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# FLORA

OF

# TROPICAL AFRICA.

EDITED BY

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74 A. Hydrochauma C.E. Hubb.

74 B. Thyridachne C.E. Hubb.

79A Beckenriopsis Fitz & Asch. et

2 heteromorphous fl. in Arundinaceae



See also

Robyns, Fl. Agron. Congo Belge et  
Ruana-Urundi 1929

Chevalier, Rev. Bot. Appl. Agric Trop. 13: 848-892.  
1933 Studies on practices of west African  
forage value noted.

Chevalier, Aug. - for synonyms credited to  
Stapt or Chevalier (undescribed) cited Sudania  
see note on Sudania under Chevalier in  
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# FLORA OF TROPICAL AFRICA.

## ORDER CLVII. **GRAMINEÆ.**

(By O. STAFF.)

Partial inflorescences (spikelets) consisting of an axis (rachilla) and, typically, of 3 or more alternate, distichous, more or less heteromorphous bracts, of which the two lowest (glumes) form an involucre to the spikelet and are empty, whilst the following (valves) bear in their axils subsessile flowers, subtended by a usually hyaline 2-keeled or 2-nerved dorsal bract (valvule: palea of other authors); valves differing usually in structure and size from the glumes, and forming with the valvule and the flower proper false flowers (florets), which are alike or different in structure and sex, and often more or less reduced toward the top of the spikelet. Flowers hermaphrodite, or unisexual (often with the rudiments of the other sex), consisting of 3 or, usually, of 2 (anterior) minute hyaline or fleshy, nerved or nerveless scales (lodicules), representing a perianth, and of stamens or of a pistil, or of both. Stamens usually 3, rarely 6, 4, 2, or 1, very rarely more, hypogynous; filaments very slender, nearly always free; anthers versatile, consisting of 2 parallel cells, opening longitudinally by a slit, rarely by a terminal pore. Ovary entire, 1-celled; styles 2, lateral, rarely 3 or 1, free or more or less united, sometimes very short; stigmas as many as the styles, with simple or branched stigmatic hairs, exerted from the sides or the top of the florets; ovule 1, anatropous, often more or less adnate to the posterior side of the carpel. Fruit with the thin pericarp adnate to the seed (caryopsis, grain; rarely a delicate dehiscent or rupturing utricle enclosing a free seed, still more rarely a nut or a berry), with 2 marks, an anterior indicating the position of the embryo, and a posterior (hilum), free within the valve and valvule, or adhering to the latter, rarely to both, usually forming with them a false fruit which becomes free by the disarticulation of the rachilla. Seed erect; albumen copious, starchy; embryo usually small on the anterior face at the base of and outside the albumen; cotyledon shield-like (scutellum), closely attached by its inner side

to the albumen, having the plumule and the descending radicle in front, and sometimes also a small anterior appendage opposite it (epiblast).—Herbs, annual, or perennial by means of rhizomes, rarely suffruticose, in *Bambuseæ* often tall shrubs or trees. Stems nearly always branched (often repeatedly and profusely) at the base, very rarely simple, thus forming fascicles or tufts of erect, ascending, prostrate or creeping, simple or ramified branches, which in the annual species are all more or less alike, having usually much shortened basal and lengthened upper internodes, terminating with an inflorescence (culms) or, in the perennial species, consist of culms and short, leafy, usually biennial shoots (innovation shoots) which grow into culms in the second season; innovation shoots either piercing the subtending sheath at the base and growing up outside it, often as runners or stolons (extravaginal), or inside the sheaths, which may or may not be thrown aside (intravaginal); culms jointed, internodes usually hollow, closed at the nodes, with or without an annular swelling above the nodes and within the sheaths (culm nodes); all the branches and the leaf-supported ramifications with a 2-keeled dorsal, usually hyaline, leaflet at the base. Leaves alternate, usually 2-ranked, rarely pseudo-opposite owing to the alternation of long and very short internodes, very often crowded in tufts or fan-shaped bunches at the base of the culms, or in some cases also of their upper branches; in the perfect form (foliage leaves or “leaves” simply) consisting of sheath, ligule and blade; sheaths with the margins free (open sheaths) or more or less connate (closed sheaths), clasping each other or the culm, finally often loosened or sometimes slipping from the culm and more or less spreading, of the same structure throughout, or with an annular succulent swelling at the base (sheath nodes), which becomes at length hardened and persistent, or partly shrinks, leaving a depressed, often dark-coloured annular mark; ligules placed transversely at the inside at the junction of the sheath and the blade, consisting of a membrane or of a fringe of hairs, rarely altogether absent; blades usually long and narrow, entire, parallel-nerved, rarely ovate, cordate or sagittate, usually passing more or less gradually into the sheath, rarely articulated with it or constricted at the base into a petiole, folded or convolute in the bud, and often folding or rolling up in the mature state as they become dry, usually much reduced or quite suppressed in the lowest leaves which, in the perennial species, act as bud-scales, sometimes also in the upper leaves. Inflorescence terminal, rarely terminal and lateral, built up of the variously arranged spikelets, paniced, racemose, capitate, simply or compoundly spicate, very rarely consisting of a single spikelet, nearly always ebracteate. Spikelets all alike or heteromorphous, differing in sex and (in co-relation with the sex) more or less also in the general structure, bisexual with all the flowers ♀, or with ♀ and ♂, or ♀ and ♂ flowers in the same spikelet, or unisexual (monœcious

*Asphyllum*



or dicecious). Mature spikelets falling entire from the tips of the pedicels, or together with a part of the pedicel or of the rhachis, or breaking up above the glumes into as many false fruits as there are fruiting florets, rarely persistent and shedding the grains. In the first case the glumes, in the second the valves are often decurrent into a callous swelling or extension (callus) at the insertion on the pedicel or rhachilla respectively and separate together with it.

About 500 genera, comprising 3000 to 3500 species in all parts of the world.

The typical structure of the spikelets is sometimes more or less obscured by the reduction or suppression, or by peculiar modifications of certain parts, generally in obvious correlation to the loss of functions, or the assumption of functions other than usual. The morphological character of those parts may, however, usually be recognised from their position in the spikelet and from comparison with allied, less modified species. Reduction or suppression is frequent in the glumes and valvules, but extremely rare in the valves, except in reduced florets. The lower valves are, in certain tribes, frequently without a flower; but they very often enclose a rudiment of a floral branchlet, in the shape of a perfect or reduced valvule, thereby indicating their homology with typical valves. In this case they often lose some of the characteristics of the fertile valves, and approach either to the glumes in their general structure, or assume some special structure differing from that of the glumes as well as from that of the fertile valves. The nervation of the valve is very constant in nearly all the genera, and often throughout the greater part of a tribe; but in order to see it clearly, it is always advisable to flatten the valve and examine it by transmitted light in a drop of water. Where the sexual conditions of the florets are of importance, it should be kept in mind, that many grasses are very distinctly protandrous, *i.e.* that they shed their anthers some time before the stigmas expand. Such flowers have frequently been taken to be female, whilst they were actually hermaphrodite. To avoid this error, young spikelets should, if possible, be examined besides the fully developed ones, or the filaments which usually remain around the ovary should be sought for.

The definition and sequence of the tribes followed here are the same as in the *Flora Capensis*. The definition of the genera of the second series (*Pooideæ*) differs on the whole very little from that adopted in the *Flora Capensis*; in the Panicoid series, however, a considerable change has been found necessary. It concerns mainly the genera *Andropogon* and *Panicum* and their allies. The necessity of it was foreshadowed in the *Flora Capensis* (vol. vii. pp. 334, 383). To carry out the change then was not feasible as any revision of genera has to take into consideration the whole of their species and those of the immediately allied groups, a task for which there was no time. Since the publication of the *Gramineæ* of South Africa much work has been done in that direction, particularly in the tribe of *Panicææ* by American authors, whilst at the same time the collections at Kew have been subjected to a special scrutiny irrespective of floral boundaries. The absence of definite dividing lines for the genera of *Andropogoneæ* and *Panicææ* has so often been demonstrated that it is unnecessary to insist upon that fact. There being none, the alternatives are to unite the groups wherever intermediate links can be detected, or to be satisfied with approximately definable groups which can on the whole be easily grasped and remembered. The first must lead to chaos unless the species is consistently quoted with the name of the subordinate group (subgenus or section) to which it belongs, a process which is too cumbersome to be generally adopted, whilst the other alternative has every practical advantage, except that of introducing a considerable number of new combinations. These innovations are, however, more apparent than real, for there is no serious difference between such terms as "*Panicum* (*Setaria*) *viride*" and "*Setaria* *viridis*," or "*Andropogon* (*Cymbopogon*) *Schænanthus*" and "*Cymbopogon* *Schænanthus*." It has therefore been

Considered more expedient and serviceable for the purposes of a Colonial Flora to adopt smaller genera on practical grounds than unwieldy large genera for theoretical reasons, and the more so as it has thus been possible to bring the genera of *Andropogoneæ* and *Paniceæ* in line with the genera of the *Pooideæ* which on the whole have always been defined more narrowly. Fortunately many of those smaller genera of *Andropogoneæ* and *Paniceæ* have been recognised long ago by the earlier authors, so that apart from new discoveries it has only in a relatively small number of cases been necessary to introduce new generic names. Similar practical reasons have led to a slightly different disposition of the genera (often subgenera and sections according to Hackel) of *Andropogoneæ*, among them particularly the recognition that the sexual peculiarities which play so important a part in Hackel's system are neither sufficiently correlated with the general morphological characters, nor always easily detectable, and therefore not workable for practical purposes.

Subfamily I. PANICOIDEÆ.—Mature spikelets falling entire from their pedicels or with them (rarely subsistent on a flat, indistinctly and tardily disarticulating rhachis: *Stenotaphrum*), all alike or differing in sex and structure; perfect spikelets with 2 heteromorphous florets, the upper ♂, the lower ♀ or barren; rhachilla not continued beyond the upper floret.

Spikelets falling entire, singly or in clusters, occur in the following genera belonging to the second subfamily: *Heleochloa* sp., *Alopecurus*, all the *Zoysieæ*, *Melanocenchris*, *Harpacehne*, *Desmostachya*, *Fingerhuthia*, *Entoplocomia*.

TRIBE I. MAYDEÆ.—*Sexes in different inflorescences on the same plant or the ♀ spikelets at the base of the inflorescence, the ♂ above them. The ♂ spikelets in pairs, one sessile, the other pedicelled, or both (very unequally) pedicelled, in spike-like solitary or panicled racemes, 2-flowered; glumes membranous to chartaceous, enclosing the florets; valves more or less hyaline, awnless. The ♀ spikelets solitary with or without a rudimentary pedicelled companion, 1-flowered; glumes firm, at least the lower which ultimately often becomes bony, or both thin and more or less hyaline; valves hyaline, awnless.*

Sexes in different inflorescences; ♂ spikelets in large terminal panicles; ♀ spikelets in axillary sheathed "cobs," consisting of several spikes whose axes are fused into a spongy more or less cylindrical body, their glumes hyaline ... .. 1. ZEA.

Sexes not in different inflorescences; ♂ spikelets in several pairs, ♀ solitary and somewhat distant from the ♂ at the base of peduncled, more or less fascicled, terminal and axillary spike-like racemes; the ♀ enclosed in the usually globose or ovoid ivory-like capsuliform supporting sheath ... .. 2. COIX.

TRIBE II. ANDROPOGONEÆ.—*Spikelets usually in pairs, one sessile, the other pedicelled, very rarely both pedicelled, those of each pair alike as to sex (homogamous) or different (heterogamous) rarely 3-nate or solitary (Monium, Cleistachne) on the axes of variously arranged, often spike-like, racemes. Glumes more or less rigid and firmer than the valves, and the lower always longer than the florets. Valves membranous, often hyaline, that of the upper floret awned or reduced to an awn or muticous (all Rottbœllinæ, many Saccharinæ, rarely in other sub-tribes).*

The characters relied upon in the keys apply usually to the African genera only.

Subfam 2 p16



KEY TO THE SUB-TRIBES AND GROUPS OF GENERA.

~ Joints and pedicels more or less stout, triquetrous or rounded, thickened upwards or widened and more or less flattened throughout, posticously approximate or contiguous or partly or wholly fused, forming a more or less imperfect receptacle for the reception of the sessile spikelet, rarely gaping and then the spikelets typically awnless (*Lasiurus*, *Elyonurus* and *Chasmopodium*; see also the 1-noded jointless racemes of *Apluda*), their tips horizontally or obliquely truncate, without appendages (excepting *Urelytrum*) and often hollowed out; fertile spikelets 1- or 2-flowered with the fertile floret awned or unawned:

Fertile spikelets 2-flowered; fertile floret awned from the sinus of the 2-fid or 2'dentate valve (sometimes awnless in *Apluda*):—Sub-tribe *Ischæminæ*

Racemes several- to many-noded, espatheate, digitate or solitary on the culms and branches, the latter, if any, few; joints and pedicels posticously approximate, rarely contiguous; spikelets of each pair homogamous or more often heterogamous, usually similar in shape and nervation, rarely distinctly heteromorphous or the pedicelled much reduced; fertile spikelets awned ... ..

a. *Ischæmastræ*.

Racemes 1-noded, reduced to 3 heteromorphous spikelets (the sessile with a ♂ and a ♀ floret and an inflated callus, one pedicelled with 2 ♂ florets, the other rudimentary on a glume-like pedicel) enclosed in a boat-shaped spathe, solitary at the ends of the branches of a decomposed panicle; fertile florets awned or awnless ... ..

b. *Apludastræ*.

Fertile spikelets 1- or 2-flowered; fertile florets awnless; joints and pedicels usually posticously contiguous or more or less fused, rarely gaping (*Lasiurus*, *Elyonurus* and *Chasmopodium* in *Rottbælliastræ*); spikelets of each pair heterogamous, more or less dissimilar or the pedicelled much reduced or quite suppressed:—Sub-tribe *Rottbællinæ*.

Racemes in espatheate inflorescences, racemosely arranged on a common axis or subpaniculate or solitary by occasional reduction, rarely typically so and then with long awns from the glumes of the pedicelled spikelets (species of *Urelytrum*) ... ..

c. *Vossiastræ*.

Racemes at the ends of the culms and their branches in a false (rarely true) spatheate panicle or solitary and terminal on simple or sparingly branched culms ... ..

d. *Rottbælliastræ*.

~ Joints and pedicels slender, filiform, linear, subcuneate or subclavate, very rarely inflated; fertile spikelets usually 1-flowered and awned.

All spikelets alike in shape and sex, or if different

*Ischæmastræ*  
*Thelypodium*  
*Schizanthus*  
*Andropogon*

*Apludastræ*

*Vossiastræ*  
*Urelytrum*  
*Thyridia*  
*Sandersonia*

*Rottbælliastræ*

- in sex, then the pedicelled ♀ (*Eriochrysis*):—  
Sub-tribe *Saccharinæ*.
- Racemes in more or less compound panicles or racemously arranged on an elongated common axis; spikelets 1-flowered; awn from the sinus of the 2-dentate valve or from the tip of the entire valve or 0 ... .. e. *Saccharastræ*.
- Racemes digitate, rarely solitary; spikelets 1-flowered (in the African species); awn from the sinus of the 2-fid or 2-dentate valve ... f. *Polliniastræ*.
- The spikelets of each pair different in sex and frequently also in shape and size, or if those of some pairs of a raceme are alike in sex, then both ♂ or neuter; the fertile spikelets 1-flowered:—Sub-tribe *Andropogoninæ*.
- Racemes in more or less compound espatheate panicles; pedicels without a translucent middle line; pedicelled spikelets ♂, neuter or quite suppressed (including the pedicel in *Cleistachne*); awn from the sinus of the 2-fid valve ... .. g. *Sorghastræ*.
- Racemes not in compound espatheate panicles or if so (*Capillipedium*) then the pedicels with a translucent middle line.
- Fertile valve awned from low down on the back; sessile spikelets convex on the back and rounded on the sides, often muriculate, particularly along the sides, pedicelled usually rudimentary or 0, rarely ♂; racemes digitate ... .. h. *Arthrastræ*.
- Fertile valve awned from the sinus of a 2-fid or 2-dentate valve or continuing the more or less stipitiform valve, very rarely awnless (*Hypogynium*).
- Margins of the lower glume of the fertile spikelet inflexed and the glume therefore sharply 2-keeled more or less all along with a short obtuse callus, rarely the keels rounded off downwards with the margins subinvolute, but then the back of the glume deeply sunk between the keels and the callus short or long and acute (*Andropogon* § *Piestium*); awn glabrous or scabrid, very rarely hirsute (*Andropogon* sp.).
- Spikelets awnless, in decompound more or less compact panicles; joints and pedicels filiform, unappendaged; sessile spikelets ♀, pedicelled ♂ very similar ... .. i. *Hypogyniastræ*.
- Spikelets awned.
- Awn forming a continuation of the stipitiform fertile valve; racemes digitate or racemously-digitate and then usually very numerous, all more or less shortly peduncled on simple or almost simple culms, or solitary at





the end of the culms and their branches and sometimes gathered into a scanty spatheate false panicle, rarely in compound spatheate panicles (*Capillipedium*); joints and pedicels slender, filiform, with a translucent middle line, tips unappendaged ... .. j. **Amphilophiastreae.**

Awn from the sinus of the 2-fid or 2-dentate fertile valve.

Racemes solitary at the ends of the culms and their branches, the branches usually gathered into a narrow lax spatheate false panicle; joints and pedicels often somewhat stout, thickened upwards, with more or less appendaged tips; pedicelled spikelets ♂, neuter or suppressed ... .. k. **Schizachyriastreae.**

Racemes in the African species mostly 2-nate at the end of simple or almost simple culms or gathered in spatheate false or true panicles, each pair supported or surrounded by a spathe; more rarely the racemes digitate (*Andropogon* sp.), the lateral always sessile; joints and pedicels linear to linear-cuneate, rarely inflated, tips truncate with or without a small dentate oblique rim, rarely with a more conspicuous appendage ... .. l. **Andropogonastreae.**

Margins of the lower glume of the fertile spikelets involute, inflexed and 2-keeled (if at all) only close to the tips, the spikelets therefore with rounded sides or quite terete; callus elongate and acute or pungent, rarely the lower glume inflexed and 2-keeled from the middle upwards with a short obtuse callus (species of *Hyparrhenium*); awn more or less hirsute (excepting *Anadelphiastreae*).

Awn from the sinus of the 2-fid fertile valve.

Racemes paired in more or less compound panicles, the lower pair or pairs of at least one of the racemes homogamous, barren, the others heterogamous; awns hirsute ... .. m. **Hyparrheniastreae.**

Racemes usually much reduced, solitary at the end of the culms and their branches or in more or less compound panicles; all pairs of spikelets heterogamous; joints and pedicels finely filiform, rarely the pedicels suppressed (*Monium*), tips unappendaged; awns glabrous ... .. n. **Anadelphiastreae.**

*Andropogon* in *Andropogon*  
to the *Andropogon*  
p 213

*of spikelets*

Awn from the stipitiform fertile valve,  
hirsute.

Racemes many-noded, solitary, very rarely paired or fascicled (*Trachypogon* sp.); all pairs of spikelets heterogamous and alike, or the lowest 1 to many homogamous and barren, very different from the fertile, not forming an involucre around them ... o. **Heteropogonastræ.**

Racemes few-noded, much contracted, solitary on the branches of decom-  
pound panicles, the lowest pair or pairs homogamous, barren, forming an involucre around the 1-3 fertile spikelets ... .. p. **Themedastræ.**

a. **Ischæmastræ.**

Racemes geminate or digitate.

Pedicelled spikelets developed, frequently ♂, sometimes ♀ or neuter; lower glume flat or somewhat convex and usually coriaceous below, chartaceous and markedly nerved upwards, rarely shallowly concave; keels frequently winged or marginate ... .. 3. **ISCHÆMUM.** 28

Pedicelled spikelets represented by a linear curved pedicel; lower glume coriaceous, convex, covered all over with transverse much raised ridges which are often broken up into teeth or warts, not keeled ... .. 4. **THELEPOGON.**

Racemes always solitary on the culms or branches.

Glumes not winged, the upper of the sessile spikelet with a setose awn; pedicelled spikelets flat, their lower glume strongly nerved ... .. 5. **SEHIMA.** 35

Upper glume of both spikelets with a wing-like crest, muticous; pedicelled spikelets rounded on the back with a large revolute wing from the keel of the lower glume ... .. 6. **ANDROPTERUM.** 34

b. **Apludastræ.**

Only genus ... .. 7. **APLUDA.** 39

c. **Vossiastræ.**

Lower glume smooth.

Lower glume of all spikelets long-caudate; racemes digitate, occasionally solitary, somewhat compressed, very tardily disarticulating; spikelets 2-flowered .. ... 8. **VOSSIA.**

Lower glume of all or at least of the sessile spikelets ecaudate, muticous.

Lower glume quite coriaceous, of the pedicelled spikelets produced into a long awn; spikelets 2-flowered; racemes solitary; paired or up to 5 on a common axis ... .. 9. **URELYTRUM.**





- Lower glume of both spikelets of each pair muti-  
cous, coriaceous near the keels, otherwise  
thinly chartaceous; spikelets 1-flowered;  
racemes paniced, very fragile ... .. 10. THYRSIA.
- Lower glume muricate; racemes paniced or race-  
mosely arranged on a long common axis; spike-  
lets 1-flowered ... .. 11. JARDINEA.

*d. Rottbœlliastræ.*

- Spikelets all alike, also as to sex; racemes tough or  
tardily disarticulating, much compressed; joints  
and pedicels fused ... .. 12. HEMARTHRIA. *type Composita*
- Spikelets of each pair more or less dissimilar, at least as  
to sex, the pedicelled ♂, neuter or suppressed.  
Sessile spikelets small, globose, foveolate, 1-flowered,  
pedicelled very dissimilar; joints and pedicels  
fused; racemes conspicuously dorsiventral ... 13. MANISURIS. = *Hæckelochloa*
- Sessile spikelets not globose.  
Sessile spikelets much compressed, winged from  
the transversely rugose or muricate lower  
glumes, 1-flowered, pedicelled very dissimi-  
lar; joints and pedicels fused; racemes con-  
spicuously dorsiventral ... .. 14. PELTOPHORUS. *Majuscula*  
= *Manisuris*
- Sessile spikelets not winged.  
Racemes usually more or less villous, very rarely  
glabrous, never cylindrical; joints and  
pedicels moderately stout, gaping.  
Spikelets 2-flowered, very villous all over, the  
sessile sometimes 2 at a node and sub-  
opposite; lower glume without trans-  
parent oil-ducts or penicillate warts ... 15. LASIURUS.
- Spikelets 1-flowered; racemes more or less  
villous from the joints and pedicels or the  
edges of the spikelets, rarely glabrous;  
lower glume with a transparent oil-duct  
inside each keel or a fringe of penicillate  
warts ... .. 16. ELYONURUS.
- Racemes glabrous, cylindrical, particularly  
when the spikelets are closed.  
Pedicels and joints fused.  
Racemes stout, few from each culm, sessile  
spikelets 2-flowered, pedicelled ♂ or  
neuter ... .. 17. ROTTBÆLLIA. 72
- Racemes slender in ample spatheate pani-  
cles; sessile spikelets 1-flowered ... 18. OPHIURUS.
- Pedicels free from the joints.  
Pedicels and joints cupular-clavate, gaping,  
exposing between them the upper  
glume (which is covered by the accu-  
mbent pedicelled spikelet); spikelets of  
each pair similar, 2-flowered ... .. 19. CHASMOPODIUM.
- Pedicels and joints posticously contiguous;  
pedicelled spikelets usually much re-  
duced or quite rudimentary.  
Racemes usually in terminal and lateral

spatheate fascicles or fastigiate panicles; spikelets 1-flowered; coarse tall grasses ... .. 20. CÆLORRHACHIS.

Racemes solitary and terminal on 1- or few-noded culms; sessile spikelets 2-flowered; back of lower glume usually transversely rugose ... 21. RHYTACHNE.

*e. Saccharastræ.*

Rhachis of racemes continuous at the nodes and tough, or tardily disarticulating, all spikelets pedicelled.

Racemes in spike-like or thyrsoïd solitary panicles, rhachis quite tough; -spikelets muticous; glumes delicate or somewhat firm at the base... 22. IMPERATA.

Racemes in large, often reddish or brownish panicles, rhachis tough or tardily disarticulating; spikelets awned; glumes chartaceous to coriaceous 23. MISCANTHIDIUM.

Rhachis of racemes readily disarticulating; spikelets paired, one sessile, the other pedicelled.

Glumes coriaceous or chartaceous throughout; panicles narrow, fulvously to rufously villous or tomentose; spikelets always muticous, the pedicelled ♀ ... .. 24. ERIOCHRYSIS.

Glumes membranous or chartaceous to subcoriaceous at the base; panicles wide, often thyrsoïd, more or less plumose and silvery; spikelets usually awned, rarely mucronate or awnless; awn a straight, rarely bent not twisted bristle 25. SACCHARUM. 94

*f. Polliniastræ.*

Spikelets dorsally compressed; callus short, obtuse ... 26. EULALIA. — 97

Spikelets subterete; callus long, pungent ... .. 27. HOMOZEUGOS.

*g. Sorghastræ.*

Spikelets dorsally compressed (at least when in flower); lower glume of the fertile spikelets firmly chartaceous to coriaceous.

Spikelets in threes, one of them fertile, or in racemes of 2-8 pairs; the pedicelled ♂, neuter or if quite suppressed then at least the pedicels present ... 28. SORGHUM. 104

Spikelets solitary ... .. 29. CLEISTACHNE.

Spikelets laterally more or less compressed.

Racemes of many pairs of spikelets; primary branches of panicle in whorls of 6 to 20 ... 30. VETIVERIA.

Racemes usually reduced to 1 sessile ♀ and 2 pedicelled ♂ or barren spikelets, rarely of 2 or more but always few pairs ... .. 31. CHRYSOPOGON. 159

*h. Arthronastræ.*

Only tropical African genus ... .. 32. ARTHRAXON. 162

*i. Hypogyniastræ.*

Only tropical African genus ... .. 33. HYPOGYNIUM. 167

*type = Manisuris glaucochloa Trin. Ktze*





j. *Amphilophiastrea*.

- Racemes in compound spatheate panicles ... .. 34. *CAPILLIPEDIUM*. 169
- Racemes not in compound spatheate panicles.
- Racemes digitate, or many racemously arranged on a common axis shorter than the racemes.
- Sessile spikelets of all pairs ♂, awned ... .. 35. *AMPHILOPHIS*. 171  
*Bolbocarpus*
- Sessile spikelets of the lowest 1-3 pairs ♂ or neuter and awnless.
- Racemes shortly or very shortly peduncled, not nodding; joints and pedicels solid; anthers of ♂ and ♂ alike ... .. 36. *DICHANTHIUM*. 177
- Racemes borne on subcapillary peduncles, which are up to over  $\frac{1}{2}$  in. long and usually nodding or sigmatoid; joints and pedicels hyaline and balsamiferous between the thickened margins; anthers of ♂ minute, about as long as broad, of ♂ several times longer than broad ... .. 37. *EUCLASTA*. 180
- Racemes solitary at the ends of the culms and branches, sometimes in scanty spatheate false panicles ... .. 38. *EREMOPOGON*. 182

k. *Schizachyriastrea*.

- Pedicelled spikelets not conspicuously larger than the sessile, very often smaller to very small; upper glume awnless ... .. 39. *SCHIZACHYRIUM*. 184
- Pedicelled spikelets very much larger than the sessile, almost concealing them; upper glume awned ... 40. *DICTOMIS*. 206

l. *Andropogonastrea*.

- Racemes mostly 2-nate or sometimes digitate at the end of simple or almost simple culms, rarely on the more or less fastigiate branches of a spatheate false panicle; usually all pairs heterogamous and all sessile spikelets ♂ and alike, or sometimes (mainly § *Pleistium*) the lowest more or less reduced and barren, but still resembling the upper fertile spikelets ... .. 41. *ANDROPOGON*. 208
- Racemes always 2-nate, with a spathe supporting or surrounding each pair, gathered into often much decompound spatheate panicles; the lowest pair of one of the racemes homogamous, ♂ or neuter; all pairs of the other heterogamous; mostly aromatic grasses... .. 42. *CYMOPOGON*. 265

m. *Hyparrheniastrea*.

- Lower glume without a herbaceous beak; pairs of racemes usually in much compound spatheate panicles; racemes few- to many-noded, only one of them or both with 1 (rarely 2) homogamous pair, the pedicelled member of which is very similar to the sessile ... .. 43. *HYPARRHENIA*. 291

43a *Hyparrhenia*

Lower glume coriaceous with a herbaceous beak; pair of racemes terminal on the culms and their distant 1-3 branches, long-exserted from the supporting sheath, one sessile, the other long-peduncled, both reduced to two pairs of large homogamous ♂ spikelets and one heterogamous pair, surrounded by them as by an involucre ... .. 44. EXOTHECA.

*n. Anadelphiastræ.*

Racemes of 1 to many sessile and as many (or more by one) pedicelled spikelets.

Sessile spikelets numerous (6 to very many), more or less imbricate owing to the short joints; the racemes enclosed, except the pedicelled spikelets, in a large coloured boat-shaped spathe, arranged in a simple, very loose panicle ... .. 45. MONOCYMBIUM.

Sessile spikelets few (1-5), not closely imbricate owing to the elongated joints; spathes narrow with the racemes laterally or terminally exserted ... .. 46. ANADELPHIA. 388

Racemes reduced to a single ♂ spikelet; habit of *Anadelphia* ... .. 47. MONTIUM.

*o. Heteropogonastræ.*

Spikelets all pedicelled, the secondary all alike and fertile, the primary ♂; rhachis of raceme tough ... .. 48. TRACHYPOGON.

Secondary spikelets sessile, those of the lower 1 or several pairs ♂ or neuter, and different in shape from those of the upper pairs, the latter fertile. 48a Ely...

Pedicelled spikelets suppressed with the exception of those of the lowest and uppermost pair which are rudimentary ... .. 49. HOMOPOGON. J. 410

Pedicelled spikelets of all pairs developed, ♂ or neuter ... .. 50. HETEROPOGON. 410

*p. Themedastræ.*

Only tropical African genus ... .. 51. THEMEDA. 415

TRIBE III. PANICEÆ.—*Spikelets in usually continuous spikes, racemes or panicles. Glumes herbaceous or membranous, the lower generally smaller, very small or suppressed. Lower valve generally resembling the glumes in structure and nervation, the upper fertile firmer, at length rigid, often chartaceous to crustaceous, awnless, very rarely mucronate (Urochloa, Alloteropsis sp.) or finely awned (Alloteropsis sp., Coridochloa).*

KEY TO THE SUB-TRIBES AND GROUPS OF GENERA.

Upper floret only fertile; valve of lower floret usually resembling the upper glume, not indurated:—Sub-tribe *Panicinæ*.

Inflorescences of usually slender (stout in *Alloteropsis*), spiciform, digitate or subdigitate or somewhat distant and quaquaversally arranged, very rarely solitary racemes; fruiting valve with usually flat, thin to hyaline margins, thinly cartilaginous, often brown or dark, with the usually minute, often microscopic, scale-like valvule of the barren floret attached to its base ... .. *a. Digitariastræ.*



52+ *Hylobates* Chippendale

Inflorescences usually different (see however *Axonopus* and *Paspalum* sp.); fruiting valve with more or less inrolled margins, usually crustaceous and straw-coloured or whitish; valvule of the barren floret, if developed, not attached to the false fruit.

Spikelets falling entire and singly from the persistent pedicels, rarely deciduous with the joints of a tardily disarticulating rhachis (*Stenotaphrum*).

Spikelets not awned, or if awned, then sessile in false secund variously arranged spikes and with the awns from the entire tips of the upper glume and lower valve (*Echinochloa* sp.) or from the tips of both glumes or at least the lower (*Oplismenus*); fruiting valve mostly crustaceous, rarely chartaceous ... ..

b. Panicestræ.

Spikelets finely awned or mucronate from the notched tips of the upper glume and barren valve (or if muticous, these at least slightly notched), delicately pedicelled, paniced; lower glume very minute; fruiting valve rigidly membranous... ..

c. Meliniestræ.

Spikelets falling in groups, or if singly then surrounded by an involucre of bristles or at least supported by 1 to several bristles.

Spikelets falling surrounded by an involucre of bristles or spines or bract-like scales, or at least supported by 1 to several bristles; or with the lower glumes of each group forming a false involucre ... ..

d. Cenchastræ.

Spikelets falling in clusters (modified spikes) together with the flat subfoliaceous rhachis or its joints; upper spikelets of each cluster imperfect ... ..

e. Trachydastræ.

Both florets fertile, or if the lower  $\delta$ , then its valve more or less resembling that of the upper floret and indurated:—Sub-tribe *Isachninae* ... ..

f. Isachnastræ.

a. Digitariestræ.

Spikelets quite awnless; lower glume minute, rarely 0 or larger and then delicately hyaline; valve of lower floret usually with 5-7 close, straight, prominent nerves ... ..

52. DIGITARIA. 422

Spikelets slender-awned.

Awns long, fine from the upper glume or barren valve.

Awn from the barren valve; lower glume 0, upper reduced to a minute scale ... ..

53. CHLORIDIUM.

Awns from the upper glume and barren valve, tangled; lower glume well developed ... ..

54. ACRITOCHETE.

Awns from the fertile valve, often short.

Spikelets 2-flowered, dorsally not compressed; lower valve more or less indurated and like the fertile ... ..

55. ALLOTEROPSIS.

Spikelets 1-flowered, dorsally much compressed; lower valve like the glumes very thin ... ..

56. CORIDOCHLOA.

## b. Panicestræ.

Inflorescence of variously arranged (rarely solitary) simple or compound, usually secund, spike-like, dense (rarely loose) racemes, not an open or contracted and cylindric panicle; spikelets usually paired or sometimes particularly towards the base of the raceme in fascicles of 3 (rarely more), unequally pedicelled or solitary, alternately to the right and the left of the median line of a usually dorsiventral rhachis.

Fruit slightly laterally compressed or subterete, more or less acuminate; its valve and valvule thinly cartilaginous; racemes somewhat lax owing to the more distant pairs or fascicles of spikelets which are attached to slender rhachises; spikelets awnless; blades lanceolate, acuminate, flat, loosely nerved, usually with some transverse venules, contracted at the base into a short petiole or pulvinus, sometimes finally disarticulating from the sheath.

Glumes and lower valve herbaceous, particularly upwards ... .. 57. CHLOACHNE.

Glumes and lower valve papery or scarious; blades broad, resembling those of the dwarf African bamboos ... .. 58. MICROCALAMUS.

Fruit dorsally (very rarely laterally) compressed, its valve and valvule crustaceous; racemes usually rather dense.

Back of fruit abaxial (indistinctly so in *Leucophrys*).

Spikelets strongly laterally compressed, distant on long slender rhachises; lower glume herbaceous, as long as the spikelet ... .. 59. PSEUDECHINO-  
[LÆNA.]

Spikelets more or less dorsally compressed; lower glume never herbaceous.

Lower glume rudimentary forming with the base of the rhachilla a swollen annular callus; fruit mucronate ... .. 60. ERIOCHLOA.

No swollen annular callus at the base of the spikelet.

Lower glume about as long as the spikelet, whitish and subhyaline; upper glume and lower valve long-hairy; racemes short and rather lax owing to the lengthening of the pedicels ... .. 61. LEUCOPHRYS.

Lower glume absent or small, rarely over half the length of the spikelet, or if longer, then the spikelets sessile or subsessile.

Lower glume present; racemes racemously arranged ... .. 62. BRACHIARIA.

Lower glume absent; racemes digitate or subdigitate ... .. 63. AXONOPUS.

Back of the fruit adaxial.

Lower glume typically absent; spikelets usually conspicuously plano-convex, with the flat side turned away from the rhachis ... .. 64. PASPALUM.





Lower glume developed.

Rhachis flat, more or less corky, disarticulating tardily at maturity; spikelets sunk in the cavities of the rhachis and falling with the joints ... .. 65. STENOTAPHRUM.

Rhachis persisting, not articulate; spikelets falling from the pedicels.

Glumes neither awned nor caudate; if shortly cuspidate-acuminate, then the fruiting valve obtuse with an imposed mucro and the margins inrolled all along.

Fruiting valve acute, not mucronate; spikelets solitary, closely 2-seriate, contiguous with their sides; false spikes rigid, not several times longer than the internodes of the long common axis, their lower parts more or less appressed to the alternately hollowed-out flanges of the latter ... 66. PASPALIDIUM.

Fruiting valve obtuse, abruptly mucronate or aristulate; spikelets solitary or paired, when solitary contiguous with their backs; false spikes often flexuous or curved, usually several times longer than the internodes of the relatively short common axis, spreading from the base ... .. 67. UROCHLOA.

Glumes caudate or cuspidate-acuminate or awned.

Glumes awned from the entire acute or acuminate tip, or caudate or cuspidate-acuminate; margins of the fruiting valve flat upwards, not embracing the tip of the valvule; racemes dense, more or less secund, often very numerous ... .. 68. ECHINOCHLOA.

Glumes awned from the slightly notched tips; racemes elongated or short to very short, secund, compact, spreading from the common axis ... .. 69. OPLISMENUS.

Inflorescence an open panicle, rarely contracted, cylindrical and spike-like (*Sacciolepis*, *Setaria* sp.).

Spikelets not supported by bristle-like branches.

Spikelets not gibbous or if slightly so, then not in cylindrical false spikes.

Fertile floret without any basal appendages in front ... .. 70. PANICUM. 638

Fertile floret with basal appendages in front ... 71. ICHNANTHUS.

Spikelets distinctly gibbous or if only slightly so, then in cylindrical false spikes.

Spikelets laterally much compressed; fruit equalling the spikelet, distinctly gibbous... 72. CYRTOCOCCUM.

Spikelets laterally not compressed; fruit much shorter than the spikelet.

Spikelets in mostly lax and open panicles, curved, very gibbous owing to the saccate upper glume ... .. 73. RHAMPHOLEPIS.

- Spikelets in cylindrical false spikes with a stout rachis, more or less gibbous ... 74. SACCOLEPIS.  
 All the spikelets or only the upper of each branch supported by bristle-like branchlets ... 75. SETARIA.

## c. Meliniastæ.

- Upper glume and barren valve gibbous at or below the middle, both 5-nerved; nerves faint, hidden by copious and long silky hairs and anastomosing below the obtuse tips ... 76. ~~TRICHOLEPIS~~ *Rhynchelytrum* p. 869  
 Upper glume and barren valve not gibbous.  
 Nervation of glume and barren valve as in *Tricho-* 76  
*lana*; both awnless or at most minutely mucronate, glabrous or pubescent, rarely shortly villous ... 77. ~~XYCHLENA~~ *Tricholana* p. 908  
 Upper glume 7-, barren valve 5-nerved; nerves conspicuous, not anastomosing below the acute tips; barren valve usually finely awned ... 78. MELINIS. p. 716

## d. Cenchastræ.

- Involucre spurious, formed by the indurated lower glumes of the spikelets of each group or cluster; clusters spicate ... 79. ANTHEPHORA.  
 Involucre not spurious, that is, not formed by parts of the spikelets.  
 Involucre formed by highly modified bristle- or spine-like barren branchlets.  
 Involucre of free naked or plumose bristles ... 80. PENNISETUM.  
 Involucre of spines or rigid bristles united at the base into a hard cup ... 81. CENCHRUS. 1070  
 Involucre of spurious bracts ... 82. ODONTELYTRUM.

## e. Trachydastræ.

- Only African genus ... 83. PHYLLORRHACHIS. 1008

## f. Isachnastæ.

- Florets very similar; spikelets more or less paniced... 84. ISACHNE. 1090  
 Florets heteromorphous, both fertile; spikelets in short secund spikes with a pungent rachis, distant along a common axis ... 85. HETERANTHECIA.

Subfamily II. POOIDEÆ.—Mature spikelets breaking up, leaving the persistent or subsistent glumes on the pedicel, or if falling entire, then not consisting of 2 heteromorphous florets as in *Panicoidææ*.

A. Blades never transversely veined in the tropical African species (except in *Cenotoheca* and sometimes in *Arundo*), nor articulated on the sheath (86-172).

- a. Awn of the fertile floret if present, <sup>usually</sup> kneed and twisted below the knee, or straight in reduced forms (86-113).  
 i. Florets 2 or more (86-98).

TRIBE IV. ARUNDINELLEÆ.—Florets 2, heteromorphous, the lower awnless or barren. Rachilla not continued beyond the upper floret. Lower valve awnless, rather resembling the glumes; upper generally (always in the

*African species*) awned, at length firm or hard; awn from the sinus between 2, sometimes minute or bristle-like, lobes, rarely from the entire, obtuse tip, usually kneed and twisted below the knee.

Valve of the upper floret 2-setose, minutely 2-toothed or entire; awn sometimes reduced ... .. 86. ARUNDINELLA.

Valve of the upper floret always distinctly 2-toothed or 2-lobed to 2-fid; awn always kneed.

Valve of the upper floret 2-toothed or 2-lobed but not 2-fid, not transversely bearded; keels of valvule unappendaged.

Spikelets solitary on distinct pedicels ... .. 87. TRICHOPTERYX.

Spikelets in clusters of 3 ... .. 88. TRISTACHYA.

Valve of the upper floret 2-fid, transversely bearded after the fashion of most *Danthonias*; keels of the valvule with wing-like appendages ... .. 89. DANTHONIOPSIS.

TRIBE V. AVENEÆ.—*Florets 2 to many, all alike (except the uppermost which often are reduced). Glumes generally hyaline or scarious and shining. Valves membranous or subherbaceous with hyaline shining margins or firmer, 5- or more-nerved, rarely 3-nerved (with the side-nerves delicate and not submarginal); awn, if present, from the back or from the sinus, or from between bristles, kneed and usually twisted below the knee (see Kœleria).*

Valves awnless or awned from the back.

Florets 2, both perfect.

Annuals; spikelets small; rachilla glabrous and very short between the florets, shortly or obscurely produced beyond the upper floret 90. AIRA.

Perennials; spikelets larger than in *Aira*; rachilla hairy and more or less elongated between the florets; usually produced beyond the upper floret into a bristle ... .. 91. DESCHAMPSIA.

Florets 2 or more, the uppermost reduced.

Panicle densely spiciform; valves thin, 3-5-nerved, awnless, mucronate or minutely awned from close to the tip ... .. 92. KœLERIA.

Panicle not spiciform; valves rather firm, 5-9-nerved, awned from the back.

Perennial; spikelets erect or suberect; glumes usually 1-3-nerved ... .. 93. AVENASTRUM. = *trichostachya*

Annual; spikelets large, pendulous; glumes 7-9-nerved ... .. 94. AVENA. *in He 85*

Valves awned (rarely mucronate) from or close to the sinus of the more or less distinctly 2-lobed tip.

Florets 2, both perfect; continuation of the rachilla minute or bristle-like ... .. 95. PENTASCHISTIS.

Florets 3 to many, the uppermost reduced.

Spikelets pedicelled (in the tropical African species), paniced, rarely racemose, disarticulating above the glumes and between the valves; glumes 3-9- (rarely 1-) nerved; valves firmly membranous to chartaceous, not ribbed, awned from the sinus ... .. 96. DANTHONIA.

Spikelets sessile and subsessile in 2-nate or digitate, flexuous spikes, disarticulating tardily above the glumes, tough between the valves; glumes 1-nerved; valves 7-9-ribbed, cartilaginous between the inner ribs, otherwise membranous, awned from close below the sinus ... .. 97. LINTONIA. *shorter than*

TRIBE VI. ARUNDINEÆ.—*Florets 2 to many, enveloped by very long hairs, springing either from a long and slender callus or from the back of the valves. Glumes and valves membranous, often hyaline, awnless or minutely awned from the tips.*

Only genus in tropical Africa ... .. 98. PHRAGMITES.

# ii. Floret 1 (99–113).

TRIBE VII. AGROSTEÆ.—*Floret 1. Rhachilla not continued beyond the floret or only as a more or less distinct point or bristle. Valve membranous or thinly herbaceous, not or hardly changed when mature, usually truncate, 5- (very rarely 3-) nerved, all the nerves or the outer side-nerves often slightly excurrent, parallel or at least not anastomosing; awn, if present, from the back, rarely from the truncate tip.*

Spikelets not in compact false spikes, although sometimes in contracted more or less spiciform panicles; glumes always free at the base; styles short; stigmas exerted laterally.

Glumes awned from the notched or lobed tips; inflorescence more or less spiciform, often lobed ... 99. POLYPOGON.

Glumes not awned.

Glumes slightly inflated at the base; inflorescences more or less spiciform, glistening ... .. 100. GASTRIDIMUM.

Glumes not inflated at the base; inflorescence not spiciform.

Callus glabrous or shortly bearded ... .. 101. AGROSTIS.

Callus with long fine hairs, often much longer than the floret ... .. 102. CALAMAGROSTIS.

Spikelets in compact heads or false spikes; glumes awnless; styles long; stigmas exerted terminally.

Glumes shorter than the florets ... .. 103. HELEOCHLOA.

Glumes longer than the florets, completely enclosing them and often connate at the base ... .. 104. ALOPECURUS.

TRIBE VIII. STIPEÆ.—*Floret 1. Rhachilla not continued beyond the floret. Valve hardened when mature, tightly enveloping the fruit; nerves joining or closely approaching at the tip; awn terminal, rarely 0.*

Awns 3 from the entire tip, or one, simple below and 3-branched above, very rarely quite simple; ligule a fringe of hairs ... .. 105. ARISTIDA.

Awns solitary or 0; ligules membranous.

Floret cylindric or linear-oblong; awn kneed and twisted below the knee ... .. 106. STIPA.

Floret broader than in *Stipa*; awn very fine, straight, caducous or 0 ... .. 107. ORYZOPSIS.

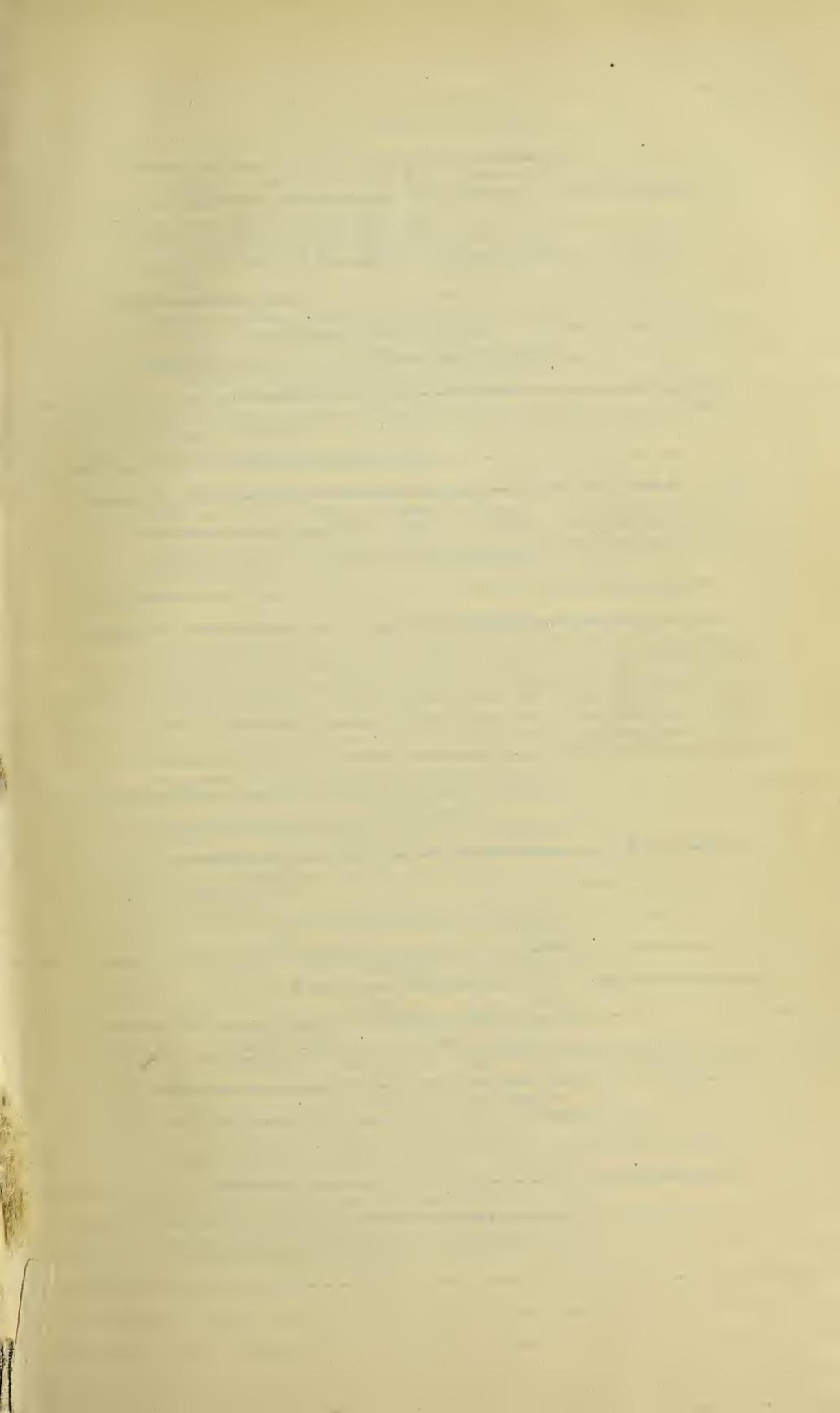
TRIBE IX. ZOYSIÆÆ.—*Mature spikelets falling entire and singly, or in clusters. Floret 1. Rhachilla not continued beyond the floret. Glumes equal, or the lower much smaller or suppressed. Valve small, delicately membranous, 3-1-nerved. Spikelets in slender spiciform panicles or racemes.*

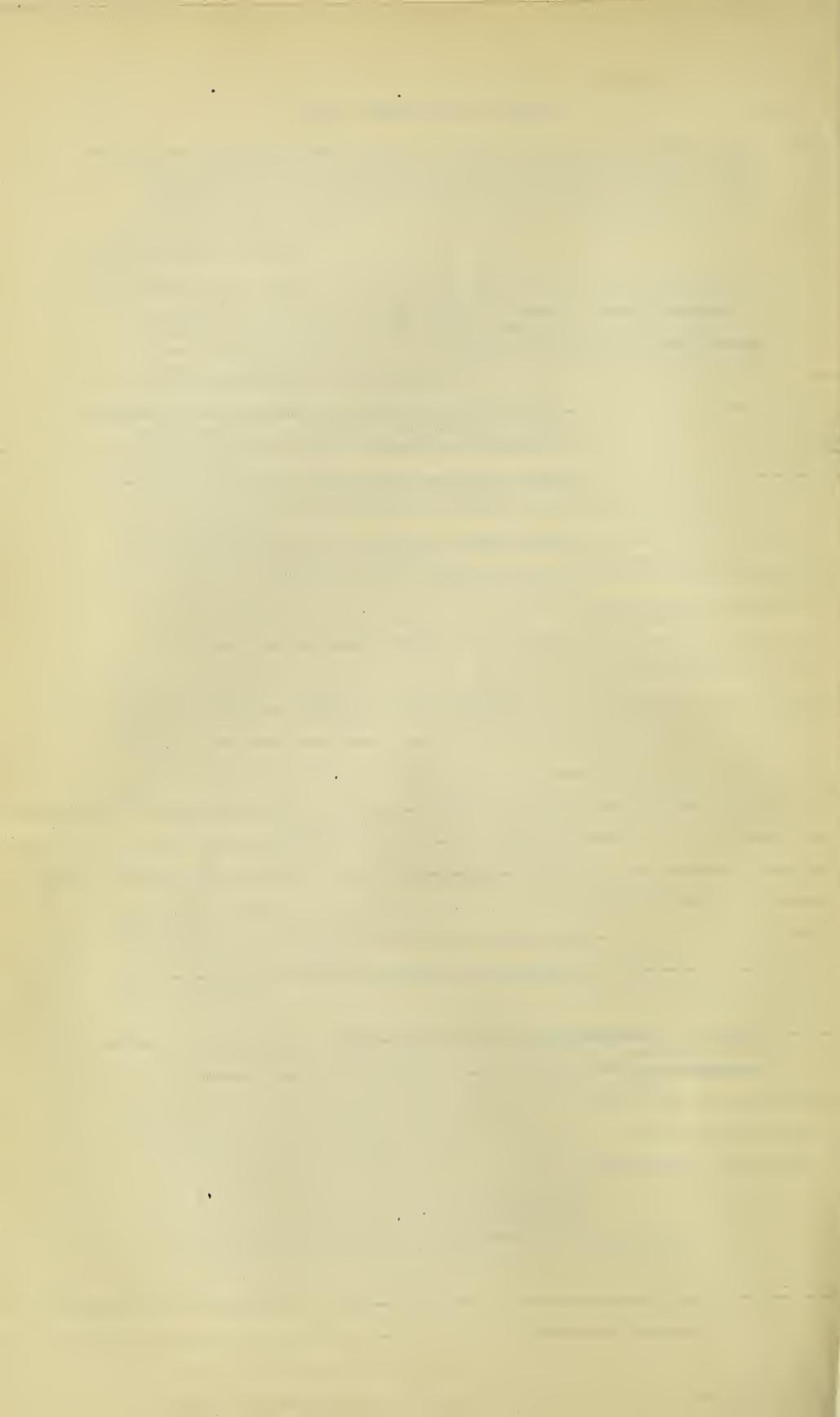
Glumes awnless or the upper subulate-cuspidate.

Glumes, or at least the upper, muricate.

Spikelets in sessile clusters of 2-4; lower glume minute, hyaline or suppressed ... .. 108. TRAGUS.

Spikelets in pairs or solitary on a flattened peduncle and deciduous with it; both glumes muricate, the lower of one of the spikelets almost flat and recurved, very hard ... 109. LATIPES





Glumes smooth, the upper curved and subulate-cuspidate; spikelets 2 or 3 in minute deciduous spikes, the uppermost always barren ... 110. DIGNATHIA.

Glumes drawn out into a long fine awn.

Spikelets solitary, glabrous, awn many times longer than the body of the spikelet; spikes usually long... ... 111. PEROTIS.

Spikelets not solitary.

Spikelets in pairs villously plumose below; spike short; both glumes developed, equal ... 112. TETRACHETE.

Spikelets 4-5 in short deciduous spikes, densely crowded on a long common axis, the lower 1 or 2 only fertile; lower glume suppressed ... 113. MONELYTRUM.

ap. 16 - b. Awn of the fertile floret, if present never kneed and twisted below the knee (114-170).

p. 22 # i. Valves typically 3-nerved (114-143).

TRIBE X. SPOROBOLÆ.—Glumes and valves very similar. Floret 1. Rachilla very rarely continued beyond the floret. Valve membranous, acute or obtuse, not changed when ripe, 1- or more or less distinctly 3-nerved, awnless, usually olive-green or olive-grey; side-nerves, if present, delicate, evanescent above. Seed often free in the delicate pericarp.

Only genus ... ... 114. SPOROBOLUS.

TRIBE XI. ERAGROSTÆ.—Spikelets pedicelled and variously paniced, or sessile or subsessile in spikes (or spike-like racemes) which are racemously arranged on an elongated common axis, rarely in a simple raceme (Harpachne). Florets usually numerous (1 in *Leptochloa* sp.) and far exserted from the glumes. Glumes and valves rather similar in general appearance. Valves membranous to subcoriaceous, very often olive-green or olive-grey, entire or slightly emarginate with the nerves evanescent above or percurrent to obscurely ecurrent, muticous, mucronulate, very rarely with a very short awn from below the tip (*Diplachne* sp.).

Valves entire, emucronate, usually glabrous, very rarely ciliate (*Eragrostis* sp.), often rather firm.

Spikelets in a rigid solitary raceme, pedicelled, spreading, falling entire with the pointed pedicel 115. HARPACHNE.

Spikelets not deciduous as a whole from the axis of a solitary raceme.

Spikelets in more or less rigid secund, straight or curved spikes; valves acute or acuminate.

Spikes usually curved upwards, in irregular spirals; spikelets breaking up between the florets with the tips of the joints bearded 116. POGONARTHRIA.

Spikes straight, crowded into a long narrow dense panicle; spikelets very closely packed, laterally very much compressed, falling entire from the very slender rachis 117. DESMOSTACHYA. = *Stachys*

Spikelets pedicelled, usually paniced, rarely in solitary terminal, more or less secund spikes. *not Milium*

Lower glume 1-, upper 1-3-nerved; valves moderately rigid; rachilla glabrous ... 118. ERAGROSTIS.

Lower glume 3-, upper 5-nerved; valves subcoriaceous; tips of rachilla-joints bearded 119. HALOPYRUM.

Valves usually emarginate and mucronulate, rarely entire and muticous or with a very short awn from below the tip, frequently more or less hairy near the base or along the sides.

Spikelets much over 1 mm. long, sessile or pedicelled in often flexuous spike-like racemes or in short contracted panicles; valves often dark... 120. *DIPLACHNE*.

Spikelets rarely much over 1 mm. long, sessile or the lowest sessile in very slender spikes on a long common axis; valves usually pale with green nerves ... .. 121. *LEPTOCHLOA*.

TRIBE XII. *CHLORIDEÆ*.—Spikelets sessile or subsessile in 2-ranked, secund, usually very dense, rarely loose spikes (or spike-like racemes), or the spikelets more or less pedicelled and panicled (*Triraphis*); spikes solitary or digitate or racemously arranged on a common axis, rarely in a spike-like panicle (*Leptocarydion*) or reduced to a fascicle of a few spikelets (*Melanocenchris*). Valves generally membranous to chartaceous, entire, emarginate or 2- to 4-lobed, 3-nerved, nerves subparallel, distant, the lateral submarginal and usually ciliate or villosulous (additional side-nerves close to the middle-nerve occur in *Eleusine* sp.); awn, if any, straight, fine, from the truncate or notched tip or all 3 nerves running out into mucros or awns (*Melanocenchris*, *Triraphis*).

Valves entire, emarginate or more or less 2-dentate or 2-lobed, mucicous or with the middle nerve running out into an awn or mucro (see also reduced forms of *Tripogon*): Sub-tribe *Chloridineæ*.

Spikelets 1-flowered without any imperfect florets above or below the fertile, very rarely 2- or sub-2-flowered with a glabrous ♂ or barren floret above the hairy ♂ (*Microchloa* sp.), with or without a bristle-like continuation of the rhachilla.

Spikelets with long flexuous awns in dense digitate spikes ... .. 122. *SCHENEFELDIA*.

Spikelets awnless or very shortly aristulate.

Lower glume boat-shaped or much reduced or quite suppressed; upper with a broad flat back.

Spikes solitary.

Spikelets more or less immersed in the hollows of the rhachis; lower glume much reduced or 0 ... ..

Rhachis very fragile ... .. 123. *LEPTURELLA*.

Rhachis tough ... .. 124. *OROPETIUM*.

Spikelets unilateral on a flattened rhachis; lower glume as long as or slightly longer than the upper ... ..

... .. 125. *MICROCHLOA*.

Spikes several, more or less distant on a common axis.

Lower glume delicate, hyaline; floret almost as long as the spikelet ... .. 126. *WILLKOMMIA*.

Lower glume almost as firm as the sub-chartaceous upper; floret much shorter than the glumes ... ..

... .. 127. *CRASPIDORHA*-

[CHIS.

Both glumes laterally much compressed, keeled.

Glumes longer than the floret, enclosing it; spikes digitate, rarely solitary ... ..

... .. 128. *BRACHYACHNE*. *M.*

Glumes shorter than the floret; spikes always digitate ... ..

... .. 129. *CYNODON*.

Spikelets with several florets.

Spikelets with 1 (rarely 2, *Chloris* sp.) fertile and

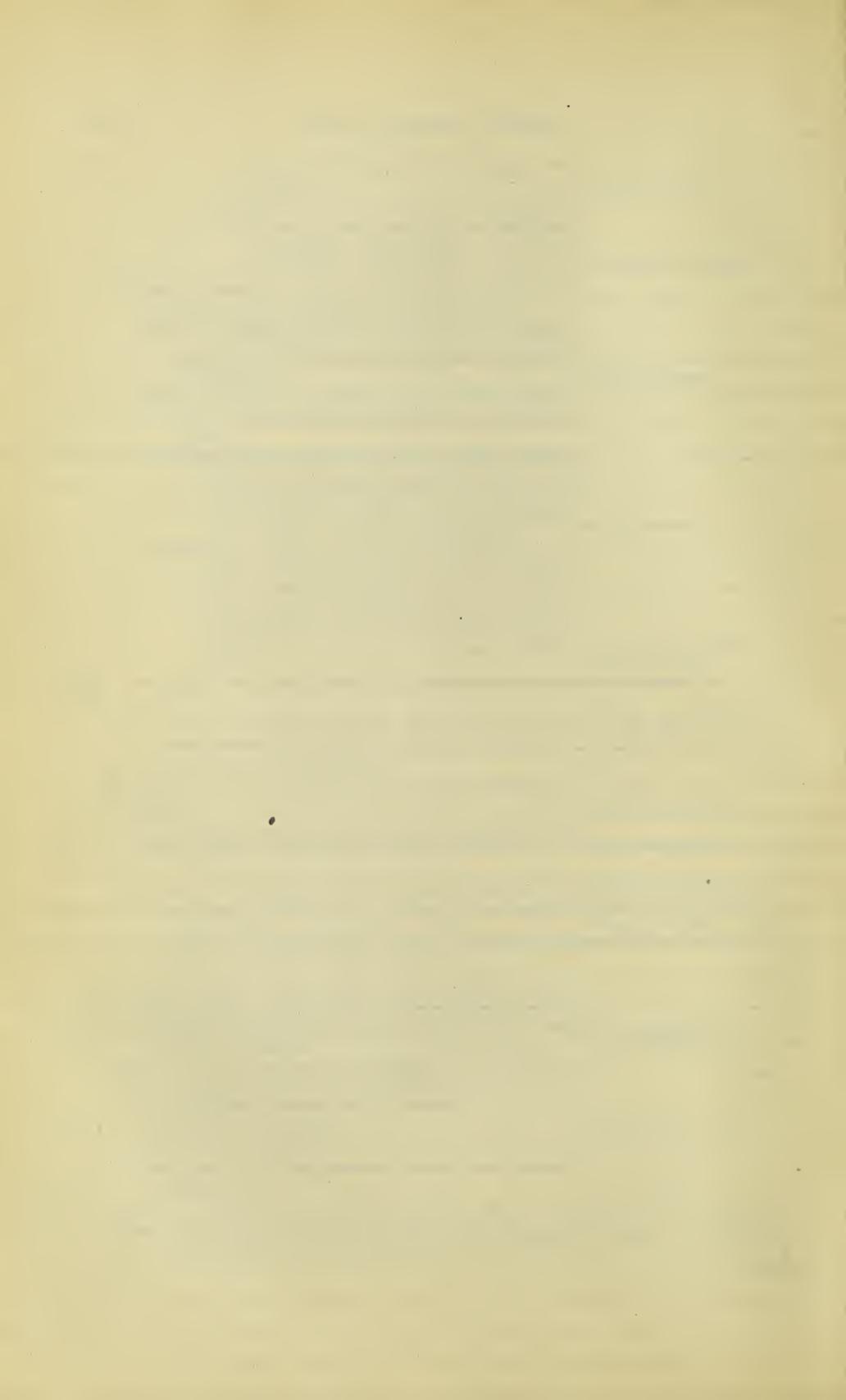
*Kralikia* where? in *Tripogon* fide Hubl.  
in US Hb. *K. africana* not yet transferred



- 1 or several imperfect florets above or below the fertile (see also *Microchloa*).
- Fertile floret with imperfect florets above it.
- Spikelets in long secund solitary spikes; valves narrow, firm, glabrous or scaberulous, with a short erect awn from the notched or subentire tips ... .. 130. ENTEROPOGON.
- Spikelets in digitate, rarely solitary or 2-nate spikes; the florets (particularly the barren) much widened upwards or if narrow, then delicate and usually with a fine awn from below the tips, often ciliate.
- Both glumes lanceolate, usually very narrow, acute and hyaline, keeled; valves or at least some of them awned, very rarely submuticous ... .. 131. CHLORIS.
- Upper glume broad, dorsally flat or rounded, not keeled, truncate, emarginate with a curved mucro or short awn from the sinus, scarious; middle nerve prominent; valves awnless ... .. 132. EUSTACHYS.
- Fertile floret with 2 imperfect florets below and 2 or more above it; spikes solitary, secund, compact; upper glume abaxial, with a stiff bristle from the back ... .. 133. CTENIUM.
- Spikelets with 2 or more fertile florets and without imperfect ones below them (see also *Chloris* sp.).
- Valves awnless or with a rigid mucro or very short awn from the acuminate tips (*Dactyloctenium* sp.), entire or subentire.
- Spikelets in digitate or subdigitate spikes.
- Glumes broad, not keeled; grain deeply hollowed out on the face, subglobose ... .. 134. CÆLACHYRIUM.
- Glumes strongly keeled; grain not hollowed out.
- Spikes terminated by a spikelet; glumes and valves emucronate or obscurely mucronate ... .. 135. ELEUSINE.
- Spikes terminating with a sharp point; upper glume and valves rigidly mucronate or shortly awned ... .. 136. DACTYLOCTE-  
[NIUM.
- Spikelets in racemosely arranged spreading or deflexed, finally deciduous spikes; valves thin, obtuse or subemarginate and obscurely mucronulate, much exceeded by the long drawn-out glumes ... .. 137. DINEBRA.
- Valves finely awned or mucronate, distinctly emarginate, toothed or lobed.
- The middle nerve of the valve running out into a fine mucro or very short awn; florets equalling or exceeding the spikelets; spikes rather rigid, long and loose or short and contracted on an elongated common axis ... .. 138. TRICHONEURA.
- The middle nerve of the valve running out into a long awn.
- Spikelets long, very slender, approximate; florets few, exceeded by the glumes;

- upper 2-4 valves barren, forming a tuft of awns ... .. 139. LOPHACME.
- Spikelets in dense spike-like panicles; florets many, distinctly exerted from the glumes; blades broad, constricted and rounded at the base ... .. 140. LEPTOCARYDION.
- Valves variously toothed or lobed with the middle and side nerves running out into awns or mucros.
- Spikelets usually distinctly pedicelled in open or contracted panicles; valves toothed or lobed and 3-awned, awns fine, bristle-like.—Sub-tribe *Triraphidinæ* ... .. 141. TRIRAPHIS.
- Spikelets sessile in solitary or racemously arranged, often very short and fascicle- or cluster-like, spikes.
- Spikes solitary and terminal on the culms; spikelets mostly olive-green or dark greyish; all three nerves or (in the African species) at least the middle nerve running out into a fine short awn or mucro.—Sub-tribe *Tripogoninæ* ... .. 142. TRIPOGON.
- Spikelets in clusters (in the African genus) or spikes, falling entire from a slender common axis, the upper of each cluster or spike reduced; valves 3-toothed and 3-mucronate or 3-aristulate (so in the African genus) or variously lobed and awned.—Sub-tribe *Boutelouinæ* ... .. 143. MELANOCEN- [CHRIS.]
- ii. Valves 5- to many-nerved, very rarely (*Stiburus*) 3-nerved (144-171).
- TRIBE XIII. PAPPOPHOREÆ.—*Valves broad, cleft into 3 to many, sometimes subulate lobes with or without alternating fine straight awns from the sinuses, usually many-nerved.*
- Fertile floret 1; valves cleft into 9 subulate, awn-like lobes ... .. 144. ENNEAPOGON.
- Fertile florets 3-5; valves cleft into 4 hyaline lobes, alternating with 5 straight awns from the sinuses ... .. 145. SCHMIDTIA.
- TRIBE XIV. ORYZEÆ.—*Spikelets all alike or more or less heteromorphous and unisexual. Fertile floret 1, awnless, very rarely caudate-aristate, terminal with 2 minute empty florets (valves) below it or solitary. Glumes very minute or confluent into an annular rim or suppressed. Pales 3-9-nerved. Stamens usually 6, rarely more or 3-1.*
- Spikelets dorsally compressed in slender axillary and terminal spikes; lower florets represented by minute hyaline scales, falling with the fruit; valve membranous; stamens 3 ... .. 146. BECKERA.
- Spikelets laterally compressed, paniced.
- Lower florets represented by two scales or bristles falling with the mature fruit; stamens 6.
- Fertile valve coriaceous ... .. 147. ORYZA.
- Fertile valve membranous ... .. 148. POTAMOPHILA.
- Lower florets quite suppressed; fertile valve papery; stamens 6-3 ... .. 149. LEERSIA.
- TRIBE XV. PHALARIDEÆ.—*Spikelets all alike. Fertile floret 1, awnless, terminal with 2 ♂ or neuter florets below it (the latter reduced to minute scales*

Beckera Fres. is near *Chloridion* and *Acrichne*  
in *Digitaria* group



in *Phalaris*). *Glumes distinct, often equalling or exceeding the terminal floret. Valvules, if present, 2-nerved or that of the terminal 1-nerved. Stamens 6 or 3 (in the African species), or 4 or 2. Rhachilla not or very obscurely produced.*

Both empty florets, or at least the upper, larger than the fertile, exceeding or equalling the glumes.

