical neck. Leaves 6—12, linear, contemporary with the flowers, ½—1 foot long, conspicuously spirally twisted, moderately firm, glabrous.

Peduncle very short, moderately stout. Flowers 2—4 in an umbel; pedicels very short; spathe-valve large, ovate, membranous. Perianth-tube 5—6 inches long, dilated at the apex; segments linear, ascending,

above 2 inches long. Staminal cup obconic, above an inch long, toothed between the short free tips of the filaments ; anthers linear, $\frac{1}{4}$ inch long. Style overtopping the anthers. Capsule-valves oblong, 1 inch long.

Flowers :—April 1861 (Thomson).

Locality :—Valleys of Shum Shum Range (Anders., Defl.) ; without locality (Birdw.).

Distribution :—Arabia, Nubia, Egypt.

Note:—Krause considers it probable that the specimen found and named as *Pancratium tortuosum* Herb. by Anderson and Deflers is identical with the following species, *P. maximum* Forsk. In favour of his opinion he mentions the fact, that the true *P. tortuosum* is almost exclusively found in sandy plains and mostly in the immediate neighbourhood of the sea, whilst rocky ravines are the favourite locality of *P. maximum*.

The author of the 'Florula' says on page 38 : "My plant, though not in flower, is doubtless the same as Herbert's species. It grows in clumps in one or two of the narrow valleys in Aden. Boissier quotes Schimper's number as 676 ; but the plant in the Hookerian herbarium is marked 876. My description is drawn partly from my own specimens and partly from the manuscript diagnosis of Herbert in the Hookerian herbarium."

We have examined Anderson's specimen and we do not doubt that his statement is correct. Thomson found the same species at Aden after the publication of the Florula, in April 1861. As to Defler's specimen we have no reason to doubt à *priori* its correct identification.

2. Pancratium maximum Forsk. Fl. Aeg.-Arab. p. 72 ; Schweinf. in Bull. Herb. Boiss. 1894, App. II, 82 ; This.-Dyer Fl. Trop. Afr. VII, 407.

Arabic name :—Bassal er robach (=bulb of the baboon).

Description :—Bulb ovate, 2 inches long, $1\frac{1}{5}$—$1\frac{3}{5}$ inches broad, gradually narrowing into the neck ; teguments fuscous, outer ones thick-coriaceous, inner ones numerous, membranous ; neck elongate, consisting of the remains of the vaginas, 4—6 inches long. Caules abbreviate, 1—4, rising from the apex of the neck, consisting of the convolute bases of the leaves. Leaves 3—5 in one caulis, $\frac{2}{3}$—$1\frac{1}{2}$ feet long, 1 inch broad, bright-green, delicate, slightly shorter than the flowers, linear, rather abruptly acute.

Scape 1-flowered, measuring 15 inches together with the flower, much shorter than the perianth-tube. Spathe 2—$2\frac{2}{5}$ inches long, linear, binerved, 4 times shorter than the tube, bipartite in the upper third, segments linear. Pedicel extremely short ("brevissimus subnullus"). Perianth very large, almost 1 foot long very delicate, with the odour of

'Convallaria suaveolens'; tube 5—5⅜ inches long, thin, green, slightly 6-gonous and a little widened at the apex; limb infundibuliform, white, 5 inches in diameter at the apex; segments 3⅛—3⅜ inches long, 1 7/24 inch broad, spathulate, linear, very acute, in the middle of the back pale-green-lineate, expanded or more or less reflex, connate with the staminal cup for half the length of the stamens. Staminal cup campanulate; stipular appendages narrowly triangular, separated from each other by acute sinuses, expanded, ¼ the length of the cup. Filaments white, erect, free part ⅘ inch long; anthers ⅛ inch long, yellow, linear Style pale-green, slightly shorter than the filaments; stigma capitate, trilobed.

Flowers :—"The plant flowered on the 6th day after a heavy shower when the leaves were fully developed on the 6th December 1888" (Schweinf.).

Locality :—Ravine and quarry near the Eastern Telegraph Office, plentiful between boulders at the foot of a very steep rocky slope of basaltic lava. (Schweinf.).

Distribution :—S. Arabia, Nubia.

Cultivated Species :

According to Deflers the following plant is cultivated at Shaikh Othman :

Polianthes tuberosa Linn. Sp. Pl. ed. 1, 316; Bot. Mag. t. 1817; Trans. Hort. Soc. London I, 41, t. 2.

Polianthes gracilis Link Enum. Pl. Hort. Berol. Alt. I, 330.

Polianthes mexicana Zucc. in Abhandl. Baier. Akad. Wiss. II (1837) 319.

English name : Tuberose.

The root of this plant is a solid tuber of an irregular shape, sending forth lateral processes, upon which the buds of the future plant are formed. Grows 3—4 feet high. Leaves radical or on the lower part of the stem. Flowers white, very fragrant, in long terminal simple racemes; perianth funnel-shaped.

Generally cultivated in America, Asia, and Europe. Believed to be endemic in Mexico.

LI.—LILIACEÆ.

Herbs, very rarely shrubs or small trees, with fibrous roots or a creeping rootstock, or a bulb or corm. Leaves various.

Flowers usually hermaphrodite, axillary or terminal, solitary, or twin, or umbellate, spicate, racemose, paniculate or fasciculate; bracts usually small, scarious, sometimes, when the flowers are umbellate, spathe-like. Perianth herbaceous or petaloid, usually 6-merous in 2

series, imbricate, (rarely valvate,) in bud. Stamens 6, rarely 3 or fewer, hypogynous or adnate to the perianth; filaments free or connate; anthers oblong or linear, often dorsifixed, usually dehiscing longitudinally. Ovary 3-celled; ovules 2 or more from the inner angles of the cells, anatropous (rarely orthotropous); style usually simple, often long (rarely short or absent), or 3 styles.

Fruit a capsule or berry, usually 3-(rarely 1-) celled. Seeds 1 or more, globose or flattened; albumen horny or fleshy; embryo small, terete.

Genera 187; *species* about 2,500.

Distribution :—Cosmopolitan.

Flowers yellow	1. Albuca.
Flowers white or violet	2. Littonia.
Flowers greenish	3. Dipcadi.

(This key applies only to the species described below.)

1. Albuca Linn.

Rootstock a tunicated bulb. Leaves all radical, linear or terete.

Inflorescence a cylindrical or corymbose raceme; pedicels sometimes long; bracts persistent, membranous. Flowers large, white or yellow; segments with a broad keel of green or red-brown. Perianth polyphyllous; outer segments oblong, spreading at the apex; inner connivent, cucullate at the apex. Stamens 6, hypogynous, as long as the inner segments; filaments flattened or filiform; anthers oblong, all perfect or the 3 outer abortive. Ovary oblong, 3-celled, sessile; ovules many, superposed; style triquetrous or filiform, stigma usually 3-lobed.

Capsule loculicidally 3-valved. Seeds numerous, compressed; testa membranous, black; albumen fleshy; embryo cylindrical.

Species : about 50.

Distribution :—Tropical and S. Africa, Arabia.

1. Albuca Yerburyi Ridley in Journ. Bot. (1884), 370.

Local name : Yellow Shum Shum Lily.

Description :—Leaves linear, lanceolate, hispid at the base, 14 inches long, 3-4 lines broad.

Scape more than 9 inches long; raceme lax. Flowers 9 or more, yellow, ½ inch long, pedicellate; pedicels delicate, ¼ inch long; bracts membranous, lanceolate, long acuminate, longer than the pedicels, scarcely ½ inch long. Sepals lanceolate, oblong, slightly acute. Petals subsimilar, broader, obtuse. Stamens all fertile, slightly shorter than the petals, filaments dilated at the base, complanate, above filiform. Pistil as long as the stamens; style filiform, slender; ovary ovoid,

shorter than the style; stigmas ovate-deltoid. Capsule erect, ovate, ½ inch long.

Flowers :—March 1884 (Yerbury), Aug. 1897 (Birdw.), Nov. 1884 (Beevor).

Locality :—" Only found within the last 200 feet of the Shum Shum Range and there only on the ridge extending eastward from the old Arab fort " (Yerbury in epist.) ; without locality (Beevor, Birdw.).

Note :—" The species of this genus are widely spread over tropical and South Africa but none have been hitherto recorded from as far north as Arabia. The section to which it belongs (*Pallastema*) is typically a Tropical African one, and it seems most nearly allied to *A. abyssinica* Jacq." Ridley.

2. Littonia Hook.

Rootstock a fleshy tuber, or bulb.

Flowers solitary in the axils of many of the leaves, bright coloured. Perianth campanulate, cut down nearly or quite to the base ; segments equal, oblong-lanceolate, nectariferous and obscurely saccate at the base. Stamens 6, inserted at the base of the perianth-segments ; filaments filiform ; anthers linear-oblong, versatile. Ovary globose, sessile, 3-celled ; ovules many, superposed ; style entire in the lower part, 3-forked upwards ; stigmas minute, capitate. Capsule coriaceous, septicidally or loculicidally 3-valved. Seeds globose or compressed ; testa brown ; albumen firm ; embryo minute.

Species about 8.

Distribution :—Tropical and S. Africa, Arabia.

1. **Littonia minor** Defl. Bull. Soc. Bot. France XXXII, 353, fig. 354, et XLIII (1896), 232.

Local name :—Little Aden Lily (Yerbury).

Description :—A low herb, glaucescent, younger parts inconspicuously papillose-puberulous ; bulb yellow, globose, the size of a cherry ; radical fibres slightly fleshy, short ; tunica thinly membranous, forming a tubular sheath, split above and loosely surrounding the stem ; caulis erect, simple, subterranean part slender, very long, measuring 6—7 inches, aerial part green, sulcate, 3—6 inches long, leafless up to the middle, upper part provided with leaves. Leaves sessile, semi-amplexicaul, linear, long attenuate-acuminate, very acute, subacuminate at the apex, the lower ones 3-5 inches long and often in verticels of 4, the upper ones irregularly scattered, gradually getting smaller.

Flowers ebracteate, terminal, usually 2, sometimes 3—4-verticillate, erect, long-peduncled ; peduncle 8-10 lines long. Perigone campanulate,

white or violet, persistent for a long time ; segments equal, 1 inch long, 3 lines broad, free from the base, lanceolate, attenuate from the middle into a claw ; claw involute, saccate at the base, margins fimbriate, near the base 2 fuscous, nectariferous auricles. Stamens 6, hypogynous, slightly longer than the perigone ; filaments subulate, erect ; anthers attached at or slightly below the middle ; loculi laterally dehiscent. Ovary oblong, sessile. Style undivided, thin, towards the tip slightly thickened, at the apex shortly tricuspidate into the recurved stigmas, erect, exceeding the anthers.

Capsule 1 inch long, $\frac{3}{5}$—$\frac{1}{2}$ inch broad, surrounded by the marcescent perianth, oblong, obtuse, subclavate, 3-dymous, loculicidally dehiscent ; loculi 4—6-seeded. Seeds compressed, irregularly orbiculate, $\frac{1}{12}$ inch in diameter ; testa fuscous-yellow, glabrous, minutely punctulate under the lens.

Flowers :—April 1884 (Defl.) ; Dec. 1883 (Yerbury).

Locality :—Little Aden, plentiful on the trachytic debris at the foot of the last spurs of Jebel Ihsan (Defl.) ; on the sand (Yerbury).

Distribution : – Yemen (Defl.).

Note :—According to Deflers the point of insertion of the anther on the filament is not constant. The anthers are usually attached at the centre of the connective, sometimes considerably below the middle, towards the lower third, and more rarely the point of insertion is situated above the middle. The length of the style, too, is very variable. It usually exceeds the stamens, but in certain flowers it scarcely reaches $\frac{2}{3}$ of the length of the stamens. Deflers does not consider these differences as a case of normal heterostyly, but is more inclined to ascribe them to simple individual peculiarities of certain flowers.

Littonia minor resembles very much *L. Revoili* Franch., but the following characteristic points mark it off as a distinct species : Verticillate arrangement of the lower leaves, different colour of the flowers, complete independence of the perianth segments of each other.

Judging from the description, Krause considers it possible that *Littonia Hardeggeri* Ritter v. Beck is identical with *Littonia minor* Defl. The differences, indeed are not very great, and it seems that *L. Hardeggeri* can be distinguished only by its yellow flowers and slightly shorter stamens. (*Cf.* Paulitschke, Harrar Forschungsreise, page 451, *Ic.* figs. 8, 9).

Deflers discovered *L. minor* for the first time in 1884 on the peninsula of Little Aden. On a later visit to the same place he could not find it ; but in 1890 he came across the same species in the Hinterland of Yemen, about 60 km. west of Aden.

3. Dipcadi Medic.

Rootstock a tunicated bulb. Leaves all radical, usually narrowly linear.

Inflorescence a lax raceme. Flowers usually small, greenish. Perianth tubular; tube cylindric; segments 6, erect, the outer recurved from about the middle, the inner at the tips only. Stamens 6, inserted in the throat of the perianth, included; filaments short or 0; anthers linear, versatile, dehiscing introrsely. Ovary stipitate or sessile, 3-celled; ovules many in each cell; style short, straight; stigma 3-lobed.

Capsule membranous, subglobose or broadly obovate, deeply 3-sulcate, sessile or stalked, loculicidally 3-valved, few- or many-seeded. Seeds in each cell 6-20, compressed; testa black, membranous.

Species about 30.

Distribution :—S. Europe, Africa, W. Asia.

1. Dipcadi erythraeum Webb. et Berth. Hist. Nat. Canar. III, (1848) 341; Baker in Journ. Linn. Soc. XI, 408; Cooke Fl. Bomb. Pres. II, 770.

Uropetalum erythraeum Boiss. Fl. Or. V, 286.

Hyacinthus serotinus Forsk. Fl. Aeg.-Arab. p. 209; Del. Fl. d'Eg. p. 2.

Dipcadi unicolor Baker in Journ. Linn. Soc. XI (1870) 397; Hook. Fl. Brit. Ind. VI, 346.

Description :—Bulb tunicate, $\frac{1}{2}$-$\frac{7}{8}$ inch in diameter. Leaves 6-8 by $\frac{1}{8}$-$\frac{1}{5}$ inch, narrowly linear. Scape 4-7 inches long.

Flowers greenish, in lax 6—12-flowered racemes 4-6 inches long; bracts $\frac{3}{8}$-$\frac{7}{8}$ inch long, the lower the longest, ovate, finely acuminate; pedicels $\frac{1}{6}$-$\frac{1}{3}$ inch long. Perianth campanulate, $\frac{5}{8}$ inch long; outer lobes $\frac{3}{8}$ by $\frac{1}{8}$ inch, elliptic-oblong, obtuse, with indurated tips, 7-nerved; inner lobes similar, 5-nerved. Ovary sessile, $\frac{1}{4}$ inch long, elliptic-obovoid.

Capsule $\frac{1}{2}$-$\frac{5}{8}$ inch long and as broad, slightly cuneate at the base, on a stout stalk $\frac{1}{8}$-$\frac{1}{4}$ inch long, transversely veined. Seeds $\frac{1}{4}$-$\frac{5}{16}$ inch in diameter, orbicular, flat, black.

Locality :—Little Aden: in sandy places at the foot of Jebel Ihsan (Defl.).

Distribution :—Nubia, Egypt, Arabia, Sind.

LII.—COMMELINACEÆ.

Herbs, rarely climbing or undershrubs. Leaves costate, bases sheathing, nerves parallel. Inflorescence various. Flowers usually

bisexual, more or less irregular. Perianth inferior, 6-partite; 3 outer segments herbaceous, often persistent, 3 inner petaloid, free or united in a tube below, marcescent, spreading. Stamens 6, inserted on the base of the segments, all antheriferous or 2 or more reduced to staminodes; filaments often bearded with jointed hairs; anthers oblong or globose, often dissimilar. Ovary free, 2—3-celled; style terminal; stigma small; ovules 1 or few in the inner angle of the cells, orthotropous. Capsule loculicidal or indehiscent. Seeds angled, testa smooth or rugose, albumen flowery; embryo minute, far from the hilum.

Genera 25; *species* about 300.

Distribution :—Tropical and subtropical.

Commelina Linn.

Herbs, usually slender and creeping below.

Flowers in usually 2-fid cymes, emerging one at a time from a terminal complicate or funnel-shaped or cucullate spathe, flowers of upper branch of cyme small, deciduous, of lower fertile; fruiting pedicel and capsule retracted within the spathe. Sepals 3, membranous, 2 inner often connate at the base. Petals longer, one larger and often clawed. Stamens 3, perfect, and 2-3 imperfect; anthers oblong, one usually largest. Ovary 3-, rarely 2-celled, 2 cells 1—2-ovuled, third cell if present 1-ovuled or empty.

Capsule loculicidal, the posticous cell sometimes indehiscent or 0, or the 2 anticous cells empty connate indehiscent and forming a persistent ligulate body, from which the posticous falls away; seeds ellipsoid or angled, reticulate pitted or rugose.

Species about 90.

Distribution :—All tropical and subtropical.

1. **Commelina albescens** Hassk. in Schweinf. Beitr. Fl. Aethiop. p. 200; Clarke Monogr. 184; Hook. Fl. Brit. Ind. VI, 373.

Commelina striata Wall. Cat. 8981 (in part).

Commelina Schimperiana Hochst. in Schimp. Herb. n. 1242.

Commelina multicaulis Hochst. ibid. n. 2268.

Description :—Root-fibres thick; stems thickened at the base, often 2 or more from the root, clothed below with many white membranous sheaths, glabrous. Leaves 2-3 by ¼-½ inch, linear or linear-lanceolate, acute, glabrous, the margins often undulate. Spathes ½-¾ inch long and sometimes nearly as broad as long, 1-3 together, subsessile, glabrous or nearly so, finely striate, cucullate, falcately hooked at one end, auricled at the other.

Flowers blue, the lower raceme obsolete, the upper 3—5-flowered.

Capsules $\frac{1}{6}$ inch long, 3-celled, 2-valved, the dorsal cell indehiscent, with muricate ribs. Seeds $\frac{1}{10}$-$\frac{1}{8}$ inch long, rounded at the ends and on the back, somewhat angular on the inner face, dull black.

Locality :—Aden (Birdw.).

Distribution :—Tropical Africa, Arabia, Baluchistan, Sind.

LIII.—PALMEÆ.

Shrubs or trees, solitary or gregarious, naked or prickly, rarely pubescent. Stem erect, scandent or decumbent, rarely branched above. Leaves alternate, plaited in bud, pinnatisect or palmate, rarely simple or bipinnate; petiole sheathing.

Flowers 1—2-sexual, small, in panicles or spikes that are enclosed in one or more large sheathing bracts (spathes), usually 3-bracteate. Perianth inferior, segments 6 in two series (sepals and petals), usually all free, imbricate or valvate. Stamens 3 or 6, rarely more; anthers versatile. Ovary 1—3-celled or of 3 1-celled carpels; stigmas 3, usually sessile; ovules 1-2 in each carpel, adnate to the wall, base, or top of the cell, anatropous.

Fruit a 1—3-celled drupe or hard berry or of 1-3 carpels; pericarp smooth, rough or clothed with shining scales that imbricate downwards. Seeds erect or laterally attached, rarely pendulous; raphe usually branching all over the testa; albumen horny or bony, solid or ruminate; embryo small, in a small cavity near the surface of the albumen.

Genera about 180; *species* about 1,300.

Distribution :—Chiefly tropical.

Leaves fan-shaped	1. Hyphaene.
Leaves pinnate . . . . (cultivated) . .	2. Phoenix.

1. Hyphaene Gaertner.

Unarmed except for the spines on the petioles. Stem cylindrical or ventricose, simple or dichotomously branched. Leaves in a terminal crown, orbicular or flabellate; segments ensiform; petiole concavo-convex, plano-convex, or more rarely bi-convex; sheath short, open; ligule oblique or equilateral.

Spathes cylindrical, incomplete; spadices dioecious, male and female similar; spadix branches alternate; flower-bearing branches subfastigiate; bracts semicircular, very densely imbricate; bracteoles membranous, bearded. Male flowers: Sepals linear-oblong, imbricate, connate at the base. Petals broadly ovate, obtuse, concave, imbricate, connate at the base into a short stalk. Stamens 6; filaments short, subulate; anthers

linear, inserted at the bifid base. Rudiment of ovary 0. Female flowers larger than the male, very shortly pedicellate. Sepals 3, ovate-orbicular, obtuse, imbricate. Petals a little smaller than the sepals, broadly ovate, obtuse, imbricate. Staminodes 3, connate into a membranous ring. Ovary subglobose, obscurely 3-lobed, 3-celled; stigmas 3, minute, sessile, terminal, at length excentric; ovule attached by a broad base to the side of the cell.

Fruit sessile or stalked, terete or obscurely lobed, often flat or intruded at the base and apex, 1-celled; stigma basal; pericarp fibrous, with a shining epidermis; endocarp woody, fleshy inside. Seed adnate to the endocarp, erect, ovoid or obovoid, intruded at the base; testa very hard, fuscous; raphe reticulately branched; albumen homogeneous, hollow; embryo apical.

Species at least 40.

Distribution:—All over tropical and subtropical Africa, Arabia, Western India.

1. **Hyphaene thebaica** Mart. Hist. Nat. Palm. III, 226 (ed. 1), excl. syn. nonnullis, tab. 131, 132, 133 (excl. ic. spadicis masculae in tab. 132); Becc. in Agricolt. Colon. (1908) II, fasc. III.

Corypha thebaica Linn. Sp. Pl. ed. 2 (1763) 1657.

Cucifera thebaica Delile Descr. de l'Egypt II, 57, t. 1,2; Dict. Hist. Nat. XIII, 472.

Douma thebaica Poir. Encycl. Suppl. II, 519.

Hyphaene cucifera, Pers. Ench. II, 2245.

Chamaeriphes thebaica Kuntze Rev. Gen. Pl. II (1891) 728.

Names:—Egyptian Doum Palm; Gingerbread Tree; Mama (in Egypt).

Description:—Stem terete, 10-30 feet high, about 1 foot in diameter, simple or more frequently dichotomously branched. Leaves 20-30 in a terminal crown on each branch; petiole sheathing at the base, triangular below, plano-convex upwards, spiny on the margins, with rusty tomentum; lamina suborbicular, lobes 20 or more, linear-lanceolate, acuminate, 1½ feet long, 1 inch wide; primary nerves thick, concave above, secondary numerous.

Male spadix about 4 feet long, 1-2 inches thick at the base, at first erect, afterwards patent; spathes nearly cylindrical; flower-bearing branches 6-7 inches long, 3-2 at the end of branches 3-4 inches long; bracteoles ½ line long. Flowers in pairs, shortly pedicellate. Calyx divided down to the base into 3 narrow acute yellow sepals, contracted below. Corolla stipitate with the segments imbricate, rotundate and cucullate at the apex, thin and not strongly striate-nervose. Stamens 6,

rarely 7 ; filaments subulate from a thickened base ; anthers linear, slightly sagittate, nearly basifixed.—Female spadix like the male ; bracteoles densely imbricate, with a transverse line of tomentum half-way up the back. Flowers very shortly pedicellate. Calyx-lobes orbicular-ovate, light green. Petals smaller than the sepals, orbicular-ovate, concave. Staminodes 6. Ovary globose or 3-lobed ; stigmas sessile or nearly so.

Fruit more or less obliquely ovoid or oblong, irregular, usually a little more constricted in the upper part than in the middle and lower part, always much longer than broad, $2\frac{4}{5}$-$3\frac{1}{5}$ inches long and $2\frac{1}{5}$-$2\frac{2}{5}$ inches broad, more or less obtusely triangular in transverse section, with the abortive carpels often much developed ; surface rather irregular and usually very distinctly punctate-impressed. Sarcocarp rather strongly impregnated with sugar ; wall of endocarp $\frac{1}{12}$-$\frac{1}{8}$ inch thick on one side, on the other (which corresponds to an obtuse longitudinal keel) $\frac{1}{6}$-$\frac{1}{5}$ inch, not thicker below than on the sides and not incurved at the apex of the seed. Seed more or less ovate-conical, and flattened at the base, more or less pyriform, $1\frac{2}{5}$-$1\frac{3}{5}$ inches long, $1\frac{1}{12}$-$1\frac{1}{8}$ inches broad.

Locality :—Shaikh Othman (Defl.).

Distribution :—Along the Nile-valley in Middle and Upper Egypt.

Uses :—The leaves of younger plants are eaten by camels. The old leaves are put to many minor uses. The trunk is used for making water conduits, and it is possible that it might contain a little sago in just the same measure as the common Indian fan palm, enough to make it a famine food. The thick fleshy-fibrous part of the fruit resembles gingerbread both in colour and taste, hence the palm is often known as the Gingerbread tree. The chief use of the palm is for the manufacture of buttons from the hard inner fruit-wall. It is also turned into beads for rosaries.

The following species, probably introduced has been observed by Deflers at Shaikh Othman. We have seen a few specimens cultivated in the town of Aden.

Phœnix dactylifera Linn. Hort. Cliff. 482 ; Spec. Pl. ed. Willd. IV, 730. The Date Palm.

Description ;—A tall tree ; trunk covered with the persistent bases of the petioles, the foot often surrounded by a dense mass of root suckers. Leaves grey, pinnæ 8-16 inches long, regularly distichous, forming a very acute angle with the petiole, often approximate in twos or threes on the same side of the petiole ; petiole grey, laterally compressed, almost flat.

Male panicles white, compact, 6-9 inches long, on a short peduncle, flowers ¼-⅓ inch long, sweet scented ; sheaths outside with rusty down. Peduncles of female inflorescence ⅓-½ inch broad, sometimes broader below ; spikes 12-24 inches long.

Fruit oblong, 1-3 inches long, pulp fleshy sweet. Seed cylindric, with a longitudinal furrow in front and a small cylindric embryo in the middle of the rounded back.

Believed to be indigenous in the Euphrates and Tigris Doab, and in the oases of the great African Sahara.

LIV.—NAIADACEÆ.

Aquatic or marsh herbs of various habit ; rootstock stout or slender, sometimes tuberous, often creeping or 0 ; stem floating or rooted in the ground. Leaves entire or serrate, submerged or floating, sheathing at the base, sometimes stipulate.

Flowers uni- or bi-sexual, green, usually inconspicuous, in spikes, racemes, or terminal or axillary pedunculate spadices ; bracts small or 0. Perianth 0, or of 3-4 inferior valvate segments, or tubular and very delicate. Stamens 1-6, hypogynous, free in bisexual flowers, solitary or connate in male flowers ; anthers 1-2-celled. Carpels 1-6 ; ovules 1 or more in each carpel, erect or pendulous ; style long or short, stigma usually simple, sometimes stigmas 2-3, capillary.

Fruit various. Seeds erect, pendulous, or laterally peltate, testa coriaceous or somewhat fleshy ; albumen 0 ; embryo fleshy, straight.

Genera 16 ; *species* about 150.

Distribution :—In all climates.

1. Cymodocea Kœnig.

Submerged marine plants, with rigid jointed and creeping rootstocks. Leaves oblong or linear, with stipular sheaths.

Flowers axillary, unisexual or bisexual, in membranous sheaths. Perianth 0. Male flowers : Anthers 2, long, connate, stipitate, extrorse. Female flowers : Carpels 2, subsessile, ovoid, compressed, 1-ovuled ; style short ; stigmas subulate ; ovule pendulous, orthotropous.

Fruit of 2 ovoid carpels. Seeds pendulous ; testa thick ; embryo inflexed.

Species 7.

Distribution :—Shores of the Indian and Pacific Oceans.

Leaves not terete :—	
Leaves falcate	1. C. ciliata.
Leaves straight	2. C. serrulata.
Leaves terete	3. C. isoëtifolia.

1. Cymodocea ciliata (Forsk.) Ehrbg. ex Aschers. in Sitzungsber. Ges. Naturf. Fr. Berl. (1867), p. 3 ; Linnaea XXXV, 162 ; Schweinf. Beitr. Fl. Aethiop. p. 242 ; Boiss. Fl. Or. V, 23 ; Benth. Fl. Austral. VII, 178 ; Aschers. in Sitzungsber. Bot. Ver. Brandb. (1882) p. 28 ; Hook. Fl. Brit. Ind. VI, 570 ; Bennet. in This.-Dyer. Fl. Trop. Afr. VIII, 229.

Thalassia cfliata Kön. Ann. Bot. II, 97 ; Kunth Enum. Pl. III, 120.

Posidonia serrulata Thw. Enum. 333 (non Aschers. !)

Zostera ciliata Forsk. Fl. Aeg.-Arab. p. 157.

Phucagrostis ciliata Ehrbg. et Hempr. Symb. phys. bot. t. VI ined. ex Aschers. l.c.

Arabic Name : Suram.

Description :—A robust plant ; stem 3—12 inches long, woody ; branches quasi-woody, erect, arising from short internodes, the scars of the leaves forming closed rings. Leaves 3—6 inches by ½—⅔ inch, linear-falcate, 23—25-nerved, emarginate-retuse at the apex, tip ciliate-serrulate ; sheath 1 inch long, up to ⅜ inch broad, obconical, only 2—3-times longer than broad, with small auricles.

Male flowers and fruits not known.

Locality :—South-western shore of Khor Bir Achmed and at Khor Maksar at a depth of from 5—10 feet (Defl.) ; without locality (Thomson, Sept. 1872).

Distribution :—Coasts of the Indian and Pacific Oceans.

2. Cymodocea serrulata. (R. Br.) Aschers. et Magn. in Sitzungsber. Ges. Naturf. Fr. Berl. (1870) p. 84 ; Boiss. Fl. Or. V, p. 22 ; Hook Fl. Brit. Ind. VI, 570 ; Bennet in This.-Dyer Fl. Trop. Afr. VIII, 229.

Posidonia serrulata Spreng. Syst. I, 181.

Caulinia serrulata R. Br. Prodr. Fl. Nov. Holl. (1810), 339.

Kernera serrulata Schult. Syst. Veg. VII (1829) 1702 ?

Thalassia indica Wight et Arn. in Wight Herb. n. 2414 ex Aschers, in Boiss. Fl. Or. V (1884) 22.

Thalassia reptans Solander mss. in Herb. Mus. Brit.

Description :—Stems long, creeping, the scars of the leaves forming open rings. Leaves 4-6 inches by ⅛-¼ inch, linear, nearly straight, 11—19-nerved, tip entire or denticulate ; sheath obconical, 2-3 times as long as broad, distinctly auricled.

Male flowers and fruits not known as yet.

Locality :—South-western shore of Khor Bir Achmed at a depth of 5-10 feet (Defl.).

Distribution :—Coasts of the Indian and Pacific Oceans.

3. **Cymodocea isoëtifolia.** Aschers. in Sitzungsber. Ges. Naturf. Fr. Berl. (1867) p. 3; Linnaea XXXV, 163; Nuovo Giorn. Bot. II, 182; Boiss. Fl. Or. V, 22; Benth. Fl. Austral. VII, 178; Hook. Fl. Brit. Ind. VI, 570.

Cymodocea æquorea Kunth Enum. Pl. III, 118 (excl. syn.); Thw. Enum. p. 333.

Description :—Rhizome slender, short, red, the leaf-scares forming open rings. Leaves terete, grooved, 3-5 inches long, $\frac{1}{12}$-$\frac{1}{10}$ inch broad, bright green, pale glaucescent when dry, longitudinally sulcate, retuse at the apex; sheath cylindrical-obconical, up to $1\frac{3}{5}$ inches long, in the upper part $\frac{1}{8}$-$\frac{1}{6}$-inch broad.

Flowering branch in the lower part laxly distichously branched. Inflorescence cymose, multiflowered, finally passing into spiciform cymes. Flowers involucrate with 2 bracts, which are as long as the sheath. Anthers $\frac{1}{12}$ inch long.

Fruit $\frac{1}{8}$ inch long.

Locality :—South-eastern shore of Aden, February 1890 (Defl.).

Distribution :—Indian and Pacific Oceans.

LV.—CYPERACEÆ.

Perrenial, rarely annual herbs with the habit of grasses; roots fibrous; stem terete or 3-angled, usually simple. Leaves grass-like, rarely 0, 3-ranked, mostly crowded at the base of the stem (the upper fewer), with tubular sheaths which are more or less closed or the lower split to the base; ligule 0 or a short prolongation of the mouth of the sheath opposite to the blade.

Inflorescence of solitary, fasciculate, paniculate or spicate spikelets, composed of small distichously or spirally imbricate scales (glumes); flowers minute, 1-2-sexual, in the axils of the glumes. Perianth 0, or of 2 or more hypogynous bristles or scales (ovary enclosed in a utricle in Carex). Stamens 1-3; filaments flattened; anthers basifixed, linear. Ovary 1-celled; ovule solitary, basal, erect, anatropous; style short or long; stigmas 2-3.