Empty florets awned from below the tip, the middle one from near the base of the membranous valve, ♂ or barren; awn of the upper empty floret often kneed ... .. 150. ANTHOXANTHUM.

Empty florets reduced to more or less cartilaginous awned or awnless valves; awn, if any, from the tip of the valve, straight ... .. 151. EHRHARTA.

Both empty florets reduced to minute scales, enclosed together with the fertile floret within the glumes ... 152. PHALARIS.

TRIBE XVI. FESTUCEÆ.—*Glumes more or less resembling the valves in general appearance. Fruiting florets 2 to many, very rarely 1, often much exerted from the glumes. Valves 5- or more-nerved, very rarely 3- or 1-nerved, then neither with the side-nerves submarginal nor with the spikelets in 2-ranked spikes; awns, if present, terminal or subterminal, never kneed.*

Spikelets in paniced clusters or more or less spike-like panicles or true spikes; valves membranous to papery or subcrustaceous, 5-9-nerved or 3-nerved (*Stiburus, Elytrophorus*), side-nerves conniving or joining below the tip, awns, if any, fine, short, terminal or subterminal.—Sub-tribe *Dactylidinae*.

Florets homœomorphous or the uppermost more or less reduced.

Spikelets in dense spike-like or subcapitate inflorescences.

Spikelets falling entire and singly from the pedicels of a compact spike-like panicle ... .. 153. FINGERHUTHIA.

Spikelets breaking up at maturity.

Spikelets in long, cylindric, sometimes interrupted, spike-like panicles; glumes and valves narrow mucronate- or aristulate-acuminate; valves 3-nerved.

Glumes and valves drawn out into long subulate points; spikelets in sessile clusters, the clusters forming a long dense or more often interrupted spike; keels of valvule winged; stamen 1 ... .. 154. ELYTROPHORUS.

Glumes and valves shortly mucronate-acuminate; spikelets clustered on the short branches of a much contracted spike-like panicle; keels of valvule not winged; stamens 3 ... .. 155. STIBURUS.

Spikelets in compact ovoid heads or short, rarely elongated, interrupted spikes; glumes and valves broad; valves 9-nerved ... .. 156. ÆLUROPUS.

Spikelets in very short secund spikes or singly on the branches of a much contracted, almost capitate panicle, laterally very much compressed; the herbaceous glumes and the pale-green 5-nerved valves acuminate to mucronate-acuminate ... .. 157. DRAKE-BROCK-  
[MANIA.]

- Florets heteromorphous; the lowest 2 barren, the following ♂; spikelets large in a simple or at the base slightly compound loose spike, curling up into a ball at maturity and falling entire ... .. 158. ENTOPLOCAMIA.
- Spikelets generally in loose more or less open, rarely narrowly spike-like or racemiform panicles; valves membranous to herbaceous, mostly 5-nerved.
- Leaves flat, more or less lanceolate, often broad with numerous transverse veins between the rather distant nerves; spikelets many-flowered, in loose open compound panicles; glumes and valves sub-herbaceous.—Sub-tribe *Centothecinae* ... .. 159. CENTOTHECA.
- Leaves more or less linear, narrow without transverse veins.
- Valves keeled, generally rather broad, ovate or oblong, often obtuse and with broad and variegated hyaline margins or tips, awnless; florets often with a tuft of curled wool at the base.—Sub-tribe *Poinæ* ... .. 160. POA.
- Valves rounded on the back or keeled upwards, herbaceous to chartaceous, usually acute or acuminate, often more or less mucronate or awned from the entire or 2-toothed tips, rarely from below the tips.—Sub-tribe *Festucinae*.
- Spikelets panicle.
- Florets more than 1 to many.
- Valves subulate-lanceolate, rounded on the back, passing into a straight often long awn, 5-nerved; glumes generally very unequal or the lower absent; panicle contracted, usually secund; annual ... 161. VULPIA.
- Valves lanceolate to broadly oblong; glumes rarely very markedly unequal.
- Valves lanceolate, rounded on the back or keeled at the tips, 5- rarely 7-nerved; mucro or awn, if present, terminal, straight; styles terminal or subterminal on the glabrous or hairy ovary-top ... 162. FESTUCA.
- Valves lanceolate to broadly oblong, rounded on the back or keeled, 5-9-nerved; awn, if present, close to or somewhat distant from the often 2-toothed tip; styles lateral on a hairy 2-3-lobed appendage of the ovary ... 163. BROMUS.
- Floret 1; valve lanceolate, 3-nerved, awn from close to the tips, straight; ovary-top villous... .. 164. PSEUDOBROMUS.
- Spikelets subsessile in a simple spike-like raceme; valves oblong to oblong-lanceolate, 7-nerved, usually awned or mucronate from the tip ... 165. BRACHYPODIUM.
- TRIBE XVII. HORDEÆ.—*Spikelets sessile, singly or in clusters on the notches of a simple spike, sometimes partially sunk in hollows of the same. Florets 1 or more.*
- Spikelets solitary at the nodes of the spike.
- Spikelets with their median plane radial to the rhachis; lower glume if present contiguous with the rhachis.
- Florets 3 to many; valves herbaceous to chartaceous, 5-7-nerved... .. 166. LOLIUM.





- Florets 1-2; valves membranous to subhyaline, 3-nerved ... 167. LEPTURUS.  
 Spikelets with their median plane tangential to the rachis,  
 Perennial; glumes not or obscurely keeled, lanceolate or linear, prominently 5- to many-nerved; valves lanceolate, rounded on the back or keeled upwards; grain tightly adhering to the valvule 168. AGROPYRUM.  
 Annual; glumes more or less keeled, at least upwards, ventricose, asymmetrical, usually with a lateral tooth; valves more or less ventricose, keeled upwards; grain free from the valvule ... 169. TRITICUM.  
 Spikelets in groups of 3 at the nodes of a dense spike, the lateral usually more or less reduced or barren (sometimes ♂ in cultivated races) ... 170. HORDEUM.
- B. Blades transversely veined or if not so, then tall shrubs with woody culms (171-178).
- TRIBE XVIII. PHAREÆ.—*Spikelets heteromorphous, unisexual, monœcious, the ♂ small. Floret 1. One or both glumes of the ♂ often minute or obsolete. Fruiting valve coriaceous to cartilaginous. Lodicules 3. Stamens 3-6. Blades flat, broad, many-nerved, often petioled.*  
 Fruiting valve crustaceous, shining; fruit very like that of a typical *Panicum*; stamens 3 ... 171. OLYRA.  
 Fruiting valve papery, dull, closed excepting a subapical or lateral hole; fruit more or less globose; stamens 6 ... 172. LEPTASPIS.
- TRIBE XIX. BAMBUSEÆ.—*Spikelets all of one kind. Florets few to many, rarely 1. Glumes distinct or indistinctly differentiated, i.e. passing below into more or less numerous bracts and sometimes having like them flowering branchlets or spikelets in their axil, and at the same time resembling the valves. Valves subherbaceous to subcoriaceous, 5- to many-nerved, generally awnless. Lodicules usually 3. Stamens 3, 6 or more. Styles 2 or 3. Shrubs or trees, rarely perennial herbs (Puelliinæ). Blades flat, many-nerved, articulated on the sheath.*  
 Shrubby, usually tall, with woody stems (canes).  
 Stamens 3; spikelets variously paniced or racemose, 1- to many-flowered:—Sub-tribe *Arundinariinæ* 173. ARUNDINARIA.  
 Stamens 6:—Sub-tribe *Bambusinaæ*.  
 Spikelets in distichous dense glomerules on the branches of a large panicle, 2-flowered; filaments free ... 174. OREOBAMBOS.  
 Spikelets in dense terminal heads or in more or less globose whorls on long simple or paniced branches, 1-3-flowered; filaments more or less united ... 175. OXYTENAN- [THERA].
- Small undershrubs or herbs:—Sub-tribe *Puelliinæ*.  
 Filaments free; spikelets lanceolate to linear-lanceolate; florets loosely distichous, the lower 1-3 ♀, the others ♂; or all ♂ ... 176. GUADUELLA.  
 Filaments more or less united at the base; florets closely imbricate, the terminal ♀, the others ♂ or neuter.  
 Spikelets much compressed in short secund racemes or contracted panicles ... 177. PUELLIA.

Spikelets somewhat tumid, usually on slender  
often flexuous pedicels in long, slender, loose  
racemes or narrow panicles ... .. 178. *ATRACTOCARPA*.

1. **ZEA**, Linn.; Benth. et Hook. f. Gen. Pl. iii. 1114.

Sexes in different inflorescences on the same plant; ♂ spikelets in large terminal panicles made up of racemously arranged or subdigitate spike-like racemes; ♀ spikelets in axillary sheathed "cobs," consisting of several spikes whose axes are fused into a spongy more or less cylindrical body. Male spikelets 2-nate, one sessile, the other alternate on the inarticulate rhachis of the spike-like racemes, 2-flowered, awnless; glumes subequal, membranous, convex, obscurely 2-keeled, 9-10-nerved; florets alike; valves more or less hyaline, 3-5-nerved; valvules similar, 2-nerved, obscurely keeled; lodicules 2, fleshy; stamens 3; anthers linear. Female spikelets 2-nate in 4-11 longitudinal rows, slightly immersed in the spongy axis of the cob, with a lower barren and an upper fertile floret, awnless; glumes similar, very broad, fleshy below, hyaline above, nerveless, ciliate; lower valve resembling the glumes but shorter and eciliate, with or without a similar but smaller valvule; upper valve similar to the lower with a valvule about as long as the ovary; lodicules 0; ovary obliquely ovoid; style very long, 2-fid at the tip, papillose upwards, exerted in long silky tassels from the sheathing bracts. Grain large, subglobose or dorsally more or less flattened, surrounded by the dried-up glumes, valves and valvules; scutellum large, equalling or exceeding two-thirds of the grain.—Tall, stout, annual grasses with large leaves, the axils of the lower of which produce the cobs, tightly enveloped by large membranous bracts.

Species 1; of American origin, in cultivation in all warm countries of the world.

1. **Z. Mays**, *Linn. Sp. Pl. ed. i.* 971. Culms up to 10 (rarely 16) ft. high. Leaf-sheaths terete, more or less hairy upwards along the margin; ligule short, truncate, thinly membranous, more or less pubescent; blades linear-lanceolate, up to over 3 ft. long and 4 in. wide, glabrous or almost so, tips often drooping. Male panicle up to over 8 in. long; rhachis pubescent; spikelets up to  $\frac{1}{2}$  in. long; anthers  $\frac{1}{4}$  in. long. Female spike (cob) and grains varying much in size and shape, the latter also in colour.—Beauv. *Agrost.* 136, t. 24, fig. 3; Kunth, *Enum. Pl.* i. 19; Nees, *Gen. Fl. Germ. Mon.* i. nos. 3 & 4; Benth. in Hook. *Niger Fl.* 557; Steud. *Syn. Pl. Glum.* i. 9; Welw. *Apont.* 540; Doell in Mart. *Fl. Bras.* ii. ii., 31, t. 11; Benth. & Trim. *Med. Pl.* t. 296; Duthie, *Field & Gard. Crops*, 25, t. 5; K. Schum. in *Engl. Jahrb.* vii. 157, and in *Engl. Pfl. Ost-Afr.* B. 69, 85, 149, & C., 95; Koern. & Wern., *Handb. d. Getreidebaues*, i. 330-378, ii. 772-870; Klatt in *Jahrb. Hamburg. Wiss. Anst.* ix. 119; Harshberger, *Maize: in Contrib. Lab. Univ. Pennsylv.* i. (1893) 75-202; Durand & Schinz, *Consp. Fl. Afr.* v. 692, and *Étud. Fl.*





Congo, 311; Hack. in Bull. Herb. Boiss. iv. App. iii. 10; Nicholls, Text-book Trop. Agr. (1892) 260–265; Rendle in Cat. Afr. Pl. Welw. ii. 161; Th. & Hél. Durand, Syll. Fl. Cong. 621; Montgomery, Corn Crops, (1913) 1–275; Davy, Maize (1914). *Mays Zea*, Gärtn. Fruct. i. 6, t. i. fig. 9.

**Upper Guinea.** Sierra Leone: Kanike, *Thomas*, 2094! Ronietta, *Thomas*, 5638! Southern Nigeria: Obu, *Thomas*, 454! 553!

**Lower Guinea.** Loanda: commonly cultivated, *Welwitsch*, 7320!

A most important cereal and fodder plant, introduced into Tropical Africa by the Portuguese in the 16th century (Harshberger, l.c. 157), now grown in many of the drier parts of the continent and rapidly gaining ground.

## 2. COIX, Linn.; Benth. et Hook. f. Gen. Pl. iii. 1112.

Spikelets unisexual, in peduncled, more or less fascicled, often numerous, terminal and axillary spike-like racemes; the ♂ in several pairs or in threes, one of each pair or three pedicelled, the other (or others) sessile on a slender rhachis which emerges from a solitary (rarely 2 superposed) usually globose or ovoid ivory-like capsuliform sheath enclosing a 2-nerved prophyll, two barren pedicels and a single spikelet. Male spikelets imbricate, lanceolate to elliptic-oblong, awnless; glumes subequal, herbaceous, lower flat on the back, many-nerved, 2-keeled, keels winged upwards, upper somewhat boat-shaped, very acute, keeled, about 11-nerved; florets 2, lower almost as long as the glumes, upper distinctly shorter, both fertile or the upper barren; valves lanceolate, acute, membranous, 5–3-nerved; valvules hyaline, equalling the valves, 2-keeled; lodicules 2, cuneate, fleshy; stamens 3; anthers linear. Female spikelet: lower glume subglobose, upwards suddenly contracted into an acute subcartilaginous beak, below it hyaline-membranous, many-nerved, upper glume of the same length and similarly beaked, acute, very acutely keeled, with a deep groove on each side of the keel, 11-nerved, sides wide, subhyaline; lower floret reduced to a valve resembling the lower glume, but 7-nerved; upper floret consisting of a valve similar to the upper glume, but only slightly keeled and grooved and 5–3-nerved, and a very broad shortly beaked 2-nerved valvule, very thin and hyaline below the beak; lodicules 0; stamens 3, rudimentary; style long, deeply 2-fid, its arms papillose, exserted from the capsuliform sheath; grain enclosed in the latter and forming with it a false fruit, subglobose or ellipsoid, broadly grooved; embryo large, as long as the grain; hilum basal, large.—Annual grasses with rather stout, tall and erect or long and floating culms, branched upwards with fascicled inflorescences from the leaf-axils; leaves large, broad.

Species 2 (?), hot countries of the Old World; introduced in America.

1. *C. Lacryma-Jobi*, Linn. *Sp. Pl. ed. i.* 972. Culms 3–5 ft. high. Leaf-sheaths smooth, glabrous; ligule very short, membranous;

blades linear-lanceolate from a broad and often subcordate base, 4–18 in. long, 1–2 in. broad, glabrous, margins cartilaginous, rough. Male inflorescences  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, close to or more or less distant from the false fruit, quite glabrous; spikelets 4–5 lin. long. False fruit typically ovoid-globose, bony, shining, white or bluish, 4–5 lin. long.—Durand & Schinz, *Consp. Fl. Afr.* v. 693; Hook. f. *Fl. Brit. Ind.* vii. 100; Rendle in *Cat. Afr. Pl. Welw.* ii. 161. *C. Lacryma*, Linn. *Syst. ed.* x. 1261; Lam. *Ill.* iii. 343, t. 750; Beauv. *Agrost.* 137, t. 24, fig. 5; Kunth, *Enum. Pl.* i. 20 and *Suppl.* 16, t. 3 & 4; Webb, *Phyt. Canar.* iii. 378, t. 242, 243; Steud. *Syn. Pl. Glum.* i. 9; Coss. & Dur. *Expl. Scient. Alger.* ii. 16; Duthie, *Grasses N.W. India*, 11, and *Fodd. Grass. N. Ind.* 18; Hack. in *Bolet. Soc. Brot.* v. 212; Batt. & Trab. *Fl. Alger, Monoc.* 31; Schweinf. in *Höhnel, Z. Rudolf & Stephanie See*, 2 (reprint); *Engl. Pfl. Ost-Afr.* A. 79.

**Upper Guinea.** Sierra Leone: Sherbro Island, *Hunter!* Kamalu, *Thomas*, 303! Bumbau, *Thomas*, 2023! Yonibana, *Thomas*, 4165! Pujahun, *Thomas*, 8233! French Guinea: N.E. from Sierra Leone, *Garret*, 4! Liberia: Kakatown, *Whyte!*

**Lower Guinea.** Island of St. Thomas: Nova Moka, *Moller*, 149! Angola: by the River Moembesee, near Dalatando, *Welwitsch*, 7241! Ambaca; in swamps between Pumba and Puri-Cacarambola, *Welwitsch*, 3004!

**Nile Land.** British East Africa: Taveta, *Höhnel!* Giriyama and Tsimba Mountains, *Taylor!*

**Mozambique Distr.** Zanzibar, *Last!* Usambara: Magila, by streams, *Holst*, 2226! *Busse*, 2180!

In India this grass is used as fodder for cattle which are said to fatten on it (*Duthie, Grasses N.W. Ind.* 19). The false fruits, of which there are several varieties differing much in shape and size, are largely used like beads for decorative purposes, and one variety with thin shells is an important cereal in Burma and the Farther East. In Africa only the typical form described here has been found. It was very probably introduced from India.

### 3. ISCHÆMUM, Linn.; Benth. et Hook. f. *Gen. Pl.* iii. 1132.

Spikelets of each pair alike, or differing only in sex, or more or less heteromorphous, one sessile or subsessile, the other pedicelled on the articulate fragile rhachis of 2-nate, digitate or fascicled, spike-like racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the adjacent joint of the rhachis and the pedicel. Florets 2; lower generally ♂; upper ♀, rarely ♂ or neuter in the pedicelled spikelets. Sessile spikelet: glumes equal or subequal, lower dorsally flattened or somewhat convex and usually coriaceous below, chartaceous and markedly nerved upwards, rarely shallowly concave and more or less chartaceous throughout (§ *Cælischæmum*), more or less 2-keeled with inflexed margins; upper boat-shaped keeled at least above, sometimes awned. Valves rigidly membranous to hyaline, of lower floret mucicous, of upper usually 2-fid and awned from the sinus, rarely mucronate or mucicous. Valvules more or less equalling their valves, hyaline. Lodicules 2, cuneate. Stamens 3, sometimes smaller or rudimentary in the fertile flower. Stigmas linear-oblong, laterally exerted. Grain





oblong or lanceolate, dorsally compressed; embryo reaching to the middle of the grain. Pedicelled spikelet in structure like the sessile, or more or less reduced, ♂ or neuter and awnless.—Generally perennial; blades convolute when young, at length flat; ligules generally membranous; racemes compressed, joints flattened or subconcave on the inner side and often stout; sessile spikelets dorsally compressed, often rather broad, the pedicelled sometimes apparently laterally compressed with a median keel owing to the more or less complete suppression of one side.

Species about 50, all in the tropics of the Old World, except 3 in tropical America.

Sessile spikelets concave on the back; blades linear up to over 1 ft. long, 2-3 lin. broad (§ *Cœlischæmum*).

Racemes slender, glaucous, the lowest on a slender peduncle up to over  $\frac{1}{2}$  in. long; spikelets 2-3 lin. long; ligule acute, up to 3 lin. long ... 1. *I. glaucostachyum*.

Racemes rather stout, not glaucous, often tinged with purple, the lowest sessile or subsessile, except when there are more than 3 racemes; spikelets 3-4 lin. long; ligule truncate, up to 1 lin. long... .. 2. *I. brachyatherum*.

Sessile spikelets ovate-lanceolate, oblong or obovate-oblong, flat or slightly convex on the back; blades lanceolate, rarely over 6 in. by 3-4 lin. (§ *Euischæmum*).

Keels not or very narrowly winged, spikelets ovate-lanceolate to narrowly oblong.

Branches, peduncles, racemes, joints and pedicels rather slender; the racemes not over 1 in. long; lower glume of subsessile spikelet  $2\frac{1}{2}$  lin. long, pale, glabrous and shining below, brownish, hairy, and prominently striate above ... .. 3. *I. tallanum*.

Branches, peduncles, racemes, joints and pedicels stouter; racemes up to 3 in. long; lower glume of subsessile spikelet  $2\frac{1}{2}$ -3 lin. long, usually purple, prominently striate and white-hairy over a greater part of the back... 4. *I. purpurascens*.

Keels broadly winged above, spikelets hence obovate-oblong to broad-oblong, smooth, shining and constricted towards the base, prominently striate, scaberulous and more or less hairy upwards ... .. 5. *I. arcuatum*.

1. *I. glaucostachyum*, Stapf in Dyer, *Fl. Cap.* vii. 328. Perennial. Culms up to 3 ft. long, slender, erect, simple, glabrous, terete. Leaf-sheaths terete, very tight, glabrous, smooth, the upper shorter than the internodes; ligules membranous,  $2\frac{1}{2}$ -3 lin. long, oblong, acute, ciliate; blades linear, tapering to a setaceous point, up to 6 in. by 2 lin., flat, erect, rigid, glaucous, glabrous, smooth, margins scabrid. Racemes 3-4, fascicled, glaucous, 3-6 in. long, distant from the uppermost sheath, on slender glabrous peduncles 3-7 lin.

long; joints and pedicels cuneate (the latter more slender),  $1\frac{1}{2}$ –3 lin. long, hollow, convex on the back, glabrous, angles ciliate. Sessile spikelet lanceolate,  $2\frac{1}{2}$  lin. long, bearded at the obtuse callus. Glumes equal; lower herbaceous-chartaceous, acute to subacute, dorsally depressed, scantily hairy along the middle, keels scabrid, intracarpal nerves 2–4; upper subchartaceous, ovate-lanceolate, boat-shaped, acute, 5- to sub-7-nerved, nerves anastomosing, keel ciliate. Lower floret ♂: valve lanceolate, acute, slightly shorter than the glumes, hyaline, glabrous; valvule of the same length, ciliate, 2-nerved. Upper floret ♀: valve equalling the lower floret, oblong, 2-fid, 3-nerved, lobes lanceolate, ciliolate, awn very slender, 3 lin. long, kneed at the middle, column smooth; valvule oblong,  $1\frac{1}{2}$  lin. long. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet about  $1\frac{1}{2}$  lin. long, reduced to the lower glume which is similar to that of the sessile spikelets.—Rendle in Journ. Linn. Soc. xl. 225.

**South Central.** Rhodesia: Gazaland; Umhlonhlo, Lower Buzi River, *Swynnerton*, 1573!

Also in the Transvaal.

**2. I. brachyatherum**, *Fenzl ex Hack. in DC. Monogr. Phan.* vi. 239. Densely cæspitose. Culms up to over 3 ft. high, slender, erect, simple, 5–6-noded, glabrous, smooth, terete. Leaf-sheaths terete, tight, striate, those of the innovations very firm and long persistent, hirsute at the base, all the others quite glabrous and smooth; ligule scarious, up to 1 lin. long, truncate, glabrous or ciliolate; blades linear, very long tapering to a setaceous point, up to 1 ft. long, and to  $3\frac{1}{2}$  lin. wide, firm and somewhat rigid, glabrous and smooth excepting the margins which are rough upwards, nerves prominent. Racemes in pairs or threes, rarely solitary or more than 3, the lower shortly peduncled, erect, rigid or flexuous, straw-coloured or slightly tinged with purple, moderately hairy; joints very stout, club-shaped,  $2$ – $2\frac{1}{4}$  lin. long, glabrous or more or less hairy to villous on the back, shining, angles ciliate; pedicels similar and parallel to, but distant from the joints and of about equal length, shortly ciliate on the outer angle. Sessile spikelet lanceolate, mostly  $3\frac{1}{2}$ –4 (rarely under 3) lin. long, shortly bearded from the obscure callus, beard whitish or purplish, absent from the lowermost spikelets. Glumes equal; lower lanceolate, subacuminate, minutely 2-dentate, sometimes with a more or less oblique tip, chartaceous, concave on the back, glabrous or sparingly hairy to villous, keels scabrid, intracarpal nerves 3–5, with some transverse veins above; upper boat-shaped, obliquely lanceolate in profile, glabrous or very sparingly hairy, membranous, 5–9-nerved, keel scaberulous or ciliate above, lateral nerves faint. Lower floret ♂: valve lanceolate, acute, slightly shorter than the glumes, hyaline, 2-nerved, ciliolate; valvule of the same length, lanceolate, long and finely acuminate, hyaline and nerveless. Upper floret ♀: valve oblong, 2-fid to  $\frac{1}{3}$  or  $\frac{1}{2}$ , with





lanceolate obtuse or acute ciliolate lobes, hyaline, 2-3 lin. long, 3-nerved, awn  $3\frac{1}{2}$ -5 lin. long, twisted, sometimes purplish; valvule linear-lanceolate, acute, somewhat shorter, hyaline, nerveless. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet lanceolate, acuminate, up to  $2\frac{1}{2}$  lin. long, with a ♂ or ♂ flower in the upper floret, or more or less reduced, sometimes consisting of two small glumes only.—Durand & Schinz, *Consp. Fl. Afr.* 697. *Andropogon brachyatherus*, Hochst. in *Flora*, 1844, 241; Rich. *Tent. Fl. Abyss.* ii. 457. *A. afer*, Gmelin, *Syst. Veg.* vii. 166? *Gir Gir*, Bruce, *Trav.* v. App. 47, with plate.

**North Central.** Bagirmi: Moito-Baro; Avuni, *Chevalier*, 9823!

**Nile Land.** Kordofan, *Kotschy*, 368; *Brown*, 908; Sudan: Senaar, *Roziani*! Abyssinia: Walcha, in swamps, *Schimper*, 1635! Gallabat: Matamma, *Schweinfurth*, 1101! 1102! British East Africa: without precise locality, *Powell*, 131! 143!

**Mozambique Distr.** Portuguese East Africa: Shamvara, between Tete and the sea coast, *Kirk*, 1!

The tomentum is extremely variable and the appearance of the inflorescences at the first glance on that account very different, but as the spikelets show practically the same structure it does not seem expedient to distinguish varieties within the species. *Chevalier*'s specimen has the upper joints and spikelets fairly hairy, whilst the lower are absolutely glabrous. *Powell*'s, on the other hand, are villous almost throughout the inflorescence. The spikelets of *Kirk*'s and *Schweinfurth*'s plants are almost glabrous and in the former mostly, in the latter occasionally, only  $2\frac{1}{2}$ - $2\frac{3}{4}$  lin. long.

**3. I. tallanum**, *Rendle in Journ. Bot.* 1893, 359. Perennial. Culms ascending, many-noded, sparingly branched upwards with the branches flowering, up to 2 ft. long, glabrous, slender. Leaf-sheaths tight, terete, glabrous, more or less hairy upwards, bearded or glabrous at the nodes; ligules membranous, obtuse, under 1 lin. long; blades lanceolate to linear-lanceolate, very acute, up to  $2\frac{1}{2}$  in. long and 4 lin. wide, flat, glabrous or more or less hairy. Racemes 3, about 1 in. long, the lower shortly peduncled, hairy; joints slender, triquetrous, ciliate along the angles, over 1 lin. long, bearded at the base; pedicels similar but 2-angled, parallel to, but distant from the joints. Sessile spikelet ovate-lanceolate from a small well-marked square callus, about  $2\frac{1}{2}$  lin. long; glumes subequal, lower subchartaceous, shortly 2-fid, subconvex or almost flat on the back, brownish hairy and finely striate above the middle, glabrous and shining below, intracarpal nerves about 5, extracarpal 1 or 2; upper glume boat-shaped, lanceolate, long-acuminate, slightly exceeding the lower, 5-nerved, sparingly hairy on the back. Lower floret ♂: valve subhyaline, lanceolate in profile, acute, 1-3-nerved, ciliate; valvule hyaline, ciliate and 2-nerved, slightly shorter. Upper floret ♀: valve ovate-oblong, deeply 2-fid, hyaline, glabrous, 3-nerved, awn from the sinus slender, 4 lin. long, twisted, kneed from below the middle; valvule slightly shorter than the valve, faintly 2-nerved, hyaline. Styles 1 lin. long; stigmas  $1\frac{1}{2}$  lin. long. Pedicelled

spikelet similar to the sessile, but the lower glume resembling the upper and of about the same length.

**Upper Guinea.** Sierra Leone : Ninia ; Talla, *Scott Elliot*, 4927 !

A specimen collected by Chevalier (12860 bis) at Kouria in French Guinea, appears to belong to this species. The general facies is exactly the same but the structure of the racemes is anomalous in so far as there is an additional large 9-nerved bract at the base of each joint, whilst the glumes show sometimes traces of slight reduction in the number of nerves and the texture. Rendle states that he found no stamens in the upper floret of the type of *I. tallanum* ; I have seen apparently normal filaments with semimature grains and his suggestion that those florets are early protandrous is no doubt correct. In Chevalier's specimen, however, the stamens of the upper floret possess rudimentary anthers on very short filaments. A malformed specimen gathered by Smeathman in Sierra Leone and preserved in the herbarium of the British Museum is evidently also referable to this species.

**4. I. purpurascens, Stapf.** Perennial. Culms tufted, ascending or suberect, 5- to many-noded, with leafy branches from the lower and intermediate internodes, 1-3 ft. long, glabrous and smooth. Leaf-sheaths exceeding or more or less equalling the internodes, subterete, glabrous or hairy, sometimes bearded at the nodes ; ligules very short, truncate, ciliate ; blades linear-lanceolate, setaceously acuminate, 3-4½ in. long, 3-4 lin. wide, flat, green, glabrous, or more or less hairy on the back, or on both sides, midrib white. Racemes fascicled, 2-3, rarely more (up to 8), straight or slightly flexuous, up to 3 in. long, hairy ; joints stout, 3-quetrous, 1½-2 lin. long, slightly curved, ciliate with whitish hairs, bearded at the base ; pedicels similar, 1 lin. long, subparallel to, but distant from the joints. pedicels and joints so excised at their junction as to form a pore visible from the back of the raceme. Sessile spikelet 2½-3 lin. long, ovate-lanceolate to oblong, from a short almost square or substipitiform callus, purplish. Glumes subequal, acuminate, 2-toothed, firmly membranous, chartaceous below, usually more or less hairy on the back, subconvex or almost flat, more or less prominently nerved, at least in the upper part, keels usually wingless, or with narrow wings, intracarpinal nerves up to 6 ; upper glume boat-shaped, lanceolate, acuminate-mucronate, slightly exceeding the lower, keeled above, hairy, 5-7-nerved. Lower floret ♂ : valve lanceolate, acute, mucronulate, 3-nerved, ciliate above ; valvule almost equal, oblong, ciliolate. Upper floret ♀ : valve oblong, 2-fid, 2 lin. long, hyaline, 3-nerved, lobes broad, obtuse to subacute, ciliolate ; awn 3-4 lin. long, twisted below ; valvule as long as the valve, linear-lanceolate, acute. Anthers 1 lin. long. Pedicelled spikelet similar to the sessile, rather more hairy. Lower glume boat-shaped, keeled, 9-nerved, the rest as in the sessile spikelet.—*I. fasciculatum*, Rendle in *Cat. Afr. Pl. Welw.* ii. 141 ; *Engl. in Sitzb. K. Preuss. Akad. Wiss. Phys. Math. Cl. lii.* (1906) 887, not of Brongn.

**Lower Guinea.** South Angola : Humpata, 6000 ft., *Pearson*, 2766 ! Huilla ; near the cataract of Lopollo, *Welwitsch*, 7484 !





Mozambique Distr. Nyasaland : Nymkowa, 6400 ft., *McClounie*, 16 ! Rhodesia : Zambesi River, near Victoria Falls, *Craster*, 69 ! *Kolbe*, 3143 ! and without precise locality, *Mundy* ! *Burt-Davy*, 5298 !

Very nearly allied to *Ischæmum fasciculatum*, Brongn., which has, however, much longer awns, and to *Ischæmum arcuatum*, Stapf, from which it differs in its narrower, purplish spikelets, the keels of which are not at all, or very narrowly winged.

Also in the Transvaal (Lydenburg, *Wilms*, 1679 ! ) and in a slightly distinct form in Madagascar (Ambalavao, *Perrier de la Bathie*, 24 ! Ambohimitomba, *Forsyth Major*, 229 ! 745 ! ). The Madagascar specimens have smaller and glabrous or only sparingly hairy spikelets (2–2½ lin. long).

(Nees)

5. *I. arcuatum*, Stapf. Perennial. Culms ascending or suberect from a slender creeping rhizome, more or less branched and fascicled near the base or simple, 1–3 ft. long, rather slender, glabrous, 5- to many-noded. Leaf-sheaths exceeding or more or less equalling the internodes, subterete, glabrous, rarely hairy upwards or shortly bearded at the nodes ; ligules very short, truncate, ciliate ; blades linear-lanceolate, setaceously acuminate, 3–8 in. by 3–6 lin., flat, quite glabrous or hairy on the back near the base, smooth, turning reddish, sometimes more or less glaucous, midrib white. Racemes fascicled, 2–5, stout, straight or flexuous, 2–5 in. long, hairy ; joints stout, triquetrous, 1¼–1½ lin. long, slightly curved, keel (outer angle) ciliate with yellowish hairs ; pedicel 2 lin. long, more or less hairy on the back, subparallel to, but distant from the joints, pedicels and joints so excised at their junction as to form a pore visible from the back of the raceme. Sessile spikelets lanceolate-oblong, 2½–3 lin. long, reddish above, bearded at the base of the often stipitiform callus. Glumes slightly unequal ; lower lanceolate-oblong, acutely and shortly 2-toothed, coriaceous below, flat and more or less distinctly 5-ribbed on the back, scaberulous, scantily hairy, keels winged near the tips, scabrid, intracardinal nerves 5–9 ; upper glume slightly longer than the lower, lanceolate, acuminate, mucronate, 3–5-nerved, keeled upwards. Lower florets ♂ : valve lanceolate, almost as long as the subtending glume, membranous, glabrous, 3-nerved, with an almost equal valvule. Upper floret ♀ : valve oblong, deeply 2-fid, 2 lin. long, delicately membranous, 3-nerved, lobes broad, hyaline, ciliate, awn 4–5 lin. long, twisted below ; valvule as long as or slightly longer than the valve, acute. Anthers 1 lin. long. Pedicelled spikelets 2½ lin. long, reddish ; lower glume lanceolate, boat-shaped, keeled, 7–9-nerved, loosely hairy, the rest as in the subsessile spikelets.—*I. fasciculatum* var. *arcuatum*, Hack. Androp. in DC. Monogr. Phan. vi. 235 ; Durand & Schinz, Consp. Fl. Afr. v. 697 ; Stapf in Dyer, Fl. Cap. vii. 327 ; Rendle in Journ. Linn. Soc. xl. 224. *Spodiopogon arcuatus*, Nees, Fl. Afr. Austr. 97. *Andropogon arcuatus*, Steud. Syn. Pl. Glum. i. 374.

Mozambique Distr. Gazaland : Lusitu River, 3000 ft., *Swynnerton*, 1652 !

Also in South Africa from Natal to the Kei River.

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D

*I. Stalagm. Pely. Nyasaland etc.*

*I. Junodii*, Hack. in Viertelj. Naturf. Ges. Zürich, lii. (1907), 419, from Haut Bokhahe near Shilouwane, Transvaal, 3300 ft., *Junod*, 2365a, is very probably this species.

4. **THELEPOGON**, Roth ; Benth. et Hook. f. Gen. Pl. iii. 1131.

Spikelets solitary and sessile, one at each node of the articulate fragile rhachis of digitate or subcorymbose spike-like racemes, each accompanied by an empty pedicel and deciduous together with it and the adjacent joint of the rhachis, joint and pedicel gaping. Florets 2, lower ♂, upper ♀. Glumes subequal, the lower coriaceous, somewhat rounded on the back, not keeled, transversely prominently rugose, with margins not inflexed; upper chartaceous, rather flat, not keeled, with narrow inflexed margins, more or less transversely rugose on the back. Valves hyaline, of the lower floret awnless, of the upper floret deeply 2-fid, 5-nerved with the outer lateral nerves running out into the lobes and with a perfect awn from the sinus. Valvules hyaline, slightly shorter than the valves. Lodicules 2, cuneate. Stamens 3. Stigmas linear, laterally exerted below the middle. Grain oblong, laterally slightly compressed; scutellum narrowly elliptic, slightly exceeding the middle.—Annual; leaves lanceolate from a broad cordate base, glaucescent; ligules very short, membranous; racemes subterete; joints slightly curved, compressed and flattened below, clavate upwards.

Species 1, in Tropical Africa and India.

1. **T. elegans**, Roth ex Roem. & Schult. Syst. ii. 788, and Nov. Pl. Spec. 62. Annual. Culms somewhat stout, erect from a geniculate and frequently rooting base, up to over 2 ft. high, 6–9-noded, terete, smooth or more or less rough towards the inflorescence, simple or branched. Leaf-sheaths loose, prominently striate, glabrous or more or less hirsute with tubercle-based hairs and ciliate along the outer margin; ligules ciliate; blades lanceolate to linear-lanceolate, from a broad and often amplexicaul cordate base, up to 10 in. by over 1 in., flat, somewhat flaccid, glaucescent, glabrous and smooth, excepting the spinulose-ciliate margins or more or less scabrid from short tubercle-based hairs, midrib whitish above, primary lateral nerves 5–7 on each side, fine. Racemes pale green, from 2–6 in. long, 2–12, if many the lowest verticillate, simple or divided, the following  $\frac{1}{2}$  in. to 1 in. higher up from the common rhachis, all with scabrid or hispidulous peduncles up to 1 in. long; joints 3–4 $\frac{1}{2}$  lin. long, with several green scabrid nerves on the back and straight tips; pedicels linear, obtuse, somewhat longer than the spikelet, flat, scabrid on the back and the margins, slightly curved, contiguous with the apex of the joint, enclosing with it a lanceolate space exposing the back of the upper glume. Spikelets with a short annuliform ciliate callus, 2 $\frac{1}{2}$ –3 $\frac{1}{2}$  lin.





long, ovate-oblong. Glumes subequal; lower subacuminate, minutely 2-toothed, transverse rugæ interrupted, most prominent towards the edge, nerves about 9, green, distinct in transmitted light, the inner 4 or 5 not reaching the tip; upper glume slightly exceeding the lower, acuminate, with the acumen keeled and scabrid, 3-nerved. Lower floret ♂: valve hyaline, slightly shorter than the lower glume, broad-lanceolate, 2-nerved, glabrous, with a similar but narrow valvule. Upper floret ♀: valve as long as that of the lower floret, 2-fid to the middle, broad, quadrate-obovate below the sinus, glabrous, lobes lanceolate, acute; awn up to 1 in. long, slender, kneed at and twisted below the middle, column dark brown, bristle yellowish. Anthers over 1 lin. long. Stigmas purple, up to 1½ lin. long. Grain deep purple.—Hack. in DC. Monogr. Phan. vi. 267; Hook. f. Fl. Brit. Ind. vii. 148; K. Schum. in Engl. Pfl. Ost-Afr. C. 97. *Andropogon princeps*, A. Rich. Tent. Fl. Abyss. ii. 470, t. 102. *Rhiniachne princeps*, Hochst. ex Steud. Syn. Pl. Glum. i. 360. *Jardinea abyssinica*, Steud. l.c. *Rhytachne princeps*, Durand & Schinz, Consp. Fl. Afr. v. 700.

**Upper Guinea.** Southern Nigeria: Lagos, *MacGregor*, 99! Northern Nigeria: Borgu, near Wana, *Barter*, 730! By the Niger, *Baikie*! Katagum District, *Dalziel*, 284! Yola, *Macleod*, 72! Cameroons: Bogalo, *Macleod*, 77!

**Nile Land.** Abyssinia: By the Tacazze River, *Quartin-Dillon*; Jelajerranne, 4000–5000 ft., *Schimper*, 2056! Gallabat: Matamma, *Schweinfurth*, 1044!

**Mozambique Distr.** German East Africa: near Bukoba, according to K. Schumann, l.c. Portuguese East Africa: East Coast of Lake Nyasa, *Johnson*, 91! Nyasaland: Nyika Plateau; Mwaremba, 7500 ft., *McClounie*!

Also in the Deccan Peninsula. According to Dalziel this is eaten by horses although very bitter.

##### 5. SEHIMA, Forsk. Fl. Ægypt.-Arab. 178.

Spikelets 2-nate, those of each pair differing in sex and (in the African species) also much in shape, one sessile, the other pedicelled on the articulate fragile rhachis of solitary spike-like racemes, the pedicelled tardily separating from their pedicels, the sessile deciduous together with the adjacent joint of the rhachis and the pedicel. Florets 2; lower ♂, upper ♀ in the sessile, ♂ or neuter in the pedicelled spikelets. Sessile spikelets: Glumes equal or subequal; lower deeply grooved (in the African species), rarely flat, 2-dentate or 2-mucronate, more or less chartaceous, upwards acutely 2-keeled with inflexed margins, keels winged; upper glume boat-shaped, keeled upwards with a bristle-like awn. Valves hyaline, of lower floret entire, muticous, of upper 2-fid and awned from the sinus. Valvules more or less equalling their valves, hyaline. Lodicules 2, cuneate. Stamens 3. Stigmas linear-oblong, laterally exerted. Grain oblong, obtusely trigonous; embryo reaching to the middle of the grain. Pedicelled spikelets flat, with (in the African species) a strongly nerved or ribbed lower glume, and 2 florets resembling the lower floret of the sessile

*See*  
5. Herb. sub *Ischaemum laxum*

spikelets, the lower or both more or less reduced and barren.— Perennial or annual; blades convolute when young, at length flat, narrow; ligules a line of stiff hairs; racemes usually gently curved, dorsiventral and laterally compressed, with the pedicelled spikelets converging over the convex side, joints and pedicels sublinear and parallel; sessile and pedicelled spikelets strikingly heteromorphous in the African species.

Species about 5, in tropical Africa, India and North America.

Perennial; sessile spikelets 4–4½ lin. long, awn very minutely ciliate along the spiral; pedicelled spikelets lanceolate, acuminate, 4½–5½ lin. long; their lower glume slightly 2-toothed ... .. 1. *S. nervosum*.

Annual; sessile spikelets 4½–7 lin. long, awn distinctly ciliate along the spiral; pedicelled spikelets narrowly lanceolate, long-acuminate, up to 8 lin. long; their lower glume with 2 long setaceous teeth 2. *S. ischamoides*.

(*Retz.*)

1. *S. nervosum*, Stapf. Perennial, forming dense tufts. Culms erect, 2 to over 3 ft. high, slender, terete, simple or nearly so, about 4-noded, middle and upper internodes exerted, smooth or slightly rough below the inflorescence, glabrous. Leaves glaucous; sheaths tight, terete, striate, smooth or nearly so, glabrous or sparingly hirsute from tubercle-based hairs; ligules a line of short stiff hairs; blades linear, long attenuated to a setaceous point, up to over 1 ft. long and up to 2½ lin. wide, rigid, more or less scabrid, glabrous, lateral nerves about 3 on each side, like the midrib whitish and prominent on both sides. Racemes solitary, 3–4½ in. long, erect, slightly curved; joints and pedicels parallel, sublinear, slightly compressed, 2–2½ lin. long, densely ciliate with white hairs along the angles, otherwise glabrous, tips more or less oblique. Sessile spikelets lanceolate-linear to linear, acuminate, 4–4½ lin. long, pale green, with a shortly bearded callus. Glumes subequal; lower subchartaceous to chartaceous, with an unequally 2-toothed flat and membranous beak, the teeth of which sometimes run out into ciliate mucros, deeply grooved, particularly below the middle, acutely 2-keeled, outer keel generally winged upwards, intracarpal nerves 4, with transverse veins in the upper part, like these green and raised on a white ground; upper glume subchartaceous, somewhat shorter, boat-shaped, sublinear in profile, keeled above, with the keel widened at the apex and passing into a fine bristle 7–8 lin. long, 5-nerved with fine transverse veins, ciliate. Lower floret: valve faintly 2-nerved, hyaline, ciliate, 3 lin. long, with a narrow linear valvule of about equal length and a ♂ flower. Upper floret ♀: valve oblong-lanceolate, 2½ lin. long, 2-fid, with narrow lobes, hyaline, 3-nerved, ciliate; awn up to 1¾ in. long, slender, column spirally twisted, bronze colour very minutely ciliate along the spiral, bristle whitish, as long as the column or slightly longer; valvule as long as the valve, linear, subacute, 2-nerved, ciliate. Anthers up to nearly 2 lin. long.





Styles and stigmas pale,  $1\frac{1}{4}$  lin. long. Pedicelled spikelet lanceolate, acuminate, green or suffused with purple,  $4\frac{1}{2}$ – $5\frac{1}{2}$  lin. long, glabrous; lower glume slightly 2-toothed, long-ciliate from the hairs of the tightly inflexed margin, keels very narrowly or obscurely winged, wing rigidly ciliate, intracarpal nerves 5, the inner 3 very prominent and rough; upper glume lanceolate, long and finely acuminate, hyaline, ciliate, 3-nerved; lower floret as in the sessile spikelet; upper floret very like the lower. Stamens smaller in the lower floret or both florets reduced and empty.—*S. macrostachyum*, Hochst. ex Hack. in DC. Monogr. Phan. vi. 245. *Andropogon nervosus*, Rottl. apud Willd. in Verh. Naturf. Fr. Berlin. iv. (1803) 218. *A. striatus*, Klein apud Willd. Spec. Pl. iv. (1805) 903; R. Br. Prodr. 201. *A. tacazensis*, Steud. Syn. Pl. Glum. i. 369. *A. macrostachys*, Anderss. in Schweinf. Beitr. Fl. Aeth. 306 (by error 310). *Ischæmum laxum*, R. Br. Prodr. 205; Benth. Fl. Austral. vii. 522; Hook. f. Fl. Brit. Ind. vii. 136, partly. *I. laxum*,  $\alpha$  *genuinum*, Hack. l.c. *I. nervosum*, Thw. Enum. Pl. Zeyl. 365. *I. macrostachyum*, A. Rich. Tent. Fl. Abyss. ii. 472. *Pollinia striata*, Spreng. Pug. ii. 12. *Hologamium nervosum*, Nees in Edinb. N. Phil. Journ. xviii. 185. 1835

Nile Land. Eritrea: Ginda, 3000–3300 ft., on arid hill sides, *Schweinfurth*, 184! 481! Abyssinia: hills by the Tacazze River, *Schimper*, 1705! Somaliland: Golis Range, *Drake-Brockman*, 183! 473!

Also in Socotra and from India to Tropical Australia.

2. *S. ischæmoides*, Forsk. Fl. Ægypt.-Arab. 178. Annual; culms usually in small fascicles, rarely over  $1\frac{1}{2}$  ft. high, slender, terete, simple, 2- or 3-noded, middle and upper internodes slightly exserted, smooth, glabrous. Leaves glaucous, sheath terete, tight, or the upper somewhat inflated, smooth or slightly rough, glabrous; ligules a fringe of stiff hairs; blades linear, tapering to a long fine point, up to 5 in. long, 1–2 lin. wide, rather firm but hardly rigid, more or less scabrid, midrib fine like the 1 or 2 primary lateral nerves. Racemes solitary, or sometimes an additional 1 or 2 from the upper nodes, 1–3 in. long, erect or slightly nodding; joints and pedicels parallel, sublinear, slightly compressed, 2 lin. long, very densely ciliate from white hairs along the angles, otherwise glabrous, tips more or less oblique. Sessile spikelets linear,  $4\frac{1}{2}$ –7 lin. long, pale green, with a shortly bearded callus; lower glume subchartaceous to chartaceous, with an unequally 2-toothed flat and membranous long beak, the teeth of which run out into mucros, deeply grooved, particularly below the middle, acutely 2-keeled, the outer keel generally winged upwards, intracarpal nerves 3–5, raised, rough, only distinct just above the groove; upper glume and florets as in *Schima nervosum* excepting the bristle of the glume which is over 10 lin. long and the awn, the column of which is generally more brown than bronze in colour, and has much longer cilia along the spirals. Pedicelled spikelets narrowly lanceolate, long-acuminate

(acumen up to 3 lin. long), pale green, up to 8 lin. long, glabrous; lower glume with 2 long setaceous teeth, sparingly hairy on the back, otherwise the spikelet as in *S. nervosum*.—*S. Kotschyi*, Hochst. in Flora, 1844, 247. *I. inscalptum*, Hochst. in Flora, 1844, 247; A. Rich. Tent. Fl. Abyss. ii. 472. *Andropogon Sehima*, Steud. Syn. Pl. Glum. i 369. *A. lineatus*, Steud. l.c. *A. schangulensis*, Rupr. ex Steud. l.c. *A. inscalptus*, Anderss. in Schweinf. Beitr. Fl. Aeth. 306 (by error 310). *A. rhynchophorus*, Stapf in Bull. Soc. Bot. Fr. lv. (1908) Mém. viii. 101.

**Upper Guinea.** Cape Verdes: St. Nicolai, *Bolle*! Cameroons: between Bipare and Léré, *Macleod*, 112!

**North Central.** Bagirmi: Dar-el-Hadjer, Moïto, Baro, Aouni, *Chevalier*, 9797!

**Nile Land.** Nubia: Wadi Laëmeb, between Suakim and Berber, *Schweinfurth*, 571! Kordofan: Abu Sunn, *Pfund*, 331! and without precise locality *Kotschy*, 373! Gallabat: Matamma, *Schweinfurth*, 1023! Sudan: Fazokl, *Kotschy*, 581! Abyssinia: Hills near Gageros, *Schimper*, 2278! Gaptia, *Schimper*, 739!

Also in Yemen, Tropical Arabia and in the Deccan Peninsula (*Woodrow*, 147! *Law*!).

## 6. ANDROPTERUM, Stapf.

Spikelets 2-nate, those of each pair different in sex and shape, one sessile, the other pedicelled on the articulate fragile rhachis of solitary spike-like racemes, the sessile deciduous together with the adjacent joint and pedicelled spikelet. Florets 2; lower ♂, upper ♀ in the sessile, ♂ in the pedicelled spikelets. Sessile spikelets: Glumes somewhat unequal, subchartaceous; lower deeply grooved, subentire or 2-toothed, subchartaceous, 2-keeled with inflexed margins, keels wingless; upper glume boat-shaped, keeled upwards, with the keel produced into an obtuse erect wing, adnate to a short mucro. Valves hyaline, of lower floret entire, mucicous, of upper 2-fid and awned from the sinus. Valvules slightly shorter than the valves, hyaline. Lodicules 2, cuneate. Stamens 3. Stigmas linear-oblong, laterally exserted. Grain unknown. Pedicelled spikelets obtuse: lower glume very asymmetrical, narrowly inflexed on one side only, with a large wing from the keel curving over sideways, upper boat-shaped, laterally much compressed; florets subequal, ♂.—Probably perennial; leaf-blades flat, slightly constricted at the base; ligule a line of stiff hairs; racemes dorsiventral much compressed with the pedicelled spikelets distichously arranged, the latter very conspicuous on account of the large wings which are rolled back over the posticous side of the lower glume.

Species 1, endemic.

1. *A. variegatum*, Stapf. Culms erect, over 2 ft. high, rather slender, terete, simple or more often branched from below with the branches appressed; internodes more or less exserted, glabrous or





appressedly hairy upwards. Leaves subglaucous; sheaths tight, terete, striate, glabrous or more or less hirsute, bearded at the nodes; ligules a line of stiff hairs, up to 2 lin. long; blades linear, long-attenuated to a fine point, slightly contracted at the base, up to 8 in. long and 6 lin. wide (basal leaves not known), more or less hairy on both sides or almost whitish-tomentose beneath, margins spinulously ciliate, lateral nerves about 3-4 on each side, hardly prominent, midrib slender, whitish. Racemes solitary, 2 to almost 3 in. long, on long and very slender exerted peduncles which are pubescent upwards; joints and pedicels parallel, linear-clavate, subequal or equal, the former very thin, the latter slightly convex on the back, about 1½ lin. long, densely ciliate from the angles and more or less so along a median line on the back, otherwise glabrous and glossy, disarticulating subhorizontally. Sessile spikelets lanceolate, subacuminate, up to 2½ lin. long, pale green, without a distinct callus. Lower glume linear, narrow in profile, keels more or less ciliate, intracardinal nerves none; upper glume slightly exceeding the lower, obliquely lanceolate in profile, finely 7-nerved, with obscure transverse veins, minutely ciliate. Lower floret ♂, about 2 lin. long: valve oblong, subacute, very faintly 3-nerved; valvule similar but narrower and 2-nerved. Anthers 1 lin. long. Upper floret ♀, about as long as the lower: valve oblong, 2-lobed beyond the middle, with the lobes narrowly lanceolate, acute, 3-nerved at the base, eciliate, awn up to 5 lin. long, slender, column spirally twisted, smooth along the spirals, bristle as long as the column, scaberulous; valvule linear-oblong, obtuse, 2-nerved. Anthers rudimentary, very small, on short filaments. Stigmas over 1½ lin. long, purple. Pedicelled spikelets linear-oblong in profile, obtuse, very pale green, edged with purple on one side, 3-3½ lin. long, glabrous. Glumes equal; lower lanceolate, slightly prominently 7-nerved; upper glume linear-lanceolate in profile, with a narrow wing from the middle upwards, about 7-nerved, nerves faint, tips purple. Florets similar to the lower floret of the sessile spikelet. Anthers of lower floret over 1½ lin. long, of upper 1 lin. long.

**Mozambique Distr.** Nyasaland: Namasi, *Cameron*, 17! Masuku Plateau, 6000-7000 ft. *Wight*!

#### 7. APLUDA, Linn. Sp. Pl. ed. i. 82.

Spikelets in threes, at the tips of the branches and branchlets of a leafy panicle, each three supported and embraced by a boat-shaped spathe, borne on a minute peduncle and deciduous from it as a whole together with the bulbous basal joint of the raceme, or the pedicelled spikelet disarticulating separately if fertile. Terminal spikelet small, barren or almost suppressed, on a flat broad glume-like pedicel. Sessile and lateral pedicelled spikelets similar in shape, both mucicous or the sessile awned, alike in sex, or more often the

pedicelled purely ♂. Florets 2: lower ♂, upper ♀ or usually ♂ in the lateral pedicelled spikelet. Glumes equal, herbaceous-chartaceous, or subcoriaceous towards the base; lower convolute, with the margins not or very narrowly inflexed, upper keeled. Valves hyaline; of lower floret muticous, of upper deeply 2-fid and awned from the sinus or nearly or quite entire and muticous. Valvules hyaline. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong, slightly laterally compressed; scutellum reaching to beyond the middle.—Perennial or annual; blades flat; ligules membranous. Panicle compound, leafy, the ultimate branchlets which bear the spikelets usually clustered.

Species 1, very polymorphic; Tropical Asia to New Caledonia, Tropical Arabia and Socotra.

1. *A. varia*, Hack. in DC. *Monogr. Phan.* vi. 196, var. *aristata*, Hack. l.c. 199. Mostly annual, branched from the base. Culms erect, 1–6 ft. high, or geniculately ascending and often rooting from the nodes, many-noded, terete, smooth and glabrous. Leaf-sheaths terete, tight and glabrous or very rarely sparingly hairy, those supporting the flowering branches wider and shorter with reduced blades; ligules short, rounded off, glabrous or ciliate; blades linear-lanceolate, long-attenuated towards the base, almost petioled, tapering upwards to a fine setaceous point, from a few inches to over 1 ft. long,  $2\frac{1}{2}$ –7 lin. wide, convolute in bud, then flat, somewhat rigid or flaccid, glaucous below, glabrous or very rarely sparingly hairy, slightly rough above, scabrid along the margins, midrib white above, stouter towards the base, primary lateral nerves 5–8 on each side, fine. Panicle up to 2 ft. long, much compound, primary branches long, those of the following orders gradually shorter, bearing clusters of trios of spikelets; spathe at the base of the trios ovate to ovate-oblong, mucronate or bearing rudimentary blades, glabrous, green or tinged with purple,  $2\frac{1}{2}$ –3 lin. long; bulbous basal joint up to 1 lin. long, whitish. Sessile spikelet lanceolate-oblong, acute, up to 3 lin. long. Lower glume chartaceous, firmer below, many-nerved; upper somewhat gibbous on the back, scaberulous on the keel. Lower floret: valve oblong-lanceolate, acute, slightly shorter than the glumes, 3-nerved, glabrous; valvule linear-lanceolate, almost as long as the valve, 2-nerved. Upper floret: valve 2 lin. long, 2-fid to beyond the middle, awn up to 6 lin. long, very fine, with or without a distinct twisted column; valvule generally much shorter, oblong to broad-ovate, nerveless. Anthers  $1\frac{1}{2}$ –2 lin. long. Stigmas purple, up to 3 lin. long. Grain over  $\frac{1}{2}$  lin. long. Pedicels  $1\frac{1}{2}$ –2 lin. long, sparingly ciliate. Lateral pedicelled spikelet  $2\frac{1}{2}$ – $2\frac{3}{4}$  lin. long. Glumes similar, subherbaceous, lanceolate, acute, many-nerved; lower glume rather flat on the back; upper not or obscurely keeled and not gibbous. Florets as in the sessile spikelet, but the upper not awned, both ♂ or more or less reduced. Terminal





spikelet reduced to a short striate glume, continuing the pedicel.—Hook. f. Fl. Brit. Ind. vii. 150; Durand & Schinz, Consp. Fl. Afr. v. 696. *Aphuda aristata*, Linn. Cent. ii. 71; Schreber, Besch. d. Graes. 93. t. 42; Beauv. Agrost. 133; Steud. Syn. Pl. Glum. i. 403; Duthie, Fodder Grasses of N. India, 44. t. 29. *A. Gryllus*, Beauv. Agrost., Explic. planches, 15, t. 23. f. 5 (by error 6).

Nile Land. Island of Socotra: *Balfour*, 229! Tamarid, *Schweinfurth*, 344!

Throughout tropical and sub-tropical Asia; also in Mauritius: according to Duthie (*l.c.*) a fairly good fodder when young.

8. **VOSSIA**, Wall. et Griff.; Benth. et Hook. f. Gen. Pl. iii. 1131.

Spikelets 2-nate, those of each pair alike in shape and sex (or the pedicelled ♂), on the moderately fragile articulate rhachis of digitate, rarely solitary, spike-like racemes, the sessile separating only very tardily together with the contiguous joint of the rhachis and the pedicel; joint and pedicel slightly gaping. Florets 2, lower ♂, upper ♀, or sometimes ♂ in the pedicelled spikelets. Glumes unequal; the lower coriaceous, flat on the back, produced into a long tail-like acumen, 2-keeled, narrowly inflexed along the margins; upper boat-shaped, chartaceous, keeled. Valves hyaline, of lower floret 2-nerved, of upper faintly 3-nerved. Valvules 2-nerved. Lodicules 2, large, broadly cuneate. Stamens 3. Stigmas linear, laterally exerted. Grain unknown.—Perennial, from a rooting base, often floating; blades long and flat; ligules membranous, ciliate; racemes subterete or more or less compressed; joints compressed below, widened above; pedicels similar but narrower and flatter.

Species 1, in Tropical Africa and India.

1. *V. cuspidata*, Griff. Notul. iii., Index, 12; *l.c. Pl. Asiat. t.* 153. Perennial. Culms submerged or floating, copiously rooting from the submerged nodes, as thick as the finger below, very many-noded, terete, perfectly smooth and glabrous, branching below, the aerial part up to over 3 ft. high. Leaf-sheaths glabrous and smooth or more or less scaberulous with small tubercle-based hairs, tight or the lower somewhat loose, mostly exceeding the internodes; ligules very short, truncate; blades linear, long-tapering to a fine point, up to 3 ft. long, by  $\frac{3}{4}$  to almost 1 in. wide, convolute in veneration, then flat, rather rigid, rough on both sides, glaucous, glabrous, midrib very stout below, in the larger leaves rounded on the back, white and channelled above, with numerous fine lateral nerves. Racemes pale green or straw-coloured, solitary or 2-6 on a short common axis, opposite, 6-9 in. long, erect, rigid or slightly nodding, stout; joints about 4 lin. long, more or less convex or almost flat on the back, scabrid along the angles, disarticulating horizontally; pedicels as long as the joints or slightly longer, scabrid along the angles. Sessile spikelets with a narrow constricted callus, ovate-oblong, without the

tail 4 to over 5 lin. long. Lower glume ovate-oblong, with a straight subulate tail, up to 1 in. long and 1 lin. wide at the base, smooth and shining on the back, spinulosly scabrid along the keels and the edges of the tail, many-nerved if seen in transmitted light; upper glume about 4 lin. long, ovate-oblong in outline, mucronulate, spinulosly scabrid on the keel, otherwise glabrous, 5-9-nerved, the pair of lateral nerves submarginal, the inner or also the outer anastomosing with the middle nerve above. Lower floret 4 lin. long: valve oblong-lanceolate, minutely 2-dentate, 2-keeled, glabrous except the ciliolate tips, with a linear-oblong 2-nerved valvule. Upper floret similar to that of the lower, but the valve acute and 3-nerved. Anthers 2 lin. long. Stigmas over 1 lin. long. Pedicelled spikelets similar to the sessile, usually slightly smaller.—K. Schum. in Engl. Pfl. Ost-Afr. A. 67, C. 97. *V. procera*, Wall. et Griff. in Journ. Asiat. Soc. Bengal, v. 573 (1836), t. 23; Grant in Trans. Linn. Soc. xxix. 175, t. 116; Hack. in DC. Monogr. Phan. vi. 270; Durand & Schinz, Consp. Fl. Afr. v. 701; Hook. f. Fl. Brit. Ind. vii. 151; Franch. Contr. Flor. Congo Franç. 14; De Wild. & Durand, Contr. Fl. Congo, ii. 71, and Reliq. Dewevr. 253; Chevalier in Revue Cult. Col. vii. 515; Hope in Ann. Bot. xvi. (1902) 501; De Wild. Étud. Fl. Bas-et Moyen-Congo, i. 94; Th. & Hél. Durand, Syll. Fl. Congo, 622. *Ischæmum cuspidatum*, Roxb. Fl. Ind. i. 324; Kunth, Enum. Pl. i. 516; Griff. Notul. iii. 70. *Ischæmum ensiforme*, Herb. Ham. ex Wall. Cat. n. 8878.

**Upper Guinea.** Northern Nigeria: Sokoto Province, *Dalziel*, 508! Katagum District; in marshes, *Dalziel*, 291!

**North Central.** Bagirmi: Fort Lamy, *Chevalier*, 10275! 10305! Upper Ubangi River, *Viancin*; Lake Lére, *Macleod*, 114! 115! Tuburi marshes, *Macleod*!

**Nile Land.** Kordofan: Takari, *Pfund*, 394! Birket-Rahad, *Pfund*, 581! Bahr el Gebel, *Schweinfurth*, Ser. III, 135! Moqrem el Bohur, *Schweinfurth*, Ser. III, 138! Uganda: White Nile, *Speke & Grant*!