Fruit a compressed or trigonous nut. Seed erect, free; embryo inute, within the base of the floury albumen.

Genera about 65 ; *species* about 3,000.
Distribution :—All over the world.

Cyperus Linn.

Perennial, rarely annual, glabrous herbs ; rhizome creeping, short or long or 0. Leaves mostly towards the base of the stem, occasionally reduced to sheaths.

Spikelets in solitary globose or umbellate heads or spikes ; involucral bracts 1 or more, foliaceous ; bracteoles under the secondary divisions of the inflorescence ; rhachilla usually persistent, not, or in a few species disarticulating towards the base, sometimes with membranous wings derived from the persistent glume-bases. Glumes distichous, the 2 lowest empty, those above 2-sexual, all nearly equal, deciduous from below upwards, the uppermost 1-3 sterile or empty ; hypogynous scales or bristles 0. Stamens 1-3 ; anthers linear or oblong. Ovary compressed, style short or long or obsolete ; stigmas 2 or 3.

Fruit trigonous, triquetrous, obovoid, or plano-convex.
Species about 360.
Distribution :—All warm and temperate regions.

Glumes not very approximate ; spikelets 8-16-flowered . .	1. C. conglomeratus.
Glumes very approximate ; spikelets often 20-40-flowered :	
Stem rather thick, terete, striate, at the top hardly trigonous .	2. C. effusus.
Stem rather slender, at the top more or less trigonous . .	3. C. cruentus.

1. Cyperus conglomeratus Rottb. Descr. et Ic. Pl. p. 21, tab. 15, fig. 7 ; Dene. Ann. Sc. Nat. (1834), p. 15 ; Steud. Syn. Pl. Glum. II, 15 ; Boiss. Fl. Or. V, 369 (var. α in great part) ; Aschers. et Schweinf. Ill. Fl. d'Eg. p. 156 ; Hook. Fl. Brit. Ind. VI, 602 ; Clarke in This.-Dyer Fl. Trop. Afr. VIII, 324.

Cyperus pungens Boeck. Linnaea XXXV, 537 (except part of α elata) ; Clarke in Journ. Linn. Soc. XXI, 113.

Cyperus proteinolepis var. pumila Boeck. Linnaea XXXV, 542.

Cyperus Jeminicus Rottb. Descr. et Ic. Pl. p. 25, tab. 8, fig. 7 ; Kunth Enum. Pl. II, 24 (not of Retz.).

Cyperus arcuatus Boeck. in Linnaea XXXV, 542.

Description :—Glabrous, glaucous-green ; rhizome usually hardly any, sometimes elongate, $\frac{1}{8}$-$\frac{1}{6}$ inch in diameter ; roots of stout woolly fibres ; stems stout, 4-24 inches long, terete below, trigonous above thickened at the base, clothed with brown ovate acuminate scales. Leaves sometimes twice as long as the stem, sometimes only half as

long, $\frac{1}{10}$-$\frac{1}{8}$ inch broad, very stout and tough, midrib very obscure, margins much inrolled when dry.

Umbel simple, often contracted into one head, 1-1½ inches in diameter, of densely crowded spreading spikelets; bracts 3-5, lowest suberect, dilated at the base, often 3-6 inches long, similar to the leaves. Spikelets ½-1 by ⅛-⅙ inch, oblong-lanceolate, compressed, 10-24-flowered; rhachilla stout, scarred, not winged. Glumes reaching ⅓ by $\frac{1}{16}$ inch, oblong-lanceolate, cymbiform, with a short stout mucro extending beyond the rounded tip, with many reddish-brown nerves and hyaline margins. Stamens 3; filaments $\frac{1}{10}$ inch long, ligulate; anthers yellow, ⅛ inch long, narrowly linear, muticous. Style short; branches 3, linear, rather long.

Nut as long as ⅓ the glume, obovoid, unequally trigonous.

Flowers:—January 1872 (Thomson), February 1851 (Thomson), March 1878 (Perry), Nov. 1888 (Schweinf.), Dec. 1888 (Schweinf.), Dec. 1889 (Defl.).

Locality:—Near the seashore (Balfour); plain of Maala (Defl.); Goldmore Valley (Defl., Schweinf.); above the coal depôt of the Messag. Marit. (Schweinf.); great valley between Steamer-Point and town (Marchesetti); without locality (Birdw., Perry, Thomson).

Distribution:—Senegambia, Togo, Egypt, Nubia, Abyssinia, Eritrea, Central and S. Arabia, S. Persia, Sind, Gujarat, Western India, Laccadive Islands, Ceylon.

2. **Cyperus effusus** Rottb. Descr. et Ic. Pl. p. 22, tab. 12, fig. 3; Kunth Enum. Pl. II, 47; Steud. Syn. Pl. Glum. II, 29; Edgew. Journ. As. Soc. Beng. XVI, 1220; Boeck. in Linnæa XXXV, 543; Clarke Journ. Linn. Soc. XXI, 112; Clarke in This.-Dyer. Fl. Trop. Afr. VIII, 325; Hook. Fl. Brit. Ind. VI, 603.

Cyperus proteinolepis Steud. Syn. Pl. Glum. II, 15; Boeck. in Linnæa XXXV, 522; Clarke in Journ. Linn. Soc. XXI, 113.

Cyperus conglomeratus var. effusa Boiss. Fl. Or. V, 369.

Cyperus conglomeratus var. major Boeck. in Linnæa XXXV, 544 (partim); Clarke in Journ. Linn. Soc. XXI, 112.

Cyperus curvulus Boeck. in Linnæa XXXV, 541 (partim).

Cyperus densus R. Br. in Salt Abyss. Append. p. 63 (nomen tantum).

Cyperus involutus R. Br. l. c. (nomen tantum).

Description:—The stem is rather stouter than in *C. cruentus* (*vide infra*) striate, terete, hardly at all trigonous even at the top.

Spikelets nearly as those of *C. cruentus*, *i.e.*, narrower with less

distant glumes than the spikelets of *C. conglomeratus* ; otherwise as the two species here described.

" The spikelets in this species are usually 20-40-flowered (the glumes standing much closer than in *C. conglomeratus*), and sometimes they are (though narrow) more than 1½ inches long with 60 flowers. It should be understood that this series (*C. conglomeratus, cruentus, effusus*) are considered but one species by Boissier and by Cosson (botanists who generally took a narrow view of species) ; while Boeckeler has described them as 6 or 7 species. The variability of the series is great, and a middle course has been taken here of collecting the forms under the 3 old types of Rottboell. But as Boeckeler has grounded his species largely on the size of the specimens, the curvature of the stems etc., (esteemed as of small import here), the synonymy has become both complex and imperfect." (Clarke in This.-Dyer Fl. Trop. Afr. VIII, 326).

Locality :—Gravelly slopes of the Shum Shum Range (Hildebrandt, Ellenbeck); without locality (Edgew., Birdw.).

Distribution :—Upper Egypt, Abyssinia, Eritrea, Syria, Central and S. Arabia, Socotra.

3. **Cyperus cruentus** Rottb. Descr. et Ic. 21, t. 5, fig. 1, 4; Kunth Enum. II, 82 ; Clarke in Durand and Schinz Conspect. Fl. Afr. V, 555, and in This.-Dyer Fl. Trop. Afr. VIII, 325.

Cyperus falcatus Nees et Ehrbg. ex Boeck. in Linnæa XXXV, 546, et in Flora (1879) p. 550 ; Schweinf. Beitr. Fl. Aethiop. 215, et in Bull. Herb. Boiss. II, Append. II, 47 ; Zarb Cat. Spéc. Bot. Pfund, 39.

Cyperus proteinolepis Steud. Syn. Pl. Glum. II, 15 (partim) ; Boeck. in Linnæa XXXV, 522 (partim, at least Kotschy, n. 27, cited).

Cyperus curvulus Boeck. in Linnæa XXXV, 541 (partim).

Cyperus conglomeratus T. Anders. in Journ. Linn. Soc. V, Suppl. p. 38 ; Clarke in Journ. Linn. Soc. XXI, 112 var. *a*; Schweinf. in Bull. Herb. Boiss. II, Append. II, 47.

Cyperus pungens Boeck. in Linnæa XXXV, 538.

Description:—Stems at the top trigonous. Spikelets narrower and glumes less distant on the rhachilla, but otherwise as *C. conglomeratus.*

Flowers and fruits in March and April (Schweinf.).

Locality :—Near the seashore (Hook., Ander.). Goldmore Valley (Lunt) ; above the coal-depôt of the Messag. Marit. (Schweinf.) ; without locality (Birdw.).

Distribution :—Upper Egypt, Nubia, Eritrea, Arabia, Baluchistan.

LVI.—GRAMINEÆ.[1]

Erect decumbent or creeping herbs, rarely suffruticose, or shrubs or trees (*Bambuseæ*) ; stems usually branched at the base, terete or compressed, with hollow or solid internodes. Leaves distichous, simple, usually long and narrow, generally parallel-nerved, with a sheathing base (sheath) distinct from the blade and rarely an interposed petiole ; sheath split to the base, very rarely entire, with usually a transverse erect appendage (ligule) consisting of a membrane or a fringe of hairs at the union with the blade.

Inflorescence terminal (rarely terminal and lateral), composed of variously arranged spikelets, paniculate, racemose, capitate, simply or compoundly spicate, rarely of a single spikelet. Spikelets consisting of an axis (rhachilla) and typically of 3 or more alternate, distichous, more or less heteromorphous bracts (glumes), of which the two lowest (involucral glumes) form an involucre to the spikelet and are empty, while the following (floral glumes) bear in their axils subsessile flowers subtended by a hyaline 2-keeled or 2-nerved dorsal scale (palea) ; floral glumes differing usually in structure and size from the involucral glumes, and forming with the palea and the flower proper false flowers (florets), which are alike or different in structure and sex. Flowers hermaphrodite or 1-sexual (often with the rudiments of the other sex), consisting of 2, rarely 3, minute hyaline fleshy scales (lodicules) which represent a perianth (sometimes absent), and of stamens or a pistil or both. Stamens usually 3, rarely 6, 4, 2, or 1, very rarely more, hypogynous ; filaments slender, usually free ; anthers versatile, fugacious, with 2 parallel cells, usually dehiscing by a longitudinal slit. Ovary entire, 1-celled ; ovule erect, anatropous ; styles 2 (rarely 3 or 1,) free or connate at the base, usually elongate and exserted from the apex or sides of the spikelet, clothed with simple or branched stigmatic hairs.

Fruit a seed-like grain, free within the flowering glume and palea or adnate to either or both ; pericarp very thin, rarely thick and separable from the seed. Seed erect, albumen copious, floury ; embryo minute, at the base of and outside the albumen ; cotyledon shield-shaped with an erect conical plumule and a descending conical radicle.

Genera about 325 ; *species* between 3,000 and 3,500.

Distribution :—All over the world.

Series I.[2] Mature spikelets falling entire from their pedicels or with them, all alike or differing in sex and structure ; perfect spikelets

[1] We follow in the main O. Stapf's publications on this order.

[2] In arranging this key we followed in the main lines Dr. Stapf in the "Flora capensis" (1898).

with 2 heteromorphous florets, the upper hermaphrodite, the lower male or barren ; rhachilla not continued beyond the upper floret.

Tribe 1. Andropogoneae. Spikelets usually in pairs, one sessile, the other pedicelled, rarely 3-nate or solitary on the axes of variously arranged, often spikelike, 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 generally awned or reduced to an awn . . . . . 1. Andropogon.

Tribe 2. Paniceae. Spikelets in usually continuous spikes, racemes or panicles. Glumes herbaceous, or membranous, the lower smaller, very small or suppressed. Lower valve generally resembling the glumes in structure and nervation, the upper firmer, at length rigid, often chartaceous to crustaceous, awnless, very rarely mucronate.

A. Mature spikelets persistent on their pedicels, surrounded singly or in clusters by an involucel of naked or plumose bristles or spines which fall along with the spikelets . . . . . 2. Pennisetum.

B. Mature spikelets falling entire and singly from the tips of their pedicels :

Spikelets subtended by an involucel of bristles . 3. Setaria.

Spikelets not subtended by bristles:

Fruiting valve rigidly membranous . . . 4. Tricholæna.

Fruiting valve subchartaceous to crustaceous :

Lower involucral glume distinct . . . 5. Panicum.

Lower involucral glume absent or minute :

Spikelets not thickened at the base . . 6. Digitaria.

Spikelets thickened at the base . . . 7. Eriochloa.

Series II. Mature spikelets breaking up, leaving the persistent or subpersistent glumes on the pedicel, or if falling entire, then not consisting of 2 heteromorphous florets as in Series I.

Tribe 3. Stipeae. 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 . . . . . 8. Arristida.

Tribe 4. Sporobolcae. Involucral and floral glumes very similar. Floret 1. Rhachilla not (or rarely) produced beyond the floret. Upper floral glume membranous, acute or obtuse, not changed when ripe, 1-or more or less 3-nerved, awnless, usually olive-green or grey ; side-nerves, if present, delicate, evanescent above . . . . . 9. Sporobolus.

Tribe 5. Eragrosteæ. Spikelets variously panicled, sometimes spicate or subspicate. Florets usually numerous and far exserted from the glumes. 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. Paleæ often persistent or subpersistent.

Upper involucral glume 3-nerved :

Spikelets usually panicled, rarely in simple spikes. Rhachilla often persistent. Valves usually numerous and closely imbricate, broad, entire, awnless . 10. Eragrostis.

Spikelets crowded on and falling entire from the flattened axis of stiff spreading secund, spikes, which are closely arranged on a long common axis . . . . 11. Desmostachya.

Upper involucral glume 5-nerved . . . . 12. Halopyrum.

Tribe 6. Chlorideæ. Spikelets usually in 2-ranked secund spikes or spike-like racemes, rarely distinctly pedicellate and paniculate. Florets 1 to many. 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.

Floret 1, awnless . . . . . 13. Cynodon.

Florets several, one hermaphrodite, the others male or barren . . . . . 14. Chloris.

Several to many hermaphrodite florets in each spikelet . 15. Eleusine.

Tribe 7. Pappophoreæ. 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 . . . . . 16. Enneapogon.

Tribe 8. Festuceæ. Involucral glumes more or less resembling the floral ones in general appearance. Fruiting florets 2 to many (very rarely 1), often much exserted from the glumes. Floral glumes 5-or more-nerved, rarely 1—3-nerved. Awns, if present, terminal subterminal, never geniculate.

Leaves narrow, less than 2 inches long, rigid, pungent . 17. Aeluropus.

1. Andropogon Linn.

Perennial or annual grasses of very varied habit. Leaves usually narrow. Spikelets similar or heteromorphous, 2-nate (one sessile, the other pedicellate), on the fragile rhachis of solitary, 2-nate, digitate fasciculate or paniculate racemes. Pedicellate spikelets usually smaller than the sessile. Sessile spikelets 1-flowered; callus long or short. Glumes 3 or 4; lower involucral glume coriaceous or chartaceous, 2-keeled, muticous; upper involucral glume usually thinner, with a median keel, rarely awned; lower floral glume hyaline or 0, neuter; upper floral glume hyaline, usually awned, often reduced to the dilated base of the awn, 2-sexual; palea various or 0. Lodicules 2, cuneate. Stamens 3-1. Stigmas laterally exserted. Grain various.

Species more than 200.

Distribution :—Warm parts of the world.

Flowers in solitary racemes	1. A. foveolatus.
Flowers in panicles:	
Leaves junciform	2. A. Iwarancusa.
Leaves linear-lanceolate or linear . . .	3. A. sorghum.

1. Andropogon foveolatus Del. Descript. de l'Egypte (1812), p. 160; Kunth Enum. Pi. I, 490; Steud. Syn. Pl. Glum. I, 366; Boiss. Fl. Or. V, 462; Hook. Fl. Brit. Ind. VII, 168; Hack. in DC. Monogr. Phan. VI, 402; Prain Beng. Pl. p. 1201; Cooke Fl. Bomb. Pres. II, 977.

Andropogon strictus Roxb. Fl. Ind. I, 260.

Andropogon orthos R. et Schult. Mant. II, 455.

Andropogon monostachyus Spreng. Pugill. Pl. Nov. II, 9.

Description :—Stems 1-2 feet long, densely tufted, usually decumbent at the base, then geniculately ascending, very slender, glabrous; nodes bearded. Leaves 3-6 by $\frac{1}{20}$-$\frac{1}{10}$ inch, linear, puberulous beneath; sheaths shorter than the internodes, scabrous or glabrous, the basal sheaths silky-villous; ligule short, truncate, hyaline, ciliate.

Racemes 1-1½ inches long, solitary; peduncles capillary, erect, usually far exserted beyond the slender spathe; joints and pedicels

slender, ciliate on 2 opposite sides with long silky hairs, shorter than the sessile spikelets. Spikelets $\frac{1}{6}$ inch long (the sessile and pedicellate equal), oblong lanceolate, glabrous, purplish; callus small, shortly hairy at the base; lower involucral glume $\frac{1}{6}$ inch long, flat, lanceolate-oblong, subobtuse, with narrowly involute margins, 4-nerved, usually marked with a deep pit above the middle; upper involucral glume equal to the lower, lanceolate, acute, obscurely 3-nerved; lower floral glume much shorter, oblong-lanceolate, glabrous, nerveless; upper floral glume reduced to an awn $\frac{1}{2}$-$\frac{5}{8}$ inch long, the column about equalling the subulate portion. Anthers $\frac{1}{10}$ inch long. Pedicellate spikelets: Pedicels $\frac{1}{10}$ inch long. Glumes 2; lower involucral-glume $\frac{1}{6}$ inch long, lanceolate, acute, with slightly incurved margins, the keels above aculeately scabrid, 5-nerved, pitted or not; upper involucral glume equalling the lower, linear-lanceolate, acute, 3-nerved.

Fruits:—March (Schweinf.).

Locality:—Dry gravelly plains of Goldmore Valley, ravine above the European cemetery of Steamer Point, above the coal-depôts of the Messag. Marit. (Schweinf.), sandy plains of Maala (Defl.), slope of Shum Shum Range (Ellenbeck).

Distribution:—Canaries, Cape Verd Islands, Egypt, Abyssinia, Eritrea, Arabia, S. Persia, Sind, Deccan, throughout the drier parts of India.

2. **Andropogon Iwarancusa** Jones in Asiat. Research. IV (1795) 109. var. **laniger** Hook. Fl. Brit. Ind. VII, 203; Cooke Fl. Bomb. Pres. II, 976.

Andropogon laniger Desf. Fl. Atlant. II, 379; Kunth Enum. Pl. I, 493; Steud. Syn. Gram. 386; Hack. Monogr. Androp. 598; Aitchis. Cat. Panj. Pl. 174; Duthie Grass. N. W. Ind. 20, Fodd. Grass. N. Ind. 35, t. 23; Lisboa in Bom. Journ. Nat. Hist. Soc. VI (1891); Boiss. Fl. Or. VII, 465; Batt. et Trab. Fl. d'Alg. p. 33.

Andropogon Arriani Edgew. in Journ. Linn. Soc. VI (1862), 208.

Andropogon circinnatus Hochst. et Steud. ex Steud. Syn. Gram. 387.

Andropogon eriophorus Willd. Sp. Pl. IV, 90.

Andropogon Olivieri Boiss. Diagn. V, 76; Steud. l. c. 387.

Andropogon commutatus Aitchis. in Journ. Linn. Soc. XIX (1882) 191 (non Steud.).

Cymbopogon arabicus Nees ex Steud. l. c.

Cymbopogon circinnatus Hochst. in Schimp. Pl. Arab. Exsicc. ed. 2 (1844) n. 783.

Cymbopogon Arriani Aitchis, l. c.

Cymbopogon laniger Duthie in Atkins. Gaz. N. W. Ind. 640.

Gymnanthelia lanigera Anderss. in Schweinf. Beitr. Fl. Aethiop. 300.

Names :—Izkhir (Arabic) ; Ginger Grass.

Description :—Whole plant of a pale often glaucous green, perennial. Stem short, tufted on an annulate creeping rootstock ; roots aromatic. Leaves junciform ; lower sheaths hardened, persistent.

Panicle narrow, subsimple ; proper spathes $\frac{1}{3}$—$\frac{2}{3}$ inch long, longer than the peduncles of the racemes, narrowly lanceolate ; racemes $\frac{1}{4}$—$\frac{1}{3}$ inch long, unequal ; joints of rhachis and pedicels of upper spikelets subclavate, densely villous with long hairs, the hairs more or less concealing the sessile spikelet, the tops cupular, toothed ; spikelets 3 or 4 pairs. Sessile spikelets reaching $\frac{1}{4}$ inch long, linear-lanceolate, acute ; callus acute, densely bearded with long whitish hairs. Glumes 4 ; lower involucral glume $\frac{1}{6}$ inch long, linear-lanceolate, thin, flat, glabrous, nerveless, keels scaberulous ; upper involucral glume $\frac{1}{6}$ inch long, ovate, acute, cymbiform, thinly membranous, 3-nerved ; lower floral glume $\frac{1}{6}$ inch long, linear-oblong, obtuse, hyaline, 2-nerved ; upper floral glume $\frac{1}{20}$ inch long, 2-fid, hyaline, ciliate ; awn from the sinus $\frac{1}{3}$ inch long, slender, glabrous. Pedicellate spikelets scarcely longer than the sessile, narrowly lanceolate, purplish ; pedicels $\frac{1}{10}$ inch long ; lower involucral glume 7—9-nerved, glabrous, with scaberulous keels ; upper involucral glume ovate-oblong, obtuse, 3-nerved, ciliate ; lower floral glume oblong, obtuse, hyaline, ciliate.

Locality :—Little Aden ; ravines of Jebel Ishan (Defl.).

Distribution :—N. Africa, Arabia, Syria, Central and Southern Persia, Sind, N. India.

The following species is cultivated at Shaikh Othman :

3. **Andropogon Sorghum** Brot. Fl. Lus. I, 88.

VAR. **bicolor** Hack. Androp. in DC. Monogr. Phan. VI, 519.

English name : Great Millet, Guinea Corn, Turkish Millet. *Arabic name* : Gherb (Schweinf.), dura (variously written dhurra, dhaura, douro), (jowari in India).

Description :—A tall handsome annual grass, usually very robust. Leave-blade linear-lanceolate or linear from an often rounded base, long

tapering to a fine point, 1-2 feet long, ¾-2½ inches broad, flat, glabrous, margins serrulate, midrib stout. Panicle very dense; sessile spikelets ⅕ inch, obtusely hexagonal, awnless at length, black. Lower glume coriaceous below the middle, then deeply rugged, upper part striate hairy. Grain almost twice as long as the glume.

Fruits in December (Schweimf.).

Distribution:—Cultivated in numberless forms in the tropical and subtropical regions, particularly in the Old World, and in the warmer parts of the temperate zones of both hemispheres.

Uses.—Dura (jowari) is much used by the Arabs and Somalis of Aden for food. "The latter boil and eat it like rice, the former pound it on a flat stone with a stone roller, moistening, it with water at the same time till it assumes the consistence of a thick paste or dough; this is allowed to ferment for a short time, after which it is made into circular cakes of about half a pound each, and then baked in an earthen oven. These ovens are made of common mud, and are circular and funnel-shaped, about five or six feet in circumference, open at both ends like a barrel. The oven is fixed in the ground, and a hole made below to remove the ashes of the burnt fuel, and also to allow a current of air to pass through. The cakes are placed inside on hot ashes; the dry stalks of jowari are used for fuel; about forty or fifty cakes can be baked at once in a good-sized oven. There are two kinds of cake, 'Fatir' unfermented, and 'Kidr' fermented; they are hawked about, and sold at about half an anna the half-pound cake."[1]

For the various uses of this plant see Watt's Dict. Econ. Prod. VI, Part III, 277—317; Commerc. Prod. Ind., p. 1031—1043.

Of the genus Saccharum the following species is cultivated at Shaikh Othman (ex Krause):

Saccharum spontaneum Linn. Mant. (1771) 183.

Description:—A tall erect grass reaching sometimes 20 feet high; stem erect from a stout rootstock, solid, smooth, polished, silky beneath the panicle. Leaves 1-2½ feet by ⅛-¼ inch, narrowly linear, finely acuminate, rigid, coriaceous, usually glabrous, often with convolute margins; sheaths smooth, with fimbriate mouth; ligule ovate, membranous. Panicle 8-24 inches long, lanceolate, silky-hairy; rhachis slender; branches 3—5-nate, 2-4 inches long; rhachis of racemes almost capillary, fragile. Spikelets ⅛ inch long, lanceolate; callus minute, bearded with spreading silky hairs ½ inch long. Glumes 4; lower involucral lanceolate-subulate, acuminate; upper involucral glume equal to the lower, lanceolate, obscurely keeled, 1-nerved; lower floral glume

[1] Hunter, l. c. p. 64.

ovate-lanceolate, subacute, ciliate, hyaline, nerveless; upper floral glume very slender ciliate; pale minute, ciliate.

Distribution :—Throughout the warm regions of the Old World, ascending to 6,000 feet in India.

Uses.—The glass being large and coarse, is used mainly as a thatching material. The leaves, sheaths, etc., are twisted into rope and worked up into mats. As a fodder plant it is especially valued for feeding buffaloes.

Zea Mays Linn. Sp. Pl. (1753) p. 971.

The well known Maize or Indian Corn.

Cultivated at Shaikh Othman (Yerbury ex litt.).

"This grain in Arabia is called 'Hind'; it is grown in Yemen, and is imported by land and sea, also from Mokha. It is used for bread after being made into flour, but it is more frequently eaten simply roasted. Ears of Indian corn, ready roasted, can be purchased at the street corners for two pice, or half of an anna, per head. The price per 100 is from 8 to 12 annas." (Hunter, l. c. p. 66.)

2. Pennisetum Pers.

Perennial or annual; culms simple or often profusely branched; blades flat or convolute; ligules usually reduced to a ciliate rim or fringe of hairs, rarely membranous.

Panicle spike-like, usually dense, branches very numerous all around the axis, very short, simple with a solitary spikelet, or scantily divided with the spikelets in clusters of 2-5; the solitary spikelets or the clusters subtended by and deciduous with an involucre (very rarely a solitary bristle) of often very numerous and usually unequal scabrid or plumose simple rarely branched bristles. Lower floret male or barren, with or without a pale; upper floret hermaphrodite. Glumes usually small and hyaline, lower sometimes suppressed, upper rarely ½ the length of the spikelet or more and then several-to 7-nerved. Valves equal or subequal, membranous to chartaceous, 5-7-nerved, or the lower more or less reduced, thinner, fewer-nerved. Pales subequal to the valve and of similar texture, 2-nerved, or more or less reduced in the lower floret. Lodicules small, usually in front and outside the plate or 0. Stamens 3. Styles distinct, slender or connate.

Grain enclosed by the slightly changed valve and pale, broadly oblong, slightly dorsally compressed to subglobose; hilum basal, punctiform; embryo large, ½-¾ the length of the grain.

Species about 40.

Distribution :—In most warm countries, particularly in dry regions.

1. **Pennisetum cenchroides** A. Rich. in Pers. Syst. Pl. I (1805) 72; Beauv. Agrost. 59, t. 13, fig. 5; Nees in Linnæa VII, 277, et Fl. Afr. Austr. 70; Kunth, Enum. I, 162; Trin. Pan. Gen. 93, et in Mém Acad. Petersb. ser. 6, III, 181; Steud. Syn. Pl. Glum. I, 105; Baker Fl. Maurit. 441; Hook. Fl. Brit. Ind. VII, 88; Anders. in Journ. Linn. Soc. V, Suppl. p. 39; Stapf. in This.-Dyer Fl. Cap. VII, 433; Cooke Fl. Bomb. Pres. II, 916.

Pennisetum ciliare Link Hort. Bot. Berol. I, 213; Steud. Syn. Pl. Glum. I, 105; A. Rich. Tent. Fl. Abyss. II, 384; Batt. et Trab. Fl. d'Alg. p. 38; Boiss. Fl. Or. V, 445; Schweinf. Beitr. Fl. Aethiop. 301, Engl. Hochgebirgsfl. Trop. Afr. 125; Durand & Schinz. Consp. Fl. Afr. V, 778; Hack. in Bull. Herb. Boiss. IV, App. III, 16.

Cenchrus ciliaris Linn. Mant. Pl. 302.

Cenchrus pennisetiformis Hochst. et Steud. ex Boiss. Fl. Or. V, 445.

Panicum vulpinum Willd. Enum. Hort. Berol. 1031.

Description :—Perennial; culms ascending from a branched geniculate and often decumbent, many-noded base, 1½-2 feet long, smooth, glabrous, or scantily hairy, upper internodes more or less exserted, the uppermost much so, and very slender; leaves quite glabrous or sometimes with scattered fine stiff hairs; sheaths tight, the lower persistent, or at length decaying, leaving the internodes naked; ligule a very narrow densely ciliate rim; blades linear, long tapering to a setaceous point 3-8 inches by 1½-3 lines, usually flat, often flaccid, usually scaberulous above or along the margins.

Panicle spike-like, cylindric, dense, 1-4 inches by 4-6 lines, pallid or purplish, often flexuous; rhachis finely scaberulous like the very short pedicels; involucres of very numerous bristles, outer bristles fine scabrid, shorter or slightly longer than the spikelets, inner thickened towards the base, ciliate, much longer (about ½ inch long), one usually conspicuously exceeding all the rest; spikelets 3-1 within each involucre, lanceolate-oblong, 2-2½ lines long, pallid, glabrous; glumes hyaline, ovate, acute or acuminate, usually 1-nerved, upper about 1 line long, lower shorter, sometimes nerveless; florets equal or subequal, lower male or barren, very rarely hermaphrodite; valves ovate-oblong, abruptly mucronate, acuminate, 5-nerved; pales subequal, truncate; lodicules 0; anthers slightly over 1 line long, tips acute, naked; styles free nearly from the base.

Fruits :—March (Schweinf.).

Locality :—In sandy plains (Hooker, Thomson); gravelly slopes and ravines of Shum Shum Range (Defl., Ellenbeck, Busse); great valley

between Steamer Point and town (Marchesetti) ; Aden, Shaikh Othman (Schweinf.).

Distribution :—Sicily, throughout Africa, Arabia, Sind, N. W. India, Gujarat, Deccan.

3. Setaria Beauv.

Perennials or annuals of various habit; nodes of stem glabrous or hairy ; ligules usually reduced to a ciliate rim, rarely a distinct membrane. Panicle mostly cylindric, spike-like, dense, with the solitary or clustered spikelets on very short branches which are more or less produced into bristles beyond the spikelets or divided into a one-sided bristly involucre at their base, or more or less open with elongate branches and more distant spikelets, often with or without subtending bristles in the same inflorescence ; bristles always persistent. Spikelets ovate to oblong, falling entire from the pedicel. Lower floret male, or reduced to the valve and a more or less arrested pale ; upper floret hermaphrodite. Glumes membranous, lower generally much smaller, usually 3-5, rarely 1-or 7-nerved, upper usually 5-sometimes 7-nerved. Lower valve more or less exceeding and resembling the upper glume ; upper valve chartaceous to coriaceous, 5-nerved. Pales subequal to their valves or that of the lower floret more or less arrested, flat, 2-nerved, hyaline in the lower, of the same substance as the valve in the upper floret. Lodicules 2, broadly cuneate. Stamens 3. Styles distinct ; stigmas laterally exserted.

Grain tightly enclosed by the hardened valve and pale, oblong or ellipsoid ; hilum basal, punctiform or orbicular ; embryo about ½ as long as the grain.

Species about 40.

Distribution :—In the warm regions of the world, some common as weeds in the more temperate parts.

Awnlike panicle-branches scabrous with erect teeth . .	1. S. viridis.
Awnlike panicle-branches scabrous with reversed teeth . .	2. S. verticillata.

1. Setaria viridis Beauv. Agrost. 51, tab. 14, fig. 3; Kunth Enum. Pl. I, 151; Aitch. Cat. Panj. Pl. 162; Miq. Fl. Ind. Bat. III, 467 ; Host Gram. Austr. II, t. 14 ; Fl. Dan. t. 352 ; Reichb. Ic. Fl. Germ. t. 47; Batt. et Trab. Fl. d'Alg. p. 37 ; Steud. Syn. Pl. Glum. I, 51 ; Boiss. Fl. Or. V, 443 ; Benth. Fl. Austral. VII, 494; Griseb. Fl. Brit. W. Ind. 554 ; Duthie Grass N. W. Ind. 9 ; Hook. Fl. Brit. Ind. VII, 80.

Setaria affinis Schult. Mant. II, 275.

Setaria ambigua Guss Fl. Sic. Syn. I, 114.