**Lower Guinea.** Gaboon: Lake Kakimba, between Setti Cama and Fernan Vaz, *Dybowski*, 21, *Lecomte*; Belgian Congo: Stanley Pool District; Bolobo, *Dewèvre*; Kimuenza, *Gillet*.

**South Central.** Belgian Congo: between Mokeno and Mongo, *Thollon*, 229; Lower Kassai District, *Descamps*.

**Mozambique Distr.** Nyasaland: Nyika Plateau; Rukuru River, 4000 ft., *McClounie*, 9! Elephant Marsh, *Kirk*! Portuguese East Africa: Luabo River, *Kirk*!

*Vossia cuspidata* is one of the principal constituents of the 'sadd' of the Nile and its tributaries and other rivers of Tropical Africa.

9. **URELYTRUM**, Hack. in Engl. u. Prantl, Nat. Pflanzenfam. ii. 2. pp. 22, 25.

Spikelets 2-nate, those of each pair different in shape and sex, one sessile, the other pedicelled, on the very fragile rhachis of solitary, paired or racemed subcylindric spike-like racemes, the sessile deciduous with the adjacent joint of the rhachis and pedicel;





joints obliquely truncate with appendaged tips. Sessile spikelets : florets 2, lower ♂, upper ♀. Glumes equal or subequal; lower coriaceous, dorsally flattened, 2-keeled, muticous; upper subchartaceous or membranous, boat-shaped, keeled. Valves hyaline, subequal, slightly shorter than the glumes, muticous, of lower floret 2-, of upper 3- to sub-5-nerved. Valvules almost equalling their valves, hyaline, 2-nerved. Lodicules 2, cuneate. Stamens 3. Stigmas linear, laterally exerted. Grain narrow, oblong, terete at the middle; scutellum reaching to the middle; hilum obovate, basal. Pedicelled spikelets with 2 ♂ florets and with the lower glume narrowed into a subulate often long awn, otherwise as in the sessile spikelets, or more or less reduced, sometimes to a pair of rudimentary glumes, the lower of which is represented by a long awn, flattened and widened at the base.—Perennial, rarely annual; culms erect, few-noded, simple; blades narrow, linear, flat or convolute; racemes long, rigid.

Species 6 or 7, in Tropical and South Africa.

Racemes solitary :

Lower glume of sessile spikelet more or less muricate along the keels, nerves usually 5 (1 intracarpal, the others in pairs at the keels).

Perennial ... .. 1. *U. squarrosum*.  
 Annual ... .. 2. *U. annuum*.

Lower glume of the sessile spikelet not muricate along the keels, nerves 8-9 (3-4 intracarpal), the others in pairs at the keels ... .. 3. *U. agropyroides*.

Racemes 2 to many.

Racemes in pairs; sessile spikelets linear-lanceolate, subacuminate, 5 lin. long ... .. 4. *U. coronulatum*.

Racemes about 10, stout, up to over 1½ ft. long; spikelets very closely appressed... .. 5. *U. giganteum*.

Racemes very numerous, slender, up to 6 in. long; spikelets loosely appressed ... .. 6. *U. thyrsooides*.

1. *U. squarrosum*, Hack. *Androp. in DC. Monogr. Phan.* vi. 272. Compactly tufted. Culms up to over 4 ft. high, glabrous, few-noded. Leaf-sheaths exceeding the internodes except the uppermost, reddish, tight, terete, glabrous, smooth, the lower widened, very firm, shining, persistent; ligules oblong, 2-3 lin. long, glabrous or with a few long hairs behind; blades very narrow, linear, tapering to a setaceous point, lowest up to over 1 ft. long by  $\frac{3}{4}$  to 2 lin. wide, flat or convolute, rather rigid, glabrous or hirsute below, prominently nerved and finely scaberulous above. Racemes solitary, 5-10 in. long, 1-2 lin. thick, almost glabrous to villous; joints 3-4 lin. long, silky at the base, scantily pubescent to villous above, appendage up to 2 lin. long, unequally lobed or toothed, ciliolate. Sessile spikelets about 4 lin. long. Lower glume oblong to lanceolate, obtuse to acute, minutely 2-toothed, one tooth sometimes running out into an awn up to over 1½ in. long, glabrous, smooth or punctate or pubescent to villous, keels acute at least above, distantly

(sometimes obscurely) spinulously muricate at the middle, rigidly ciliate above, usually with 1 intracarinale nerve which is more or less prominent towards the tips; upper glume lanceolate, acute, firmly membranous, 3-nerved, side-nerves submarginal, keel rigidly ciliate above, margins softly ciliate. Valves about 3 lin. long, softly ciliate, of lower floret lanceolate, acute, of upper ovate-lanceolate, obtuse to subacute, mucronulate. Anthers 2–1½ lin. long. Pedicelled spikelets varying in hairiness like the sessile, narrow and usually smaller than they, with 2 ♂ florets, or (often in the same raceme) more or less reduced, sometimes to an awn representing the lower glume and a minute rudiment of the upper; awn squarrose, flattened below, scabrid, 1½–3½ in. long.—Durand & Schinz, *Consp. Fl. Afr.* vi. 701; Stapf in Dyer, *Fl. Cap.* vii. 330. *Rottbøllia hordeoides* (name only), Munro in Harvey, *Gen. S. Afr. Pl.* ed. ii. 442.

**Lower Guinea.** Angola: Benguella; marshes of the valleys of the Tiengo and Kuito rivers, *Gossweiler*, 3198! 3777! 3955! in open Mumma woods between N'jata and Dongo, *Gossweiler*, 3133!

**South Central.** Rhodesia: Salisbury; Ingese, *Nobbs*, 670!

Extending to the Transvaal, the Orange Free State and Lourenço Marques.

Hackel (ex *Henriq. in Bolet. Soc. Brot.* xvii. (1900) 47) refers certain specimens collected by Quintas at Lourenço Marques to *U. agropyroides*, Hack., but that received at Kew under the name (*Quintas*, 200) is *U. squarrosum*.

2. *U. annuum*, *Stapf in Bull. Soc. Bot. France*, lv. (1908), *Mém.* viii. 99. Annual. Culms tufted, up to 5 ft. high, slender, straight, terete, with flowering branches from the lower nodes, 3–5-noded, smooth. Leaf-sheaths glabrous, smooth, terete, tight; ligules membranous, 1½ lin. long, the sides firm, forming an acute auricle, decurrent along the sheath, the central portion longitudinally striate; blades narrowly linear, flat or convolute, tapering to a long setaceous point, up to 1 foot long and 1½ lin. wide, glabrous, scabrid on both sides and particularly along the margin, often with a few long hairs near the base, midrib and lateral nerves rather prominent below and the latter also above. Racemes solitary, up to 6 in. long, over 1½ lin. wide, dull purplish-green, erect, pubescent or glabrous; joints linear, up to 2½ lin. long, slightly wider above, rounded on the back, slightly concave on the inner face, glabrous or pubescent, disarticulating very obliquely, scar with a membranous margin, produced into 2 or 3 unequal teeth; pedicels similar to the joints, but shorter, with 2 minute or obscure teeth at the apex. Sessile spikelet with a short broad bearded callus, up to 3 lin. long, lanceolate-oblong. Glumes subequal; lower cartilaginous, subobtuse, slightly convex, glabrous or pubescent upwards, finely granular, minutely muricate along the thickened keels and rigidly ciliate towards the apex, with 1 central nerve, prominent above, and 2 close lateral nerves at each keel; upper glume very slightly shorter, firmly membranous, obliquely linear-lanceolate in profile, glabrous except the pubescent tips, 3-nerved, keels and margins ciliate above. Lower





floret: valve somewhat shorter than the glumes, lanceolate, acute, 2-nerved, ciliate upwards; valvule similar but narrower and glabrous. Upper floret: valve almost as long as that of the lower floret, hyaline, very acute, 3-nerved, minutely ciliate; valvule slightly shorter, faintly 2-nerved. Anthers almost 2 lin. long. Stigmas over  $\frac{1}{2}$  lin. long. Grain narrowly oblong, 2 lin. long, terete at the middle, scutellum not quite reaching to the middle, hilum obovate, basal. Pedicelled spikelet: lower glume lanceolate, produced into a ciliolate awn, which is twisted below and passes into a horizontally spreading bristle, about 1 in. or more long, frequently all the awns of the racemes pointing one way, flat, 3-nerved, pubescent or glabrous; upper glume broadly lanceolate with an eccentric acute keel, with the broader side concave, otherwise as in the sessile spikelet; florets as in the sessile if not smaller, the upper ♂.

Upper Guinea. French Guinea: Timbo, *Pobéguin*, 1773! Futa-Jallon: between Soumbalako and Boulivel, *Chevalier*, 18667! Koulikoro, *Chevalier*, 2387!

3. *U. agropyroides*, *Hack. in DC. Monogr. Phan.* vi. 272. Perennial. Culms up to over  $2\frac{1}{2}$  ft. high, rather robust, straight, terete, simple, smooth, or slightly rough below the raceme, few-noded. Leaf-sheaths glabrous or sparingly hairy upwards, the lower strongly striate, with their bases persistent; ligules membranous, truncate, about 1 lin. long; blades linear, tapering to a short setaceous point, about  $\frac{1}{2}$  ft. long and 2–3 lin. wide, flat, hirsute on both sides, rough along the margin, midrib slender. Raceme solitary, 6–8 in. long, dull purplish-brown, erect, glabrous except at the calli; joints linear, compressed, slightly concave on the inner face, about 4 lin. long, more or less rough, ciliate along the inner angle, disarticulating very obliquely, scar with a membranous toothed ciliate appendage, exceeding the joint by up to 1 lin.; pedicels similar to the joints but flatter and with a smaller membranous appendage, contiguous with them. Sessile spikelet with an obconical bearded callus, up to  $1\frac{1}{2}$  lin. long, separated from it by a deep transverse groove, oblong-lanceolate, 4 lin. long. Glumes equal, lower acute, cartilaginous, slightly convex, glabrous, almost smooth with the exception of the keels which are rigidly ciliolate upwards, keel-nerves 2, intracarinal nerves about 4, slightly prominent; upper glume of about the same length, thinly chartaceous, boat-shaped, obliquely linear-lanceolate in profile, acute, 3-nerved, the keels ciliolate above. Lower floret: valve slightly shorter than the glume, subhyaline, lanceolate, subacute, 2-nerved, obscurely ciliate near the tip, otherwise glabrous, with a similar valvule. Upper floret: valve hyaline, oblong-lanceolate, acute, finely 3-nerved, glabrous, with a shorter faintly 2-nerved valvule. Lodicules glabrous. Anthers  $2\frac{1}{2}$  lin. long. Stigmas  $1\frac{1}{2}$  lin. long. Pedicelled spikelets consisting of two reduced glumes and a small hyaline valve,

the outer glume passing into a rough, more or less squarrose awn, up to 8–10 lin. long.—*Rottboellia agropyroides*, Hack. in Bolet. Soc. Brot. iii. 135, t. 2, fig. 1, not. l.c. xvii. 47.

**Lower Guinea.** Angola : Lobango ; near Humpata and Huilla, *Newton* !

4. *U. coronulatum*, *Stapf*. Perennial. Culms erect, rather robust, terete, smooth, glabrous. Leaf-sheaths somewhat loose, terete, keeled above, smooth, glabrous, striate (only the upper known); ligules membranous, truncate, sparingly ciliate, 1 lin. long; blades linear, over 6 lin. long, 3 lin. wide, flat, sparingly hairy above, very rough along the edges, midrib whitish on both sides. Racemes in pairs, on peduncles which are about  $\frac{1}{2}$  lin. long, erect, rather stiff, glabrous, with the exception of the calli; joints 3–3 $\frac{1}{2}$  lin. long, linear, slightly clavate above, with the back more or less rounded and prominently nerved, slightly concave on the inner face, quite smooth, disarticulating obliquely, scar with a scarious ciliate irregularly toothed coronulate appendage; pedicels linear, much compressed, without an apical appendage, otherwise similar to the joints, subcontiguous with them, few-nerved. Sessile spikelets with slightly bearded obovate calli, with a deep transverse groove above it, including the callus 5 lin. long, linear-lanceolate, subacuminate, reddish straw-coloured or dull purplish-brown. Glumes equal, lower subcoriaceous, obscurely 2-toothed, rather flat on the back, keels spinulously ciliate above the middle, intracarinal nerves 4–5, some of them more or less raised on the back, quite distinct on the inner side; upper glume thinly chartaceous, narrowly boat-shaped, acute, 3-nerved, keel rigidly ciliate above, lateral nerve close to the glabrous margin. Lower floret: valve hyaline, lanceolate-linear, acute, 3 $\frac{1}{2}$  lin. long, ciliate, finely 3-nerved with a similar 2-nerved valvule. Upper floret: valve and valvule very like those of the lower floret. Anthers 2 lin. long. Stigmas 2 lin. long. Pedicelled spikelets more or less reduced, sometimes containing 2 florets, with rudimentary ♂ flowers or rudimentary valves only, the outer glume similar to that of the sessile spikelet but smaller and tapering into a scabrid squarrose awn, about 1 in. long.

*Nile Land.* Uganda : Buddu, in dry alluvial sands, *Scott Elliot*, 7459 !

5. *U. giganteum*, *Pilger in Engl. Jahrb.* xxxiv. 125 (1904). Perennial. Culms very stout, up to nearly 3 lin. thick. Leaf-sheaths tight, slightly rough, finely striate, glabrous; ligules membranous, truncate, over 1 lin. long, glabrous; blades linear, tapering almost from the base, up to 1 $\frac{1}{2}$  ft. long, about 5 lin. wide at the base, very firm, more or less rough above, less so below, very scabrid along the edges. Racemes about 10 on a common axis, which is about 3 in. long and more or less angular above and slightly rough,





lowest raceme solitary, the following verticillate or opposite, all peduncled (peduncles  $1\frac{1}{2}$ – $\frac{3}{4}$  in. long and with a few hairs at the base), stiff, erect, over  $1\frac{1}{2}$  ft. long, and about 1 lin. in diam., glabrous, dull purplish; joints linear, slightly thickened above, semiterete, very slightly concave on the inner face, prominently many-nerved, rough on the back, outer angle scabrid, disarticulating obliquely, scar surrounded by a coriaceous ciliolate irregularly toothed appendage; pedicels linear, similar to and almost contiguous with the joints but more compressed and shorter, indistinctly nerved and without appendages. Sessile spikelet with a short obovate minutely bearded callus, which is hardly marked off from the lower glume,  $3$ – $3\frac{1}{2}$  lin. long, linear-oblong. Glumes subequal, coriaceous, very minutely truncate, rather flat on the back, with keels spinulously ciliate above the middle, 6-nerved, intracarpal nerves 2, one or both of them slightly raised and scaberulous upwards; upper glume chartaceous, almost as long as the lower, narrowly boat-shaped, acute, 3-nerved, keel rigidly ciliolate above, lateral nerves submarginal, margin hyaline and ciliate. Lower floret: valve lanceolate from a broad base, subacute, almost 3 lin. long, hyaline, ciliolate, with a similar 2-nerved, almost glabrous valvule. Upper floret: valve similar to that of the lower floret, but firmer below, more or less boat-shaped and 3-nerved, its valvule of the same length, somewhat obtuse, faintly 2-nerved. Anthers up to  $1\frac{1}{2}$  lin. long. Pedicelled spikelets similar to the sessile, but both florets usually ♂, the lower glume produced into a squarrose scabrid awn,  $\frac{3}{4}$  in. long.

**Lower Guinea.** Belgian Congo: Baschilange; Mukenge, *Pogge*; Muata Yamvo's Mussumba, *Pogge*, 471. Angola: Malange, *Gossweiler*, 800!

6. *U. thyrsioides*, *Stapf*. Perennial, up to 8 ft. high. Culms erect, terete below, up to  $\frac{1}{2}$  in. in diam., very glabrous and smooth, 5- or more-noded. Leaf-sheaths terete, firm, striate upwards, more or less hirsute, or quite glabrous and smooth; ligules scarious, truncate, up to  $1\frac{1}{2}$  lin. long, ciliate with long hairs from the back; blades linear, very long-tapering to a slender point, slightly contracted at the junction with the sheath, up to 3 ft. long and over 1 in. wide, flat, rigid, glabrous or hirsute towards the base, scabrid above and along the margins, midrib very stout, pale and slightly channelled above, lateral nerves numerous, fine. Racemes fragile, numerous on a common rhachis, usually simple, whorled, up to 6 in. long, straight or flexuous, greenish-yellow or purplish; common rhachis up to more than 10 in. long, very angular, the lowest internode up to 2 in. long, the upper much shorter, smooth below, scabrid upwards, glabrous or bearded at the nodes; joints linear, subclavate and hollow at the tip,  $3$ – $3\frac{1}{2}$  lin. long, convex on the back, scaberulous along the angles, disarticulating somewhat obliquely with a narrow cupuliform margin round the scar; pedicels similar to the joints

but distinctly shorter, parallel to and somewhat distant from them. Sessile spikelets with an obscure callus and a transverse groove above it, linear-oblong,  $2\frac{1}{2}$ –3 lin. long. Lower glume chartaceous, subacute or acute, mucicous, flat on the back, smooth or aculeolate along the sides, spinulously ciliate on the keels, glabrous, intracarinal nerves 3; upper glume subequal to the lower, chartaceous, boat-shaped, broadly linear in profile, acute, glabrous, scabrid on the keel, 1–3-nerved. Lower floret: valve shorter than the glumes by  $\frac{1}{4}$ , oblong, subacute, with a similar valvule. Upper floret: valve and valvule similar to those of the lower floret, but the former 3-nerved. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet similar to the sessile, but with 2 ♂ florets and with or without a bristle-like awn from the lower glume.—*Rhytachne gigantea*, Stapf in Bull. Soc. Bot. Fr. lv. (1908) Mém. viii. 99.

**Upper Guinea.** Northern Nigeria: Abinsi, *Dalziel*, 902!

**Lower Guinea** French Congo: Fort Possel on the Ubangi River, *Chevalier*, 5303! Krebedje, *Chevalier*, 5410! 5451! Shari region; between Fort Campel and Nana, *Chevalier*, 10686!

**South Central.** Belgian Congo: Monbuttu; by the Kusumbo River, *Schweinfurth*, 3589!

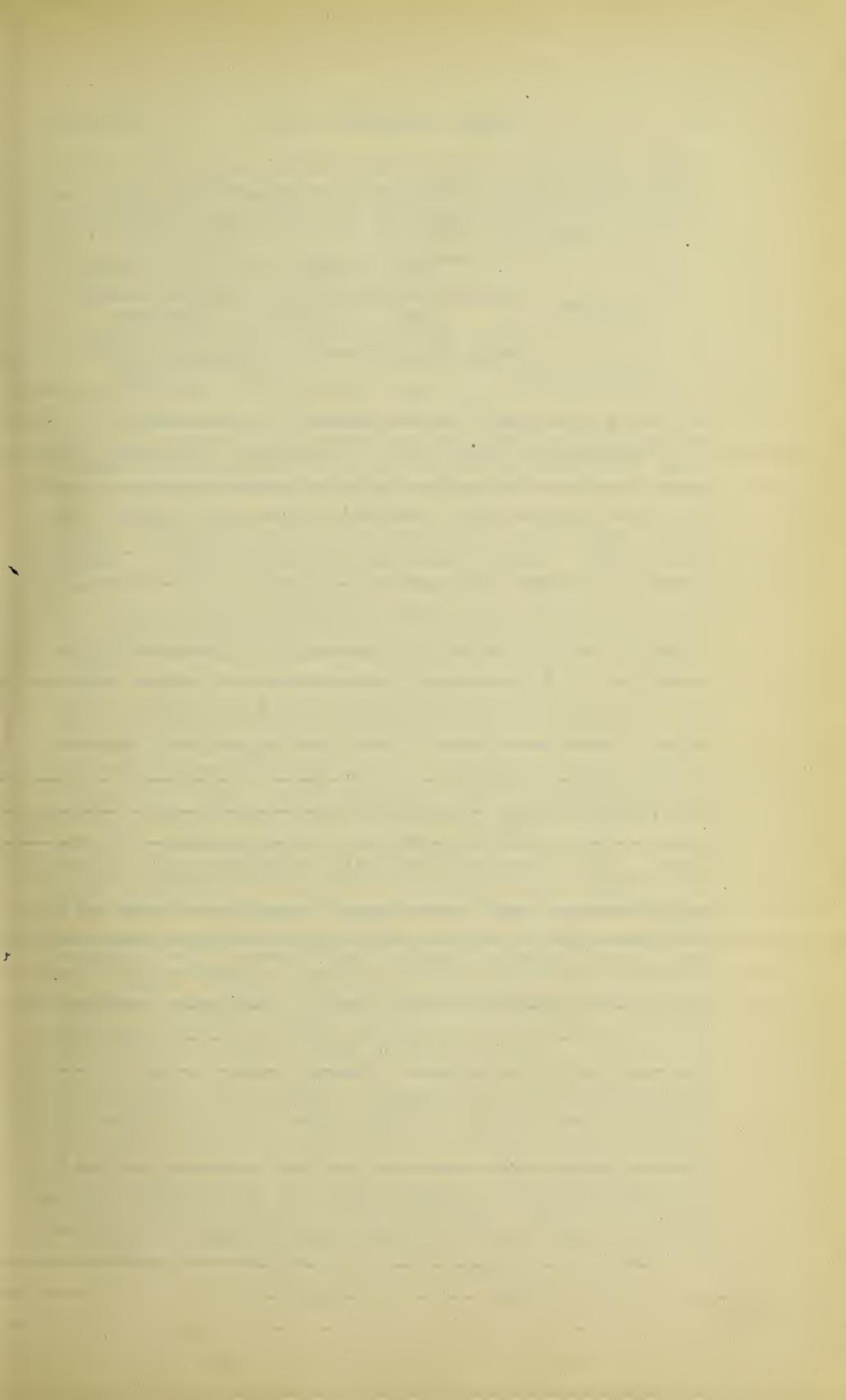
*Imperfectly known species.*

7. *U. digitatum*, *K. Schum. in Engl. Pfl. Ost-Afr. C.* 97. Culms over 3 ft. high. Leaf-sheaths glabrous; ligules short, rounded, membranous, glabrous; blades  $4$ – $4\frac{1}{2}$  lin. wide, prominently nerved, pubescent. Racemes usually 5, the lower paired, shortly peduncled. Lower glume of the sessile spikelet minutely hairy at the apex, otherwise not ciliate; awn of the pedicelled spikelet squarrose, about 1 in. long.

**Mozambique Distr.** German East Africa: Karagwe; Kassasse, *Stuhlmann*, 850, 3218; Bukoma; Itole, *Stuhlmann*, 929.

10. **THYRSIA**, Stapf.

Spikelets 2-nate, those of each pair very similar in shape or the pedicelled more or less reduced or quite rudimentary, different in sex (occasionally some homogamous in the same inflorescence), on the fragile articulate rhachis of racemosely arranged or paniced spike-like racemes; joints and pedicels stout, posticously contiguous or almost so; articulation at a right angle to the rhachis, tips hollowed out, not appendaged. Sessile spikelets: Florets 2, lower reduced to a barren valve, upper ♀, awnless. Glumes equal, coriaceous or more or less chartaceous or the upper membranous, lower flat on the back, smooth, 2-keeled, narrowly inflexed along the margins, mucicous, upper boat-shaped, keeled. Valves hyaline, awnless, of lower floret 2-, of upper 3-nerved. Valvule of upper floret hyaline, 2-nerved; lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong, dorsally compressed; scutellum extending beyond the





middle.—Tall, coarse grasses; blades very long, hard, flat; ligules very short, membranous; racemes rather stout and stiff, more or less distinctly dorsiventral and sometimes submoniliform owing to the constrictions between the swollen joints and pedicels.

Species 3 or 4, in Tropical Africa and India.

Joints and pedicels clavate, much inflated upwards, of equal length; spikelets  $2\frac{1}{2}$ –3 lin. long ... .. 1. *T. inflata*.

Joints subclavate, slightly convex on the back; pedicels stoutly clavate, shorter than the joints; spikelets 2 lin. long ... .. 2. *T. huillensis*.

1. *T. inflata*, Stapf. Perennial, tufted. Culms erect, up to over 3 ft. high, densely covered at the base with persistent sheath-bases, simple, smooth and glabrous or very slightly rough and hairy below the inflorescences, terete, 4–5-noded, the upper internodes exserted. Leaf-sheaths striate, more or less hairy to glabrous, the basal compressed, particularly those of the innovation shoots, nodes slightly bearded; ligules very short, membranous, ciliolate; blades linear, long-attenuated to a fine point, passing at the base into the sheath, up to over 1 ft. long and  $1\frac{1}{2}$ –3 lin. wide, folded or flattened out, soft or sometimes rather stiff, softly hirsute, particularly along the rough margins, or more or less glabrescent, midrib and lateral nerves slender, slightly prominent. Racemes quite glabrous, 3–4 on a common rhachis, which is  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, subterete and more or less hairy, shortly peduncled, of unknown length, about  $1\frac{1}{2}$  lin. wide, stiff, pale yellowish green, tinged with purple; joints stout, much inflated and hollow upwards,  $1\frac{1}{2}$ –2 lin. long, very convex on the back, slightly concave on the face, smooth, distinctly striate, disarticulating horizontally, with a smooth, almost square scar; pedicels similar to the joints but more narrowed at the base and more or less curved, usually shorter than the joints and subcontiguous with them. Sessile spikelet, including the very short subannular callus, slightly over 2 lin. long, ovate-oblong. Glumes equal; lower coriaceous along the keels, chartaceous between them, subobtusate, sometimes minutely emarginate, with narrow inflexed margins, distinctly 2-keeled, keels very minutely ciliolate, intracarinar nerves very fine, 3–4, with few transverse veins above; upper glume boat-shaped, thinly chartaceous, semiovate in profile, subacute, with a marked minutely ciliate keel and a submarginal nerve on each side. Lower floret barren: valve hyaline, broadly lanceolate to oblong, 2-nerved, finely ciliate above; valvule 0. Upper floret: valve broadly lanceolate, acute, 3-nerved; valvule slightly shorter, oblong, subobtusate, obscurely 2-nerved. Anthers  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. long. Stigmas purple,  $\frac{3}{4}$  lin. long, exserted from near the base. Grain oblong, dorsally much compressed,  $\frac{3}{4}$  lin. long, scutellum extending beyond the middle. Pedicelled spikelet showing various degrees of development from a perfect state with a ♂ flower, when it is very

similar to the sessile spikelet, down to 2 very minute glumes or only a single one.

**South Central.** Belgian Congo: Katanga; Chisangwe, in dry bush, *Hombé*, 34! Elizabethville, *Hombé*, 51!

A similar plant, but with a more compound inflorescence and numerous racemes and spikelets 2-3 lin. long, was collected by Whyte in the Nyika Mts., N. Nyasaland, at 4000-6000 ft. The inflorescences are incomplete and there are no leaves with them.

2. **T. huillensis**, *Stapf*. Perennial from a slender hard rhizome, marked with annuliform rings (the scars of the cataphylls and leaf-bases), innovations extravaginal, covered with firm compressed short cataphylls. Culms erect, up to over 1 ft. high, compressed below, 2-noded, glabrous, smooth. Leaf-sheaths glabrous, apart from the ciliate upper margins and the sometimes silky nodes, the basal compressed, keeled and more or less persistent; ligules very short, membranous, densely ciliate; blades lanceolate-linear, shortly acute or subacute,  $1\frac{1}{2}$ - $1\frac{3}{4}$  ft. long, up to 3 lin. wide, folded or flattened out, apparently somewhat succulent, glabrous, smooth except near the tips, midrib slender, forming a keel below, primary lateral nerves about 4 on each side. Racemes 4, in 2 pairs, each borne on a glabrous smooth peduncle, not quite  $1\frac{1}{2}$  lin. long; joints  $1\frac{1}{2}$  lin. long, subclavate, slightly curved, somewhat convex on the back and upper part, slightly hollowed out on the face, quite glabrous, minutely granular, 3-nerved apart from the margins; pedicels stoutly clavate, much contracted towards the base, shorter than the joints and subcontiguous with them. Sessile spikelet including the very short callus, 2 lin. long, oblong. Glumes equal; lower coriaceous along the keels, otherwise chartaceous, obtuse, with narrow inflexed margins and distinct acute keels, eciliolate, glabrous, minutely granular, intracarpal nerves few, with some transverse veins above; upper glume boat-shaped, thinly chartaceous to membranous, semiovate in profile, with a minutely scabrid keel and a submarginal nerve on each side. Lower floret  $1\frac{1}{2}$  lin. long: valve hyaline, oblong, subobtuse, 2-nerved, eciliolate. Upper floret as long as the lower: valve oblong, minutely 2-dentate, with a microscopic mucro from the notch, 3-nerved, eciliolate; valvule similar, 2-nerved. Pedicelled spikelet similar to the sessile, but both glumes coriaceous, the lower sometimes with an eccentric keel. Upper floret ♂.—*Rottbællia huillensis*, Rendle in Cat. Afr. Pl. Welw. ii. 140.

**Lower Guinea.** Angola: Huilla; Mumpulla, *Welwitsch*, 2648!

11. **JARDINEA**, Steud. in *Flora*, 1850, 229 (name); *Syn. Pl. Glum.* i. 360.

Spikelets 2-nate on the more or less fragile articulate rhachis of racemously arranged simple or partly compound, often very numerous

*Thyrsia Schliebenii* Polger  
Tanganyika Terr.



spike-like racemes, those of each pair heterogamous, very similar in shape, but the pedicelled usually smaller or quite rudimentary, the sessile deciduous with the adjacent joint and pedicel; joints and pedicels parallel, posticously contiguous or almost so; articulation at a right angle to the rhachis, tips hollowed out, not appendaged. Sessile spikelet: Florets 2, lower barren, upper ♂, awnless. Glumes subequal, chartaceous; lower flat on the back, mucronate or spinulous at least along the sides, 2-keeled, narrowly inflexed along the margins, mucronate; upper boat-shaped, keeled. Valves hyaline, awnless, lower usually 2-, upper 3-nerved. Valvules similar to the valves, 2-nerved or much reduced or quite suppressed. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exserted. Grain oblong, dorsally slightly compressed.—Tall, coarse grasses; blades long and flat; ligules very short, membranous; racemes long, slender, more or less distinctly dorsiventral, the lower glume of the sessile spikelets much spreading during flowering.

Species 3, endemic.

Racemes very rigid, fragile, 6–12, opposite or scattered; pedicelled spikelets reduced to a small glume or quite suppressed ... 1. *J. gabonensis*.

Racemes slender, usually flexuous; pedicelled spikelets like the sessile, though smaller and sometimes slightly reduced.

Racemes 5–9, the lowest solitary, the following paired ... 2. *J. angolensis*.

Racemes very numerous, verticillate or semi-verticillate, rather tough ... 3. *J. congoënsis*.

1. *J. gabonensis*, Steud. in *Flora*, 1850, 229 (name); *Syn. Pl. Glum.* i. 360. Perennial, tufted, up to 8 ft. high. Culms erect, terete, very smooth and glabrous, simple or with leafy shoots from some of the upper sheaths. Leaf-sheaths firm, striate, smooth, glabrous or sparingly and softly hairy, the lower much compressed and long persistent; ligules membranous, very short, truncate, ciliolate with long hairs from the back; blades linear, long-tapering to a fine point, at the base gradually passing into the sheath, up to over 1 ft. long and to over 4 lin. wide, rigid, flat, glabrous except towards the base where they are usually more or less covered with long silky hairs on the upper face, smooth except the very rough margin, midrib moderately stout, lateral nerves numerous, faintly raised. Racemes frequently over a dozen, simple or the lowest compound (2 or 3 on a common peduncle), opposite or scattered on the common rhachis, rigid, fragile, suberect, up to over 6 in. long, greenish-yellow; common rhachis up to 4 in. long, lowest internode up to more than 1 in., the following 6–4 lin. long, angular, with or without beards at the nodes; peduncles of the lowest racemes up to 1 in. long, of the upper very much shorter; joints linear, subclavate and hollow above, 3–4 lin. long, rounded on the back, slightly concave on the inner face, scabrid

or almost smooth on the green nerves and the angles, disarticulating horizontally, scar glabrous or sparingly ciliate; pedicels linear, terete, much compressed, about as long as the joints or slightly shorter, more or less contiguous with them or slightly gaping near the base, ciliate on the inner angle. Sessile spikelet linear-lanceolate, with a narrow annuliform very shortly bearded callus, 3-4 lin. long. Lower glume acute or subacutely acuminate, often running out into a rigid sharp mucro, glabrous, muricate-tuberculate along the sides or more or less across the base of the flat back, with the tubercles often bearing sharp points, keels rigidly ciliate above, intracardinal nerves 3, fairly distinct on the inner face; upper glume slightly shorter than the lower, chartaceous, boat-shaped, linear in profile, subacute, muticous, glabrous, spinulously ciliate on the keel, 5-nerved, lateral nerves in pairs close to the minutely ciliate margin. Lower floret: valve linear-lanceolate, acute,  $2\frac{1}{2}$ -3 lin. long, hyaline, ciliate, 2-3-nerved, with or without a short valvule. Upper floret: valve similar to that of the lower, with a slightly shorter very narrow 2-nerved ciliate valvule. Anthers  $1\frac{1}{2}$  lin. long. Ovary pubescent at the top. Styles  $\frac{1}{4}$  lin. long from much thickened bases. Stigmas purple, laterally exerted, up to  $\frac{3}{4}$  lin. long. Pedicelled spikelet reduced to a lanceolate or subulate glume up to  $1\frac{1}{2}$  lin. long or almost entirely suppressed.—Franch. Contr. Fl. Congo Franç. 12, partly. *Rhytachne gabonensis*, Hack. in DC. Monogr. Phan. vi. 276; Durand & Schinz, Étud. Fl. Congo, 313; Consp. Fl. Afr. v. 700; De Wild. Étud. Fl. Bas- et Moyen-Congo, i. (1903) 11; ii. (1907) 10; Th. & Hél. Durand, Syll. Fl. Congo, 623.

Lower Guinea. French Gaboon: Gaboon River, *Mann*, 1028! Spanish Gaboon: Corisco Bay, *Mann*, 1891! French Congo: Brazzaville, *Thollon*, 893! Belgian Congo: Tombi-Lutete, *Hens*, 310! Kisantu, *Gillet*, 3508; Lemfu, *Gillet*, 2256.

(*Rendle*)

2. *J. angolensis*, *Stapf*. Perennial, from a stout creeping rhizome with intravaginal innovations, covered at the base with short hard glabrous cataphylls. Culms up to 4 ft. high, stout, 6-7-noded, with all the internodes (except the uppermost) enclosed in the sheaths, terete, glabrous and smooth. Leaf-sheaths tight, terete, quite glabrous and smooth, the basal more or less persistent, firm; ligules short, membranous, ciliate; blades tapering rapidly, narrowly linear below, setaceous above, up to over 1 ft. long and  $1\frac{1}{2}$ -2 lin. wide near the base, very firm, flexuous in the upper part, midrib stout and channelled above, keeled on the back in the lower part, glabrous excepting a silky beard at the junction with the sheath, scabrid on the margins and scaberulous towards the tips, primary lateral nerves few. Racemes usually 5-9 on a common rachis, the lowest solitary and long peduncled, the following paired, shortly peduncled or more usually sessile, fragile, rigid or slightly flexuous, 8 to almost 12 in. long, straw-coloured or dull brownish-purple; common





rhachis 1 to over 6 in. long, lowest internode up to over 3 in. long, perfectly glabrous; joints linear, slender, slightly widened and hollowed out above, 4-5 lin. long, almost flat or obtusely angular on the back, flat on the inner face, glabrous, sparingly scabrid or almost smooth all over, disarticulating horizontally, scar very sparingly ciliate; pedicels similar to the joints,  $1\frac{1}{2}$ -2 lin. long, parallel to and contiguous with them. Sessile spikelet linear-lanceolate, including the semi-annular short callus 3- $3\frac{1}{2}$  lin. long. Glumes subequal; lower chartaceous, flat, tapering to a short scabrid mucro, glabrous, with 3 or 5 short spines on each side and keels scabrid upwards, intracardinal nerves 3-4, distinct; upper glume slightly shorter than the lower, subchartaceous, boat-shaped, semi-obovate-lanceolate, acute, glabrous, sparingly spinulously ciliate on the keel, 3-nerved, lateral nerves close to the margin. Lower floret: valve linear-oblong, subobtuse,  $2\frac{1}{2}$  lin. long, hyaline, 2-nerved, with a similar but narrower valvule. Upper floret as long as the lower: valve lanceolate, acute, hyaline, 3-nerved; valvule almost the same length, linear. Ovary glabrous. Grain oblong, slightly compressed on the back, 1 lin. long. Pedicelled spikelet similar to the sessile, but smaller.—*Rotibellia angolensis*, Rendle in Cat. Afr. Pl. Welw. ii. 139.

**Lower Guinea.** Angola: Pungo Andongo, *Welwitsch*, 2849!

**3. J. congoënsis**, *Franch. ex Hack. in DC. Monogr. Phan.* vi. 277, 690. Perennial, up to 10 ft. high. Culms erect, terete, stout, very smooth and glabrous, with leafy shoots from some of the upper sheaths. Leaf-sheaths firm, striate, smooth and glabrous, terete, the basal ones not seen; ligules very short, membranous, rufous, minutely ciliate; blades linear, very long, tapering to a fine point, at the base gradually passing into the sheath, up to over  $1\frac{1}{2}$  ft. long and 6 lin. wide, firm, apparently not rigid, quite glabrous or more or less hairy at the base and along the margins, smooth excepting the rough margin, midrib stout, whitish and slightly channelled above, nerves numerous, the primary 5-6 on each side. Racemes usually very many on a common rhachis, simple or compound, the lower verticillate, slender, flexuous, somewhat tough, up to 10 in. long, dull purplish or yellowish-green; common rhachis up to 6 in. long, lowest internode up to 4 in. long, the following 6-4 lin. long, angular, bearded at the nodes, peduncles of the lowest racemes over an inch long, of the upper very much shorter or none; joints linear, slender, slightly widened and hollow above, 3-4 lin. long, angular on the back, almost flat on the inner face, very scabrid along the inner angles, disarticulating horizontally, scar sparingly ciliate; pedicels similar to the joint, but shorter, parallel to it and somewhat distant. Sessile spikelet narrowly linear-lanceolate, with a small indistinct callus,  $2\frac{1}{2}$ -3 lin. long. Lower glume chartaceous, flat, usually running out into a rigid or more or less flexuous scabrous

mucro, glabrous, more or less muricate at least along the sides, with the tubercles often bearing sharp points, keels rigidly ciliate, intracarinal nerves 2-3, faint; upper glume slightly shorter than the lower, subchartaceous, boat-shaped, linear in profile, acute, mucicous, glabrous, spinulously ciliate on the keel, 3-nerved, lateral nerves close to the margin. Lower floret: valve linear-lanceolate, acute, about 2 lin. long, hyaline, ciliate, 2-nerved and with a similar, only slightly shorter, valvule. Upper floret: valve and valvule similar to those of the lower floret. Anthers 1-1 $\frac{1}{4}$  lin. long. Ovary glabrous. Styles very short. Stigmas dark purple, 1 lin. long, laterally exserted. Pedicelled spikelet very similar to the sessile, or sometimes slightly reduced, barren.—Franch. Contr. Fl. Congo Franç. 13. *Rhytachne congoënsis*, Hack. in DC. Monogr. Phan. vi. 277; Durand & Schinz, Consp. Fl. Afr. v. 700; Durand & Schinz, Étud. Fl. Congo, i. 65, including varieties *incompleta*, Hack, *polystachya*, Hack., *submutica*, Hack., and l.c. ii. 71; Th. & Hél. Durand, Syll. Fl. Congo, 623.

**Upper Guinea.** Togo: Lome, *Warnecke*, 235! Southern Nigeria: Lagos: Banks of Ogun river, *Millen*, 131! and without precise locality, *MacGregor*, 86! Northern Nigeria: Nupe, *Barter*, 1381! Abinsi, *Dalziel*, 898! and without precise locality, *Barter*, 281!

**North Central.** French Congo: Likolela, between Alima and Sangha Rivers, forming enormous meadows, *Chevalier*, 5087! Shari Region; Guibingui, between Forts Archambault and Campel, *Chevalier*, 10384!

**Nile Land.** Bongo: Culango, *Schweinfurth*, 2215!

**Lower Guinea.** French Congo: Brazzaville, *Thollon*, 58! Belgian Congo: mouth of the Congo river, *Smith*! Boma, *Hens*, 323!

## 12. HEMARTHRIA, R. Br.; Benth. et Hook. f. Gen. Pl. iii. 1131.

Spikelets 2-nate on the tough or tardily disarticulating rhachis of spike-like spathe-supported racemes which terminate the culms and their often fascicled branches, alike in sex and shape, or at least similar; joints and pedicels fused into roughly semicylindric internodes, hollowed out on the inner face for the reception of the sessile spikelet; disarticulation at a right angle to the rhachis or slightly oblique, tips of joints truncate, not hollowed out or appendaged. Sessile spikelet: Florets 2, lower reduced to a barren valve, upper ♂, awnless. Glumes equal or subequal, lower flat on the back, 2-keeled, very narrowly inflexed along the margins, coriaceous or subcoriaceous, closing up the cavity formed by the adjacent joint and pedicel, upper membranous adhering to the inner face of the cavity. Valves hyaline, of lower floret 2-nerved, of upper usually nerveless. Valvule (of upper floret) hyaline, small, nerveless. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exserted. Grain oblong, dorsally slightly compressed; embryo about two-thirds the length of the grain; hilum conspicuous, punctiform, subbasal. Pedicelled spikelet with more elongated acuminate glumes, par-



1 = *A. altissima* (Poir) Stapf & Hubb  
*Rottboellia altissima* Poir 1789

ticularly the terminal, the upper glume mucronate or aristate.—Decumbent or ascending perennial grasses with many-noded branched compound culms; blades linear, conduplicate in bud, then flat; ligules very short, membranous; racemes compressed, often curved, tips more or less subulate owing to the slender terminal spikelet; spikelets pseudo-opposite owing to the fusion of joints and pedicels, each pair made up of a sessile (secondary) spikelet and the pedicelled companion of the sessile spikelet of the next lower node.

Species about 8, throughout the warm countries of the old world; one also in America (probably introduced).

Sessile spikelets with obtuse tips, usually more or less constricted below them; callus shortly obtriangular; culms erect or ascending, sometimes from a prostrate base, not over a few feet long ... 1. *H. fasciculata*.

Sessile spikelets subulate, acuminate; callus elongated-obtriangular; culms up to 25 ft. long, often floating ... .. 2. *H. natans*.

1. *H. fasciculata*, Kunth, *Rév. Gram.* i. 153. Perennial. Culms erect, or more often ascending, sometimes from a long decumbent rooting base, usually branched, 1–5 ft. high, many-noded, compressed, glabrous. Leaf-sheaths shorter or the lower longer than the internodes, compressed, keeled, often ciliate towards the mouth, otherwise glabrous or almost so; ligules membranous, very short, ciliate; blades linear, gradually tapering, acute, very variable in length and width, up to 9 in. by  $2\frac{1}{2}$  lin., in the tropical African specimens flaccid or rigid; glabrous. Racemes usually fascicled, straight or curved, tapering to a slender point formed by the terminal spikelet, ultimately more or less fragile. Sessile spikelet linear-oblong to oblong, from a short obtriangular more or less conspicuous glabrous callus,  $2\frac{1}{2}$ – $3\frac{1}{2}$  lin. long, glabrous. Lower glume coriaceous, opaque, usually more or less constricted below the obtuse, entire or emarginate, 2-keeled and very narrowly winged tips, smooth, intracarinial nerves about 7; upper broadly oblong-lanceolate, acute, membranous except at the hardened tip, 3-nerved. Valve of lower floret oblong, subobtuse, distinctly shorter than the glumes, 2-nerved; of upper floret slightly shorter, ovate-oblong, obtuse, nerveless. Anthers 1– $1\frac{1}{2}$  lin. long. Stigmas about 1 lin. long, laterally exerted. Grain oblong, dorsally compressed, slightly over 1 lin. long, reddish; scutellum exceeding half the length of the grain; hilum punctiform, subbasal. Pedicelled spikelet similar in sex and shape to the sessile, but slightly longer, with the lower glume more acuminate and acute, and the upper sharply mucronate, the mucro somewhat exceeding the lower glume.—Kunth, *Enum.* i. 465, *Suppl.* 375; *Steud. Syn. Pl. Glum.* i. 359; *Hack. in Mart. Fl. Bras.* ii. iii. 314, t. 72, fig. 2. *H. capensis*, Trin. *Androp. in Mém. Acad. Petersb.* 6me sér. ii. 248. *Rottbællia compressa*, var. *fasciculata*,

Hack. in DC. Monogr. Phan. vi. 286 ; Durand & Schinz, Consp. Fl. Afr. v. 699 ; K. Schum. in Engl. Pfl. Ost-Afr. C. 96 ; Hook. f. Fl. Brit. Ind. vii. 153 ; Stapf in Dyer, Fl. Cap. vii. 329. *R. fasciculata*, Lam. Illustr. i. 204 ; Desf. Fl. Atl. i. 110, t. 36. *Lodicularia fasciculata*, Link, Hort. Berol. i. 6. *L. capensis*, Nees, Fl. Afr. Austr. 128. *Lepturus fasciculata*, Trin. Fund. Agrost. 123.

**North Central.** Lake Chad : Kouri Archipelago, *Chevalier*, 10169 !

**Nile Land.** British East Africa : Nairobi, *Linton*, 10 !

**Mozambique Distr.** Portuguese East Africa : Zambesi Delta, Kongone River, *Kirk* ! Lower Buzi River, *Swynnerton*, 1566 ! Nyasaland : Elephant Marsh, *Kirk* ! Milauri, *Scott* ! Rhodesia : Leshumo valley, *Holub* !

Throughout Africa in the Mediterranean region and in America (here probably introduced).

The specimens from Lake Chad have the characteristic almost spindle-shaped spikes of the Algerian type and altogether agree well with the typical form ; those from Nairobi have compressed-cylindric spikes, resembling those of the Indian *H. compressa*, Linn. f., but stouter and with the spikelets of *H. fasciculata*. *Holub*'s specimen represents an erect form with rigid long leaves and long cylindric spikes, as is frequently found among the South African material. As the specimens are mostly collected without the bases and unaccompanied by notes, the determination of the specimens referred here to *H. fasciculata* must to some extent remain open to doubt.

**2. *H. natans*, Stapf.** Perennial. Culms 15 to 25 ft. long, often floating, very many-noded, somewhat compressed, glabrous, barren internodes as far as seen short,  $1\frac{1}{4}$ – $1\frac{1}{2}$  in. long, rather stout, exceeded by the sheaths, uppermost 5–6 internodes somewhat elongated, exerted from the sheaths with inflorescences from their axils. Leaf-sheaths somewhat compressed and keeled, at least the lower, rather loose, sparingly ciliate towards the mouth, otherwise glabrous ; ligules membranous, very short, with cilia 1 lin. long ; blades linear from a slightly wider base, shortly acute, the upper up to 3 in. long and 3 lin. wide at the base, flat, rigidly white-ciliolate from the middle upwards, otherwise glabrous. Racemes fasciated, mostly 3 from a node, straight or gently curved, linear in outline, ultimately disarticulating ; joints linear ; pedicels distinctly narrowed downwards, about 2 lin. long. Sessile spikelet lanceolate-oblong, long-acuminate,  $2\frac{3}{4}$ – $3\frac{1}{4}$  lin. long, excluding the obtriangular, often narrow, acute and distinctly marked callus which is  $\frac{3}{4}$ – $1\frac{1}{4}$  lin. long, quite glabrous. Lower glume coriaceous, opaque, usually very gradually acuminate, entire or minutely 2-toothed, acute, margins slightly thickened, inflexed flaps almost 0, keels slightly rough, not winged, intracarpal nerves faintly raised, about 7, invisible in transmitted light ; upper slightly shorter, detachable from the joint, subulate-acuminate, membranous except at the hardened tip. Valve of lower floret oblong, subobtuse,  $2\frac{1}{2}$  lin. long, very faintly 2-nerved, of upper floret slightly shorter, nerveless. Anthers up to  $\frac{3}{4}$  lin. long. Stigmas not quite 1 lin. long. Pedicelled spikelet very similar to the sessile, but up to 4 lin. long, with a short obscure transverse





callus, the lower glumè subulate-acuminate, exceeded by the long hard subulate tip of the upper.

**Mozambique Distr.** Nyasaland : Umbaca River, in wet marshy ground, on the banks of rivers and ponds, very frequent, *Scott!* and without precise locality, *Buchanan*, 1310!

Also in Madagascar (*Du Petit Thouars*).

13. **MANISURIS**, Linn. f. ; Benth. et Hook. f., Gen. Pl. iii. 1130.

Spikelets 2-nate, one sessile, the other pedicelled, with the pedicels completely adnate to the joints of the rachis, on the articulate and fragile rachis of fascicled spike-like racemes, conspicuously heteromorphous, alike in sex or the pedicelled neuter ; the sessile deciduous with its joint and the pedicelled spikelet belonging to it. Sessile spikelet : Florets 2, lower barren, upper ♀. Glumes equal, lower cartilaginous, subglobose, upper chartaceous, immersed in the cavity of the joint. Valves hyaline, muticous. Valvules hyaline, absent from the lower floret. Lodicules broadly cuneate. Anthers exerted from the apex of the spikelet. Stigmas exerted terminally. False fruit nut-like, formed by the hardened lower glume of the sessile spikelet and the closely applied joint. Grain suborbicular, very convex on the back, almost flat on the face ; embryo large. Pedicelled spikelet : Florets 2, lower barren, upper ♀, or more or less reduced or suppressed. Glumes equal, herbaceous, ovate. Valves, if present, hyaline, the lower without a valvule.—Annual, much-branched ; leaves soft ; racemes very conspicuous on account of the grain-like fertile spikelets.

Species 1, throughout the tropics.

1. **M. granularis**, Sw. *Prodr. Veg. Ind. Occ.* 25 (1788). Culms erect, up to over 3 ft. high, more or less terete below, compressed above the branching level, glabrous or hirsute with tubercle-based hairs ; branches 2 or more from a node, unequal, simple or the longer divided again. Leaf-sheaths loose to inflated, usually more or less compressed, striate, hirsute with tubercle-based hairs, usually more or less bearded at the nodes ; ligules very short, membranous, ciliate ; blades lanceolate or linear-lanceolate, from a cordate and amplexicaul base, acute, 2–4 in. long and 4–6 lin. wide, more or less hirsute from fine tubercle-based hairs, margins ciliate, midrib white and flat above, lateral nerves 5–7 on each side, slightly prominent. False spikes  $\frac{1}{2}$ –1 in. long, about 1 lin. wide, borne on short or long peduncles, partly enclosed in to completely exerted from the supporting spathe-like sheath, glabrous, pale green ; joints linear,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. long, the portion corresponding to the pedicel with 2 fine grooves, that corresponding to the rachis with 1 broad flat groove, both with distinct scars, that of the joint hollowed out. Sessile spikelet, including the short obconical callus, from almost 1 lin. to  $1\frac{1}{4}$  lin. long, glabrous. Glumes subequal ; lower pitted

and tubercled, with faint longitudinal often interrupted ribs, nerves numerous, faintly visible from within; upper glume broad ovate-oblong, obtuse, lining and adhering below to the cavity of the joint, thickened at the tips, hyaline towards the base, 3-nerved. Lower floret shorter than the glumes; valve broadly ovate-obtuse. Upper floret  $\frac{1}{2}$  lin. long: valve ovate-obtuse, like the similar valvule nerveless. Anthers  $\frac{1}{4}$  lin. long. Stigmas up to  $\frac{1}{2}$  lin. long. Grain under  $\frac{1}{2}$  lin. long. Pedicelled spikelet as long as the sessile or slightly longer, ovate, herbaceous, green or purplish. Glumes equal; lower slightly asymmetrical, one keel widened, scaberulous, nerves 5-7, very marked, green; upper boat-shaped, prominently keeled, keel scaberulous, nerves 5-7. Lower floret barren: valve ovate-lanceolate, acute, hyaline, 2-nerved. Upper floret: valve similar to that of the lower, but shorter and 1-nerved, or like the valvule nerveless, frequently the florets reduced or suppressed.—Gært. Fruct. ii. t. 175; Beauv. Agrost. t. xxi. fig. 10; Roxb. Pl. Corom. t. 118; Mart. & Eichl. Fl. Bras. ii. 2, t. 46; Hack. in DC. Monogr. Phan. vi. 314; Klatt in Jahrb. Hamb. Wiss. Anst. ix. (1891) 122; K. Schum. in Engl. Pf. Ost-Afr. C. 97; Hook. f. Fl. Brit. Ind. vii. 159; Durand & Schinz, Consp. Fl. Afr. v. 700; Rendle in Cat. Afr. Pl. Welw. ii. 141; Durand & Schinz, Étud. Fl. Congo, i. 313; De Wild. & Durand in Bull. Herb. Boiss. 2me sér. i. 60, and Contrib. Fl. Congo, ii. 71; Th. & Hél. Durand, Syll. Fl. Congo, 622; Pilger in Engl. Pflangenuw., Afr. ii. 192, fig. 135. *M. polystachya*, Beauv. Fl. Owar. et Ben. t. 14. *Cenchrus granularis*, Linn. Mant. ii. App. 575. *Hackelochloa granularis*, O. Kuntze, Rev. Gen. Pl. ii. 776; Franch. Contr. Fl. Congo Franc. 11. *Rytidix granularis*, Skeels in U.S. Dept. Ag. Bur. Pl. Industr. Bull. 282, (1913) 20.

**Upper Guinea.** French Guinea: between Nyamino and Koulikoro, *Chevalier*, 2280! Timbo, *Pobéguin*, 1770! Gold Coast: Cape Coast Castle, *Ogilvie*! Togo: Lome, *Warnecke*, 172! Northern Nigeria: Labba Road, *Parsons*, 22! Nupe, *Barter*! Yola, *Dalziel*, 273! Adamawa, *Macleod*! Bogolo, on the River Benue, *Macleod*! Southern Nigeria: Lagos, *Dawodu*, 33! 229! Ogurude, *Holland*, 272! Pandiaki, *Ansell*! Quorra, *Vogel*! Cameroons: Sanaga, *Zenker*, 1469!

**North Central.** French Congo: Upper Ubangi River; Fort Possel, *Chevalier*, 10549!

**Nile Land.** Gallabat: Matamma, *Schweinfurth*, 1109! 1110! Abyssinia: Hamedo plain, *Schimper*, 1012! Gafta, *Schimper*, 1198! Jur: Ghattas Seriba, *Schweinfurth*, 2313! Uganda: Unyoro, *Speke & Grant*! British East Africa: Mombasa, *Hildebrandt*, 2043! and without precise locality, *Powell*, 146!

**Lower Guinea.** French Gaboon: plains of Lopé, Ogowe River, *Thollon*, 792! Belgian Congo: Bingila, *Dupuis*; Lukungo, *Hens*, 219! Dolo, *Laurent, Vanderyst*, 665! Kisantu, *Gillet*, 373. Angola: Golungo Alto; Banza de Sova Montalegre, *Welwitsch*, 2759!

**Mozambique Distr.** Zanzibar, *Stuhlmann, Hildebrandt*, 1077! German East Africa: Amboni, *Holst*, 2805A! Pangani, *Stuhlmann*; Kokotoni, *Stuhlmann*. Portuguese East Africa: East coast of Lake Nyasa, *Johnson*! Quilimane, *Stuhlmann*. British Central Africa: Nyasaland; Manganja Hills, *Kirk*! *Waller*! between Kondowe and Kasonga, 2000-6000 ft. *Whyte*! Rhodesia; North Mazoe district, *Mundy*!

Throughout the tropics.





14. PELTOPHORUS, Desv. ex Beauv. Agrost. 119, t. 21,  
fig. 11, and in Journ. Bot. 1813, 73.

1955

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

Species 5; 4 in the Indian Peninsula, 1 in Tropical Africa.

= *H. sulcatus* (Stapf) Hubb

1. *P. sulcatus*, Stapf. Perennial. Culms rising from a creeping rhizome, which is covered like the extravaginal innovation buds by firm striate cataphylls ciliate upwards, over 3 ft. high, slender, simple except for one or two flowering branches from the uppermost nodes, smooth, glabrous, internodes very long-exserted. Leaf-sheaths all striate, tight, the lowest short and persistent, the following longer about 3 in. long, more or less hairy in the upper part; ligules short, membranous, ciliate; blades linear, long-tapering to a fine point, up to 1 ft. long and 2½ lin. wide, rigid, erect, very hirsute to glabrous, midrib channelled above, rather slender, nerves prominent, margins scabrid. Racemes solitary from the culm and the branches, erect, cylindrical, about 3 in. long, 1½ lin. in diam., dull olive-green variegated with purple, glabrous, fragile; joints and the slightly shorter pedicels united into a semicylindric internode

14 type species is *P. meyeri* which is type of *manuensis*  
*manuensis meyeri*, which is type of *manuensis*

(in herb)

with hollow tip, concave on the inner face, striate or ribbed and frequently sulcate on the back, smooth, glabrous. Sessile spikelet oblong, 2 lin. long, with a very short glabrous callus. Glumes equal; lower very obtuse, emarginate, coriaceous, transversely rugose throughout, with longitudinal grooves, keels winged above, eciliate, intracarpinal nerves 5; upper glume membranous, broadly oblong, subacute, obscurely ciliate above, with an obscure and often gibbous keel below the apex. Lower floret barren: valve hyaline, broadly oblong, subobtuse, 2-nerved, obscurely ciliate; valvule 0. Upper floret: valve a quarter shorter, broadly oblong, obtuse, hyaline, 2-nerved; valvule somewhat shorter than the valve, narrowly oblong, nerveless. Anthers  $1\frac{1}{2}$ –2 lin. long. Pedicelled spikelet slightly longer and narrower than the sessile. Lower glume smooth on the back, somewhat asymmetrically winged, olive-green with brown keel-nerves; upper glume 3-nerved, keel winged all along. Florets as in the sessile spikelet, but the upper ♂.

**South Central.** Belgian Congo: Katanga; Éville, in dry bush, *Hombé*, 56!

#### 15. *LASIURUS*, Boiss. *Diagn. ser. ii. iv.* 145.

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

Species 1 (? 2), from Nubia through Arabia and Baluchistan to Sind.

1. *L. hirsutus*, Boiss. *Diagn. ser. ii. iv.* 146. Perennial, tufted





or sometimes almost shrubby at the base, with extravaginal and intravaginal innovation shoots. Culms from an oblique rhizome which is often woody and more or less covered with imbricate firm appressedly hirsute and ultimately glabrous cataphylls or their remains, erect, branched from the base, up to 3 ft. high, rather slender, terete, smooth or the lower internodes often slightly rough and more or less hairy, dorsal prophylls at the base of the lower branches long and frequently villous. Leaf-sheaths terete, tight, the lower crowded, long-persistent, glabrous or sparingly ciliate upwards, smooth; ligule reduced to a fringe of hairs; blades linear, long-attenuated to a fine setaceous point, convolute or flat, the lower sometimes up to over 1 ft. long and 3 lin. wide, like the middle and upper which are much shorter and narrower, glaucous, glabrous or with a few tubercle-based hairs towards the ligule, more or less rough particularly along the margin, midrib broad and whitish above, lateral nerves slender, more or less prominent. Racemes erect, up to  $4\frac{1}{2}$  in. long and 3 lin. wide, densely villous and more or less fragile; joints linear,  $2-2\frac{1}{2}$  lin. long, dorsally much compressed, somewhat convex on the back, almost flat with a keel on the inner face, glabrous, pubescent or densely villous on the back, rather ciliate along the angles; pedicels narrowly linear,  $1\frac{1}{2}-1\frac{3}{4}$  lin. long, otherwise similar to the joints. Sessile spikelets lanceolate,  $3\frac{1}{2}-4\frac{1}{2}$  lin. long, from a very narrow annuliform callus, bearing dense erect hairs up to 3 lin. long, pale green. Lower glume acuminate, with the acumen 1-2 lin. long and unequally 2-toothed, flat and usually quite glabrous on the back, 2-keeled upwards, densely long-ciliate almost from the base, intracarpal nerves about 4, often anastomosing, slender; upper glume boat-shaped, obliquely lanceolate in profile, acute, membranous, keeled, more or less ciliate above, 5-nerved. Lower floret: valve oblong, subacute, 3-nerved, 2 lin. long, hyaline, glabrous; valvule narrowly oblong, as long as the valve or slightly exceeding it, 2-nerved. Upper floret nearly as long as the lower: valve and valvule as in the lower floret. Anthers  $1\frac{1}{4}-1\frac{1}{2}$  lin. long. Styles short, widened at the base; stigmas up to  $1\frac{1}{2}$  lin. long, laterally exerted. Pedicelled spikelet similar to the sessile,  $2\frac{1}{2}-3\frac{1}{2}$  lin. long, with a glabrous indistinct callus and with both florets ♂ or more or less reduced.—*Saccharum hirsutum*, Forsk. Fl. Ægypt.-Arab. 16. *Rottbœllia hirsuta*, Vahl, Symb. i. 11; Delile, Fl. Ægypt. Illustr. t. xiv. fig. 1; Hack. in DC. Monogr. Phan. vi. 311; Durand & Schinz, Consp. Fl. v. Afr. 699; Penzig in Atti Congr. Bot. Genoa, (1893) 366; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 9. *Ischæmum mastrucatum*, Trin. in Mém. Acad. Pétersb. 6me sér. ii. 298. *I. hirsutum*, Nees in Schimp. Pl. Arab. Fel. n. 791; Steud. Syn. Pl. Glum. i. 361. *Cœlorhachis hirsuta*, Brongn. apud Decne in Ann. Sci. Nat. 2me sér. ii. 13; Schweinf. Fl. Soturba, Verh. Zool.-Bot. Gesellsch. Wien, xv. (1865) 556. *Elionurus hirsutus*, Munro apud Benth. in Journ. Linn. Soc. xix. 68; Boiss. Fl. Or. v.

466; Hook. f. Fl. Brit. Ind. vii. 162; Terracciano in Ann. Istit. Bot. Roma, v. (1894) 94; Cooke, Fl. Bombay, ii. 973.

**Nile Land.** Nubia: between Suakim and Berber, Wadi-O-Mareg, *Schweinfurth*, 567! Ser. III, 134! Suakim; Uaratab Mountain, *Schweinfurth*, 1191! Eritrea; Ambakahl, *Ehrenberg*! Samhar; sides of the Amba torrent, *Penzig*; Islands of Midir and Haressan, *Terracciano*. British Somaliland, *Drake Brockman*, 498! 507!

Also in Egypt and eastwards through Baluchistan to Rajputana and Sind.

Considered to be excellent grazing when young. In Rajputana the seeds are collected and largely consumed with Sorghum flour (Watt, Dict. Econ. Prod. Ind. iii. 242).

16. **ELYONURUS**, Humb. & Bonpl. apud Willd. Sp. Pl. iv. 941.

Spikelets similar, usually awnless, but differing in sex, 2-nate, one sessile, the other pedicelled, on the articulate fragile rhachis of solitary spike-like racemes, the sessile deciduous with the adjacent joint of the rhachis and the pedicel. Florets 2; lower reduced to an empty valve; upper ♀ in the sessile, ♂, rarely barren, in the pedicelled spikelet. Glumes equal; lower subcoriaceous to herbaceous, often 2-toothed or 2-fid, rarely awned, dorsally flattened, 2-keeled, usually with fine filiform transparent balsam ducts close to the ciliate or penicillate keels; upper membranous, lanceolate, acute, rarely awned. Valves hyaline, awnless. Valvule obsolete or 0. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong, dorsally compressed; embryo about half the length of the grain.—Generally perennial, cæspitose, aromatic; blades flat or folded; ligules membranous, very short; racemes erect, joints strongly compressed, usually villous, tips oblique, not appendaged.

Species about 15, in the tropical and subtropical regions of both hemispheres.

Lower glume of sessile spikelet with warts bearing tufts of hairs.

Perennial ... .. 1. *E. hirtifolius*.

Annual.

Racemes distant, long-exserted from the narrow supporting sheaths ... .. 2. *E. elegans*.