Setaria chlorantha Schur Enum. Pl. Transs. 723.
Setaria decipiens C. Schimp. ex Nym. Consp. 787.
Setaria imberbis Roem. et Schult. Syst. II, 891.
Setaria Weinmanni Roem. et Schult. l. c. 490.
Setaria nana Dum. Obs. Gram. Belg. 139.
Setaria penicillata Wall. Cat. n. 8640 D.
Setaria villosa Beauv. Agrost. 51.
Panicum bicolor Moench. Meth. 206.
Panicum cynosuroides Scop. Fl. Carn. Ed. 2, I, 50.
Panicum humile Thunb. ex Trin. Gram. Panic. 164.
Panicum imberbe Poir. Encycl. Suppl. IV, 272.
Panicum laevigatum Lam. Fl. Fr. III, 578.
Panicum psilocaulum Steud. Syn. Gram. 50.
Panicum purpurascens Opiz in Flora V, 266 ; Raddi ex Nees Agrost. Bras. 240.
Panicum quale Linnaei Krock Fl. Siles. I, 88.
Panicum reclinatum Vill. Hist. Pl. Dauph. II, 64.
Panicum tejucense Nees ex Trin. Gram. Panic. 166.
Panicum virescens Salzm. ex Doell in Mart. Fl. Bras. II, II, 157.
Panicum viride Linn. Syst. Veg. ed. 10, p. 870 ; Anders. Journ. Linn. Soc. V, Suppl. p. 39 ; Trin. Sp. Gram. Ic. t. 203.
Pennisetum viride R. Br. Prodr. 195.

English name :—Green Bristle-Grass.

Description :—An annual ; stems numerous, more or less geniculate, branched towards the base, erect or ascending, 3-18 inches high. Leaves 1-6 inches long by ¼-¾ inch broad, lively green with a paler midrib, with rather distant scabrous ribs and strongly scabrous margins. Ligule composed of a tuft of hairs. Panicle ½ to 3 inches long. Bristles ¼-½ inch long.

The spikelike panicle 1-2 inches long in the typical form, but occasionally nearly twice that, the lower spikelets in distinct clusters or on short branches, the awnlike branches more irregular and often shorter, the asperities directed upwards. Outer glume acute, about ½ the length of the spikelet ; second and third glumes nearly equal, broad, concave, 5- or 7-nerved.

Fruiting glumes smooth and shining, the minute transverse wrinkles visible only under a lens.

Locality :—Aden, in umbris arbuscularum (Anders.).

Distribution :—Temperate and subtropical regions of the world. According to Amphlet and Rea (the Botany of Worcestershire p. 397) "this plant is a native of Manchuria which has become a weed of cultivated and waste ground throughout the greater part of the north temperate zone."

2. **Setaria verticlatail** Beauv. Agrost. 51; Kunth Enum. Pl. I, 152; Wall. Cat. n. 8642 A. B. C. D. in part, E. F.; Dalz. & Gibs. Bomb. Fl. 294; Aitch. Cat. Panj. Pl. 162; Trim. Cat. Ceyl. Pl. 105; Duthie Grass. N. W. Ind. 9, Fodd. Grass. N. Ind. 15; Benth. Fl. Austral. VII, 494; Host Gram. Austr. t. 13; Reichb. Ic. Fl. Germ. t. 47, fig. 1465; T. Nees Gen. Fl. Germ. Monoc. n. 22; Eng. Bot. ed. 3, t. 1694; Sowerb. Brit. Grass. 63, t. 52; Durand & Schinz Consp. Fl. Afr. V, 774; Hack. in Bull. Herb. Boiss. IV, Append. III, 16; Hook. Fl. Brit. Ind. VII, 80; Stapf. in This.-Dyer Fl. Cap. VII, 429.

Setaria floribunda Spreng. Syst. I, 305; Wall. Cat. n. 8642 E.

Setaria nubica Link. Hort. Berol. I, 220; Kunth l. c.

Setaria respiciens Hochst. ex Miq. Fl. Ind. Bat. III, 467.

Setaria verticilliformis Dum. Fl. Belg. 150.

Setaria Rottleri Spreng. Syst. Veg. I, 304; Steud. Syn. Gram. 153; Kunth l. c. 153.

Panicum aparine Steud. 52.

Panicum adhaerens Forsk. Fl. Aegypt.-Arab. p. 20.

Panicum asperum Lamk. Fl. Fr. III, 577.

Panicum floribundum Willd. ex Spreng. Syst. I, 306.

Panicum humile Trin. Gram. Panic. 167.

Panicum italicum Ucria Hort. Reg. Panorm. 54.

Panicum respiciens Hochst. ex A. Rich. Tent. Fl. Abyss. II, 379.

Panicum rude Lamk. ex Steud. Nom. ed. 1, 589, 772.

Panicum verticillatum Linn. Sp. Pl. ed. 2, 82; Roxb. Fl. Ind. I, 301; Thw. Enum. 361; Trin. Sp. Gram. Ic. t. 202; Eng. Bot. t. 874; Host Gram. Austr. II, t. 13; Nees Fl. Afr. Austr. 53; Pan. Gen. 137 et in Mém. Acad. Petersb. ser. 6, III, 225; Steud. Syn. Pl. I, 52.

Description :—Annual; culms erect or ascending from a geniculate base, ½-5 feet long, usually compressed below, more or less branched, glabrous, smooth, or scabrid below the panicle, 4-9-noded, internodes mostly at length exserted; sheaths thin, rather lax, usually compressed, striate, glabrous or finely hairy upwards; ligules short, truncate, densely ciliate; blades linear or lanceolate-linear from a broad and rounded, or from a narrow base, long tapering to an acute or subsetaceous point, 2-12 inches by 2-6 (rarely up to 12) lines, thin, flat, flaccid, scaberulous, usually finely and scantily hairy.

Panicle erect or curved, spike-like, cylindric or oblong, dense or rather lax, 1-5 inches long, coarsely bristly; axis scabrid and often pubescent; branches spirally arranged, close, in robust specimens the lower up to 4 lines long with a distinct scabrid angular rhachis and 2-nate spikelets, otherwise very short or reduced to sessile clusters, each spikelet subtended by a coarse reversely scabrid bristle 2-7 lines long,

spikelets ellipsoid, obtuse, about 1 line long, light green, glabrous; lower glume hyaline, broad, ovate, acute, 1- to sub-3-nerved, $\frac{1}{3}$-$\frac{2}{5}$ as long as the spikelet, upper membranous, elliptic, concave, 5-7-nerved, equal to the spikelet or almost so; lower floret barren; valve similar to the upper glume, dorsally flattened, 5-7-nerved, pale hyaline, more or less arrested or 0; hermaphrodite floret elliptic-oblong, plani-convex, subapiculate or obtuse, almost 1 line long, greenish or straw-coloured; valve subcoriaceous, very obscurely wrinkled, 5-nerved, anthers $\frac{3}{8}$ line long.

Grain broadly ellipsoid, over $\frac{3}{4}$ line long, white, subtranslucent.

Locality:—Aden (Birdw.).

Distribution:—Throughout Africa and India to Malaya, elsewhere (Europe, Australia, America) only as a weed.

4. Tricholæna Schrad.

Erect tufted perennial (rarely annual) grasses. Leaves narrow; ligule a fringe of hairs. Spikelets oblong, laterally compressed, more or less gaping, panicled, deciduous from capillary pedicels; lower floret usually male or barren, upper hermaphrodite. Glumes very dissimilar or at least unequal, lower reduced to a minute scale or obsolete, very rarely half the length of the spikelet, somewhat remote from the upper; upper glume membranous, emarginate, muticous or finely mucronate or aristate from the sinus, 5-nerved, usually hairy. Valves very dissimilar, lower like the upper glume with a hyaline 2-nerved subequal pale, upper much smaller, thinly chartaceous, glabrous, shining, obtuse or submarginate, obscurely 5-nerved with an equal 2-nerved pale of similar substance. Lodicules 2, very small. Stamens 3. Style free, slender; stigma densely plumose, laterally exserted.

Grain oblong-ellipsoid, closely embraced by the valve and pale; hilum basal, punctiform; embryo about $\frac{1}{2}$ the length of the grain.

Species about 12.

Distribution:—In the dry and hot countries of the Old World, chiefly African.

Tricholæna Teneriffæ Parlat. in Webb et Berth. Phyt. Canar. III, part 2 (1848) p. 425, Fl. Ital. I., 30; Anders. Journ. Linn. Soc. V, Suppl. p. 38; Boiss. Fl. Or. V, 434; Hook. Fl. Brit. Ind. VII, 65; Cooke Fl. Bomb. Pres. II, 924.

Tricholæna micrantha Schrad. in Sch. Mant. II, 163; Nees in Ann. Sc. Nat. ser. 2, VI (1836) 106.

Panicum plumosum Presl Fl. Sic. I, 43.

Panicum saccharoides Trin. Gram. Panic. 245.

Panicum Teneriffæ Br. Prodr., 189 ; Kunth Enum. Pl. I, 98, Suppl. 75.

Panicum villosum Presl Gram. et Cyp. Sic. 18.

Saccharum Teneriffæ Linn. f. Suppl. 106, Jacq. Eclog. Gram. 51, t. 34 (excl. syn.) ; Biv. Bern. Stirp. Sic. Rar. IV, 5, t. 1 ; Sibth. Fl. Graec. I, t. 53 (excl. Anal.).

Agrostis plumosa Ten. Fl. Nap. Prodr. Suppl. I, 59.

Description :—Perennial ; stems many from a woody rootstock, geniculate below, slender, rigid. Leaves $1\frac{1}{4}$-3 by $\frac{1}{16}$-$\frac{1}{8}$ inch, narrowly linear-lanceolate, finely acuminate, convolute, rigid, glabrous ; sheaths glabrous ; ligule a narrow softly hairy ridge.

Inflorescence of slender erect panicles $2\frac{1}{2}$-$4\frac{1}{2}$ inches long ; branchlets and pedicels capillary. Spikelets up to $\frac{1}{6}$ inch long, clothed with silky hairs. Glumes 3 (rarely 4) ; involucral glume minute or obsolete ; upper involucral glume $\frac{1}{8}$ inch long, ovate, acute, densely silky ; lower floral glume $\frac{1}{6}$ inch long, ovate, acute, apiculate, paleate, the palea narrowly oblong, subobtuse, hyaline ; upper floral glume $\frac{1}{10}$ inch long, ovate-oblong, obtuse, coriaceous, shining ; palea as long as the glume, oblong-lanceolate, subacute. Anthers $\frac{1}{10}$ inch long, narrowly linear. Stigmas $\frac{1}{10}$ inch long, exserted, sessile or nearly so, plumose.

Fruits :—November (Schweinf.).

Locality :—Basaltic lava above the coal-depôts of the Messag. Marit. (Schweinf.) ; plain of Maala (Defl.) ; great valley between Steamer Point and town (Marchesetti) ; without locality (Edgew., Hook., Thomson).

Distribution :—Sicily, Canaries, Cape Verd Islands, N. Africa, Arabia, Sind, Punjab, W. peninsula of India.

5. Panicum Linn.

Annual or perennial grasses of various habit. Leaves broad or narrow ; ligules usually reduced to a ciliate rim or a fringe of hairs (rarely a distinct membrane) or 0.

Inflorescence various. Spikelets small, 1-2-flowered, terete or dorsally or laterally compressed, solitary or 2-nate, often secund, ovoid or oblong, articulate at the base and deciduous, rarely awned. Glumes 4 ; involucral glumes empty ; the lower the smallest (sometimes minute) and fewest-nerved ; upper involucral glume usually equal or almost equal to the lower floral glume, sometimes cuspidate, 5-13-nerved ; lower floral glume equalling the upper or longer, more or less resembling the upper involucral glume, usually neuter, paleate or not ; upper floral glume coriaceous to crustaceous, sometimes shortly stipitate,

convex, bisexual, the palea usually as long as and of the same texture as the glume. Lodicules 2, cuneate. Stamens 3. Styles distinct; stigmas laterally exserted near the tops of the spikelet.

Grain free, but tightly enclosed by the hardened glume and palea, oblong, ellipsoid or lanceolate.

Species between 200 and 250.

Distribution :—Mainly in the warm regions of the world.

Inflorescence of spiciform or effuse panicles :	
Panicles elongate	1. P. leucanthum.
Panicles broad, effuse :	
Lower involucral glume as long as the lower floral glume or nearly so	3. P. turgidum.
Lower involucral glume shorter than the lower floral glume	4. P. antidotale.
Panicles pauciradiate	5. P. leersioides.
Inflorescence racemose, of simple spikes	2. P. colonum.

1. Panicum leucanthum A. Rich. Tent. Fl. Abyss. II, 372; Waip. Ann. Bot. III, 718; Steud. Syn. Pl. Glum. I, 92.

Tricholæna leucantha Hochst. in Schimp. Pl. Abyss. n. 1818.

Description :—Stem erect, ramose, slender, 2 feet high; leaves narrow, glaucous, convolute, glabrous, smooth; ligule silky, short; sheaths glabrous.

Panicle elongate; branches erect, flexuose; branchlets thickened at the ends, truncate, glabrous, smooth; spikelets articulate at the base, deciduous, oblong, narrow, 2-flowered. Involucral glumes lanceolate, equal, acute, ciliate, covered with very long setose hairs. Male flower with 2 pales, linear; pales of hermaphrodite flower coriaceous, glabrous, awnless, shining.

Locality :—Gravelly slope of Shum Shum Range (Ellenbeck). We have not seen the specimen.

Distribution :—Yemen, Eritrea, Abyssinia.

2. Panicum colonum Linn. Syst. ed. 10, 870; Jacq. Eclog. Gram. t. 32; Ehret. Ic. Sel. t. 3, f. 3; Beauv. Agrost. t. X, f. 6; Trin. Sp. Gram. Ic. t. 160; Steud. Syn. Gram. 46; Wall. Cat. n. 8685; Trim. Cat. Ceyl. Pl. 104; Duthie Grass. N. W. Ind. 3, et Indig. Fodd. Grass. t. 4, et Fodd. Grass. N. Ind. 4; Benth. Fl. Hongk. 411, Fl. Austral. VII, 478; Boiss. Fl. Or. V, 435; Franch. & Sav. En. Pl. Jap. II, 160; Griseb. Fl. Brit. W. Ind. 545; Hook. Fl. Brit. Ind. VII 32; Cooke Fl. Bomb. Presid. II, 931.

Panicum arabicum Nees ex Steud. Nom. ed. 2, II, 251, Syn. Gram. 63.

Panicum brizoides Linn. Mant. I, 184.

Panicum caesium Nees in Hook. and Arn. Bot. Beech. Voy. 235; Steud. l. c. 47.

Panicum confertum Herb. Rottl. ex Wall. Cat. n. 8687 B.

Panicum Crus-galli Wall-Cat. n. 8687 I; var. colonum Coss. Expl. Alger. 28; var. minor Thw. Enum. Pl. Zeyl. 359.

Panicum cuspidatum Roxb. Fl. Ind. I, 298; Duthie Grass. N. W. Ind. 3; Steud. l. c.; Fig. & de Not. in Mem. Acad. Tor. (1854), 340, t. XIII, f. 1—16.

Panicum Daltoni Parlat. ex Webb in Hook. Niger Fl. 185; Steud. l.c.

Panicum flaccidum Wall. Cat. n. 8692 H (partim).

Panicum grossarium Griff. Notul. III, 36, Ic. Pl. Asiat. t. 139, f. 113.

Panicum haematodes Presl Fl. Sic. I, 43.

Panicum numidianum Presl Cyp. et Gram. Sic. 19.

Panicum Petiveri Kotsch ex Griseb. Fl. Brit. W. Ind. 545.

Panicum pseudo-colonum Roth Nov. Sp. 147.

Panicum semiverticillatum Herb. Rottl. (non Rottl. in Ainsl. Mat. Med.).

Panicum tetrastichum Forsk. Fl. Aeg.-Arab 19.

Panicum zonale Presl Prodr. Fl. Sic. I, 82.

Oplismenus colonus H. B. & K. Nov. Gen. et. Sp. I, 108; Kunth Enum. Pl. I, 142; Dalz. & Gibs. Bomb. Fl. 291; Aitchis. Cat. Panj. Pl. 161.

Oplismenus pseudo-colonus Kunth Rev. Gram. I, 44, Enum. I, 142.

Description :—Annual; stem 1-2 feet long, slender, decumbent or shortly creeping below; nodes glabrous or puberulous. Leaves 4-8 by $\frac{1}{6}$-$\frac{1}{3}$ inch, narrowly lanceolate or linear, acuminate, flat, glabrous, with scaberulous margins; sheaths up to 6 inches long; ligule 0.

Spikes 8-20, suberect, usually distant, $\frac{1}{12}$-1 inch long; rhachis stout, angular, scaberulous on the angles. Spikelets $\frac{1}{12}$-$\frac{1}{10}$ inch long, globosely ovoid, acute or subcuspidate, more or less hispidly pubescent, secund, sessile, 3-5 seriate. Glumes 4; lower involucral glume about $\frac{1}{2}$ as long as the lower floral glume, broadly ovate or suborbicular, membranous, 3-nerved, ciliolate; upper involucral glume about equal to the lower floral glume, broadly ovate, cuspidate, concave, 5-7-nerved, hairy; lower floral glume similar, empty, with a hyaline palea; upper floral glume coriaceous, broadly ovate, turgid, acute, finely striolate, polished, yellowish-white, with a coriaceous palea.

Flowers and *fruits* from January to March (Schweinf.).

Locality :—Shaikh Othman (Schweinf.).

Distribution :—Most warm countries.

Uses :—This plant is an excellent fodder grass. (*c.f.* Church, Food Grains of India, 1886, p. 50).

3. **Panicum turgidum** Forsk. Fl. Aeg.-Arab (1775) p. 18; Del. Fl. Aegypt. Ill. 51, t. 9, f. 2; Nees Agrost. Bras. I, 172 (in nota); Trin. Pan. Gen. 221, Sp. Gram. Ic. t. 227; Kunth Enum. Pl. I, 97; Steud. Syn. Gram. 88; Duthie Fodd. Grass. N. Ind. p. 13; Hook. Fl. Brit. Ind. VII, 44; Cooke Fl. Bomb. Pres. II, 935.

Arabic Name :—Thomam.

Description :—Perennial, glabrous, glaucous; rootstock sometimes as thick as the little finger; root-fibres thick, velvety; stem hard, (bamboo-like), solid, smooth and polished, $\frac{1}{10}$-$\frac{1}{8}$ inch in diameter about the middle, emitting from the nodes fascicles of branches in tufts from a swollen base. Leaves few, those at the base of the stem and branches 1-3 inches long, flat, coriaceous, linear-lanceolate, acuminate, smooth, those of the upper nodes often reduced to open chartaceous sheaths with a setiform blade.

Panicle terminal, subpyramidal, $1\frac{1}{2}$-4 inches long; branches at first erect, then more or less spreading, $\frac{1}{2}$-$1\frac{1}{2}$ inches long; rhachis angular, grooved, glabrous. Spikelets $\frac{1}{8}$-$\frac{1}{6}$ inch long, solitary, or rarely 2-nate, subsecund, ovoid, turgid, glabrous, white; pedicels short or long, with a cupular tip, scaberulous. Glumes 4, subcoriaceous; lower involucral glume scarcely shorter than the upper, and about equalling the lower floral glume, broadly ovate, acute, concave, 5-7-nerved; upper involucral glume broadly ovate, acute, 7-nerved; lower floral glume ovate, acuminate, 9-nerved, paleate, male; upper floral glume much smaller than the lower, ovate-oblong, acute, smooth, polished. Anthers purple. Styles short; stigmas short, pale purple.

Locality :—Little Aden (Def., Schweinf.).

Distribution :—Nubia, Abyssinia, Egypt, Palestine, Arabia, Socotra, S. Persia, Baluchistan, Sind, Gujarat.

This is the most common plant of the Nubian steppe.

4. **Panicum antidotale** Retz. Obs. fasc. IV (1786), p. 17; Trin. Gram. Pan. 227, Pan. Gen. 195; Nees Agrost. Bras. 201; Kunth Enum. Pl. I, 125; Steud. Syn. Gram. 77; Wight Cat. n. 1630; Thw. Enum. Pl. Zeyl. 360; Trim. Cat. Ceyl. Pl. 105; Aitchis. Cat. Panj. Pl. 158; Duthie Grass. N. W. Ind. 2, Fodd. Grass. t. 3, Fodd. Grass.

N. Ind. 4; Benth. Fl. Austral. VII, 483; Boiss. Fl. Or. V, 440; Hook. Fl. Brit. Ind. VII, 52; Trim. Fl. Ceyl. V, 156; Cooke Fl. Bomb. Pres. II, 937.

Panicum maximum Wall. Cat. n. 8715 B (partim) C (partim).
Panicum polygamum Herb. Madr. ex Wight Cat. n. 1630.
Panicum pruinosum Bernh. ex Trin. Pan. Gen. 191.
Panicum subalbidum Kunth Revis. Gram, II, 397. t. 112, Enum I.
Panicum tenue Roxb. ex Wight Cat. sub n. 1628 (non Fl. Ind.)
Milium arundinaceum Koen. ex Wight. Cat. l.c.

Description :—A tall glabrous perennial grass reaching 5 feet high; rootstock creeping, stoloniferous; stem solid, woody, terete, smooth; nodes thickened, the lower sometimes rooting. Leaves 6-24 by ¼-¾ inch, linear, very finely acuminate with capillary tips; sheaths long, glabrous, striate, with naked margins; ligule short, membranous, jagged or fimbriate.

Panicle 6-9 inches long, effuse, pyramidal; rhachis very slender, angular, glabrous, or slightly scaberulous; branches usually fascicled (the upper sometimes solitary), 3-4 inches long, filiform, spreading and drooping; branchlets capillary. Spikelets laxly crowded on the branchlets, reaching ⅛ inch long or slightly longer, ovoid, acute, glabrous. Glumes 4; lower involucral glume half as long as the upper, broadly ovate, subobtuse, 3-nerved, hyaline; upper involucral glume broadly ovate, acuminate, 7-9-nerved, membranous; lower floral glume equal and similar to the upper involucral glume, paleate, empty or male, the palea oblong, subacute, hyaline, as long as the glume; upper floral glume coriaceous, elliptic, obtuse, with incurved margins, dorsally smooth, yellowish-white; palea thinly coriaceous, ovate, acute, as long as the glume. Anthers linear-oblong. Styles 2, distinct, conspicuous, very plumose.

Flowers and fruits :— December (Schweinf.).

Locality :—Shaikh Othman, as a weed in watered places of gardens (Schweinf.).

Distribution :—Tropical Africa, Afghanistan, Punjab, Upper Gangetic Plain, Sind, Gujarat, Southern Maratta Country, W. Peninsula of India, Ceylon, tropical Australia.

5. **Panicum leersioides** Hochst. in Flora (1855) p. 196; Schweinf. in Bull. Herb. Boiss. II (1894), Append. 2, p. 21; Durand & Schinz, Consp. Fl. Afr. V (1895), p. 752, no. 98.

Description :—Culms 1-2 feet high, branched below from an apparently annual root; sheaths and leaves glabrous or with long

scattered pilose hairs. Leaves flat, linear, elongate, long acuminate, flaccid, scabrous on the margins ; ligule ciliate.

Panicle pauciradiate ; radii remote, solitary, 1-3 inches long, patent ; rhachis of radii subtriquetrous, scabrous on the angles and sparingly pilose. Spikelets mostly solitary, short-pedicellate ; inferior glume less than half the length of the spikelet, broadly ovate, 1-nerved, a little remote from the superior glume which is as long as the spikelet and 5-nerved ; the neuter flowers often bivalved, the lower valve as long as the superior glume and 5-nerved ; both valves of hermaphrodite flowers deeply rugulose.

Locality :—Aden (Birdwood).

Distribution :—Abyssinia, Eritrea.

6. Digitaria Rich.

Annual or perennial grasses. Leaves linear or lanceolate. Spikelets usually 2-3-nate, in digitate or racemose spikes, jointed on the pedicel, but not thickened at the base ; lower floret barren, reduced to the floral glume and a very minute palea ; upper floret hermaphrodite. Glumes very dissimilar, normally 4 ; the lower involucral glume usually hyaline, sometimes absent or present in the same species ; the upper involucral glume membranous, 1-5-nerved or nerveless ; floral glumes equal or subequal, the lower like the upper involucral glume, usually 7-9-nerved, the nerves close, parallel, straight, prominent ; upper floral glume chartaceous or subchartaceous, usually 3-nerved. Palea of upper floret subequal to the glume, and of same texture, 2-nerved. Lodicules 2, minute, broadly cuneate. Stamens 3. Styles distinct ; stigmas plumose, laterally exserted near the apex of the floret.

Grain oblong, slightly dorsally compressed, free, but tightly enclosed between the hardened glume and the palea.

Species about 50.

Distribution :—Mostly in warm parts of the Old World.

Digitaria pennata T. Cooke in Fl. Bomb. Pres. II, 941.

Panicum pennatum Hochst. in Flora XXXVIII (1854) 197.

Paspalum pennatum Hook. f. Fl. Brit. Ind. VII, 16 ; Woodr. in Journ. Bomb. Nat. Hist. Soc. XIII (1901) 433.

Description :—Stems 2 feet long, tufted, leafy. Leaves 1-6 by $\frac{1}{8}$-$\frac{1}{4}$ inch, linear or linear-lanceolate, finely acuminate, glabrous or sparsely hairy, distantly ciliate with long, fine, bulbous-based hairs ; sheaths long, striate, glabrous or with a few scattered hairs ; ligule long, oblong, membranous.

Spikes several, radiating, 3-6 inches long; rhachis very slender, trigonous, with numerous long cilia. Spikelets erect, solitary or 2-nate, $\frac{1}{8}$ inch long, narrowly lanceolate, acute, subsilky. Glumes normally 4 lower involucral glume minute, ovate, acute (rarely absent); upper involucral glume lanceolate, acute, membranous; lower floral glume similar to the upper involucral glume, 3-5-nerved; upper floral glume chartaceous, lanceolate, acuminate, nearly equal to the lower.

Locality .—Aden (Birdwood).

Distribution :—Abyssinia, Arabia, Baluchistan, Sind, Gujarat.

7. Eriochloa H. B. & K.

Annual or perennial grasses. Leaves flat, lanceolate or ovate-lanceolate.

Spikelets 1-flowered, aristulate, secund on the spiciform branches of a raceme or panicle, the base thickened and articulate on the thickened apex of the short pedicel. Glumes 3; lower involucral glume absent; upper involucral glume subequal to the lower floral glume; upper floral glume paleate, rather shorter than the lower, apiculate, hardening in fruit. Lodicules truncate. Stamens 3; anthers linear. Styles 2, free; stigmas plumose, subapically exserted.

Grain oblong, free, between the hardened glume and the palea.

Species perhaps 5.

Distribution :—Tropical.

Eriochloa polystachya H. B. & K. Nov. Gen. & Sp. I (1815) 95, f. 31; Lam. Encycl. t. 909; Kunth Enum. Pl. I, 72, Suppl. 53; Trim. Cat. Ceyl. Pl. 104; Duthie Indig. Fodd. Grass. t. 41, Fodd. Grass. N. Ind. 2; Hook. Fl. Brit. Ind. VII, 20; Trim. Fl. Ceyl. V, 126; Woodr. in Journ. Bomb. Nat. Hist. Soc. XIII (1901) 433; Prain Beng. Pl. 1183; Cooke Fl. Bomb. Pres. II, 944.

Eriochloa annulata Kunth Revis. Gram. I, 30, Enum. I, 73; Aitchis. Cat. Panj. Pl. 158; Duthie Grass. N. W. Ind. 2; Benth. Fl. Hongk. 409, Austral. VII, 463.

Eriochloa punctata Ham. Prodr. Fl. Ind. Occ. 5; Kunth Enum. I, 72; Miq. Fl. Ind. Bat. III, 441; Benth. Fl. Austral. VII, 462.

Eriochloa sundaica Miq. l. c. 606.

Eriochloa succincta Kunth Enum. I, 73.

Helopus annulatus Nees in Mart. Fl. Bras. II, 17; Wight Cat. n. 1605; Wall. Cat. n. 8750.

Helopus laevis Trin. ex Spreng. Neue Entdeck. II, 49, f. 4.

Helopus pilosus Trin. Fund. Agrost. 104, f. 4.

Helopus acrotrichus Steud. Syn. Gram. 100.

Paspalum punctatum Fluegge Gram. Monog. 127 (Paspalus) ; Trin. Sp. Gram. Ic. t. 155.

Paspalum annulatum Fluegge l. c. 133 (Paspalus) ; Trin. l. c. t. 133.

Paspalum succinctum Trin. Diss. II, 19, Sp. Gram. Ic. t. 156.

Milium Carar Herb. Ham. ex Wall. Cat. n. 8750 F.

Milium Languchinia Herb. Ham. l. c. n. 8750 G.

Milium polystachyum Spreng. Syst. I, 251.

Milium punctatum Linn. Amoen. Acad. V, 392, Sp. Pl. 91; Br. Prodr. 188.

Milium orixense Roxb. Ic. ined. n. 818.

Milium ramosum Retz. Obs. VI, 22; Roxb. Fl. Ind. I, 316; Griff. Notul. III, 15, Ic. Pl. Asiat. t. 139, f. 60.

Piptatherum punctatum Beauv. Agrost. 18, t. 5, f. 1.

Piptatherum confine Schult. Mant. II, 184 (ex Kunth).

Piptatherum annulatum Raddi Agrost. Bras. 30.

Agrostis punctata Lamk. Encycl. I, 58.

Oedipachne punctata Link Enum. Hort. Berol. I, 51.

Description :—Perennial, densely tufted, 2-5 feet high ; rootstock short, creeping ; stems leafy, ascending from a creeping base, stout or slender, simple or branched, glabrous except the nodes. Leaves 3-8 by $\frac{1}{6}$-$\frac{1}{5}$ inch, linear or linear-lanceolate, acuminate, glabrous ; sheaths glabrous ; ligule a villous ridge.

Panicles 2-5 inches long ; peduncles long or short ; rhachis slender, angular, smooth ; branches of panicle (spikes) alternate, 1-2 inches long, suberect, angular. Spikelets silvery, $\frac{1}{8}$-$\frac{1}{6}$ inch long, loosely imbricate, shortly pedicellate, distichous, solitary or 2-nate, elliptic-lanceolate, acuminate. Lower involucral glume 0; upper involucral glume oblong-lanceolate, acuminate, obscurely 3-nerved, silky-hairy, membranous ; lower floral glume similar to the upper involucral glume ; upper floral glume much shorter than the lower, elliptic-oblong, obtuse, apiculate, thinly coriaceous, pale, shining ; palea oblong with incurved margins. Anthers linear.

Grain oblong, free within the hardened glume and palea.

Locality :—Shaikh Othman, on cultivated ground (Schweinf.).

Distribution :—Most hot countries.

8. Aristida Linn.

Annual or more often perennial, tufted, usually with more or less wiry culms ; blades narrow, usually convolute ; ligule usually a line of very short hairs.

Panicle varying from spike-like to effuse. Spikelets 1-flowered, narrow, panicled, rhachilla disarticulating above the glume, not produced. Glumes usually persistent, narrow, 1-3-nerved, muticous or mucronate, awnless. Valve convolute, cylindric or oblong cylindric, 3-nerved, awned, rather rigid, tips gradually tapering or minutely bilobed, sometimes jointed at or above the middle; callus villous, shortly bearded, usually pungent; awn nearly always tripartite from the base or above the simple base, very rarely simple, continuous with the valve or disarticulating from it or deciduous with a portion of the valve, foot straight or twisted, bristles plumose or the lateral or all naked. Palea small, oblong, 2-nerved or nerveless. Lodicules 2, finely nerved. Stamens 3. Ovary glabrous; styles distinct, short; stigmas plumose, laterally exserted.

Grain slender, cylindric or oblong-cylindric, terete, sometimes grooved, lightly embraced by the valve; hilum linear, almost as long the grain; embryo short or long.

Species about 100.

Distribution :—In the dry and warm regions of both hemispheres

Awn tripartite from the base :
- Glumes not equal :
  - Stems ½-3 ft. high . . . . . 1. A. Adscensionis.
  - Stems up to 4 inches high . . . . . 2. A. pumila.
- Glumes equal . . . . . 7. A. mutabilis var.

Awn feathery :
- Leaves rigid :
  - Sheath glabrous . . . . . 3. A. brachypoda.
  - Sheath not glabrous . . . . . 6. A. plumosa.
- Leaves flexuous :
  - Lower glume longer than the upper . . . 5. A. hirtigluma.
  - Lower glume shorter than the upper . . . 4. A. paradisea.