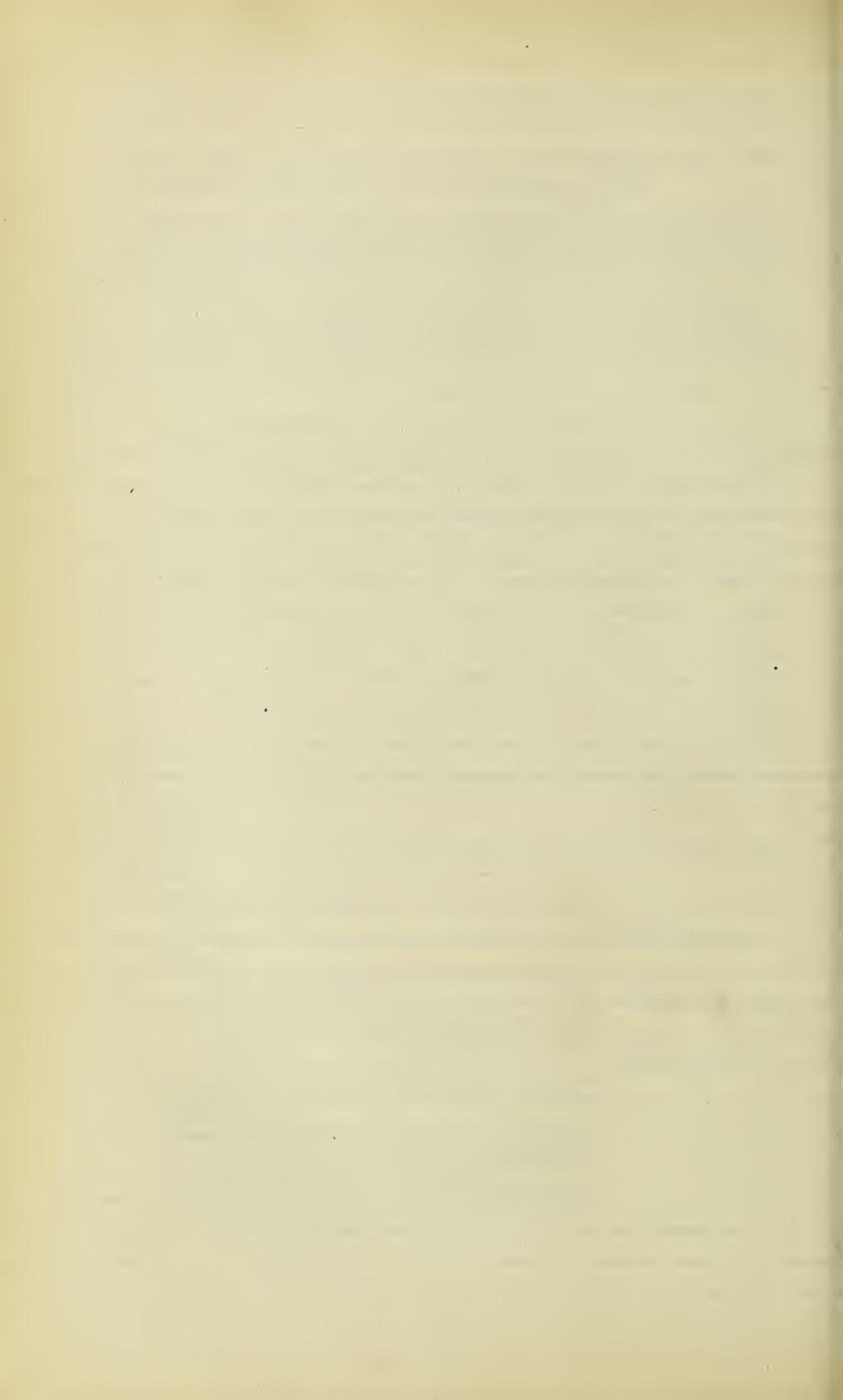
Racemes usually gathered in bunches, more or less embraced by the wide spathe-like supporting sheaths ... .. 3. *E. royleanus*.

Lower glume of sessile spikelet ciliate, the cilia not gathered in tufts borne on wart-like tubercles along the keels.

Culms much branched upwards; flowering branches usually 2- or 3-nate, long and very slender, fastigiate; sessile spikelet  $3\frac{1}{2}$ –4 lin. long.

Hairs of joint several times longer than the short cilia of the sessile spikelet; pedicelled spikelet acute, not mucronate ... .. 4. *E. platypus*.





- Hairs of joint as long as or only slightly longer than the short cilia of the sessile spikelet; pedicelled spikelet mucronate or aristulate ... 5. *E. Pobeginii*.
- Culms branched upwards; flowering branches usually 2-nate, laterally exerted from spathe-like sheaths; sessile spikelets 3 lin. long; hairs of joints slightly longer than the short cilia of the sessile spikelet ... 6. *E. tenax*.
- Culms simple or very sparingly branched and then the branches solitary, distant.
- Racemes glabrous ... 7. *E. Welwitschii*.
- Racemes very villous from the long hairs of the joints or all over.
- Culms singly, with short bladeless cataphylls at the base, many-noded; hairs of joints and cilia of sessile spikelet 1-2 lin. long, back of lower glume glabrous ... 8. *E. Hensii*.
- Culms fasciated, with intravaginal innovation shoots, without short bladeless cataphylls at the base.
- Spikelets long, villous all over, the hairs up to 3 lin. long, keels of lower glume indistinct, mucros hidden by the hairs ... 9. *E. Chevalieri*.
- Sessile spikelet glabrous or pubescent on the back of the distinctly 2-keeled lower glume, or if villous the hairs not hiding the mucros; pedicelled spikelet sparingly hairy to glabrous, excepting the short cilia ... 10. *E. argenteus*.

1. *E. hirtifolius*, Hack. in DC. *Monogr. Phan.* vi. 341. Perennial, densely caespitose, innovation shoots intravaginal, more or less compressed below. Culms erect, about 1½ ft. high, simple or rarely with a flowering branch, terete, bearded close below the nodes, otherwise glabrous, smooth, 3-4-noded, internodes mostly long exerted. Basal leaf-sheaths lax, covered with silky appressed hairs, at length somewhat glabrescent, long-persistent, those of the innovation shoots more or less compressed, the upper terete, tight unless they enclose a flowering shoot, hairy towards the mouth, otherwise mostly glabrous, the uppermost bladeless; ligules very short, membranous, densely ciliate; blades linear, shortly acute or subacute, 2-4 in. long, 1 to over 1½ lin. wide, or the upper shorter, folded in veneration, then flat, more or less hirsute, sometimes very densely so, rough along the margins particularly upwards, lateral nerves 3-4 on each side, prominent below. Racemes 1½-2½ in. long, straight or curved, peduncled, the terminal finally more or less and sometimes long exerted from the subspathaceous supporting sheath, villous, greenish, tinged with purple. Rhachis somewhat tough unless quite mature; joints linear, up to 2 lin. long, densely villous, upper hairs up to 2 lin. long, disarticulating obliquely; pedicels similar, slender, with long hairs only on one

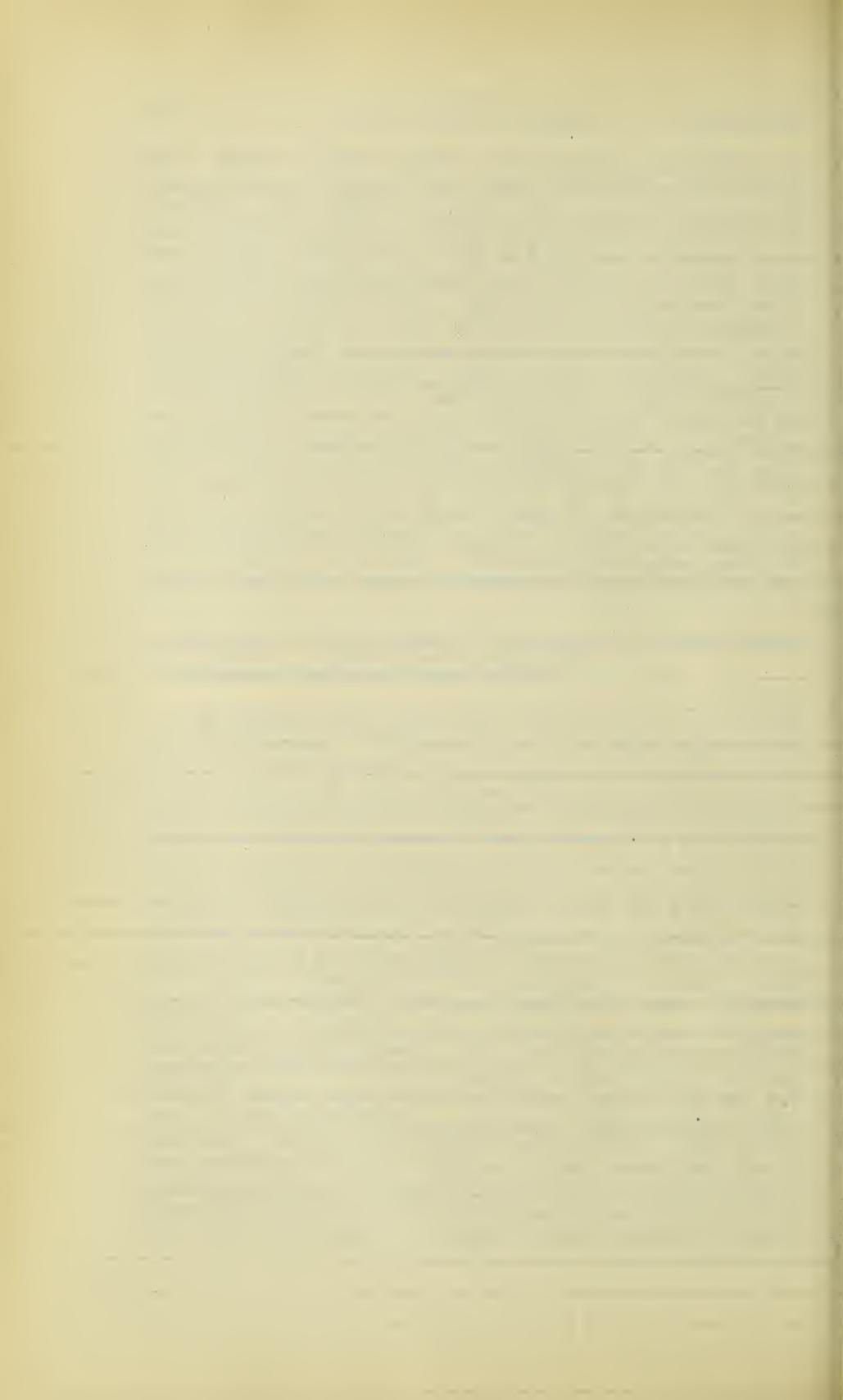
side. Sessile spikelet broadly ovate-lanceolate, acuminate, including the small stipitate hairy callus and excluding the bristles 3–3½ lin. long. Glumes unequal; lower chartaceous, produced into 2 straight bristles up to 1½ lin. long, penicillate-ciliate from the base upwards, with about 12 tufts of hairs, each tuft carried on a stout laterally projecting process, densely hairy on the back, intracardinal nerves about 6, faint; upper glume membranous, lanceolate, acute, sometimes shortly aristulate, 2–2½ lin. long, pubescent, ciliate, 3-nerved. Lower floret as long as the upper glume: valve lanceolate-oblong, subacute, hyaline, ciliate, 2-nerved. Upper floret 1½ lin. long: valve linear-oblong, acute, 3-nerved, glabrous; valvule minute, nerveless. Anthers 1½–2 lin. long. Stigmas of the same length. Pedicelled spikelet lanceolate, 2½–3 lin. long. Glumes equal; both or only one of them aristulate, with the awn up to 2½ in. long; lower keeled and ciliate on one side only, cilia short and not penicillate, nerves about 4–5, apart from the keel; upper glume boat-shaped, obliquely lanceolate in profile, keeled upwards, with 1–2 nerves on each side. Florets as in the sessile spikelet or slightly smaller, the upper ♂.—Durand & Schinz, *Consp. Fl. Afr.* 702.

**Upper Guinea.** Northern Nigeria: Nupe, *Barter*, 1176! Lokoja, *Parsons*, 35! *Richardson*! Abinsi and Lokoja, *Dalziel*, 878!

**North Central.** Dar Banda, *Chevalier*, 7073 bis!

2. *E. elegans*, *Kunth*, *Rév. Gram.* 161 and 361, t. 94. Annual, growing gregariously. Culms erect, up to 2 ft. high, simple or with 1 or 2 flowering branches from the upper nodes, slender, terete, bearded close to the nodes, otherwise glabrous, smooth, about 3-noded, internodes mostly long-exserted. Leaf-sheaths terete, tight, glabrous or frequently bearded, or the lower more or less hirsute; ligules very short, membranous, densely ciliate; blades linear, acute, 2–3 (rarely up to 5) in. long, up to 1 lin. broad, flat, flaccid, glabrous or sparingly hairy to hirsute towards the base, smooth excepting along the margins, especially upwards, 1 lateral nerve on each side rather prominent below. Racemes 1½ to over 2 in. long, the terminal on long exserted slender peduncles, straight or subfalcate, straw-coloured, sometimes tinged with purple. Rhachis very fragile; joints linear, stout, subtriangular, about 1 lin. long, disarticulating very obliquely, with a large rounded scarious ciliate appendage, ciliate on the outer angle, the upper cilia 1 lin. long, minutely ciliate along the other angles; pedicels similar, but more slender and without an appendage. Sessile spikelet oblong-lanceolate, including the stipitate shortly bearded callus 2½ lin. long, excluding the bristles. Glumes unequal; lower thinly chartaceous, produced into 2 straight bristles, up to over 1 lin. long, penicillate-ciliate from the base upwards, with about 10–12 tufts of hairs, each tuft carried on a stout laterally projecting process,





appressedly hairy at the base, otherwise glabrous, intracarpal nerves none or very obscure; upper glume membranous, lanceolate, acute, 2 lin. long, very minutely hairy, faintly 3-nerved. Lower floret  $1\frac{1}{2}$  lin. long: valve lanceolate, acute or subacute, hyaline, glabrous. Upper floret about 1 lin. long: valve lanceolate-oblong, obscurely 3-dentate, 1-nerved; valvule 0. Anthers 1 lin. long. Grain linear-oblong, dorsally compressed, almost flat on the back,  $1\frac{1}{4}$  lin. long, scutellum elliptic, less than half the length of the grain, hilum basal, large, punctiform. Pedicelled spikelet ovate-lanceolate, 2 lin. long. Glumes equal, glabrous, with fine bristles  $1\frac{1}{2}$ –2 lin. long; lower spreading more or less horizontally, more or less twisted, with a narrowly winged, minutely ciliolate keel on one side, apart from the submarginal nerves on the keelless flat side almost nerveless; upper glume boat-shaped, glabrous, 1-nerved. Florets as in the sessile spikelet, but the upper ♂, if not more or less reduced. —Kunth, Enum. i. 480; Hack. in DC. Monogr. Phan. vi. 342; Durand & Schinz, Consp. Fl. Afr. 702. *Andropogon elegans*, Gay ex Steud. Syn. Pl. Glum. i. 364.

Upper Guinea. Senegambia: Walo country, Roger! Tagana, Leprieur; and without precise locality, Heudelot, 384! French Guinea: Koulikoro, Chevalier, 2201 partly! Northern Nigeria: Nupe, Barter, 993!

3. *E. royleanus*, Nees ex A. Rich. Tent. Fl. Abyss. ii. 471. Annual. Culms from a few inches to over 1 ft. high, erect, tufted, simple below, fastigiately branched upwards, the branches flowering and spreading in 2's and 3's from the upper internodes, slender, terete, glabrous or with a few hairs close below the nodes, 4–5-noded; internodes mostly exserted. Leaf-sheaths glabrous, smooth, the lower terete and tight, the upper wide, spathaceous, bladeless or almost so, at last turning red; ligules short, membranous, densely ciliate; blades linear, tapering to a fine point, 2–6 in. long by 1 lin. wide, rather thin, glabrous below, more or less pubescent above, the base often almost villous, and beset there with scattered long near tubercle-based hairs along the margins, smooth apart from the rough upper margins, with 1 lateral nerve on each side, prominent below. Racemes  $1\frac{1}{4}$ – $2\frac{1}{2}$  in. long, erect, straight, embraced below by the spathe, very rarely slightly exserted, pale straw-coloured or more or less tinged with purple or reddish. Rhachis fragile; joints subclavate, slightly curved, about 2 lin. long, disarticulating obliquely, with a short 2-toothed appendage, back rounded, minutely pubescent or almost glabrous, with a short beard on each side of the base and another up to 3 lin. long on the outer side near the top, inner face pubescent all along; pedicels similar but shorter, densely ciliate along the outer angle, without a terminal tuft or an appendage. Sessile spikelet, including the short obconical densely bearded callus but excluding the beak,  $2\frac{1}{2}$ –3 lin. long, lanceolate-oblong. Glumes unequal; lower firmly chartaceous, produced into a straight

beak, penicillate-ciliate from the base upwards, with about 7–12 tufts of hairs, each carried on a short laterally projecting process, back scaberulous or more or less (to densely) hairy, intracarpinal nerves 7–9, very faint, beak about 3 lin. long, linear, cultriform, 2-fid to  $\frac{1}{4}$ – $\frac{1}{2}$ , rigidly ciliate on both margins; upper glume boat-shaped, ovate-lanceolate in outline, mucronate-acuminate,  $2\frac{1}{2}$  lin. long, membranous, 3-nerved, glabrous. Lower floret: valve ovate-oblong, subobtusate,  $1\frac{1}{2}$ –2 lin. long, hyaline, faintly 2-nerved; valvule 0. Upper floret: valve elliptic-oblong, obtuse,  $1$ – $1\frac{1}{4}$  lin. long, faintly 3-nerved, glabrous. Anthers  $\frac{1}{2}$  lin. long. Stigmas  $\frac{2}{3}$  lin. long. Grain lanceolate-oblong, dorsally much compressed,  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin. long, scutellum reaching to the middle, hilum punctiform, basal. Pedicelled spikelet lanceolate, subulate, afterwards gaping, 4–5 lin. long. Glumes more or less unequal; lower up to 5 lin. long, including the cultriform or subuliform ciliate beak, which may be up to over 3 lin. long; upper glume ovate-lanceolate, produced into a slender subuliform beak, including it 3–4 lin. long, 3-nerved. Florets 0.—Schweinf. Fl. Soturba, in Verh. Zool.-Bot. Gesellsch. Wien, xv. (1865), 556; Hack. in DC. Monogr. Phan. vi. 343; Penzig in Atti Congr. Bot. Genoa (1893), 365; Schweinf. in Bull. Herb. Boiss. 2me sér. ii. (1894) 10; A. Terracciano in Ann. Istit. Bot. Roma, v. (1894) 94, incl. var. *insularis* and *albiflorus*; Durand & Schinz, Consp. Fl. Afr. v. 702; Hook. f. Fl. Brit. Ind. vii. 161; Chiov. in Ann. Istit. Bot. Roma, vii. (1898) 58; Rendle in Cat. Afr. Pl. Welw. ii. 137. *E. Grisebachii*, Schmidt, Beitr. z. Fl. Capverd. 154. *Ratzburgia Schimperii*, Steud. Nomencl. ed. ii. 439. *Rottballia elegantissima*, Hochst. ex Steud. Syn. Pl. Glum. i. 365. *Andropogon elegantissimus*, Steud. l.c. 364. *A. Grisebachii*, Steud. l.c. 365.

**Upper Guinea.** Cape Verde Islands: St. Vincent, *Lowe! Moseley! Bolle!* Villa de Mindello, *Wehwitsch*, 2885! San Jago: Porto Praia, *Lowe! Wilkes Expedition!*

**Nile Land.** Nubia: Soturba Mountains, *Schweinfurth*, 1569! Coast Region, *Bent!* Sudan: Sheikh Talha, *Brown*, 817! Gallabat: Matamma, *Schweinfurth*, 1565! 1566! Eritrea: Dalak Islands, *Ehrenberg!* Gaaba, 1300 ft., *Schweinfurth*, 1651! valley of Terha, near Saati, *Schweinfurth*, 286! Samhar, sides of torrent between the hills of Vierek and Monkullo, *Penzig!* Bay of Hamfila, *Terracciano*. Abyssinia: Soea, 4000 ft., *Schimper*, 125! Begemedar; Gunnokle, 4000 ft., *Schimper*, 699! banks of the Tacazze River, *Schimper*, 795! Gebel Ras Edinep, near Cape Elba, *Schweinfurth*, 1563! Somaliland: Malka Daka, *Riva*, 460; between Cajammo and Web Ruspoli, *Riva*, 1139.

4. **E. platypus**, *Hack. in Bolet. Soc. Brot.* iii. 135. Perennial, caespitose, with the innovation shoots much compressed. Culms erect, about 4-noded, terete, smooth, glabrous, with the flowering branches from the nodes, nodes exserted. Leaf-sheaths glabrous, smooth, striate, those of the innovations short and very much compressed, of the culms more or less terete; ligules very short, membranous, glabrous or ciliate; blades linear, with a short acute point, 2–4 in. long. (according to Hackel up to 8 in.), up to 2 lin. wide.





somewhat rigid, glabrous or with a few hairs towards the base, rough along the margins and the slender almost keeled midrib below, spinulously ciliate towards the tips, lateral primary nerves 4-5 on each side, slender and more or less prominent. Racemes on shortly or long exerted peduncles,  $2\frac{1}{2}$  to over 3 in. long, flexuous, more or less silvery-hairy; joints linear,  $1\frac{1}{2}$  lin. long, villous, with the hairs 1 lin. long; pedicels similar but shorter and more slender. Sessile spikelet lanceolate, including the downwards bearded callus  $3\frac{1}{2}$ -4 lin. long. Glumes unequal; lower acuminate with a slender more or less 2-fid acumen, rigidly ciliolate from the middle upwards, otherwise glabrous and smooth, intracarpal nerves very faint, 5-7, balsam-ducts distinct; upper lanceolate, acute,  $2\frac{1}{2}$  lin. long, glabrous, 1-3-nerved. Lower floret almost  $2\frac{1}{2}$  lin. long: valve linear-lanceolate, acute, glabrous, obscurely 2-nerved. Upper floret not quite 2 lin. long: valve obscurely 3-nerved; valvule 0. Anthers 1- $1\frac{1}{4}$  lin. long. Pedicelled spikelet linear-lanceolate,  $2$ - $2\frac{1}{2}$  lin. long, acute. Glumes entire, subequal; lower rigidly ciliolate and keeled on one side, with a balsam-duct close to the keel, ecarinate and glabrous on the other, glabrous on the back, about 5-nerved apart from the keel. Florets similar to those in the sessile spikelet, but the upper ♂.—Hack. in DC. Monogr. Phan. vi. 335; Durand & Schinz, Consp. Fl. Afr. v. 702. *Andropogon platypus*, Trin. in Mém. Acad. Pétersb. 6me sér. ii. 261. *Andropogon donianus*, Benth. in Hook. Niger Fl. 570.

**Upper Guinea.** French Guinea: Futa Jallon; Diaguissa, 4290-4600 ft., Chevalier, 12659! Portuguese Guinea: Bolama, *Carvalho*. Sierra Leone: without precise locality, *Afzelius!* *Don!* *Barter!*

5. **E. Pobeguini**, *Stapf in Journ. de Bot.* xix. (1905) 99. Apparently a fairly tall grass, smooth, glabrous, much-branched upwards with the branches flowering (only the upper parts known). Leaf-sheaths smooth, glabrous, striate; ligules reduced to a very short and densely hairy rim; blades long-tapering from the base, where they are  $1$ - $1\frac{1}{2}$  lin. wide, narrow, convolute, glabrous, smooth, nerves prominent below. Racemes numerous, 2 to over 3 in. long, on slender peduncles which are 2-5 in. long and enclosed up to or beyond the middle in a narrow sheath, more or less hairy, straw-coloured. Rhachis fragile; joints up to  $1\frac{1}{2}$  lin. long, densely ciliate along the outer angle, minutely puberulous on the back, disarticulating very obliquely; pedicels similar, about the same length but more slender. Sessile spikelet oblong-lanceolate, including the small bearded callus  $3\frac{1}{2}$ -4 lin. long. Glumes unequal; lower chartaceous-herbaceous, long-acuminate, with the acumen 2-fid to the base into 2 subulæ, pectinate-ciliate from the base upwards, glabrous and smooth or more or less hairy on the back, obscurely 5-nerved, balsam-ducts distinct; upper lanceolate, acute, up to 2 lin. long, with a few minute hairs, ciliate upwards, faintly 3-nerved. Lower floret about 2 lin. long; valve lanceolate, ciliolate, faintly 2-nerved;

valvule 0. Upper floret similar to the lower,  $1\frac{1}{2}$  lin. long : valve 1- to obscurely 3-nerved, ciliate ; valvule very minute, narrowly linear or absent. Anthers purple,  $1-1\frac{1}{4}$  lin. long. Pedicelled spikelet obliquely ovate to lanceolate,  $1\frac{1}{2}$  lin. long. Lower glume acuminate, mucronate or aristulate, rigidly ciliate along one margin, with a balsam-duct within it, glabrous on the other, glabrous or minutely puberulous on the back, faintly 5-nerved, otherwise as in the sessile spikelet, but upper floret ♂.

**Upper Guinea.** French Guinea : Kouroussa, *Pobéquin*, 517 ! Timbo, *Pobéquin*, 1772 !

6. **E. tenax**, *Stapf in Kew Bulletin*, 1909, 422. Culms only known from their upper parts, over 1 ft. long, branched ; internodes glabrous or hairy upwards. Leaves quite glabrous ; sheaths smooth ; ligules reduced to a shortly and densely ciliate rim ; blades long-tapering from the base upwards,  $1-1\frac{1}{2}$  lin. wide below, convolute, spinulosly rough along the midrib and the margins. Racemes few, distant, shortly peduncled, laterally exerted from a linear acute spathe, hairy, whitish,  $1-1\frac{1}{2}$  in. long ; rhachis tough ; joints slender,  $1\frac{1}{2}$  lin. long, densely white-villous all over excepting the inner face ; pedicels very similar to the joints. Sessile spikelet ovate-lanceolate, including the short and hairy callus 3 lin. long. Glumes unequal ; lower subchartaceous, 2-fid to  $\frac{1}{3}$  or  $\frac{1}{5}$  into subulæ, rigidly pectinate-ciliate from the base upwards with the cilia longest towards the subulæ, white-villous on the back, balsam-ducts distinct ; upper glume 2 lin. long, lanceolate, acute, membranous, minutely pubescent or glabrous on the back, 3-nerved. Lower floret  $1\frac{1}{2}-1\frac{3}{4}$  lin. long : valve oblong-lanceolate, acute, hyaline, obsoletely 2-nerved ; valvule 0. Upper floret : valve similar to the lower, over 1 lin. long, obsoletely 3-nerved ; valvule  $\frac{1}{4}$  lin. long. Anthers purple, 1 lin. long. Pedicelled spikelet lanceolate, up to 2 lin. long. Lower glume mucronate, acuminate, entire, rigidly ciliate along one margin with a balsam-duct within it, almost ciliate on the other, more or less pubescent on the back, otherwise as in the sessile spikelet, but with the upper floret ♂.

**Upper Guinea.** French Guinea : Kankan, *Bardon*, 15 ! 36 !

7. **E. Welwitschii**, *Rendle in Cat. Afr. Pl. Welw.* ii. 137. Perennial, compactly cæspitose ; innovation-shoots intravaginal, more or less compressed below, rising with the culms from an oblique hard rhizome. Culms erect, slender, up to 4 ft. high, glabrous, simple for 3 or 4 nodes, then sparingly branched, with the branches erect, slender, flowering. Basal leaf-sheaths persistent, those of the innovations compressed, purplish, like the others glabrous, smooth, the intermediate and upper cauline ones usually shorter than the internodes ; ligules membranous, short, truncate, ciliate ; blades very narrowly linear, tapering to a fine point, up to 1 ft. or more





long, tightly folded, 1-1½ lin. wide when flattened out, rigid, glabrous or with some long hairs at the base, scabrid along the margins and the keel, lateral nerves prominent below, 2-3 on each side. Racemes up to 3½ in. long, stiff or slightly flexuous, on long slender exerted peduncles, glabrous, greenish. Rhachis rather tough; joints linear, about 2½ lin. long, slightly scaberulous along the outer angle, otherwise smooth and glabrous, very tardily disarticulating with an oblique scar; pedicels very similar, more slender. Sessile spikelet lanceolate-oblong, 3 lin. long, excluding the glabrous callus which is over 1 lin. long, glabrous. Glumes equal; lower obscurely acuminate, very minutely 2-toothed, very shortly ciliate towards the apex, intracarinal nerves 6, faint, balsam-ducts conspicuous in the brown margin; upper glume lanceolate, acute, glabrous, 3-nerved, with a few transverse veins near the apex. Lower floret about 2¼ lin. long: valve linear-oblong, subobtuse, minutely ciliate above, 2-nerved; valvule 0. Upper floret 1½ lin. long: valve oblong, subacute, sub-3-nerved, ciliate; valvule 0. Anthers slightly over 1 lin. long. Stigmas purple, over 1 lin. long. Pedicelled spikelet very similar to the sessile, but smaller (2-2½ lin. long), ♂ or barren, the lower glume with 4 intracarinal nerves.

**Lower Guinea.** Angola: Pungo Andongo; Candumba, *Welwitsch*, 2711!

8. **E. Hensii**, *K. Schum. in Engl. Jahrb.* xxiv. 326. Perennial. Culms erect, 2-3 ft. high, slender, glabrous, slightly waxy below the nodes, terete, many-noded, with flowering branches from the upper nodes. Leaf-sheaths terete, tight, the lower longer, the upper somewhat shorter than the internodes, glabrous, smooth; ligules reduced to a ciliate rim; blades linear, setaceous involute, tapering to a fine point, 3-7 in. long and 1-1½ lin. wide if flattened out, glabrous, smooth excepting the rough margins, midrib and lateral nerves very slender, prominent below. Racemes on long slender exerted peduncles, or the lateral partly enclosed in the supporting sheath, 1½-3 in. long, slightly curved, silky-villous; joints linear, about 1½ lin. long, densely villous with the hairs 1½-2 lin. long; pedicels similar, 1 lin. long, very slender. Sessile spikelet lanceolate-oblong, including the long-bearded callus and the mucros 3-3½ lin. long. Glumes unequal; lower acuminate, with a slender deeply 2-fid acumen which is up to 1 lin. long, glabrous on the back, densely ciliate along the keels with the hairs up to over 1 lin. long, intracarinal nerves 6, balsam-ducts conspicuous; upper glume linear-lanceolate, acute, 2 lin. long, minutely pubescent on the back, finely 3-nerved. Lower floret under 2 lin. long: valve linear-oblong, acute, ciliate, 2-nerved. Upper floret over 1 lin. long: valve similar to that of the lower floret, obscurely 3-nerved; valvule 0. Pedicelled spikelet reduced to the glumes and one valve, narrowly lanceolate, over 2 lin. long. Glumes subequal, mucronate-acuminate; lower rigidly ciliate and with a balsam-

duct on one side, glabrous on the other, 2-3-nerved, apart from the keel; upper glume asymmetrically keeled, keel minutely and rigidly ciliate above the middle, 3-nerved. Valve linear, over 1 lin. long, nerveless.—Th. & Hél. Durand, Syll. Fl. Congol. 623. *E. argenteus*, Durand & Schinz, Étud. Fl. Congo, (1896) 313.

**Lower Guinea.** Belgian Congo: Kiengi; Luteté, *Hens*, 285! Kisantu, *Gillet*, 850!

9. **E. Chevalieri**, *Stapf in Bull. Soc. Bot. Fr.* lv. (1908), *Mém.* viii. 100. Perennial, densely caespitose; innovations intravaginal. Culms erect, slender, up to over 3 ft. high, glabrous or bearded below the nodes, compressed below, simple or sparingly branched, with the branches flowering, about 3-noded; internodes more or less exserted. Leaf-sheaths terete, tight, the uppermost bladeless; the lower long-persistent, silky at the very base (the inner) or quite glabrous, shining; ligules very short, ciliate; blades linear, long-tapering upwards, 4-8 in. long by 1½ lin. wide, loosely involute or almost flat, pale green, smooth, bearded at the very base otherwise quite glabrous, nerves about 10, equal, prominent below. Racemes on a shortly or long exserted peduncle, 3-3½ in. long, flexuous, silvery-feathery; joints linear, 3-2 lin. long, densely villous with the hairs up to 3 lin. long; pedicels similar to the joints but shorter and more slender. Sessile spikelet lanceolate, 5 lin. long. Glumes subequal; lower acuminate with a slender acumen, deeply 2-fid, densely and long villous, keels indistinct, nerves about 7, obscure, balsam-ducts pale; upper glume lanceolate, acute or acuminate, slightly shorter than the lower, hairy along the middle nerve, nerves 3, distinct. Lower floret 3 lin. long: valve lanceolate, acute, 2-nerved, softly ciliate upwards. Upper floret 2½ lin. long, valve similar to that of the lower floret, 3-nerved; valvule 0. Anthers 1½ lin. long. Pedicelled spikelet lanceolate, acute or acutely acuminate, 2½-3 lin. long. Glumes subequal; lower 7-nerved, villous; upper 5-nerved, less and more shortly hairy. Florets as in the sessile spikelets if not shorter, but the upper ♂.

**Upper Guinea.** French Guinea: Sangorola, near Kouroussa, *Chevalier*, 341! Northern Nigeria: Abinsi and vicinity, in bush, *Dalziel*, 866!

**North Central.** Eastern Shari Region: Ndelli and village of Kounde, Darrounga, *Chevalier*, 7713!

10. **E. argenteus**, *Nees, Fl. Afr. Austr.* (1841) 95. Perennial, densely caespitose; innovation-shoots intravaginal. Culms compressed below, terete above, glabrous or more or less hairy, slender, 3-5-noded, with 1, rarely 2, flowering branches from the upper nodes. Leaf-sheaths tight, the lower appressedly silky with long hairs, later on glabrescent or glabrous from the beginning, often very firm and long-persistent, the others glabrous or sparingly hairy, strongly striate, nodes sometimes bearded; ligules a densely ciliate membranous rim; blades very narrow, linear, acute, usually folded,





rarely flat, up to over 1 ft. long, and  $\frac{3}{4}$  to 2 lin. wide when flattened out, somewhat rigid, flexuous, glabrous or with long hairs towards the base, smooth except near the more or less rough tips, lateral nerves about 3 on each side, rather prominent below. Racemes 2-5 in. long, the terminal on long peduncles, usually exerted from the slender bladeless sheath, the lateral shortly peduncled and shortly or only partially exerted from the supporting sheath, villous, pale green, sometimes suffused with purple or marked with purple lines. Rhachis rather tough; joints linear, about 2 lin. long, densely villous, with the hairs up to  $1\frac{1}{2}$  lin. long; pedicels similar but shorter and more slender. Sessile spikelet lanceolate to ovate-lanceolate, including the long more or less hairy callus mostly  $4\frac{1}{2}$ - $5\frac{1}{2}$  lin. long. Glumes unequal; lower chartaceous, more or less acuminate (acumen 1-2 lin. long, 2-fid almost to the base into 2 subulæ), ciliate from the base upwards, with the cilia up to 1 lin. long, glabrous, pubescent or villous on the back, intracarinal nerves 6-8, balsam-ducts distinct, purplish or brown; upper glume lanceolate, acute, up to  $2\frac{1}{2}$  lin. long, very delicately pubescent, ciliolate on the keel upwards and the upper margins, with 1 or 2 nerves on each side. Lower floret slightly over 2 lin. long: valve oblong-lanceolate, 2-nerved, ciliolate upwards. Upper floret somewhat shorter: valve similar to that of the lower floret but 3-nerved; valvule very minute. Anthers orange or purple,  $1\frac{1}{2}$ -2 lin. long. Pedicelled spikelet oblong-lanceolate, about 2-3 lin. long. Lower glume entire, mucronate, keeled on one side only, ciliate along the keel, with a balsam-duct within it, almost flat and glabrous on the other. Upper glume and florets as in the sessile spikelet but the upper floret ♂.—Hack. in DC. Monogr. Phan. vi. 339; Durand & Schinz, Consp. Fl. Afr. v. 702; K. Schum. in Engl. Pfl. Ost-Afr. C. 97; Stapf in Dyer, Fl. Cap. vii. 332; De Wild. Miss. Laurent, 199, et Étud. Fl. Bas- et Moyen-Congo, ii. (1907) 10 (*argentatus*); Th. & Hél. Durand, Syll. Fl. Congol. 623. *E. Brazzæ*, Franch. Contr. Fl. Congo Franç. 15. *E. rostratus*, Bur. in Compt. Rend. ciii. (2nd Aug. 1886) 361, not of Nees.

**Lower Guinea.** French Congo: Brazzaville, *Brazza*, 63! *Thollon*. Loango, *Lecomte*, 45! Belgian Congo: Kisantu, *Gillet*, 3671; Lemfu, *Gillet*, 3473. Angola: Benguella; country of the Ganguellas and Ambuellas, *Gossweiler*! Damaraland: Okanokarema, *Dinter*, 639!

**South Central.** Belgian Congo: Kassai District; Bukila, Butala, *Laurent*. **Mozambique Distr.** Kilimanjaro, 5000 ft., *Johnston*! Portuguese East Africa: Zimbiti, near Beira, *Johnson*, 304! Nyasaland: Nyika Plateau, *Henderson*! Rhodesia: Bulawayo, *Eyles*, 1205! Salisbury, *Nobbs*, 666! Mashonaland; Charter District, *Mundy*! Matabeleland; Insiza District, *Mundy*, 3! Gazaland; Chirinda, 3700 ft. *Swynnerton*, 1624! Mount Pene, 6500-7000 ft. *Swynnerton*, 1648!

*Imperfectly known species.*

11. *E. Ledermanii*, *Pilger* in *Engl. Jahrb.* xlv. (1910) 207. Perennial, densely cæspitose, with intravaginal innovation-shoots. Culms

slender, up to 3 ft. high, 2-noded, glabrous; internodes exserted. Leaf-sheaths short, more or less hairy; ligules very short; blades narrow-linear, acute, folded, about 5 in. long, or those of the culms much shorter, hairy. Racemes solitary, on a long-exserted peduncle, 3-4 in. long; joints varying in length, those near the base of the raceme up to 6 lin. long, the upper somewhat shorter, stout, convex and striate on the back, flat on the face, with the margins thickened, disarticulating obliquely, with the scar surrounded by an irregular denticulate membrane, with a long and dense white beard at the base of the sessile spikelet; pedicels similar to the joints, but flatter, with the tips not oblique. Sessile spikelet ovate-lanceolate, 4 lin. long. Glumes equal?; lower rigid, scabrid, hairy at the apex, keels with warts bearing short stiff hairs, intracarinar nerves 4, raised on the back, with shorter ones in between; upper glume boat-shaped, with a stout middle nerve and 2 faint lateral nerves. Lower floret equalling the upper glume: valve ovate, ciliate, 3-nerved, with a valvule. Upper floret ovate-oblong, very delicate, 3-nerved. Grain ellipsoid, scutellum reaching almost to the middle, hilum small, roundish. Pedicelled spikelet similar to the sessile, less verrucose, ♂.

**Upper Guinea.** Cameroons: between Garua and Mao Madi, in the savannahs, 1200 ft., *Ledermann*, 3605.

Evidently near to *E. hirtifolius*, Hack.

17. **ROTTBÆLLIA**, Linn. f.; Benth. et Hook. f. Gen. Pl. iii. 1129, partly.

Spikelets 2-nate on the nodes of the very fragile rhachis of stout cylindrical perfectly glabrous spike-like racemes which terminate the culms and their branches (in the latter case spathe-supported), different in sex and usually also in size, colour and nervation except those of the uppermost pairs which are barren, homeomorphous and upwards increasingly reduced forming a tail-like tapering appendage to the raceme; joints dorsally flattened below, widely cup-shaped and hollowed out upwards, more or less completely fused, although externally marked off, with the equally flattened and upwards very slightly thickened pedicels along their posticous angles, forming a deeply concave rather thin-walled receptacle for the reception of the sessile spikelet; disarticulation of the joints at a right angle or oblique to the rhachis, of the pedicelled spikelets slightly oblique, leaving a crescent-shaped, faintly concave scar. Sessile spikelet pale, triangular in cross section, the narrow callus fused with the bases of the adjacent joint and pedicel into a glabrous ring from the centre of which protrudes a knob fitting into the cup-shaped hollow of the next lower joint, the whole plexus falling together. Florets 2, lower ♂, upper ♀, awnless. Glumes equal; lower coriaceous, flat on the back, with very narrow inflexed margins, 2-keeled upwards,





obtuse or subobtuse; upper boat-shaped, keeled upwards, acute. Valves hyaline, 3-nerved. Valvules as long or almost as long as the valves, hyaline, 2-nerved. Lodicules 2, cuneate. Stamens 3. Stigmas suberect or shortly laterally exerted above the middle of the spikelet. Grain broad-oblong or ellipsoid, dorsally compressed; hilum large, suprabasal; embryo almost as long as the grain. Pedicelled spikelet similar to the sessile, but more compressed, green, striate, with 2 ♂ florets, or smaller and more or less reduced.—Annual, usually coarse grasses, often with stilt-roots from the lowest nodes, more or less branched, particularly upwards; blades large, linear-lanceolate, rather wide; ligule membranous, short; racemes dorsiventral, with the spikelets placed anticously and laterally; the barren terminal appendages often very slender and their imperfect spikelets very narrow, green.

Species 2 or 3, very closely allied; in the tropics of the Old World.

1. *R. exaltata*, Linn. *f. Suppl.* 114. Culms erect, up to 12 ft. high, branched, with the branches more or less erect, smooth or more or less rough and even hirsute, terete, with a channel facing the branches. Leaf-sheaths terete, tight, or widened upwards, usually more or less hirsute, with tubercle-based hairs, sometimes quite glabrous, strongly striate, ciliolate; ligules membranous, brown, short, rounded, ciliolate; blades linear-lanceolate, tapering to a long fine point, 1–1 $\frac{3}{4}$  ft. long,  $\frac{1}{2}$ –1 in. wide, somewhat flaccid, glaucescent, smooth below, scabrid with minute stiff hairs above, very rough along the margins, midrib rather stout below, whitish, primary lateral nerves about 4–6 on each side. Racemes 3–6 in. long, 1–1 $\frac{1}{2}$  lin. in diam., stiff, pale yellowish-green, joints 2–3 lin. long, rounded on the back, concave on the inner face, smooth, disarticulating with an almost orbicular scar; pedicels slightly shorter than the joints, broad, rounded on the back, concave on the inner face. Sessile spikelet 2 $\frac{1}{2}$ –3 $\frac{1}{2}$  lin. long, including the short broad smooth callus ovate-lanceolate, glabrous. Glumes about equal, lower coriaceous, subacute, entire or very minutely 2-toothed, smooth or very slightly rough, intracarinat nerves faintly visible on the inner side, about 9; upper glume boat-shaped, very broad in profile, obliquely acute, about 11-nerved. Lower floret: valve oblong-lanceolate, acute, glabrous, with a valvule similar in shape and size, but firmer, rigid and 2-nerved. Upper floret: valve slightly shorter than that of the lower floret, boat-shaped, obliquely ovate in profile; valvule narrowly oblong, nerveless, almost as long as the valve. Anthers 1–1 $\frac{1}{2}$  lin. long. Styles almost 1 lin. long. Grain up to 1 $\frac{1}{2}$  lin. by 1 lin., pale. Pedicelled spikelet about the size of the sessile, but more compressed, and (particularly the upper) more or less acuminate, green-striate and with 2 male florets, or more or less reduced, the upper consisting of one glume only.—Roxb. *Pl. Corom.* t. 157; Steud. *Syn. Pl. Glum.* i. 361; Baker, *Fl. Maur.* 457; Hack.

in DC. Monogr. Phan. vi. 293; Hook. f. Fl. Brit. Ind. vii. 156; Durand & Schinz, Consp. Fl. Afr. v. 699; K. Schum. in Engl. Pfl. Ost-Afr. C. 96, A. 31; Rendle in Cat. Afr. Pl. Welw. ii. 139; De Wild. & Durand in Bull. Herb. Boiss. 2me sér. i. 59; De Wild. Miss. Laurent, 198; De Wild. Étud. Fl. Bas- et Moyen-Congo, ii. 11; Th. & Hél. Durand, Syll. Fl. Congol. 621; Pilger in Engl. Pflanzeng. Afr. ii. 189, fig. 134. *R. exaltata*, var. *genuina*, Schweinf. in Höhnel, Disc. of Lakes Rudolf and Stefanie, ii. App. 352; Bull. Herb. Boiss. 2me sér. ii. 9. *R. exaltata*, f. *arundinacea*, Hack. in Bolet. Soc. Brot. v. 215. *R. arundinacea*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 444; Steud. Syn. Pl. Glum. i. 362. *Stegosia cochinchinensis*, Lour. Fl. Cochinch. 51. *Stegosia exaltata*, Nash in N. Amer. Fl. xvii. i. 84.

**Upper Guinea.** French Guinea: Kouroussa, *Pobéquin*, 532! Timbo, common in deep soil, *Pobéquin*, 1804! Northern Nigeria: Abinsi; Katsina Allah, edges of marsh, *Dalziel*, 870; Katagum District, *Dalziel*, 288! Sokoto Province, *Dalziel*, 509! Southern Nigeria: Niger, *Vogel*! Aguku District, *Thomas*, 532! Awka, Agolo and Obu Districts, *Thomas*! Fernando Po, *Vogel*, 91!

**North Central.** Bagirmi, and district of Lake Fitri: Kolkele and Moito, *Chevalier*, 9571! Mokoangi, *Boucken*.

**Nile Land.** Abyssinia: Mai Mezanno Valley, near Jelajeranne, *Schimper*, 1459! Jur: (Ghattas') Seriba, *Schweinfurth*, 2432! British East Africa: Kibwesi, 3000 ft., *Scheffler*, 369! Taveta, *Höhnel*! Rabai Hills, *Taylor*!

**Lower Guinea.** Island of St. Thomas: Saudade, 2500 ft. *Moller*, 161! Belgian Congo: Kisantu, *Gillet*! Mushi, *Laurent*. Angola: Casengo, *Gossweiler*, 4765! 5549! 5934! *Welwitsch*, 1110! Golungo Alto, *Welwitsch*, 7251! 7271! 7271b!

**South Central.** Belgian Congo: La Fini, *Laurent*; Lulunga, *Laurent*.

**Mozambique Distr.** Zanzibar, *Last*! German East Africa: Usambara, *Amboni*, *Holst*, 2772! Portuguese East Africa: between Lupata and Tete, *Kirk*! Nyasaland: Shire valley, above Morumbala marsh, *Scott*! Rhodesia: Livingstone, *Rogers*, 7076!

Introduced into the West Indies. According to *Welwitsch* much disliked by cattle.

*Imperfectly known species.*

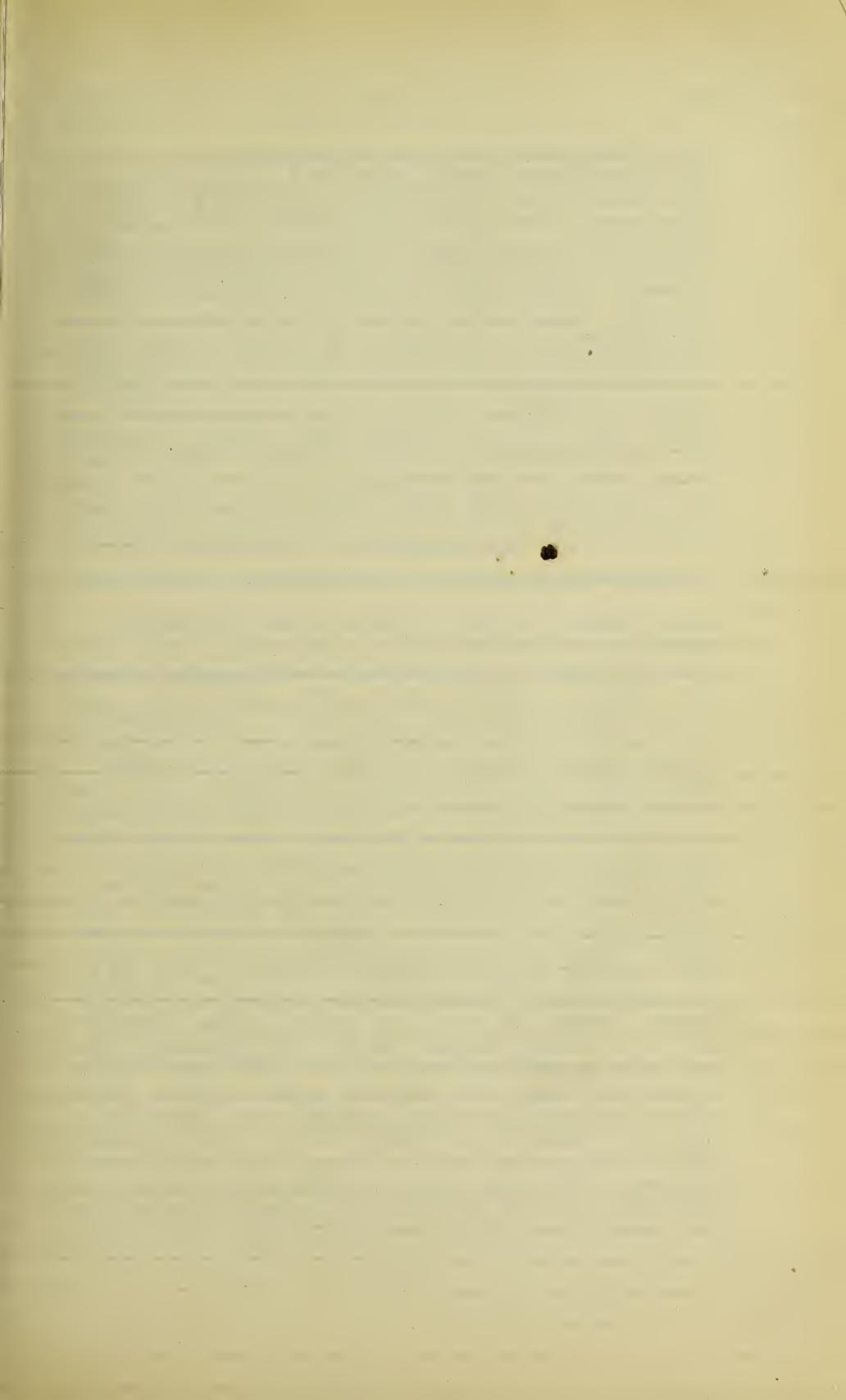
2. *R. setifolia*, *K. Schum.* in Engl. Pfl. Ost-Afr. C. 96. Perennial, caespitose. Culms slender, up to 2 ft. high, glabrous. Leaf-sheaths glabrous; ligules membranous, truncate, short, villous from the back; blades involute, setaceous, equalling the spike, solitary. Spike 2 to over 3 in. long, fragile. Spikelets not quite 2 lin. long. Lower glume submucronulate, transversely tubercled in the lower half.

**Mozambique Distr.** German East Africa: Bukoba, *Stuhlmann*, 3956.

This is very probably *Rhytachne rottbœllioides* or a species very closely allied to it.

18. **OPHIURUS**, *Gært.*, partly; *R. Br.*; *Benth.* et *Hook.* f. Gen. Pl. iii. 1130.

Spikelets solitary on the nodes of the fragile rhachis of slender cylindrical spikes which terminate the culms and their usually fascicled spathe-supported branches, their pedicelled companions suppressed or rudimentary and very minute and the pedicels completely fused with





the joints, both forming together a deeply hollowed-out cylindrical receptacle for the reception of the sessile spikelet; disarticulation of the internodes at a right angle or slightly oblique to the rhachis, their tips hollowed out. Sessile spikelet with a very narrow callus which is fused with the base of the internode into a rim from the centre of which protrudes a small knob fitting into the hollow of the next lower internode, the whole plexus falling together. Florets 2, lower ♂ or neuter, upper ♀, awnless. Glumes equal; lower coriaceous, flat or subconvex on the back with very narrow inflexed margins, faintly nerved, with a transverse groove at the base, upper boat-shaped, hyaline, obtuse. Valves hyaline, 2-nerved or nerveless. Valvules similar to the valves. Lodicules 2, cuneate. Stamens 3. Stigmas short, laterally exerted. Grain oblong, dorsally slightly compressed; embryo a quarter the length of the grain.—Annual (?) or perennial, sometimes very coarse grasses, usually much-branched upwards; blades linear to lanceolate, short to very long, conduplicate or convolute in bud, then flat; ligules very short, membranous; racemes dorsiventral.

Species about 4, ranging from the Sudan through tropical Asia to Australia.

1. *O. papillosus*, Hochst. in *Flora*, 1844, 248. Annual. Culms rather stout,  $1\frac{1}{2}$ – $4\frac{1}{2}$  ft. high, much-branched, the branches forming ultimately a large and more or less leafy panicle, glabrous or sparingly hirsute. Leaf-sheaths wide, striate, glabrous or hirsute with tubercle-based hairs; ligules short, thinly membranous, glabrous; blades lanceolate, from a broad subcordate base, 3–10 in. long, 4 to 10 lin. wide, soft, more or less hirsute with tubercle-based hairs, particularly on the cartilaginous, often minutely wavy margin, rarely almost glabrous below, lateral nerves 4–5 on each side, like the midrib slightly raised. Panicle up to more than 2 ft. long, with distant fascicles of branches; branches unequal, the longest sometimes divided again, the others or all reduced to 2 internodes, with a narrow spathaceous leaf from the node, with or without a short blade, the internodes very short or elongated (up to  $1\frac{1}{2}$  in.). Spikes cylindrical, slender, erect, straight or nearly so, 2 to over 3 lin. long,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. in diam., whitish, variegated with green, glabrous; joints completely fused with the pedicels, cylindrical,  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. long, green, multistriate, deeply hollowed out behind the spikelet, disarticulating horizontally with a circular scar and a hollow tip. Sessile spikelet elliptic-oblong, from an indistinct glabrous callus, very obtuse, somewhat shorter than the joint, pale straw-coloured. Glumes equal; lower coriaceous, with narrow subinflexed margins, indistinctly keeled upwards, faintly 9-nerved, back of the glume slightly convex, quite smooth, or minutely pitted above the callus and sometimes also in parallel rows in the upper part; upper glume boat-shaped, membranous, obtuse, 3-nerved, glabrous. Lower floret barren: valve ovate-oblong, obtuse, 1 lin. long, hyaline, finely

2-nerved; valvule narrowly oblong, emarginate,  $\frac{3}{4}$  lin. long, nerveless. Upper floret ♂, somewhat shorter than the lower: valve elliptic-oblong, subobtuse, hyaline, nerveless or almost so; valvule slightly shorter, oblong, emarginate, flaps much widened below. Anthers  $\frac{1}{4}$  lin. long. Styles finely capillary, almost  $\frac{1}{2}$  lin. long. Stigmas purple, slightly shorter, laterally exerted. Grain oblong, 1 lin. long, dorsally slightly compressed; scutellum elliptic-oblong, equalling a quarter of the grain; hilum punctiform, basal. Pedicelled spikelet completely suppressed.—Hack. in DC. Monogr. Phan. vi. 318. *O. aethiopicus*, Rupr. in Steud. Syn. Pl. Glum. i. 360. *Rottboellia papillosa*, Durand & Schinz, Consp. Fl. Afr. v. 699.

Nile Land. Gallabat: Matamma, *Schweinfurth*, 1100! Sudan: Senaar, *Kotschy*, 192!

### 19. CHASMOPODIUM, Stapf.

Spikelets 2-nate on the nodes of the very fragile rhachis of stout cylindrical spike-like racemes which terminate the culms and their scanty branches, different in sex, very similar in shape and size excepting the terminal spikelet which is sometimes very long and slender; joints linear and slender below, cup-shaped and hollowed out upwards, free and distant from the linear, upwards slightly widened, and not hollowed pedicels, joints and pedicels ciliate along the posticous edges; disarticulation of the spikelets at a right angle to the rhachis, of the pedicelled spikelets very tardy. Sessile spikelet dorsally somewhat compressed, its narrow callus fused with the bases of the adjacent joint and pedicel into a minutely bearded ring from the centre of which protrudes a knob fitting into a cup-shaped hollow of the next lower joint, the whole plexus falling together. Florets 2, lower ♂, upper ♀, awnless. Glumes equal; lower coriaceous, flat or convex on the back with very narrow inflexed margins, 2-keeled upwards, the keels widened upwards into a crest or wing, obtuse; upper boat-shaped, keeled and winged upwards. Valves hyaline, 3-nerved. Valvules as long as the valves, 2-nerved. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain unknown. Pedicelled spikelet similar to the sessile, but the lower glume convex, winged on one side only and the upper asymmetrical; both florets ♂ or one barren.—Annual (or sometimes perennial?) somewhat coarse grasses, sparingly branched; blades lanceolate-linear, flat; ligules a line of short hairs; racemes dorsiventral, with the sessile spikelets placed anticously and the pedicelled posticously.

Species 2, endemic.

Racemes caudate owing to the elongation of the  
glumes of the terminal spikelet. Sessile spikelet  
ovate ... .. 1. *C. caudatum*.  
Racemes not caudate. Sessile spikelet oblong ... 2. *C. Afzelii*.





(Hack.)  
 1. *C. caudatum*, Stapf. Annual, rooting from the lower nodes. Culms up to 10 ft. high, 8- or more-noded, terete below, branched above, with the branches short, simple, solitary, and appressed, all flowering. Leaf-sheaths terete, slightly keeled above, hirsute with tubercle-based hairs or glabrous, sometimes bearded at the nodes, the lower longer than the nodes; ligules a line of short hairs; blades lanceolate-linear from a base which is narrower than the sheath, setaceous acuminate, 10-20 in. long, 4-6 lin. wide, flat, somewhat flaccid, more or less scabrous on both sides, and shortly hairy or glabrous, midrib stout, whitish above, primary nerves 3-4 on each side. Racemes up to 3 in. long, erect,  $1\frac{1}{2}$ -2 lin. in diam., pale green, nearly glabrous, caudate owing to the first glume of the terminal spikelet being produced into a scabrid somewhat twisted green tail, 5-7 lin. long; joints  $2\frac{1}{2}$  lin. long, nearly as long as the sessile spikelet, much clavate from a narrow-linear base, hollow above, scaberulous on the convex back, slightly concave on the inner face, ciliate along the outer angle; pedicels about as long as and similar to the joints, or almost linear, separated from them by a broad oblong space. Sessile spikelet broadly ovate, from a very narrow annuliform shortly bearded and well marked off callus, 3- $3\frac{1}{2}$  lin. long, pale. Glumes equal; lower coriaceous including the upwards widened keels, subobtuse, 2-toothed, with the margins narrowly inflexed, very convex, almost smooth on the back, glabrous, nerves numerous, visible in transmitted light as are the anastomosing venules of the keel-wings; upper glume broad-ovate, somewhat obtuse, subcoriaceous, with a short glabrous subapical wing on the keel, 7-9-nerved, ciliolate. Valve of lower floret similar to the lower glume, but hyaline, entire, finely 3-nerved, ciliolate, with a similar 2-nerved valvule; of upper floret slightly shorter, broad-ovate, obtuse, hyaline, obscurely 3-nerved or nerveless, ciliolate, with a similar glabrous 2-nerved valvule. Anthers up to 1 lin. long. Stigmas short. Pedicelled spikelet ovate to ovate-oblong, compressed, 4 lin. long. Lower glume entire, with a greenish scabrous wing on one keel; upper glume with an eccentric upwards winged keel. Lower floret barren; upper ♂.—*Rottbællia caudata*, Hack. in DC. Monogr. Phan. vi. 298; Durand & Schinz, Consp. Fl. Afr. 698.

**Upper Guinea.** Sierra Leone: Bumbuna, 650 ft., *Thomas*, 3346! 3807!  
 French Guinea: Timbo, *Pobéguin*, 1805! Southern Nigeria: Lagos, *MacGregor*, 168! French Sudan: Macina, *Chevalier*, 24920!

**Nile Land.** Jur: Ghattas, Seriba, *Schweinfurth*, 2357!

**Lower Guinea.** Angola: Malange, *Buchner*, 36.

*Rottbællia Kerstingii* Pilger in Engl. Jahrb. xxxiv. 126, seems to differ from *C. caudatum* only in its perennial duration, forming elongated rhizomes from which arise solitary erect and distant culms, and in the slightly larger spikelets. It was collected at Kirikiri, in Togo (*Kersting*, 237).

(Hack.)  
 2. *C. Afzelii*, Stapf. Culms reed-like, over 5 ft. high, erect, somewhat compressed, branched, the lower leafy, the upper solitary or

2 or 3, rather long and simple, all flowering. Leaf-sheaths more or less terete, tight, quite glabrous; ligules a line of short cilia; blades long, linear-lanceolate, setaceously acuminate, gradually passing into the sheath, up to  $1\frac{3}{4}$  ft. long and 3-5 lin. wide (those of the branches much shorter or the uppermost rudimentary), flat, rigid, glabrous, scaberulous above, smooth below, very rough along the margin, midrib stout, whitish above, lateral nerves not prominent. Racemes  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. long, straight, rather stout, glabrescent, pale; joints  $2$ - $2\frac{1}{2}$  lin. long, stout, linear below, clavate above, convex and smooth on the back, slightly concave on the inner face, shortly and softly ciliate on the angle facing the pedicel; pedicels hardly shorter than the joints, separated from them by a linear-oblong space, linear, clavate, flat, ciliate along the outer angles. Sessile spikelet with a very narrow ring-shaped minutely puberulous distinct callus, oblong,  $3\frac{1}{2}$  lin. long, pale. Glumes subequal; lower coriaceous including the upwards widened keels, obtuse, 2-toothed, convex on the back, glabrous, very minutely scaberulous, many-nerved if seen from within, keel-wings or crests with anastomosing venules; upper slightly shorter, coriaceous, ovate, truncate, keeled, with a coriaceous obliquely truncate wing, quite glabrous, 11-nerved. Valve of lower floret elliptic-lanceolate, as long as the upper glume, acute, hyaline, ciliate, 3-nerved, with a similar glabrous 2-nerved valvule; of upper floret of the same length as that of the lower floret, ovate, acute, hyaline, 3-nerved, glabrous, with a lanceolate acute equally long valvule. Anthers  $1\frac{1}{2}$  lin. long. Stigmas linear, purple. Pedicelled spikelet similar in size and shape to the sessile, if not more lanceolate and greener, the lower glume winged rather broadly on one side only; upper glume winged nearly from the base. Florets both ♂.—*Rottbællia Afzelii*, Hack. in DC. Monogr. Phan. vi. 300.

**Upper Guinea.** Senegal, *Heudelot*, 336! Sierra Leone: Mabonto, *Thomas*, 3506! very common all over the Sierra Leone hills, *Scott Elliot*, 3938! *Afzelius*! Sherbro Island, *Hunter*!

20. **CÆLORHACHIS**, Brongn. in Duperr. Voy. Coq. Bot. 64, t. 14.

Spikelets 2-nate on the nodes of the fragile rhachis of slender more or less compressed conspicuously dorsiventral spike-like racemes which terminate the culms and their usually fasciated spathe-supported branches, different or very rarely alike in sex, similar in shape or the pedicelled more or less to very much reduced; joints and pedicels similar or the latter more slender, linear to cuneate or subclavate, dorsally compressed, glabrous, contiguous or nearly so; disarticulation of the joints at a right angle to the rhachis, their tips more or less hollowed out, with or without an auriculi-form appendage. Sessile spikelet dorsally compressed, the narrow transverse callus fused with the bases of the adjacent joint and





pedicel into an obscure rim from the centre of which protrudes a knob fitting into the hollow of the next lower joint, the whole plexus falling together. Florets 2, lower usually reduced to the valve, rarely with a small valvule, always neuter, upper ♂, awnless. Glumes subequal; lower flat or slightly convex on the back, smooth or variously sculptured with narrow inflexed margins, 2-keeled upwards and more or less winged from the keels, obtuse or emarginate, very faintly nerved; upper chartaceous, keeled, acute, 1-3-nerved. Valves hyaline, of lower floret 2-nerved or nerveless, of upper 3-1-nerved or nerveless. Valvule hyaline, similar to the valve, 2-nerved or nerveless. Lodicules 2, cuneate. Stamens 3. Stigmas laterally shortly exerted. Grain oblong, dorsally compressed; embryo about half the length of the grain. Pedicelled spikelet very varied, similar to the sessile or more or less reduced or rudimentary, ♂ or neuter, very rarely ♀.—Mostly tall coarse perennial grasses, much-branched upwards; racemes with the not rarely imbricate sessile spikelets placed anticously and the pedicelled laterally.

Species about 11 or 12, in the tropics of both hemispheres.

Pedicels without appendage; racemes much exceeding  
the leaves of the primary branches ... 1. *C. lepidura*.

Pedicels with a lanceolate wing-like appendage;  
racemes overtopped by the leaves of the primary  
branches ... 2. *C. afraurita*.

1. *C. lepidura*, Stapf. Perennial, glabrous. Culms over 3 ft. high, robust, many-noded, erect above, with the branches solitary or in small branched fascicles, unequal, the longer divided again, the whole collected into a loose leafy panicle. Leaf-sheaths smooth, finely striate, the lower more or less keeled, the middle and upper shorter than the internodes; ligules very short, truncate, membranous, eciliolate; blades linear, long-attenuated from the base, which passes gradually into the sheath, acute, complicate, the cauline up to over 6 in. long and 3 lin. wide, somewhat rigid, reddish, smooth except the upwards rough margins, midrib acutely keeled, nerves close and fine. Panicle up to 2 ft. long, branches and branchlets distant, subtended by leaves with narrow blades or reduced to spathes. Racemes glabrous, solitary at the ends of the branches and branchlets, much exceeding the leaves of the primary branches, slightly compressed, erect or somewhat nodding, straw-coloured variegated with brown, up to 4 in. long and over 1 lin. wide; joints 1 lin. long, triquetrous, hollow, glabrous, smooth, disarticulating subhorizontally, scar ovate with an acute point over the outer angle; pedicels linear, as long as the sessile spikelet, dorsally compressed, without any appendages, parallel with and somewhat distant from the joints. Sessile spikelet with a short broad callus, 2 lin. long, oblong, dorsally much compressed, imbricate, glabrous. Glumes subequal; lower coriaceous, almost flat

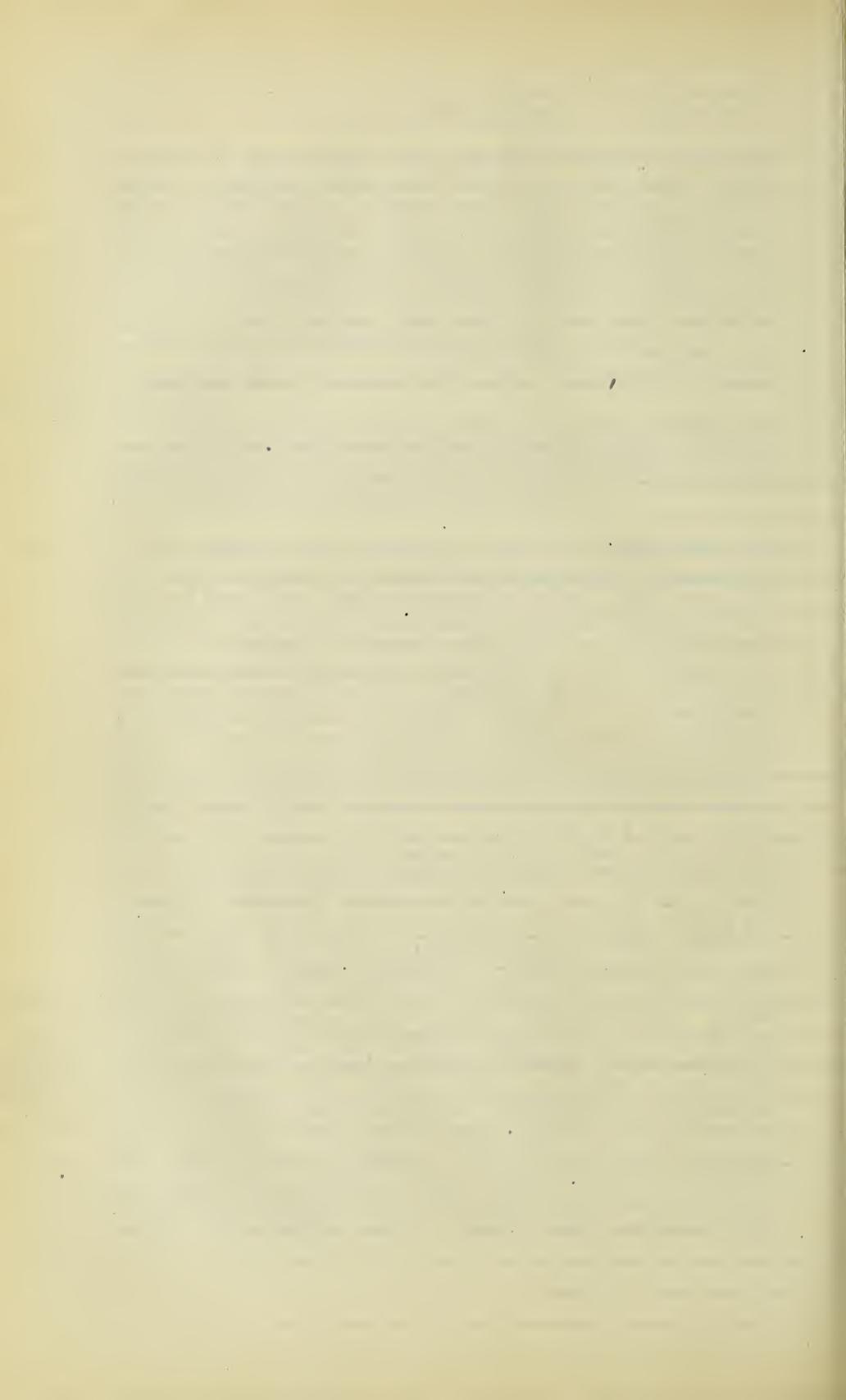
on the back, keels winged, wings widened upwards, the obtuse tips slightly overlapping, intracarpal nerves 4-5, very faint; upper glume slightly shorter, oblong, acute, thin, 3-nerved, glabrous. Valve of lower floret ovate-oblong, acute,  $1\frac{1}{4}$  lin. long, thinly hyaline, faintly 2-nerved, without a valvule; of upper floret slightly shorter than that of the lower floret, similar in shape but 3-nerved and glabrous; valvule of the same length, minutely truncate, very faintly 2-nerved. Anthers dark purple,  $\frac{1}{2}$  lin. long. Pedicelled spikelet reduced to 2 lanceolate brown glumes,  $1-1\frac{1}{4}$  lin. long.

**Mozambique Distr.** Portuguese East Africa: Zambesi Delta; Kongone River, *Kirk!*

The racemes are slightly compressed parallel to the backs of the sessile spikelets, with the result that the racemes seen from one side exhibit all the lower glumes of the sessile spikelets overlapping like fish-scales, whilst, seen from the opposite side, they show a succession of joints and pedicels, with the alternating more or less obliquely linear interstices between them.

2. *C. afraurita*, Stapf in *Bull. Soc. Bot. Fr.* lv. (1908), *Mèm.* viii. 98. Perennial, glabrous; innovations intravaginal, forming dense tufts of leaves with much compressed sheaths. Culms over 3 ft. high, many-noded, erect, branched above, with the branches solitary or in the upper part 2 or more, unequal, the longer divided again, the whole collected into a loose leafy panicle. Leaf-sheaths smooth, prominently nerved, the lower laterally compressed, broad, up to 1 ft. long, the upper more or less terete, shorter than the internodes; ligules very short, truncate, ciliolate; blades long-attenuated from the base which passes gradually into the sheath, acute, complicate, up to  $2\frac{1}{2}$  ft. long,  $3\frac{1}{2}$  lin. wide, somewhat rigid, subglaucous or reddish, smooth apart from the upwards rough margins, midrib acutely keeled, broad and whitish above, nerves close and fine. Panicle 1 ft. long or longer, the branches and branchlets subtended by leaves with narrow blades or reduced to spathes. Racemes fascicled, unequally peduncled, overtopped by the leaves of the primary branches, subcylindric, slender, straight, green, 6-10 lin. long,  $\frac{1}{2}$  lin. thick; joints 1 lin. long, acutely triquetrous, hollow, glabrous, smooth, with a subulate appendage; pedicels similar,  $1\frac{1}{2}$  lin. long, dorsally compressed, with a short tooth above the inner, and a lanceolate wing-like appendage,  $\frac{3}{4}$  lin. long, from the outer angle. Sessile spikelet with a short broad indistinct callus,  $1\frac{1}{2}-1\frac{3}{4}$  lin. long, oblong, dorsally much compressed, imbricate, glabrous. Glumes subequal; lower coriaceous, flat on the back, keels equally or unequally winged, with the wings confluent, or produced into obtuse lobes at the tips, nerves 5, fine; upper slightly shorter, oblong, subacute, thin, finely 3-nerved, wingless. Valve of lower floret equalling the upper glume, oblong, obtuse, 2-nerved, without a valvule; of upper floret elliptic, obtuse, thin,  $\frac{3}{4}$  lin. long, 1-nerved, with an equally long subobtuse valvule. Anthers purple, not quite  $\frac{1}{2}$  lin.





long. Grain oblong, dorsally compressed, 1 lin. long, biconvex; scutellum elliptic, half the length of the grain, hilum punctiform, basal. Pedicelled spikelet similar to the sessile, but smaller, with a winged keel to the upper glume and obscure nerves to the valves and valvule. Upper floret ♀.

**Upper Guinea.** French Guinea: Middle Niger; Bammako, Soknafi Falls, *Chevalier*, 232!

**Lower Guinea.** Angola: Benguella: Fte Princeza Amelia, in humid situations by the Cubango River, *Gossweiler*, 3314! Cunsango River near Lobo and Qualhunge, abundant along brooks, *Gossweiler*, 801! river side below Chibia, *Pearson*, 2721!

## 21. RHYTACHNE, Desv. in Hamilt. Prodr. Fl. Ind. Occ. 11.

Spikelets 2-nate on the nodes of the more or less fragile rhachis of slender cylindrical or somewhat compressed distichous slightly dorsiventral racemes terminating simple 1-noded culms, the pedicelled barren, very much reduced or suppressed; joints more or less clavate to sublinear and hollow upwards, forming with the posticously contiguous compressed more or less linear pedicels a receptacle for the reception of the sessile spikelet; disarticulation of the joints at a right angle to the rhachis, their tips without an appendage. Sessile spikelets dorsally compressed with a very narrow transverse callus, fused with the adjacent joint and pedicel into a fine annular rim, the whole plexus falling together. Florets 2, lower ♂, rarely neuter, upper ♀, awnless. Glumes equal, apart from occasional bristles; lower coriaceous, convex on the back, usually transversely rugose, very faintly nerved; upper membranous, hyaline, 3-5-nerved with or without a terminal bristle-like awn. Valves linear-lanceolate to oblong, hyaline, 1- or 2- (rarely 3-) nerved. Valvules hyaline, shorter than the valves to very short, delicately 2-nerved to nerveless. Lodicules 2, cuneate. Stamens 3. Stigmas short, suberect. Grain unknown. Pedicelled spikelets rudimentary, often represented by a bristle or point or quite suppressed.—Perennial or annual grasses with very slender 1-4-noded culms; blades usually long and setaceous; ligules very short, membranous; racemes rigid or flexuous; the lower glumes spreading obliquely during flowering.

Species 7, in Tropical Africa and Madagascar.

Perennial; culms and leaf-shoots in compact tufts.

Spikelets 4-4½ lin. long, in cylindrical spike-like racemes, up to over 1 lin. in diameter; lower glume not rugose on the rounded back: a somewhat robust grass with linear leaf-blades, 4-5 lin. wide ... .. 1. *R. robusta*.

Spikelets not over 2½ lin. long, in slender or very slender racemes; lower glume usually transversely rugose: slender grasses with more or less setaceous leaf-blades.

Raceme very fragile. Lower glume transversely rugose, 2-2½ lin. long.

*this is Rottboellia  
fide King  
by the way*

Leaves auricled at the junction of blade and sheath; blades folded without sclerenchymatic bars running right through and encasing the primary bundles ... .. 2. *R. rottbællioides*.

Leaves not auricled; blades subterete, deeply channelled, with sclerenchymatic bars running right through and encasing the primary bundles ... .. 3. *R. benguelensis*.

Raceme rather tough. Lower glume obtuse, very obscurely muricate,  $1\frac{1}{2}$ -2 lin. long ... .. 4. *R. Mannii*.

Annual; culms single or if tufted all flowering, not associated with purely leafy shoots.

Lower glume transversely rugose; pedicels with a terminal pair of unequal bristles ... .. 5. *R. triaristata*.

Lower glume slightly tubercled or rugose near the base; pedicels with a single bristle ... .. 6. *R. gracilis*.

1. *R. robusta*, Stapf. Perennial, compactly caespitose. Culms and innovations surrounded by the dried-up firm bases of the leaf-sheaths, 2-4 ft. high, 2-3-noded, erect, simple, smooth, glabrous or softly hairy, terete. Leaf-sheaths tight, mostly longer than the internodes, but often their upper parts slipping off the culms, terete, usually softly hairy, whitish pubescent at the nodes; ligules membranous, truncate,  $1\frac{1}{2}$  lin. long, scarios, ciliate, reddish; blades linear, long-attenuated towards both ends, with long setaceous tips, up to over 1 ft. long and 4-5 lin. wide, firm, drying reddish, usually more or less hairy, particularly near the base, or almost glabrous in the upper parts, midrib slender, prominent below, whitish, lateral nerves fine, numerous, margins scabrid. Raceme spike-like, cylindric, over  $\frac{1}{2}$  ft. long, slightly over 1 lin. in diam., erect, stiff, brownish or reddish-green, pubescent at the nodes; joints linear,  $4\frac{1}{2}$ -5 lin. long, somewhat cupular at the top, convex on the back, very slightly concave on the inner face, quite hollow, softly ciliate along both angles, otherwise glabrous and smooth; pedicels somewhat shorter, narrowly linear and slightly tapering upwards, dorsally very much compressed, with a few prominent nerves, angles softly ciliate, almost contiguous with the joint. Sessile spikelet linear-lanceolate, almost as long as the joint, with a very obscure annuliform pubescent callus. Glumes equal; the lower subacute to acute, coriaceous, rounded on the scaberulous back, keeled, very scabrid above, intracarinal nerves 4-5, green and distinct seen from within, invisible from without; upper glume chartaceous, boat-shaped, linear in profile, very acute, keel asperulous above, lateral nerves 2 on each side close to the upwards ciliolate margin. Florets subequal. Lower floret ♂: valve almost as long as the glumes, lanceolate, acute, subhyaline, finely scaberulous, 2-nerved, ciliolate, with a valvule of equal length and similar structure, but 2-nerved and almost eciliate. Upper floret ♀: valve lanceolate, acute, 3-nerved, ciliolate, its valvule of the same length, narrowly lanceolate,





2-nerved. Anthers 2 lin. long. Grain oblong, subterete; scutellum  $\frac{1}{2}$  the length of the grain; hilum large, circular, basal. Pedicelled spikelet more or less reduced, consisting of 2 glumes, very small or up to 1 lin. long.

**Lower Guinea.** Angola: Benguella; country of the Ganguellas and Ambuellas, *Gossweiler*, 2721 partly! Cuiriri river, in open scrub and woods, *Gossweiler*, 2742!

**2. R. rottbællioides**, *Desv. in Hamilt. Prodr. Fl. Ind. Occ.* 12; *Opuscula*, 75, t. 6, fig. 1. Perennial, densely tufted; innovations intravaginal, surrounded by the remains of the coarse basal leaf-sheaths. Culms very slender, 1-2 $\frac{1}{2}$  ft. high, 2-3-noded, compressed, glabrous, and smooth. Leaf-sheaths tight and striate, glabrous and smooth; ligules very short, membranous, ciliate, forming small auricles at the mouth of the sheath; blades complicate, setaceous to very narrowly linear, the basal nearly 1 ft. long, the upper very much shorter,  $\frac{1}{4}$  to almost  $\frac{1}{2}$  lin. wide in the folded state, glabrous and smooth below, finely puberulous above, with 3-4 primary nerves on each side, which are slightly raised below. Racemes solitary, very slender, fragile, 3-6 in. long, erect, flexuous, sometimes rather rigid, quite glabrous, sometimes purplish; joints 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  lin. long, more or less clavate and hollow above, concave on the inner face, more or less rounded on the back and prominently nerved, smooth, disarticulating horizontally; pedicels linear, curved, contiguous with and slightly shorter than the joints, much compressed, minutely ciliate on the inner angle, with a prominent middle nerve. Sessile spikelet linear-lanceolate, acute, 2 lin. long, with an obscure callus, straw-coloured or purplish. Lower glume subcoriaceous, acute, muticous, 1-2-mucronate or with 1 or 2 short bristles, transversely rugose, with or without longitudinal grooves between the rugæ, smooth above the middle or at least towards the tips, keels ciliate above, nerves about 7, very faint; upper glume hyaline-membranous, linear in profile, acute, with or without a short fine terminal bristle, 3-nerved. Lower floret ♂: valve linear-lanceolate, slightly shorter than the glumes, subacute, hyaline, faintly 3-nerved, with a similar but shorter and narrower valvule. Upper floret: valve oblong, subacute, hyaline, as long as or shorter than the lower floret, 1- or sub-3-nerved, very minutely ciliate, with a minute indistinctly 2-nerved valvule. Anthers over 1 lin. long. Stigmas purplish, over 1 lin. long. Pedicelled spikelet reduced to a minute mucro or a short fine bristle, or in robust specimens to 1 or 2 minute glumes.—Hack. in DC. Monogr. Phan. vi. 274; Franch. Contr. Fl. Congo Franç. 12 partly; Rendle in Journ. Linn. Soc. xxx. (1895) 100. *Rottbællia Rhytachne*, Hack. in Bolet. Soc. Brot. iii. 136, t. ii. fig. 2. *R. loricata*, Bur. in Compt. Rend. ciii. (2nd Aug. 1886) p. 36, not of Trin.

**Upper Guinea.** French Guinea: Futa Jallon; between Trebeleya and Timbo, 2000-2300 ft., *Chevalier*, 18298! Sierra Leone: Port Lokko, alluvial plains,

U.S. type

*Scott Elliot*, 5737! and without precise locality, *Afzelius*! Northern Nigeria: Nupe, moist valleys, *Barter*, 1383! Abinsi, by pools, *Dalziel*, 873!

**North Central.** French Congo: Shari District; Ndelli, swamps, *Chevalier*, 8137!

**Nile Land.** Jur: Genana, near Ghattas' Seriba, *Schweinfurth*, 1493!

**Lower Guinea.** French Congo: Brazzaville, *Thollon*, 73! Belgian Congo: Leopoldville, *Gillet*, 2651. Angola: Rio Pallanca, *Newton*! Fte Princeza Amelia, moist meadows, *Gossweiler*, 1996! between Hurta and the Cubango River, *Gossweiler*, 2226!

**South Central.** Belgian Congo: Katanga, *Hombler*, 12!

**Mozambique Distr.** Rhodesia: Salisbury, *Mrs. Craster*, 56!

*Mrs. Craster's* specimen possesses very slender racemes, representing a *forma tenuis* also occurring in Madagascar (*Perrier de la Bathie*, 107).

Most of the specimens are awnless, but those from Sierra Leone and Futa Jallon have distinct bristles, at least from the upper glume, whilst in *Chevalier's* 8137, awnless and awned spikes occur in the same individual. The same is the case, to some degree, in *Thollon's* 73.

3. *R. benguellensis*, *Rendle in Cat. Afr. Pl. Welw.* ii. 138. Perennial, compactly caespitose, innovations intravaginal, surrounded by the remains of the coarse basal leaf-sheaths. Culms up to  $1\frac{3}{4}$  ft. high, 1-2-noded, compressed below, glabrous and smooth. Leaf-sheaths tight, striate, glabrous and smooth, the lowest more or less compressed; ligules very short, membranous, ciliate, not produced into auricles; blades subterete, deeply channelled, tapering to a sub-obtuse or shortly setaceous point, up to 1 ft. long, up to  $\frac{1}{2}$  lin. wide in the folded state, rigid, glabrous excepting some hairs at the junction with the sheath, with 2 slightly raised primary nerves on each side. Racemes solitary, fragile, rather stiff,  $2\frac{1}{2}$ -3 in. long, quite glabrous, dull brown; joints 2- $2\frac{1}{2}$  lin. long, subclavate and hollow above, concave on the inner face, rounded on the back and prominently many-nerved, smooth, disarticulating horizontally; pedicels linear, somewhat curved, contiguous with and as long as the joints, much compressed, smooth, with 1 prominent middle nerve. Sessile spikelet oblong, subobtuse, with an obscure callus, brownish-purple,  $2\frac{1}{2}$  lin. long. Glumes equal; lower glume subcoriaceous, subacute, transversely rugose, with longitudinal grooves between the rugæ, which extend almost all over the back and the sides, keels eciliate, nerves about 11, faint; upper glume hyaline, membranous, linear in profile, acute, not produced into a bristle, 3-nerved. Lower floret ♂: valve oblong, obtuse, hyaline, finely 2-nerved; valvule similar but narrower. Upper floret slightly shorter than the lower: valve oblong, subacute, hyaline, obscurely ciliate; valvule  $1\frac{1}{2}$  lin. long, almost nerveless. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet reduced to a minute glume-like appendage.

**Lower Guinea.** Angola: Huilla; between Humpata and Nene, *Welwitsch*, 2639!

Very similar to *R. rottbællioides*, but apparently distinct in the structure of the leaves, which in cross section are almost semiterete and nearly twice as thick, with the primary nerves completely encased in sclerenchymatic bands, running right through. In *R. rottbællioides*, on the other hand, they are laterally much more compressed, with or without small sclerenchymatic caps above and below the 2-4 primary bundles.





4. *R. Mannii*, Stapf. Perennial, densely tufted; innovations intravaginal, surrounded by the remains of the slender basal leaf-sheaths, up to over 1 ft. high. Culms very slender, 2-3-noded, slightly compressed, glabrous and smooth. Leaf-sheaths tight, finely striate, glabrous and smooth; ligules very short, membranous, ciliolate, obscurely auriculate; blades complicate, setaceous, up to over 1 foot long,  $\frac{1}{4}$  lin. wide when folded, with 2-3 primary faint nerves, smooth and glabrous below, very minutely puberulous above. Racemes solitary, very slender, rather tough, about 2-3 in. long, flexuous, glabrous, pale greenish; joints linear, up to  $1\frac{1}{2}$  lin. long, slightly clavate and hollow above, shallowly concave on the inner face, more or less rounded on the back, with few slightly prominent nerves, smooth, disarticulating horizontally; pedicels linear, clavate, slightly curved, contiguous with and about as long as the joints, much compressed, ciliolate on the outer angle, with a more or less distinct middle nerve. Sessile spikelet oblong, obtuse,  $1\frac{1}{2}$  lin. long, with an obscure callus, dull straw-coloured. Lower glume subcoriaceous, obtuse, with few and short transverse rugæ or little knobs, mainly on the sides of the lower half or right across the base, rarely almost smooth, margins ciliolate near the apex, nerves about 7, very faint, sometimes very slightly prominent above on the back; upper glume membranous, linear in profile, acute, mucous, 3-nerved. Lower floret ♂: valve oblong, obtuse, slightly shorter than the glumes, hyaline, faintly 2-nerved, with a similar 2-nerved valvule. Upper floret: valve oblong, subobtuse, hyaline,  $\frac{3}{4}$  lin. long, faintly 1-nerved and minutely ciliolate, with a valvule  $\frac{1}{4}$  lin. long. Anthers under 1 lin. long. Stigmas  $\frac{1}{2}$  lin. long, purple. Pedicelled spikelet completely suppressed, or indicated by a minute point.—*R. rottballeioides*, Franch. Contr. Fl. Congo Franc. 12 partly.

Lower Guinea. Spanish Gaboon: Corisco Island, in meadows, Mann, 1886! French Congo: Brazzaville, Thollon!

There are two specimens attributed to Thollon and named *R. rottballeioides* at Kew, one with obtuse and almost smooth lower glumes and the other with acute and transversely rugose lower glumes, both being extremely similar in general appearance. One is numbered 73 and this is referred, above, to *R. rottballeioides*, whilst the other, without a number, is accounted for under *R. Mannii*.

5. *R. triaristata*, Stapf. Annual. Culms fascicled in small tufts, up to  $1\frac{1}{2}$  ft. high, slender, simple or with a few erect flowering branches from the lower nodes, 3-4-noded, terete, glabrous like the whole plant. Leaf-sheaths tight, fairly firm, striate; ligules very short, membranous, ciliolate, forming small auricles at the mouth of the sheath; blades convolute, setaceous or very narrowly linear,  $\frac{3}{4}$  to over 1 lin. wide when flattened out, glabrous and smooth below, very minutely puberulous (with some long fine hairs intermixed) above, primary nerves 2 on each side, raised below. Racemes

solitary, fragile, from the uppermost sheath, erect, straight, quite glabrous, usually pale-greenish; joints linear, 2 to over 3 lin. long, more or less clavate and hollow upwards, slightly concave on the inner side, more or less rounded on the back, with 2 prominent and several faint nerves, slightly rough, disarticulating horizontally, with a ciliate rim round the scar; pedicels linear, tapering and twisted upwards, contiguous with the joints, much compressed, rigidly ciliate, middle nerve prominent, as long as or longer than the joints. Sessile spikelet linear-oblong, shortly acuminate,  $2\frac{1}{2}$  lin. long (excluding the awns), callus minute. Lower glume subcoriaceous, terminating with 2 mostly unequal bristles, the longer of which may be up to over 3 lin. long, transversely rugose (rugæ 5-7, laterally projecting) with longitudinal ribs, smooth towards the tips, keels narrowly winged, ciliate above, nerves 6-7, fairly distinct. Upper glume hyaline, membranous, linear in profile, acute, with a fine terminal bristle, up to 3 lin. long, 3-nerved. Lower floret barren: valve lanceolate, subacute, somewhat shorter than the glumes, hyaline, 2-nerved, with a narrow nerveless valvule. Upper floret: valve linear-lanceolate, acute, about 1 lin. long, delicately hyaline, faintly 1-nerved, with a valvule less than half its length. Anthers  $\frac{1}{4}$ - $\frac{1}{3}$  lin. long. Stigmas  $\frac{1}{2}$  lin. long. Pedicelled spikelet usually represented by 2 fine stiff unequal scabrid awns, the longer of which may be up to over 2 lin. long.—*Rhytachne trisetata*, Hack. in DC. Monogr. Phan. vi. 275; Durand & Schinz, Consp. Fl. Afr. v. 700. *Lepturopsis triaristata*, Steud. Syn. Pl. Glum. i. 358. *Rhytidachne trisetata*, K. Schum. in Engl. Pfl. Ost-Afr. C. 97. *Rhytidachne triaristata*, K. Schum. l.c. *Ischæmum elionuroides*, Munro MS. ex K. Schum. l.c.

**Upper Guinea.** Sierra Leone: Los Islands, *Jardin*. French Guinea: Segou, *Chevalier*, 2329! Timbo, *Pobéguin*, 1765!

**North Central.** Upper Ubangi River: plateau of the Ungourras, 1500 ft. *Chevalier*, 6142!

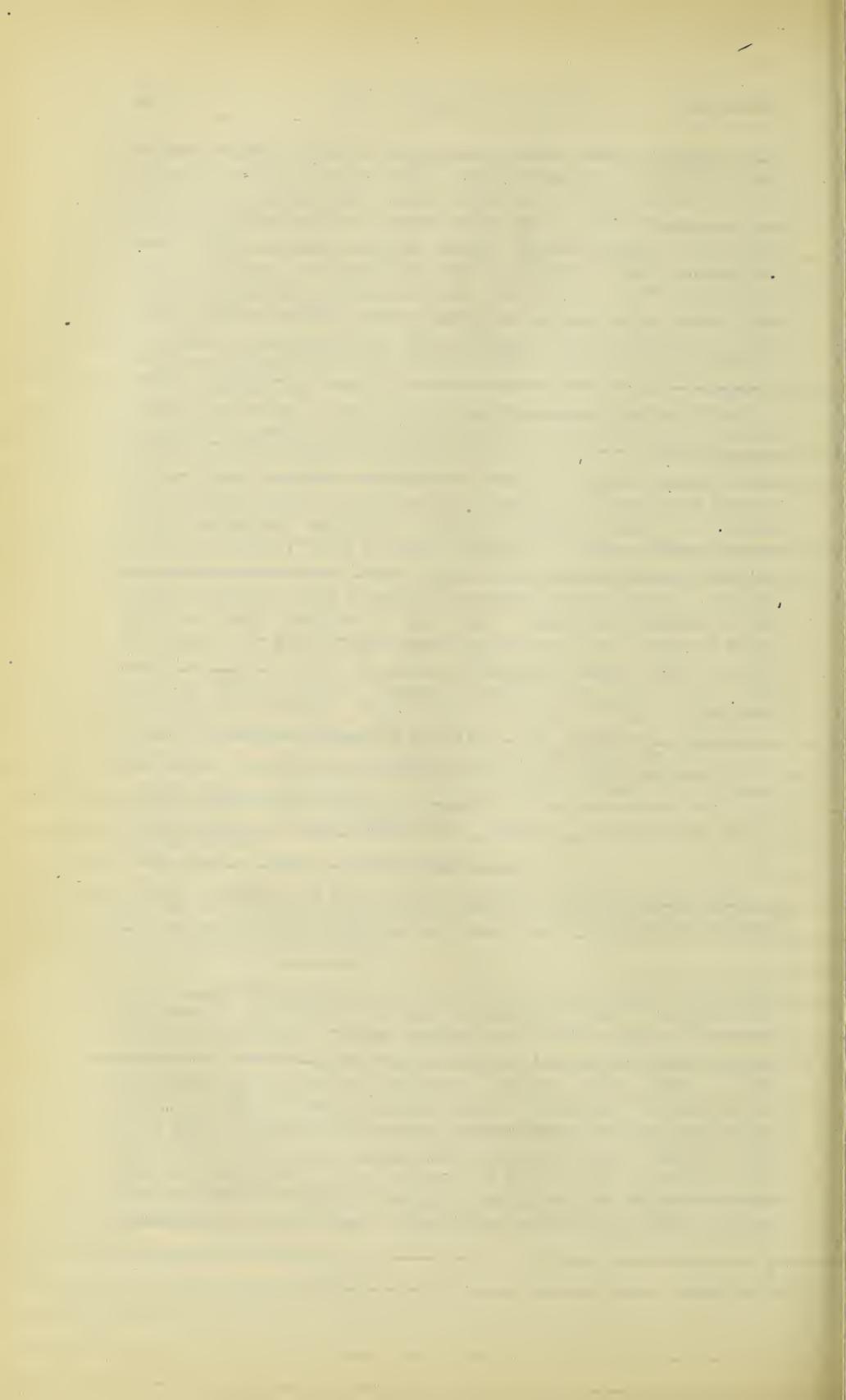
**Nile Land.** Bongo: Gir, *Schweinfurth*, 2485!

Hackel describes this grass as perennial with extravaginal innovations. I find all the specimens seen by me to consist of culms terminating with an inflorescence as do also the branches, if there are any present, and I must therefore consider the grass as annual.

6. *R. gracilis*, *Stapf in Journ. de Bot.*, 1905, 98, and *Pobég. Ess. Fl. Guin. Fr.* (1906) 219. Annual, not forming tufts though growing in close association. Culms slender, up to 16 in. high, 2-3-noded, compressed below and enclosed at the base in a short sheath, 2 upper internodes long-exserted, glabrous like the whole plant. Leaf-sheaths smooth, those at the base much compressed, keeled, about 1 in. long; ligules short, ovate, subauriculate, minutely hairy on the back; lower and intermediate blades filiform, tightly complicate, 2-3 in. long,  $\frac{1}{4}$  lin. wide when folded, the uppermost setiform and short. Racemes solitary, erect, straight or more or less flexuous, up to 4 in. long; joints linear, clavate and hollow above,

*R. minor Pely. Sierra Leone Br...*





1½ lin. long, rounded on the back, slightly concave on the inner face, slightly rough, disarticulating horizontally, the scar surrounded by a ciliolate rim; pedicels linear-lanceolate, flattened, contiguous with the joint, faintly nerved. Sessile spikelet lanceolate-oblong, with a small annular callus, 1½ lin. long, without awns, dull reddish-brown. Lower glume chartaceous, acute, transversely and obscurely rugose below the middle, the rugæ often broken up into tubercles, about 9-nerved, with the nerves faintly raised above, keels rigidly ciliolate above the middle, continued into equal or unequal bristles, 1½–2 lin. long; upper glume equalling the lower, subhyaline, lanceolate, with a fine terminal bristle, 1½ lin. long, 3-nerved. Lower floret ♂: valve lanceolate, hyaline, 1 lin. long, faintly 2-nerved, with a smaller valvule. Upper floret: valve lanceolate, acute, hyaline, about ¾ lin. long, 1-nerved, with a very much smaller valvule. Anthers purple, ¾ lin. long. Pedicelled spikelet reduced to a bristle about 1½ lin. long.

**Upper Guinea.** French Guinea: Kouroussa, *Pobéquin*, 494! Timbo, *Pobéquin*, 1764! 1766! 1767! 1790b!

## 22. IMPERATA, Cyr.; Benth. et Hook. f. Gen. Pl. iii. 1125.

Spikelets all alike, generally 2-nate (one short-, the other long-pedicelled) on the continuous branches (racemes) of a spike-like or narrowly thyriform panicle, disarticulating from the pedicels. Florets 2; the lower reduced to an empty valve (very rarely ♂?). Glumes subequal, membranous, 3–9-nerved, rarely nerveless, enveloped by very long silky hairs from the obscure callus and the lower portion of both glumes. Valve of the lower floret generally much smaller than the glumes, hyaline; of upper floret still smaller, hyaline, awnless, rarely 0. Valvule broad, hyaline, nerveless. Lodicles 0. Stamens 1–2. Styles connate below; stigmas linear, exserted from the top of the spikelet. Grain oblong; embryo half the length of the grain or more.—Perennial; basal leaves crowded and, like those of the innovation shoots, long; panicle silvery-silky.

Species 5 or 6, mostly closely allied, in the warm regions of both hemispheres.

1. *I. cylindrica*, Beauv. *Agrost.* 165, t. v. fig. 1, *Explan. planch.* 5. Culms 1½–4 ft. long, erect, 3–4-noded, glabrous. Leaf-sheaths rather loose, glabrous, the lowest at length usually breaking up into fibres; ligules membranous, short, hairy; blades linear, from a very narrow base, tapering to an acute point, the lowest ½–1 ft. by 1–2 lin., the upper very short, rigid, usually convolute, glabrous or bearded at the base, smooth below, margins scabrid, midrib stout. Panicle spike-like, 2–8 in. long, cylindrical, very dense; branches and branchlets very numerous, crowded, appressed; pedicels fine with clavate tips, ½–1½ lin. long, with long fine hairs below. Spikelets about 2½ lin. long, pale or purplish, enveloped by hairs 5–6 lin.

long. Glumes ovate-oblong to ovate-lanceolate, obtuse or sub-obtuse with the tips ciliate, usually 5-7 nerved. Valve of lower floret oblong, obtuse, denticulate, ciliate, nerveless; of upper ovate, acute, glabrous, nerveless. Anthers  $1\frac{1}{2}$ - $2\frac{1}{4}$  lin. long. Stigmas  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. long, purple.—Durand & Schinz, *Consp. Fl. Afr.* v. 693; Pilger in *Engl. Pflanzenw. Afr.* ii. 189, fig. 188 (?).

Var.  $\beta$  *Thunbergii*, Durand & Schinz, l.c. Sheaths usually glabrous at the nodes; ligules very short, truncate; blades usually flat, 2-4 lin. broad, otherwise as in the type. Panicle very dense. Spikelets about  $2\frac{1}{2}$  lin. long, hairs 5-6 lin. long.—Hack. in *Bull. Herb. Boiss.* iv. App. iii. 10; Durand & Schinz, *Étud. Fl. Congo*, 312; Franch. *Contr. Fl. Congo Franç.* 11; De Wild. & Durand, *Reliq. Dewevr.* (1902) 253; De Wild. *Étud. Fl. Katanga*, 1 (*cylindracea*). *I. Thunbergii*, Beauv. l.c. 165; Roem. & Schult. *Syst.* ii. 289; Nees, *Fl. Afr. Austr.* 89; Steud. *Syn. Pl. Glum.* i. 405. *I. arundinacea*, var. *africana*, Anderss. in Oefvers, K. Vet. Akad. Förh. Stockh. 1855, 159. *I. arundinacea*, var. *Thunbergii*, Hack. *Androp.* in DC. *Monogr. Phan.* vi. 94; Hack. in *Bolet. Soc. Brot.* vi. 142; K. Schum. in *Engl. Pfl. Ost-Afr.* B. 86, C. 96; Rendle in *Cat. Afr. Pl. Welw.* ii. 135. *I. angolensis*, Fritsch in *Bull. Herb. Boiss.* 2me sér. i. 1096. *I. Dinteri*, Pilg. in *Engl. Bot. Jahrs.* xlviii. 342. *Saccharum spicatum*, Thunb. *Prodr.* 20, not of Linn. (except in *Herb.*). *S. Thunbergii*, Retz. *Obs.* v. 17.

**Upper Guinea.** Senegambia: coast between Portudal and Jual, *Dollinger*! Sierra Leone: common by the Kora River, *Scott Elliot*, 1892! 4590! and without precise locality, *Smythe*, 251! *Don*! French Sudan: Dio, *Chevalier*, 166! Guionkorkoma, *Chevalier*, 329! Gold Coast: Aburi Hills, *Johnson*, 291! Central Province; Juabin, *Evans*, 433! Dahomey: Gebe, *Newton*, 20! Northern Nigeria: Nupe, *Barter*, 1393! Yola, *Dalziel*, 307! Lokoja and Abeokuta, *Migeod*, 69! Bahr Trona, *Oudney*, 4! Southern Nigeria: Lagos, *MacGregor*, 10 partly!

**North Central.** Dar Banda: Kaga Balidja, *Chevalier*, 6700! Lake Chad district, *Miss Macleod*! Tuburi, *Miss Macleod*!

**Nile Land.** Uganda: Entebbe, *Fyffe*, 194! Kavirondo, *Scott Elliot*, 6136! Toro; Butiti, 5000 ft., *Bagshawe*, 1100! *Stuhlmann*, 1320! British East Africa: Ngatana, Tana River plains, *Gregory*!

**Lower Guinea.** Lower Congo: without precise locality, *Smith*! Belgian Congo: Lubusi, *Dewèvre*, 351; Lutete, 2000 ft. *Hens*, 271! Angola: Loanda to Huilla, *Welwitsch*, 7179! 7354! 7189! 7229! 2640! Benguella, *Gossweiler*, 1956! Hereroland: Okokongominja, *Dinter*, 1767.

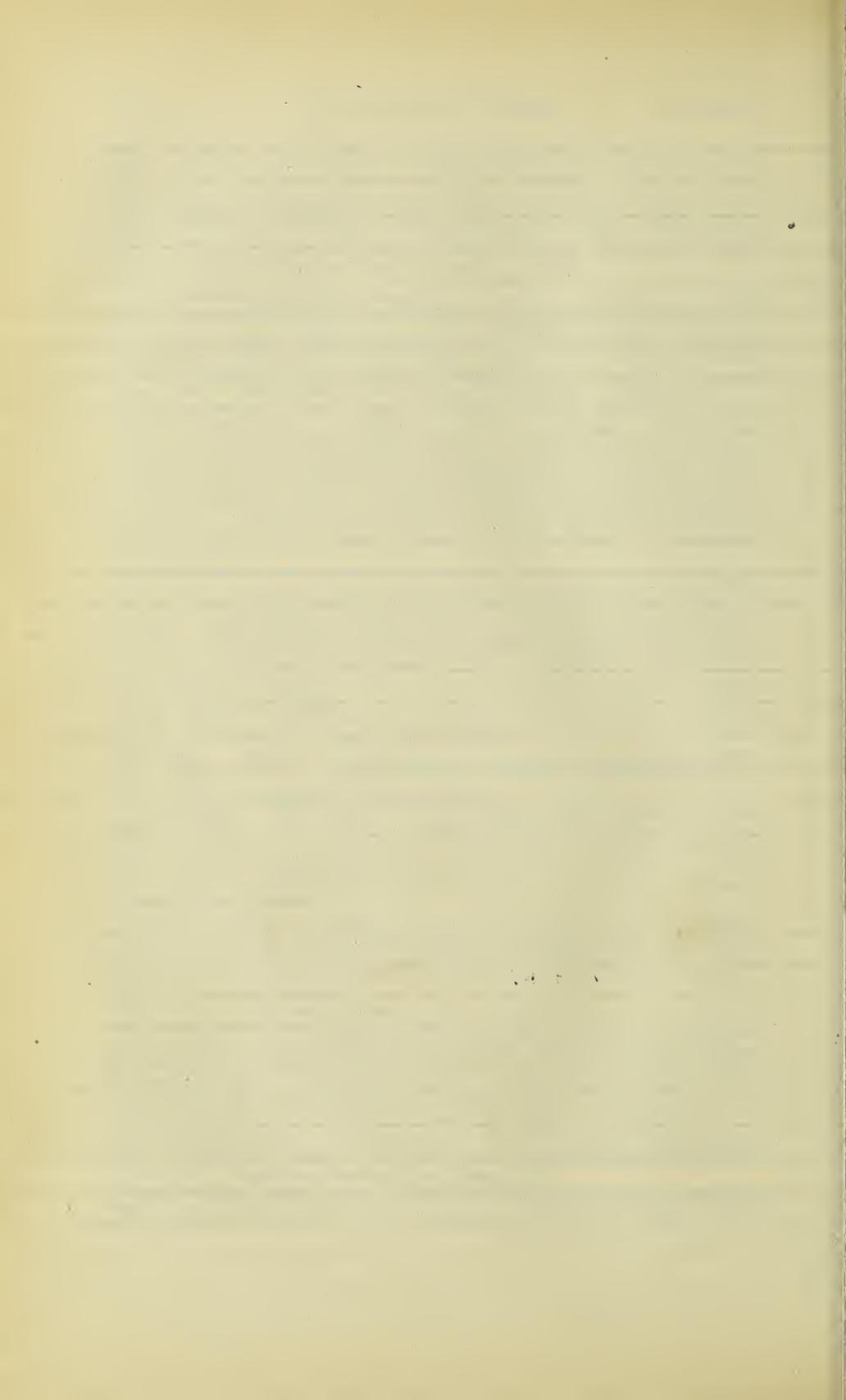
**South Central.** Belgian Congo: Bena Moulengere, *Dewèvre*, 1012; Katanga, common in bush, *Verdick*.

**Mozambique Distr.** Nyasaland: Mount Malosa, *Whyte*! Shire Highlands, *Adamson*, 189! and without precise locality, *Buchanan*, 1064! Portuguese East Africa: Zambesi, *Carvalho*! Kalahari: Lake Ngami, covering a wide area of the old lake bottom, *Schinz*, 653; Mutshama, *Fleck*, 302! Rhodesia: Kashitu River, *Rogers*, 8299!

Var.  $\gamma$  *Kœnigii*, Durand & Schinz, l.c. 694. Culms slender; sheaths generally long-bearded at the nodes; ligules very short, truncate; blades less rigid than in var. *Thunbergii* or almost flaccid, subglaucous. Panicle less dense, particularly when ripe. Spikelets  $1\frac{1}{2}$ -2 lin. long, hairs 5-7 lin. long.—Franch. *Contr. Fl. Congo Franç.* 11. *I. Kœnigii*, Beauv. l.c. 165; Roem. & Schult. l.c. 289; Trin. in *Mém. Acad. Pétersb.* 6me sér. ii. 331; Nees, l.c. 89; Steud. l.c. *I. arundinacea*, Hook. f. *Fl. Brit. India*, vii. 106 partly. *I. arundinacea*, var. *indica*, Anderss. l.c. 160. *I. arundinacea*, var. *Kœnigii*, Benth. *Fl. Hongk.* 419; Hack. *Androp.* in DC. *Monogr. Phan.* vi. 94; K. Schum. in *Engl. Pfl. Ost-Afr.* B. 86; C. 96. *Saccharum Kœnigii*, Retz. *Obs.* v. 16.

**Upper Guinea.** Sierra Leone: Bumban, 650 ft., *Thomas*, 1961! Southern Nigeria: Lagos; Ekau, *MacGregor*, 10 partly! *Dodd*, 387! Gaboon River, *Mann*, 1024!





Nile Land. Bongo: Gir, *Schweinfurth*, 1533! Uganda: Toro to Semliki valley, 3500–4500 ft., *Doggett*! East side of Lake Victoria, 4000 ft., *Battiscombe*, 684! British East Africa: Rabai Hills, *Taylor*!

Mozambique Distr. Zanzibar, *Last*! *Hildebrandt*, 1102! Nyasaland: Shire Highlands, *Buchanan*, 58! Mount Sochi, *Kirk*! Portuguese East Africa: Nyasa; Msala River, *Allen*, 124!

*Imperata cylindrica*, the 'alang alang' of the Malays, often covers enormous areas and when entering cultivated land may become a serious pest. The type is limited to the Mediterranean region as far as Turkestan and North-west India. The varieties and the type, although on the whole pretty distinct within their areas, often pass into each other, chiefly along the confines of their areas, or they possibly lose their distinctive characters under particular local conditions, when their separation becomes almost impossible.

### 23. MISCANTHIDIUM, Stapf.

Spikelets all alike, 2-nate, those of each pair unequally pedicelled on the articulate and tough or very tardily disarticulating rachis of paniced racemes, falling from their pedicels. Florets 2; lower reduced to an empty valve; upper always ♀. Glumes equal, chartaceous to coriaceous, lower dorsally flattened, more or less distinctly 2-keeled, with inflexed margins and a variable number of intracarinial nerves, upper 1–3-nerved, keeled. Valves hyaline, of the lower floret muticous or mucronate, of the upper awned; awn perfect. Valvules small, hyaline, nerveless. Lodicules 2, cuneate. Stamens 3. Stigmas usually laterally exerted. Grain oblong to linear-oblong; embryo half the length of the grain.—Perennial, erect; blades long, narrow, midrib very stout or the whole blade terete (tropical African species); ligules membranous; panicle much-branched, often large, silky and showy; spikelets usually villous, and with an involucre of hairs at the base.

Species 4, in Tropical Africa (south of the equator) and South Africa.

Panicles rather dense, silvery, with joints and pedicels

1½–2 lin. long; spikelets up to 2½ lin. long; hairs  
of callus ½ lin. long ... .. 1. *M. teretifolium*.

Panicles loose, tawny, with joints and pedicels 2–3 lin.

long; spikelets up to 2 lin. long; hairs of callus  
up to 1 lin. long ... .. 2. *M. Gossweileri*.

1. *M. teretifolium*, <sup>(Stapf)</sup> *Stapf*. Culms 6–12 ft. high, erect. Leaves congested at the base; sheaths tight, firm, terete, quite smooth, pallid, their remains long persisting around the base of the culms; ligules broad-ovate or oblong, 1–2 lin. long, scarious, hairy on the back; blades terete, quill-like, slightly channelled towards the base, over 3 ft. long, up to 2½ lin. in diam., pale green, smooth, glabrous. Panicle narrow, erect, silvery-villous, about 2 ft. long and up to 4 in. wide; rachis smooth, terete, or angular above, primary branches up to 8 in. long, very slender, often flexuous, loosely divided near the base. Racemes filiform, tough; joints subcapillary, 1½–2½ lin. long, pubescent with some longer hairs or almost glabrous; pedicels

paired, glabrous or hairy like the joints, with discoid tips, one very much longer than the other. Spikelets lanceolate, whitish, up to  $2\frac{1}{2}$  lin. long, with dense hairs  $\frac{1}{2}$  lin. long from the short callus. Glumes of equal length, membranous, the lower narrowly oblong, 2-toothed at the tip, 2-keeled with 2 intracarpal nerves and 1 extracarpal on each side, with hairs 2 to 3 lin. long from the lower part of the back; upper glume acute, lanceolate, 3-nerved, with hairs like the lower. Valve of lower floret oblong-lanceolate, subacute, slightly shorter than the glumes, hyaline, 1-nerved, ciliate; of upper floret narrowly linear-lanceolate, with two lobes, ciliate, up to 1 lin. long, hyaline with a slender awn from the notch; awn up to 4 lin. long, more or less twisted and geniculate near the base. Valvule elliptic, very small and hyaline. Anthers purple,  $1\frac{1}{2}$  lin. long. Stigmas purple, up to  $1\frac{1}{2}$  lin. long.—*Erianthus teretifolius*, Stapf in Journ. Linn. Soc. xxxvii. 478; Pilger in Engl. Jahrb. xxxix. (1907) 597.

**Lower Guinea.** Angola: Malange District, *Gossweiler*, 807!

**Mozambique Distr.** Rhodesia: Livingstone, by the Zambesi River, *Mrs. Craster*, 66! Victoria Falls, *Miss Gibbs*, 141! *Rogers*, 5315! Insiza District, *Mundy*!

**2. M. Gossweileri, Stapf.** Culms up to over 8 ft. high, erect, 4-noded, silky-hairy below the panicle. Leaf-sheaths tight, firm, terete, smooth, glabrous except towards the mouth where they are frequently ciliate along the margin and often tomentose near the junction with the blade, pallid, the basal long-persistent; ligules very short and rounded, scarious, hairy on the back; blades terete, quill-like, channelled towards the base, over 3 ft. long, 1 lin. in diam., pale green, smooth, tomentose above the ligule, otherwise glabrous. Panicle narrow, erect, tawny-villous, up to 20 in. long, and up to 4 in. wide, rarely wider; rhachis smooth, hairy below, terete, or angular above, primary branches up to 8 in. long, filiform, more or less flexuous, the lowest distinctly peduncled, the others loosely divided near the base. Racemes finely filiform, flexuous, tough; joints subcapillary, 2-3 lin. long or in lax specimens much longer, finely scaberulous, more or less hairy or glabrous; pedicels paired, like the joints with discoid tips, one very much longer than the other. Spikelets lanceolate to oblong, up to 2 lin. long, tawny, with dense whitish hairs up to 1 lin. long from the short callus. Glumes of equal length, membranous, the lower narrowly oblong, minutely truncate or 2-toothed, 2-keeled, with 1 or 2 intracarpal nerves and 1 extracarpal nerve on each side, with hairs up to  $1\frac{1}{2}$  lin. long from the lower part of the back; upper glume lanceolate, subacute, 3-nerved, with hairs like the lower. Valve of the lower floret lanceolate, subacute, slightly shorter than the glumes, hyaline, 1-nerved, long-ciliate and pubescent above; of the upper narrowly lanceolate-linear, long-ciliate, pubescent on the back,  $1\frac{1}{2}$  lin. long, delicately hyaline, with a fine flexuous awn  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long. Valvule very

*M. fuscescens* Polg. Schlieben 1010 type  
Tanganika E. Schlieben 129

Distinguished by the relatively large brown  
spots.

*Eremitus teretifolius* Pilg 1907 not  
Stapp 1906  
Grossweiler 807 is *Miscanthus*  
*leucopetius* p. 90

minute, hyaline and ciliate. Anthers over 1 lin. long. Stigmas purple, up to 1 lin. long.—*Cleistachne terebifolia*, Hack. in Oest. Bot. Zeitschr. li. 153.

**Lower Guinea.** Angola: Benguella; in marshes along the rivers Tiengo and Kiuto, *Gossweiler*, 4032! along the Luasenha lutchi rivulet, *Gossweiler*, 3067! Humpata, *Newton*, 24!

*Imperfectly known species.*

3. "**Erianthus capensis**, Nees"; Klatt in *Jahrb. Hamb. Wiss. Anst.* ix. (1891) 122.

**Mozambique Distr.** Zanzibar: near Tschukuani, *Stuhlmann*, 6. ii. 1889.

*E. capensis*, Nees, is a *Miscanthidium* (*M. capense*, Stapf) which so far has not been observed outside of South Africa. The determination is very doubtful.

4. **E. flavescens**, K. Schum. in *Engl. Pfl. Ost-Afr. C.* 96. Culms including the panicle over 5 ft. high. Leaf-sheaths quite glabrous; ligules membranous, 1 lin. long, with dense hairs up to 4 lin. long; blades over 1 ft. by up to 7 lin., smooth, midrib very stout. Panicle about 1½ ft. long, narrow. Spikelets 2 lin. long, yellowish, with a basal ring of hairs of the same length. Lower glume sparingly hairy. Fertile valve densely hairy, with an awn as long as the spikelet.

**Mozambique Distr.** German East Africa: Bukoba, *Stuhlmann*, 3694.

5. **E. violaceus**, K. Schum. in *Engl. Pfl. Ost-Afr. C.* 96. Only known from a portion of an inflorescence. Spikelets 2 lin. long, reddish, basal ring of hairs of the same colour. Lower glume almost glabrous. Fertile valve much less hairy than in the preceding species. Pilger in *Mildbr. Bot. Wiss. Ergebn. Deutch. Zentral-Afr. Exped.*, 42.

**Mozambique Distr.** German East Africa: Itolio, western shore of Lake Victoria, *Stuhlmann*, 933; Ruanda; sources of Mhogo river, in swamps, 6000 ft., *Mildbraed*, 700.

Schumann says that *E. flavescens* and *E. violaceus* can only be compared with *E. Sorghum* which is a *Miscanthidium* (*M. Sorghum*, Stapf). There is nothing in the descriptions to throw any light on the affinity of these two species.

## 24. ERIOCHRYSIS, Beauv. Agrost. 8.

Spikelets 2-nate, of each pair similar, differing in sex and slightly in size, one sessile, the other pedicelled, on the articulate fragile rhachis of racemously arranged spike-like racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rhachis and pedicel. Florets 2, lower reduced to an empty valve, upper ♀ in the sessile, ♀ in the pedicelled spikelets. Glumes more or less equal, lower chartaceous or coriaceous, with narrow inflexed margins, with several intracarinal nerves, upper thinner, 1-3-nerved. Valves hyaline, mucous, nerveless, of the upper floret smaller. Valvule 0. Lodicules 2, cuneate. Stamens 3, in the pedicelled spikelet rudimentary. Stigmas laterally

exserted. Grain obovoid- to ellipsoid-globose; embryo half the length of the grain.—Perennial, of moderate size. Leaves mostly crowded at the base, with narrow blades. Panicle contracted, fulvously or rufously tomentose. Spikelets surrounded by short or moderately long hairs springing from the callus.

Species 5, in Tropical Africa and America.

Sessile spikelets surrounded by hairs up to half as long as the spikelets.

Glumes subchartaceous, thin in the upper part; panicles oblong, 1–2 in. long, pale tawny ... 1. *E. purpurata*.

Glumes chartaceous, shining; panicles narrow, 3–6 in. long, fulvous ... 2. *E. brachypogon*.

Sessile spikelets surrounded by hairs distinctly exceeding them; glumes chartaceous, shining; panicles fulvous ... 3. *E. pallida*.

(Rendle)

1. *E. purpurata*, <sup>(Rendle)</sup> Stapf. Culms 1–1½ ft. high, erect, 3-noded, upper nodes long-exserted. Leaf-sheaths rather tight, the lowest glabrous, shining, long-persistent, the upper pubescent, all bearded at the nodes; ligules membranous, very short, truncate, ciliate; blades linear, tapering to an acute or subacute point, very narrow or almost setiform, those of the innovations 4–7 in. long, of the culm up to 4 in. long and 1½ lin. wide, the uppermost very short, pubescent on both sides, but particularly on the back and often villous at the tips, or villous all along, about 3 secondary nerves on each side. Panicle oblong, 1–2 in. long, ½–⅔ in. wide, tawny, dense. Rhachis glabrous, smooth. Racemes about 6, sessile or the lowest shortly peduncled and up to 1 in. long, the following much shorter; joints 1–1½ lin. long, smooth, ciliate, thickened at the tips; pedicels similar, about ½ lin. long. Sessile spikelet lanceolate, subacute, 3 lin. long, surrounded by fulvous hairs springing from the callus, up to half as long as the spikelet. Glumes equal; lower glume membranous, minutely truncate, 2-keeled, with 2 to 4 intracarinial nerves connected by transverse veins in the upper part, strongly ciliate, pubescent near the tips otherwise usually glabrous, sometimes tinged with wine-red; upper glume acute, 3-nerved, ciliate, thin. Valve of lower floret oblong, subacute, 2½ lin. long, hyaline, ciliate, nerveless, pubescent on the back upwards; of upper oblong, subobtuse or truncate, rarely produced into a delicate mucro or minute bristle, 1 lin. long, hyaline, nerveless, sparingly ciliate. Anthers 1–1½ lin. long. Stigmas purplish, over 1 lin. long. Pedicelled spikelet ♀, similar to the sessile, up to 2½ lin. long, surrounded by a tuft of hairs as long as the spikelet, glumes with fewer nerves and longer clubs. Valves slightly smaller. Anthers reduced to very minute club-shaped bodies.—*Saccharum purpuratum*, Rendle in Trans. Linn. Soc. ser. ii., iv. 56; K. Schum. in Engl. Pfl. Ost-Afr. C. 96.

Mozambique Distr. Nyasaland: Mount Milanji, Whyte, 8! and without precise locality, Buchanan, 997!



3 = *E. munroana* (Hack) Pilg.

**Lower Guinea.** Angola: Country of the Ganguellas and Ambuellas, Gossweiler, 1959! 2384!

Also in South Africa.

(Stapf)

**2. E. brachypogon**, Stapf. Perennial, caespitose, with intravaginal innovations. Culms 15–30 in. high, slender, 2–4-noded, upper nodes exserted. Leaf-sheaths tight, firm, more or less woolly near the mouth, otherwise glabrous, shining, long-persistent, the upper bearded at the nodes; ligules short, truncate, with long hairs; blades narrow, linear, acute, tightly involute, rigid, up to 10 in. long, 2 lin. wide if flattened out, glabrous excepting the base which is hairy on one or both sides, or appressedly hairy all along on the back. Panicle oblong or linear, dense, 3–6 in. long, fulvous or ferruginous; rhachis slender, terete, shortly hairy or glabrescent, pubescent at the nodes; racemes 10–16, solitary or the lowest paired, almost 1 in. long, 2–3 lin. wide, erect or slightly spreading; joints rather stout, terete,  $1\frac{1}{2}$  lin. long, ciliate with fulvous hairs up to 1 lin. long; pedicels similar, 1 lin. long. Sessile spikelet lanceolate, straw-coloured, 2–2 $\frac{1}{2}$  lin. long, surrounded at the base by hairs up to half as long. Glumes subequal; lower glume chartaceous, minutely 3-dentate, flat on the back, glabrous, somewhat shining, keels ciliate upwards, nerves 3–5, rarely 7, with obscure cross-veins visible only in transmitted light; upper glume thin, acute, 3-nerved, ciliate along the keel and at the apex. Valve of lower floret almost as long as the upper glume, lanceolate, hyaline, nerveless, hairy; of upper ovate,  $\frac{3}{4}$  lin. long, hyaline, nerveless, ciliate. Anthers  $\frac{2}{3}$  lin. long. Styles and fulvous stigmas each  $\frac{1}{2}$  lin. long. Pedicelled spikelet ♀, similar to the sessile but smaller,  $1\frac{1}{2}$  lin. long, glumes with fewer nerves and longer hairs. Anthers 0 or very much reduced.—*Saccharum brachypogon*, Stapf in Bull. Soc. Bot. France, lv. (1908) Mém. viii<sup>9</sup>. 97.

**Upper Guinea.** Northern Nigeria: Nupe, savannas, Barter, 1351! French Sudan: Tabacaroni, south-west of the Siguiri River, in marshy places, Chevalier, 716!

**North Central.** Ndouka district and Konti: village of Tele, Chevalier, 8251!

**South Central.** Belgian Congo, Butaye (1900), 1815!

**Mozambique Distr.** Mashonaland: Charter District, Mundy!

*nov. n. n. n.*

**3. E. pallida**, Munro in Harv. Gen. S. Afr. Pl. ed. ii. 440. Perennial, caespitose, with intravaginal innovations. Culms 2 ft. long, 3-noded, lower leaves crowded, upper internodes long-exserted. Leaf-sheaths rather lax, scantily hairy or bearded (tropical specimens) at the nodes, otherwise glabrous, or more or less hairy in the upper part, the lowest shining as if lacquered; ligules short, with hairs from the base behind; blades narrow, linear, acute, flat, 4–5 in. long by 2 lin. (or by less than 1 lin. in the more or less convolute innovation leaves), firm, puberulous to villous on both sides, margin smooth. Panicle oblong, 4–5 in. long, densely fulvous or ferruginous.

shining; rhachis slender, terete, long-hairy, bearded at the nodes. Racemes 6–14, solitary or the lower 2–3-nate,  $\frac{1}{2}$  to almost 1 in. long, rather stout; joints and pedicels stout, terete, 1–1 $\frac{1}{2}$  lin. long, ciliate with fulvous hairs up to 3 lin. long. Sessile spikelet lanceolate, straw-coloured, 2–2 $\frac{1}{2}$  lin. long, enveloped by rigid hairs up to 3 lin. long. Glumes subequal; lower chartaceous, entire, subobtusely, 2-keeled and 4-nerved between the keels which are long-ciliate above the middle. Valve of lower floret 1 $\frac{1}{2}$ –1 $\frac{3}{4}$  lin. long, lanceolate; of upper very small, ovate, nerveless, tips ciliate. Anthers 1 lin. long. Grain obovoid-globose,  $\frac{1}{2}$  lin. long. Pedicelled spikelet ♀, similar to the sessile but smaller (1 $\frac{1}{2}$ –1 $\frac{3}{4}$  lin. long), with more copious enveloping hairs. Anthers rudimentary, very minute.—*Saccharum munroanum*, Hack. in DC. Monogr. Phan. vi. 124; Durand & Schinz, Consp. Fl. Afr. v. 694; Stapf in Dyer, Fl. Cap. vii. 321; Rendle in Cat. Afr. Pl. Welw. ii. 136.

**North Central.** Eastern Shari: Ndelli, *Chevalier*, 8113!

**Lower Guinea.** Angola: Huilla; Humpata and between Lopollo and the River Monino, *Welwitsch*, 2642!

Also in South Africa.

25. **SACCHARUM**, Linn.; Benth. et Hook. f. Gen. Pl. iii. 1125.

Spikelets all alike, 2-nate, one sessile, the other pedicelled on the articulate fragile rhachis of paniced racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rhachis and pedicel. Florets 2; lower reduced to an empty valve; upper ♂. Glumes equal, often chartaceous to subcoriaceous towards the base, membranous to subhyaline upwards; lower with inflexed margins and in the sessile spikelet usually with an even number of nerves; upper 1-, 3-, or 5-nerved. Valves hyaline; upper with a terminal bristle-like usually straight awn, or mucronate or muticous or 0. Lodicles 2, cuneate. Stamens 3. Stigmas laterally exerted. Grain oblong to subglobose; embryo short to half the length of the grain or more; hilum basal.—Perennial, tall to very tall; leaves various; panicle large, often silvery-silky and showy; spikelets usually surrounded by long silky hairs from the base.

Species about 7, tropical or subtropical.

Racemes up to 4 in. long; hairs of the callus 2–3 times as long as the spikelet; valve of the upper floret subulate or 0.

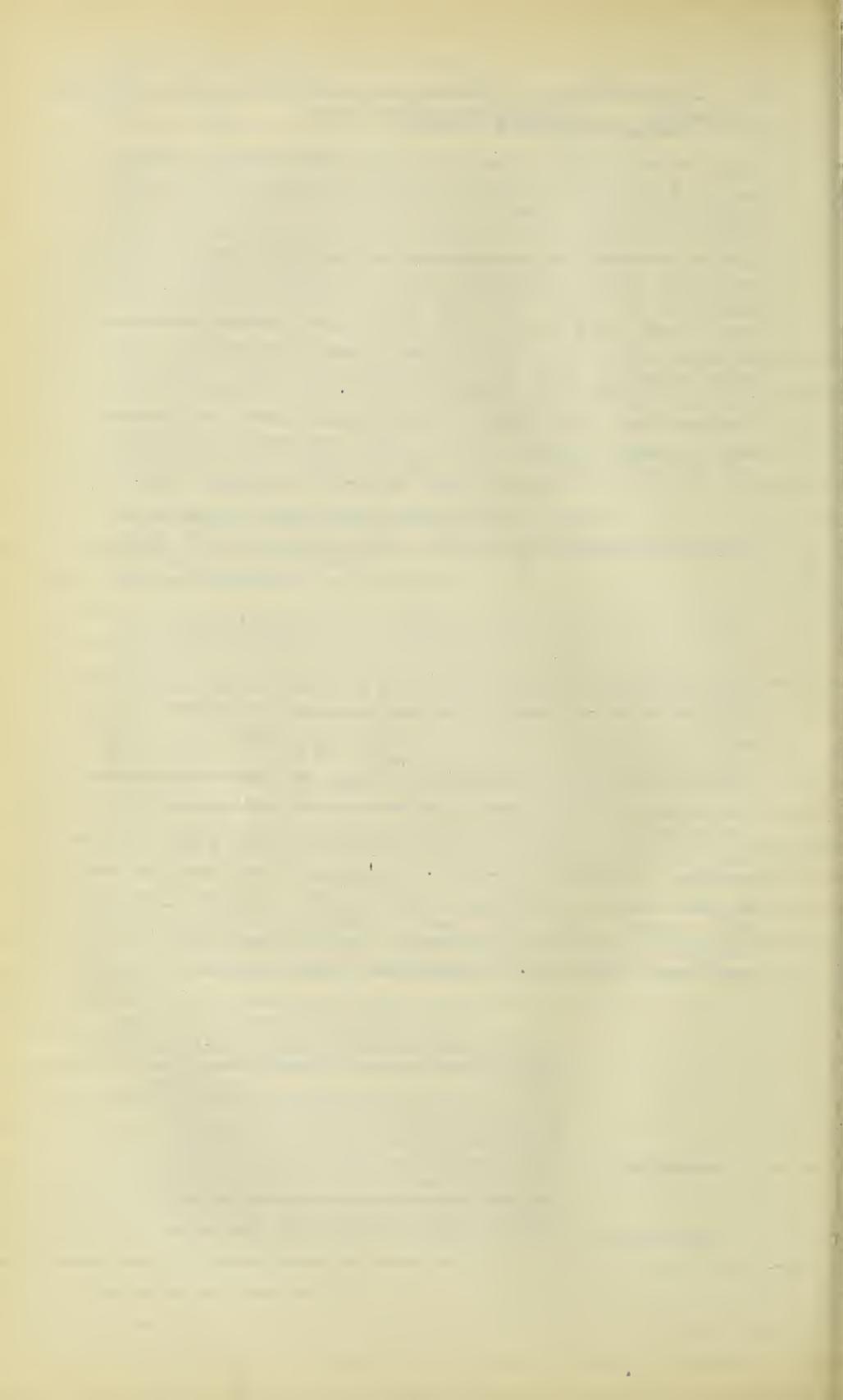
Leaf-blades up to 5 lin. wide; spikelets 2–3 lin. long, surrounded from the callus by hairs up to 6 lin. long; lower glume chartaceous and reddish at the base, whitish and subhyaline above

1. *S. spontaneum*.

Leaf-blades up to 2 in. wide; spikelets 1 $\frac{3}{4}$ –2 lin. long, surrounded from the callus by hairs up to 5 lin. long; lower glume subhyaline, slightly firmer at the base, whitish throughout...

2. *S. officinarum*.

4. *Emochrysis phaenostachya* Pilger  
Tanganyika Terr.



Racemes up to 8 lin. long; hairs of the callus as long as the spikelet; valve of upper floret ovate-lanceolate, awned; awn as long as the valve; blades 3-8 lin. wide... .. 3. *S. Ravenna*.

1. *S. spontaneum*, Linn. *Mant. Alt.* 183, var. *ægyptiacum*, Hack. in *DC. Monogr. Phan.* vi. 115. Culms up to over 12 ft. high, many-noded, silky below the panicle, coated with wax below the nodes. Leaf-sheaths tight, terete, smooth, glabrous or fimbriate at the mouth; ligules short, membranous, brown, long-ciliate from the back; blades linear, tapering to a very long and fine point, the upper  $2\frac{1}{2}$ -5 lin. wide, glaucous, glabrous or sometimes hirsute above the ligule, smooth below, slightly rough above, margins very scabrid, midrib very stout, rounded on the back, flat above. Panicle oblong, up to over  $1\frac{1}{2}$  ft. long, up to 5 in. wide, dense and rather contracted, silvery; common rachis silky; primary branches obliquely erect, the lower in whorls of 4 or 5 or more, more or less silky-hairy, very slender. Racemes up to 4 in. long, very fragile; joints and pedicels filiform, with long silky hairs, the former of varying length (the middle ones about 2- $2\frac{1}{2}$  lin. long), the latter much shorter. Spikelets lanceolate, 2-3 lin. long, surrounded from the callus by a tuft of long silky hairs, 5-6 lin. long. Glumes subequal, lanceolate, firm and more or less reddish at the base, otherwise subhyaline, the lower acuminate, sometimes minutely 2-toothed, 2-nerved, sparingly ciliate, the upper acute, 1-nerved, mucronate, densely ciliate. Valve of lower floret oblong to lanceolate, acute or subacute, hyaline, nerveless, 1- $1\frac{1}{2}$  lin. long, of upper setiform or subulate, up to 1 lin. long or more or less reduced. Valvule, if present, ovate-lanceolate, sparingly ciliate, up to  $\frac{1}{2}$  lin. long. Lodicules broad, cuneate, ciliate from the top. Anthers yellow, 1 lin. long. Styles over 1 lin. long. Stigmas purplish,  $\frac{1}{2}$  lin. long. Grain unknown.—Durand & Schinz, *Consp. Fl. Afr.* 694; K. Schum. in *Engl. Pfl. Ost-Afr.* C. 96; Hook. f. *Fl. Brit. Ind.* vii. 119. *S. spontaneum*, Beauv. *Fl. Owar.* ii. 71, t. 103. *S. biflorum*, Forsk. *Fl. Ægypt.-Arab.* i. 16; Aschers. & Schweinf. *Ill. Fl. Égypte*, 163. *S. ægyptiacum*, Willd. *Enum. Hort. Berol.* i. 82; Boiss. *Fl. Or.* v. 454. *S. caducum*, *S. speciosissimum*, and *S. Palisotii*, Tausch in *Flora*, 1836, 527; Steud. *Syn. Pl. Glum.* i. 406, 405. *S. punctatum*, Schumach. in *Schumach. & Thonn. Beskr. Guin. Pl.* 46. *Imperata spontanea*, Beauv. *Agrost.* 165; Roem. & Schult. *Syst.* ii. 289.