1. Aristida Adscensionis Linn. Sp. Pl. ed. I, p. 82; Kunth Enum. Pl. I, 190; Willd. Sp. Pl. I, 458; Trin. et Rupr. Stip. 138; Steud. Syn. Pl. Glum. I, 139; Anders. Journ. Linn. Soc. V, Supplem. p. 39; Boiss. Fl. Or. V, 491; Batt. et Trab. Fl. d'Alg. 56; Baker Fl. Maurit. 450 Durand & Schinz Consp. Fl. Afr. 799; Hook. Fl. Brit. Ind. VII, 224; Cooke Fl. Bomb. Pres. II, 1008.

Aristida paniculata Forsk. Fl. Aegypt.-Arab. 25 (?)[1].

Aristida americana Linn. in Amœn. Acad. V, 393 (not Swartz).

Aristida gigantea Linn. Fl. Suppl. 113.

Aristida depressa Retz. Obs. IV, 22.

Aristida cærulescens Desf. Fl. Atlant. I, 109, t. 21, fig. 2; Schum. & Thonn. Beskr. Guin. Pl. 47; Trin. Sp. Gram. Ic. t. 313.

[1] Synonymy after Stapf.

Aristida interrupta Cav. Ic. V, 45, t. 471, f. 2.

Aristida elatior Cav. Ic. VI, 65, t. 589, f. 1.

Aristida canariensis Willd. Enum. 99.

Aristida humilis H. B. & K. Nov. Gen. et Spec. I, 121.

Aristida bromoides H. B. & K. l. c. 121.

Aristida coarctata H. B. & K. l. c. 122.

Aristida divaricata Jacq. Eclog. Gram. 7, t. 6 (not Willd.).

Aristida mauritiana Kunth Revis. Gram. I, 61; Trin. & Rupr. Stip. 139.

Aristida setacea Trin. Gram. Gen. 84 (not Retz).

Aristida nigrescens Presl Reliq. Haenk. I, 223.

Aristida cognata Trin. & Rupr. Stip. 127.

Aristida dispersa Trin. & Rupr. l. c. 129.

Aristida festucoides Hochst. & Steud. (not Poir.) ex Trin. & Rupr. l. c. 129.

Aristida laxa Willd. (not Cav.) ex Trin. & Rupr. l. c. 130.

Aristida vulgaris Trin. & Rupr. l. c. 131-136 (excl. vars. aethiopica senegalensis, Ehrenbergii, spicigera).

Aristida nutans Ehrenb. & Hempr. ex Trin. and Rupr. l. c. 135.

Aristida pusilla Trin. & Rupr. l. c. 140; Steud. Syn. Pl. Glum. 1 139; Durand & Schinz Consp. Fl. Afr. V, 807.

Aristida swartziana
Aristida maritima
Aristida nana
Aristida arabica
Aristida tenuiflora
Aristida modatica
Aristida simplicissima
} Steud. Syn. Pl. Glum. I, 137-139.

Aristida chaetophylla Steud. l. c. 420.

Aristida Teneriffae Steud. l. c. 420.

Aristida macrochloa Hochst. in Flora (1855), 200.

Aristida vulpioides Hance in An. Sc. Nat. ser. 5, V, 251.

Aristida Heymanni Regel in Act. Hort. Petrop. VII (1880) 649.

Chaetaria ascensionis
Chaetaria canariensis
Chaetaria cærulescens
Chaetaria depressa
Chaetaria elatior
Chaetaria gigantea
Chaetaria interrupta
} Beauv. Agrost. 30.

Chaetaria humilis
Chaetaria bromoides
Chaetaria coarctata
} Roem. & Schult. Syst. II, 396.

Chaetaria nana Nees ex Steud. Nom. ed. 2, I, 340.

Chaetaria mauritiana Nees Fl. Afr. Austr. 188.

Description :—Annual or occasionally perennial with an oblique rhizome, glabrous; culms tufted, geniculately ascending, slender, from a few inches to 2 feet long, usually branched from one or several of the lower nodes, smooth, upper internodes long exserted; sheaths tight, rather firm, smooth; ligule a line of short hairs; blades very narrow, linear, tapering to a very fine point, 1-9 inches long, up to one line broad, convolute, rarely flat, smooth below, scabrid above and on the margins.

Panicle linear, spike-like, usually interrupted or oblong and more or less lax, rigid or flaccid; branches single or 2-nate unequal, branched from the base or simple to the middle, erect or nodding or flexuous, filiform, scabrid, lateral pedicels short; spikelets 3-5 lines long, often purplish; glumes linear to linear-lanceolate, acute or subobtuse, 1-nerved, the lower 2-3½ lines, the upper 3-4½ lines long, sometimes mucronate; valve linear, laterally compressed, as long as the upper glume or slightly longer, rarely shorter, scabrid along the keel and the outer nerve, otherwise smooth or scabrid, particularly below the straight tip; callus ¼ line long; awns 6-9 lines long, rarely shorter (down to 4 lines) or longer (up to 1 inch), diverging, continuous with the valve, the lateral somewhat shorter; palea obtuse, less than ½ line long; lodicules similar to the palea, 3-5-nerved, ⅓-½ line long; anthers ½ line long. Grain almost as long as the valve.

Fruits :—January and March (Schweinf.).

Locality :—Above the coal-depôts of the Messag. Marit. (Schweinf.); plain of Maala (Defl.); slope of Shum Shum Range at about 650 feet (Busse); rarissime (Hooker, Thomson).

Distribution :—Common in most dry and hot countries.

2. **Aristida pumila** Dcne. Ann. Sc. Nat. (1835) p. 85; Steud. Syn. Pl. Gl. 138; Boiss. Fl. Or. V, 491; K. Krause in Engl. Bot. Jahrb. XXXV, 23.

Aristida Adscensionis var. pumila Coss. in Coss. & Durieu Expl. Sc. Alger. II, 84; Batt. et Trab. Fl. d'Alg. p. 56.

Description :—Annual, 1½-4 inches high; rootlets fibrous, pilose; culms several, filiform, striate, deflexed, glabrous, the nodes fuscous. Leaves setaceous, involute, acute, pale green, glaucescent, subarcuate; sheath split, striate, membranous on the margin; ligule ciliate.

Panicles subcontracted, subequal in length to the culms; spikelets 1-flowered, peduncled, scabrous. Lower glume linear, mucronate, aristate, upper one twice as long, linear, acute, glabrous. Flower shortly pedicelled; pedicel pilose. Lower palea linear, elongate, involute, subcarinate; the keel 3-nerved, the nerves passing into 3 filiform,

denticulate scabrous awns. Upper palea very short, several times shorter than the lower one, included, ovate, obtuse, membranous. Stamens 3, erect, as long as the upper palea; anthers linear-oblong. Styles filiform, short; stigmas fibrillose, scarcely exceeding the stamens. Ovary ovate-oblong.

Locality :—Crater of Shum Shum Range (Defl.).

Distribution :—Nubia, Abyssinia, Central and S. Arabia, Morocco.

3. Aristida brachypoda Tausch in Flora 1836, p. 506; Boiss. Fl. Or. V, 495. K. Krause in Engl. Bot. Jarhrb. XXXV, 23; Post Fl. Syr. Palest. and Sinai 860.

Description :—Cæspitose, 6-8 inches high. Leaves narrow-convolute, filiform, acute; culms erect or ascendent, often ramose in the lower part; sheaths glabrous; ligule reduced to a setaceous ring.

Panicle narrow, racemiform; glumes glabrous, narrowly linear-lanceolate, obtuse-acuminate; the upper one longer; callus long, hirsute, stipitiform; awn articulate, 1½ inches long. "Aristâ infra genu brevissimâ rectâ nudâ, setâ mediâ tertiâ vel dimidiâ parte inferiore rarius a basi nudâ superne patule plumosâ, setis lateralibus tenuiter capillaribus nudis intermediâ dimidio vel tertiâ parte brevioribus ejus parte nudâ longioribus" Boiss.

Locality :—Little Aden, on the Jebel Ishan (Defl.).

Distribution :—Upper Egypt, Sinai, S. Arabia.

Note :—"Valde affinis facie *A. plumosae* a quâ vaginis glabris, aristæ parte infra genu sita breviore setisque lateralibus magis elongatis fere tantum differt. An illae notae sat firmæ?" Boiss. l.c.

4. Aristida paradisea Edgew. in Journ. As. Soc. Beng. XVI (1847), II, 1219.

Arthratherum caloptilum Jaub. et Spach Ill. Pl. Or. IV, t. 336.

Aristida sericea Ehrenb. Mss. ex Boiss.

Aristida caloptila Boiss. Fl. Or. V, 497; K. Krause in Engl. Bot. Jahrb. XXXV, 23.

Description :—Almost 1 foot high, cæspitose. Leaves narrowly convolute, filiform, flexuose, acute; culms erect, glabrous, ramose at the base; sheaths glabrous.

Panicle erect, contracted, slightly lax, exserted from the uppermost sheath; glumes lanceolate, obtuse, attenuate-acuminate, the lower one longer; palea with a short long-plumose callus, much shorter than the glumes, with an articulate awn. "Aristâ longâ infra genu elongatâ tortâ glabrâ, setis lateralibus tenuiter subulatis glabris intermediâ ex toto plumosâ triplo brevioribus."

Fruits :—November and March (Schweinf.).

Locality :—Plain of Maala (Defl.) ; Goldmore Valley, above the coal-depôt of the Messag. Marit., rocky and sandy watercourses (Schweinf.).

Distribution :—Egypt, Sinai, Arabia, Persia, Afghanistan.

Note :—" Aristis elongatis affinis *A. hirtiglumæ* sed glumæ non hirtæ et inferior longitudine superiorem superans quod in aliis speciebus non occurrit." Boiss. l.c.

5. **Aristida hirtigluma** Steud. Nomen. Bot. ed. 2, I (1840) 131 et Syn. Pl. Glum. I, 144 ; Trin. & Rupr. in Mem. Acad. Petersb. ser. 6, V (1842) 171 ; Walp. Ann. Bot. III, 750 ; Boiss. Fl. Or. V, 496 ; Schweinf. Beitr. Fl. Aethiop. 298 ; Aitchis. Cat. Panj. Pl. 164 ; Duthie Grass. N. W. Ind. 26, Fodd. Grass. N. Ind. 47 ; Hook. Fl. Brit. Ind. VII, 227 ; Cooke, Fl. Bomb. Pres. II, 1009.

Aristida ciliata Steud. & Hochst. ex Steud. Nom. ed. 2, I, 131 (non Desf.).

Aristida decorata Steud. Syn. Gram. 421.

Aristida pogonoptila Boiss. Fl. Or. V, 496.

Aristida Schimperi Hochst. & Steud. ex Steud. l.c. 143.

Arthratherum ciliatum Nees in Linnæa VII (1832) 287 ; Fl. Afr. Austr. I, 182.

Arthratherum elatum Boiss. Diag. Pl. Or. ser. 2, IV, 128.

Arthrantherum hirtiglume Jaub. & Spach Ill. Pl. Or. IV, 52.

Arthrantherum pogonoptilum Jaub. & Spach l.c. 56.

Arthrantherum Schimperi Nees. Fl. Afr. Austr. 178.

Description :—Perennial ; stems tufted, 1-2 feet high, smooth, glabrous, terete, shining ; nodes glabrous. Leaves 2-6 inches long, reaching $\frac{1}{20}$ inch broad when opened out, convolute, filiform with capillary tips ; sheaths quite glabrous except for a few long hairs at the mouth, close ; ligule a very narrow densely ciliate membrane.

Panicle slender ; branches short, erect, capillary. Spikelets pale green or straw-coloured, linear-lanceolate. Lower involucral glume $\frac{1}{3}$ inch long, linear-oblong, acute, scarious ; upper involucral glume a little longer, but similar ; floral glume slightly muricate ; callus about $\frac{1}{50}$ inch long, pointed, shortly villous ; column of awn $\frac{1}{10}$-$\frac{1}{8}$ inch long, plumose with long slender hairs articulated on the glume ; middle branch $1\frac{1}{2}$ inches long or more, plumose in the lower half with long delicate hairs ; lateral branches very slender, hair-like, about $\frac{1}{2}$ inch long, not plumose.

Locality :—Top of Shum Shum Range (Busse).

Distribution :—Tunis, Upper Egypt, Sinai, Syria, Nubia, Abyssinia, Eritrea, Highlands of Somaliland, Arabia, Sind, Punjab.

Note.—"Species glumis hirtis, flosculo muriculato, aristis longis ab *A. plumosa* et *brachypodâ* facile distinguenda." Boiss. l.c.

6. Aristida plumosa Linn. Sp. Pl. ed. 2, p. 1666 ; Willd. Sp. Pl. I, 460 ; Vahl Symb. I, 11, t. 3 ; Trin. Diss. I, 181, II, 26 ; in Act. Petrop. (1829) 89 ; Trin. & Rupr. in Mém. Acad. Pétersb. ser. 6, V (1842) 165 ; Kunth Enum. Pl. I, 195, II, 151 ; Steud. Syn. Pl. Glum. I, 143 ; Aitchis. Cat. Panj. Pl. 164 ; Boiss. Fl. Or. V, 495 ; Duthie Grass. N.W. Ind. 26, Fodd. Grass. N. Ind. 47 ; Hook. Fl. Brit. Ind. VII, 228 ; Durand & Schinz. Consp. Fl. Afr. V, 807.

Aristida lanata Forsk. Fl. Aegypt.-Arab. 25.

Aristida Raddiana Savi in Mem. Moden. (1837), 198 ; Steud. l.c. 144.

Arthratherum plumosum Nees Fl. Afr. Austr. I, 182 ; Coss. & Durieu Expl. Scient. Algér. II, 81 ; Batt. et Trab. Fl. d'Alg. p. 56.

Stipagrostis plumosa Munro Mss. in Herb. Benth.; Anders. Journ. Linn. Soc. V, Suppl. p. 40.

Description :—Cæspitose, perennial ; stem 1-2 feet high, from a stout branching woody stock with stout rigid roots. Leaves 2-6 inches long, rigid, filiform, convolute, flexuous ; ligule reduced to a setose ring ; sheaths of leaves and internodes tomentellous or woolly.

Panicle 2-3 inches long (excl. the awns), narrow, racemiform. Spikelets erect ; glumes glabrous, unequal, lanceolate, acuminate, the upper longer ; lower palea one-third as long the glumes ; awn naked ; middle bristle $\frac{1}{6}$ naked, the rest feathery, three to five times as long as the lateral bristles.

Locality :—Upper end of great valley between Steamer Point and town (Marchesetti) ; without locality (Edgew., Hook., Anders., Birdw.).

Distribution :—Morocco, Algeria, Tunis, Egypt, Abyssinia, Syria, Arabia, Kurdistan, Persia, Afghanistan, Western Tibet (7,700 feet).

7. Aristida mutabilis Trin. & Rupr. in Mém. Acad. Pétersb. Ser. VI, VII (1849) 150 (excl. var. aequilonga) ; Walp. Ann. Bot. III, 745 ; Steud. Syn. Pl. Glum. I, 141 ; Hook. f. Fl. Brit. Ind. VII, 226.

Aristida articulata Edgew. in Journ. Linn. Soc. VI (1862) 209 ; Aitch. Cat. Panj. Pl. 164 ; Duthie Grasses N. W. Ind. 26, Fodd. Grass. N. Ind. 47.

Aristida Kunthiana et meccana Trin. & Rupr. l.c. 151 (ex descr.) ; Steud. l.c. 141.

Aristida Schweinfurthii Boiss. Fl. Or. V, 493.

Aristida spicata Rottl. Mss. (ex Hooker f. l. c.).

Aristida tenuis Hochst. in Flora, XXVIII (1855) 200.

Description:—Stems 6-12 inches high, many ascending from the root, simple or proliferously branched, slender. Leaves 1-3 inches long, very slender, curved, convolute, rigid, smooth.

Panicles 3-6 inches long; branches all very short and crowded, or with sometimes a few remote lower down or the stem ascending from a naked base and bearing a dense oblong fascicle of spikelets, rhachis smooth, branches scaberulous. Spikelets very shortly pedicelled, pale green or straw-coloured. Lower glume $\frac{1}{6}$ inch, keel scaberulous; upper glume $\frac{1}{4}$ inch, tip 2-toothed below the awn; valve scaberulous, callus shortly bearded; column of awn nearly as long as the glumes, slender, smooth, branches capillary.

Locality:—Aden (Birdwood).

Distribution:—Senegal, Kordofan, Egypt, Arabia, Punjab, Rajpootana, Jodhpore, Southern India.

The Aden plant is a variety of the above species:

Var. **meccana** Fenzl. in Kotschy Pl. Aeth. n. 103. Glumes equal, florets $3\frac{1}{2}$ lines long; setæ 6-7 lines long.

9. Sporobolus R. Br.

Annuals or perennials of various habit; ligules reduced to a ciliate or ciliolate rim. Panicles contracted to spike-like, or more or less open, sometimes extremely lax. Spikelets usually very small, continuous on the pedicels; rhachilla more or less readily disarticulating above the glumes, or very rarely produced into a bristle. Floret 1, hermaphrodite. Glumes 2, delicately membranous, lower usually smaller, nerveless, upper 1-nerved, falling away one after the other. Valve more or less resembling the upper glume, 1-nerved or more or less distinctly 3-nerved. Palea usually almost as long as the valve, 2-nerved, folded between the nerves, often split by the maturing grain. Lodicules 2, small, broadly cuneate, glabrous, thin. Stamens 3, rarely 2. Ovary glabrous; styles short, distinct, terminal; stigmas plumose or subaspergilliform.

Grain free, falling out or retained and dehiscing; pericarp thin, usually swelling in water, rigid, dehiscing, or the inner layers mucilaginous when wetted and adherent, or the whole pericarp adnate and indistinct; hilum small, punctiform, basal; embryo rather large.

Species about 70.

Distribution:—Chiefly in the tropical and subtropical regions of both hemispheres.

Not more than 1½ feet high:	
Lower involucral glume as long as the floral glume or nearly so .	1. S. glaucifolius.
Lower involucral glume shorter than upper involucral and floral glume	2. S. spicatus.
More than 1½ feet high	3. S. robustus.

1. Sporobolus glaucifolius Hochst. in Flora XXV, part I (1842), Beibl. p. 133 ; Hook. Fl. Brit. Ind. VII, 250 ; Cooke Fl. Bomb. Pres. II, 1019.

Vilfa glaucifolia Steud. Syn. Gram. 154.

Vilfa scabrifolia Hochst. ex Edgew. in Journ. Linn. Soc. VI (1862), 196 ; Aitchis. Cat. Panj. Pl. 165.

Agrostis barbata β senegalensis Pers. Syn. I, 76.

Agrostis littoralis β Lamk. Illustr. 161 ; Poir. Encycl. Suppl. I, 251.

Description :—Perennial ; stems 12-18 inches long, densely tufted, leafy ; nodes glabrous. Leaves 1½-5 by $\frac{1}{10}$-$\frac{1}{8}$ inch, narrowed from a subcordate base to an acuminate tip, strict, glaucous, flat or undulate, not pungent ; sheaths ribbed, glabrous ; ligule a line of hairs.

Panicle 3-5 inches long, contracted, interrupted, pale, yellowish-white ; branches short, erect. Spikelets crowded, $\frac{1}{12}$ inch long ; pedicels very short. Glumes 3 ; lower involucral glume $\frac{1}{16}$ inch long, lanceolate, hyaline, acutely acuminate, 1-nerved ; upper involucral glume $\frac{1}{12}$ inch long, broader than the lower, ovate-lanceolate, acutely acuminate, hyaline, 1-nerved ; floral glume $\frac{1}{16}$ inch long, ovate, acute, 1-nerved ; pales as long as the glume. Stamens 3 ; filaments very short ; anthers $\frac{1}{10}$ inch long.

Locality :—Aden (Birdwood).

Distribution :—Tropical Africa, Punjab, Sind, W. Peninsula of India.

2. Sporobolus spicatus Kunth Revis. Gram. I ; Enum. Pl. I, 210 ; A. Rich. Tent. Fl. Abyss. II, 394 ; Boiss. Fl. Or. V, 512 ; Hook. Fl. Brit. Ind. VII, 250 : Balfour f. Bot. Socotra 318 ; Durand & Barratte Fl. Lib. Prodr. (1910) 254.

Sporobolus orientalis Herb. Wight n. 3303, 3304, Cat. n. 1745 (partim).

Vilfa spicata Beauv. Agrost. 16 ; Trin. Diss. 1, 157, Sp. Gram. Ic. t. 12 ; Steud. Syn. Gram. 160.

Agrostis spicata Vahl. Symb. I, 9 ; Del. Fl. Aegypt. 20, t. 10, f. 1.

Agrostis virginica Forsk. Fl. Aegypt-Arab. 20 (ex Kunth).

Arabic name :—Elef (Schweinf.).

Description :—Stems 6-12 inches high, from a hard stoloniferous rootstock, stiff, strict above the geniculate base; leaves 1-2 inches long, divaricate, pungent, scabrid above; ligule 0.

Panicle spiciform, slender, cylindric, 2-3 inches by $\frac{1}{16}$-$\frac{1}{6}$ inch in diameter. Spikelets sessile, $\frac{1}{16}$ inch long, persistent on the branchlets, pale. Glumes hyaline, lower involucral glume minute, rounded, upper involucral glume 1-nerved, lanceolate, acute; floral glume ovate-lanceolate; palea as long as the glumes.

Grain obliquely oblong or orbicular-oblong.

Locality :—Shaikh Othman (Defl.).

Distribution :—Tropical Africa, Egypt, Nubia, Abyssinia, Socotra, Arabia, Deccan.

3. **Sporobolus robustus** Kunth Rev. Gram. p. 425, t. 126 (1829-35) et Enum. Pl. I, 218, suppl. p. 168; Benth. in Hook. Niger Fl. 564 (1849); Schweinf. in Bull. Herb. Boiss. II, Append. 2, p. 28; Durand & Schinz Consp. Fl. Afr. V, 823; Rendle Cat. Afr. Pl. Welwitsch, II, pt. I, 206.

Vilfa robusta Steud. Syn. Pl. Glum. 154 (1854); Schweinf. Beitr. Fl. Aethiop. p. 303.

Description :—A fine widely caespitose grass, 2-6 feet high, culms ascending, geniculate, branched, nodes purplish, the lower sending out roots; sheaths usually slightly shorter than the internodes, thinly villous on the margins, subcoriaceous; ligule consisting of a narrow subciliate margin; leaves almost 1 foot long, 3 lines broad, flat, canaliculate-compressed, attenuate-linear or convolute-acuminate, glabrous, hispid on the margins.

Panicle almost one foot long, open, dense, consisting of racemes which bear flowers from the base; spikelets lanceolate, linear; glumes slightly hispid on the back, as long as the subequal valves.

Locality :—Aden (Birdwood).

Distribution :—Niger, Cape Verd Isles, Gaboon Coast, Abyssinia, Eritrea, Senegambia, Suakim.

10. Eragrostis Beauv.

Perennial or annual, of very varying habit; blades narrow; ligule reduced to a fringe of usually minute hairs.

Panicles lax to effuse or contracted to spike-like, or transformed into simple or compound spikes. Spikelets usually more or less olive-green or olive-grey, usually strongly laterally compressed, very rarely

articulate on the pedicels; rhachilla disarticulating above the glumes and between the valves or tough and persistent, glabrous, sometimes more or less scaberulous, very rarely minutely hairy. Florets 2 to many, hermaphrodite or the uppermost reduced. Glumes unequal or equal, usually membranous, 1-nerved, or the upper sometimes 3-nerved, keeled, persistent, or deciduous. Valves more or less imbricate, ovate to lanceolate, acute or obtuse, entire, muticous, membranous to chartaceous, 3-nerved, glabrous, very rarely minutely pubescent; side nerves short or almost percurrent. Palea equal to the valves or slightly shorter, membranous, 2-keeled, deciduous or persistent on the rhachilla. Lodicules 2, small, cuneate, more or less fleshy. Stamens 3, rarely 2. Ovary glabrous; styles distinct; stigmas plumose, laterally exserted.

Grain enclosed by the scarcely altered valve and palea and deciduous with them, or more commonly falling with the deciduous valve, leaving the more or less persistent palea behind, oblong to obovoid or globose, round or very obtusely triquetrous or quadrangular in cross section; pericarp thin, sometimes slightly swelling or separating; embryo often ½ as long as the grain; hilum punctiform, basal.

Species about 100.

Distribution:—Warm parts of the world.

Rhachilla of spikelets more or less jointed and breaking up from above downwards	1. E. ciliaris.
Rhachilla of spikelets tough, persistent	2. E. major.

1. Eragrostis ciliaris Link. Hort. Bot. Berol. I, 192; Trin. Gram. Gen. 397, et in Mém. Acad. Pétersb. ser. 6, I, 397; Nees Fl. Afr. Austr. 413; Steud. Syn. Pl. Glum. I, 265; Anderss. in Peters Reise Mossamb. Bot. 558; Anders. Journ. Linn. Soc. V, Suppl., p. 41; Baker Fl. Maurit. 456; Durand & Schinz Consp. Fl. Afr. V, 881; Hook. Fl. Brit. Ind. VII, 314; Cooke Fl. Bomb. Pres. II, 1023.

Eragrostis lobata Trin. in Mem. Acad. Petersb. ser. 6, I (1831) 396.

Eragrostis lepida Hochst. ex A. Rich. Tent. Fl. Abyss. II, 424.

Eragrostis pulchella Parl. in Hook. Niger Fl. 188.

Poa ciliaris Linn. Sp. Pl. 102; Jacq. Ic. Pl. Rar. II, t. 304; Kunth. Enum. I, 337; A. Rich. l.c. 423; Boiss. Fl. Or. V, 582.

Megastachya ciliaris Beauv. Agrost. 167; Roem. & Schult. Syst. II, 592.

Description:—Annual or subperennial (?), tufted; culms geniculate, ascending, often from a procumbent base, slender, ½-2 feet long, glabrous, smooth, simple or branched below, about 3-noded, internodes exserted; sheaths striate, tight, glabrous or scantily hairy, bearded with long hairs at the mouth; ligule a fringe of short hairs; blades linear, tapering to

a fine point, 3-6 inches by 1-2 lines, usually involute, somewhat stiff and spreading, glabrous, or with scattered fine long hairs, scaberulous.

Panicle spike-like, more or less lobed or interrupted, dense to very dense, 2-6 inches long; axis scabrid; branches adpressed, usually all very short or the lowest up to 1 inch long, divided from the base; pedicels very short; spikelets crowded, ovate, strongly compressed, 1 to almost 2 lines long, loosely 6-12-flowered, pallid, sometimes purplish; rhachilla breaking up; glumes oblong-lanceolate, acute, $\frac{2}{5}$ to almost $\frac{1}{2}$ line long, 1-nerved, keel scabrid; valves oblong in profile, subtruncate and mucronulate, spreading, about $\frac{1}{2}$ line long, thin, side-nerves prominent, keel scabrid; paleæ equal to the valves and falling with them; keels of palea very long and rigidly ciliate; anthers $\frac{1}{5}$-$\frac{1}{6}$ line long.

Grain elongate-ovoid, $\frac{1}{4}$ line long, brown.

Locality :—Aden (Anders., Hildebrandt, Birdw.).

Distribution :—Common throughout tropical Africa and America, and in N. India.

Note :—This is an exceedingly variable plant. Anderson's specimens from Aden are only about $1\frac{1}{2}$ inches high.

2. Eragrostis major Host. Gram. Austr. IV, 14, t. 22; Hook. Fl. Brit. Ind. VII, 320; Cooke Fl. Bomb. Pres. II, 1026; Trim. Fl. Ceyl. V, 297.

Eragrostis flexuosa Steud. Syn. Gram. 266; Duthie Grass. N. W. Ind. 37.

Eragrostis megastachya Hort. Berol. I, 187; Kunth. Enum. Pl. I, 333; Reichb. Ic. Fl. Germ. t. 91; Wight Cat. n. 1778; Thwaites Enum. Pl. Zeyl. 373; Trim. Cat. Ceyl. Pl. 109; Aitchis. Cat. Panj. 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; Ledeb. Fl. Ross. IV, 382; Boiss. Fl. Or. V, 580.

Eragrostis multiflora Aschers. ex Boiss. Fl. Or. V, 580.

Eragrostis poaloides Trin. in Mem. Acad. Petersb. ser. 6, I (1830) 404.

Eragrostis vulgaris var. megastachya Coss. & Dur. Fl. Alger. 148.

Poa cilianensis All. Fl. Pedem. II, 246, t. 91, f. 2.

Poa elegans Herb. Wight and Herb. Hamilt. ex Wall. Cat. n. 3828 C.D.

Poa eragrostis Cav. Ic. I, 63, t. 92; Sibth. Fl. Graec. t. 73.

Poa flexuosa Roxb. Fl. Ind. I, 339.

Poa multiflora Forsk. Fl. Aeg.-Arab. 21.

Poa polymorpha Koen. ex Wall. Cat. n. 3828 A.

Poa Roxburghiana Schult. Mant. II, 315.

Poa subsecunda Herb. Ham. ex Wall. Cat. n. 3828 D.
Poa tortuosa Spreng. Syst. Veg. I, 345.
Megastachya Eragrostis Beauv. Agrost. 74.
Briza Eragrostis Linn. Sp. Pl. 70; Schreb. Beschr. Graes. II, 74.
Briza oblonga Moench. Meth. 185.
Eragrostis Wall. Cat. n. 3828, 3837.

Description:—Annual; stems 1-3 feet high, usually stout and branched, leafy, erect or geniculately ascending, smooth, polished. Leaves reaching 8 by $\frac{1}{3}$ inch, narrowed to a fine point, flat, smooth, flaccid, glandular along the margins; sheaths sparingly bearded; ligule a ciliolate ridge.

Panicle 2-8 inches long, erect, oblong or ovate-oblong, open or sometimes contracted, usually stiff; rhachis strict, rather stout, smooth; branches spreading or suberect, capillary, stiff or flexuose, again branching from near the base, the branchlets short, capillary. Spikelets $\frac{1}{6}$-$\frac{1}{4}$ inch long with 6-8 glumes, to linear oblong, rather narrowed upwards, and $\frac{1}{3}$-$\frac{1}{2}$ inch long or more with many (up to 60) glumes, olive grey or yellowish; rhachilla tough, zigzag, the internodes short, smooth. Involucral glumes ovate, acute, with scabrid keels; lower smaller than the upper, 1-(sometimes 3-) nerved; upper slightly larger than the lower, 3-nerved; floral glumes broadly ovate, acute, sometimes apiculate, $\frac{1}{12}$ inch long, strongly nerved; palea obovate, much curved, shorter than its glume, with ciliolate keels. Stamens 3; anthers $\frac{1}{60}$ inch long.

Grain globose, $\frac{1}{40}$ inch in diameter, microscopically rugulose, reddish-brown.

Locality:—Aden (Birdw.).

Distribution:—S. Europe, tropical and subtropical Asia, ascending to 5,200 feet in the Himalaya.

11. Desmostachya Stapf.[1]

Perennial, branched at the base; branches covered with leathery sheaths at or above the base and with a tuft of coarse leaves.

[1] Stapf. (in This.-Dyer Fl. Cap. VII, 632) has the following remark regarding this new genus: "The only species of this genus D. bipinnata Stapf, was originally described as Uniola bipinnata by Linnaeus. Subsequently it has been redescribed in, or referred to, at least 5 other genera, *viz.*, Poa, Briza, Cynosurus, Eragrostis and Leptochloa. Hochstetter pointed out the affinity to the latter genus in Flora, 1855, 422. My recent researches in Eragrostis have convinced me that it is one of the links which connect Eragrosteæ and Chlorideæ (especially the Leptochloa group), and I have (following Sir Joseph Hooker's example in the case of Myriostachys) now separated Desmostachya generically from Eragrostis, where, under the name of E. cynosuroides, Beauv., it represented a separate section, Desmostachya in Hook. f. Fl. Brit. Ind."

Panicle spike-like, often interrupted below; branches (spikes) more or less spreading, irregularly approximate or spirally arranged on a stiff axis, persistent; spikelets on the lower side of, and often at right angles to the rhachis, closely packed, light straw-coloured or tinged with brown or purple, often very many-flowered. Spikelets linear, strongly laterally compressed, closely imbricate, alternate-sessile or subsessile on and falling entire from the slender rhachis of secund more or less distinctly 2-ranked spikes which are crowded into long narrow spike-like panicles; rhachilla tough. Florets numerous, hermaphrodite, rather loose. Glumes very unequal, membranous, 1-nerved, keeled. Valves ovate, acute or subacute, entire, muticous, rigidly membranous, 3-nerved, acutely keeled, glabrous, side-nerves evanescent upwards. Paleæ slightly shorter than the valves, 2-keeled. Lodicules 2, rather large, asymmetric, hyaline, nerved at the base. Stamens 3. Ovary glabrous; styles distinct, slender; stigmas plumose, laterally exserted.