**Upper Guinea.** Nigeria: Nun River, *Vogel*, 33! *Mann*, 536! common on the sandbanks of the Niger from the sea up to Borgu, *Barter*, 925! *Vogel*! Katagum District, by streams, *Daziél*, 277!

**Nile Land.** Gallabat: Matamma, *Schweinfurth*, 1115! Sudan: Sennaar, *Brown*, 782! Fazokl, *Kotschy*, 498! Abyssinia: Takafri, *Stuedner*, 1105! banks of the tributaries of the Tacazze River, 3000-3500 ft., *Schimper*, 18! 2206! Lake Heba, *Drake Brockman*, 139; Schebeli, *Donaldson Smith*!

**Mozambique Distr.** Nyasaland: West shore of Lake Nyasa, *Kirk*!

Extending through lower Egypt to Syria.

2. *S. officinarum*, *Linn. Sp. Pl. ed. i.* 54. Culms up to 20 ft. high, many-noded, glabrous or pubescent below the panicle, more or less coated with wax below the nodes. Leaf-sheaths tight, terete, smooth, glabrous except when young; ligules very short, membranous, ciliate; blades linear-lanceolate, up to 5 ft. long, and over 2 in. wide, glaucous below and green above, more or less scabrid along the margins, midrib very stout, rounded on the back, more or less flat above. Panicle pyramidal, up to over 3 ft. long, dense, silvery; common rachis glabrous except on the pubescent nodes, or more or less silky; primary branches verticillate or semiverticillate, glabrous or hairy, very slender. Racemes up to 4 in. long, very fragile, joints and pedicels filiform, more or less ciliate or glabrous, the former of varying length (the middle ones 2–3 lin. long), the latter much shorter. Spikelets lanceolate,  $1\frac{3}{4}$ –2 lin. long, surrounded from the callus by a tuft of long silky hairs, up to 5 lin. long. Glumes subequal, lanceolate, firm towards the base, otherwise subhyaline, the lower acute, 2-nerved to sub-4-nerved, glabrous, the upper very similar, 1- to 3-nerved, glabrous or ciliate. Valve of lower floret oblong, acute or subacute, hyaline, nerveless, ciliate, about  $1\frac{1}{2}$  lin. long; of upper subulate, ciliate, as long as the lower or 0. Valvule if present, very minute, obovate, ciliate. Lodicules broad, cuneate, sparingly ciliate from the top. Anthers  $\frac{3}{4}$  lin. long. Styles  $\frac{3}{4}$  lin. long. Stigmas purplish, 1 lin. long. Grain oblong, attenuated upwards, subterete,  $\frac{3}{4}$  lin. long, flesh-coloured; embryo  $\frac{1}{6}$  the length of the grain.—Beauv. *Agrost. Explan. planch.* 5, t. iv. fig. 10; Kunth, *Enum. Pl. i.* 474; Steud. *Syn. Pl. Glum. i.* 405; Benth. & Trimen, *Med. Pl. t.* 298; Hack. in DC. *Monogr. Phan. vi.* 111; Durand & Schinz, *Consp. Fl. Afr. v.* 694; K. Schum. in *Engl. Pf. Ost-Afr. B.* 74–76, 86, figs. 8 & 9, C. 96; Rendle in *Cat. Afr. Pl. Welw. ii.* 136; Cheval. in *Bull. Mus. Hist. Nat. Paris, vii.* 92.

**Lower Guinea.** Angola: Golungo Alto; in plantations by the Luinha River, *Welwitsch*, 2901! Mossamedes; near Cavalheiros, *Welwitsch*, 2283!

**Mozambique Distr.** German East Africa, *Busse*, 193! Nyasaland: between Kondowe and Karonga, *Whyte*!

Grown in many parts of Tropical Africa, but mostly only for chewing.

3. *S. Ravennæ*, *Linn. Syst. ed. xiii.* 88. Culms from 3 to over 6 ft. high, robust, many-noded, glabrous, smooth. Leaf-sheaths tight, the lowest hirsute at least towards the base, otherwise glabrous; ligules very short, membranous, with long hairs; blades linear, the basal up to over 3 ft., the upper up to 2 ft. long and 3–8 lin. wide, towards the base more or less bearded with long white hairs, rough on both sides, midrib very stout, rounded on the back, flat or slightly channelled above, occupying almost the whole width of the lower part of the blade. Panicle erect, up to 2 ft. long, dense or somewhat lax and lobed, silvery-silky, with a tinge of grey or purple or quite white; rachis glabrous, smooth below; branches slender, solitary from the distant nodes, divided from the base, up to 8 in. long,





branchlets unequal, divided again, glabrous except at the nodes. Racemes sessile or the lower more or less peduncled, up to 8 lin. long, narrow to oblong; joints and pedicels filiform, long-ciliate, with thickened tips, the latter shorter than the joints. Sessile spikelet lanceolate, acuminate, 2-3 lin. long, surrounded by hairs of the same length, springing from the callus. Glumes subequal, membranous, the lower acuminate, minutely 2-toothed, 2-keeled, with or without 1 or 2 short intracarinial nerves, back smooth and glabrous, keels scabrid; the upper lanceolate, acuminate, minutely mucronate, 1-nerved, margins hyaline, ciliolate, back glabrous or sometimes with a few hairs, keels scabrid. Valve of lower floret lanceolate, acute,  $1\frac{1}{2}$  lin. long, hyaline, 1- or obscurely 3-nerved, ciliate, of upper floret ovate-lanceolate,  $1-1\frac{1}{2}$  lin. long, hyaline, 3-nerved, glabrous or ciliolate, with a bristle-like awn about as long as the spikelet. Valvule oblong-lanceolate, glabrous, hyaline, up to 1 lin. long. Lodicules glabrous. Anthers up to  $1\frac{1}{2}$  lin. long. Stigmas purplish, up to 1 lin. long. Pedicelled spikelet like the sessile, but both glumes 3-nerved and hairy.—Sibth. & Sm. Fl. Græca, t. 52; Reichb. Ic. Fl. Germ. fig. 1505. *Erianthus Ravennæ*, Beauv. Agrost. 162; Roem. & Schult. Syst. ii. 323; Kunth, Enum. i. 479; Hack. in DC. Monogr. Phan. vi. 139; Durand & Schinz, Consp. Fl. Afr. v. 695; Hook. f. Fl. Brit. Ind. vii. 121; Chiov. in Ann. Istit. Bot. Roma, vi. 164, and vii. 58; Stapf in Kew Bulletin, 1907, 208; Nees, Gen. Fl. Germ. t. 90. *Andropogon Ravennæ*, Linn. Sp. Pl. ed. ii. 1481; Host, Gram. Aust. iii. t. 1. *Ripidium Ravennæ*, Trin. Fund. 169.

**Nile Land.** British Somaliland: between Hargaisa and Berbera, *Robecchi Bricchetti*! Plains of Seek, north-east of Hargaisa, *Riva*, 49! between Derra Godeli and Bernera, *Riva*, 19! Issituggan and generally along the margins of river beds, *Drake-Brockman*, 4! 35!

Mediterranean countries to Turkestan and N.W. India.

The Somaliland specimens quoted here were referred by Dr. Chiovenda and myself to Hackel's subvariety *purpurascens* (Hack. l.c. 140; *Erianthus purpurascens*, Anders. in Öfvers K. Vet. Acad. Stockh. 1855, 161) which is supposed to differ from the original in having smaller spikelets with purple or violet glumes, greyish hairs, a less acuminate lower glume and usually ciliate upper valve. Although the European specimens have a fairly uniform facies, those of the Asiatic material vary so much in the characters mentioned that a differentiation of subvarieties may for the present be neglected. I would only state that the Somali specimens seen by me match completely with some of the Indian examples.

## 26. EULALIA, Kunth, Rév. Gram. i. 160.

Spikelets all alike or nearly so, 2-nate, one sessile, the other pedicelled, on the articulate fragile rhachis of 2-nate, digitate or fascicled spike-like racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rhachis and the pedicel. Florets typically 2; lower reduced to an empty

valve or represented by a minute scale or quite suppressed; upper always ♂. Glumes equal, rigidly membranous to coriaceous; lower dorsally flattened or shallowly concave (not grooved), more or less 2-keeled with inflexed margins; upper 1-3-nerved, keeled. Valves hyaline; lower mucous, sometimes much reduced or quite suppressed; upper very short, 2-lobed, awned. Valvules small or 0. Lodicules 2, small, cuneate. Stamens 3. Stigmas linear, laterally exerted. Grain oblong; embryo almost half the length of the grain or longer; hilum basal, punctiform.—Perennial. Culms simple, erect or ascending. Leaf-blades convolute in bud, then flat, usually narrow, gradually passing into the sheath. Racemes often coloured (brown or purplish).

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

Racemes with white, pinkish or violet hairs; spikelets  $2\frac{1}{2}$ – $4\frac{1}{2}$  lin. long; lower glume with 2-7 distinct intracarinial nerves; valve of lower floret well developed.

Spikelets acute,  $4\frac{1}{2}$  lin. long ... .. 1. *E. sericea*.

Spikelets minutely truncate and 2-toothed,  $2\frac{1}{2}$ – $3\frac{1}{2}$  lin. long.

Lower glume concave on the back, with 2 intracarinial nerves ... .. 2. *E. villosa*.

Lower glume flat on the back or subconvex near the base, with 5-7 intracarinial nerves ... 3. *E. polyneura*.

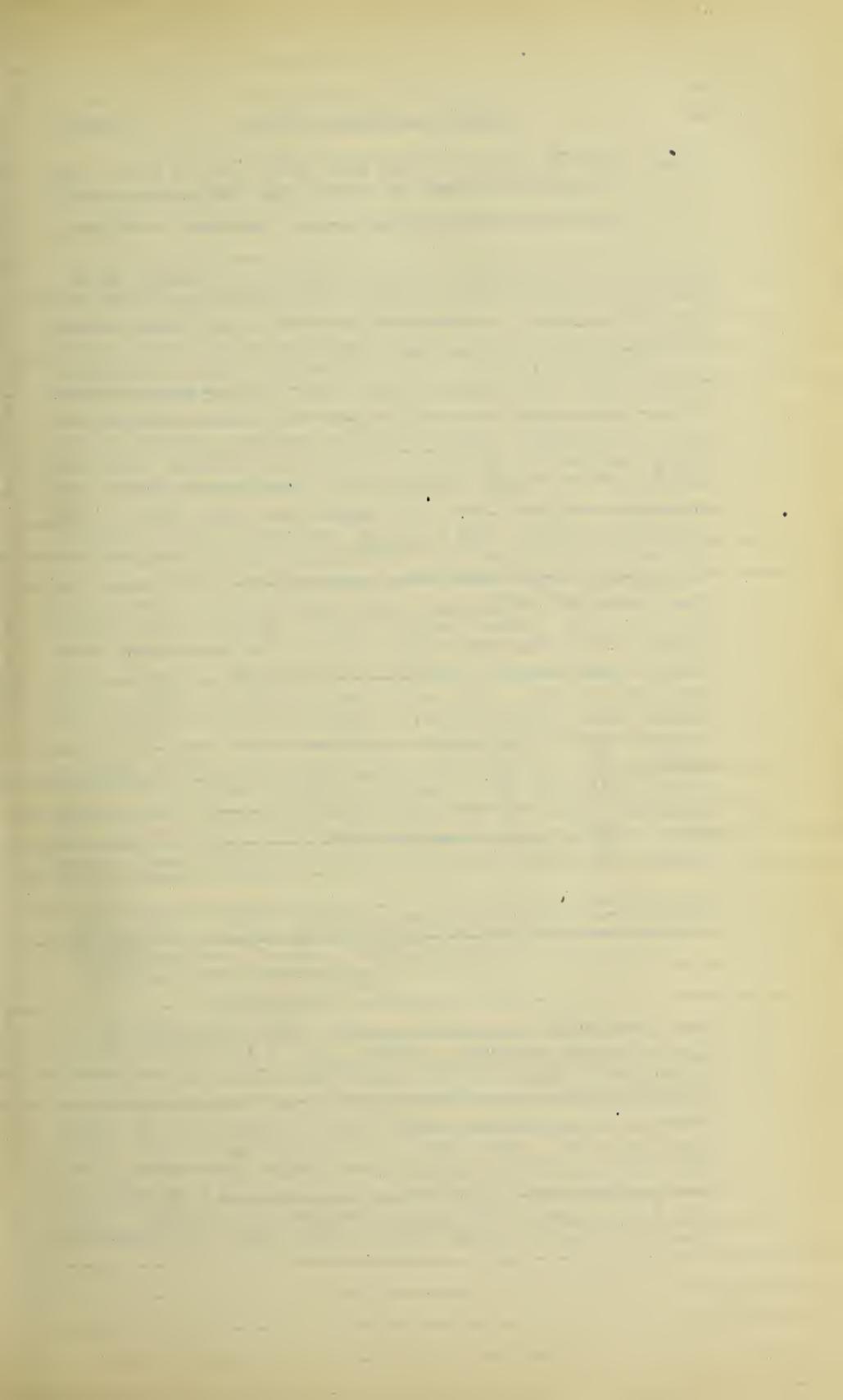
Racemes with fulvous hairs; spikelets up to 2 lin. long; lower glume with very obscure intracarinial nerves; lower floret quite suppressed or represented by a minute scale.

Culms erect, about 3-noded; terminal raceme much exceeding the lateral ... .. 4. *E. ferruginea*.

Culms ascending, conspicuously geniculate, 8- or more-noded; racemes subequal... .. 5. *E. geniculata*.

(*Chiov.*)

1. *E. sericea*, Stapf. Perennial. Culms over 3 ft. high, 3-noded, silky. Leaf-sheaths shorter than the internodes, silky all along; ligules short, silky-villous; upper blades short, linear, obtuse,  $1\frac{1}{2}$ –3 lin. wide, silky. Panicle of 7 racemes, crowded on a short common rhachis, the two lowest paired, one of them shortly peduncled, the others sessile, rigid and erect, about 4 in. long, very fragile; joints more than 9, semicylindrical, obliquely clavate at the tips,  $1\frac{3}{4}$  lin. long, densely villous with pale violet hairs; pedicels similar but shorter and more slender. Spikelets lanceolate, acute,  $4\frac{1}{2}$  lin. long, 1 lin. wide, pale brown, shining, surrounded at the base by white hairs up to 1 lin. long. Glumes coriaceous, equal; lower 2-keeled, with narrow inflexed margins and about 4 intracarinial nerves and 1 extracarinial nerve on each side, connected by transverse veins in the upper part; upper ovate-lanceolate, 3-nerved, ciliate along the margins and on the keel. Valve of lower floret shorter than the glumes by one-quarter or one-third, 2-nerved, hyaline, glabrous; of upper floret 2-fid to the middle, with acute and glabrous lobes; awn  $1\frac{1}{4}$  in.





long, kneed at the middle and twisted below.—*Pollinia sericea*, Chiov. in Ann. Istit. Bot. Roma, vii. 1898, 59, t. 3, fig. 1.

Nile Land. Somaliland : between Giaribule and Herr, *Riva*, 109.

2. *E. villosa*, Nees, *Fl. Afr. Austr.* 91. Culms  $1\frac{1}{2}$  to over 3 ft. long, 3-4-noded, appressedly hairy or pubescent, at least below the usually bearded nodes, upper internodes long-exserted. Leaf-sheaths tight, terete, more or less hairy to almost villous, or the lowest glabrescent to glabrous ; ligules membranous, brown, up to 1 lin. long, glabrous, with long hairs behind ; blades linear-lanceolate and acute or linear and tapering towards both ends, 4-12 in. long, 3-6 lin. wide, more or less flat, suberect, glabrous or hairy to villous. Racemes 2-7, on a short silky common axis, suberect or nodding, 2-6 in. long ; joints and pedicels clavate, linear, stout,  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. long, with long whitish hairs, mainly along the margins and round the base. Spikelets crowded, fulvous, lanceolate,  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long. Glumes coriaceous, the lower minutely truncate, shallowly concave on the back (particularly those of the sessile spikelets), with broad inflexed margins and ciliate keels and 2 intracarpinal nerves ; upper glume lanceolate, boat-shaped, acute, shining, 3-nerved, ciliate, keeled. Valve of lower floret linear-oblong, up to  $2\frac{1}{2}$  lin. long, membranous below, hyaline above, 2-nerved, margins inflexed, ciliate ; of upper floret ovate to oblong, 2-fid with ciliate lobes,  $1\frac{1}{2}$  lin. long ; awn 7-10 lin. long, kneed above or below the middle. Valvule oblong, obtuse, ciliate, up to 1 lin. long. Lodicules ciliate. Anthers  $1\frac{1}{2}$  lin. long. Stigmas purplish,  $1\frac{1}{2}$  lin. long.—Steud. Syn. Pl. Glum. i. 412. *Pollinia villosa*, Spreng. Syst. i. 288, not of Benth. ; Hack. in DC. Monogr. Phan. vi. 157 ; Durand & Schinz, Consp. Fl. Afr. v. 696 ; Rendle in Cat. Afr. Pl. Welw. ii. 136 ; Stapf in Dyer, Fl. Cap. vii. 325. *Andropogon villosus*, Thunb. Prodr. 20 ; Fl. Cap. ed. Schult. 108 ; Kunth, Enum. i. 499.

Lower Guinea. Angola : Benguella ; country of the Ganguellas and Ambuellas, *Gossweiler* ! Huilla ; Morro de Monimo, on rocks, *Welwitsch*, 7485 !

Mozambique Distr. Rhodesia : Umtali, *Saver*, 29 !

Also in South Africa and Madagascar.

(Pilger)

3. *E. polyneura*, *Stapf*. Perennial, caespitose. Culms erect, few-noded, slender, 2- $2\frac{1}{2}$  ft. high, glabrous, uppermost internodes long-exserted. Leaf-sheaths tight, striate, the lower more or less hirsute, at length glabrescent, the upper appressedly hairy or nearly glabrous except at the bearded nodes ; ligules membranous, very short ; blades linear, long-tapering to an acute point, flat when fresh, hirsute on the back, scabrid on the margins, of the innovations over 1 ft. long, up to 2 lin. wide, of the stem much shorter and narrower. Panicle narrow, of 3-5 racemes, on a glabrous common axis, lowest internodes  $\frac{1}{2}$  in. long, rarely longer ; racemes erect, the lowest

sometimes peduncled or like the following sessile to subsessile and solitary, much shorter than the terminal which may be up to 3 in. long; joints slender,  $2\frac{1}{2}$ -3 lin. long, smooth, ciliate with white hairs about 1 lin. long; pedicels similar, shorter. Spikelets lanceolate-oblong, olive-brown to fuscous,  $3-3\frac{1}{2}$  lin. long, with short hairs from the callus. Glumes equal; lower rather firm, chartaceous, minutely truncate and obscurely 2-toothed, more or less flat on the back, somewhat shining and loosely hairy, margins narrowly inflexed, intracarinal nerves 5-7, with transverse veins, extracarinal usually 1 on each side; upper narrowly lanceolate-oblong, subacute or minutely truncate, 5-nerved, with faint transverse nerves, ciliate, very sparingly hairy. Valve of lower floret oblong, obtuse or minutely 2-dentate, hyaline, 2-nerved, ciliate; of upper floret lanceolate, 2-lobed to one-third, with the lobes narrow and acute, hyaline, 3-nerved at the base, ciliate, awned; awn up to 6 lin. long, kneed at the middle, twisted below. Valvule 0. Anthers 2 lin. long. Styles  $\frac{1}{2}$  lin. long; stigmas 1 lin. long, dark purple. —Pilger in Engl. Jahrb. xxxix. 597 (1907).

*Pollinia polymera*  
 Nile Land. Abyssinia: Arussi; Druka Gilo, *Drake-Brockman*, 153! British East Africa: Massai Island, *Forestry Dept. Nairobi*, 19! Mau Plateau, 7500-10,000 ft., *Linton*, 177!

4. *E. ferruginea*, Stapf. Perennial. Culms 2-3 ft. high, densely set on a short rhizome, slender, erect, about 3-noded, the uppermost internode long-exserted, pubescent below the inflorescence, innovation-buds covered with firm striate cataphylls which are appressedly hirsute or ultimately glabrescent. Leaf-sheaths tight, striate, glabrous, membranous, very shortly ciliate; ligules short, membranous, truncate, ciliate; blades linear, tapering to a fine point, 3-5 in. long, up to 3 lin. broad, quite flat, glabrous, smooth, about 5 lateral nerves on each side of the slender midrib. Panicle narrow, about  $3\frac{1}{2}$  in. long, of about 4 racemes, rusty-brown, on a short pubescent common axis, the lowest internode about 5 lin. long; lateral racemes up to 2 in. long, erect, the lowest shortly peduncled, terminal raceme much longer; joints very slender, not much over 1 lin. long, smooth, shortly ciliate with brownish hairs; pedicels similar and about as long as the joints. Spikelets linear, oblong, obtuse, ferruginous, 2 lin. long, surrounded from the callus by hairs  $\frac{1}{2}$  lin. long. Glumes equal, rigidly membranous; lower truncate, almost flat on the back, hairy below the middle and along the keels, minutely pubescent at the tip, margins narrowly inflexed, intracarinal nerves 2, very faint; upper lanceolate-oblong, minutely truncate, obscurely 3-nerved, hairy above the middle. Lower floret suppressed. Valve of upper floret oblanceolate, cuneate, 2-toothed, slightly over  $\frac{1}{2}$  lin. long, hyaline below, 3-nerved, ciliate from the acute teeth; awn fine, 6 lin. long, twisted, indis-





tinctly kneed at the lower third. Valvule 0. Anthers  $1\frac{1}{2}$  lin. long. Stigmas  $1\frac{1}{2}$  lin.

**Mozambique Distr.** German East Africa: in swamps near Tabora, *Speke & Grant*!

5. *E. geniculata*, *Stapf*. Perennial. Culms up to over 2 ft. high, ascending from a geniculate base, up to 8- or more-noded, glabrous except near the inflorescence, smooth, the upper internodes exerted. Leaf-sheaths tight, striate, smooth, glabrous, more or less tinged with purple, at the nodes deep purple; ligules membranous, truncate,  $\frac{1}{2}$  lin. long, ciliate; blades linear, tapering to an acute point, flat, quite glabrous and smooth. Panicles of about 2-4 (usually 3) fulvous racemes on a short pubescent common axis, the lowest internode about 3 lin. long; racemes 2- $2\frac{1}{2}$  in. long, somewhat flexuous, the lowest shortly peduncled; joints very slender, up to  $1\frac{1}{2}$  lin. long, with oblique tips, densely fulvously hairy all over on the back and sides, glabrous on the face, hairs  $\frac{1}{2}$  lin. long; pedicels similar, of equal length or slightly shorter. Spikelets linear-oblong, truncate, fulvous, 2 lin. long, callus-hairs merged in the general tomentum. Glumes equal; upper rigidly membranous, truncate, densely hairy all over; lower with the margins narrowly inflexed, obtusely 2-keeled, with a few very faint intracarinial nerves and one extracarinial on each side; upper glume very similar to the lower but slightly broader above, 3-nerved. Lower floret reduced to a very minute scale-like hyaline valve. Valve of upper floret oblanceolate, shortly 2-toothed, hyaline below, almost 1 lin. long, 3-nerved, ciliate from the teeth; awn a fine bristle,  $3\frac{1}{2}$ -4 lin. long, twisted, indistinctly kneed near the middle. Valvule 0. Anthers  $1\frac{1}{2}$  lin. long. Stigmas over 1 lin. long.

**South Central.** Belgian Congo: Katanga; Chisangwe, *Hombé*, 42!

**Mozambique Distr.** Rhodesia: Salisbury, *Mrs. Craster*, 18! *Rogers*, 4088! 118  
Bulawayo, 4500 ft., *Eyles*, 1137!

## 27. HOMOZEUGOS, Stapf in Hook. Ic. Pl. t. 3033.

Spikelets homomorphous, subcylindric, awned, 2-nate on the slender more or less fragile rhachis of fascicled or solitary racemes, one sessile, the other pedicelled, sessile spikelet falling together with the adjacent joint and pedicel, pedicelled deciduous by itself. Florets 2; lower reduced to an empty valve, upper ♀. Glumes narrow, subequal, margins involute or in the lower spikelets inflexed and keeled from the middle upwards, tips membranous, base decurrent on the joints and pedicels forming a densely bearded pointed callus, the lower 7-8-, the upper 3-nerved. Valve of lower floret hyaline; of upper floret hyaline below, coriaceous above, minutely 2-lobed

or entire with a slender kneed awn. Valvule 0 in the lower floret, very minute in the upper. Lodicules 2, cuneate. Styles almost as long as the laterally exerted stigmas. Grain unknown.—Perennial, cæspitose; blades long, very narrow, often terete, more or less rigid; ligules membranous. Racemes slender.

Species 3, endemic.

Leaf blades narrowly linear, convolute, 1-2½ lin. wide when flattened out; spikelets 7-9 lin. long (including the callus) ... .. 1. *H. fragile*.

Leaf-blades terete, slightly channelled above.

Culms 4-5-noded; racemes 3 on a short common axis; joints 2 lin. long, ciliate; spikelets 4-5 lin. long (including the callus) ... .. 2. *H. huillense*.

Culms 2-noded; racemes solitary; joints 3½-4 lin. long, glabrous; spikelets 6 lin. long (including the callus) ... .. 3. *H. Gossweileri*.

1915

1. *H. fragile*, *Stapf in Hook. Ic. Pl. t.* 3033. Perennial, densely cæspitose, innovations intravaginal. Culms up to 4 ft. high, terete, 3-noded, glabrous except towards the inflorescences, surrounded at the base by the firm persistent leaf-sheaths. Leaf-sheaths terete, tight, frequently longer than the internodes, striate, densely silky, the lower glabrescent, ultimately glabrous, nodes densely bearded; ligules scarious, rounded, up to 1½ lin. long, ciliate and densely hairy on the back; blades narrowly linear, tapering to a fine point, usually convolute, over 1 ft. long and 1-2½ lin. wide when flattened out, densely silky on the back, glabrous above, midrib very stout, like the fine lateral nerves rather prominent above. Inflorescence embraced at the base by the sheath of the uppermost leaf, common rhachis very short or up to 1½ in. long, terete, sparingly hairy, transversely bearded at the nodes, internodes up to 6 lin. long. Racemes 3-5, sessile, 3-4 in. long, somewhat flexuous, very fragile; joints very slender, 5-6 lin. long, long-ciliate (upper cilia up to 2½ lin. long), disarticulating with a very oblique linear-oblong scar; pedicels similar but shorter. Spikelets 7-9 lin. long, including the callus which is up to 2 lin. long. Glumes subequal; lower lanceolate-oblong when flattened out, densely and silky hairy all over with the hairs increasing in length upwards (the uppermost over 2 lin. long), tip minutely truncate, nerves about 8, well marked within, greenish, with transverse veins; upper glume linear-oblong, very narrow, subobtuse, 3-nerved, hairy on the back, glabrous towards the base, ciliate along the margin. Lower floret reduced to a linear-oblong subacute hyaline pubescent densely ciliate 2-nerved valve, 3½ lin. long. Upper floret ♂: valve narrow-linear, about 3 lin. long, ciliate, with 2 minute, often subulate lobes; awn slender, about 3 in. long, kneed below the middle, with 2 to 3 very steep spirals, shortly hairy, bristle subplumose at the base, hairs up to 1 lin. long, decreasing very much in length upwards; valvule as





long as the lodicules, hyaline, ciliate from the top. Anthers 3 lin. long, with glabrous tips.

**Lower Guinea.** Angola: Benguella; country of the Ganguellas and Ambuellas, *Gossweiler*, 4029! *MS type*

2. *H. huillense*, *Stapf in Hook. Ic. Pl. sub t.* 3033. Perennial from a nodose rhizome. Culms  $1\frac{1}{2}$  ft. high, slender, 4-5-noded, glabrous, upper internodes exserted. Leaf-sheaths glabrous, tight, terete, the uppermost bearded at the nodes; ligules membranous, truncate, 1 lin. long; blades terete, junciform, slightly channelled towards the base, up to  $1\frac{1}{2}$  ft. long,  $1\frac{1}{2}$ - $\frac{3}{4}$  lin. in diam. at the base, hairy along the channel. Panicle of 3 racemes on a very short common axis; racemes up to 4 in. long; joints subfiliform, slightly thickened upwards, 2 lin. long, ciliate, upper cilia 2 lin. long, disarticulating obliquely; pedicels very similar but usually slightly shorter and the hairs longer. Spikelets narrowly oblong, 3-4 lin. long, greyish tinged with purple, callus pungent, 1 lin. long, shortly hairy. Glumes equal; lower membranous, lanceolate, when flattened out minutely truncate, hairy along the sides or also on the back, intracarpinal nerves 5-6, greenish above; upper glume narrower, 3-nerved, minutely ciliolate. Lower floret reduced to an oblong obtuse 2-nerved ciliolate valve, up to  $3\frac{1}{2}$  lin. long. Upper floret ♂: valve narrowly linear, about 3 lin. long, 1-nerved, gradually passing into the awn, which is up to 1 in. long, tightly spirally twisted and hairy for about  $\frac{1}{2}$  in. from the base and more or less kneed 3 lin. above the base; valvule 0. Anthers unknown.—*Pollinia huillensis*, Rendle in Cat. Afr. Pl. Welw. ii. 136.

**Lower Guinea.** Angola: Huilla; pastures near Empalañca, *Welwitsch*, 2669!

3. *H. Gossweileri*, *Stapf*. Perennial, caespitose; innovation-shoots intravaginal. Culms up to  $2\frac{1}{2}$  ft. high, terete, 2-noded, glabrous, surrounded at the base by the firm persistent leaf-sheaths. Leaf-sheaths terete, tight, shorter than the internodes, the basal strongly striate, glabrous or more often hirsute upwards, the cauline glabrous, uppermost node bearded; ligules ovate, obtuse, scarious, up to over  $\frac{1}{2}$  lin. long, hairy on the back; blades terete, junciform, slightly channelled towards the base, up to 1 ft. long, hardly more than  $\frac{1}{3}$  lin. in diam., hirsute at the base or up to the middle, then glabrous or almost glabrous all along. Raceme solitary, about 5 in. long, exserted from the uppermost sheath, not very fragile; joints very slender,  $3\frac{1}{2}$ -4 lin. long, glabrous, disarticulating with an oblique linear-oblong scar; pedicels similar, but slightly shorter, ciliate, lower cilia short, uppermost up to 3 lin. long. Spikelets 6 lin. long, including the callus which is  $1\frac{1}{2}$ -2 lin. long. Glumes subequal; lower linear-oblong, obtuse or truncate in the sessile, linear-lanceolate and minutely truncate in the pedicelled spikelet, loosely whitish-

villous all over, the hairs 1-2 lin. long, nerves 7-9, well marked within, greenish, with transverse veins; upper linear, narrow, obtuse, 3-nerved, loosely hairy above the middle, ciliate along the margins. Lower floret reduced to a linear-oblong subacute hyaline pubescent densely ciliate 2-nerved valve, over 2 lin. long. Upper floret ♂: valve narrowly linear-lanceolate, about  $2\frac{1}{2}$  lin. long, ciliate, at least upwards, with 2 linear-subulate erect ciliate lobes, up to  $\frac{3}{4}$  lin. long; awn slender,  $1\frac{1}{4}$  in. long, kneed at the middle, column with 5-6 spirals below it, loosely hairy, bristle glabrous, scaberulous; valvule as long as the lodicules, with a tuft of cilia from the top.

**Lower Guinea.** Angola: Benguella; country of the Ganguellas and Ambuellas, *Gossweiler*, 2586!

### 28. SORGHUM, Pers. Syn. i. 101.

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

For *Sorghastrum* see p 111 species 28-33



About 35 spontaneous species in the tropical and subtropical regions of both hemispheres, very few extending into the temperate zones; one group of forms widely cultivated in the tropics, particularly in Africa.

The treatment of the species of the section *Sorghastrum* does not call for any special remark. Those of the section *Eu-sorghum*, however, are on a different footing, and their adequate treatment for the purposes of classification forms a serious and difficult problem. Those which come under consideration in this work have with two exceptions (*S. purpureo-sericeum* and *S. versicolor*) been placed by Hackel in one vast species, *Andropogon Sorghum*, the leading idea being that they were all derived from one wild ancestor, the old *Holcus halepensis*, Linn. Piper, however, has recently advanced good reasons why this is extremely improbable. He has pointed out that the Linnean *Holcus halepensis* (*Andropogon Sorghum*, subsp. *halepensis*, var. *genuinus*, Hack.) is a perennial type almost confined to the Mediterranean region (sensu lato) and absent from tropical Africa which is the home of most of the spontaneous annual forms and probably also the cradle of most of the cultivated races known collectively as Guinea corn (*Andropogon Sorghum*, subsp. *sativus*, Hack.). To these spontaneous annuals and the cultivated forms he confines the name *Andropogon Sorghum*, and dealing in particular with the former he groups them under 11 subspecies, whilst he abstains from attempting to classify the latter. Most of Piper's subspecies are here recognised as definite units, but with the status of species, a procedure which seems to have the advantage of simplicity and directness, whilst it leaves the door open to any theoretical grouping which may in the future be desirable. The same reasoning has been applied to the cultivated forms. Hence the breaking up of Hackel's *Andropogon Sorghum*, var. *sativus*. Koernicke, who made the first comprehensive attempt to classify them, relied for that purpose exclusively on characters exhibited by mature infructescences, especially their degree of looseness or contraction, and the colours of the ripe glumes and grains; but Hackel in his monograph introduced characters taken from the shape of the spikelets. The grain being in most cases the thing aimed at in the evolution of these very numerous races, it is clear that artificially introduced modifications must from the beginning have tended, in the grain-state, to obscure or repress the phylogenetically important features in so far as they were economically indifferent or undesirable. It seemed, therefore, more promising to base the primary grouping on the comparison of the flowering stages, which might be expected to be more or less outside the influence of the artificially moulding forces of man. Within these primary groups, which are treated here as species, nothing more than a purely artificial arrangement can for the present be attempted. An exhaustive treatment of the hundreds of races which have been given distinctive popular names would, even if it were possible, be beyond the scope of a colonial flora. But above all, it is not feasible, owing to the very rudimentary state of our knowledge and of our collections. A certain number of forms have, however, been given scientific names and technical descriptions, and it has seemed desirable to account for these, whilst a few others represent more or less striking new types quite worthy of being added. Unfortunately not a few of the descriptions are so inadequate that in the absence of authentic material they cannot be assigned a definite place in the classification and are therefore dealt with under the heading "Imperfectly known species and varieties." Concerning the species admitted here it may be remarked that they have been found to coincide to some extent with the groups which the American cultivators have empirically learned to distinguish. This seems to justify the hope that in a general way they may prove sound, however much correction in detail they may need and will no doubt undergo.

- \* Primary branches of panicle whorled (at least at the lower nodes); pedicelled spikelets usually developed, although sometimes much reduced (particularly in cultivated species); lodicules ciliate (§ *Eu-Sorghum*, nos. 1-27).

- † Primary branches of panicle divided, racemes terminal and lateral; sheath-nodes appressedly and finely pubescent, not bearded (nos. 1-24).
- ☞ Mature sessile spikelets deciduous with the adjoining joint of the rachis and its pedicelled companion: spontaneous grasses (nos. 1-10).
- Panicles very narrow and long; branches erect or suberect, the lowest often up to  $\frac{1}{2}$  ft. long; sessile spikelets narrowly lanceolate, acute,  $3\frac{1}{2}$  lin. by  $1-1\frac{1}{4}$  lin., greenish in the upper half or third, finely awned; leaf-blades usually not over  $\frac{1}{2}$  in. wide; stems slender ... .. 1. *S. virgatum*.
- Panicles usually wide and loose, pyramidal when fully expanded, or obovate-lanceolate and more or less contracted, rarely narrow, linear-oblong (see 7, *S. Elliotti* and 9, *S. aethiopicum*); stem mostly stout.
- Sessile spikelets lanceolate, acutely acuminate, 3-4 lin. by  $1-1\frac{1}{4}$  lin., loosely villous on the back (young), often brilliantly red and with yellowish tips when mature, awned, awn 4-8 lin. long; pedicelled spikelets deciduous from the discoid tips; panicle pyramidal, branches and branchlets scabrid; leaf-blades  $\frac{3}{4}-1$  in. wide ... 2. *S. lanceolatum*.
- Sessile spikelets oblong- to elliptic- or ovate-lanceolate or ovate.
- Sessile spikelets over 2 lin. long; branches and branchlets more or less rough (often spinulosly scabrid).
- ☉ Panicles more or less pyramidal, very large; sessile spikelets not white-silky.
- Leaf-blades up to about  $\frac{1}{2}$  in. wide, the lower long-attenuated towards the base; longest branches of panicle rarely up to  $\frac{1}{2}$  ft. long; sessile spikelets oblong to elliptic-oblong, subacute, 3 lin. by  $1\frac{1}{4}$  lin., hairs white, scanty, awns 6-7 lin. long; pedicelled spikelets lanceolate, 3 lin. long, persistent ... .. 3. *S. sudanense*.
- Leaf-blades often over  $\frac{1}{2}$  in. (up to 2 in.) wide, rather broad and often rounded at the base; longest branches of panicle often over  $\frac{1}{2}$  (to up to 1) ft. long; sessile spikelets acutely acuminate; pedicelled spikelets deciduous.
- Sessile spikelets rather long-acuminate,  $3-4\frac{1}{2}$  lin. long, hairs usually fulvous to rufous.
- Sessile spikelets oblong, 3- $3\frac{1}{2}$  lin. by  $1-1\frac{1}{8}$  lin., awnless or awned 4. *S. arundinaceum*.
- Sessile spikelets oblong-lanceolate,  $4-4\frac{1}{2}$  lin. by  $1\frac{1}{4}-1\frac{1}{2}$  lin., awn 6-8 lin. long ... .. 5. *S. vogelianum*.





Sessile spikelets shortly acuminate, ovate to ovate-lanceolate, usually bulging below and slightly depressed upwards,  $2\frac{1}{2}$ –3 lin. by  $1-1\frac{1}{2}$  lin., hairs whitish or purplish; awn 5–6 lin. long ... 6. *S. verticilliflorum*.

oo Panicles linear to oblong- or obovate-lanceolate in outline.

Leaf-blades 4–5 lin. wide; sessile spikelets  $2\frac{1}{2}$  lin. by  $1-1\frac{1}{2}$  lin., ovate, acutely acuminate, at length glossy, frequently red and almost glabrous, awn 4–6 lin. long; panicle sublinear, subsecund; pedicelled spikelets dull purple, about 3 lin. long, their pedicels almost black ... .. 7. *S. Elliotii*.

Leaf-blades over  $\frac{1}{2}$  (up to  $2\frac{1}{2}$ ) in. wide; sessile spikelets over  $2\frac{1}{2}$  lin. long.

Panicle obovate-lanceolate in outline, large; sessile spikelets ovate-oblong to elliptic-oblong, acute,  $3\frac{1}{4}$ –4 lin. by  $1\frac{1}{2}$  lin., minutely and more or less evanescently strigillose, hairs pale fulvous; awns 10–12 lin. long ... .. 8. *S. abyssinicum*.

Panicle oblong to linear-oblong, narrow; sessile spikelets ovate to elliptic-lanceolate, acute to subacute,  $3-3\frac{1}{2}$  lin. by  $1\frac{1}{4}-1\frac{3}{4}$  lin., silky-tomentose, hairs white; awn 6–8 lin. long ... .. 9. *S. aethiopicum*.

Sessile spikelets 2 lin. by  $\frac{3}{4}$ –1 lin., oblong, subacute, pale, minutely hairy, not awned; panicle oblanceolate, rather large; rhachis, branches and branchlets of panicle smooth, the lowest branches simple for over 2 lin.; pedicelled spikelets lanceolate,  $2\frac{1}{2}$  lin. long ... 10. *S. panicoides*.

= = Mature sessile spikelets persistent: cultivated grasses (nos. 11–24).

9 Mature glumes wholly coriaceous or the lower with a herbaceous triangular tip, its nerves not visible on the back except at the tip, particularly when this is herbaceous (nos. 11–19).

/ Mature panicles more or less loose, usually with arched or drooping branches, never quite compact (nos. 11–16).

Mature spikelets closed, tightly embracing the grain, never obovate.

Glumes acute to subacuminate; panicle oblong, erect and sometimes secund, rather loose, branches and branchlets fine and almost smooth; sessile spikelets lanceolate to ovate or elliptic-lanceolate,  $2\frac{3}{4}$  lin. by  $1-1\frac{1}{4}$  lin. ... 11. *S. aterrimum*.

Glumes subacute to obtuse (at least the lower); panicle oblong, erect, rather rigid and dense, branches and branchlets spinulously scabrid; sessile spikelets ovate to elliptic or broad-oblong,  $2\frac{1}{4}$ – $2\frac{3}{4}$  lin. by  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. 12. *S. Drummondii*.

Mature spikelets more or less gaping and exposing the grain, rarely closed and then obovate in outline (16, *S. bicolor*).

Panicles apparently glabrous when young owing to the scanty hairs of the glumes and the short cilia of the joints and pedicels; sessile spikelets when young flattened on the back, greenish; straw-colour or dull tawny, ovate- to oblong-lanceolate or oblong, acute or acutely acuminate, uniformly coriaceous, awned or awnless; valves shortly ciliolate; grain shorter than the glumes, or equalling or exceeding them.

Mature spikelets with the grain almost wholly exposed between the widely spreading involute glumes, 3 lin. by  $1\frac{1}{4}$  lin. ... .. 13. *S. guineense*, var. [*involutum*].

Mature spikelets with the grain embraced below by the tightly appressed glumes whose margins are not involute.

Panicles with very slender branches, rather loose, sometimes nodding and secund in fruit; spikelets lanceolate- to ovate-oblong, about  $2\frac{1}{2}$  lin. by  $1$ – $1\frac{1}{2}$  lin., usually awned; grain shorter than the glumes ... .. 13. *S. guineense*, var. [*tremulans*].

Panicles with more robust branches, suberect and much contracted in fruit; spikelets rather broader, usually ovate- or elliptic-oblong,  $2\frac{1}{2}$ – $3\frac{1}{2}$  lin. by  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. in flower, awnless; grain exceeding the glumes ... 13. *S. guineense*, var. [*robustum*].

Panicles more or less conspicuously hairy, sometimes almost villous when young; sessile spikelets with conspicuously ciliate joints and pedicels, at length often glabrescent on the back which is usually more or less convex from an early stage.

Spikelets ovate or elliptic- to lanceolate-oblong, uniformly coriaceous or almost so.

Spikelets awned; mature glumes sparingly hairy or nearly glabrous and glossy on the back, straw-coloured to tawny and





tinged with red, widely spreading with their margins involute, much exceeding the white translucent grains ... .. 14. *S. margaritifera*.

Spikelets awnless, ovate, acute; glumes hairy when young, permanently tawny or pale straw-colour, slightly exceeding or equalling the dull white (in the tropical African forms) grains.

Mature spikelets  $2\frac{1}{2}$ –3 lin. long, pale straw-colour, permanently more or less hairy; the grain embraced below by the tightly appressed glumes whose margins are not involute ... .. [var. *semiclausum*.]  
15. *S. Roxburghii*,

Mature spikelets  $2\frac{1}{2}$  lin. long, bright tawny, early glabrescent; margins of glumes involute, grain almost wholly exposed between them; panicles rather loose with long slender very flexuous branches ... .. [var. *hians*.]  
15. *S. Roxburghii*,

Sessile spikelets broadly obovate in outline; lower glume with a very short depressed, usually permanently strigillose tip; mature grain obovate-oblong, enclosed or the top slightly exposed ... .. [obovatum].  
16. *S. bicolor*, var.

// Mature panicles very dense to compact, rarely more or less loosened owing to the reduction of the primary axis and the consequent subdigitate arrangement of the branches; spikelets always densely clustered; grains mostly large (nos. 17–19).

Sessile spikelets rhombic-obovate in outline when in flower; lower glume with a rather conspicuous greenish, usually strongly nerved tip; mature grain subglobose with a broad rounded much exposed top ... .. 17. *S. Durra*.

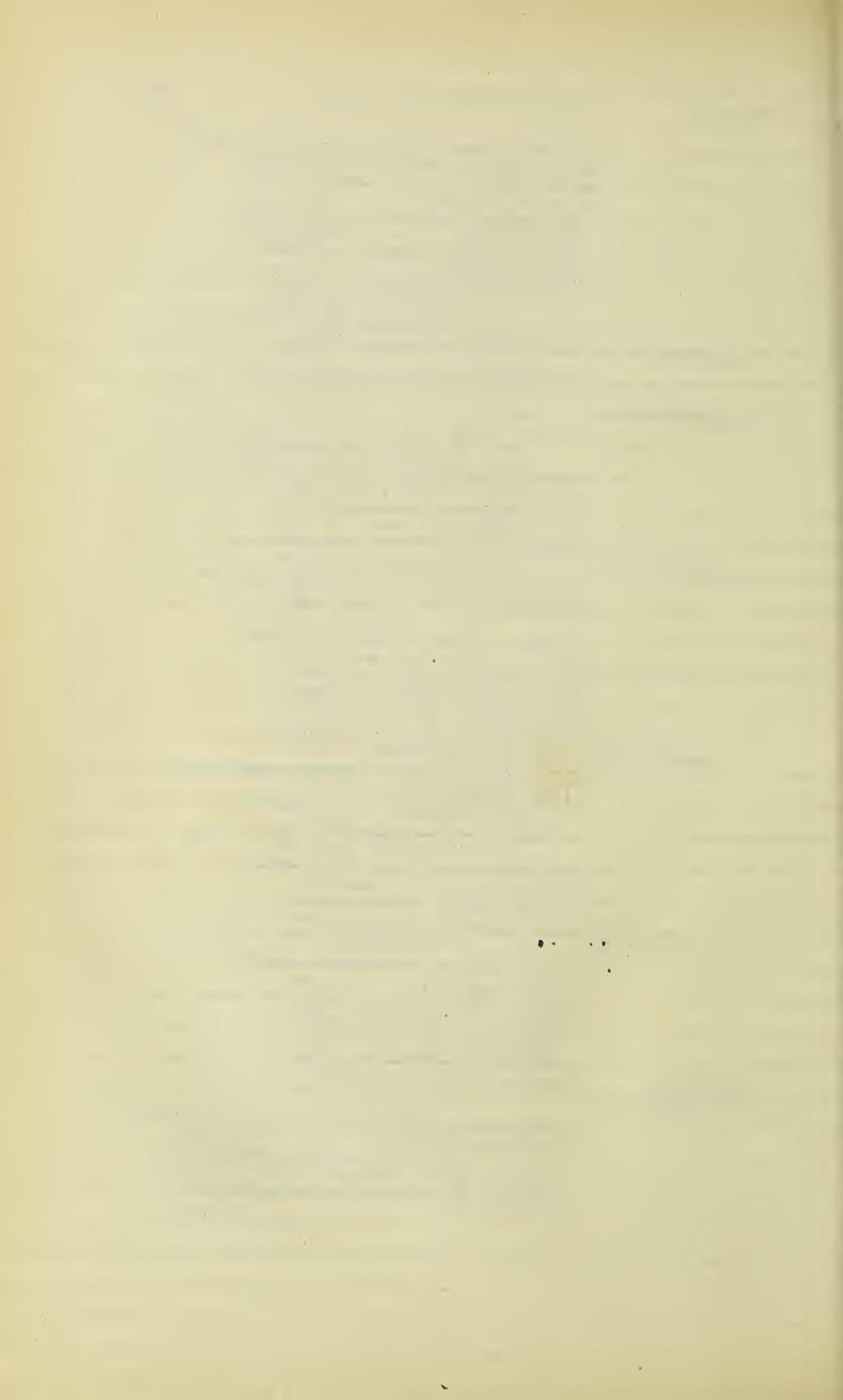
Sessile spikelets not obovate nor with a conspicuous greenish triangular tip.

Spikelets elliptic-ovate, shortly acute,  $2\frac{1}{4}$ – $2\frac{3}{4}$  lin. by  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin., loosely villos; panicles erect (sometimes recurved), oblong, very dense, sometimes lobed ... .. 18. *S. Caffrorum*.

Spikelets elliptic-oblong (sides rather straight), subobtuse or minutely acute, 2 lin. by  $1\frac{1}{4}$  lin., sparingly hairy or almost glabrous; panicles erect, oblong to linear (in flower), dense, branches rather flexuous often arching and nodding at the tips, and then the panicle looser and lobed ... .. 19. *S. caudatum*.

- 99 Mature glumes thinly crustaceous to papery, the tips brittle and breaking irregularly, at least from the middle upwards, nerves of the lower more or less raised, hence back of spikelets longitudinally striate (nos. 20-24).  
Sessile spikelets 3-4 lin. long, lanceolate-oblong to narrowly-oblong in flower; lower glume ovate to ovate-elliptic when mature; pedicelled spikelets long, persistent,  $3\frac{1}{2}$ - $4\frac{1}{2}$  lin. long.  
Grain much shorter than the pale papery glumes, completely enclosed by them 20. *S. papyrascens*.
- Grain as long as the black suberustaceous gaping glumes, showing between them, white ... .. 21. *S. melaleucum*.
- Sessile spikelets  $2\frac{1}{4}$ -3 lin. long; pedicelled spikelets up to 3 lin. long.  
Sessile spikelets ovate-oblong, very acute, 3 lin. long, thinly coriaceous below the middle, papery above, sometimes with an obscure impressed transverse line, separating the coriaceous and papery portions ... .. 22. *S. Ankolib*.
- Sessile spikelets broad-oblong or ovate in outline, shortly acute or subobtuse, under 3 lin. long.  
Sessile spikelets ovate in outline; lower glume coriaceous up to the middle or at the base only, with broad tips, whitish-villous all over or glabrous on the coriaceous portion of the back, whitish when mature; panicles often recurved ... 23. *S. cernuum*.
- Sessile spikelets oblong or ovate in outline; lower glume thinly coriaceous at the base with a broad depressed transverse zone around it, tip shortly acute or subobtuse.  
Seeds moderately compressed, not umbonate; lower glume of the mature sessile spikelets 2 lin. broad, acutely triangular from the middle upwards ... .. 24. *S. subglabrescens*.
- Seeds lenticular, umbonate below the top; lower glume of the mature sessile spikelet broad, oblong (sides rather straight),  $1\frac{1}{2}$  lin. broad, tip less conspicuously or obscurely triangular, constricted transverse zone often obscure ... .. 19. *S. caudatum*, var. [umbonatum.
- 7 ↑ Primary branches of panicle simple; racemes terminal; sheath-nodes (at least the upper) with long spreading beards (nos. 24-27).  
Lower glume of sessile spikelets wholly coriaceous and at length black, excepting the very base and tip.





Perennial; sessile spikelets broad-lanceolate-oblong, not acuminate or only obscurely so, 3-3½ lin. by almost 1 lin. ... 25. *S. versicolor*.

Annual; sessile spikelets lanceolate, acuminate, 4-5 lin. by 1 lin. ... 26. *S. purpureo-sericeum*.

Lower glume of sessile spikelets firmly coriaceous and usually dark brown or almost black up to the middle, then abruptly thinner, chartaceous and green, lanceolate, acuminate, 3½-4 lin. long ... 27. *S. dimidiatum*.

\*\*\* Primary branches of panicle usually solitary, divided from the base, hence apparently semiverticillate; pedicelled spikelets suppressed, but pedicels present; lodicules eciliate (§ *Sorghastrum*, nos. 28-33). Perennial; racemes with 4-7 sessile spikelets, never all reduced to a solitary spikelet.

Panicles with very numerous racemes; calli with short beards; leaf-blades flat or involute when dry.

Leaf-blades about ½ ft. long, the basal much shorter; peduncles hairy towards the tips of racemes.

Primary branches of panicle repeatedly divided, hence part of the racemes on branches of the 3rd order; racemes 2-1-noded ... 28. *S. trichopus*.

Primary branches simple or only once divided, hence the racemes terminal and lateral on them; racemes 4-1-noded ... 29. *S. micratherum*.

Leaf-blades up to 1½ ft. long; peduncles of racemes glabrous ... 30. *S. rigidifolium*.

Panicles very scanty; calli with long spreading beards; leaf-blades junciform, laterally compressed ... 31. *S. pogonostachyum*.

Annual; all the racemes reduced to a solitary spikelet, accompanied by 2 empty pedicels.

Glumes coriaceous, brown, the lower whitish at the base, 2½ lin. long ... 32. *S. bipennatum*.

Glumes subchartaceous, pale throughout, 2-2¼ lin. long ... 33. *S. incompletum*.

(Haeberle)

1. *S. virgatum*, Stapf. Annual. Culms rather slender, usually with suberect branches from the lower and middle nodes, 4-5-noded, glabrous. Leaf-sheaths finely and densely silky-pubescent at the nodes, otherwise glabrous; ligules 1 lin. long, thin; blades narrowly linear, gradually, and the longer long, attenuated towards the base, 6-18 in. long, 2-4 (rarely to 8) lin. broad, green or green tinged with red, glabrous, in robust specimens the midrib very stout. Panicle very narrow, ½ to over 2 ft. long; rhachis more or less hairy to villous at the nodes; branches erect or suberect, the lowest often up to ½ ft. long, like the branchlets scabrid or spinulously ciliate particularly upwards. Racemes fragile, few- to 7-noded, up to 1½ in. long; joints slender, 2-2½ lin. long, white-ciliate, cilia ½-1 lin.

long; pedicels similar, slightly shorter. Sessile spikelets narrowly lanceolate, acute,  $3\frac{1}{2}$  lin. by  $1-1\frac{1}{4}$  lin., pale straw-colour, greenish in the upper half or third, rarely flushed with purple-brown, finely awned; callus beard  $\frac{1}{2}$  lin. long. Glumes about equal, coriaceous and more or less glossy to or beyond the middle, then subherbaceous-papery, lower about 13-nerved, 2-keeled from the middle upwards with the keels spinulosly ciliate, more or less finely white-strigillose, glabrescent to almost glabrous, upper 7-nerved, with a slender scabrid keel upwards, usually sparingly hairy. Valves ciliate, lower broad-oblong,  $2\frac{1}{2}$  lin. long, upper ovate, 2-lobed to a quarter or a third,  $1\frac{1}{2}$  lin. long; awn up to 8 lin. long. Anthers  $1\frac{1}{2}$  lin. long. Grain narrowly obovate in outline, dorsally compressed,  $1\frac{1}{2}$  by 1 lin., reddish-brown; embryo-mark distinct, equalling or exceeding half the grain. Pedicelled spikelets linear to linear-lanceolate, acute,  $3-3\frac{1}{2}$  lin. long, glabrous, ♂, usually perfect, sometimes more or less reduced; lower glume 9-, upper 7-8-nerved; anthers 1 lin. long.—*S. halepense*, var. *Crupina*, Schweinf. Pl. Nilot. 43 (Ehrenberg's plant); *Andropogon Sorghum*, subsp. *halepensis*, var. *virgatus*, Hack. in DC. Monogr. Phan. vi. 504; Durand & Schinz, Consp. Fl. Afr. v. 724 (partly). *A. Sorghum exiguus*, Piper in Proc. Biol. Soc. Wash. xxviii. 32 (excl. *Holcus exiguus*, Forsk.).

**Nileland.** Nubia: between Old Dongola and Meroe, *Bromfield*, 32! between Khartoum and Berber, *Schweinfurth*, 529! 538! Khartoum, *Kotschy*, 316; Kordofan, *Kotschy*, 173, partly!

Hackel, l.c., also quotes it from the White Nile, Wad Schellai, *Schweinfurth*, iii. 136, and Piper from Matamma, Gallabat, Abyssinia, *Schweinfurth* 1428. *Perrottet*, 928, also referred to *A. Sorghum*, var. *virgatus*, by Hackel, is probably the next species. *S. virgatum* extends along the Nile as far as the delta; but the specimens seen by me from Cairo are meagre and the spikelets purplish-brown.

Forskål's *Holcus exiguus*, the basis of Piper's *Andropogon Sorghum exiguus*, according to the specimens in Forskål's herbarium in Copenhagen, is *Sorghum halepense*, Pers.

**2. *S. lanceolatum*, Stapf.** Annual. Culms rather slender, up to 10 ft. high, simple (?) or with some suberect branches. Leaf-sheaths delicately silky-pubescent at the nodes, otherwise glabrous; ligules very short; blades linear to linear-lanceolate from a rather broad and often rounded base, up to 15 in. by 1 in., pale green, flushed or mottled with purple, glabrous except for a dense zone of hairs just behind the ligule, midrib rather prominent and acutely keeled below in the larger leaves. Panicle ovate-oblong to lanceolate in outline, loose, more or less nodding, 9-15 in. long; branches obliquely erect or spreading, flexuous, sparingly hairy at the base, lowest branches 4-7 in. long, loosely branched from low down, like the branchlets finely scabrid. Racemes fragile, 2-4-noded, up to 1 in. long; joints slender,  $2-2\frac{1}{2}$  lin. long, white-ciliate, cilia  $\frac{1}{2}-\frac{3}{4}$  lin. long; pedicels similar, of equal length or slightly shorter. Sessile spikelets lanceolate, acutely acuminate, 3-4 lin. by  $1-1\frac{1}{3}$  lin., straw-colour, slightly





greenish upwards, on maturity often turning bright red or brownish-red below the middle or upper third, finely awned; callus-beard  $\frac{1}{2}$  lin. long. Glumes about equal, coriaceous and more or less glossy to beyond the middle, papery and striate upwards, lower about 13-nerved, finely 2-keeled towards the tips with the keels scabrid, sparingly and very finely white-strigillose to almost glabrous, upper 7-nerved with a slender almost smooth keel upwards, glabrous or almost so. Valves ciliate, lower lanceolate-oblong, 3 lin. long, upper ovate-oblong, 2-lobed to a quarter,  $2-2\frac{1}{4}$  lin. long; awn up to 8 lin. long, bristle loosely twisted. Grain obovate-oblong, dorsally compressed,  $1\frac{1}{2}$  lin. by 1 lin., more or less fuscous above, paler below; embryo-mark indistinct, about half the length of the grain. Pedicelled spikelet linear to linear-lanceolate, acute, about 4 lin. long, glabrous, ♂ or more or less reduced; lower glume 9-11-, upper 5-nerved; anthers 2 lin. long.—*Andropogon Sorghum*, near var. *sudanensis*, Piper in Proc. Biol. Soc. Wash. xxviii. 34.

Upper Guinea. North Nigeria: Katagum District, by rivers, Dalziel, 293! Nileland. Upper Nile Province: White Nile; Kio rubber plantation, Brown, 1473!

The Hausa name, according to Dalziel, is *Dawar rafi*.

Two specimens from Senegambia (*Heudelot*, No. 544 and 654) also belong probably here, but they have rather smaller spikelets (not over 3 lin. by 1 lin.), more hairy glumes and more scabrid keels, that of the upper being particularly sharp upwards. They were referred to *Andropogon Sorghum sudanensis* by Piper, l.c. 34.

(Piper)

3. *S. sudanense*,<sup>A</sup> Stapf. Annual. Culms relatively slender, 6-10 ft. high, about 9-noded, glabrous, slightly pruinose below the nodes. Leaf-sheaths very finely and densely silky-pubescent at the nodes, otherwise glabrous; ligules membranous, 1 lin. long; blades linear, the lower long-attenuated towards the base and there almost reduced to the stout strongly striate midrib, 6-12 in. by 4-6 lin., dull green flushed or mottled with purple, glabrous. Panicle ovate-pyramidal, erect, 6-12 in. long, up to 6 in. wide at the base; branches obliquely ascending, flexuous, whorled, the longest up to 6 in. long, undivided for 1-2 in., nearly glabrous at the base, like the branchlets finely scabrid, particularly upwards. Racemes fragile, few- to 5-noded, up to 1 in. long; joints slender, about 2 lin. long, ciliate, cilia pale fulvous or whitish,  $\frac{1}{4}$  lin. long; pedicels similar, of equal length or very slightly shorter. Sessile spikelet lanceolate to elliptic-oblong, subacute, 3 lin. by  $1\frac{1}{4}$  lin., pale straw-colour to pale fuscous with dull greenish striate tips when young, awned; callus-beard inconspicuous,  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous, thinner upwards, more or less glossy, lower about 13-nerved, 2-keeled above the middle with the keels scabrid, very finely and shortly strigillose (sometimes sparingly), hairs dirty-white to pale fulvous, upper finely keeled upwards, 7-nerved, almost glabrous apart from the cilia. Valves conspicuously ciliate, lower

oblong,  $2\frac{1}{2}$  lin. long, upper ovate,  $1\frac{1}{2}$  lin. long, 2-lobed to one-third; awn up to 8 lin. long. Anthers 2 lin. long. Grain oval, flattened, orange, 2 lin. long (*Piper*). Pedicelled spikelet ♂, or sometimes the lower more or less reduced, linear-lanceolate, acute, 3 lin. long, persistent, glabrous, dull greenish to dark purple; lower glume about 11-, upper 7-nerved; anthers  $1\frac{3}{4}$  lin. long.—*Andropogon Sorghum sudanensis*, Piper in Proc. Biol. Soc. Wash. xxviii. 33.

**Nileland.** Sudan: specimens grown at Arlington Farm, Virginia, from seed secured from R. Hewison, Khartoum, received from *Piper*! and without precise locality, *Penton*!

Piper definitely refers to this specimens from Upper Egypt and Cairo, both collected by *Sieber*! from Senegambia, *Heudelot*, 544! and 654! and from between Kondowe and Karonga, in Nyasaland, *Whyte*! Of these *Sieber*'s specimens are undoubtedly *Sorghum sudanense* and to them might be added specimens collected on Gebel Magaier between Siut and Girgeh, *Schweinfurth*, 1548! and near Benisinef, between Cairo and Kenneh, cultivated, *Schweinfurth*, 1529! *Heudelot*'s specimens (see above), though very similar are somewhat doubtful, whilst *Whyte*'s from Nyasaland, consisting of a panicle only, is in my opinion probably *S. verticilliflorum*.

*S. sudanense* is now extensively cultivated in the semi-arid regions of the United States under the name of Sudan grass.

(Willd.)  
4. *S. arundinaceum*, *Stapf*. Annual. Culms up to 12 ft. high, rather stout, simple, glabrous, more or less pruinose below the nodes. Leaf-sheaths delicately silky-pubescent at the nodes, otherwise glabrous; ligules up to over 1 lin. long, firmly scarious; blades linear from a broad rounded and usually clasping base, long-attenuated upwards, up to  $1\frac{1}{2}$  and even 2 ft. long and up to  $1\frac{1}{2}$  in. broad, bright green, sometimes flushed with purple, with a densely tomentose zone behind the ligule. Panicle erect, ovoid to pyramidal, very lax, up to 15 in. by 9 in.; branches obliquely ascending or spreading, slender, flexuous, more or less whorled, longest up to 1 ft. long, and undivided up to over 3 in. from the base, distinctly branched, villous (often very densely) at the base, like the branchlets very rough, particularly upwards. Racemes fragile, 2-5-noded, up to 1 in. long; joints slender,  $1\frac{1}{2}$ - $2\frac{1}{2}$  (mostly about 2) lin. long, densely ciliate, cilia more or less fulvous or purplish,  $\frac{3}{4}$  lin long; pedicels similar, slightly shorter, tips slightly thickened. Sessile spikelet lanceolate-oblong to lanceolate-elliptic, acutely acuminate, 3- $3\frac{1}{2}$  lin. by  $1$ - $1\frac{1}{2}$  lin., clay-colour to tawny, glossy black (? always) when mature, awned or more often awnless; callus-beard fulvous,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long. Glumes equal, coriaceous and more or less glossy to beyond the middle then thinner to papery, lower about 13-nerved with the nerves obscure near the tips, sharply 2-keeled and spinulously ciliolate from the middle upwards, fulvously or purplishly strigillose, hairs loosely appressed or slightly spreading, finally glabrescent except at the sides, upper sharply keeled, with the keel very rough towards the tip, 7-nerved, sparingly hairy. Valves conspicuously ciliate, lower broad-lanceolate, 2- $2\frac{1}{2}$  lin. long, upper





ovate, shortly 2-lobed or subentire, up to  $1\frac{1}{2}$  lin. long, awn up to 5 lin. long, often much reduced or suppressed. Anthers  $1-1\frac{1}{2}$  lin. long. Grain obovoid or ellipsoid, dorsally compressed, not quite  $1\frac{1}{2}$  by less than 1, lin., dark fuscous; embryo-mark very obscure, middle-ridge prominent. Pedicelled spikelet linear to subulate, ♂ or neuter, and then reduced to the glumes, acutely acuminate,  $2\frac{1}{2}-4$  lin. long, dull pale green or more often brownish or reddish, finally deciduous, glabrous or almost so; lower glume about 11-nerved, spinulously ciliate upwards, upper 5-nerved.—*S. halepense*, var. *effusus*, subvar. *aristatum* and *submuticum*, Rendle in Cat. Afr. Pl. Welw. ii. 150. *Andropogon arundinaceus*, Willd. Sp. Pl. iv. 906, not of Scop. *A. a.*, var. *effusus*, Hack. in Bolet. Soc. Brot. v. 213. *A. Sorghum*, subsp. *halepensis*, var. *effusus*, Hack. in DC. Monogr. Phan. vi. 503 (partly) and var. *halepensis*, Hack. in Bull. Herb. Boiss. 2me sér. i. 60. *A. Sorghum*, subsp. *halepensis*, var. *effusus*, Durand & Schinz, Consp. Fl. Afr. v. 724. *A. Sorghum*, var. *effusus*, Durand & Schinz, Étud. Fl. Congo, 318; Th. & Hél. Durand, Syll. Fl. Cong. 626. *A. Sorghum effusus*, Piper in Proc. Biol. Soc. Wash. xxviii. 35. *A. S.*, var. *halepensis*, Durand & Schinz, l.c.; De Wild. Reliq. Dewevr. 254, and Études Fl. Katanga, 1; Hack. in Bull. Herb. Boiss. 2me sér. i. 60; Th. & Hél. Durand, l.c. *A. halepensis*, var. *effusus*, Stapf in Dyer, Fl. Cap. vii. 346, partly. *Rhaphis arundinaceus*, Desv. Opusc. 69.