Grain loosely enclosed by the scarcely altered valve and palea, obliquely ovoid, obtusely triquetrous; pericarp thin, adnate to the seed; embryo about ⅓ the length of the grain, hilum small, basal, punctiform.

Species 1.

Distribution :—Syria, Mesopotamia, from Egypt southwards to East Tropical Africa and eastwards to India (from Peshawar and Sind to Burma and southward in hot and dry places).

1. Desmostachya bipinnata Stapf. in This.-Dyer Fl. Cap. VII, 632.

Eragrostis cynosuroides Beauv. Agrost, 71 (1812); Steud. Syn. Gram. 264; Wight Cat. n. 1774, 1774b.; Trin. in Mém. Acad. Pétersb. ser. 6, I (1831) 415; Dalz. & Gibs. Bomb. Fl. 298; Aitchis. Cat. Panj, 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; Stapf in Hook. Fl. Brit. Ind. VII, 324; Woodr. in Journ. Bomb. Nat. Hist. Soc. XIII (1901) 441; Prain Beng. Pl. 1221; Watt. Dict. Econ. Prodr. III, 253; Cooke Fl. Bomb. Pres. II, 1029; Durand & Barratte Fl. Libycæ Prodr. (1910) 265.

Poa cynosuroides Retz. Obs. IV, 20; Roxb. Fl. Ind. I, 333; Del. Fl. Aegypt. 159, t. 10; Grah. Cat. Bomb. Pl. 236; Kunth Enum. Pl. I, 227.

Leptochloa bipinnata Hochst. in Flora XXXVIII (1855), 422.

Briza bipinnata Linn. Syst. Nat. X, 875.

Cynosurus durus Forsk. Fl. Aegypt.-Arab. 21.

Dactylis interrupta Herb. Rottl. (ex Stapf. in Fl. Brit. Ind.).

Uniola bipinnata Linn. Sp. Pl. ed. 2, 104.

Eragrostis bipinnata Muschler in Abhandl. d. bot. Vereins d. Prov. Brandenb. vol. 40 (1907) 74.

Eragrostis affine Wall. Cat. n. 3821.

Eragrostis eragrostoides Wall. Cat. n. 5016.

Characters of the genus.

Locality :—Aden (Birdw.).

12. Halopyrum Stapf.

A tall stout perennial glabrous grass with a branching creeping sheathed rootstock. Leaves narrow, rigid, convolute.

Spikelets large, many-flowered, sessile or shortly pedicellate on the short alternate branches of an elongate panicle, ovoid, strongly laterally compressed, not joined on their pedicels, nor are the pedicels jointed on the branches; rhachilla articulate at the base and between the flowering glumes, silky hairy. Glumes many, closely distichously imbricate, dorsally rounded, coriaceous, keeled; involucral glumes subequal, ovate-lanceolate, acuminate or apiculate; lower involucral glume 1-3-nerved; upper involucral glume 5-nerved; floral glumes 6-10, rather shorter than the involucral, mucronulate, 3-nerved; palea as long as the glume, subacute, 2-keeled. Lodicules 2, obcordate. Stamens 3. Styles short, free; stigmas elongate.

Grain ellipsoid, compressed, deeply hollowed anticously, free.

Species 1.

Distribution :—Coasts of India and Ceylon, Arabia, Tropical Africa.

1. **Halopyrum mucronatum** Stapf in Hook. Ic. Pl. t. 2448 (1896); in Hook. Fl. Brit. Ind. VII, 328; Cooke Fl. Bomb. Pres. II, 1029.

Brizopyrum mucronatum Nees in Wall. Cat. Herb. Ind. n. 8898; Wight Cat. n. 2386.

Desmazeria unioloides Defl. Voy. Yemen 220.

Eragrostis mucronata Trim. Cat. Ceyl. Pl. 109 (non Roem. & Schult.).

Eragrostis mucronata (L.) Benth. & Hook. according to Krause in Engl. Bot. Jahrb. XXXV, 24.

Uniola mucronata Linn. Sp. Pl. ed. 2, 104; Kunth Enum. Pl. I, 425; Steud. Syn. Gram. 281.

Triticum repens Thw. Enum. Pl. Zeyl. 376.

Aeluropus Aitchis. Cat. Panj. Pl. 169.

Eragrostis sp. Sect. Sclerostachya Benth. & Hook. in Gen. Pl. III, 1187.

Description :—Rootstock sending up hard woody stems 12-18 inches high and as thick as a crow-quill, smooth, shining, with strict vermiform roots, the branches often fascicled and clothed at the base with pale coriaceous mucronate sheaths. Leaves 8-12 by $\frac{1}{8}$-$\frac{1}{6}$ inch, convolute (rarely flat), very narrow, glaucous, coriaceous, striate, quite smooth; sheaths terete, appressed, striate, hard with villous mouth; ligule a few hairs.

Panicle 12-16 inches long, erect or nodding; rhachis and branches quite smooth, angular, wiry. Spikelets $\frac{1}{2}$-$\frac{5}{8}$ inch long, flat, sessile or shortly pedicellate, 10-15-flowered, smooth, white or pale-yellowish; rhachilla very short, the hairs half as long as the glumes. Lower involucral glume $\frac{1}{4}$ inch long, scarcely longer than the lowest flowering glume, ovate-lanceolate, apiculate; upper involucral glume $\frac{1}{3}$ inch long, strongly 5-nerved.

Flowers and fruits in December (Schweinf.).

Locality :—Eastern shore of the isthmus north of Barrière Gate on small dunes and sandhills forming large bushes with stolons often reaching 3 feet and more (Schweinf.); without locality (Defl., Birdw.).

Distribution :—S. Arabia, N. India.

13. Cynodon Pers.

Perennial glabrous grasses; stems creeping, rooting at the nodes and arising from the fascicles of barren shoots and flowering stems.

Spikes 2-6, in terminal umbels. Spikelets 1-flowered, laterally compressed, sessile, imbricate, alternately 2-seriate and unilateral on a slender keeled rhachis; rhachilla disarticulating above the involucral glumes, produced or not beyond the floral glume. Floret hermaphrodite. Involucral glumes narrow, keeled, acute or subulato-mucronate, the upper usually deciduous with the floral glume, the lower subpersistent; floral glume exceeding the involucral glumes, navicular, firmly membranous, 3-nerved, awnless, the keel ciliate; palea somewhat shorter than the glume, 2-keeled. Lodicules 2, minute, obovate-cuneate, glabrous. Stamens 3. Ovary glabrous; styles distinct, slightly shorter than the plumose stigmas.

Grain oblong, subterete, free within the glumes.

Species 2.

Distribution :—One species in S. Africa, the other almost cosmopolitan.

1. **Cynodon dactylon** Pers. Syn. I, 85; Kunth Enum. Pl. I, 259, Suppl. 203, t. 16, f. 1; Reichb. Ic. Fl. Germ. t. 26, f. 1404; Wall.

Cat. n. 3803; Dalz. & Gibs. Bomb. Fl. 297; Griff. Notul. III, 50, Ic. Pl. Asiat. t. 139, f. 204; Thwaites Enum. Pl. Zeyl. 371; Trim. Cat. Ceyl. Pl. 109; Aitchis. Cat. Panj. Pl. 160; Duthie Grass. N.-W. Ind. 32, Fodd. Grass. N. Ind. 52; Lisboa in Journ. Bomb. Nat. Hist. Soc. VII (1893) 366; Benth. Fl. Hongk. 428, Fl. Austral. VII, 609; Hook. Fl. Brit. Ind. VII, 288; Cooke Fl. Bomb. Pres. II, 1032; Nees Fl. Afr. Austral. 241; Steud. Syn. Pl. Glum. I, 212; Engl. Hochgebirgsfl. Trop. Afr. 132; Durand & Schinz Consp. Fl. Afr. V, 856; Engl. Pfl. Ost. Afr. A. 11, 79; B. 78; C. 110; Stapf. in This.-Dyer Fl. Cap. VII, 634.

Cynodon erectus Presl Rel. Haenk. I, 290; Kunth Enum. Pl. I, 260.

Cynodon filiformis Voigt Hort. Suburb. Cal. 712.

Cynodon linearis Willd. Enum. Hort. Berol. 90; Wight Cat. n. 1750.

Cynodon maritimus H. B. and K. Nov. Gen. et Spec. I, 170.

Cynodon occidentalis Willd. ex Steud. Nom. ed. 2, I, 463.

Cynodon portoricensis Willd. ex Steud. l. c.

Cynodon radiatus Roth. Nov. Pl. Sp. 38; Kunth Enum. Pl. I, 260.

Cynodon repens Dulac. Fl. Haut. Pyr. 76.

Cynodon sarmentosus S. F. Gray Nat. Arr. Brit. Pl. II, 100.

Cynodon stellatus Willd. Enum. Hort. Berol. 90; Kunth Enum. Pl. I, 260.

Cynodon virgatus Nees ex Steud. Syn. Gram. 213.

Cynodon pascuus Nees. Agrost. Bras. 425; Kunth Enum. Pl. I, 259; Nees Fl. Afr. Austr. 243; Steud. Syn. Pl. Glum. I, 212; Durand & Schinz Consp. Fl. Afr. V, 857.

Cynodon glabratus Steud. Syn. Pl. Glum. I, 212; Durand & Schinz Consp. Fl. Afr. V, 857.

Chloris Cynodon Trin. Gram. Unifl. 229.

Chloris maritima Trin. l. c. 226.

Fibichia umbellata Koel. Gram. Gall. et Germ. 308.

Dactylon officinale Vill. Hist. Pl. Dauph. II, 69.

Digitaria Dactylon Scop. Fl. Carn. ed. 2, I, 52.

Digitaria littoralis Salisb. Prodr. 19.

Digitaria maritima Spreng. Syst. I, 272.

Digitaria radiata Spreng. l. c. 272.

Digitaria stolonifera Schrad. Fl. Germ. I, 165, t. 3, f. 9; Steud. in Flora (1829) II, 468.

Panicum dactylon Linn. Sp. Pl. 58; Thunb. Prodr. I, 19; Fl. Cap ed Schult. 103; Host. Gram. Austr. II, 15, t. 18; Sibth. Fl.

Graec. 45, t. 60; Engl. Bot. t. 840; Knapp Gram. Brit. t. 13; Grah. Cat. Bomb. Pl. 236; Roxb. Fl. Ind. I, 289.

Panicum lineare Burm. Fl. Ind. 25, t. 10, f. 2.
Paspalum dactylon DC. Fl. Franc. III, 16.
Paspalum praecox Walt. Fl. Carol. 75.
Paspalum umbellatum Lam. Illustr. I, 177.
Agrostis bermudiana Tussac ex Kunth l. c. 259.
Agrostis filiformis Koen. ex Kunth l. c. 261.
Agrostis linearis Retz. Obs. IV, 19.
Agrostis stellata Willd. Sp. Pl. I, 376.

Names:—Creeping Panic Grass, Bermuda Grass.

Description:—Culms from a few inches to 1 foot long, slender, glabrous, smooth, many-noded, the lower internodes very short, enclosed, the upper 3-4 much longer, more or less exserted; leaves usually conspicuously distichous on the barren shoots and at the base of the culms; sheaths tight, glabrous or hairy, often bearded at the mouth; ligule a very fine ciliate rim; blades linear, finely acute to pungent, 1½-6 inches by 1-1½ lines, very rigid to flaccid, folded or convolute or flat, more or less glabrous or hairy, smooth below, scaberulous above.

Spikes 2-6, straight, ½-2½ inches long; rhachis pubescent at the base, keel and margins scabrid or the keel smooth; spikelets light green or purplish, ⅞-1⅛ lines long; rhachilla produced, very slender, equalling ½ the length of the spikelet; glumes lanceolate, acute to subulate-mucronate, the lower ½-¾ lines long, the upper usually slightly longer, keels scabrid or smooth; valve obliquely oblong to semi-ovate, subobtuse or minutely apiculate, about 1 line long, keel ciliate; keels of palea scaberulous; anthers oblong, ½ inch long. Grain ½ line long.

Locality:—Aden (Birdw.).

Distribution:—Almost cosmopolitan.

Uses:—Having great fattening and milk-producing qualities this plant is a very valuable fodder grass. The plant is also used medicinally and a cooling drink is said to be prepared from the roots.

14. Chloris Sw.

Annual or perennial grasses. Leaves flat or convolute.

Spikes solitary or several, in terminal umbels or short racemes, erect or stellately spreading. Spikelets of 2-4 florets (1 only or rarely more fertile), sessile, crowded, unilateral, 2-seriate on a slender rhachis; rhachilla disarticulating above the involucral glumes, more or less

produced; lowest floret hermaphrodite, the second male or barren (rarely fertile), the following if present barren, often minute. Involucral glumes 2, persistent, narrow, keeled, membranous, 1-nerved, acute, mucronate or the upper awned. Hermaphrodite floret: floral glume narrow or broad, 3-nerved, acute or obtuse, minutely 2-toothed, usually awned from below the apex, often ciliate; palea almost equalling the glume, 2-keeled. Lodicules 2, minute. Stamens 3. Ovary glabrous; styles distinct, short; stigmas laterally exserted. Male floret: glume and palea as in the hermaphrodite flower, but smaller and glabrous. Rudimentary florets glabrous, awned or awnless, small to minute, usually without a trace of a pale.

Species between 40 and 50.

Distribution :—Tropical and subtropical regions of both hemispheres.

1. **Chloris villosa** Pers. Syn. I, 87; Kunth Enum. Pl. I, 267, Suppl. 217, t. 16, f. 3; Jaub. & Spach Ill. Pl. Or. IV, 40, t. 327; Coss. & Dur. Fl. Alger. 87; Steud. Syn. Pl. Glum. I, 204; Aitchis. Cat. Panj. Pl. 167; Schweinf. Beitr. Fl. Aethiop. 298; Aschers. & Schweinf. Ill. Fl. d'Eg. 170; Hook. Fl. Brit. Ind. VII, 291; Cooke Fl. Bomb. Pres. II, 1034.

Chloris tetrapogon Beauv. Agrost. 158.

Tetrapogon villosus Desf. Fl. Atlant. II, 388, t. 255; Anders. Journ. Linn. Soc. V, Suppl. p. 40; Trin. Fund. Agrost. 760; Boiss. Fl. Or. V, 555; Duthie Grass. N. W. Ind. 33; Fodd. Grass. N. Ind. 55, t. 68; Krause in Engl. Bot. Jahrb. XXXV, 24; Blatter in Journ. Bomb. Nat. Hist. Soc. XVII, 920.

Description :—Perennial, stout; stems 6-10 inches long from a densely tufted stout woody base, clothed with equitant leaf-sheaths. Leaves 1-3 by $\frac{1}{16}$-$\frac{1}{10}$ inch, linear, acute, flat, convolute or twisted, rigid; ligule obscure.

Spikes 1-3, erect, pale-yellow, $1\frac{1}{2}$-$2\frac{1}{2}$ by $\frac{1}{3}$-$\frac{1}{2}$ inch. Spikelets $\frac{1}{8}$ inch long, obconic, with 4 unequal awns. Glumes 6; lower involucral glume $\frac{1}{8}$ inch long (including a short awn), oblong-lanceolate, hyaline; upper involucral glume $\frac{1}{6}$ inch long, oblong, hyaline, 2-toothed at the tip and shortly awned; glume of the hermaphrodite floret $\frac{1}{8}$ inch long, broadly ovate or suborbicular, concave, with an awn $\frac{1}{4}$ inch long or more, and broad hyaline margins bounded by the lateral nerves, hirsute all over with long silky hairs which are much longer than the glume; the palea elliptic-obovate with ciliate margins, hyaline; the 4th glume barren, about $\frac{1}{2}$ as long, also hirsute, the 5th small, cuneate, the 6th reduced to an awn.

Locality :—Above the coal-depôts of the Messag. Marit. (Schweinf.) ; Flag-staff on top of the Shum Shum Range and in a valley south-west of the Tower of Silence (Defl.) ; top of Shum Shum Range (Busse) ; without locality (Hooker, Thomson).

Distribution :—Canaries, Morocco, Algeria, Egypt, Abyssinia, Eritrea, S. Arabia, S. Persia, Sind, Punjab, Rajputana.

15. Eleusine Gaertn.

Annual or perennial ; leaves long, flat or folded, flaccid or firm.

Spikelets, 3-12-flowered (flowers all perfect except the terminal), sessile, 2-3-seriate and secund, forming digitate capitate or whorled spikes laterally compressed, not jointed at the base. Rhachilla disarticulating above the glumes and between the valves, or tough, produced, sometimes terminating with a rudimentary valve. Florets hermaphrodite. 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. Valves very similar, 3-nerved near the base ; lateral nerves submarginal above, with 1-2 short additional nerves, close to the keel. Paleæ slightly shorter than the valves, 2-keeled, keels winged. Lodicules 2, minute, cuneate, Stamens 3. Ovary glabrous, styles slender from a broadened base, distinct ; stigmas plumose, laterally exserted.

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 about 7.

Distribution :—Tropical Africa and Asia ; one widely spread through the tropics.

1. **Eleusine aegyptiaca** Desf. Fl. Atlant. I, 85 ; Graham Cat. Bomb. Pl. 235 ; Roxb. Fl. Ind. I, 344 ; Wall. Cat. n. 3818 ; Griff. Notul. III, 51, Ic. Pl. Asiat. t. 139, f. 79 ; Trim. Cat. Ceyl. Pl. 109 ; Benth. Fl. Austral. VII, 615 ; Duthie Grass. N. W. Ind. 34 ; Fodd. Grass. N. Ind. 56, t. 35 ; Lisboa in Journ. Bomb. Nat. Hist. Soc. VII (1893), 374 ; Prain Beng. Pl. 1229 ; Hook Fl. Brit. Ind. VII, 295 ; Cooke Fl. Bomb. Pres. II, 1038.

Eleusine ciliata Rafin. in Desv. Journ. Bot. IV (1814), 273.

Eleusine cruciata Lamk. Illustr. I, 203, t. 48, f. 2.

Eleusine mucronata Stokes Mat. Med. I, 150 ; Lisboa in Journ. Bomb. Nat. Hist. Soc. VII (1893), 376.

Eleusine pectinata Moench Meth. Suppl. 68.

Eleusine prostrata Spreng. Syst. I, 350.

Eleusine radulans Br. Prodr. 186.

Dactyloctenium aegyptiacum Willd. Enum. Pl. Hort. Berol. 1029; Beauv. Agrost. 72, t. XV, f. 2; Kunth Enum. Pl. I, 261, Suppl. II, 204; A. Rich. Tent. Fl. Abyss. II, 406; Steud. Syn. Pl. Glum. I, 211; Grah. Cat. Bomb. Pl. 235; Dalz. & Gibs. Bomb. Fl. 297; Thw. Enum. Pl. Zeyl. 371; Aitchis. Cat. Panj. Pl. 167; Miq. Fl. Ind. Bat. III, 384; Anders. Journ. Linn. Soc. V, Suppl. p. 41; Boiss. Fl. Or. V, 556; Griseb. Fl. Brit. W. Ind. 540; Baker Fl. Maurit. 452; Schweinf. in Bull. Herb. Boiss. II, Append. II, 34; Durand & Schinz Consp. Fl. Afr. V, 868; Hal. Consp. Fl. Graec. III, 337; Coss. & Dur. Fl. Alg. Glum. 85; Batt. & Trab. Fl. Alg. II, 188; Stapf. in This.-Dyer Fl. Cap. VII, 646; Krause in Engl. Bot. Jahrb. XXXV, 25; Durand & Barr. Fl. Libyc. Prodr. (1910), 261.

Dactyloctenium distachyum Bojer Hort. Maurit. 370.

Dactyloctenium Figarei De Not. Catal. Sem. Hort. Genuens. 1847, and in Ann. Sc. Nat. ser. 3, IX (1848), 325; Steud. l. c.

Dactyloctenium meridionale Ham. Prodr. Pl. Ind. Occ. 6.

Dactyloctenium mucronatum Willd. Enum. Pl. Hort. Berol. 1029; Trin. Sp. Gram. Ic. t. 69; Nees Fl. Afr. Austral. 150; Steud. Syn. Pl. Glum. 212; Anderss. in Peters Reise Mossamb. Bot. 555; Wight Cat. n. 1761.

Dactyloctenium prostratum Willd. l. c.; Steud. l. c.

Dactyloctenium radulans Beauv. Agrost. 72; Kunth l. l. c. c. 262, 204; Steud. l. c.

Cynosurus aegyptius Linn. Sp. Pl. 72.

Cynosurus Cavara Herb. Ham. ex Wall. Cat. l. c. B.

Cynosurus Macara Herb. Ham. l. c. C.

Cynosurus distachyus Rottl. ex Steud. Nom. ed. 2, I, 465.

Chloris mucronata Mich. Fl. Am. Bor. I, 59.

Cenchrus aegyptius Beauv. Agrost. 157.

Rhabdochloa mucronata Beauv. Agrost. 84.

Aegilops saccharinus Walt. Fl. Carol. I, 249.

Arabic name :—Areija.

Description :—Annual of variable habit, 1-1½-feet high; stems sometimes prostrate, rooting from the proliferously branched nodes, geniculately ascending, compressed, glabrous smooth. Leaves linear, 1-5 by $\frac{1}{12}$-$\frac{1}{6}$ inch, tapering to a fine point, flat, glaucous, glabrous or hairy or hispidly ciliate with bulbous-based hairs; ligule a slightly ciliolate line.

Spikes 2-6, digitately radiating, ½-1½-inches long; rhachis trigonous or dorsally flattened, rigid, often excurrent into a pungent

mucro. Spikelets many, 3-5-flowered, spreading at right angles to the rhachis, up to $\frac{1}{8}$ inch long. Glumes divaricate ; lower involucral glume ovate, acute, $\frac{1}{12}$ inch long ; upper involucral glume $\frac{1}{12}$ inch long (excluding the awn), suborbicular, the midnerve produced into a usually curved awn often as long as or sometimes longer than the glume ; floral glumes gibbously ovate, up to $\frac{1}{8}$-inch long, mucronate or awned ; palea rather shorter than its glume, ovate-oblong, obtuse or 2-fid. Anthers about $\frac{1}{20}$-inch long.

Grain subglobose, reddish, very rugose, $\frac{1}{25}$-inch in diameter.

Locality :—Flag-staff on top of Shum Shum Range, Goldmore Valley (Deff.) ; great valley between Steamer Point and town (Marchesetti) ; without locality (Hooker, Thomson).

Distribution :—Widely spread throughout tropical and subtropical regions (Tunis, Algeria, S. Italy, Sicily, Greece, Syria, Arabia, Egypt, Nubia, Abyssinia, Sind, Deccan, Konkan, etc.)

16. Enneapogon Desv.

Perennial, rarely subannual ; blades usually narrow, often convolute; ligules reduced to a line of hairs.

Panicle contracted, more or less spike-like, elegantly bristly-plumose from the numerous awns. Spikelets 3-flowered ; rhachilla disarticulating above the glumes, minutely scaberulous or almost smooth. Lowest floret hermaphrodite, the intermediate male or barren, the uppermost rudimentary, minute. Glumes 2, persistent, membranous, acute or obtuse or minutely truncate, 3-5 or sub-7-nerved. Hermaphrodite floret : valve very broad, rounded on the back, rather firm, more or less villous, 9-nerved, 9-awned ; awns subulate, equal or subequal, plumose, ciliate or scaberulous ; callus minute, short, pale oblong, 2-keeled, exceeding the valve ; lodicules 2, minute, cuneate, fleshy ; stamens 3 ; ovary glabrous ; styles distinct, short ; stigmas laterally exserted, loosely plumose. Second floret like the lower, but the valve about $\frac{1}{2}$ as long, glabrous, the ovary rudimentary or suppressed. Uppermost floret reduced to a tuft of minute awns.

Grain oblong, dorsally more or less compressed ; hilum punctiform, subbasal ; embryo large, occupying $\frac{3}{4}$ or more of the front.

Species about 6.

Distribution :—In the dry and warm regions of the Old World and in Australia, one in Western North America.

1. **Enneapogon brachystachyus** Stapf in This.-Dyer Fl. Cap. VII, 654.

Pappophorum phleoides Trin. in Spreng. Neue Entdeck. II, 73; Gram. Gen. 91, et in Mém. Acad. Pétersb. ser. 6, I (1831), 91; Kunth Enum. I, 254 (non Cav. neque Steud.).

Pappophorum brachystachyum Jaub. & Spach in Ann. Sc. Nat. ser. 3, XIV(1850), 365; Illustr. Pl. Or. IV, 34; Steud. Syn. Pl. Glum. I, 200; Durand & Schinz Consp. Fl. Afr. V, 870; Boiss. Fl. Or. V, 558; Hook. Fl. Brit. Ind. VII, 302; Blatter in Journ. Bomb. Nat. Hist. Soc. XVII (1907), 920.

Pappophorum figarianum Fig. & De Not. in Mem. Ac. Torin. ser. 2, XII (1852), 254.

Pappophorum bulbosum Fig. & De Not. l. c.

Pappophorum vincentianum Schmidt Beitr. Fl. Cap. Verd. Ins. 144; Durand & Schinz l. c. 871.

Pappophorum nanum Steud. l. c.; Edgew. in Journ. Linn. Soc. VI (1862), 196.

Pappophorum senegalense Steud. l. c.; Durand & Schinz l. c. 871.

Description :—Perennial, often compactly cæspitose, all parts finely glandular pubescent, rarely subglabrous; culms fascicled, geniculately ascending, 2-6 inches long, slender, often with a bulbous thickening at the base, 2-4-noded, simple or sparingly branched below, internodes mostly exserted; leaves mostly near the base; sheaths tight or those at the base of the branches loose, finely striate, nodes pubescent to villous; blades very narow, linear, finely attenuated, 1-5 inches long, usually setaceously convolute, sometimes more or less scabrid.

Panicle spike-like, ½-1½ inches by 3-5 lines, dense, light to dark grey; spikelets 1¾-2 lines long; glumes subequal, oblong, obtuse or emarginate, scantily pubescent, thin, usually 5-(rarely 3- or 7-) nerved, side-nerves evanescent above; lower valve ¾ line long, shortly villous; awns about 1-1½-lines long, shortly plumose to or beyond the middle; palea 1 line long, keels scabrid; anthers ellipsoid-oblong, ⅛-⅙ line long. Grain almost ½ line long.

Locality :—Aden (Birdw.).

Distribution :—South Africa, Kalahari Region, Senegambia, Cape Verde, North Africa, Arabia, Panjab, Rajputana, Central Asia.

17. Aeluropus Trin.

Low, much-branched, very rigid perennial leafy grasses. Leaves distichous, short, strict, usually convolute, coriaceous, pungent.

Spikelets 6-many-flowered, minute, sessile, densely crowded in terminal villous heads, laterally compressed, not articulate at the base; rhachilla obscurely jointed at the base, not produced beyond the upper

glume; internodes very short. Glumes many, oblong, membranous, apiculate, the margins and tips broadly hyaline. Involucral glumes unequal, persistent, lower one narrowly oblong, 1-3-nerved, upper one much larger, 5-7-nerved from below the hyaline tip; floral glumes oblong, apiculate, 7-9-nerved; palea very large, broadly cuneate, 3-lobed, the lobes erose, flaps broad, keels nearly smooth or ciliolate. Lodicules obliquely truncate. Stamens 3; anthers minute. Styles short, free; stigmas short, plumose. Grain oblong or obovoid, free within the glumes.

Species few.

Distribution:—From the Mediterranean and Caspian regions to the Punjab, Sind, S. India and Ceylon.

Spikelets 4-8-flowered	1. A. villosus.
Spikelets 9-12-flowered	2. A. littoralis.

1. Aeluropus villosus Trin. ex C. A. Mey. Verz. Pfl. Cauc. 18; Aitchis. Cat. Panj. Pl. 169; Hook. Fl. Brit. Ind. VII, 334; Trim. Fl. Ceyl. V, 304; Woodr. in Journ. Bomb. Nat. Hist. Soc. XIII (1901), 441; Cooke Fl. Bomb. Pres. II, 1045.

Aeluropus arabicus Steud. Nomencl. Bot. ed. 2, I, 30; Anders. Journ. Linn. Soc. V, Suppl. p. 42; Boiss. Fl. Or. V, 595.

Aeluropus brevifolius Wall. Cat. n. 8897; Wight Cat. n. 1792 (non Herb. Wight et excl. syn. Dactylis brevifolia, Linn.); Duthie Grass. N. W. Ind. 39.

Aeluropus brevifolius Nees in Steud. Nomencl. Bot. ed. 2, I, 30; Aschers. & Schweinf. Ill. Fl. d'Eg. 173.

Aeluropus concinnus Fig. & de Not. in Mem. Acad. Torin. ser. 2, XII (1852), 257.

Aeluropus siniacus Fig. & de Not. l. c.

Aeluropus lagopodioides Trin. ex Tw. Enum. Pl. Zeyl. 374.

Aeluropus lagopoides Trin. ex Trim. Cat. Ceyl. Pl. 110.

Aeluropus littoralis var. repens Coss. & Dur. Expl. Sc. Alger. 155; Boiss. Fl. Or. V, 594.

Aeluropus mucronatus Aschers. in Schweinf. Beitr. Fl. Aethiop. 297; Boiss. l. c. 595.

Aeluropus niliacus Steud. Nomencl. Bot. ed. 2, I, 30.

Aeluropus niloticus Edgew. in Journ. Linn. Soc. VI (1862), 196.

Aeluropus pubescens Trin. ex Steud. l. c. partim?

Aeluropus pungens C. Koch in Linnæa XXI (1848), 408.

Aeluropus repens Parl. Fl. Ital. I, 462; Edgew. l. c.

Aeluropus bombycinus Fig. & de Not. in Mem. Acad. Torin. ser. 2, XII (1852), 258.

Dactylis lagopodioides Dalz. and Gibs. Bomb. Fl. 298 (excl. syn.).

Dactylis lagopoides Linn. Mant. 38; Roxb. Fl. Ind. I, 340; Grah. Cat. Bomb. Pl. 236 (excl. Syn.).

Dactylis massaviensis Steud. Syn. Gram. 298.

Dactylis repens Desf. Fl. Atlant. I, 79, t. 15.

Poa lagopodioides Kunth Rev. Gram. I, 111; Enum. I, 325.

Poa massavensis Fresen. in Mus. Senckenb. II (1837), 143.

Poa repens Bieb. Fl. Taur. Cauc. III, 69.

Poa tunetana Spreng. Pugill. II, 20.

Calotheca arabica, Calotheca niliaca, Calotheca repens } Spreng. Syst. Veg. I, 347, 348.

Koeleria brevifolia Herb. Wight ex Wall. Cat. n. 8897 C.

Sesleria lagopodioides Spreng. Pugill. II, 22.

Festuca mucronata Forsk. Fl. Aegypt. Arab. 22.

Festuca pungens Vahl Symb. I, 10, t. 2.

Description :—Perennial, rigid, tufted; stems 3-8-inches long, crowded on a woody rootstock with stout root-fibres, as thick as a crow-quill, simple or branched, smooth and polished; branches sometimes elongate, divaricate, 6-10 inches long, resembling stolons, giving off branchlets at the nodes but not rooting; nodes glabrous; internodes short or long. Leaves $\frac{1}{6}$-1 inch long, narrowly lanceolate, acuminate, flat or convolute and subulate, erect or spreading, glabrous or sparsely ciliate; sheaths short, terete or inflated, glabrous or ciliate; ligule a shortly hairy ridge.

Heads of spikelets shortly pedunculate, subglobose or oblong. Spikelets reaching $\frac{1}{8}$-inch long, 4-8-flowered, crowded, sessile, villous with soft hairs, pale green or white. Lower involucral glume $\frac{1}{10}$-inch long, ovate-oblong, subacute, hairy and with ciliate margins; upper involucral glume $\frac{1}{8}$-inch long, similar; floral glumes $\frac{1}{8}$-inch long, ovate, subobtuse, apiculate, many-nerved, hairy and ciliate, the lower 2-4 sometimes neuter; pale, broad, 3-lobed. Anthers $\frac{1}{16}$-inch long, oblong.

Grain $\frac{1}{40}$-inch long, obovoid-oblong, dorsally compressed.

Flowers and *fruits* :—December (Schweinf.).

Locality :—In sandy places (Anders.); Shaikh Othman (Defl.); very common on sand fields along the coast of Shaikh Othman (Schweinf.).

Distribution :—Mediterranean and Caspian regions, Upper Egypt, Nubia, Central and S. Arabia, Persia, Afghanistan, Sind, Punjab, W. Peninsula of India, Ceylon.

2. **Aeluropus littoralis** Parl. Fl. Ital. I, 461; Batt. & Trab. Fl. d'Alg. 75; Boiss. Fl. Or. V, 591; Pojero Fl. Sic. (1909), 332.

Dactylis littoralis Willd. Sp. Pl. I, pars 1, 408; Roem. & Scnult. Syst. Veg. II, 628; Bert. Amœn. Ital. 238; Pollin. Fl. Veron. I, 116; Tent. Fl. Nap. III, 72; Guss. Pl. Rar. 30, et Fl. Sic. Prodr. I, 100 (excl. syn. Cup. et Bon.); Lois. Fl. Gall. ed. 2, I, 69; Boiss. Voy. en Esp. 664; Vis. Fl. Dalm. I, 77; Guss. Fl. Sic. Syn. I, 91;

Poa littoralis Gouan Fl. Monsp. 470; Savi Bot. Etrusc. II, 53; Moric. Fl. Venet. I, 52; Nacc. Fl. Venet. I, 70; Kunth Enum. Pl. I, 324 (excl. Syn. Desf.).

Dactylis maritima Schrad. Fl. Germ. I, 313; Roem. & Schult. Syst. Veg. II, 627; Reich. Fl. Germ. Excurs. I, 36.

Festuca littoralis Sibth. & Smith Fl. Graec. I, 63 (excl. syn. Desf.)

Dactylis distichophylla Brign. Fasc. Pl. Foroj. 16.

Calothea littoralis Spreng. Syst. Veg. I, 347.

Description :—Caespitose, densely intricate, creeping, stoloniferous, the sterile stolons long-prostrate; sheaths as long as the internodes; floriferous culms several, squamose-vaginate at the base (sheaths coriaceous), erecto-ascendent; leaves canaliculate, short, lanceolate, acute, very often distichous-squarrose, hard, glaucous, smooth, mucronato-callose at the apex; ligule pilose.

Panicle terminal or axillary, on a very short peduncle, ovate-oblong, slightly elongate, dense; branches very short, disticho-glomerate. Spikelets glabrous, 9-12-flowered, oblanceolate or lanceolate, short; florets densely imbricate; glumes ovate, acute, concave, carinate, obscurely nerved on the margin; lower palea obsoletely 5-nerved, ovato-mucronate; upper palea bidenticulate.

Locality :—Sandy plain between Barriere Gate and Shaikh Othman (Defl.).

Distribution :—Spain, France, Italy, Greece, Asia Minor, Algeria, Tunis, Egypt, Arabia (not Sind).

LVII.—GNETACEÆ.

Trees or shrubs; branches jointed at the nodes. Leaves opposite, large and green or minute and scale-like; stipules 0.

Flowers 1-sexual, monoecious or dioecious, in axillary or terminal spikes or cones. Male flowers: perianth valvately 2-lobed or spathaceous; stamens connate in a column of united filaments; anthers 2-8, globose, 1-3 celled, sessile or subsessile on the column. Female flowers: a naked erect ovule with 2-3 coats, of which one is produced into a styliform tube with a discoid mouth.

Seed dry or drupe-like; albumen copious or scanty; embryo straight; cotyledons appressed; radicle long, superior.

Genera 3 ; *species* about 40.

Distribution :—In temperate and tropical regions.

1. Ephedra Linn.

Erect or subscandent rigid shrubs ; branches opposite or whorled, terete, striate, with membranous sheaths at the nodes, which often bear narrow leafy blades.

Flowers unisexual, usually dioecious. Male flowers in short bracteate spikelets which are whorled or in pairs. Perianth of 2 opposite compressed membranous sepals. Anthers 2-8, on a central column, 2-celled, opening by a short slit at the apex. Female flowers usually in pairs, sometimes 3 or solitary, each flower consisting of 1 ovule with a single integument prolonged into a styliform tube (tubillus) and enclosed in a bag, each female inflorescence supported by several pairs of decussate bracts.

Fruit in our species fleshy, consisting of several succulent bracts enclosing 1 or 2 seeds. Seeds usually oblong, plano-convex, testa dry.

Species about 30.

Distribution :—Dry regions of Europe, N. Africa, Asia, America.

1. Ephedra foliata Boiss. Fl. Orient. V (1881), 716 ; Stapf, Die Art. d. Gatt. Ephedra (1889) p. 49; Cooke Fl. Bomb. Pres. II, 665.

Ephedra peduncularis Boiss. Fl. Orient. V (1881), 717 ; Hook Fl. Brit. Ind. V, 641.

Ephedra Alte Brandis For. Fl. p. 501, t. 69 (not of C. A. Meyer).

Description :—A dioecious or monoecious climbing shrub reaching 15 feet long or more (rarely prostrate or hanging from walls) ; branches often fascicled, slender ; bark green or glaucescent, smooth, striate ; buds terminal, minute, shortly ovate or more or less elongate. Leaves 2, 3, or 4, shortly connate at the base, 1-1$\frac{1}{6}$ inch long by $\frac{1}{25}$ inch broad, linear-setaceous. Male flowers : spikelets ovate, obtuse, tetragonal, in pairs, or 3 together, or solitary, of various lengths, often with a peduncle 1-1$\frac{1}{2}$ inches long ; flowers 6-24 ; bracts rotund, obtuse, connate for $\frac{1}{3}$-$\frac{1}{2}$ their length, $\frac{1}{16}$-$\frac{1}{12}$ inch long and as broad as long ; perianth obovate, exceeding the bracts ; staminal column equalling the perianth or shortly exserted. Female flowers : floral galbuli in depauperate usually nodding cymes, ovate, on long peduncles or in short fascicles, with 3 pairs of bracts ; flowers usually in pairs, equalling the bracts ; integument at first oblong, obtusely trigonous ; tubillus

exserted, straight, short. Fruit globose, $\frac{1}{4}$ inch in diameter, semitransparent, red or milky white, with 2 dark-coloured seeds.

Flowers :—May 1886 (Defl.), Dec. 1888 (Schweinf.).

Fruits :—Febr. 1851 (Thomson), April 1878 (Perry), May 1886 (Defl.).

Locality :—Ravines west of the Tower of Silence (Defl.) : ravine on the northern side of the Shum Shum Range, trailing in thorny shrubs (Schweinf.) ; without locality (Hook., Birdw., Perry).

Distribution :—Syria, Turkestan, S. Persia, Afghanistan, Western Punjab, Sind.

Note :—The size of the leaves seems to vary a good deal. In Schweinfurth's specimens they measure $\frac{1}{8}$ inch in length, whilst Deflers' plants, collected in the same locality, show leaves of almost $\frac{4}{5}$ inch in length. The leaves of Hooker's specimens measure $\frac{2}{3}$-$\frac{5}{6}$ inch.

Uses :—It has been suggested that the 'soma' of ancient classical writers may have been the astringent stems of Ephedra employed in place of hops, and not as itself the source of the liquor of which so much has been written. (Watt. Dict. Econ. Prod. III, 247-51.)

FUNGI.

Podaxon arabicus Pat. Bull. Soc. Mycol. (1887), p. 122, Saccardo Syll. Fung. IX, p. 268.

Description :—Peridio subgloboso-ovato, 4-5 cm. alto sicco brunneo-rufo, membranaceo, 1-2 mm. cr., apice parce adpresso-squamoso, deorsum usque ad dimidium altitudinis in 5-7 lacinias acutas diviso ; stipite basi incrassato, 12 cm. circ. alt., 1·5 cm subtus diam., apice attenuato, usque ad peridii apicem in columellam producto, durissimo, subligneso, hinc inde scarioso-squamoso, longitudinaliter tenuissime striato-fibroso, flavo-aurantio maculis saturate rubris marmorato, intus floccoso-medulloso ; sporarum massa compacta, brunneo-rufa, cinnabarino-maculata ; sporis globulosis, rufis, laevibus, eguttatis.

Locality :—Shaik Othman (Defl.).

Distribution :—Ad planities sabulosas inter Shaik Othman et Lahej, prope Aden.

LICHENES.

Physcia vulcanica Stnr. Denkschr. Wiener Akad. vol. 71 (1907) p. 94.

Description :—Thallus parvus, subrosulatus et lobatus, centroversus irregulariter areolato-rimosus, ad 1·5 mm latus, v. nonnulli confluentes, omnino adpressus et fere planus, parcius sorediosus, supra cinerec v.

subglauco-albidus, madefactus paullo perlucens, infra pl. m. dilute sordide ochraceus, K H O adh. extus et intus lutescens.

Cortex superior subordinate cellulosus ad 20 μ crassus. Cortex inferior indistinctus, rhizinae nullae. Lobi primarii ad 3-4 mm longi et ad 0·2 mm crassi, marginem versus delatati et cum ramulis ad 3-3·5 mm. lati, plani centroversus h. i. paullo convexuli, ter v. quater subdichotome ramosi, rami contigui et ad apicem dilatati et. pl. m. crenato-incisi. Soralia tenera, subrotunda et marginata vel elongata et confluentia in partibus adultioribus rariora adsunt; soredia alba. Apothecia desunt. Pycnides punctiformes (0·15 mm. lt.), paullo emergentes, nigrae, madef. fuscescentes. Fulcra parmelioidea minora, saepius pauci-articulata. Pycnoconidia bacillaria recta 5·5-9 μ longa et ca. 1 μ crassa, obtusa.

Locality :—On lava of Shum Shum Range (Simony).

Physcia tribacia Nyl. Fl. (1881), p. 537. Ach. Univ. (1810), p. 415 (sub Lecanora).

Description :—P. crusta imbricata albo-incana subtus subfibrillosa, lobis irregularibus difformibus eroso-crenulatis, apotheciis adpressis, disco plano pallido in ambitu demum crenato lobato, margine thallode elevato persistente.

Locality :—On lava of Shum Shum Range (Simony).

Distribution :—Ad truncos arborum et in saxis Helvetiæ, Angliæ.

Ramalia farinacea Ach. Univ. (1810) p. 606.

Parmelia farinacea Ach. Meth. Lich. 263.

Lichen farinaceus Linn. S. N.

Lichen rostratus femina Scop. Fl. Carn. 378.

Description :—R. thallo tereti-compresso glabro sublacunoso soredifero rigido ramoso albo subcinerascente, ramis lineari-attenuatis, apotheciis sparsis pedicellatis planis subimmarginatis albidis.

Locality :—On lava of Shum Shum Range (Simony).

Distribution :—Ad arborum truncos et ramos in Europa.

Caloplaca (Amphiloma) lobulascens Stnr. Denkschr. Wiener. Akad. vol. 71 (1907), p. 95.

Description :—Thallus irregulariter vel interrupte suborbicularis v. fere expansus, squamae parvae ut in Cal. lobulata formatae etiamque h. i. coralloideo-granulosae, sed siccae albescentes, pallide ochraceae v. pallide lutescentes, madef. distincte luteæ et K H O adh. maculatim intus purpurascentes. Apothecia parva ad 0·5 mm. lata v. saepius minora, primum concava et thallo marginata, deinde saepe paullo convexula,

margine thallino demisso. Discus luteus, rarius pl. m. aurantiacus v. varie fuscescens. Paraphyses bene clavatae. Sporæ ut in Cal. lobulata sed crassiores 10-14 μ lg et 6·5—8·5 μ. lt. Pycnides lutescentes tuberculiformes. Fulcra endobasidialia, crebre septata, ramosa. Pycnoconidia elliptica vel ovoidea, 1·8-2 μ longa et 0·5-1 μ lata.

Locality :—On lava of the Shum Shum Range (Simony).

Roccella Montagnei Bélang Voy. Ind. Or. P. 3, p. 117 sec. Darbish. Monogr. Roccell. p. 24.

Description.—Thallus fruticulosus, basi substrato affixus, prothallus bene evolutus, latus 6 mm. crassus 2 mm., strato corticali instructus ex hyphis transversalibus, strato gonidiali et strato medullari laxiore in substratum penetrantibus ; podetia erecta, ramosa, dichotome divisa aut plus minusve fissa, valde complanata, loriformia, membranacea, alta ad 30 mm, lata 1-6 mm, usque ad 5 cm., crass. 0·25-0·5 mm ; virescentia, glauco-viridia ; anastomosantia ; stratum corticale ex hyphis formatum transversalibus ; stratum gonidiale distinctum ; stratum medullare ex hyphis formatum plus minusve longitudinalibus, laxe contextis, 2-5 μ crassis. Apothecia lateralia, orbicularia, superficialia aut saepius marginalia, basi constricta, 1 mm lat.; hypothecium fusco-nigrum 10—300 μ crass. ; parathecium fusco nigrum vel fuscescens, 10 μ crass. ; amphithecium gonidiis instructum ; thecium 80 μ altum ; asci 16 μ lati ; sporæ octonæ, decolores, fusiformes, quadriloculares, longit. 40 μ latit. 4 μ ; paraphysæ ramosæ, thecii 1-1·8 μ lat., epithecii 2·5 μ lat. ; epithecium fuscescens, parce pruinosum, laxe contextum, 40 μ alt. Spermogonia lateralia, simplicia, thallo immersa ; excipulum 10-12 μ crass., discolor ; ostiolum prominulum, fuscescens ; sterigmata simplicia (?) 20 μ alt.

Soralia lateralia, orbicularia, marginalia aut superficialia, 0·5-1 mm lat.; soredia rotundata, 20-40 μ lat. (Ex. Darbish. l. c.).

Locality :—On lava of Shum Shum Range (Simony).

Distribution :—On trees, rarely on maritime rocks.

Africa (Senegambia, Congo Angola, Socotra, Zanzibar, Mozambique, Cape of Good Hope, etc.), India, Ceylon, Sumatra, Java, Philippines, China, Australia (Liverpool River).

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CONTENTS.

	Page.
I.—History of the Botanical Exploration of Aden	1
II.—Physical Aspects of Aden	24
1. Area and Position	24
2. Geology	24
3. Topography	28
4. Conditions of Plant-Life	30
(*a*) Soil	30
(*b*) Rain	32
(*c*) Humidity and Temperature	34
III.—The Vegetation	39
1. Statistical account	39
2. General aspects	51
(*a*) Peninsula of Aden	51
(*b*) Little Aden	56
3. Adaptation	57
4. Flowering season and climate	60
5. Plants and Animals	61
6. Colour of Flowers	62
7. Geographical Relations	63
8. Origin	71
9. Means of dissemination	72
(*a*) Wind	72
(*b*) Water	73
(*c*) Animals	74
(*d*) Man	74
(*e*) Mechanical Propulsion	76
10. Gardening and Cultivation	76
IV.—Systematical Part	81
1. Synopsis of orders	81
2. Description of species	89
V.—Bibliography	406
Index	419

INDEX.

[*Names of families are printed in bold type, synonyms in italics.*]

PAGE.

A

Abutilon denticulatum Planch. . . 123
Abutilon fruticosum (*Fresen.*) *Guill. & Perr.* 123
Abutilon microphyllum A. Rich. . 123
Abutilon *Tournef.* 122
Acacia *Willd.* 188
„ arabica (*Forsk.*) *Willd.* . . 194
Acacia asak Willd. 191
„ *Aucheri* Benth. . . . 192
Acacia eburnea (*L.*) *Willd.* . . 189
„ Edgeworthii (*Edgew.*) *Anders.* 190
Acacia erioloba Edgew. . . . 190
Acacia Farnesiana *Willd.* . . . 195
„ hamulosa (*Willd.*) *Benth.* . 191
Acacia Hunteri Oliv. . . . 191
Acacia læta *R. Br.* 193
„ mellifera (*Forsk.*) *A. Rich.* . 193
„ nubica *Benth.* . . . 192
Acacia nubica β. pubescens A. Terr. . 192
„ *pterygocarpa* Hochst. . . 192
Acacia spirocarpa (*Forsk.*) *Hochst.* . 192
Acacia vera Willd. 194
Acanthaceae 282
Acanthodium spicatum Del. . . 284
Acanthus Delilii Spreng. . . . 284
„ *edulis* Forsk. . . . 284
„ *imbricatus* Edgew. . . 284
Achyranthes corymbosa L. . . . 114
„ *incana* Roxb. . . 303
„ *lanata* Linn. . . . 304
„ *papposa* Forsk. . . 301
„ *tomentosa* Tuckey. . . 303
„ *villosa* Forsk. . . . 304
Adenium *Roem. & Sch.* . . . 240
„ arabicum *Balf. f.* . . 240
Adenium arborescens Ehrenb . . 241
„ *Boehmianum* Schinz. . . 241
„ *Honghel* A. DC. . . . 241
„ „ Bot. Reg. . . 240

PAGE.

Adenium multiflorum Kl. . . . 241
„ *obesum* Anders. . . . 240
Adenium obesum (*Forsk.*) *Roem. & Schult.* 241
Adenium obesum Hook. . . . 240
Adenocheton phyllanthoides Fenzl . 90
Adenoropium glaucum Pohl . . 331
„ *spinosum* Pohl . . 330
Æchmandra velutina Dalz. & Gibs. . 212
Ægilops saccharimus Walt. . . 396
Æluropus *Trin.* 398
Æluropus arabicus Steud. . . . 399
„ *bombycinus* Fig. & De Not. . 399
„ *brevifolius* Nees . . . 399
„ „ Wall. . . 399
„ *concinnus* Fig. & De Not. . 399
„ *lagopoides* Trin. . . . 399
„ *lagopodioides* Trin. . . 399
Æluropus littoralis *Parl.* . . . 400
Æluropus littoralis var. repens Coss. & Dur. 399
„ *mucronatus* Aschers. . . 399
„ *niloticus* Edgew. . . 399
„ *niliacus* Steud. . . . 399
„ *pubescens* Trin. . . . 399
„ *pungens* C. Koch. . . 399
„ *repens* Parl. . . . 399
„ *siniacus* Fig. & De Not. . 399
Æluropus villosus *Trin.* . . . 399
Æluropus sp. Aitchis. . . . 390
Ærua *Forsk.* 302
Ærua ægyptiaca Gmel. . . . 302
„ *Bovii* Edgew. . . . 302
„ *floribunda* Wight . . . 304
„ *incana* Mart. . . . 302
„ *javanica* Wight . . . 302
Ærua lanata *Juss.* 304
„ tomentosa *Forsk.* . . . 302
Æruch 303
Æschynomene grandiflora Linn. . . 176
Agati grandiflora Desv. . . . 176
Agrostis barbata β senegalensis Pers. . 384

PAGE.

Agrostis bermudiana Tussac. . . 393
„ *filiformis* Koen. . . . 393
„ *linearis* Retz. . . . 393
„ *littoralis* Lamk. . . 384
„ *plumosa* Ten. . . . 369
„ *punctata* Lamk. . . . 376
„ *spicata* Vahl . . . 384
„ *stellata* Willd. . . . 393
„ *virginica* Forsk. . . . 384
Albersia caudata Boiss. . . . 300
„ *polygama* Boiss. . . . 300
Albizzia umbrosa Benth. . . . 197
Albuca *Linn.* 342
„ Yerburyi *Ridley* . . . 342
Alcanna spinosa Gærtn. . . . 200
Algarobia glandulosa Torr. . . 196
Alhagi *Tourn.* 177
Alhagi karduchorum Boiss. & Haussk. 178
„ *mannifera* Desv. . . . 178
Alhagi maurorum *Medic.* . . . 178
Alhagi napaulensium DC. . . . 178
Alhenna 200
Amarantaceæ 298
Amarantus *Linn.* 299
Amarantus Blitum var. *polygonoides* Moq. 300
Amarantus polygamus *Linn.* . . 300
Amarantus polygonoides Roxb. . . 300
Amarantus viridis *Linn.* . . . 299
Amblogyna polygonoides Dalz. & Gibs. 300
Amaryllidaceae 338
Amyris gileadensis Linn. . . 150
„ *opobalsamum* Forsk. . . 150
Anabasis *Linn.* 314
„ Ehrenbergii *Schweinf.* . 314
Anarrhinum pedicellatum T. Anders. . 273
Anchusa asperrima Del. . . . 260
„ *hispidissima* Sieb. . . 260
Andropogon *Linn.* 359
Andropogon Arriani Edgew. . . 360
„ *circinnatus* Hochst. & Steud. . . . 260
„ *commutatus* Aitchis. . 360
„ *eriophorus* Willd. . . 360
Andropogon foveolatus *Del.* . . 359
„ Iwarancusa *Jones* . . 360
Andropogon laniger Desf. . . . 360
„ *monostachyus* Spreng. . 359

PAGE.

Andropogon Olivieri Boiss. . . 360
„ *orthos* Roem. & Schult. . 359
Andropogon Sorghum *Brot.* var. bicolor *Hack.* 361
Andropogon strictus Roxb. . . 359
Aniseia calycina Chois. . . . 267
Anisophyllum Forskalii Klotzsch & Garcke 323
Anticharis *Endl.* 274
"*Anticharis arabica* Endl." . . 275
Anticharis arabica *Endl.* . . . 276
Anticharis arabica Hochst. . . 277
Anticharis glandulosa (*Ehrbg. & Hempr.*) *Aschers.* 275
Anticharis glandulosa var. *intermedia* Terr. 276
Anticharis linearis *Hochst.* . . 277
Anticharis Schimperi Endl. . . 276
Antichorus depressus L. . . . 132
Antirrhinum apterum Vatke . . 273
„ *heterophyllum* Schous. . 272
Aobbiana 240
Apocynaceæ 239
Apocynum patula Auch. . . . 244
„ *syriacum* Clus. . . . 244
Arg 158
Argyrolobium *Eckl. & Zeyh.* . . 167
„ arabicum *Jaub. & Spach* 167
Argyrolobium Kotschyi Boiss. . . 168
„ *ornithopodioides* Jaub. & Spach 168
Argyrolobium roseum *Jaub. & Spach* 168
Areija 396
Aristida *Linn.* 376
„ Adscensionis *Linn.* . . 377
Aristida Adscenscionis var. pumila Coss. 379
„ *americana* Linn. . . . 377
„ *arabica* Steud. . . . 378
„ *articulata* Edgew. . . 362
Aristida brachypoda *Tausch.* . . 380
Aristida bromoides H. B. & K. . . 378
„ *cærulescens* Desf. . . 377
„ *caloptila* Boiss. . . . 380
„ *canariensis* Willd. . . 378
„ *chætophylla* Steud. . . 378
„ *ciliata* Steud. & Hochst. . 381
„ *coarctata* H. B. & K. . . 378

PAGE.

Aristida cognata Trin. & Rupr. . . 378
„ *decorata* Steud. . . . 381
„ *depressa* Retz. . . . 377
„ *dispersa* Trin. & Rupr. . 378
„ *divaricata* Jacq. . . . 378
„ *elatior* Cav. . . . 378
„ *festucoides* Hochst. & Steud. . 378
„ *gigantea* Linn. . . . 377
„ *Heymanni* Regel . . . 378
Aristida hirtigluma *Steud.* . . 381
Aristida humilis H. B. & K. . . 378
„ *interrupta* Cav. . . . 378
„ *Kunthiana* Trin. & Rupr. . 382
„ *lanata* Forsk. . . . 382
„ *laxa* Willd. . . . 378
„ *macrochloa* Hochst. . . 378
„ *maritima* Steud. . . . 378
„ *mauritiana* Kunth. . . 378
„ *meccana* Trin. & Rupr. . 382
„ *modatica* Steud . . . 378
Aristida mutabilis Trin. & Rupr. . 382
Aristida nana Steud. . . . 378
„ *nigrescens* Presl. . . . 378
„ *nutans* Ehrenb. & Hempr. 378
„ *paniculata* Forsk. . . 377
Aristida paradisea *Edgew.* . . . 380
„ plumosa *Linn.* . . . 382
Aristida pogonoptila Boiss. . . 381
Aristida pumila *Dene.* . . . 379
Aristida pusilla Trin. & Ruper. . . 378
„ *Raddiana* Savi . . . 382
„ *Schimperi* Hochst. & Steud. . 381
„ *Schweinfurthii* Boiss. . . 382
„ *sericea* Ehrenb. . . . 380
„ *setacea* Trin. . . . 378
„ *simplicissima* Steud. . . 378
„ *spicata* Rottl. . . . 382
„ *Swartziana* Steud. . . 378
„ *Teneriffæ* Steud. . . 378
„ *tenuiflora* Steud. . . . 378
„ *tenuis* Hochst. . . . 383
„ *vulgaris* Trin. & Rupr. . . 378
„ *vulpioides* Hance . . 378
Aristolochiaceæ 316
Aristolochia *Linn.* 316
Aristolochia abyssinica Klotzsch . 317
Aristolochia bracteata *Retz.* . . 316

PAGE.

Aristolochia bracteolata Lam. 316
„ *crenata* Ehrbg. 317
„ *Kotschyi* Hochst. 317
„ *mauritiana* Pers. . 316
„ *maurorum* Klotzsch . 317
„ *sempervirens* Forsk. 317
Arnebia hispidissima (*Spreng.*) DC. . 260
Arthratherum caloptilum Jaub. & Spach . 380
„ *ciliatum* Nees . 381
„ *elatum* Boiss. . . 381
„ *hirtiglume* Jaub. & Spach . . . 381
„ *plumosum* Nees . . 382
„ *pogonoptilum* Jaub & Spach . . 381
„ *Schimperi* Nees . 381
Arthrothamnos Schimperi Schweinf. 325
Aschirák 182
Asclepiadaceae . 241
Asclepias cordata Forsk. . . 248
„ *gigantea* Forsk. . . . 244
„ „ L. . . . 244
„ *laniflora* Forsk. . . . 252
„ *radians* Forsk. . . 247
Assal 106, 308
Assef 108
Atriplex farinosa *Forsk* . . . 307
Awsaj 268
Axonotechium trianthemoides Fenzl. . 215
Azadirachta indica *A. Juss.* . . 145

B

Baccharis indica Linn. . . . 223
Badr-es-Simssim . . . 330
Balm of Gilead . . . 150
Balasan 150
Balsam of Mecca . . . 150
Balsamea abyssinica Engl. . . 148
Balsamodendron abyssinicum Berg. . 148
Balsamodendron gileadense Kunth . 150
„ *Kafal* A. Rich. . 148
„ *opobalsamum* Kunth 150
Balanus myrepsica Belon . . . 161
Banana 338
Barkania punctata Ehrb. . . . 337

PAGE.

Barleria Hildebrandtii *S. Moore* . 386
Bassal er robach 340
Bastard Cedar 144
Batatas maritima Boj. . . . 266
Bead Tree 144
Bermuda Grass 393
Besham 150
Bignoniaceæ 282
Bissere 114
Blackburnia oppositifolia Roxb. . . 239
Blepharis edulis (*L.*) *Pers.* . . . 284
Boerhaavia *L.* 294
Boerhaavia dichotoma Vahl . . 294
Boerhaavia elegans *Chois.* . . . 295
Boerhaavia grandiflora Rich. . . 294
„ *Marlothii* Heimerl. . . 295
„ *repens* var. *elegans* Aschers. & Schweinf. . . 295
„ *repanda* Willd. . . . 294
Boerhaavia repens *L.* 296
Boerhaavia rubicunda Steud. . . 295
„ *scandens* Ehrbg. . . 294
„ *stellata* Wight . . . 294
Boerhaavia verticillata *Poir* . . 294
Boerhaavia vulvarifolia Poir . . 296
Boraginaceæ 253
Boswellia Carterii *Birdwood* . . 152
Bourcerosia adensis Defl. . . . 250
„ *Forskalli* Done. . . 251
„ *cicatricosa* Defl. . . 251
Bouchea *Cham.* 287
„ marrubiifolia (*Fenzl.*) *Schauer* 288
„ pterygocarpa (*Fenzl.*) *Schauer* 288
Bovea sinaica Done. 278
Brachyramphus goræensis DC. . . 231
„ *lactucoides* Anders. . 232
„ *obtusus* DC. . . 233
Breweria *R. Br.* 264
Breweria argentea Terrac. . . . 265
„ *evolvuloides* Vatke . . 265
Breweria latifolia (*Hochst. & Steud.*) *Benth. & Hook.* 264
Bricchettia somalensis Pax . . . 90
Briza bipinnata Linn. . . . 389
„ *Eragrostis* Linn. . . . 388
„ *oblonga* Moench. . . . 388
Brizopyrum mucronatum Nees . . 390

PAGE.

Brotera bracteosa Guill. & Perr. . . 129
Burseraceæ 147

C

Cadaba *Forsk.* 104
„ farinosa *Forsk.* . . . 106
„ glandulosa *Forsk.* . . . 105
„ longifolia DC. . . . 105
Cadaba monopetala Edgew. . . 105
Cadaba rotundifolia *Forsk.* . . 104
Cadaba scandens Pax . . . 106
Cæsalpinia elata Sw. 180
Cæsalpinia pulcherrima *Swartz* . . 188
Caidbeya adhærens Forsk. . . . 335
Calliandra umbrosa *Benth.* . . 197
Caloplaca (Amphiloma) lobulascens *Stur.* 404
Calothea littoralis Spreng. . . . 401
Calotheca arabica Spreng. . . . 400
„ *niliaca* Spreng. . . . 400
„ *repens* Spreng. . . . 400
Calotropis *R. Br.* 244
Calotropis Hamiltonii Wight . . 244
„ *heterophylla* Wall. . . 244
Calotropis procera (*Forsk.*) *R. Br.* . 244
Calotropis Wallichii Wight . . 244
Camel's Thorn 178
Cameraria obesa Spreng. . . . 241
Campylanthus *Roth.* 278
„ junceus *Edgew.* . . . 279
Caper 108
Capparidaceæ 94
Capparis *L.* 107
Capparis aphylla Roth . . . 109
„ *cartilaginea* Done. . . 108
Capparis decidua (*Forsk.*) Pax . . 109
„ galeata *Fresen.* . . . 107
Capparis heteroclita Roxb. . . 103
„ *sodada* R. Br. . . . 109
„ *spinosa* L. var. *galeata* Hook. f. 108
„ *uncinata* Edgew. . . . 108
Capraria arabica Steud. & Hochst. . 276
Capsicum *L.* 269
„ annuum *L.* 269
Capsicum conicum var. *orientale* Oliv. . 269

PAGE.

Capsicum conoides Mill. . . . 269
Caralluma *R. Br.* 249
„ adenensis (*Defl.*) *K. Schum.* 250
„ Forskalii (*Dcne.*) *K. Schum.* 251
Cardiostegia Kotschyi Presl. . 129
Caroxylon Bottæ Moq. . . . 313
„ *imbricatum* Moq. . . 313
Caryophyllaceæ 116
Casearia multiflora Spreng. . . 200
Cassia *Linn.* 181
„ adenensis *Benth.* . . . 185
„ angustifolia *Vahl* . . . 184
Cassia aschrek Forsk. . . . 182
Cassia auriculata *L.* 186
Cassia Burmanni Wight . . . 182
„ *cana* Wenderoth . . . 183
Cassia Flower 195
„ holosericea *Fresen.* . . 183
Cassia lanceolata Defl. . . . 185
„ *lanceolata* Wall. . . . 184
„ *obtusa* Roxb. . . . 182
Cassia obovata (*L.*) *Collad.* . . 182
Cassia pubescens R. Br. . . . 183
„ *Schimperi* Steud. . . . 183
„ *senna* L. 182
Castor-oil Plant 333
Catacline sericea Edgew. . . . 174
Caulinia ovalis R. Br. . . . 337
„ *serrulata* R. Br. . . . 351
Cayenne 269
Cebatha Forsk. 90
„ *edulis* Forsk. . . . 90
„ *pendula* O. Ktze. . . 90
Celosia *Linn.* 304
„ argentea *L.* 305
Celosia lanata L. 302
„ *margaritacea* L. . . . 305
„ *splendens* Schumach. & Thonn. 305
Cenchrus ægyptius Beauv. . . 396
„ *ciliaris* Linn. . . . 364
„ *pennisetiformis* Hochst. & Steud. 364
Ceratonychia nidus Edgew. . . 298
Chadara tenax Forsk. . . . 131
Chaddar 296
Chaddash 148
Chaddir 296
Chætaria ascensionis Beauv. . . 378

PAGE.