**Upper Guinea.** Sierra Leone: Musaia, *Thomas*, 2637! Kennema, *Thomas*, 7714! French Guinea: Baffing Valley, *Pobéguin*, 1807! Gold Coast: Aburi, *Johnson*, 799! Togo: Misahöhe, *Baumann*, 151. Southern Nigeria: Nun River, *Vogel*, 50! Northern Nigeria: Nupe, on low islands and river banks, *Barter*, 1379! Cameroons: Ossidinge, *Mansfeld*, 8; Mau Tschufi, *Ledermann*, 4180. Fernando Po, *Mann*, 114!

Nileland. Uganda: Entebbe, 4000 ft. Mahon! region of Lake Victoria, *Maitland*, 92!

**Lower Guinea.** St. Thomas Island, *Moller*, 150! Spanish Guinea: Fan, *Tessmann*, 93; Nkolentangan; Alcu, *Tessmann*, 257! Gaboon: Adolinalongo, *Soyaux*, 284! Belgian Congo: Kisantu, *Gillet*! Lower Congo, *Smith*! and without precise locality, *Demeuse*. Angola: Cazengo; common in abandoned cultivations at Caculo, *Welwitsch*, 2994! Ambriz, *Welwitsch*, 2898! 2898/3! Icolo and Bengo; flooded ground by the Bango River, *Welwitsch*, 7197! Damaraland: Tsoachaub, *Fleck*, 403! Kuisib, *Fleck*, 469! and without precise locality, *Ben*!

**Mozamb. Distr.** German East Africa: Unyamwezi; Wala River, *Böhm*! Portuguese East Africa: between Shupanga and Senna, *Kirk*! Zambesi Delta; below Mazaro, *Kirk*! Boruma, *Menyharth*, 1044! Rhodesia: Salisbury, *Townsend*!

Also in South Africa. Introduced into Brazil.

*Menyharth*, 1044, has spikelets which are unusually hairy, approaching in this respect those of *S. æthiopicum*.

Specimens collected in Italian Somaliland at Buahere (*Riva*, 461) and Mil-Mil (*Riva*, 1166) and enumerated by Chiovenda (Ann. Istit. Bot. Roma, vii. 60) as *Andropogon Sorghum*, var. *halepensis*, subvar. *genuinus*, belong probably either to this species or to *S. verticilliflorum*. The same applies to specimens collected by Carvalho in "Zambesia" (*A. Sorghum*, var. *effusus*, Hack. in Bolet. Soc. Brot. vi. 142).

(Piper)  
 5. *S. vogelianum*, Stapf. Annual. Culms stout, 6–15 ft. high, simple, glabrous. Leaf-sheaths delicately silky-pubescent at the nodes, otherwise glabrous; ligules up to 1 lin. long, scarious, usually hairy on the back; blades lanceolate-linear from a broad rounded base, long-attenuated upwards, up to over 2 ft. by almost 2 in., green flushed or blotched with red, glabrous apart from a narrow tomentose zone immediately behind the ligule. Panicle erect, pyramidal or ovoid, loose, up to 1½ ft. by 9 in.; branches whorled, obliquely ascending or spreading, slender, flexuous, longest to over 9 in. long and undivided to up to 1 in. from the base, distantly branched, villous (often very densely) at the base, like the branchlets very rough, often spinulously ciliolate, particularly upwards. Racemes fragile, 2–7-noded, up to 1¼ in. long; joints slender, 2 lin. long, densely ciliate, cilia fulvous to rufous, ½–¾ lin. long; pedicels similar, of equal length or slightly longer, tips slightly thickened. Sessile spikelet oblong-lanceolate, acutely acuminate, 4–4½ lin. long, dark straw-colour to tawny, dull greenish upwards, awned or awnless; callus-beard fulvous, ½ lin. long. Glumes equal, coriaceous, and more or less glossy to beyond the middle, then thinner, lower about 13-nerved with the nerves very obscurely raised near the tips, sharply 2-keeled and spinulously ciliolate from the middle upwards, fulvously to almost rufously strigillose, hairs loosely appressed or slightly spreading, soon glabrescent on the back, upper sharply keeled (with keel rough) towards the slender tip, 7-nerved, glabrous or nearly so. Valves conspicuously ciliate, lower broad-lanceolate, up to 3½ lin. long, upper ovate, shortly 2-lobed or sub-entire, 2 lin. long; awn up to 7 lin. long, often reduced to a short bristle or mucro. Anthers 2 lin. long. Grain unknown. Pedicelled spikelet usually ♂, sometimes more or less reduced, linear-lanceolate, long-acuminate, up to 4 lin. long, dull greenish, glabrous; lower glume about 11-nerved, spinulously ciliate upwards, upper 5-nerved.—*A. Sorghum vogelianus*, Piper in Proc. Biol. Soc. Wash. xxviii. 34.

**Upper Guinea.** Southern Nigeria: banks of Nun River, *Vogel*, 11! Lau and Amar, by the Benue River, *Macleod*, 49! 60! 62! 65! Idu, banks of Eugenni River, *Holland*, 153! Oban, *Talbot*, 846! Cameroons: by the Cameroon River, *Mann*, 2109! Karnak Logome, *Macleod*, 157!

*Holland*, 153, is a meagre specimen with small panicles and narrow leaves; but he says the plant grows up to 15 ft. high, and the spikelets are exactly as in *Vogel's* plant. *Mann*, 2109, and *Macleod*, 157, have also smaller panicles and narrower leaves and the indumentum of the racemes is pale.

(Sturd)  
 6. *S. verticilliflorum*, Stapf. Annual. Culms 4–8 ft. high, sometimes slightly pruinose below the nodes. Leaf-sheaths delicately silky-pubescent at the nodes; ligules up to over 1 lin. long, scarious, hairy on the back; blades linear from a broad rounded and often clasping base, long-attenuated upwards, up to 1½ ft. long, rarely much over 1 in. wide, green, sometimes slightly glaucous or flushed





with purple, hairy just behind the ligule, otherwise glabrous. Panicle oblong to ovoid-oblong, often rather contracted and more or less nodding at first, then spreading out and more erect, up to 15 in. long and ultimately 6-9 in. wide; branches slender, flexuous, whorled, longest up to 9 in. long and undivided to up to 2 (rarely 3) in. from the base, distantly branched, slightly and shortly hairy to villous at the base, like the branchlets more or less rough, at least upwards. Racemes fragile, up to 5-, but mostly 2- or 3-noded, rarely over  $\frac{3}{4}$  in. long; joints slender,  $1\frac{1}{2}$ -2 lin. long, shortly ciliate, cilia dirty white or pale fulvous, often with a tinge of purple; pedicels similar, slightly shorter, their tips subdiscoid. Sessile spikelet ovate to ovate-lanceolate, shortly acuminate to acute,  $2\frac{1}{2}$ -3 lin. by  $1-1\frac{1}{2}$  lin., straw-colour, greenish towards the tips (at least when young), sometimes tinged with purple, ultimately often turning bright or blackish-red, particularly below; callus-beard less than  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous, slightly glossy below (more so when ripening), thinner upwards, lower usually slightly bulging below and somewhat depressed towards the tips, 11-13-nerved, with the nerves very obscure near the tips or more or less marked, sharply 2-keeled and scabrid to spinulously ciliate in the upper half or third, more or less strigillose, often glabrescent, rarely almost glabrous, hairs pale whitish or fulvous, loosely appressed, upper sharply keeled towards the tips with the keel rough, 7-nerved, more or less hairy. Valves conspicuously ciliate, lower lanceolate,  $2\frac{1}{2}$  lin. long, upper ovate, shortly 2-lobed,  $1\frac{1}{2}$  lin. long; awn fine, 6-8 lin. long. Anthers  $1\frac{1}{2}$  lin. long. Grain obovate-oblong,  $1\frac{1}{2}$  lin. by  $\frac{1}{8}$  lin., fuscous, paler below; embryo-mark distinct, hardly exceeding the middle of the grain. Pedicelled spikelet ♂ or neuter, early deciduous, subulate-lanceolate to linear, acutely acuminate, 3 lin. long, pale greenish, often tinged with red or purple; lower glume 9-, upper 5-nerved.—*Sorghum halepense*, Nees, Fl. Afr. Austr. 88, not of Pers. *Andropogon verticilliflorus*, Steud. Syn. Pl. Glum. i. 393. *A. Sorghum*, subsp. *halepensis*, var. *effusus*, Hack. in DC. Monogr. Phan. vi. 503 (partly). *A. Sorghum verticilliflorus*, Piper in Proc. Biol. Soc. Wash. xxviii. 37. *A. halepensis*, var. *effusus*, Stapf in Dyer, Fl. Cap. vii. 346 (partly).

Nileland. British East Africa: Kavirondo, *Whyte!* Rabai Hills, *Taylor!*  
 Mozamb. Distr. German East Africa: Usambara; Tanga, lowland bush, *Holst*, 2342! and without precise locality, *Buchwald*, 509! *Busse*, 140!  
 Portuguese East Africa: Molau River, *Allen!* Boruma, *Menyharth*, 1046!  
 Lower Buzi River, *Swynnerton*, 957! 966! Nyasaland: between Kondowe and Karonga, *Whyte!*

Extending from tropical Africa to Natal, the Comoros, Seychelles, Madagascar and the Mascarenes. Introduced into India from South Africa as Tabucki grass, also to Australia, Polynesia and the West Indies.

Piper, l.c., quotes more specimens from Kilimandjaro southwards. I have not seen them and refrain therefore from citing them, the more so as they do not extend the area of the species as here understood. According to Piper, Busse suggests that his samples may be reversals from the cultivated

*Sorghum* of the Gabi Sad to the wild form. *Andropogon Sorghum niloticus*, Stapf ex Piper in Proc. Biol. Soc. Wash. xxviii. 41, based on a specimen collected on the White Nile below Gaba Shambe (70° N. Lat.) by J. Murie on Petherick's expedition, is in my opinion probably nothing but a state of *S. verticilliflorum* with spikelets bulging more than usual and with rather tardily disarticulating racemes.

This and the two preceding species are very closely allied and apparently overlap so as to merge into each other. They are, however, as a rule not difficult to distinguish, they inhabit, broadly speaking, distinct areas, and *S. arundinaceum* and *S. verticilliflorum* have proved quite constant where introduced into other countries. All the Brazilian specimens I have seen are easily recognised as *A. arundinaceum* and all those from India, Australia and Polynesia as *S. verticilliflorum*. *S. vogelianum* has a comparatively limited area.

7. *S. Elliottii*, Stapf. Annual. Culms slender, with suberect branches from the lower and middle nodes. Leaf-sheaths very finely silky-pubescent at the nodes; ligules glabrous or more or less hairy on the back; blades linear from a slightly narrowed base, up to 1 ft. long, 4-5 lin. wide, quite glabrous, dull pale green, midrib slender, prominent below. Panicle (fruiting) sublinear, narrow, with the longer branches slightly arched and subsecund, about 7 in. long; longest branches up to 1½ in. long and undivided up to 1 in. (but mostly much less) from the base, very slender, more or less hairy at the base, like the branchlets and the rachis very rough to spinulosly ciliate upwards. Racemes very tardily disarticulating, few-noded, up to ½ in. long; joints slender, 1½ lin. long, ciliate, cilia pale fulvous, not quite ½ lin. long; pedicels very similar and of about the same length, but more slender and almost black, tips like those of the joints slightly thickened. Sessile spikelet ovate, acutely acuminate, 2-2½ lin. by 1-1½ lin., dark straw-colour, glossy, usually tinged with red or quite red or the tips purple; callus-beard about ½ lin. long. Glumes equal, coriaceous, thinner at the tips, lower 11-nerved, with the nerves very obscurely raised towards the tips, 2-keeled and spinulosly ciliate in the upper third, sparingly strigillose, at length almost glabrous, hairs loosely appressed or those on the sides almost spreading, pale fulvous, upper 7-nerved, finely keeled on the slender acumen, keel scabrid, almost glabrous. Valves conspicuously ciliate, lower broad ovate-oblong, 2 lin. long, upper 1½ lin. long, 2-lobed to a third, awn 4-6 lin. long. Anthers 1 lin. long. Grain (immature) broad-elliptic in outline, 1 lin. long, dorsally compressed. Pedicelled spikelet lanceolate-subulate, up to 3 lin. long, ♂ or neuter, deciduous, purple; lower glume 8-9-, upper 7-nerved.—*Andropogon Sorghum niloticus*, Stapf ex Piper in Proc. Biol. Soc. Wash. xxviii. 41 (partly).

Nileland. Uganda: Ruwenzori; Kasamaga, on granite, *Scott Elliott*, 7612!

(Piper)

8. *S. abyssinicum*, Stapf. Annual. Culms tall, stout, somewhat pruinose below the nodes. Leaf-sheaths delicately silky-pubescent at the nodes; ligules very short, scarious, dark brown,





pubescent on the back; blades (upper) lanceolate-linear from a broad rounded clasping base, long-attenuate to a fine point, to over 2 ft. long and  $2\frac{1}{2}$  in. broad, green, pubescent to tomentose at the base above the ligule, midrib very stout. Panicle obovate-lanceolate in outline, over 1 ft. by over 3 in., contracted, erect; branches whorled, slender, subflexuous, finely villous at the base, the longest up to  $\frac{1}{2}$  ft. long and undivided to up to 2 in. from the base, like the branchlets spinulosly ciliolate. Racemes 1-3-noded, almost up to 1 in. long; joints slender,  $2\frac{1}{2}$  lin. long, shortly ciliate, cilia dirty white; pedicels very similar, tips very slightly thickened upwards. Sessile spikelet ovate-lanceolate to elliptic-oblong, acute,  $3\frac{1}{4}$ -4 lin. by  $1\frac{1}{2}$  lin., dull straw-colour, faintly greenish upwards, awned; callus-beard  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous to beyond the middle then papery, lower 11-nerved, the nerves slightly showing near the tips, 2-keeled and minutely spinulosly ciliate above the middle, shortly and finely strigillose, hairs pale fulvous, upper 7-nerved, finely keeled on the acumen, almost glabrous. Valves distinctly ciliate, lower broad-oblong, 3 lin. long, upper ovate, 2-lobed to one-quarter or one-third,  $2\frac{1}{2}$  lin. long; awn 10 lin. long. Anthers 2- $2\frac{1}{2}$  lin. long. Grain unknown. Pedicelled spikelet ♂, linear-lanceolate, acute,  $3\frac{1}{2}$  lin. long, greenish or tinged with purple; lower glume about 8-nerved, lower 7-nerved; anthers over  $1\frac{1}{2}$  lin. long.—*Andropogon Sorghum abyssinicus*, Piper in Proc. Biol. Soc. Wash. xxviii. 39.

Nileland. Gallabat: Matamma; a troublesome weed, *Schweinfurth*, 1521!

9. *S. æthiopicum*, *Rupr. ms. ex Hack. in DC. Monogr. Phan.* vi. 504. Annual. Culms slender, up to 10 ft. high, with suberect branches from the lower and middle nodes, pruinose (? always) below the nodes. Leaf-sheaths delicately silky-pubescent at the nodes; ligules scarious, up to 1 lin. long, more or less pubescent on the back; blades linear to linear-lanceolate, from a broad rounded or almost subcordate base, long or shortly tapering to an acute point, up to over 1 ft. long and up to over 1 in. wide, pale green, usually strongly flushed with red or purple, with a tomentose zone behind the ligule, flat, midrib rather slender. Panicle narrow, linear to linear-oblong, up to over 1 ft. long, contracted or loose below, often secund; branches suberect, the longer more or less nodding, slender, flexuous, villous at the base, longest up to over 3 in. long and undivided for a short distance (frequently apparently for 1-2 in. from the base owing to the arrest of the lowest branchlets), like the branchlets rough to spinulosly ciliolate upwards. Racemes fragile, 1-3- (rarely 4-) noded, up to  $\frac{3}{4}$  in. long; joints slender, 2 lin. long, densely ciliate, cilia white,  $\frac{1}{2}$  lin. long; pedicels very similar, of same length or slightly shorter, tips slightly thickened. Sessile spikelet ovate- to elliptic-lanceolate, acute to subacute, 3- $3\frac{1}{2}$  lin. by  $1\frac{1}{4}$ - $1\frac{3}{8}$  lin., clay-colour, finally often reddish below,

*Syn. in DC. Monogr. Phan.*

awned; callus-beard  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous, thinner upwards, lower 13-nerved, sharply 2-keeled and spinulosly ciliate above the middle with the apex running out into a hyaline beak between the abrupt tooth-like keel-ends, white-tomentose, almost silky, glabrescent over the more bulging portions\* of the back, lower 7-nerved, sharply and narrowly keeled towards the tip, with the keel scabrid, more or less tomentose on the sides and upwards. Valves conspicuously ciliate, lower broad-oblong, 3 lin. long, upper ovate, 2-lobed to a quarter or almost  $2\frac{1}{2}$  lin.; awn 10–12 lin. long. Anthers 2 lin. long. Grain obovate-ellipsoid,  $1\frac{1}{4}$  lin. by 1 lin., brown, paler below; embryo-mark distinct, very broad, about half the length of the grain. Pedicelled spikelet ♂ (or neuter and then more or less reduced), linear-lanceolate, acutely acuminate, up to 4 lin. long, greenish or reddish to bright red, more or less appressedly hairy; lower glume 10-, upper 7-nerved, nerves rather marked; anthers  $1\frac{1}{2}$  lin. long.—*Andropogon æthiopicus*, Rupr. ex Steud. Syn. Pl. Glum. i. 372. *A. Sorghum*, subsp. *halepensis*, var. *æthiopicus*, Hack. in DC. Monogr. Phan. vi. 504; Durand & Schinz, Consp. Fl. Afr. v. 723, partly; Chiovenda in Ann. Istit. Bot. Roma, viii. fasc. i. 24. *A. Sorghum cordofanus*, Piper in Proc. Biol. Soc. Wash. xxviii. 39; excl. syn. *A. cordofanus*, Hochst.

**Nileland.** Nubia: Sagadi, between Suakin and Berber, *Schweinfurth*, 599; Wadi Eremit, *Schweinfurth*, 655; Kordofan; Arash-Kol Mountain, *Kotschy*, 173! 390 partly! Sudan: on the Blue Nile, *Muriel*, L. 13! and without precise locality, *Kotschy*, 132!

A short-awned state was described by Hackel, l.c., 505, as subsp. *breviariatus* from Sorghum fields on Arash-Kol (*Kotschy*, 158!). It is also recorded by Chiovenda from various places in Eritrea, namely the islands of Dilemmi (*Terracciano*, 797), Assarke (*Terracciano*, 745) and Hotha (*Terracciano*, 791), from Samhar, Otumlo (*Pappi* and *Terracciano*, 2582), Barca, Agordat, 1600 ft. (*Pappi* and *Terracciano*, 2813), Agordat-Adarti, 2660 ft. (*Pappi* & *Terracciano*, 2758); Adag-Adarti, 2660 ft. (*Pappi* & *Terracciano*, 2725) and from Gerba, Gaseh (*Bartolommei-Gioli*). *Kotschy*'s specimen has a denser panicle than the type, whilst the spikelets are somewhat broader and possess rather large triangular subherbaceous tips. It may be a cross between *S. æthiopicum* and *S. Durra*. Hackel (l.c. 505: see also Durand & Schinz, Consp. Fl. Afr. v. 723) refers to it a specimen collected by Marloth at Barmen in Damaraland; but Piper considers it distinct, and I suspect it to be *S. arundinaceum*. Other specimens collected by Hartmann on the Blue Nile in Sennaar, and referred by Schweinfurth (Pl. Nilot. 43) to *Sorghum halepense*, var. *Crupina*, are said by Hackel to be intermediate between *S. æthiopicum* and *S. virgatum*. According to Schweinfurth's very full description they seem to me to be *S. æthiopicum*.

This is one of the most distinct species of this difficult group. Piper's name "*cordofanus*" is based on the mistaken identification (probably owing to a confusion of labels) with *Andropogon cordofanus*, Hochst. (*Kotschy*, 54!) which is *Andropogon gayanus*, var. *cordofanus*.

10. *S. panicoides*, Stapf. Annual. Culms slender. Leaf-sheaths (upper only known) pubescent at the nodes; ligules a fringe of hairs about 1 lin. long; blades linear from a hardly widened base, tapering to a fine point, about 1 ft. by 8 lin., hairy behind the ligule,





green, reddish along the margins, midrib stout. Panicle oblanceolate, contracted or the lower branches spreading and nodding, and then more or less secund, up to 9 in. long; branches suberect or the lower arching over, very slender, whorled, hairy at the base, the longest up to 5 in. long and undivided for half their length, all very finely scabrid or almost smooth below. Racemes up to 5-noded and 10 lin. long; joints very slender,  $1\frac{1}{2}$  lin. long, ciliate, cilia whitish, less than  $\frac{1}{2}$  lin. long; pedicels very similar, tips subdiscoid. Sessile spikelet oblong, subacute,  $2-2\frac{1}{2}$  lin. by  $\frac{3}{4}-1$  lin., pale straw-colour, dull; callus-beard  $\frac{1}{2}$  lin. long. Glumes equal, thinly coriaceous, papery upwards, lower 9-11-nerved, more or less and unevenly whitish-strigillose, finely 2-keeled and sparingly ciliate upwards, the hyaline apex usually produced between the abrupt tooth-like keel-ends, lower 7-nerved, finely keeled towards the tip, hairy above the middle and on the sides. Valves finely ciliate, lower broad oblong-lanceolate,  $2-2\frac{1}{2}$  lin. long, upper ovate,  $1\frac{1}{2}$  lin. long, subentire, mucronulate. Anthers  $1\frac{1}{4}$  lin. long. Grain unknown. Pedicelled spikelet ♂, lanceolate,  $2\frac{1}{2}$  lin. long, of the same colour as the sessile, glabrous or nearly so; anthers  $\frac{3}{4}$  lin. long.—*Andropogon halepensis muticus*, Pilger in Proc. Biol. Soc. Wash. xxviii. 29 (as to Figari's specimen). *Piper (but Piper) ... to ...* *Hasad*

Nileland. Eastern Abyssinia: without precise locality, *Figari!* *MS type*

11. *S. aterrimum*, Stapf. Annual. Culms slender to 6 ft. high. Leaf-sheath (only parts of the upper seen) strongly blotched or flushed with blackish-purple; ligules very short, blackish-purple, densely ciliate from the back; blades lanceolate-linear from a somewhat narrower base, long-tapering upwards to an acute point, the uppermost 7-8 in. by 10 lin., pale green to almost glaucous, blotched with purple, pubescent inside above the ligule. Panicle narrowly oblong to ovate-lanceolate, erect, contracted or more or less secund with nodding branches, up to 1 ft. by 2-4 in.; branches slender, somewhat flexuous, whorled or 1-2 from a node, mostly branched from the base though the lowest divisions often arrested, the longest 3-4 (rarely 5) in. long, internodes rather stout, all divisions very slightly rough or smooth downwards. Racemes rather tough, 2-3- (rarely 4- or 5-) noded, 4-5 (rarely 7-8) lin. long; joints very slender,  $1\frac{1}{2}$  lin. long, shortly whitish-ciliate; pedicels very similar and of about equal length, tips minutely discoid. Sessile spikelet lanceolate-oblong in flower, ovate- to elliptic-oblong in fruit, acute or subacute,  $2\frac{3}{4}-3$  by  $1-1\frac{1}{4}$  lin., clay-colour tinged with red below, finally usually jet-black or reddish-black and glossy, closed when mature, awned or awnless; callus-beard  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous, thinner upwards, lower minutely 3-toothed, about 13-nerved, 2-keeled and very minutely spinulously scabrid in the upper third or quarter, with the nerves very obscure in the tip, usually very sparingly and shortly strigillose, finally often glabrous, upper

shortly and finely keeled near the tip, 7-nerved. Valves shortly ciliate, lower ovate-lanceolate, as long as the glumes, upper ovate, shortly 2-lobed,  $1\frac{1}{2}$  lin. long; awn up to 9 lin. long, mostly with a short bristle, often reduced or represented by a short mucro. Anthers  $1\frac{1}{2}$  lin. long. Grain obovate-oblong,  $1\frac{1}{2}$ – $1\frac{3}{4}$  by 1 lin. or slightly over 1 lin., dull brown to greyish-brown. Pedicelled spikelet ♂ or more often neuter, linear-lanceolate to linear, up to over  $2\frac{1}{2}$  lin. long, deciduous; lower glume about 11-, upper 5-nerved.—*Andropogon Sorghum*, var. near *Drummondii*, Piper in Proc. Biol. Soc. Wash. xxviii. 43.

**Upper Guinea.** French Guinea: Kouroussa, *Pobéguin*, 539!

**Nileland.** Jur: Ghattas' Seriba, cultivated, *Schweinfurth*, 2590!

The specimens quoted represent apparently two slightly different races, one with secund panicles and brown plano-convex grains with a distinct embryo-mark (*Pobéguin*), the other with an erect, permanently contracted panicle and biconvex grains with an obscure embryo-mark (*Schweinfurth*). *Pobéguin* speaks of it as "*mil sauvage*" of no value. *Schweinfurth* says that it is cultivated and has the Arabic name "*burri*."

12. **S. Drummondii**, *Nees ex Steud. Syn. Pl. Glum.* i. 393. Annual.

Culms stout, up to 6 ft. high. Leaf-sheaths finely pubescent at the nodes; ligules very short, densely ciliate from the back; blades linear to linear-lanceolate from a broad rounded base, up to 20 in. by (upper) 10–20 lin., pale green. Panicle oblong, erect, rather dense, up to over 1 ft. long; branches suberect, more or less slender, flexuous, 1 or 2 from a node or subverticillate, usually branched from near the base or the longer undivided for  $\frac{1}{2}$ – $1\frac{1}{2}$  in., up to 4 in. long, like the branchlets very scabrid, ciliate towards the base. Racemes tough or at least very tardily disarticulating, up to 5-noded and 1 in. long; joints slender, almost  $1\frac{1}{2}$  lin. long, ciliate, cilia pale fulvous,  $\frac{1}{2}$  lin. long; pedicels very similar, somewhat shorter, tips like those of the joints minutely discoid. Sessile spikelet ovate to elliptic or broad-oblong-lanceolate, subacute to obtuse,  $2\frac{1}{4}$ –3 lin. by  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin., straw-coloured, dull greenish at the tips, turning more or less purplish-brown to black and very glossy when mature; callus-beard  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous, very hard when mature, lower up to 15-nerved, 2-keeled and more or less spinulously ciliate in the upper third with the nerves showing in the broad tip, almost glabrous, upper sharply keeled upwards with the keel rough. Valves distinctly ciliate, turning purple when ripe, lower oblong, almost 2 lin. long, upper ovate, 2-lobed to a third or quarter,  $1\frac{1}{2}$  lin. long; awn up to 6 lin. long, bristle almost at a right angle to the column. Anthers not much over 1 lin. long. Grain roundish-ellipsoid, up to  $1\frac{1}{2}$  lin. by  $1\frac{1}{4}$  lin., slightly flattened, pale olive-brown, embryo-mark very faint, exceeding the middle of the grain. Pedicelled spikelet ♂ or neuter and more or less reduced, subulate-lanceolate to linear, up to 3 lin. long, greenish to purplish-brown, deciduous; lower glume about 8-, upper 5-nerved.

publ. Millsp. & Chase Field Col. Mus. Publ. Bot. 3: 21  
1903.



—*S. halepense*, var. *effusum*, subvar. *aristatum*, Rendle in Cat. Afr. Pl. Welw. ii. 150 (partly). *Andropogon Drummondii*, Steud. Syn. Pl. Glum. i. 393. *A. Sorghum*, subsp. *sativus*, var. *Drummondii*, Hack. in DC. Monogr. Phan. vi. 507 (partly); Durand & Schinz, Consp. Fl. Afr. v. 725 (partly). *A. Sorghum Drummondii*, Piper in Proc. Biol. Soc. Wash. xxviii. 42 (partly).

**Lower Guinea.** Princes Island: in gravel near Porto de S. Antonio, *Welwitsch*, 2932! Angola: Loanda; in abandoned cultivation near Imbondeiro dos Lobos, *Welwitsch*, 7277! without notes, *Welwitsch*, 7331!

Introduced into the Southern States of North America previous to 1832 and known as "*Chickencorn*" in Mississippi and Louisiana, where it appears spontaneously each year in cultivated ground (*Piper*). The American specimens examined are those collected by Drummond near New Orleans and S. Louis in 1832 (herb. Kew, herb. British Museum, and herb. Lindley at Cambridge, the latter being part of the type of the species). Hackel refers to it specimens collected by Barter in Nupe (!) and by Newton in Dahome (!); both are *S. guineense*, as is also a young specimen from the Senegal (*Roger*, a. 1823!) mentioned by Piper under *A. Sorghum Drummondii*. Franchet also quotes *S. Drummondii* (under *A. Sorghum*, var. *Drummondii*) from Pongo, French Congo (*Brazza & Thollon*, 53), and adds that according to Thollon and Dybowski it is nowhere in that region cultivated for alimentary purposes and occurs in a spontaneous state.

13. *S. guineense*, *Stapf*. Annual. Culms stout, tall, often waxy-pruinous below the nodes. Leaf-sheaths delicately pubescent at the nodes; ligules very short, dark, ciliate from the back; blades linear to linear-lanceolate from a broad clasping base, long-attenuated upwards, up to over 2 ft. by 3 in., bright to pale dull green flushed with purple, glabrous to tomentose inside above the ligule and glabrous to finely pubescent outside at the junction with the sheath, otherwise glabrous. Panicle oblong, up to over 1 (sometimes almost 2) ft. long and up to 3 (rarely 4) in. wide, erect, contracted and rather stiff or more or less loose and then often secund with the branches at length drooping; branches moderately slender at the base, more so upwards, usually very flexuous, whorled, often many from a node, or semiverticillate, the longest undivided for up to  $1\frac{1}{2}$  in. from the base, but most branching from low down, all divisions more or less ciliolate towards the base (the primary often pubescent), finely scabrid upwards only. Racemes tough, 1-4-noded, usually crowded, rarely over  $\frac{1}{2}$  in. long; joints slender, 1 lin. long, rarely longer, shortly and often very scantily ciliate, cilia white; pedicels similar, of about the same length, more ciliate; tips discoid. Sessile spikelet ovate- to oblong-lanceolate or oblong, conspicuously flattened on the back when young, then more or less convex, acute or acutely acuminate,  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. by 1 to over  $1\frac{1}{2}$  lin., greenish or dull straw-colour to tawny, at length much darker, awned or awnless; callus-beard scanty to almost none. Glumes equal, coriaceous, gradually thinner upwards, at length very hard or tough, lower about 13-nerved, finely and often obscurely 2-keeled towards the tips with the keels slightly scabrid and the nerves

scarcely showing at all even in the tips, thin and distinctly constricted at the base, glabrous or nearly so, upper 7-9-nerved, finely keeled in the more or less recurved tip. Valves moderately ciliate, lower ovate-oblong or ovate-lanceolate as long as the glumes, upper broad-ovate, 2 lin. long, entire and mucicous or more or less 2-lobed and mucronate or awned; awn if present up to 6 lin. long, sharply bent, bristle often shorter than the column. Anthers  $1\frac{1}{2}$  lin. long. Grains elliptic, obovate or almost orbicular in outline,  $1\frac{3}{4}$ - $2\frac{1}{2}$  lin. by  $1\frac{1}{2}$ -2 lin., variously coloured, more or less exposed between the gaping glumes. Pedicelled spikelet neuter (? always) and more or less reduced, linear- or lanceolate-subulate, up to over 3 lin. long, mostly deciduous; lower glumes about 11-, upper 5-nerved.

Numerous cultural races are probably referable to this species, but owing to lack of material their exact classification is impossible at present. Among them three groups seem to stand out sufficiently clearly to be treated here provisionally as varieties. They are more readily recognised from fruiting than from flowering material, and some of the identifications given below may therefore need correction.

1. Var. *tremulans*, Stapf. Panicles erect, branches very slender and flexuous to flaccid (in flower), arching or sometimes nodding and secund in fruit. Spikelets narrowly lanceolate-oblong to ovate-oblong in flower, often ovate in fruit, mostly  $2\frac{1}{2}$  lin. by  $1$ - $1\frac{1}{2}$  lin., greenish or straw-colour in flower, at length dark straw-colour to tawny and sometimes blotched with red, somewhat glossy, usually awned, awn very slender, about 5 lin. long. Grains white or reddish, slightly shorter than the glumes, partly embraced by both or only by the lower. —*Andropogon Sorghum Drummondii*, Piper in Proc. Biol. Soc. Wash. 42 (partly).

Upper Guinea. Senegal, Roger! Sierra Leone: Kamalo, Thomas, 368! Balumba, Thomas, 1932! Yombana, Thomas, 4172! 4776! Mamaha, Thomas, 4509! Magbile, Thomas, 6236! Northern Nigeria: Sokoto Province, Dalziel, 518! "West Africa," Daniell, a. 1849!

Vern. names: *Kiti* (Mende), *Kokboio* (Timne) in Sierra Leone; *Karama* or *Bakin rakumi* in Sokoto. According to Dr. Dalziel it is called *Bakin rakumi* (camel's mouth) in allusion to the quivering habit of the panicles. Grown as a cereal. All the Sierra Leone specimens with the exception of Thomas, 368, are in flower only. They are remarkably uniform and also agree with Roger's specimen. The grains of No. 368 are reddish-brown, darker towards the top, lighter (almost yellowish) at the base and they are embraced up to or beyond the middle by the dark straw-coloured glumes. They are either in their normal position or more or less twisted out of it approaching the orientation characteristic of the following variety.

2. Var. *involutum*, Stapf. Panicles erect and rather dense or nodding and loose. Mature glumes dull purplish or blackish-brown, widely spreading, their margins involute, the back and front of the grain parallel to the median plane of the spikelet; fertile valve awned or awnless.—*Andropogon Sorghum*, subsp. *sativus*, var. *Drummondii*, Hack. in DC. Monogr. Phan. vi. 507 (partly).

Upper Guinea. Gambia, Herb. Nees; Dahomey: cultivated as a cereal, Newton, 17! Northern Nigeria: Nupe, Baikie! Barter! Jeba, Barter! Borgu, Barter!

Grown for the grain, one of the *Dawa* (Barter), the general Hausa name for Guinea corn. Among the Nigerian specimens at Kew there are two distinct races, one with erect rather dense panicles and grains almost orbicular in outline, and whitish to pale buff or reddish, and another with secund, drooping, rather loose panicles and grains broad-ovoid and yellowish cinnamon-colour or ochre. To this are probably referable the *Keniki* and *Bemberi* of the Middle Niger (Dumas, Agr. Pays Chauds, v. i. 1905, 460). *Keniki* is the commonest

Thomas 368 is *Gorgium melleum* Swartz



grain in the markets. Some fragments of a mature panicle, collected in the district of Huilla (*Welwitsch*, 2682 !), may also belong here. He says it is commonly cultivated there and is called *Masamballa branca*. It has glossy-black involute glumes and white grains.

Another rather striking race, probably referable to this group, is represented by a panicle (*Busse*, 2756 !) collected at Seliman Mamba, German East Africa. The panicle is very large, obovate with long loose fastigiate almost glabrous branches. The spikelets are oblong-lanceolate in flower,  $3\frac{1}{2}$  lin. by  $1\frac{1}{4}$  lin., glabrous apart from the scanty callus, dark sepia-brown to almost black with yellowish tips; the white grains are held between the more or less involute glumes which exceed them slightly in length. The pedicelled spikelets persist and are about 3 lin. long.

✓ 3. Var. *robustum*, Stapf. Panicles erect and much contracted. Mature glumes glossy, blackish-maroon, appressed to the grain with the margins not involute; fertile valve awnless; grain with back and front at a right angle to the median plane of the spikelet or more or less twisted round as in var. *involutum*, reddish, slightly exceeding the glumes.—*A. sp.*, Pobéguin, Ess. Fl. Guin. Franc. 216, No. 1087. "*Karandeffi*," Dudgeon, Agric. & Forest Prod. Brit. West Afr. 138, 146.

Upper Guinea. Liberia: within 20 miles from Kakatown, *Whyte*! Northern Nigeria: without precise locality, *Imperial Institute*, 32058! Southern Nigeria: Oban, *Talbot*, 841!

This variety also comprises several races. The specimens communicated by the Imperial Institute (No. 32058) represent two forms, one with very dense panicles 6-7 in. by  $2\frac{1}{2}$ -3 in. and spikelets about  $2\frac{1}{2}$  lin. long, whose mature glumes are dark-maroon and slightly shorter than the grain, the other with less dense though contracted panicles, 18 in. by 4-5 in., and spikelets  $3\frac{1}{2}$  lin. long. Of this only the flowering state is known. The vernacular name of both is given as *Karandeffi* and of the larger form it is stated that it is used for dyeing purposes. Dudgeon (l.c.) also says that *Karandeffi* is grown for medicine and the preparation of a red dye from the stem, used for Kano leather. It is evidently the *Faraoro* of Dumas (Agr. Pays Chauds, v. i. 1905, 461) from the Middle Niger. He says it is grown exclusively for dyeing leather, and the grain is considered to give colic to animals. The other specimens mentioned are only known from flowering panicles and are therefore somewhat doubtful.

14. *S. margaritifera*, Stapf. Annual. Culms stout. Leaf-sheaths almost glabrous (? always) at the nodes; ligules up to 1 lin. long, dark purple, densely ciliate from the back; blades linear-lanceolate from a broad clasping base, over 1 ft. by  $2-2\frac{1}{2}$  in., subglaucous, sparingly spotted with red, tomentose inside at the base of the midrib. Panicle oblong,  $1-1\frac{1}{4}$  ft. by 3-5 in., erect, contracted, dense; branches scattered or more or less verticillate, obliquely erect, the longest 3-6 in. long, branched almost from the base, but the lowest ramifications arrested, hence naked for  $1-2\frac{1}{2}$  in., flexuous, like the branchlets very slender, almost filiform, and rather rough all along. Racemes up to 6-noded and up to 10 lin. long, crowded; joints slender to very slender, 1 to over  $1\frac{1}{2}$  lin. long, ciliate, cilia white, under  $\frac{1}{2}$  lin. long; pedicels very similar, tips minutely discoid. Sessile spikelet oblong-lanceolate, subacute,  $2\frac{1}{4}-2\frac{1}{2}$  lin. by  $1-1\frac{1}{3}$  lin., straw-colour, flushed with bright-red below; callus-beard less than  $\frac{1}{2}$  lin. long. Glumes equal, coriaceous, thinner upwards, lower 13-15-nerved, sometimes minutely 3-toothed, sparingly and

finely strigillose mainly below and on the sides, or almost quite glabrous and glossy, nerves very slightly raised at the very tips, keels short, sharp, somewhat rough, upper glume 9-nerved, very obscurely keeled, tip straight or slightly recurved, usually both involute when mature. Valves ciliate, lower oblong to elliptic, 2-2½ lin. long, upper broad ovate, shortly 2-lobed, 1½ lin. long; awn up to 6 lin. long, sharply bent above the middle. Grain elliptic-rotundate in outline, 1½-1¾ by 1¼ lin., almost equally convex on both sides, slightly translucent, white; embryo-mark very distinct, elliptic-oblong, exceeding the middle of the grain. Pedicelled spikelet neuter, though often both valves present, persistent or deciduous, linear, acute, 2½ lin. long, greenish; lower glume 7-9, upper about 7-nerved.

Upper Guinea. French Congo: Bilima, *Chevalier*, 15861! US

"*Keudé bilé*" or "*Keudé rouge*" and "*Keudé blanc*" of Dumas (Agric. Pays Chauds, v. 1905, 459, 460) probably belong here. Both have small translucent (vitrifié) grains, *Keudé bilé* of red, and *Keudé blanc* of white colour. They are cultivated along the Middle Niger and are much valued as food grains.

15. *S. Roxburghii*, *Stapf*. Annual. Culms stout, tall, often slightly waxy, pruinose below the nodes. Leaf-sheaths softly pubescent at the nodes; ligules very short, scarious, hairy from the back; blades linear to linear-lanceolate or (the upper) lanceolate from a broad clasping base, long-attenuated upwards, up to over 1½ ft. long, and up to 1½ in. wide, usually hairy to tomentose inside above the ligule and outside at the junction with the sheath, otherwise glabrous. Panicle oblong to ovoid-oblong, rarely subobovate or elliptic in outline, erect, contracted and dense (rarely lax) in flower, somewhat to much loosened when mature; branches slender, flexuous, whorled or semiverticillate, the longest undivided for up to ½-1 in. (rarely much more) from the base, more or less ciliate towards the base and often villous at the junction with the nodes, otherwise like their divisions glabrous or nearly so, finely scabrid upwards. Racemes tough, up to 4- (rarely 5-) noded, ½-½ in. long; joints slender, 1-1½ lin. long, distinctly and often densely ciliate, cilia white or purplish; pedicels similar but more slender, of about the same length or more often shorter with very slightly thickened tips. Sessile spikelet ovate, acute with a small fine point, sometimes flattened on the back when young but soon convex, about 2½ lin. by 1¼-1½ lin. permanently pale or dull straw-colour to tawny, at length slightly glossy; callus-beard distinct, white. Glumes equal, coriaceous, lower about 10-13-nerved, finely and often obscurely 2-keeled towards the tips with the keels slightly scabrid, transversely constricted at the base, more or less white-strigillose (to almost tomentose) when young, at length more or less glabrescent on the back, upper 7-9-nerved, finely keeled upwards, tip usually straight. Valves distinctly ciliate, cilia up to ½ lin. long, lower





broad-oblong, as long as the glumes, upper broad-ovate,  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin. long, middle nerve much thickened from the middle upwards, running out into a short straight mucro, lobes adnate to it almost all along. Anthers  $1\frac{1}{4}$  lin. long. Grains elliptic or ovate-elliptic in outline,  $1\frac{3}{4}$ – $2\frac{1}{4}$  lin. by  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin., dull white (in the African specimens). Pedicelled spikelet usually neuter, linear or linear-lanceolate, up to 2 lin. long, more often much reduced and quite small, persistent; lower glume if well developed up to 9-nerved, upper 5-nerved.

There are several cultural races of *S. Roxburghii* known in India, and so far two of them have been found in tropical Africa, namely:—

1. Var. *semiclausum*, Stapf. Panicles fairly dense, also when mature. Glumes less coriaceous towards the tips and more or less showing the nerves in that portion, permanently more or less strigillose, their margins clasping the grain so that only its top or upper half is exposed.—*Holcus Sorghum minus* et *Sisna*, Wall. Cat. 8777 F.H. *A. Sorghum*, subsp. *sativus*, var. *Roxburghii* (?) and *fulvum*, Hack. in DC. Monogr. Phan. vi. 510 and 512. *A. Sorghum*, var. *Usorum* (?), Stapf in Dyer, Fl. Cap. vii. 348, in note; Medley Wood, Natal Pl. ii. t. 120, not of Koern., nor of Hack.

**Nileland.** Uganda: Entebbe, *Fyffe*, 281! British East Africa: Rabai Hills, near Mombasa, *Taylor*!

**Mozamb. Distr.** German East Africa: Kilossa, *Busse*! Portuguese East Africa: Zambesi Delta; Vicente, *Scott*! Nyasaland: Lokoma Island, Lake Nyasa, *Johnson*, 81!

Also in Natal, Madagascar and India.

2. Var. *hians*, Stapf. Panicles more or less loose with very flexuous and often drooping branches. Glumes coriaceous to the tips with the nerves quite obscure, subglabrous and somewhat glossy on the back when mature, their margins involute, exposing the whole grain, which is often placed with its back and front parallel to the median line of the spikelet.—*Holcus Sorghum nitidum*, Wall. Cat. 8777 D. *A. Sorghum*, var. *hians*, Stapf in Hook. f. Fl. Brit. India, vii. 184. *A. S.*, var. *Roxburghii*, K. Schum. in Engl. Pf. Ost-Afr. B. 48; C. t. iv. F-H; *Busse & Pilger* in Engl. Jahrb. xxxii. 184, partly.

**Mozamb. Distr.** Zanzibar, *Hildebrandt*, 1344b!

Vern. name *Mtama-Mópe* (Zanzibar).

Also in India.

Hackel quotes under *Andropogon Sorghum*, var. *Roxburghii*, Roxburgh's *Andropogon saccharatus*. From Roxburgh's description (Fl. Ind. i. p. 274; ed. Carey i. 271), I should suggest it to be var. *hians* rather than var. *semiclausum*, and this seems to be supported by the fact that Wight quotes *Andropogon saccharatus*, Roxb., as a synonym of his No. 1670 which is var. *hians*; but as there is no figure of this form in Roxburgh's collection of drawings and Roxburgh does not mention the curiously exposed grains, the point must remain undecided.

This species includes the forms cultivated in North America under the name of *Shallu*, an Indian vernacular.

16. *S. bicolor*. *Moench*, *Method.* 207, var. *obovatum*, <sup>(Hack.)</sup> *Stapf*. Annual. Culms stout, up to 14 ft. high, many-noded. Leaf-sheaths mostly overlapping, finely pubescent at the nodes; ligules short, ciliate from the back; blades linear to lanceolate-linear from a broad and rounded or slightly narrowed base, up to 20 in. long and 3 in. broad, pubescent to tomentose inside above the ligules and

less so or glabrous on the back at the junction with the sheath. Panicle erect, contracted and more or less dense, or loose and oblong or oblong-ellipsoid or obovate to oblanceolate in outline, 3–10 in. by 2–3½ ins.; branches erect or obliquely erect, rather rigid, finally sometimes slightly drooping, the longest often more than half the length of the panicle and undivided for ½–3 in. from the base, like the branchlets very rough, spinulously ciliate or ciliate, particularly upwards, slightly hairy, rarely villous at the base. Racemes tough, compact, frequently 3- or 4- (rarely 5-) noded; joints somewhat stout, flattened,  $\frac{3}{4}$ –1¼ lin. long, shortly whitish or fulvously ciliate; pedicels similar, about ½ lin. long. Sessile spikelet more or less broadly obovate even in flower, with very short broad and depressed tips,  $2\frac{1}{4}$ –2¾ lin. by 1½–2 lin., straw-colour to tawny, finally darker, often with red or brown or purple spots or blotches or turning altogether fuscous, chestnut-brown or quite black, closed when mature or only slightly gaping, usually awned; callus-beard scanty. Glumes equal, firmly coriaceous except at the papery to membranous tips, unevenly strigillose particularly and mostly persistently on the tips or almost glabrous; lower up to 16-nerved, nerves very faint, keels short, usually obscure, tips very short, broadly triangular with a hyaline point, depressed; upper broad, 9-nerved, obscurely keeled close to the tip, otherwise broadly rounded on the back. Valves ciliate, lower broad-elliptic, about 2 lin. long, upper broad-ovate, 1½ lin. long, 2-lobed, awn about 5 lin. long, sometimes much reduced. Anthers up to 2 lin. long. Grain tightly enclosed in the glumes or the top slightly exposed, obovate-oblong in outline,  $1\frac{1}{2}$ –1¾ lin. by 1–1½ lin., brown; embryo-mark distinct; nerves obliterated. Pedicelled spikelet neuter, persistent, lanceolate to linear-oblong, acute, about 2 lin. long, reddish; lower glume 9–10-, upper about 7-nerved.—*S. bicolor*, Willd. Enum. Hort. Berol. 1036; Roem. & Schult. Syst. ii. 837. *S. nigrum*, Roem. & Schult. l.c. *S. vulgare bicolor*, Pers. Syn. i. 101. *S. vulgare*, var. *obovatum*, subvar. *nigrum*, Rendle in Cat. Afr. Pl. Welw. ii. 151. *S. rubens*, Willd. Enum. Hort. Berol. 1036. *Holcus bicolor*, Linn. Mant. Alt. 301; Willd. Sp. Pl. iv. 929. *H. Sorghum*, Mieg in Act. Helv. viii. 129, t. 4, fig. 4. *H. niger*, Ard. in Sagg. sc. e lett. acad. Padova, i. 134, t. 5. *H. saccharatus*, Gært. Fruct. ii. 3, t. 80, fig. 2 (?), not of other authors. *Andropogon niger*, Kunth, Enum. i. 501. *A. rubens*, Kunth, l.c. 502. *A. Sorghum*, subsp. *sativus*, var. *obovatus*, Hack. in DC. Monogr. Phan. vi. 514. *A. S.*, var. *bicolor*, Koern. in Bull. Herb. Boiss. ii. 226.

**Lower Guinea.** Angola: cultivated near Mossamedes, *Welwitsch*, 2881, 2882! Huilla; Lopollo, cultivated in a garden, *Welwitsch*, 2682b! Damara-land: Ondonga; Olukonda, *Schinz*, 22! 650!

This is said to have been introduced into Angola in 1856. Occasionally cultivated in the Mediterranean region from Madeira to India, also introduced into Australia, the West Indies and Brazil. Another variety characterised by its more dense to compact inflorescences represents the *Andropogon Sorghum*, var. *Arduini* of Koern. or *A. Sorghum*, subsp. *sativus*, var. *vulgaris* of Hack. A form





with black glumes and red fruits has been called var. *æthiops* by Koernicke (in Koern. & Wern. Handb. Getreidebaues, i. 313). The name suggests tropical Africa, but there is no record of its having been found there.

(Forsk.)

17. *S. Durra*, Stapf. Annual. Culms stout, up to 14 (or even more) ft. high, 20-40-noded. Leaf-sheaths finely pubescent at the nodes; ligules very short, shortly ciliate; blades up to over 15 in. by 2 in., quite glabrous (? always). Panicle usually quite compact, ovoid or ellipsoid, erect or sometimes recurved, 4-6 in. by 2-4 in.; branches erect, more or less flexuous, rather slender, rough to spinulously ciliate, particularly upwards, ciliate to subvillous at the base, the longest up to one half or a third the length of the panicle, divided from very low down. Racemes compact, tough, about 4 lin. long (in flower), mostly 3- or 4-noded; joints somewhat stout, flattened,  $\frac{1}{2}$  to almost 1 lin. long, whitish-ciliate; pedicels similar, but still shorter. Sessile spikelet rhombic-obovoid, subacute (in flower),  $2\frac{1}{2}$ -3 lin. by  $1\frac{1}{2}$ -2 lin., greenish or straw-colour with greenish tips, ultimately whitish or variously brown, dark red or black, awned or awnless, callus-beard scanty. Glumes equal, coriaceous up to beyond one half or two-thirds, then papery, unevenly strigillose, particularly at the tips and sides; lower with a broad triangular greenish strongly nerved tip, about 12-nerved with 3 or 4 finer nerves interspersed, 2-keeled upwards (keels rough), more or less flattened out and very broad to rotundate when mature with the tips worn off and the back glossy; upper broad, 9-nerved with some additional finer nerves, slightly keeled upwards. Valves ciliate; lower ovate-elliptic, over 2 lin. long; upper broad-ovate, 2-toothed, 2 lin. long, awn up to 5 lin. long, mostly much shorter and then hardly twisted and differentiated into column and bristle or quite suppressed. Anthers over 1 lin. long. Grain subglobose, slightly compressed, with a broad rounded much exposed top, white, yellow or variously reddish,  $2\frac{1}{2}$  lin. by  $2\frac{1}{2}$  lin., nerveless, embryo-mark faint. Pedicelled spikelet neuter (? always), persistent, lanceolate to linear-oblong, subacute, up to 3 lin. long, greenish or reddish, lower 11-, upper 7-nerved.—*Holcus Durra*, Forsk. Fl. Ægypt.-Arab. 174. *H. Duna* (sphalm.), Gmelin, Syst. 173. *Andropogon Sorghum*, var. *ægyptiacus*, Koern. in Aschers. & Schweinf. Ill. Fl. Égypte, 164. *A. S.*, subsp. *sativus*, var. *Durra* and *ægyptiacus*, Hack. in DC. Monogr. Phan. vi. 516. *A. S.*, subsp. *s.*, var. *Durra*, Chiov. in Ann. Istit. Bot. Roma, viii. 24. *A. S.*, var. *niloticus* and *schweinfurthianus*, Koern. in Aschers. & Schweinf. l.c. 778, 779. *A. S.*, var. *arabicus* and *rubrocernuus*, Koern. in Bull. Herb. Boiss. ii. App. ii. 12 (probably).

Niléland. Eritrea: Sambar, Island of Seek Said, Terracciano & Pappi, 2789. Sudan: Geteina District, without further indication of origin, Rubber Exhibition, London, 1914!

A young specimen collected by the Rev. W. E. Taylor in the Rabai Hills near Mombasa, B. E. Africa, is very probably referable to *S. Durra*.

The most commonly cultivated *Sorghum* of Egypt, also grown in Arabia and more sparingly in India and Afghanistan. The Sudan specimens represent 3 distinct varieties, but owing to lack of material it has not been possible to refer them with certainty to any of Koernicke's varieties described above. They are distinct enough to deserve being mentioned and briefly characterised. They are :—

Glumes dull whitish with a brown band across just below the tip, more or less white-hairy; grains shortly exserted with very broad and almost flattened pale yellow tops ... .. vern. n. *Aklimawi*.

Glumes more or less glossy and almost glabrous without a dark band across the tips; grains more distinctly compressed and exserted.

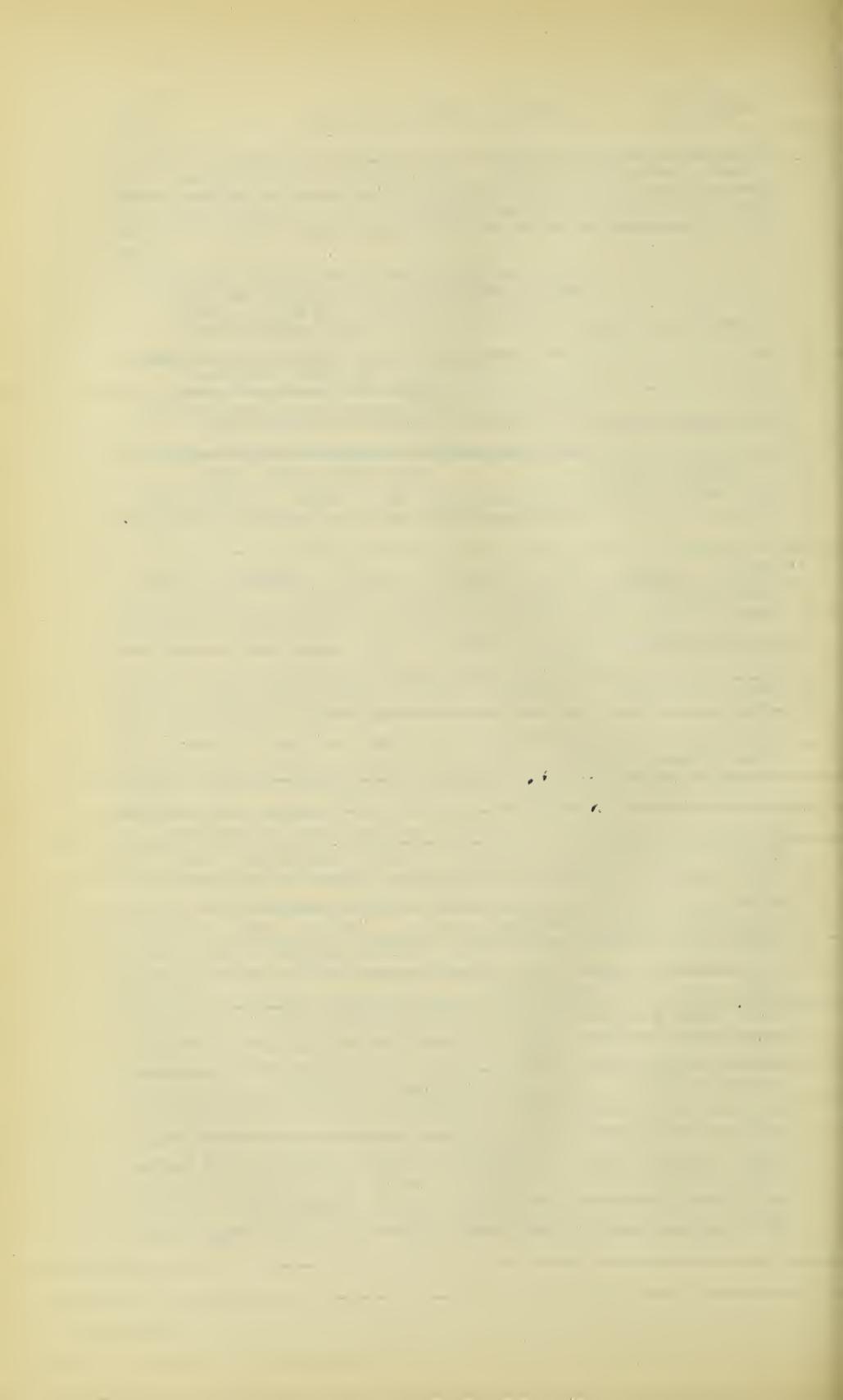
Glumes straw-colour, frequently flushed with brown or almost black at the base; grains ivory-colour vern. n. *Safra Kohia*.

Glumes burnt-sienna colour to blackish, particularly below; grains reddish-ochre ... .. vern. n. *Hamaizi*.

This is also the "*Durra*" of the United States of N. America, where it has been grown as a grain corn to some extent since 1874.

18. *S. Caffrorum*, Beauv. *Agrost.* 131, 178. Annual. Culms stout, about 6 ft. high. Leaf-sheaths longer than the internodes except the uppermost, very finely pubescent at the nodes; ligules very short, long-ciliate from the back; blades lanceolate from a broad, more or less clasping base, long-acuminate, up to 2 ft. by 3 in., green, often flushed with purple, pubescent to tomentose inside above the ligule, usually pubescent on the back at the junction with the sheath. Panicle oblong to ovoid-oblong, erect or recurved, usually very dense,  $\frac{1}{2}$  to 1 ft. by 2-4 in.; branches usually verticillate, erect or nodding when mature, rather stout below, stiff or flexuous, the longest 3-5 in. long and undivided to about half-way from the base or apparently up to over 1 in. owing to the arrest of the lowest branchlets, villous at the base, all the divisions scabrid and pubescent or ciliate, particularly downwards. Racemes compact, very crowded, mostly 3-4-noded and 5-6 lin. long; joints from less than 1 lin. to 1 lin. long, flattened, white-ciliate, longest cilia almost as long as the joint; pedicels very similar,  $\frac{1}{4}$ - $\frac{1}{2}$  lin. long. Sessile spikelet elliptic-ovate, shortly acute, almost apiculate,  $2\frac{1}{4}$ - $2\frac{3}{4}$  lin. by  $\frac{1}{4}$ - $1\frac{1}{2}$  lin., straw-colour or whitish under the loosely villous whitish tomentum, remaining pale or turning dark to a glossy black when mature; callus-beard about  $\frac{3}{4}$  lin. long. Glumes equal, thinly coriaceous, terminating with a small hyaline whitish point, tough, tomentum persistent or disappearing more or less on maturity; lower finely 11-13-nerved, the keel-nerves (the 2nd or 3rd from the margins situated in the fold) slightly raised towards the tips indicating keels, inflexed margins flattened out when mature; upper almost as broad as the lower, 7-nerved, very finely and obscurely keeled. Valves ciliate; lower broad-oblong, 3-nerved, about 2 lin. long; upper broad and shortly ovate, shortly 2-lobed,  $1\frac{1}{2}$  lin. long,





middle nerve stout upwards and running out into a short point. Anthers over 1 lin. long. Grain exerted from and more or less exceeding the gaping glumes, broad-elliptic to slightly obovate-elliptic in outline, dorsally compressed, convex on both sides,  $2\frac{1}{2}$  lin. by 2 lin., white or yellowish and flushed with red from below or more or less apricot-orange and ivory-white, embryo-mark somewhat faint, elliptic, exceeding the middle of the grain, style-bases contiguous. Pedicelled spikelet neuter, persistent, lanceolate to linear, 2 lin. long, whitish to reddish or brown, pubescent, glumes about 9-nerved.—*S. bicolor*, Nees, Fl. Afr. Austr. 86, not of Willd. *S. Usorum*, Nees, l.c. 87. *Holcus Caffrorum*, Thunb. Prodr. 20; Fl. Cap. ed. i. 410, ed. Schult. 109. *Andropogon Usorum*, Steud. Syn. Pl. Glum. i. 392. *A. Sorghum*, var. *Neesii*, Koern. in Koern. & Wern. Handb. Getreideb. i. 315; Stapf in Dyer, Fl. Cap. vii. 348, and var. *Usorum*, Koern, l.c. 312; Stapf, l.c. *A. Sorghum*, vars. *albidus*, *Usorum*, *rubicolor*, *Ondongæ*, and *Schenckii*, Koern. in Bull. Herb. Boiss. ii. 226, 227 (the Ondonga specimens). *A. Sorghum*, subsp. *sativus*, var. *Neesii*, Hack. in DC. Monogr. Phan. vi. 517, and var. *Usorum*, Hack. l.c. 512.

**Lower Guinea.** Damaraland: Ondonga; Olukonda, *Schinz!*

**Mozambique Distr.** Rhodesia: Victoria Falls, a stray plant, *Kolbe*, 3138!

Cultivated in South Africa in several races mainly characterised by the colour of the mature glumes and grains, also in Mauritius and, under the name of Kafir, in North America. To which of them Kolbe's specimen belongs is uncertain as it is in flower. K. Schumann (in Engl. Pf. Ost-Afr. B. 47) says that a specimen collected in Turu, S.E. of Tabora, *Stuhlmann*, 4246, agrees exactly with Drège's sample referred by Nees to *Sorghum bicolor*, that is to *S. Caffrorum*.

(Hack.)

19. *S. caudatum*, <sup>A</sup>*Stapf*. Annual. Culms slender or stout, tall, up to 14 ft. Leaf-sheaths overlapping, very finely silky-pubescent at the nodes; ligules short, usually long-ciliate from the back; blades linear-lanceolate from a broad base or the lower long-attenuated to a narrow base, up to over  $1\frac{1}{2}$  ft. by 1-3 in., green, often blotched with red, more or less hairy to tomentose inside above the ligule and pubescent on the back at the junction with the sheath. Panicle erect, oblong, sometimes very narrow, very dense, permanently contracted or at length more or less secund, lobed and looser owing to the nodding or drooping mature branches,  $\frac{1}{2}$ -1 ft. long, 2-3 (rarely 4) in. wide; branches whorled or scattered, numerous, lowest rather stout below, all more or less (often very much) flexuous, smooth to the touch or almost so, finely villous at the nodes or the lower for some distance from the base, otherwise more or less ciliate to glabrous, the longest not much over 3 in. long, undivided for  $\frac{1}{2}$ - $1\frac{1}{2}$  in. Racemes compact, very crowded, up to 3-noded,  $2\frac{1}{2}$ -5 lin. long; joints  $\frac{3}{4}$ -1 lin. long, flattened, white-ciliate, cilia up to  $\frac{1}{2}$  lin. long; pedicels very similar, up to  $\frac{1}{2}$  or (the terminal) to 1 lin. long, their tips more or less discoid if the spikelets are deciduous. Sessile

spikelet elliptic-oblong (sides rather straight), subobtusely or minutely pointed,  $1\frac{3}{4}$ –2 lin. by  $1$ – $1\frac{1}{4}$  lin., straw-colour often with the very tips greenish when in flower, when mature darker to glossy black or reddish or almost white, sparingly white-hairy, or almost glabrous; callus-beard  $\frac{1}{2}$  lin. long. Glumes equal, thinly coriaceous, tough; lower subobtusely, rarely with an obscure hyaline point, finely 13-nerved, the keel-nerves slightly raised and thickened towards the tips, smooth or almost so, inflexed margins flattened out when mature; upper rather broad, 7-nerved, finely and often obscurely keeled. Valves ciliate; lower broad-elliptic or oblong, 2–3-nerved,  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin. long; upper broad-ovate, subentire or minutely 2-lobed, up to  $1\frac{1}{2}$  lin. long, middle-nerve thickened upwards, running out into a minute point or a short stiff bristle, rarely a small bent awn. Anthers 1 lin. long. Grain very broad-elliptic to orbicular rarely obovate-orbicular in outline,  $1\frac{1}{2}$ –2 lin. long and broad, dorsally little or much compressed, white, yellow or red to chocolate-red. Embryo-mark distinct or obscure. Pedicelled spikelets neuter, often much reduced, persistent or deciduous,  $1\frac{1}{2}$ –3 lin. long, upper up to 9-, lower to 7-nerved. —*Andropogon Sorghum*, subsp. *sativus*, var. *caudatus*, Hack. in DC. Monogr. Phan. vi. 517, and var. *peruvianus*, Hack. l.c. 512. *Sorghum vulgare*, vars. *saccharatum* (fruiting spec.), and *angolense*, Rendle in Cat. Afr. Pl. Welw. ii. 150, 151.