Chæteria bromoides Roem. & Schult. . 378
„ *cærulescens* Beauv. . . 378
„ *coarctata* Roem. & Schult. . 378
„ *canariensis* Beauv. . . 378
„ *depressa* Beauv. . . . 378
„ *elatior* Beauv. . . . 378
„ *gigantea* Beauv. . . . 378
„ *humilis* Roem. & Schult. . 378
„ *interrupta* Beauv. . . 378
„ *mauritana* Nees. . . 379
„ *nana* Nees. . . . 379
Chaferab 284
Chamædryfolia viridis O. Kuntze . 336
Chamæriphes thebaica O. Kuntze . 348
Chascanum lætum Fenzl. . . . 288
„ *marrubiifolium* Fenzl. . 288
Chenopodiaceæ 306
Chenopodium caudatum Jacq. . . 300
„ *fruticosum* Linn. . . 310
Chilli 269
Chloris *Sw.* 393
Chloris Cynodon Trin. . . . 392
„ *maritima* Trin. . . . 392
„ *mucronata* Mich. . . . 396
„ *tetrapogon* Beauv. . . . 394
Chloris villosa *Pers.* 394
Cholf 328
Chosam 97
Chrozophora *Neck.* 332
„ obliqua (*Forsk.*) Juss. . 332
Chrozophora oblongifolia A. Juss. . 332
„ *tinctoria* Muell. Arg. . 332
Chrysocoma spathulata Forsk. . . 222
Cienfugosia Welshii Gürke . . 125
Cissus arborea Forsk. . . . 237
„ *bifida* Schum. & Thonn. . . 160
„ *edulis* Dalz. 160
„ *quadrangularis* Linn. . . 160
„ *tetraptera* Hook. f. . . . 160
„ *triandra* Schum. & Thonn. . 160
Cistanche *Hoffmgg. & Link* . . 280
„ lutea *Hoffmgg. & Link* . 281
Citrullus *Schrader* 207
„ colocynthis (*L.*) *Schrad.* . 207
Cleome *Linn.* 95
„ brachycarpa (*Forsk.*) *Vahl* . 96
„ brachystyla *Defl.* . . . 99
Cleome cordata Ehrenbg. . . . 96

PAGE.

Cleome diversifolia Hochst. & Steud. 97
Cleome droserifolia *Del.* . . . 100
Cleome Ehrenbergiana Schweinf. 96
„ *gracilis* Edgew. . . . 96
„ *grandiflora* Ehrbg. . . 97
„ *hispida* Defl. . . . 100
„ *hispida* Ehrbg. . . 99
„ *muricata* Edgew. . . . 97
„ *ornithopodioides* Forsk. . . 96
Cleome papillosa *Steud.* . . . 96
„ paradoxa *R. Br.* . . 97
Cleome parviflora R. Br. . . . 97
„ *pentanervia* Ait. . . . 95
Cleome polytricha *Franch.* . . 100
„ pruinosa *Anders.* . . . 98
„ quinquenervia DC. . . 95
Cleome radula Fenzl. . . 96
„ *roridula* R. Br. . . . 100
„ *ruta* Camb. 96
„ *scaposa* DC. . . . 96
„ *Vahliana* Fresen. . . . 96
„ *venusta* Fenzl. . . . 97
Cnidone Mentzeloides E. Mey . . 204
Cocculus *DC.* 89
„ Cebatha *DC.* . . . 89
Cocculus ellipticus DC. . . . 89
„ *Epibaterium* DC. . . 89
„ *glabra* W. & A. . . . 89
„ *Leæba* DC. . . . 89
„ *lævis* Wall. . . . 89
„ *pendulus* (Forst.) Diels . 89
„ *recisus* Miers . . . 89
Colocynth 208
Combretaceæ 198
Cometes *Linn.* 297
„ abyssinica *R. Br.* . . 297
Cometes abyssinica T. Anders. . . 298
„ *apiculata* Dene. . . . 298
Cometes surattensis *Burm.* . . 298
Commelinaceæ 345
Commelina *Linn.* 346
„ albescens *Hassk.* . . 346
Commelina multicaulis Hochst. . . 346
„ *Schimperiana* Hochst. . 346
„ *striata* Wall. . . . 346
Commiphora *Jacq.* 147
„ abyssinica *Engl.* . . 148
„ abyssinica *Engl.* var. simplicifolia *Schweinf.* . . . 148

PAGE.

Commiphora opobalsamum (*Forsk.*) *Engl.* var. gileadense *Engl.* . . 150
Compositæ 221
Convolvulaceae 262
Convolvulus *L.* 262
Convolvulus acicularis Vatke . . 264
„ *arabicus* Hochst. . . 263
„ *bilobatus* Roxb. . . 266
„ *calycinus* Roxb. . . 267
" „ *capitatus* Vahl " . . 263
Convolvulus glomeratus (*Hochst.*) *Chois.* 263
Convolvulus Hardwickii Spreng. . . 267
„ *maritimus* Lam. . . 266
„ *pescapræ* L. . . . 266
Convolvulus sericophyllus *Anders.* . 264
Convolvulus somalensis Franch. . . 264
Conyza corymbosa Roxb. . . . 223
„ *indica* Miq 223
Corallocarpus *Welw.* . . . 209
„ erostris (*Schweinf.*) *Oliv.* 211
Corallocarpus Gijef Schweinf. . . 210
Corallocarpus glomeruliflorus *Schweinf.* 210
„ velutinus *Benth. & Hook. f.* 211
Corchorus *Linn.* 132
„ antichorus (*L.*) *Rœuschel* . 132
Corchorus decemangularis Roxb. . 133
„ *humilis* Munro . . . 132
„ *microphyllus* Fresen. . . 132
Corchorus olitorius *Linn.* . . . 133
„ trilocularis *Linn.* . . 133
Coronilla grandiflora Willd. . . 176
Cornulaca *Delile* 315
„ monacantha *Del.* . . 315
Corypha thebaica Linn. . . 348
Country Senna 182
Creeping Panic Grass . . . 393
Cressa latifolia Anders. . . . 265
Crotalaria *Linn.* 163
Crotalaria Brownei Reich. . . 166
„ *dubia* Balf. . . . 164
Crotalaria falcata *Vahl* . . . 166
Crotalaria fertilis Del. . . . 166
„ *Hookeri* Arn. . . . 166
„ *latifolia* Hort. Calc. . . 166
Crotalaria leptocarpa *Balf. f.* . . 164
„ lupinoides *Hochst.* . . 164
Crotalaria pallida Klotzsch . . 166
„ *pisiformis* Guill. & Perr. . 166

PAGE.
Crotalaria Schweinfurthii *Deſl.* . . 165
„ striata *DC.* . . . 166
Crotalaria striata Schum. & Thonn. . 166
Croton argenteus Forsk. . . . 332
„ *lobatus* Forsk. . . . 331
„ *obliquus* Vahl . . . 332
„ *oblongifolius* Del. . . . 332
„ *spinosus* Forsk. . . . 330
„ *spinosus* Linn. . . . 333
„ *tinctorius* Wall. . . . 332
Cruciferæ 92
Cucifera thebaica Delile . . . 348
Cucumis *L.* 205
Cucurbitaceæ 205
Cucumis abyssinicus Schimp. . . 206
„ *amarus* Stocks . . . 206
„ *anguinus* Forsk. . . . 206
„ *arabicus* Del. . . . 206
„ *colocynthis* L. . . . 208
Cucumis prophetarum *L.* . . . 206
„ pustulatus *Hook.* . . 206
Cylindrocarpus cordata Kl. . . 96
Cymbopogon arabicus Nees . . 361
„ *Arriani* Aitchis. . . 361
„ *circinnatus* Hochst. . 361
„ *laniger* Duthie . . 361
Cymadocea *Koenig* 350
Cymodocea æquorea Kunth . . 352
Cymodocea ciliata (*Forsk.*) *Ehrnbg.* . 351
„ isœtifolia *Aschers.* . . 352
„ serrulata *Aschers.* . . 351
Cynodon *Pers.* 391
„ dactylon *Pers.* . . . 391
Cynodon erectus Presl . . . 392
„ *filiformis* Voigt . . . 392
„ *glabratus* Steud. . . . 392
„ *linearis* Willd. . . . 392
„ *maritimus* H. B. & K. . . 392
„ *occidentalis* Willd. . . 392
„ *portoricensis* Willd. . . 392
„ *pascuus* Nees . . . 392
„ *radiatus* Roth . . . 392
„ *repens* Dulac . . . 392
„ *stellatus* Willd. . . . 392
„ *sarmentosus* S. F. Gray . 392
„ *virgatus* Nees . . . 392
Cynosurus ægyptius Linn. . . . 396
„ *Cavara* Ham. . . . 396

PAGE.
Cynosurus distachyus Rottl. . . 396
„ *durus* Forsk. . . . 389
„ *Macara* Ham. . . . 396
Cyperaceæ 352
Cyperus *Linn.* 353
Cyperus arcuatus Boeck. . . . 353
Cyperus conglomeratus *Rottb.* . . 353
Cyperus conglomeratus T. Anders . 355
„ „ var. *effusa.* Boiss. . . 354
„ „ var. *major* Boeck. . 354
Cyperus cruentus *Rottb.* . . . 355
Cyperus curvulus Boeck. . . 354, 355
„ *densus* R. Br. . . . 354
Cyperus effusus Rottb. . . . 354
Cyperus falcatus Nees & Ehrbg. . . 355
„ *jeminicus* Rottb. . . . 353
„ *involutus* R. Br. . . . 354
„ *proteinolepis* Steud. . 354, 355
„ „ var. *pumila,* Boeck. . . 353
„ *pungens* Boeck. . . 353, 355
Cyprus s. Alcanna Rumph. . . 200
Cytisus arabicus Dene. . . . 167
„ *roseus* Camb. . . . 168

D

Dactylis distichophylla Brign. . . 401
„ *interrupta* Rottl. . . . 389
„ *lagopodioides* Dalz. & Gibs. . 400
„ *lagopoides* Linn. . . . 400
„ *littoralis* Willd. . . . 401
„ *maritima* Schrad. . . 401
„ *massaviensis* Steud. . . 400
„ *repens* Desf. . . . 400
Dactylon officinale Vill. . . . 392
Dactyloctenium ægyptiacum Willd. . 396
„ *distachyum* Bojer . 396
„ *Figarei* De Not. . . 396
„ *meridionale* Ham. . 396
„ *mucronatum* Willd. . 396
„ *prostratum* Willd. . 396
„ *radulans* Beauv. . 396
Dæmia *R. Br.* 248
„ cordata (*L.*) *R. Br.* . . 248
Dæmia incana Dene. . . . 248

PAGE.

Dæmia tomentosa Pomel. . . . 248
Deluq 310
Demia 248
Desmazeria unioloides Defl. . . 390
Desmidorchis Ehernb.] . . . 251
Desmostachya *Stapf* . . . 388
„ bipinnata *Stapf* . . 389
Dianthera grandiflora Kl. . . 97
Dicoma *Cass.* 229
Dicoma Schimperi (*DC.*) *O. Hoffm.* . 230
Digitaria *Rich.* 374
Digitaria Dactylon Scop. . . . 392
„ *littoralis* Salisb. . . . 392
„ *maritima* Spreng. . . 392
Digitaria pennata *T. Cooke* . . 374
Digitaria radiata Spreng. . . . 392
„ *stolonifera* Schrad. . . 392
Dioclea hispidissima Spreng. . . 260
Dipcadi *Medic.* 345
„ erythraeum *Webb. & Berth.* . 345
Dipcadi unicolor Bak. . . . 345
Diplotaxis *DC.* 93
Diplotaxis crassifolia DC. . . . 94
„ *harra* Boiss. . . . 94
„ *hispida* DC. . . . 94
Diplotaxis pendula (*Vahl*) *DC.* . . 93
Dipteracanthus patulus Nees . . 285
Dipterygium *Dcne.* 101
„ glaucum *Dcne.* . . 101
Distemon angustifolius Ehrenb. & Hempr. . . . 277
„ *campanularis* Ehrenb. & Hempr. . . . 276
„ *glandulosus* Ehrbg. & Hempr. . . . 275
Dobera *Juss.* 238
„ glabra (*Forsk.*) *DC.* . . 239
Dobera Roxburghii Planch. . . 239
Dobra 239
Dohn el-handhal 208
Doluq 310
Doranthera linearis Bth. . . . 277
Date Palm 349
Doum Palm 348
Douma thebaica Poir. . . . 348
Dra el Kelb. 251
Dsub. 193
Dura 361

PAGE.

E

Echiochilon *Desf.* 261
„ fruticosum *Desf.* . . 261
Echiochilon hispidissimum Tausch . 260
Echichilon longiflorum *Benth.* . . 261
Egyptian Privet 200
Elan 158
Elb 156
El-bejadd 106
Elef 385
Eleusine *Gærtn.* 395
„ ægyptiaca *Desf.* . . . 395
Eleusine ciliata Rafin. . . . 395
„ *cruciata* Lamk. . . . 395
„ *mucronata* Stokes . . 395
„ *pectinata* Mœnch . . 395
„ *prostrata* Spreng. . . 395
„ *radulans* Br. . . . 396
Embelia grossularia Retz. . . . 237
Enneapogon *Desv.* 397
„ brachystachys *Stapf* . 397
Ephedra *Linn.* 402
Ephedra Alte Brandis . . . 402
Ephedra foliata *Boiss.* . . . 402
Ephedra peduncularis Boiss. . . 402
Epibaterium pendulum Forst. . . 90
Eragrostis *Beauv.* 385
Eragrostis *affine* Wall. . . . 390
„ *bipinnata* Muschler . . 390
Eragrostis ciliaris *Link* . . . 386
Eragrostis cynosuroides Beauv. . . ..
„ *eragrostoides* Wall. . . 390
„ *flexuosa* Steud. . . . 387
„ *lepida* Hochst. . . . 386
„ *lobata* Trin. . . . 386
Eragrotis major *Host.* . . . 387
Eragrostis megastachya Link . . 387
„ *mucronata* Trim. . . 390
„ *mucronata* Benth. & Hook. 390
„ *multiflora* Aschers. . . 387
„ *poaloides* Trin. . . . 387
„ *pulchella* Parl. . . . 386
„ *vulgaris* var. *megastachya* Coss. & Dur. . . 387
„ *sp.* Benth. & Hook. . . 390
„ *sp.* Wall. 388
Erig agrab 317

PAGE.

Eriochloa *H. B. & K.* . . . 375
Eriochloa annulata Kunth . . . 375
Eriochloa polystachya *H. B. & K.* . 375
Eriochloa punctata Ham. . . . 375
" *succincta* Kunth . . 375
" *sundaica* Miq. . . . 375
Erodium *L'Herit.* 141
Erodium althæoides Jord. . . . 142
" *floribundum* Batt. . . 142
" *glabellum* Del. . . . 142
" *glutinosum* Dulac . . 142
Erodium malacoides (*L.*) *Willd.* . 141
Erodium malacoides var. *α* Ait. . 142
" *malacoides* var. *macrophyllum* Lange 142
" *malvaceum* Jord. . . 142
" *stipulaceum* Duf. . . 142
Euphorbiaceæ 319
Euphorbia *Linn.* 320
" adenensis *Defl.* . . 327
Euphorbia ægyptiaca Anders. . . 321
" *androsæmoides* Dennst. . 321
Euphorbia arabica *Hochst. & Steud.* . 322
Euphorbia arillata Edgew. . . 323
Euphorbia Bottæ *Boiss.* . . . 324
Euphorbia cassioides Presl. . . 321
Euphorbia cuneata *Vahl* . . . 325
Euphorbia decumbens Willd. . . 321
" *Forskalii var.* β. *et* γ J. Gay 323
" *fragilis* Dcne. . . . 323
" *fruticosa* Edgew. . . 325
Euphorbia granulata *Forsk.* . . 323
" granulata *Forsk.* var. glabrata Boiss. . . . 323
" hypericifolia *Linn.* . . 321
Euphorbia indica Lamk. . . . 321
" *papilligera* Boiss. . . 321
" *parviflora* Linn. . . 321
Euphorbia polycnemoides *Hochst.* . 324
" Schimperi (*Forsk.*) *Presl.* . 324
" systyla *Edgew.* . . 326
Euphorbia thymifolia Wall. . . 323
" *Tirucalli* Forsk. . . 324
" *villosa* Herb. Royle . . 323
Euxolus caudatus Hook. . . . 299
" *polygamus* Moq. . . 300

PAGE.

F

Fagonia *L.* 137
Fagonia acerosa Boiss. . . . 138
" *arabica* Linn. . . . 138
" *Aucheri* Boiss. . . . 138
" *Bruguieri* DC. . . . 138
" *Californica* Benth. . . 138
" *Chilensis* Hook. & Arn. . 138
" *cistodes* Del. . . . 138
Fagonia cretica *Linn.* . . . 138
Fagonia diversifolia Boiss. . . 138
" *echinella* Boiss. . . . 138
" *fruticans* Coss. . . . 138
Fagonia glabra *Krause* . . . 140
Fagonia glutinosa Del. . . . 138
" *grandiflora* Boiss. . . 138
" *Hispanica* Linn. . . . 138
" *Kahirana* Boiss. . . . 138
" *latifolia* Del. . . . 138
" *mollis* Del. 138
" *myricantha* Boiss. . . 138
" *Mysorensis* Roth . . . 138
" *Oliveri* DC. 138
Fagonia parviflora *Boiss.* var. brevispina *Schweinf.* 139
Fagonia Persica DC. . . . 138
" *Sinaica* Boiss. . . . 138
" *subinermis* Boiss. . . . 138
" *Thebaica* Boiss. . . . 138
" *virens* Coss. . . . 138
Farsetia *Desv.* 92
" longisiliqua *Dcne.* . . 92
Farsetia stylosa Anders. . . . 92
Festuca littoralis Sibth. & Smith . 401
" *mucronata* Forsk. . . . 400
" *pungens* Vahl . . . 400
Fibichia umbellata Koel. . . . 392
Ficoideæ 212
Fissenia capensis Endl. . . . 204
Forskohlea *Linn.* 335
Forskohlea latifolia Retz. . . . 335
Forskohlea tenacissima *L.* . . 335
" viridis *Ehrbg.* . . . 336
Frankincense-tree 152
Fungi 403

PAGE.

G

Galega apollinea Del. . . . 174
Gar 333
Geraniaceæ 140
Geranium malacoides L. . . . 142
Gerardiopsis Fischeri Engl. . . 277
Gherb 361
Gingerbread Tree 348
Ginger Grass 361
Glossonema *Dcne.* 242
Glossonema affine N. E. Br. . . 243
Glossonema Boveanum *Dcne.* . . 243
Glycine memnonia Del. . . . 179
Glinus trianthemoides Heyne . . 215
Gnetaceæ 401
Gomphocarpus pauciflorus Hochst. & Steud. 243
Gorrah 106
Gorreh 106
Gramineæ 356
Great Millet 361
Green Bristle Grass 366
Grewia *L.* 130
Grewia betulæfolia Juss. . . . 131
„ *crenata* Hochst. . . . 131
„ *membranacea* Rich. . . 131
Grewia populifolia (*Fors.*) *Vahl* . . 131
Grewia recticulata Hochst. . . 131
„ *ribesiæfolia* Hochst. . . 131
Guinea Corn 361
„ Pepper 269
Gymnanthelia lanigera Anderss. . . 361
Gypsophila *L.* 119
„ montana *Balf. f.* . . 119
„ montana *Balf. f.* var. diffusa *Balf. f.* 120
Gypsophila somalensis Franch. . . 119

H

Halopeplis *Bunge* 307
Halopeplis amplexicaulis Ces. Pass. & Gib. 308
Halopeplis perfoliata (*Forsk.*) *Bunge* . 307
Halophila *Thouars* 337

PAGE.

Halophila ovalis Hook. f. . . . 337
Halophila ovata *Gaudich.* . . . 337
Halopyrum *Stapf* 390
„ mucronatum *Stapf* . . 390
Halothamnus Bottæ Jaub. & Spach . 313
Hamak-el-hhomr 206
Hamma 93
Hándhal gehed 208
Harm 313
Hassar 170
Hedyotis maritima Wall. . . 220
„ *Schimperi* Presl. . . . 220
„ *sp.* Edgew. . . . 220
Heliophytum pterocarpum DC. . . 256
Heliotropium *Linn.* 253
„ adenense *Gürke* . . 257
Heliotropium bicolor Hochst. & Steud. 254
„ *brevifolium* Wall. . . 254
„ *cressoides* Franch. . . 258
„ *crispum* Desf. . . 258
„ *curassavicum* var. *zeylanicum* Burm. . . 255
„ *eriocarpum* Del. . . 258
„ *fruticosum* Forsk. . . 254
Heliotropium lignosum *Vatke* . . 257
Heliotropium marocanum Lehm. . 258
„ *nubicum* Bunge . . 258
Heliotropium ophioglossum *Stocks* . 256
Heliotropium paniculatum Heyne . 255
Helitropium paradoxum *Vatke* . . 259
Heliotropium parvifolium Edgew. . 254
„ *persicum* Burm. . . 258
„ *persicum* Lam. . . 258
Heliotropium pterocarpum *Hochst.* & *Steud.* 256
Heliotropium ramosissimum Sieber . 258
Heliotropium strigosum (*Forsk.*) *Willd.* 254
Heliotropium stylosum Franch. . . 256
„ *subulatum* Hochst. . 255
„ *tenue* Wall. . . . 254
„ *tenuifolium* R. Br. . 254
Heliotropium undulatum *Vahl* . . 258
„ zeylanicum *Lam.* . . 255
Helopus acrotrichus Steud. . . 375
„ *annulatus* Nees . . . 375
„ *lævis* Trin. 375
„ *pilosus* Trin. . . . 375

PAGE

Hendibe 233
Henneh 200
Herodium malacoides Reichb. . . 142
Heterachænia massaviensis Fresen. . 232
Hhashfe. 254
Hhedar 281
Hibiscus *L.* 123
Hibiscus clandestinus Cav. . . 124
„ *intermedius* Hochst . . 124
Hibiscus micranthus *L.* . . . 124
Hibiscus ovalifolius Vahl . . . 124
„ *parvifolius* Hochst. . . 124
„ *rigidus* L. f. . . . 124
„ *versicolor* Schum. & Thonn. . 124
Hibiscus Welshii *Anders* . . . 125
Hind 363
Hochstetteria Schimperi DC. . . 230
Hoddar 281
Houer 172
Hyacinthus serotinus Forsk. . . 345
Hydrocharitaceæ 337
Hyperanthera Forsk. . . . 161
Hyphæne cucifera Pers. . . . 348
Hyphæne *Gærtner*. 347
„ thebaica *Mart.* . . . 348

I

Illecebraceæ 296
Illecebrum lanatum Linn. . . . 304
„ *verticillatum* Burm. . . 121
Indian Corn 363
Indigofera *Linn.* 169
Indigofera æruginis Schweinf. . . 173
Indigofera arabica *Jaub. & Spach* . . 171
„ argentea *L.* 172
Indigofera argentea Roxb. . . . 170
„ *articulata* Gouan . . 172
„ *asperifolia* Hochst. . . 173
„ *Burmannii* Boiss. . . 171
„ *cærulea* Roxb. . . . 172
„ *erythrantha* Hochst. . . 170
„ *glauca* Lam. . . . 172
„ *heterophylla* Roxb. . . 170
Indigofera leptocarpa *Hochst. & Steud.* 172
Indigofera oblongifolia Forsk. . . 170

PAGE.

Indigofera parvula *Del.* 170
„ paucifolia (*Forsk.*) *Del.* . 170
„ paucifolia (*Forsk.*) *Del.* var. carpostigma Schweinf. 170
„ semitrijuga *Forsk.* . . 171
Indigofera somalensis Vatke . . 171
„ *tenuisiliqua* Schweinf. . 172
„ *tinctoria* Forsk. . . 172
Indigofera trigonelloides *Jaub. & Spach* 173
Inga mellifera Willd.. . . . 193
„ *umbrosa* Wall. 197
Iphiona *Cass.* 224
Iphiona arabica B. Hgp. . . . 227
Iphiona scabra *Dcne.* . . . 224
Ipomœa *L.* 265
Ipomœa auricoma A. Rich. . . 263
Ipomœa biloba *Forsk.* . . . 266
Ipomœa calycina Benth. . . . 266
Ipomœa calycina *C. B. Clarke* . . 266
Ipomœa cardiosepala Hochst. . . 267
„ *maritima* R. Br. . . . 266
„ *pes-caprae* Roth. . . . 266
„ *sagittata* Roxb. . . . 266
Iresine persica Burm. . . . 302
Italian Senna 182
Izkhir 361

J

Jamaica Senna 182
Jata 134
Jatropha *Linn.* 329
Jatropha aculeata F. G. Dietr. . . 330
„ *glauca* Vahl 331
„ *lobata* var. *genuina* Muell. Arg. 331
Jatropha lobata (*Forsk.*) Muell. Arg. . 331
Jatropha lobata var. *Richardiana* Muell. Arg. 331
Jatropha spinosa (*Forsk.*) *Vahl* . . 330
Jatropha ricinifolia Fenzl . . . 331
Jew's Mallow 134
Jowari 361
Jussiæa edulis Forsk. . . . 132
Juta 134
Jute 134

PAGE.

K

Kabath 237
Kaber 108
Kanahia *R. Br.* 251
Kanahia Delilii Dcne. . . . 252
Kanahia laniflora *R. Br.* . . . 252
Kelesere 218
Kernera ovalis Roem. & Schult. . 337
„ *serrulata* Schult. . . . 351
Khark 244
Khereb 190
Khirva 333
Kissenia *R. Br.* 203
„ spathulata *R. Br.* . . 204
Kittr 193
Koeleria brevifolia Wight . . . 400
Kohautia arabica Hochst. . . . 220
„ *caespitosa* Schnizlein . . 220
„ *Schimperi* Hoschst. & Steud. 220
Kousma 251
Kuhnia arabica Hochst. & Steud. . 225

L

Lä 317
Labiatæ 289
Lactuca *Linn.* 230
„ goræensis (*Hochst.*) *Schultz. Bip.* 231
Lactuca massaviensis Schultz. Bip. . 232
„ *nubica* Schultz. Bip. . . 231
„ *obtusa* C. B. Clarke . . 233
„ *octophylla* Schultz. Bip. . 321
„ *Petitiana* A. Rich. . . 231
Lahaya corymbosa Schult. . . . 117
Lavandula *Linn.* 292
Lathræa Phelipæa Linn. . . . 281
Latssaf 108
Launæa *Cass.* 231
Launæa lactucoides (*Fresen.*) *O. Hoffm.* 232
„ nudicaulis *Less.* . . . 233
Lavandula setifera *Anders.* . . 293
Lawsonia *Linn.* 199
Lawsonia alba Lam. 200
Lawsonia inermis *Linn.* . . . 200
Lawsonia spinosa Linn. . . . 200

PAGE.

Läya 317
Leæba Forsk. 90
„ *dubia* Gmel. 90
Lébbena 323
Leguminosae 162
Leptochloa bipinnata Hochst. . . 389
Lerchea maritima & fruticosa O. Kuntze 310
„ *obtusifolia* Steud. . . 310
Lessike 335
Lichenes 403
Lichen farinaceus Linn. . . . 404
„ *rostratus femina* Scop. . . 404
Liliaceae. 341
Limeum *L.* 216
„ indicum *Stocks* . . . 217
Lindenbergia *Lehm.* 277
„ sinaica (*Dcne.*) *Benth.* . 278
Linaria *Juss.* 270
Linaria circinnata Sweet . . . 272
„ *gracilis* var. *propinqua* Benth. . . 272
„ „ R. Br. . . . 272
„ *heterophylla* Steud. . . 271
„ *Lancerottæ* Delile . . . 272
Linaria macilenta *Dcne.* . . . 271
Linaria patula Baker . . . 271
„ *propinqua* R. Br. . . . 272
Linaria sagittata *Hook. f.* . . . 271
Linaria Webbiana Visiani . . . 272
Little Aden Lily 343
Littonia *Hook.* 343
Littonia Hardeggeri Ritter v. Beck. . 344
Littonia minor *Defl.* . . . 343
Lithospermum divaricatum Siteb. . 261
„ *hispidissimum* Lehm. . 260
„ *hispidum* Forsk. . . 258
„ *lignosum* Schweinf. . 257
Loasaceae 203
Loranthaceae 317
Loranthus *Linn.* 318
„ curviflorus *Benth.* . . 318
Lu 263
Lycium *L.* 268
Lycium arabicum Schweinf. . . 268
„ *Edgeworthii* Dun. . . . 268
Lycium europæum *L.* . . . 268

PAGE.

Lycium indicum Wight . . . 268
„ *mediterraneum* Dun. . . 268
„ *orientale* Miers . . . 268
„ *persicum* Miers . . . 268
„ *intricatum* Boiss. . . . 268
„ *saevum* Miers . . . 268
„ *salicifolium* Mill. . . . 268
Lythraceæ 199

M

Maerua *Forsk.* 102
Maerua arenaria Hook. f. & Thoms. . 103
Maerua crassifolia *Forsk.* . . . 103
„ ovalifolia *Cambess.* . . 103
„ Thomsoni *Anders.* . . 102
Maerua uniflora Vahl . . . 103
Maghrayt d' sheehaz . . . 152
Mail Ahschi Rheede . . . 200
Maize 363
Malvaceae 122
Mama 348
Margosa Tree 145
Mathiola stylosa Hochst. & Steud. . 93
Medicago *Linn.* 168
„ sativa *Linn.* . . . 169
Megastachya ciliaris Beauv. . . 386
Megastachya Eragrostis Beauv. . . 388
Meisarrhena tomentosa R. Br. . . 275
Melhania *Forst.* 129
Melhania bracteosa Boiss. . . . 129
Melhania Denhamii *R. Br.* . . 129
Melhania Kotschyi Hochst. . . 129
Meliaceæ. 143
Melia *Linn.* 143
„ Azedarach *Linn.* . . . 144
Melia Azadirachita Linn. . . . 145
„ *angustifolia* Schum. & Thonn. . 144
„ *australis* Sw. 144
„ *Bukayun* Royle . . . 144
„ *cochinchinensis* M. Roem. . 144
„ *Commelini* Medic. . . . 144
„ *composita* Benth. . . . 144
„ *florida* Salisb. 144
„ *fraxinifolia* Salisb. . . . 145
„ *guineensis* G. Don. . . . 144

PAGE.

Melia indica Brandis . . . 145
„ *japonica* Hassk. . . . 145
„ *parviflora* Moon . . . 145
„ *orientalis* M. Roem. . . 144
„ *pinnata* Stokes . . . 145
„ sambucina Blume . . . 144
„ *sempervirens* Sw. . . . 144
„ *Japonica* G. Don. . . . 144
Melochia 133, 134
Menispermaceae 89
Menisperntum edule Vahl . . . 90
„ *ellipticum* Poir. . . 90
„ *leæba* Del. . . . 90
Meru 103
Messerschmidia hispida Benth. . 255
Microrrhynchus fallax Jaub. & Spach . 233
„ *Hochstetteri* Schultz Bip. . . . 231
„ *octophyllus* Hochst. . 231
„ *nudicaulis* DC.. . 233
„ *patens* DC. . . 233
Milium arundinaceum Koen. . . 373
„ *Carar* Herb. Ham. . . 376
„ *Languchinia* Herb. Ham. . 276
„ *orizense* Roxb. . . . 376
„ *polystachyum* Spreng. . . 376
„ *punctatum* Linn. . . . 376
„ *ramosum* Retz. . . . 376
Mimosa arabica Lam. . . . 194
„ *eburnea* L. 189
„ *mellifera* Vahl . . . 193
„ *nilotica* Forsk. . . . 194
„ *tortilis* Forsk. . . . 192
„ *unguis cati* Forsk. . . 193
Mollugo *Linn.* 215
„ Cerviana (*L.*) *Seringe* . . 216
Molochia 134
Mooz 338
Moringaceæ 161
Moringa *Lam.* 161
„ aptera (*Forsk.*) *Gaertn.* . 161
Moringa arabica Pers. . . . 161
Mulukhije 134
Musa Cliffortiana Linn. . . . 338
Musa paradisiaca *Linn.* . . . 338
Musa paradisiaca var. *normalis* O. Kuntze 338

PAGE.

Musa Sapientum var. *paradisiaca* Baker 338

N

Naiadaceæ 350
Neem 145
Nerium obesum Forsk. . . . 241
Neshem 145
Niebuhria oblongifolia Royle . . 103
Nutssaf 108
Nyctaginaceæ 293

O

Obēira 174
Ochradenus *Delile* 112
„ baccatus *Delile* . . . 113
Ocimum *Linn.* 289
Ocimum anosurum Fenzl. . . . 290
„ *gratissimum* var. *suave* Hook. f. 290
„ *menthæfolium* Hochst. . . 290
„ *nepetæfolium* Hochst. . . 292
„ *reflexum* Ehrenb. . . . 291
„ *reflexus* var. *pallidus* Terr. . 292
Ocimum suave *Willd.* . . . 290
Oedipachne punctata Link . . . 376
Oldenlandia *L.* 219
Oldenlandia graminifolia DC. . . 220
„ *retrorsa* Boiss. . . 220
Oldenlandia Schimperi *Anders.* . . 220
„ stricta *Linn.* . . . 220
Olibanum tree 152
Oplismenus colonus H. B. & K. . . 371
„ *pseudo-colonus* Kunth . 371
Orobanchaceæ. 279
Orobanche tinctoria Willd. . . . 281
Ormol 294
Orthosiphon *Benth.* 291
Orthosiphon Ehrenbergii Vatke . . 291
Orthosphon inodorus Koen. . . 291
Orthosiphon pallidus *Royle* . . 291
Orthosiphon verticillatus Heyne . . 291
Orygia *Forsk.* 214
„ decumbens *Forsk.* . . . 215
Orygia mucronata Klotsch . . 215
Otssfai 307

PAGE.

Osaru 124
Ouret lanata Hiern. 304
„ *persica* Hiern. . . . 303

P

Pachypodium obesum G. Don . . 241
Palma Christi 333
Palmeæ 347
Pancratium *Linn.* 339
„ maximum *Forsk.* . . 340
Pancratium tortifolium Boiss. . . 339
Pancratium tortuosum *Herb.* . . 339
Panicum *Linn.* 369
Panicum adhaerens Forsk. . . 367
Panicum antidotale *Retz.* . . . 372
Panicum aparine Steud. . . . 367
„ *arabicum* Nees . . . 370
„ *asperum* Lamk. . . . 367
„ *bicolor* Moench . . . 366
„ *brizoides* Linn. . . . 370
„ *caesium* Nees . . . 371
Panicum colonum *Linn.* . . . 370
Panicum confertum Herb. Rottl. . 371
„ *cuspidatum* Roxb. . . 371
„ *Crus-galli* Wall. . . . 371
„ *Crus-galli* Wall. var. *colonum* Coss. . 371
„ *Crus-galli* Wall. var. *minor* Thw. . . . 371
„ *cynosuroides* Scop. . . 366
„ *dactylon* Linn. . . . 392
„ *Daltoni* Parlat. . . . 371
„ *flaccidum* Wall. . . . 371
„ *floribundum* Willd. . . 367
„ *grossarium* Griff. . . 371
„ *haematodes* Presl. . . 371
„ *humile* Thunb. . . . 366
„ *humile* Trin. . . . 367
„ *imberbe* Poir. . . . 366
„ *italicum* Ucria . . . 367
„ *laevigatum* Lam. . . 366
Panicum leersioides *Hochst.* . . 373
„ leucanthum *A. Rich.* . . 370
Panicum lineare Burm. . . . 393
„ *maximum* Wall. . . . 373
„ *numidianum* Presl. . . 371

PAGE.

Panicum pennatum Hochst. . . 374
„ *Petiveri* Kotsch . . . 371
„ *plumosum* Presl. . . 368
„ *polygamun* Herb. Madr. . 373
„ *pruinosum* Bernh. . . 373
„ *pseudo-colonum* Roth . . 371
„ *psilocaulum* Steud. . . 366
„ *purpurascens* Opiz . . 366
„ *quale Linnaei* Krock . . 366
„ *reclinatum* Vill. . . . 366
„ *respiciens* Hochst. . . 367
„ *rude* Lamk. . . . 367
„ *saccharoides* Trin. . . 368
„ *semi-verticillatum* Herb. Rottl. 371
„ *subalbidum* Kunth . . 373
„ *tejucense* Nees . . . 366
„ *Teneriffae* Br. . . . 369
„ *tenue* Roxb. . . . 373
„ *tetrastichum* Forsk. . . 371
Panicum turgidum *Forsk.* . . 372
Panicum verticillatum Linn. . . 367
„ *villosum* Presl. . . . 369
„ *virescens* Salzm. . . . 366
„ *viride* Linn. . . . 366
„ *vulpinum* Willd. . . . 364
„ *zonale* Presl. . . . 371
Pappophorum brachystachyum Jaub. & Spach . . . 398
„ *bulbosum* Fig. & De Not. 398
„ *figarianum* Fig. & De Not. . . . 398
„ *nanum* Steud. . . 398
„ *phleoides* Trin. . . 398
„ *senegalense* Steud. . 398
„ *vincentianum* Schmidt . 398
Papularia crystallina Forsk. . . 213
Parkinsonia *Plum.* 186
„ aculeata *L.* . . . 187
Parmelia farinacea Ach. . . . 404
Paspalum Dactylon Dc. . . . 393
„ *praecox* Walt. . . . 393
„ *umbellatum* Lam. . . 393
„ *annulatum* Fluegge . . 376
„ *pennatum* Hook. f. . . 374
„ *punctatum* Fluegge . . 376
„ *succinctum* Trin. . . 376

PAGE.

Pegolettia *Cass.* 225
„ senegalensis *Cass.* . . 225
Pennisetum *Pers.* 363
„ cenchroides *A. Rich.* . 364
Pennisetum ciliare Link . . . 364
„ *viride* R. Br. . . . 366
Pentatropis *R. Br.* 246
„ cynanchoides *R. Br.* . 246
Pentatropis spiralis Dcne. . . . 246
„ *spiralis* Dcne. var. *longepetiolata* Engl. . . . 246
Pergularia tomentosa L. . . . 248
Persian Lilac 144
Petalidium patulum Dalz. & Gibs. . 285
Petalostemma chenopodii R. Br. . . 243
Pharnaceum Cerviana L. . . . 216
Phelipæa Brunneri Webb. . . 281
„ *lusitanica* Coss. . . . 281
„ *lutea* Desf. . . . 281
„ *senegalensis* Reut. . . 281
„ *tinctoria* Walp. . . . 281
Phialocarpus glomeruliflorus Defl. . 210
Phœnix dactylifera *Linn.* . . . 349
Phucagrostis ciliata Ehrbg. & Hempr. . 351
Phyllanthus *Linn.* 327
Phyllanthus anceps Herb. Heyne . 328
„ *andrachnoides* Willd. . 328
„ *arabicus* Hochst. . . 329
„ *javanicus* Poir. . . 328
„ *linearis* Herb. Madr. . 328
„ *longifolius* E. Mey . . 329
Phyllanthus maderaspatensis *L.* . 328
„ maderaspatensis *L.* var. Thonningii *Muell. Arg.* . . . 329
Phyllanthus malabaricus Herb. Wight . 328
„ *obcordatus* Willd. . . 328
„ *Thonningii* Schum. & Thonn. . . . 329
„ *niruri* Wall. . . . 328
„ *venosus* Hochst. . . 329
Physcia tribacia *Nyl.* . . . 404
„ vulcanica *Stnr.* . . . 403
Piptatherum annulatum Raddi . . 376
„ *confine* Schult. . . 376
„ *punctatum* Beauv. . . 376
Plantain 338
Platychæte glutinosa Boiss. . . 227

PAGE.

Plicosepalus curviflorus Van Tiegh. . 318
Pluchea *Cass.* 223
Pluchea foliosa DC. 223
Pluchea indica *Less.* . . . 223
Plumbaginaceæ 233
Poa cilianensis All. 387
„ *ciliaris* Linn. 386
„ *cynosuroides* Retz. . . . 389
Poa elegans Herb. Wight and Ham. . 387
„ *eragrostis* Cav. 387
„ *flexuosa* Roxb. 387
„ *lagopodioides* Kunth . . . 400
„ *littoralis* Gouan . . . 401
„ *massavensis* Fresen. . . . 400
„ *multiflora* Forsk. . . . 387
„ *polymorpha* Koen. . . . 387
„ *repens* Bieb. 400
„ *Roxburghiana* Schult. . . . 387
„ *subsecunda* Ham. . . . 388
„ *tunetana* Spreng. . . . 400
„ *tortuosa* Spreng. . . . 388
Podaxon arabicus *Pat.* . . . 403
Pogonostigma arabicum Boiss. . . 174
Poinciana *L.* 180
„ elata *L.* 180
Poinciana pulcherrima Linn. . . 188
Polianthes gracilis Link . . . 341
„ *mexicana* Zucc. . . . 341
Polianthes tuberosa *Linn.* . . . 341
Polycarpæa *Lam.* 117
„ corymbosa *Lam.* . . . 117
„ *eriantha* Hochst. . . . 117
„ *fallax* J. Gay 117
„ fragilis *Del.* 118
Polycarpæa humifusa J. Gay . . 117
„ *indica* Lam. 117
Polycarpæa spicata *Wight* . . . 118
Polycarpæa staticæformis Hochst. & Steud. 118
Polygalaceæ 113
Polygala *L.* 113
Polygala arabica Edgew. . . . 114
„ *arvensis* Willd. . . . 115
Polygala chinensis *Linn.* . . . 115
„ erioptera *DC.* 114
Polygala irregularis Defl. . . . 114
„ *oligantha* A. Rich. . . . 114
„ *Rothiana* W. & A. . . . 115

PAGE.

Polygala Thurmanniana *Chodat* . . 115
Polygala triflora Anders. . . . 114
„ „ Linn. 115
Portulacaceæ 121
Portulaca *L.* 121
Portulaca anceps Rich. . . . 121
„ *decumbens* Vahl . . . 215
„ *linifolia* Forsk. . . . 121
Portulaca quadrifida *L.* . . 121
Posidonia serrulata Spreng. . . 351
„ „ Thw. . . . 351
Prenanthes patens Wall. . . . 233
„ *procumbens* Roxb. . . 233
Prosopis *Linn.* 196
Prosopis glandulosa Torr. . . . 196
Prosopis juliflora *DC.* . . . 196
Prosopis odorata Torr. . . . 196
Psoralea arabica Hochst. . . . 174
Psyllothamnus Beevori Oliv. . . 119
Pulicaria *Gaertn.* 226
„ adenensis *Schweinf.* . . 227
„ glutinosa *Jaub. & Spach* . 227
Pulicaria iphionoides O. K. . . 227
Pteroloma arabicum Hochst. & Steud. . 101
Ptychotis *Koch.* 218
„ arabica *Anders.* . . . 218

Q

Qadsab 104
Qattab 104
Quafal 148
Quaradd 194
Quaratt 190

R

Ra 303
Råk 237
Ramalia farinacea *Ach.* . . . 404
Red Pepper 269
Resedaceæ 110
Reseda *L.* 110
„ amblyocarpa *Fresen.* . . 110
Reseda lurida Muell. Arg. . . . 111
„ *quartiniana* A. Rich. . . 111
Rhabdochloa mucronata Beauv. . . 396
Rhag 237

PAGE.

Rhamnaceæ 157
Rhamnus lotus L. 159
„ *nabeca* Forsk. . . . 158
„ *Spina Christi* L. . . . 158
Rhynchocarpa Courboni Defl. . . 210
„ *erostris* Schweinf. . 211
Rhynchosia *Lour.* 178
„ memnonia (*Del.*) DC. . 179
Rhynchosia minima DC. . . 179
„ *pulverulenta* Stocks . . 179
Ricin de Palma Christi . . . 333
Ricinus *Linn.* 333
„ communis *L.* . . . 333
Ricinus inermis Jacq. . . . 333
„ *lividus* Jacq. . . . 333
„ *speciosus* Burm. . . . 333
„ *spectabilis* Blume . . . 333
„ *viridis* Willd. . . . 333
Riqma 214
Robach 340
Roccella Montagnei *Bélang* . . 405
Rogama 213, 296
Rotantha combretoides Bak. . . 200
Rubiaceæ 219
Ruellia *Linn.* 284
Ruellia ciliaris L. 284
„ *erecta* Roth 285
„ *Huttonii* T. Anders. . . 285
„ *matutina* Hochst. & Steud. . 285
Ruellia patula Jacq. . . . 285
Ruellia persica Burm. . . . 284
„ *pilosa* T. Anders. . . . 285
„ *prostrata* Lam. . . . 285
Rugma 206
Rummid 325
Runf 180

S

Saccharum spontaneum *Linn.* . . 362
Saccharum Teneriffæ Linn. f. . . 369
Salanthus quadragonus Forsk. . . 160
Salicornia perfoliata Forsk. . . 307
Salsola *Linn.* 312
Salsola Bottæ (*Jaub. & Spach*) *Boiss.* . 312
Salsola Bottæ var. *Fauroti* Franch. . 313
Salsola Forskalii *Schweinf.* . . 313

PAGE.

Salsola fruticosa Linn. . . . 310
„ *globulifolia* Poir. . . 311
„ *imbricata* Forsk. . . . 313
„ *indica* Wall. . . . 310
„ *lana* Edgew. . . . 316
„ *mollis* Desf. . . . 311
Saltia *R. Br.* 301
Saltia abyssinica R. Br. . . . 297
Saltia papposa (*Forsk.*) *Moq.* . . 301
Salvadoraceæ 236
Salvadora *Linn.* 237
Salvadora crassinervia Hochst. . . 237
Salvadora indica Royle . . . 238
„ „ Wight . . . 237
Salvadora oleoides *Dene.* . . . 238
Salvadora paniculata Zucc. . . 237
Salvadora persica *L.* . . . 237
Salvadora persica T. Anders. . . 238
„ *Stocksii* Wight. . . . 238
„ *Wightiana* Planch. . . 237
Schanginia baccata Moq. . . . 310
Schizocalyx coriaceus Hochst. . . 239
Schweinfurthia *A. Braun.* . . . 272
Schweinfurthia aptera Vatke . . 273
Schwienfurthia pedicellata *Benth. & Hook. f.* . . 273
„ pterosperma *Al. Braun.* 274
Scitaminaceæ 338
Scrophulariaceæ 270
Seddera latifolia Hochst. & Steud. . 265
Senna Hookeriana Batka. . . . 185
„ *obtusa* Roxb. 182
„ *officinalis* Roxb. . . . 184
Sesbania *Scop.* 175
„ grandiflora *Pers.* . . . 176
Sesleria lagopodioides Spreng. . . 400
Setaria *Beauv.* 365
Setaria affinis Schult. . . . 365
„ *ambigua* Guss. . . . 365
„ *chlorantha* Schur. . . . 366
„ *decipiens* C. Schimp. . . 366
„ *floribunda* Spreng. . . . 367
„ *imberbis* Roem. & Schult. . 366
„ *nana* Dum. 366
„ *nubica* Link. . . . 367
„ *penicillata* Wall. . . 366
„ *respiciens* Hochst. . . 367
„ *Rottleri* Spreng. . . . 367

PAGE.

Setaria verticillata *Beauv.* . . . 367
Setaria verticilliformis Dum. . . 367
„ *villosa* Beauv. . . . 366
Setaria viridis *Beauv.*. . . . 365
Setaria Weinmanni Roem. & Schult. . 366
Shagarat-el-athleb 304
Shedach 300
Sheker 318
Shoeka 138
Shuki 138
Sida denticulata Fresen. . . . 123
„ *gracilis* R. Br. 123
Sida Kotschyi Hochst. . . . 123
Sisymbrium hispidum Vahl . . 94
„ *pendulum* Desf. . . 94
Sodad 109
Sodada decidua Forsk. . . . 109
Sogaf 284
Soghaf 284
Solanaceæ 267
Sonchus ciliatus Perr. . . . 231
„ *gorœnsis* Lam. . . . 231
„ *Hochstetteri* Schultz Bip. . 231
„ *massaviensis* Schultz Bip. . 232
Sphærocoma T. *Anders.* . . . 118
„ Hookeri T. *Anders.* . . 119
Sporobolus *R. Br.* 383
„ glaucifolius *Hochst.* . . 384
Sporobolus orientalis Herb. Wight . 384
Sporobolus robustus *Kunth* . . 385
„ spicatus *Kunth* . . 384
Sreissi 182
Ssamma 190
Ssammer. 192
Ssamr. 192
Ssaq-el-gherab. 90
Ssela 160
Sselam. 194
Sselm. 194
Sserah 106
Sserk 103
Ssga'a 258
Ssidr. 158
Ssile-asadiracht. 144
Ssonna 184, 185
Stachytarpheta cernua Br. . . . 288
Statice *L.* 234

PAGE.

Statice axillaris *Forsk.* . . . 234
Statice Bovei Jaub. & Spach . . 234
Statice cylindrifolia *Forsk.*. . . 235
Statice lanceolata Edgew. . . . 234
Steinheilia *Dcne.* 247
„ radians (*Forsk.*) *Dcne.* . 247
Sterculiaceæ 126
Sterculia *L.* 126
Sterculia abyssinica R. Br. . . 127
Sterculia arabica (*R. Br.*) *T. Anders.* . 127
Stipagrostis plumosa Munro . . 382
Stroblocarpus Fenzlii Parl. . . . 106
Strebila hispidissima G. Don . . 260
Strœmia farinosa Vahl . . . 105
„ *glandulosa* Vahl . . . 105
„ *longifolia* R. Br. . . . 106
„ *rotundifolia* Vahl . . 104
Suæda *Forsk.* 308
„ baccata *Forsk.* . . . 310
Suæda baccata Volk. 311
Suæda fruticosa *Forsk.* . . . 310
Suæda mollis Del. 311
Suæda monoica *Forsk.* . . . 308
Suæda nudiflora Thw. . . . 308
Suæda vermiclulata *Fersk.* . . 311
Suram 351

T

Tabasco 269
Talinum decumbens. Willd. . . 215
Tanner's Cassia 186
Taverniera *DC.* 176
Tavernisra cyclophylla Hochst . . 177
„ *floribunda* Schweinf. . 177
Taverniera glauca *Edgew.* . . . 176
„ Schimperi *Jaub. & Spach* 177
Tecoma *Juss.* 282
„ *sp.* 282
Tekker 193
Teneim 105
Tenun 332
Tephrosia *Pers.* 173
„ apollinea *Link* . . . 174
Tephrosia arabica Steud. . . . 174
Tephosia pogonostigma (*Steud.*) *Boiss.*. 174

PAGE.

Terminalia *Linn.* 198
„ sp. 199
Tetrapogon villosus Desf. . . . 394
Thalassia ciliata Kön. . . . 351
„ *indica* Wight & Arn. . . 351
„ *reptans* Solander . . 351
„ *stipulacea* Thw. . . 337
Thespesia populnea *Correa* . . 125
Themam 372
Tiliaceæ 129
Tissumm. 235
Tournefortia Edgeworthii DC. . . 255
„ *Royleana DC.* . . 255
„ *subulata* Hochst. . . 255
„ *zeylanica* Wight . . 255
Tomex glabra Forsk. 239
Toxostigma luteum A. Rich. . . 260
Traganum *Del.* 311
„ nudatum *Del.* . . . 312
Traganium nudatum Sieb. . . . 315
Trianthema *Linn.* 212
„ crystallina (Forsk.) *Vahl* . 213
„ *Govindia* Wall. . . 213
„ monogyna *L.* . . 214
„ *obcordata* Rexb. . . 214
„ „ Wall. . . 213
„ pentandra *L.* . . . 213
„ „ *β obcordata* DC. 214
„ *sedifolia* Visiani . . 213
„ *triquetra* Rottl. . . 213
Tribulus *L.* 135
Tribulus albus Poir. 136
„ *excrucians* Wawr. & Peyr. . 136
„ *humifusus* Schum. & Thonn. 136
„ *Kotschyanus* Boiss. . . 136
„ *lanuginosus* L. . . . 136
„ *mollis* Ehrenbg. . . 136
Tribulus terrestris *L.* . . . 136
Tricholæna *Schrad.* 368
Tricholæna leucantha Hochst. . . 370
„ *micrantha* Schrad. . . 368
Tricholæna Teneriffæ Parlat . . 368
Triticum repens Thw. . . . 390
Tuborese 341
Tumbashi ghulghul 331
Turkish Millet 361
Turrâch 90
Tylophora cirrosa Aschers. . . 246

PAGE.

U

Ueki 132
Umbelliferæ 217
Um-el-lebben 323
Uniola bipinnata Linn. . . . 390
„ *mucronata* Linn. . . 390
Urena ovalifolia Forsk. . . . 124
Uretia persica O. Kuntze . . . 303
Uropetalum erythræum Boiss. . . 345
Urticaceæ 334
Usara 285
Ushar 244

V

Vachellia Farnesiana W. & A. . . 195
Valliacapo-molage Rheede . . 269
Varthemia arabica T. Anders. . . 227
Verbenaceæ 287
Vernonia *Schreb.* 222
Vernonia arabica Dene . . . 222
Vernonia atriplicifolia (*Forsk.*) *Jaub.* & *Spach* 222
Vernonia spathulata Schultz. Bip. . 222
Vitaceæ 159
Vitis Linn. 160
Vitis quadrangularis *Wall.* . . 160
Vilfa glaucifolia Steud. . . . 384
„ *robusta* Steud. 385
„ *scabrifolia* Hochst. . . . 384
„ *spicata* Beauv. . . . 384

Y

Yellow Shum Shum Lily . . . 342

Z

Zea Mays *Linn.* 363
Zizyphus *Juss.* 157
Zizyphus africana Mill. . . . 158
„ *jujuba* Defl. . . . 158
Zizyphus lotus *Lam.* . . . 159
Zizyphus napeca Lam. . . . 158
Zizyphus spina Christi (*Forsk.*) *Willd.* 158
Zollikoferia massaviensis *Boiss.* . . 232
Zollikoferia nudicaulis Boiss. . . 233
Zostera ciliata Forsk. . . . 351
Zygophyllaceæ. 135
Zygophyllum *Linn.* 136
Zygophyllum portulacoides Forsk. . 137
Zygophyllum simplex *L.* . . . 137

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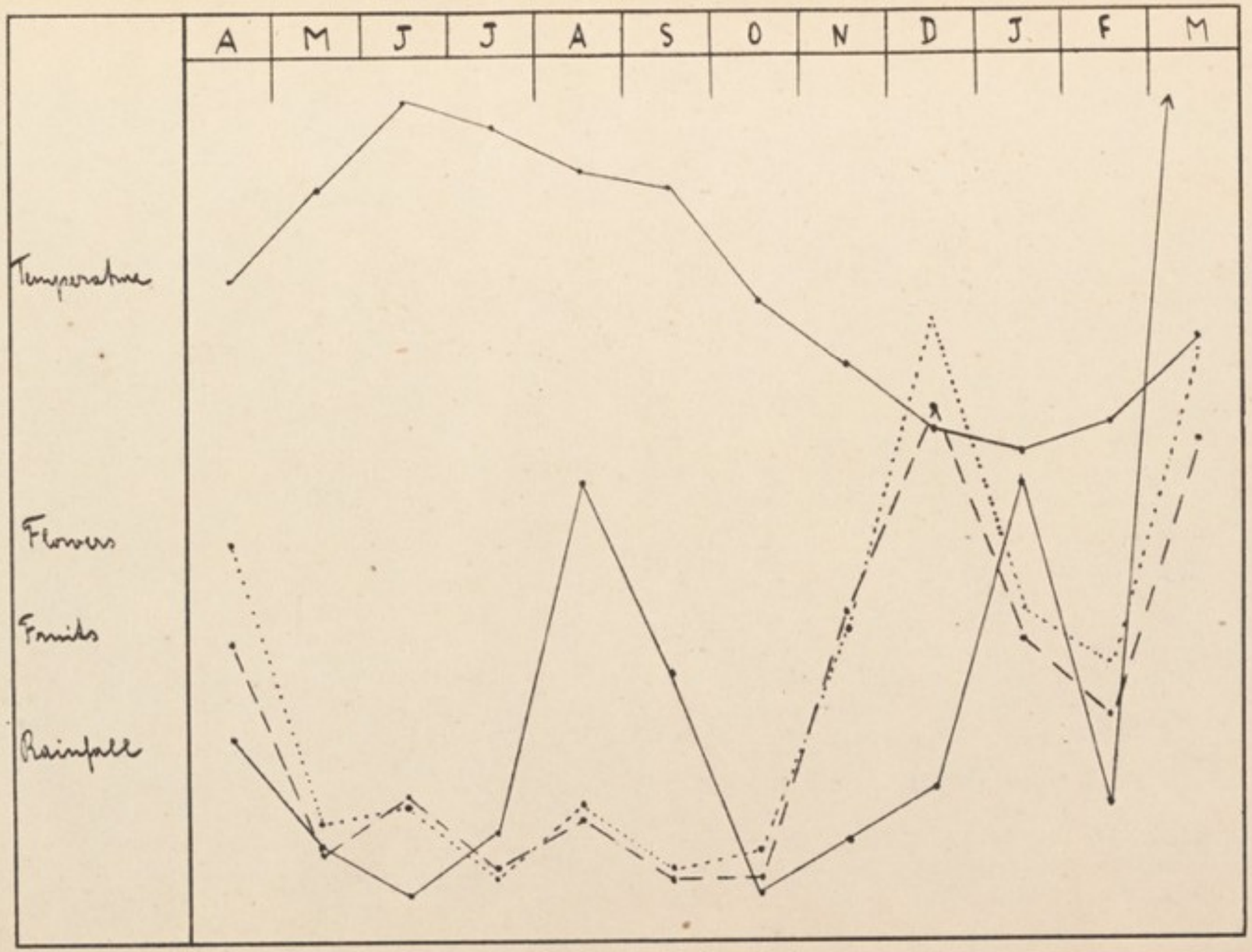
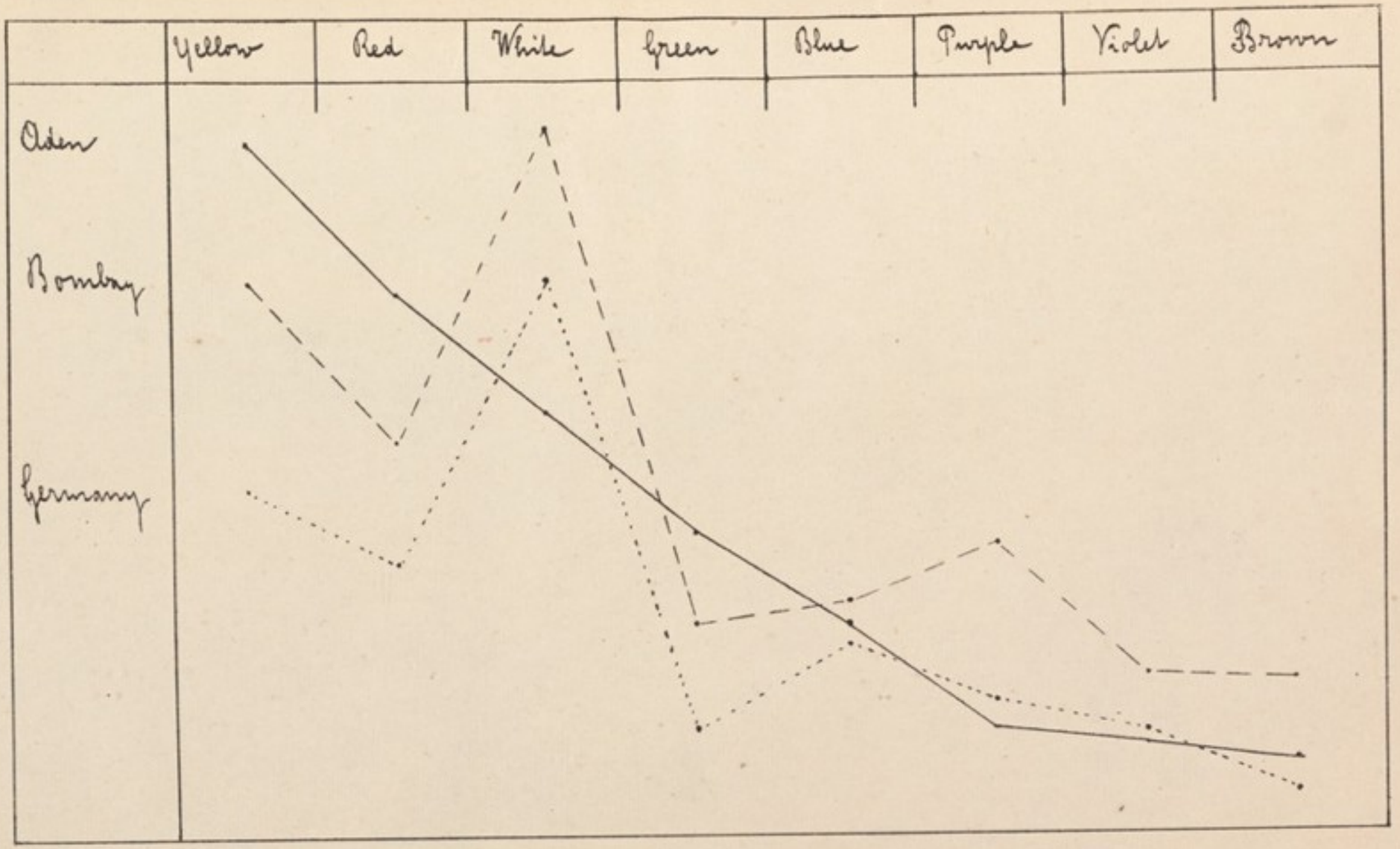


Relation of Flowering- and Fruiting Season to Temperature and Rainfall at Aden.

	Hoop	Ax	White	Green	Blue	Purple	Red	Brown	



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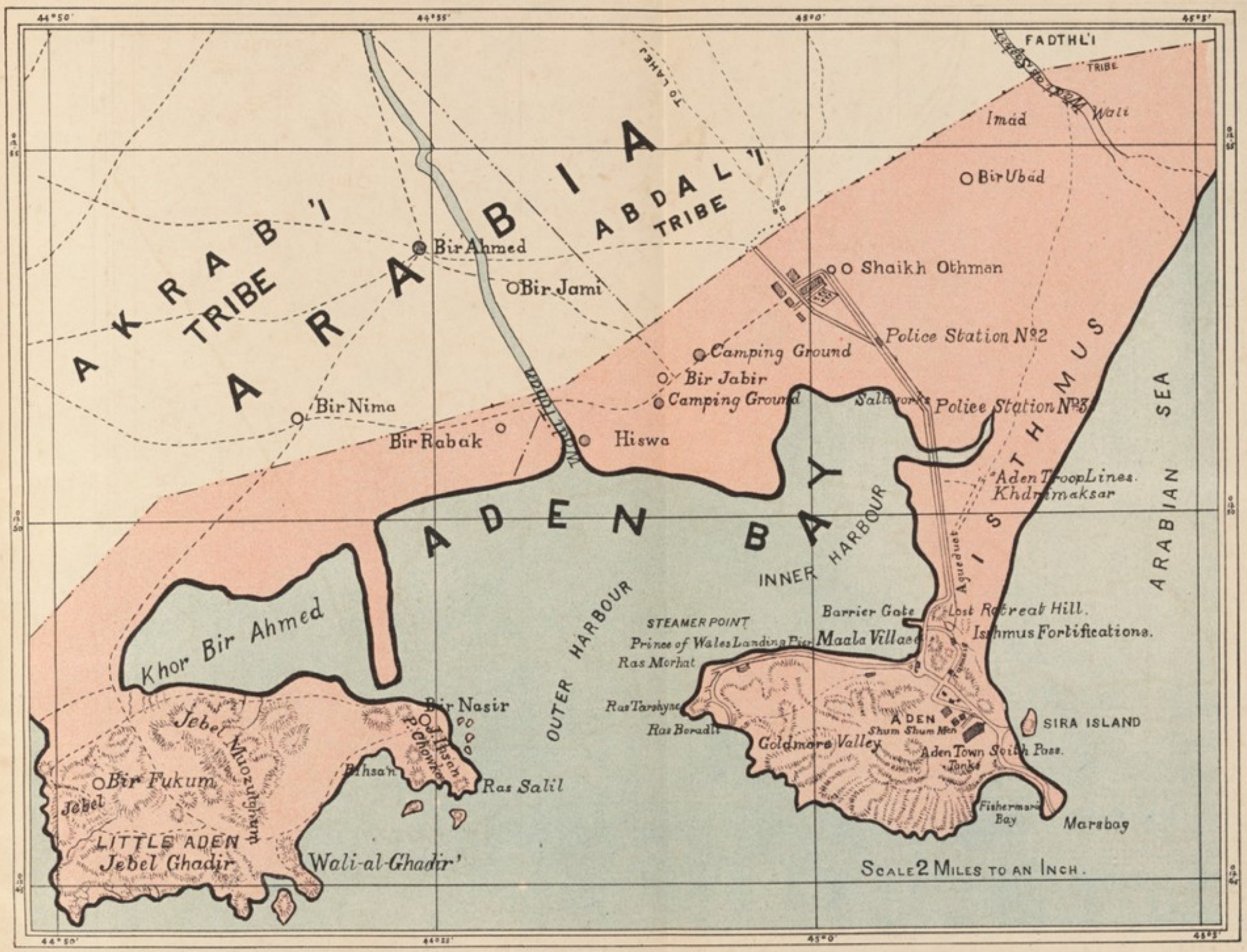

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