**Upper Guinea.** Cape Verd Islands: in abandoned fields, *Welwitsch*, 2880!

**Nileland.** Jur: Ghattas' Seriba, *Schweinfurth*, 180! Uganda: Toro, *Dawe*, 527! 528! British East Africa: Freretown, *Taylor*!

**Lower Guinea.** Belgian Congo: Stanley Pool, *Hens*, B 47! Lower Congo, *Smith*! Angola: Golungo Alto; cultivated along the Cuango River near Arimodo Isidro, *Welwitsch*, 7237! Sange; cultivated everywhere, *Welwitsch*, 2995! Cazengo; Luinha River, everywhere cultivated, also in abandoned fields, *Welwitsch*, 7216! Huilla; very commonly cultivated, *Welwitsch*, 2681 (fruit)! Hereroland, *Nels*!

**Mozambique Distr.** Zanzibar, *Hildebrandt*, 1344b!

Widely cultivated in numerous races from Angola to the Sudan and East Africa; introduced into tropical America (Brazil, Venezuela, Peru; also Jamaica).

To the specimens enumerated above many others known only from fruiting panicles and mostly distinguished by larger grains have in all probability to be added, as the unfertilized and arrested spikelets to be found in the mature infructescences agree well with the known flowering states of *S. caudatum*. The following is an attempt to classify the whole material available and apparently referable to this most important species. Many of them were obtained from the Rubber Exhibition, London, 1914 (Sudan Division). They are marked with an asterisk. Their vernacular names are given between inverted commas, and where known their origin is added:—

Grain up to  $1\frac{1}{2}$  lin. long, broad-obovate in outline.

- |  |        |                          |
|--|--------|--------------------------|
| Panicle erect, oblong, rather compact ("Masambalo, <i>M. rubro</i> ," <i>Welwitsch</i> , 2681, fruiting spec., 2880, 2995, 7216, 7237.— <i>Hens</i> , B. 47; Hereroland, <i>Nels</i> ; <i>Hildebrandt</i> , 1344b.—"Mtama-Makunda," Freretown, <i>Taylor</i> ) | ... .. | var. <i>angolensis</i> . |
| Panicle umbelliform, owing to the shortening of the rhachis ( <i>Dawe</i> , 527)   | ... .. | var. <i>Cerevisiæ</i> .  |





Grain over  $1\frac{1}{2}$  lin. long, more or less roundish or obovate-elliptic in outline; panicle oblong with the rachis running through.

Pedicelled spikelets more or less persistent.

Pedicelled spikelets up to  $1\frac{1}{2}$  lin. long.

Mature glumes straw-colour to whitish; grain slightly compressed, white or ochre-salmon, Schweinfurth, 180—"Zerzereih"\*—"Bahana"\* ... .. var. *Schweinfurthii*.

Mature glume blackish-red or black; grain much compressed (*Dawe*, 528) ... .. var. *Lens*.

Pedicelled spikelets  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long.

Mature glumes not black.

Mature glumes whitish, sometimes spotted, streaked or flushed with red, rather thin.

Grain not umbonate, white; mature glumes brittle upwards ("*Rubai*"; Sennar\*) ... .. var. *fragile*.

Grain umbonate, much flattened, rich apricot-colour; lower glume frequently transversely constricted\* ... .. var. *umbonatum*.

Mature glumes straw-colour, tinged with red, firm; grain ochre-red to salmon on the top, paler below, often twin (*Hegareig*\*) ... .. var. *rutilum*.

Mature glumes black; grains sulphur- or maize-yellow or ochre-buff and sometimes twin ("*Safra Timan*"\*—"Safra"\*; Sudan, White Nile\*"—"Shabat Almer"; Sudan, Kassala\*) ... .. var. *atrolutescens*.

Pedicelled spikelets readily deciduous, tips of pedicels and joints more or less discoid; mature glumes black (rarely the lower whitish, the upper variegated with red, chestnut-brown or black ("*Gassabi*" in v. *Feterita*).

Grain ochre to salmon-colour, flushed with orange, or terra-cotta to Indian red, more or less gibbous; glumes rather glabrous to quite glabrous when mature ("*Abu Sana*"; Sennar, Shebh el Arial\*"—"Wad Masnab"; Tayiba\*"—"Aby Garda"; Sudan, Geteina District—"Um Shebasha"\*—"Wad Kassilek"\*—"El Torak Shaddo"; Sennar\*"—"El Torak"\*) ... .. var. *gibbum*.

Grain white, not gibbous; glumes villosulous ("*Maghbash Akhdar*"; Sudan, Geteina District\*"—"Web Akar"\*—"Feterita"\*—"Gassabi"; Sennar\*) ... .. var. *Feterita*.

Var. *angolensis* is the commonest *Sorghum* grown for grain in Angola, and it is also the form introduced into South America. The fertile spikelets seem always to be awned, the awn being so short that only the sharply bent bristle is exerted. The East African specimens differ from it apparently only in the absence of the awn and the dark, almost chocolate-red colour of the grains. Var. *Cerevisiæ* differs from them only in the peculiar modification of the inflorescence. It is used exclusively for fermenting beer. All the other varieties are more or less valuable cereals. Among them *Feterita* is considered to be one of the most prized by the Sudanese (*Schweinfurth*, *The Heart of Africa*, i. 245, 246). It has recently been introduced into the United States as a new grain crop (see *Vinall*, *Ball*, U.S. Dept. Agric. Circ. no. 122, 15-32).

20. *S. papyrascens*, Stapf. Mature panicles only known. Culms up to 8 lin. across at the base of the panicle. Panicle erect, oblong to oblanceolate in outline, contracted, dense, up to over 1 ft. by 4-5 in.; branches more or less whorled, often many to a whorl, erect, the longer slightly arching, rather robust, like the branchlets rough to spinulously ciliate upwards and softly ciliate or pubescent in addition, villous at the base, lowest branches divided almost from the base or  $\frac{1}{2}$  in. above it, following (longest) up to 6 in. long and undivided for 2-3 in. from the base. Racemes tough, up to 4-noded and  $\frac{3}{4}$  in. long, dense, much crowded; joints moderately slender, up to over  $1\frac{1}{2}$  lin. long, shortly white-ciliate; pedicels similar,  $\frac{1}{2}$ - $1\frac{1}{4}$  lin. long. Sessile spikelet oblong (in flower), at length ovoid or oblong-ovoid, tight or somewhat inflated, closed, up to  $4\frac{1}{2}$  lin. long, permanently pale straw-colour or reddish; callus-beard very short. Glumes equal, papery and transparent throughout; lower up to 16-nerved with numerous transverse veins, very obscurely keeled upwards or keel-less, nerves raised from the base upwards, softly pubescent to almost villous, very imperfectly glabrescent or at length almost glabrous, hairs white; upper broad, about 13-nerved, very obscurely keeled upwards, much less hairy. Valves conspicuously ciliate; lower broad-elliptic,  $2\frac{1}{2}$  lin. long; upper broad-ovate, entire and awnless or shortly 2-lobed, with a mucro or an awn up to 3 (rarely 5) lin. long, usually slightly bent and hardly twisted. Lodicules densely ciliate. Grain completely enclosed by the glumes or partly exposed by their breaking up, obovate to orbicular-obovate in outline, compressed, biconvex, dull white or orange; embryo-mark faint, elliptic, slightly exceeding the middle of the grain. Pedicelled spikelet neuter, reduced to the glumes, persistent, linear or linear-lanceolate, acute, pale straw-colour or reddish, 3-4 lin. long, lower glume 11-13-, upper 9-nerved, shorter.

**Tropical Africa?** Without indication of locality or collector.

✓ Var. *vesiculare*, Stapf. Mature spikelets somewhat inflated, usually 4- $4\frac{1}{2}$  lin. long, pale straw-colour, rather hairy; grain white.

**Nileland.** Sudan: Sennar, without special localisation, *Rubber Exhibition, London, 1914!*

Vernacular name "*Fakih Mestahi*" (or "*Faki el Mostahi*"). This is also known from India (*India Museum Collection, Kew*).

✓ Var. *lateritium*, Stapf. Mature spikelets tight, very brittle upwards,  $3\frac{1}{2}$ -4 lin. long, strongly flushed with brick-red, rather glabrescent; grain brilliant orange.

**Nileland.** Sudan: Sennar, *Rubber Exhibition, London, 1914!*

Vernacular name "*Gedoomel Teital*."

21. *S. melaleucum*, Stapf. Mature panicles only known. Culms up to 5 lin. across at the base of the panicles. Panicle erect, contracted, somewhat loose, oblong, secund, almost 1 ft. by 4 in.; branches more or less whorled, often many in a whorl, ascending, arched and ultimately somewhat nodding, slender, like the branchlets





purple, spinulously ciliate, with white cilia towards the base and villous at the nodes, lowest branches divided almost from the base, following (longest) up to  $4\frac{1}{2}$  in. long and undivided for  $1-1\frac{1}{2}$  in. from the base. Racemes tough, 3-noded, up to over  $\frac{1}{2}$  in. long, loose and loosely arranged; joints slender, up to  $2\frac{1}{2}$  lin. long, purple, densely or sparingly and shortly white-ciliate; pedicels similar,  $\frac{1}{2}-1$  lin. long. Sessile spikelet oblong in flower, ellipsoid and gaping in fruit, up to  $3\frac{1}{2}$  lin. long, glossy jet black, sometimes with red tips; callus-beard dense below the lower, scanty below the upper glume or altogether scanty and ultimately disappearing. Glumes equal, crustaceous with brittle tips, opaque, margins membranous, reddish, at length flattened out; lower about 13-nerved with few transverse veins, very finely 2-keeled below the tip, nerves very fine, faintly raised, whitish-strigillose or pubescent particularly above the middle, or almost glabrous; upper about 11-nerved, faintly keeled all along, much narrower than the lower. Valves conspicuously ciliate; lower oblong, 3 lin. long, tinged with red; upper over 2 lin. long, ovate, entire, minutely mucronate. Anthers 2 lin. long. Grain obovoid-ellipsoid, much exposed between the widely gaping appressed glumes,  $2\frac{1}{2}$  lin. by nearly 2 lin., more or less compressed, biconvex, milk-white; embryo-mark as in *S. papyrascens*. Pedicelled spikelet ♂ or neuter, more or less persistent, straw-colour more or less tinged with claret, lower glume about 13-, upper 11-nerved.

Nileland. Sudan, *Rubber Exhibition, London, 1914!* *U.S. type*

Vernacular name "*Shelsheleh*."

(Hack.)

22. *S. Ankolih*, Stapf. Culms stout. Leaf-sheaths short, long-ciliate from the back; blades linear to linear-lanceolate from a broad base, over  $\frac{1}{2}$  ft. by almost 3 in., pubescent inside above the ligule and outside at the junction with the sheath. Panicle oblong, contracted, dense in flower, looser when mature, up to 1 ft. by  $2\frac{1}{2}$  in.; branches more or less whorled, erect, the lower somewhat stout below and branched almost from the base, following (longest) up to 3 in. long and undivided for about 1 in., all very finely scabrid or smooth, minutely villous at the base, otherwise glabrous or almost so. Racemes tough, 1-3-noded, dense in flower, much crowded; joints very slender,  $1-1\frac{1}{2}$  lin. long, more or less shortly whitish-ciliate; pedicels very similar,  $\frac{1}{4}-\frac{1}{2}$  lin. long, tips not discoid. Sessile spikelet elliptic-oblong, acute or minutely acuminate,  $3-3\frac{1}{2}$  lin. by  $1\frac{1}{2}$  lin., dark straw-colour in flower, closed when mature, turning dark maroon or blackish-red in the lower third or two-thirds when ripe; callus-beard very scanty or none. Glumes equal, papery, glossy and somewhat firmer to subcoriaceous near the base or up to beyond the middle, finely and sparingly hairy here and there or almost quite glabrous; lower up to 16-nerved, very finely or obscurely

2-keeled, ending in a minute hyaline point; upper about 11-nerved, finely keeled upwards. Valves conspicuously ciliate; lower broad-oblong,  $2\frac{1}{2}$  lin. long; upper ovate, entire, 2 lin. long, running out into a fine bristle, shorter than the glumes. Anthers  $1\frac{1}{2}$  lin. long. Grain enclosed, broad-ellipsoid or almost orbicular in outline, 2 lin. by  $1\frac{3}{4}$  lin., somewhat flattened ventrally more so than dorsally, clay- to ochre-colour; embryo-mark distinct or obscure exceeding the middle of the grain. Pedicelled spikelet neuter, persistent, linear, acute, about  $2\frac{1}{2}$ –4 lin. long, lower glume up to 12-, upper 5- or 6-nerved.—*Andropogon Sorghum*, subsp. *sativus*, var. *Ankolib*, Hack. in DC. Monogr. Phan. vi. 519; Durand & Schinz, Consp. Fl. Afr. v. 724. *A. S.*, *sativus*, var. *nitidus*, Chiov. in Ann. Istit. Bot. Roma, vii. 61 and viii. 25.

Nileland. Abyssinia: Gallabat; Matamma, cultivated, *Schweinfurth*, 1530! 1531! and without precise locality, *Calvert*, a. 18! Eritrea: Barca, *Pappi & Terracciano*, 4800. Italian Somaliland: Marro Umberto, *Riva*, 1285.

Grown for its sweet canes which are chewed. Vernacular name "*Ankolib*."

23. *S. cernuum*, *Host*, *Gram. Austr.* iv. t. 3. Annual. Culms stout, 10 to 14 ft. (or more) high, 20–30-noded. Leaf-sheaths minutely pubescent at the nodes; ligules very short, densely ciliate from the back; blades linear-lanceolate, over 1 ft. by  $2\frac{1}{2}$  in., pale green, pubescent to tomentose inside above the ligule and outside at the junction with the sheath. Panicle erect or recurved, ovoid to oblong, very compact or somewhat loose, 4–10 in. by 2–3 in.; branches rather stout below, rigid, spinulously ciliolate, particularly upwards, softly ciliate to villous at the base, branches divided almost from the base, the longest 2–3 in. long. Racemes compact, up to 3- or 4-noded, up to 5 (rarely 6) lin. long; joints rather stout, compressed,  $\frac{1}{2}$  lin. long, more or less white-silky-villous; pedicels very similar, of about the same length. Sessile spikelet ovate with rather broad tips,  $2\frac{1}{2}$  lin. by  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin., pale straw-colour with greenish tips, whitish when mature, awned. Glumes equal, coriaceous about up to the middle or at the base only, otherwise papery and often partly spongy, white-silky-villous all over or glabrous on the coriaceous portion of the back; lower 12-nerved (with the nerves distinct upwards and sometimes with a few very delicate additional nerves interspersed), sharply 2-keeled upwards with the keels spinulously ciliolate and abruptly ending, forming minute teeth between which the hyaline end of the tip protrudes; upper very broad, about 12-nerved, slightly keeled upwards. Valves very densely ciliate; upper broad elliptic-oblong; lower broad-ovate, 2-lobed, 2 lin. long; awn about 4 lin. long with the bristle half the length of the long-exserted column or more or less reduced. Anthers  $1\frac{1}{2}$  lin. long. Grain equalling the glumes or more or less exserted, orbicular or orbicular-obovate in outline, more or less (often much) compressed, 2– $2\frac{1}{2}$  lin. by 2 lin., white, dull; embryo-mark indistinct. Pedicelled spikelet





neuter, linear-lanceolate, 2 lin. long, pubescent, lower glume 11-, upper 10-nerved.—Willd. Enum. Hort. Berol. 1036; Reichb. Ic. Fl. Germ. 1845, t. 80, fig. 466. *Holcus Sorghum*, Linn. Sp. Pl. ed. i. 1047, partly; Mant. ii. 500. *H. Dora*, Mieg in Act. Helv. viii. (1777) 125, t. 4, fig. 3. *H. cernuus*, Ard. in Saggi sc. e lett. ac. Padova, i. 128, t. iii. figs. 1, 2; Willd. Sp. Pl. iv. 930. *H. compactus*, Lam. Encycl. iii. 140. *Andropogon compactus*, Brot. Fl. Lus. i. 88. *A. cernuus*, Roxb. Fl. Ind. ed. Carey, i. 273; Kunth, Enum. i. 501. *A. Sorghum*, var. *cernuus*, Koern. in Koern. & Wern. Handb. Getreideb. i. 314. *A. Sorghum*, subsp. *sativus*, var. *cernuus*, Hack. in DC. Monogr. Phan. vi. 515; Durand & Schinz, Consp. Fl. Afr. v. 724.

**Upper Guinea.** Gambia (acc. to Koernicke, l.c.). Senegal: Futa (acc. to Dumas in Agric. Prat. Pays Chauds, v. 459). French Guinea (acc. to Dumas, l.c.). Northern Nigeria: Bornu, *Barth* (Trav., ii. 241), and without precise locality, *Oudney*, 6! North Cameroons: Musgu country (acc. to Vogel; see Wagner, Ed. Vogel, 221 and to Barth, l.c. iii. map facing 118).

**North Central.** Bagirmi: Logon District (*Barth*, l.c. iii. 284).

Vernacular names: "*Manio*" (Gambia); "*Amadi-boubou*" (Segu); "*Masakuwa, Masakwa, Mazgua*" (Bornu and Bagirmi).

This is the common durra of North Africa and the Orient to Turkestan, also grown to a considerable extent in Northern India as far as Manipur. It is the "*durra eweige*" of Egypt and probably also covers other forms of the summer "*durra, durra sefi*," of that country.

24. *S. subglabrescens*, *Schweinf. & Aschers. in Schweinf. Beitr. Fl. Aethiop.* 302, 306. Annual. Culms (only a meagre specimen seen) slender, almost simple, 2½ ft. high, about 8-noded, internodes (except the uppermost) shorter than the sheaths. Leaf-sheaths finely pubescent at the nodes; ligules very short, shortly ciliate from the back; blades linear from a broad (middle and upper leaves) or slightly narrowed (lower leaves) base, long-attenuated upwards, up to 8 in. by 8 lin., green, flushed with red, quite glabrous. Panicle oblong, erect, 3½ in. by almost 1 in., contracted, moderately dense; branches scattered, erect, the longest not much over 1 in. long and undivided for about ½ in. from the base, almost simple, scabrid to spinulously ciliate, sparingly hairy at the base. Racemes tough, up to 4-noded and 4 or 5 lin. long, dense; joints rather stout, up to 1 lin. long, shortly whitish-ciliate; pedicels very similar, up to ½ lin. long. Sessile spikelet oblong, acute in flower, broad-ovoid or ellipsoid in fruit, 3 lin. by 1½ lin., at length variegated, awned; callus-beard scanty, ½ lin. long. Glumes equal, gaping when mature, more or less coriaceous and glossy in the lower third, spongy-subcoriaceous and constricted about the middle, then papery, more or less whitish-strigillose, at length sometimes almost glabrous; lower finely 13-nerved, nerves showing above the coriaceous base, keels rather sharp, scabrid, running into minute teeth, between which the minute hyaline tip protrudes, the coriaceous part rich maroon to almost black, followed by a pale transverse zone, then violet or

purple across the middle, the broad triangular somewhat depressed tip straw-colour or reddish upwards; upper glume almost as broad as the lower, 9-nerved, slightly keeled, coloured like the lower. Valves ciliate; lower broad-oblong, up to almost  $2\frac{1}{2}$  lin. long; upper ovate, subentire,  $1\frac{1}{2}$  lin. long, awn up to 6 lin. long, sharply bent, column stout, twisted, equalling the bristle. Grain exposed upwards between the gaping glumes, equalling or slightly exceeding them, obovoid, 2 lin. by  $1\frac{2}{3}$ – $1\frac{4}{5}$  lin., more or less orange; embryo-mark and nerves obscure. Pedicelled spikelet neuter, persistent, linear-lanceolate, acute, 2– $2\frac{1}{2}$  lin. long, reddish, lower glume up to 11-, upper 7-nerved.—*Andropogon subglabrescens*, Steud. Syn. Pl. Glum. i. 393. *A. Sorghum*, subsp. *sativus*, var. *subglabrescens*, Hack. in DC. Monogr. Phan. vi. 519; Durand & Schinz, Consp. Fl. Afr. v. 726; Chiovenda in Ann. Istit. Bot. Roma, viii. 25.

**Nileland.** Abyssinia: hillsides above Jelajeranne, *Schimper*, 623! Eritrea: Agard-Adarté, 2600 ft., *Terracciano & Pappi*, 2726.

Also in tropical Arabia (*Deflers*, 123!) and in a smaller variety in India (Maharatta Country, *Young*!).

*Andropogon Sorghum*, subsp. *sativus*, var. *Schimperi*, Hack. l.c. 518 (Durand & Schinz, Consp. Fl. Afr. l.c.), based on *Schimper*, 968, from Abyssinia, is evidently the same. *Schimper* gives "*Maschilla Morôbi*" as the vernacular name for his No. 623, whilst Hackel quotes "*Maschilla legna fensha*" as the Abyssinian name of his var. "*rugulosus*" (Hack. l.c. 508; Durand & Schinz, l.c. 725), which according to him also occurs in the Cape Verd Islands (*S. Nicola, Ball*). Whether the latter be a form of *S. subglabrescens* is not quite certain, but from the description this is very probable. Chiovenda (l.c.) has var. *Schimperi* (including a form *pallida*) from the following localities in Eritrea:—Mensa; between Ferekanrot and Aba Maitan, 2500–5300 ft., *Terracciano & Pappi*, 1772; Bogos; Keren Dari, 5300 ft., *Terracciano & Pappi*, 2673; Barca; Agordat, *Terracciano & Pappi*, 4799, 4801 (f. *pallida*).

25. *S. versicolor*, *J. N. Andersson in Peters, Reise Mozamb. Bot.* 563. Perennial, caespitose, 2–3 ft. high. Culms erect, somewhat stout, simple or branched below, glabrous, about 3-noded, internodes exserted. Leaf-sheaths terete, smooth, glabrous or very sparingly hairy upwards, subherbaceous, with a dense white spreading beard up to  $3\frac{1}{2}$  lin. long at the nodes and a densely tomentose dorsal band at the junction with the blade; ligules very short, membranous, ciliate and long-hairy from the back; blades linear, long-attenuated to a fine point, slightly narrower at the base, to over 1 ft. long, 4 lin. broad, very loosely hairy on both sides, hairs very fine from minute tubercles, margins very finely cartilaginous and scaberulous, midrib whitish, broad and flat above, prominent below, lateral nerves about 4 on each side. Panicle oblong, up to 9 in. long; rachis smooth, glabrous or scantily and shortly bearded at the nodes; lower branches 4–7-nate, upper mostly 3–4-nate or in depauperate states 2–3-nate or solitary, filiform, flexuous, undivided, 1 to over 2 in. long, glabrous and smooth or more or less rough from short stiff hairs. Racemes somewhat stout, mostly 6-noded,

Schimper 623 is type of *And. sorghum* v. *abyssinicum*  
Hack



bearded at the nodes, about 1 in. long; joints  $1\frac{3}{4}$ – $2\frac{1}{2}$  lin. long, densely ciliate, glabrous on back and face, hairs pale reddish, about 1 lin. long; pedicels very similar, more densely ciliate. Sessile spikelet broad-lanceolate-oblong,  $3$ – $3\frac{1}{2}$  lin. long, up to almost 1 lin. wide; lower glume coriaceous, except at the short scarious truncate tip, about 11-nerved (nerves fine, but distinct on the inner side), black except for a whitish transverse band above the short obtuse bearded callus and the paler tips, rigidly ciliate towards the tip, very sparingly hairy on the sides and sometimes below the middle on the back; upper glume coriaceous, slightly longer than the lower, lanceolate, subacuminate, acute, 5-nerved. Valve of lower floret sublinear, minutely 2-toothed, 2 lin. long, membranous, whitish, brown upwards, ciliate, 2-nerved; of upper floret broad-ovate, shortly 2-lobed,  $1\frac{1}{2}$  lin. long, ciliate; awn slender, about  $1\frac{3}{4}$  in. long, kneed at and twisted below the middle, column dark bronze-colour, minutely ciliate along the spirals, bristle pale. Valvule a broad scale as long as the densely ciliate lodicules. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet ♂ or particularly the uppermost reduced and neuter, oblong-lanceolate, 3 lin. long, greenish; glumes thinly chartaceous, loosely hairy, lower 9–11-, upper 5–7-nerved; valve of lower floret lanceolate, up to  $2\frac{1}{2}$  lin. long, 2-nerved, ciliate, of upper broad-oblong, shortly 2-lobed, delicately hyaline except for a firmer median stripe, ciliate, with a ♂ flower.—*Andropogon serratus*, var. *versicolor*, Hack. in DC. Monogr. Phan. vi. 522; Durand & Schinz, Consp. Fl. Afr. v. 723; K. Schum. in Engl. Pfl. Ost-Afr. C. 98.

Nileland. British East Africa: Mombasa, *Turnbull*, 3! Malindi, *Linton*, 54!

South Central. Rhodesia: Livingstone, *Rogers*, 7057! Salisbury, *Rogers*, 5798! by the Batoka River, *Allen*, 439!

Mozambique Distr. German East Africa: without precise locality, *Hannington*! *Busse*, 163! Portuguese East Africa: in damp meadows, Tete and Boror, *Peters*.

Also in the Transvaal (Rustenburg, near the Crocodile River, *Burt-Davy*, 9305!).

26. *S. purpureo-sericeum*, *Aschers. & Schweinf. in Schweinf. Beitr. Fl. Æthiop.* 302, 306. Annual, erect, up to over 3 ft. high. Culms somewhat stout, simple or almost so, appressedly silky below the nodes, otherwise glabrous, 3–4-noded, internodes exerted. Leaf-sheaths slightly compressed and keeled upwards, scarious, the lower more or less softly hirsute upwards, otherwise glabrous like the upper, all with a dense beard  $3\frac{1}{2}$ –4 lin. long at the nodes, and a shorter dorsal transverse one at the junction with the blade; ligules very short, truncate, membranous, ciliate and with long hairs from the back; blades linear, attenuated to a fine point, hardly narrower at the base, up to 9 in. long,  $2\frac{1}{2}$ – $4\frac{1}{2}$  lin. wide, flat, softly hirsute on both sides, slightly scabrid on the fine cartilaginous margins, midrib prominent and white below, lateral nerves 3–5 on each side, fine. Panicle oblong, about 4 in. long, rather loose; rachis smooth,

shortly bearded at the nodes; branches 3-2-nate, filiform, flexuous, often nodding, undivided for  $\frac{3}{4}$ -1 in., sparingly hairy below the racemes. Racemes rather stout, rather tough, 4-noded, bearded at the nodes, up to over 1 in. long; joints about  $2\frac{1}{2}$  lin. long, densely hairy along the sides and more or less so on the back, hairs pale to dark rufous, 1- $1\frac{1}{2}$  lin. long. Sessile spikelet lanceolate, 4-5 lin. long, 1 lin. broad; lower glume coriaceous, except at the scarious truncate tip, 7-9-nerved, pale straw-colour or dark brown or at length a deep glossy black, rigidly hairy along the involute sides and ciliate towards the tip, callus short; upper glume slightly exceeding the lower, coriaceous, almost glabrous, 7-nerved. Valve of lower floret linear-lanceolate, acute, white, ciliate, 2-nerved; of upper floret hyaline, broad-ovate-oblong, 2- $2\frac{1}{2}$  lin. long, 3-nerved, 2-lobed to a fifth or quarter, ciliate, awn up to 2 in. long, twisted to the middle, column dark brown, minutely ciliate along the spiral, bristle pale. Anthers 2-3 lin. long. Grain 2 lin. by  $\frac{7}{8}$  lin. Pedicelled spikelet narrowly lanceolate, about 4- $4\frac{1}{2}$  lin. long; glumes acute, more or less hairy, lower 7-11-, upper 5-7-nerved, nerves distinct, green; florets (if present) reduced to their valves, upper ♂ or neuter like the lower; valve of lower almost as long as the glumes, ciliate, of upper up to 3 lin. long, minutely 2-toothed, somewhat firmer along the middle, otherwise delicately hyaline, ciliate.—*Andropogon purpureo-sericeus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 469; Hack. in DC. Monogr. Phan. vi. 524; Engl. Glied. Veget. Usambara, 38; K. Schum. in Engl. Pfl. Ost-Afr. C. 98; Durand & Schinz, Consp. Fl. Afr. v. 721; Chiov. in Ann. Istit. Bot. Roma, viii. 25.

**North Central.** Bagirmi: Moito, Boro, Aoumi, *Chevalier*, 9794!

**Nileland.** Eritrea: Assaorta, Jugal Ras Koral, *Terracciano & Pappi*, 2790, 2791. Gallabat: Matamma, gregariously, *Schweinfurth*, 1033! 1040! Abyssinia: Sana; in swamps, in the hilly district of Walcha, *Schimper*, 1551! in moist places at Jaja, 6000 ft., *Schimper*, 243! and without precise locality, *Schimper*, 1417.

**Mozambique Distr.** German East Africa: Usambara (according to Engler, l.c.), and from Tana River to Rovuma River (according to K. Schumann).

Hackel's varieties *pallidior* (*Schweinfurth*, 1033) and *calomelas* (*Schimper*, 1417, evidently the same as *Schimper*, 243) represent in my opinion only individual variations. *Chevalier*'s specimen combines the pale sessile spikelets of *pallidior* with the reduced pedicelled spikelets of *calomelas*. A pale form with somewhat smaller (young) spikelets was collected in the Transvaal, in wet places near Marabastad (*Schlechter*, 4335).

27. *S. dimidiatum*, *Stapf*. Perennial(?) about 2 ft. high. Culms geniculately ascending, branched, 3- or more (?)-noded, internodes enclosed. Leaf-sheaths terete, smooth, glabrous, subherbaceous, with a dense white spreading beard  $2\frac{1}{2}$  lin. long at the nodes and another at the junction with the blade; ligules very short, membranous, ciliate and long-hairy from the back; blades linear, long-attenuated to a fine point, slightly narrower towards the base, to





over 1 ft. long, 3 lin. broad, pale dull green, hairy on both sides, hairs very fine, sometimes from minute tubercles, margins very finely cartilaginous and scaberulous, midrib whitish, broad and flat above, prominent below, lateral nerves about 5 on each side. Panicle linear, up to  $2\frac{1}{2}$  in. long; rhachis smooth, glabrous except at the shortly bearded nodes; lower branches about 4-nate, upper 2-nate or solitary, filiform, flexuous, undivided, up to over 1 in. long, glabrous and smooth or with a few short hairs at the thickened tips. Racemes few-noded, bearded at the nodes; joints  $1\frac{3}{4}$  lin. long, densely ciliate, hairs reddish or purplish, up to 1 lin. long; pedicels very similar. Sessile spikelet lanceolate, acuminate,  $3\frac{1}{2}$ -4 lin. long, 1 lin. wide; lower glume firmly coriaceous up to half-way, then abruptly thinner, more or less chartaceous, 9-nerved, the coriaceous portion usually early turning a glossy brown or black, the remainder green, rigidly ciliate upwards and hairy on the sides; upper glume coriaceous up to three-quarters, then gradually thinner, as long as the lower, lanceolate, acuminate, 5-nerved, hairy upwards. Valve of lower floret linear-oblong,  $3-3\frac{1}{2}$  lin. long, membranous, whitish or brownish, ciliate, 2-nerved; of upper floret ovate, shortly 2-lobed,  $1\frac{1}{2}$  lin. long, ciliate; awn slender, about 1 in. long, kneed at and twisted below the middle. Column dark bronze-colour, minutely ciliate along the spirals, bristle pale. Lodicules densely ciliate. Pedicelled spikelet ♂ (?) or neuter, linear-lanceolate, 3 lin. long, greenish; glumes membranous, loosely hairy, lower about 7-, upper 5-nerved; valves linear-lanceolate to linear, hyaline, ciliate, lower entire, 2-nerved, upper 2-lobed, 1-nerved, with the nerve running out into a hair-like micro.

**Nileland.** Sudan: without precise locality, *Brown*!

Perhaps a hybrid of *S. versicolor* and some cultivated form. The differentiation of the lower glumes into a thick coriaceous, usually dark coloured lower and a thin chartaceous green upper half is very striking, and recalls similar conditions in *S. Ankolib*, but the transition is quite abrupt. The general habit of the plant is that of *S. versicolor*, but the spikelets are slightly larger and very gradually narrowed from the middle upwards.

(Stapf)  
28. *S. trichopus*, *Stapf*. Perennial (*Barter*), up to 5 ft. high. Culms (only the upper parts known) erect, rather slender, smooth, glabrous. Leaf-sheaths glabrous, smooth, the uppermost very long; ligules short, scarious, pubescent; blades (uppermost) subsetaceous convolute,  $\frac{1}{2}$  ft. long, smooth, glabrous, closely nerved, 2 primary lateral nerves on each side more prominent below. Panicle linear-oblong, erect or somewhat flaccid, 6-10 in. long; rhachis smooth, glabrous; branches semiverticillate, many fascicled at the nodes, very unequal, the longest up to 4 in. long and up to 6-noded, repeatedly divided, filiform to capillary, hairy towards the tips. Racemes 3-1-noded, each sessile spikelet save the uppermost accompanied by an empty pedicel, the uppermost (or in 1-noded racemes the solitary spikelet) by 2 empty pedicels; joints and

*Sorghastrum Nash*  
recognised  
for these by  
*Palger*

pedicels alike, finely filiform, ciliate, cilia up to  $\frac{1}{2}$  lin. long, joints  $2\frac{1}{2}$ –3 lin. long, pedicels  $1\frac{1}{2}$ –2 lin. long. Spikelets lanceolate to lanceolate-oblong, subacuminate,  $2$ – $2\frac{1}{2}$  lin. long, pale brown to straw-colour. Glumes equal, chartaceous, thin; lower minutely truncate, loosely hairy on the back, scabrid on the subterminal keels, finely 9-nerved; upper very similar, 5-nerved. Valves equally long; of lower floret broad-lanceolate-oblong, 2 lin. long, hyaline, densely ciliate upwards, 2-nerved; of upper floret oblong, ciliate upwards, 3-nerved, lobes adnate to the awn; awn 4 lin. long, very slender, kneed at and twisted below the middle. Lodicules glabrous. Anthers  $1\frac{1}{4}$  lin. long. Grain oblong, 1 lin. long, reddish-brown.—*Andropogon nutans* (forma), Franch. Contrib. Fl. Congo Franç. 21; not of Linn. *A. trichopus*, Stapf in Kew Bulletin, 1897, 287.

**Upper Guinea.** Northern Nigeria: on open plains at Nupe, *Barter*, 1375!

Two specimens collected in French Guinea (*Pobéquin*, 507 from Kouroussa and 1731 from the Baffing valley) may have to be connected with *S. trichopus*. They dissect very similarly, but have much longer and perfect awns ( $5$ – $6\frac{1}{2}$  lin. and up to 12 lin. respectively) and glabrous peduncles. But as neither is accompanied by complete culms and leaves, their status is still doubtful. They and *S. trichopus* as originally described approach the American *S. nutans*, Linn., very closely indeed.

**29. *S. micratherum*, Stapf.** Perennial, tufted, up to 3 ft. high. Culms erect, rather slender, smooth, glabrous. Leaf-sheaths glabrous except at the appressedly bearded nodes, or the lowest and those of the innovation-shoots sparingly hairy towards the mouth, smooth, mostly shorter than the internodes; ligules short, scarious, slightly pubescent and ciliate; blades linear; of the lowest leaves and the innovations short, 1–3 in. long; of the upper much elongated and tapering to a long fine point, up to 7 in. long,  $2$ – $2\frac{1}{2}$  lin. wide, rather rigid, flat or convolute, pale dull green, smooth below, somewhat rough above, glabrous, rarely with a few scattered hairs, closely nerved. Panicle linear to linear-oblong, erect, often more or less secund, 6–9 in. long; rhachis smooth, glabrous; branches semiverticillate, 2–4 from a node, unequal, the longest up to 2 rarely 3 or even 4 in. long and 3–4-noded, filiform, divided only once, that is the branchlets of the first order which are hairy below their tips bearing the 4–1-noded racemes; each sessile spikelet except the uppermost accompanied by an empty pedicel, the uppermost (or in 1-noded racemes the solitary spikelet) by two empty pedicels; joints and pedicels alike, finely filiform, ciliate, cilia up to almost 1 lin. long, often purplish, joints  $2$ – $2\frac{1}{2}$  lin. long, pedicels  $1\frac{1}{2}$ –2 lin. long. Spikelets linear-lanceolate, acuminate,  $2\frac{1}{2}$ –4 lin. long, pale brown; glumes subequal, chartaceous, lower minutely truncate, loosely villous on the back, with the hairs often purplish, finely 9-nerved, upper similar but slightly longer, 5-nerved; valves  $2\frac{1}{2}$ –3 lin. long; of lower floret lanceolate-oblong, minutely ciliate upwards, 2-nerved; of upper floret oblong, ciliate upwards, 3-nerved, lobes

= *S. Friesii* (Pilg.) Hubb. based on *Androp. Friesii*  
Pilg.

*Sorghastrum micrathenum* (Stapf) Pilger



almost wholly adnate to the awn which is 2-3 lin. long, very slender, slightly twisted below the middle. Lodicules very small and glabrous. Anthers over 2 lin. long. Pedicelled spikelets none or quite rudimentary and minute.—*S. nutans*, var. *angolense*, Rendle in Cat. Afr. Pl. Welw. ii. 152.

Lower Guinea. Angola: Huilla; between Lopollo and Catumba, *Welwitsch*, 7491! damp wooded grassy places near Catumba, *Welwitsch*, 7496!

Mozambique Distr. Portuguese East Africa: Beira, *Rogers*, 5939! Rhodesia: Salisbury, *Mrs. Craster*, 63! Qweebi Flats, *Allen*, 686! Insiza District, *Mundy*, 21! and without precise locality, *Allen*, 740!

30. *S. rigidifolium*, *Stapf*. Perennial (?). Culms erect, apparently simple and tall (over 4 ft. high), somewhat stout, 4-6-noded, upper internodes exerted, smooth, glabrous. Leaf-sheaths terete, rather tight, firm, striate, smooth, glabrous except at the appressedly bearded nodes, produced into short auricles along the ligule; ligules firm, scarious, from very short to 1 lin. long, more or less hairy from the back, glabrescent; blades linear, rather shortly tapering to a hard point, hardly narrowed at the base, very variable in length, up to 1½ ft. long and 3 lin. wide, flat or involute, firm and rigid, glabrous, smooth except on the upwards very scabrid margins, midrib usually slender, lateral nerves numerous, very close. Panicle erect, narrow, up to 1 ft. long; rhachis smooth, glabrous or with a few hairs at the nodes; branches semiverticillate, in dense fascicles from the nodes, very unequal, the longest up to 4 in. long, divided from near the base, up to 8-noded, the longest branchlets divided again, filiform to capillary, more or less flexuous, smooth, glabrous, tips discoid-clavate. Racemes 4-1-noded; each sessile spikelet except the uppermost accompanied by 1 empty pedicel, the uppermost (or in 1-noded racemes the solitary spikelet) by 2 empty pedicels; joints and pedicels finely filiform, ciliate, cilia ½ lin. long; joints 2-2½ lin. long; pedicels 1½-2 lin. long. Spikelets oblong to lanceolate-oblong, obtuse to subacuminate, 2½-3 lin. long, brown with pale tips. Glumes equal, subcoriaceous to coriaceous; lower truncate, loosely hairy on the back, rigidly ciliolate at the subterminal keels and tips, finely 9-nerved; upper very similar, 5-nerved. Valves of lower floret broad-oblong, 2 lin. long, minutely ciliolate from the middle, 2-nerved; of upper oblong, eciliolate or almost so, 1¾ lin. long, 3-nerved, lobes almost wholly adnate to the awn; awn 4-7 lin. long, very slender, kneed at and twisted below the middle. Lodicules glabrous. Anthers 1½-2 lin. long.

Nileland. Uganda: Nandi country; Sibü, *James*! British East Africa: Nairobi, *Lyne*, 146! *Johnstone*, 162! and without precise locality, *Powell*, 137!

✓Var. *microstachyum*, *Stapf*. Spikelets 2 lin. long, awn reduced to a bristle, 1½-2 lin. long.

Nileland. Uganda: Kavirondo, a common grass, 4000 ft., *Scott Elliot*, 7050!

Miss *Johnstone*'s specimens are somewhat anomalous, as in a few racemes the terminal trio is represented by 2 sessile spikelets, both ♂ or one ♂, and an

empty pedicel, instead of one sessile spikelet and 2 empty pedicels. In other cases the pedicel of a lower pair bears a ♂ spikelet or a ♀ spikelet with an empty pedicel by its side. Sir Evan James' specimen is somewhat intermediate between the typical form and the variety *microstachyum*.

31. *S. pogonostachyum*, Stapf. Perennial; rhizome creeping, wiry, sending up a small tuft of culms and intravaginal innovation-shoots. Culms up to 3 ft. high, somewhat compressed below, slender, 2-noded, smooth, glabrous. Leaf-sheaths firm, tight, glabrous (also at the nodes), smooth, striate, the lowest long-persistent, fuscous or lead-grey; ligules short, firmly scarious, pubescent; blades very narrow, junciform, laterally compressed, narrowly and shallowly channelled towards the base, ending in a short point, up to 5 in. by  $\frac{3}{4}$  lin., glabrous, smooth except at the slightly rough tips, striate. Panicle very narrow, erect, up to 4 in. long; rhachis and branches smooth and glabrous; branches paired and unequal or the upper solitary, simple, bearing a single raceme, or the longest which may be almost up to over 1 in. long with a small lateral raceme, their tips discoid. Racemes 3-1-noded; joints and pedicels alike, finely filiform, ciliate, cilia white, up to over 1 lin. long; joints up to  $2\frac{1}{2}$  lin. long; pedicels about 2 lin. long. Spikelets narrowly lanceolate, subacute, 3 lin. long, pale brown. Glumes equal, chartaceous, very minutely truncate, glabrous except for the long-bearded callus, lower finely 9-nerved, upper 5-nerved. Valve of lower floret linear-oblong, almost  $2\frac{1}{2}$  lin. long, 2-nerved, ciliate above the middle, of upper floret oblong,  $1\frac{3}{4}$  lin. long, lobes adnate to the awn, ciliate; awn bristle-like, about 3 lin. long. Lodicules minute, glabrous.

Lower Guinea. Angola: Benguella; country of the Ganguellas and Ambuellas, Gossweiler, 2225!

(Hack.)

32. *S. bipennatum*, Stapf. Annual, up to 4 ft. high. Culms erect or geniculately ascending, slender, often rooting from the lowest nodes, sparingly branched below or simple, quite glabrous. Leaf-sheaths terete, rather tight, quite glabrous except at the silky nodes, smooth, produced into auricles along the ligules; ligules short, truncate, scarious, up to 1 lin. long; blades linear, long-attenuated to a fine point, narrowed towards the base, up to 1 ft. long, 2-3 lin. wide, subglaucous, glabrous, rarely more or less hairy, very finely scaberulous below, scabrid along the cartilaginous margins, midrib slender, whitish, lateral nerves obscure. Panicle linear-oblong, up to 7 in. long, rather lax; rhachis smooth, glabrous; branches 8-2-nate, very unequal, the longer divided again, the longest up to  $2\frac{1}{2}$  in. long and up to 6-noded, all capillary with slightly thickened tips, smooth, glabrous. Racemes reduced to a solitary spikelet accompanied by two slender pedicels, about 2 lin. long, elegantly ciliate, cilia whitish, up to 1 lin. long. Spikelets broad-lanceolate,  $2\frac{1}{2}$  lin. long,  $\frac{3}{4}$  lin. broad. Lower glume coriaceous except at the often scarious minutely truncate tip, finely 9-nerved





on the inside, dark brown, whitish at the base, somewhat glossy, more or less silkily hairy, the subterminal keels scaberulous; callus very short, obtuse, with a dense white beard,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. long; upper glume coriaceous, broad-lanceolate, shortly acute, glabrous, 5-nerved. Valve of lower floret somewhat shorter than the glumes, oblong, hyaline, 2-nerved, ciliate; of upper floret lanceolate, minutely 2-lobed, as long as the lower, hyaline, ciliate upwards, faintly 3-nerved; awn  $1\frac{1}{3}$ – $1\frac{2}{3}$  in. long, kneed at and twisted below the middle, column dark brown, bristle pale. Valvule 0. Lodicules glabrous. Anthers  $\frac{1}{2}$ – $\frac{3}{4}$  lin. long.—*Andropogon bipennatus*, Hack. in Flora, 1885, 142, and in DC. Monogr. Phan. vi. 537; Durand & Schinz, Consp. Fl. Trop. Afr. v. 707. *A. nutans*, var. *africanus*, Franch., Contr. Fl. Congo Franç. 21.

**Upper Guinea.** French Guinea: Kouroussa, *Pobéguin*, 530! Northern Nigeria: Lokoja, *Dalziel*, 286! Cameroons: Yaunde, *Zenker & Staudt*, 561! Golombe, *Macleod*, 107! and between Golombe and Bipare. *Macleod*, 110!

**Nileland.** Jur: between Gir and Ghattas' Seriba, *Schweinfurth*, 2486!

**Lower Guinea.** Gaboon: Ogowe; plains of Lopé, *Thollon*, 788! 1077. Angola: Benguella; between Old Munonque and N'Jaia, gregarious, *Gossweiler*, 3131! Cazengo, in thickets, *Gossweiler*, 5576! 5922!

According to Hackel also in Madagascar.

(Presl)

**33. *S. incompletum*, Stapf.** Annual, up to over 3 ft. high. Culms erect or more often geniculate at the base, and then usually rooting from the lowest nodes, simple, quite glabrous. Leaf-sheaths terete, rather tight, glabrous or more or less hairy from minute tubercles, delicately silky at the nodes, produced into auricles along the ligules; ligules truncate, scarious, up to 1 lin. long; blades linear, long-attenuated to a fine point, slightly narrowed towards the base, up to 6 in. by  $2\frac{1}{2}$  lin. (in the African specimens; twice as large in some of the American), subglaucous, glabrous or more or less hairy like the sheaths, very finely scaberulous below and along the cartilaginous margins, midrib slender, lateral nerves fine, 3–4 on each side. Panicle usually narrowly oblong, up to 6 in. long, rarely longer, usually somewhat contracted, shining; rhachis smooth, glabrous; branches 6–2-nate, unequal, the longer divided from the base, the longest over 1 in. long and up to 6-noded, all capillary with turbinate hollowed-out tips, smooth, glabrous or sometimes more or less ciliate. Racemes reduced to a solitary spikelet accompanied by 2 slender pedicels, about  $1\frac{1}{2}$  lin. long, elegantly whitish-ciliate, cilia  $\frac{1}{2}$  lin. long. Spikelets lanceolate,  $2$ – $2\frac{1}{4}$  lin. long,  $\frac{1}{2}$ – $\frac{2}{3}$  lin. broad. Glumes subchartaceous, whitish except at the reddish tips, lower minutely truncate, finely 9-nerved, dull, more or less silkily hairy to beyond the middle, the subterminal keels scaberulous; callus very short, obtuse with a short silvery beard; upper glume similar to the lower, but acute, narrower, 5-nerved and glabrous. Florets as in *S. bipennatum*, but the awn rather shorter.—*Andropogon incompletus*, J. S. Presl in C. B. Presl, Reliq. Haenk. i. 342. *A. Galeottii*,

Fourn. Pl. Mex. ii. 56. *A. nutans*, var. *incompletus*, Hack. in DC. Monogr. Phan. vi. 531; Rendle in Cat. Afr. Pl. Welw. ii. 152.

**Lower Guinea.** Angola: Quilanga, in sandy woods, *Welwitsch*, 2821!

Also in Tropical America, from Mexico to Brazil.

*Imperfectly known species and varieties.*

1. *Andropogon Sorghum*, var. *abyssinicus*, *Hack. in DC. Monogr. Phan.* vi. 518; *Durand & Schinz, Consp. Fl. Afr.* v. 724. Sessile spikelets  $2\frac{1}{2}$  lin. by  $1\frac{1}{2}$  lin., the coriaceous basal part black, the remainder clay-colour, glabrous, mucous. Grain dark-violet.

**Nileland.** Abyssinia: without precise locality, *Quartin-Dillon & Petit*, 439.

Probably a form of *S. Ankolib*.

2. *A. S.*, var. *albidus*, *Koern. in Bull. Herb. Boiss.* ii., *App.* ii. 12, not ii. 226. Panicle erect, contracted, ovate to ovate-lanceolate in outline, up to 1 ft. by  $2\frac{1}{2}$ –4 in. Glumes pale yellow. Grain yellowish-white,  $2\frac{1}{2}$  lin. by  $2$ – $2\frac{1}{4}$  lin.—*Koern. in Baumann, Massailand*, 295; ? *Chiov. in Ann. Istit. Bot. Roma*, viii. 25.

**Nileland.** Eritrea: Bogos; Keren Dari, 5300 ft., *Terracciano & Pappi*, 2648; Barca; Agordat, *Terracciano & Pappi*, 4798.

**Mozambique Distr.** German East Africa: Masailand; Meatu, *Baumann*.

Compared by the author with *S. cernuum*, Host, but the panicle is less compact. The type of this variety, a specimen from Ondonga (*Schinz*!) is *S. Caffrorum* (which see).

3. *A. S.*, var. *albofuscus*, *Koern. in Baumann, Massailand*, 295. Panicle contracted, branches erect. Glumes reddish-brown. Grain white.

**Mozambique Distr.** German East Africa: Karagwe; West Usui, *Baumann*.

4. *A. S.*, var. *amphibolus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 184. Panicle lanceolate, 16 in. long, loose; branches erect. Sessile spikelets crowded. Glumes reddish, with involute margins, gradually tapering, slightly bearded at the base. Grain much compressed,  $2\frac{1}{2}$  lin. by 2 lin., reddish, shorter than the glumes.

**Upper Guinea.** Togo: Sokode, *Kersting*, 19, 19A.

Evidently a form of *S. guineense*.

5. *A. S.*, var. *Baumannii*, *Koern. in Baumann, Usambara*, 318. Panicle subumbelliform, open, up to 7 in. by 4 in.; rachis stunted; branches obliquely erect, hardly nodding, villous at the base. Sessile spikelets crowded, obovate to suborbicular in outline,  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin. long, hairy on the sides, black when mature, awned. Grain obovoid,  $1\frac{3}{4}$ – $2\frac{1}{4}$  lin. long,  $1\frac{1}{2}$ –2 lin. broad, yellowish-brown, exceeding the tightly appressed glumes.—*K. Schum. in Engl. Pfl. Ost-Afr.* B. 44, C. t. iv. figs. J–L; *Busse & Pilger in Engl. Jahrb.* xxxii. 186.

Schimper 623 Hackel's specimen is cited  
(p. 138) sub *S. subglabrescens* (Steud.) Schum.  
(+Aschen)



**Mozambique Distr.** German East Africa: North Usegua, *Baumann*; Usambara, *Holst*.

Vernacular name "*kihufu*" (Kisegua). Varies with longer panicles (up to 1 ft.) and darker brown grains (subvar. *dulcis*, Schum. l.c. 45) and looser panicles, with 12-15 almost glabrous branches from the lowest node and chestnut-brown fruits (subvar. *verticillata*, Schum. l.c. 46). Probably a form of *S. caudatum*, allied to var. *Cerevisia*. According to *Holst* mostly grown for chewing the sweet stems.

6. A. S., var. *bicolor*, *Koern. in Baumann, Massailand*, 295; not in *Bull. Herb. Boiss.* ii. 226, nor in *Koern. & Wern. Handb. Greteideb.* i. 313. Panicle contracted, dense, oval, 7 in. by  $2\frac{1}{2}$  in. Glumes black. Grain dull white.

**Mozambique Distr.** German East Africa: Masailand; Meatu, *Baumann*; Speke Gulf; Katoto, *Baumann*; Urundi; Elmatau, *Baumann*.

Very likely a form of *S. caudatum*. A specimen from Ondonga (*Schinz*!), named A. S., var. *bicolor* by *Koernicke* himself (*Bull. Herb. Boiss.* ii. 226), is *S. Caffrorum* (which see).

7. A. S., var. *calcareus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 188. Panicle very dense, lanceolate in outline, about 8 in. long; rhachis stout; branches short, erect. Sessile spikelets crowded. Glumes roundish, minutely toothed at the tip, orange or brown, glabrous, or pubescent on the sides. Grain exceeding the tightly appressed glumes, chalk-white, 2 lin. by  $1\frac{3}{4}$  lin.

**Mozambique Distr.** German East Africa: Ugogo; Ilindi, *Busse*, 276, 276A. Vernacular name "*kigegu*." Probably a form of *S. caudatum*.

8. A. S., var. *callomelæna*, *K. Schum. in Engl. Pfl. Ost-Afr. B.* 40. Panicle loose, up to 16 in. by 7 in.; longest branches obliquely erect, arching over, silky-hairy at the base. Sessile spikelets ovate, acuminate, 3 lin. long, strigillose at the base and usually also on the side and towards the tips. Glumes at length glossy black. Grain  $2-2\frac{1}{4}$  lin. long, enclosed (except at the top) by the slightly longer, somewhat gaping glumes, yellowish or brownish upwards.

**Mozambique Distr.** German East Africa: Mamboya, *Stuhlmann*.

Possibly near *S. melaleucum*.

9. A. S., var. *charisianus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 187. Panicle pyramidal, lax, about 1 ft. long; branches slender, erect, nodding, the lower 4-6 in. long. Sessile spikelets globose-ovoid, more or less black when mature, glossy. Glumes rather densely hairy at the base and tip and the sides, hairs white. Grain equalling the glumes, bright reddish,  $2\frac{1}{2}$  lin. long.

**Mozambique Distr.** German East Africa: Usambara, *Holst*; Mpapwa, *Busse*, 1881.

*Busse's* specimen is described as having a more contracted panicle with stiffer branches and shorter glumes.

Subvar. *glabrescens*, *Busse & Pilger, Engl. Jahrb.* xxxii. 187. Glumes about three-quarters as long as the grain, glabrescent.

Upper Guinea. Togo: Sokode, *Kersting*, 5a. a. 1910.

Mozambique Distr. German East Africa: Kilossa, *Busse*, 1146.

Subvar. *Holstii*, *Busse & Pilger, l.c.* Glumes half to two-thirds as long as the grain, more or less hairy.—*A. Sorghum*, var. *Holstii*, K. Schum. in *Engl. Pfl. Ost-Afr. B.* 44 (according to *Busse & Pilger*).

Mozambique Distr. German East Africa: Usambara, *Holst*.

According to *Busse and Pilger* the variety *charisianus* forms together with var. *callometana*, a natural group.

10. *A. S.*, var. *concolor*, *K. Schum. in Engl. Pfl. Ost-Afr. B.* 42. Panicle ellipsoid to ovoid, narrowed to both ends, about 6 in. by  $2\frac{1}{2}$  in.; branches erect, hairy. Sessile spikelets much crowded, rhombic to ovate in outline, acute, 2 lin. long, hairy at the callus, on the sides and below the tip; awn delicate. Glumes yellow. Grain  $1\frac{1}{2}$ – $2\frac{1}{4}$  lin. by  $1\frac{3}{4}$ –2 lin., pale yellow, exceeding the tightly appressed glumes by  $\frac{1}{2}$ – $\frac{3}{4}$  lin.

Mozambique Distr. German East Africa: Ugogo; Kisokwe, *Stuhlmann*, 326.

11. *A. S.*, var. *densissimus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 188. Panicle nodding, almost cylindrical, quite compact, 6 in. by  $2$ – $2\frac{1}{2}$  in. Glumes more or less turning black, obtuse, pubescent at the base and the sides. Grain slightly compressed, dull brownish-red or whitish, 2 lin. by  $1\frac{1}{2}$  lin., much exserted from the tightly appressed glumes.

Mozambique Distr. German East Africa: Ugogo; Ilindi, *Busse*, 271, 272.

Vernacular name “*hembra hembra metupe*” (the white variety).

This and the preceding may be identical. The affinity is doubtful.

12. *A. S.*, var. *Eichingeri*, *Piper in Proc. Biol. Soc. Wash.* xxviii. 33. Culms slender, up to 3 ft. high. Leaf-blades 4–8 in. by 5–10 lin., bright green, glabrous at the nodes. Panicle erect, very narrow, 6–8 in. long; branches erect, the longest half the length of the panicle. Sessile spikelets readily deciduous, ovate-lanceolate, acuminate,  $3\frac{1}{2}$  lin. long, densely covered with appressed silvery hairs, awned. Lower glume 7–9-nerved. Awn to over 2 in. long. Pedicelled spikelets narrow, glabrous, on very hairy pedicels.

Mozambique Distr. German East Africa: Buibo, *Eichinger*, 3365.

*Piper's* description reads almost exactly like that of *S. aethiopicum*, except for the longer awns and the glabrous pedicelled spikelets.

13. *A. S.*, var. *elegans*, *Koern. in Baumann, Usambara*, 318. Panicle pyramidal, effuse, 8–12 in. long; rhachis and branches





nearly glabrous, the latter spreading obliquely and when mature drooping. Sessile spikelets rhombic to subquadrate-obovate, straw-colour, mostly turning glossy black on maturity or black below and yellowish above, or brownish or yellowish, sparingly strigillose, awned. Grain exserted from the glumes, obovate-orbicular in outline, dull white,  $2\frac{1}{2}$  lin. by  $2\frac{1}{4}$  lin.—K. Schum. in Engl. Pfl. Ost-Afr. B. 40; Busse & Pilger in Engl. Jahrb. xxxii. 185.

**Mozambique Distr.** German East Africa: North Useguha, *Baumann*; Usambara, *Holst*; Mamboyo, *Stuhlmann*, 4309; Usagara, *Busse*, 1179; Kilossa, *Busse*, 1198.

Busse & Pilger (l.c.) also refer to this plants collected at Sokode in Togo (*Kersting*, 12, 14, 15, & 20, a. 1900), but they say that these have narrower, relatively longer panicles (10–12) and larger grains, either white or scarlet.

14. **A. S.**, var. *glaberrimus*, *Hack. in DC. Monogr. Phan.* vi. 512; *Durand & Schinz, Consp. Fl. Afr.* v. 725. Panicle oval-oblong, obtuse, compact; lower branches equalling about a quarter of the panicle, undivided for  $\frac{1}{2}$  in. or somewhat more. Sessile spikelets broad ovate-elliptic, acute,  $2\frac{1}{2}$  lin. by 2 lin., straw-colour with reddish spots, at length quite glabrous. Grain as long as the glumes, orbicular in outline, plano-convex and strongly gibbous, bright copper-colour.

**Nileland.** Sudan: Darfur and Kordofan, *Pfund*, 561; Sennar, *Wurttemberg*. Probably a colour form of *S. caudatum*, var. *gibbum*.

15. **A. S.**, var. *Hewisonii*, *Piper in Proc. Biol. Soc. Wash.* xxviii. 41. Culms stout, 13–19-noded, up to almost 12 ft. high, waxy below the nodes. Leaf-sheaths mostly overlapping; blades up to over 3 ft. by  $1\frac{3}{4}$ – $3\frac{1}{2}$  in. Panicle fusiform, very compact, 4–6 in. by  $1\frac{1}{4}$ – $1\frac{3}{4}$  in., longest branches about 1–2 in. long. Sessile spikelets moderately persistent, broad-ovate or oval,  $2\frac{3}{4}$  lin. by  $1\frac{1}{2}$  lin., densely white-hairy, green except at the chestnut-red base, awned. Lower glume 9–11-nerved. Awn  $5\frac{1}{2}$  lin. long. Grain obovoid, compressed,  $1\frac{3}{4}$  lin. long. Pedicelled spikelets neuter, narrowly lanceolate, hairy.

**Nileland.** Sudan: Sennar; wild, *Hewison*.

Piper says that this suggests his “*cordofanus*,” that is *Sorghum æthiopicum*, but the heads are much more dense, the awns smaller and the lateral spikelets without stamens; differences which do not carry much weight from the point of view of classification.

16. **A. S.**, var. *hirsutus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 185. Panicle about 9 in. long, ovate-lanceolate in outline, a little narrower upwards; rhachis stout; lower branches  $1\frac{1}{4}$ – $1\frac{3}{4}$  in. long, erect, stiff, somewhat arching. Glumes ovate-lanceolate, acute, dark brown, greyish-white-strigillose, margins involute on maturity. Grain slightly compressed, white, shorter than the glumes.

**Mozambique Distr.** German East Africa: Meatu; Ngungumavar, *Baumann*, 14.

Evidently a variety of the *Roxburghii* group.

17. A. S., var. *jucundus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 185. Panicle about 8 in. long, ovate-lanceolate in outline; branches erect, about a third the length of the panicle. Glumes rigid, shortly narrowed upwards, acute with the margins not involute on maturity, straw-colour, densely pubescent at the base and sides. Grain much compressed, 2 lin. by  $1\frac{1}{2}$  lin., equalling the glumes; hilum ovate, large.

**Mozambique Distr.** German East Africa: Ugogo; Ilindi, *Busse*, 273.

Vernacular name "*lugugu*." Evidently another variety of *S. Roxburghii*.

18. A. S., var. *intermedius*, *Busse & Pilger in Engl. Jahrb.* xxxii. 185. Panicle narrow, to over 1 ft. long, contracted; branches equalling about a quarter or fifth of the panicle. Glumes with slightly involute margins. Grain about as long as the glumes, lead-grey; hilum large.

**Upper Guinea.** Togo: Sokode, *Kersting*, 5, a. 1900.

Vernacular name "*neu*." Probably a member of the *guineense* group.

19. A. S., var. *kerstingianus*, *Busse & Pilger in Engl. Jahrb.* xxxii. 187. Panicle cylindrical, erect, dense or looser upwards with the longer branches up to over 1 ft. long; branches short, appressed, close. Glumes rounded at the tips, sparingly hairy at the base and sides, yellow, then reddish and finally glossy black. Grain subglobose, twice as long as the glumes,  $2\frac{1}{4}$  lin. by  $2\frac{1}{2}$  lin., waxy-yellowish; hilum narrowly ovate, concave.

**Upper Guinea.** Togo: Sokode, *Kersting*, 7, 18, a. 1900.

Some fruiting specimens collected at Ibadan, Southern Nigeria (*Millson*, 2!), may represent a more lax condition of this. It has the peculiar waxy subglobose grains, enclosed below by tightly appressed yellow to jet-black glumes, but the panicles are much smaller and (in fruit) nodding.

20. A. S., var. *Natæ*, *Koern. in Baumann, Massailand*, 296. Panicle contracted, dense; branches erect. Mature glumes black. Grains yellowish-red.

**Mozambique Distr.** German East Africa: Nata, East of Speke Gulf, *Baumann*.

According to *Busse and Pilger*, l.c. 186, very near var. *Baumannii*, and therefore probably a member of the *caudatum* group.

21. A. S., var. *nitens*, *Busse & Pilger in Engl. Jahrb.* xxxii. 189. Panicle loose, secund, 10–16 in. long; branches arched, spreading, the lowest up to 5 in. long. Sessile spikelets loosely grouped, elliptic-lanceolate, much compressed,  $2\frac{1}{2}$ –3 lin. long, bearded at the base and hairy on the sides, straw-colour, at length glossy dark brown or black except the straw-coloured tips, slightly gaping when mature. Grain small, bright brown.





**Mozambique Distr.** German East Africa : Ugogo ; Nsali, *Busse*, 1182.  
Vernacular name "ludenge." Evidently very near to *S. Ankolib*.

22. *A. S.*, var. *Ondongæ*, *Koern. in Baumann, Usambara*, 319 (excluding the *Ondonga specimen*) ; *K. Schum. in Engl. Pfl. Ost-Afr. B.*, 46 ; *Busse & Pilger in Engl. Jahrb.* xxxii. 186 ; not of *Koern. in Bull. Herb. Boiss.* ii. (1894) 227. Panicle contracted, about 5 in. by  $1\frac{1}{2}$ –2 in. ; branches hairy at the base, otherwise glabrous, short or somewhat elongated, but always contiguous. Grains obovoid,  $2\frac{1}{4}$ – $2\frac{1}{2}$  lin. by 2 lin., dark red to violet-red.

**Mozambique Distr.** German East Africa : Usambara ; Buiti and Budi Elze, *Baumann*, 3, 4 ; Unyamwezi ; Mzigue, *Baumann* ; Usagara ; Sedia, *Stuhlmann*, 3192 ; Tura, *Stuhlmann*, 4237 ; Mwansa, on Lake Victoria, *Stuhlmann*, 4622, 4664.

23. *A. S.*, var. *ovulifer*, *Hack. in DC. Monogr. Phan.* vi. 510 ; *Durand & Schinz, Consp., Fl. Afr.* vi. 725. Panicle oval-oblong, rather lax with spreading branches, the lower half the length of the panicle, undivided for up to 2 in. Sessile spikelets  $2\frac{1}{2}$  lin. by  $1\frac{1}{2}$  lin., at length purplish-brown, quite glabrous apart from the sides of the lower glume, awned, awn 6 lin. long. Grain ovate-subglobose, snow-white, exposed between the widely divergent glumes.

**Upper Guinea.** Gambia (herb. Nees).

This seems to be either *S. guineense*, var. *tremulans*, or *S. margaritifera*.

24. *A. S.*, var. *Schenckii*, *Koern. in Baumann, Usambara*, 319, not in *Bull. Herb. Boiss.* ii. 227. Panicle contracted, oblong, 10 by 6 in. ; branches slender, glabrous except at the base, drooping. Sessile spikelets crowded, broad-ovate in outline, 2 lin. by 2 lin. Glumes apiculate, yellowish, glabrous or almost so when mature. Awn not exerted. Grain exerted from the glumes, obovoid to orbicular, bright yellowish-red,  $2\frac{1}{2}$  lin. by 2 lin.—*K. Schum. in Engl. Pfl. Ost-Afr. B.* 43.

**Mozambique Distr.** German East Africa : Useguha, *Baumann*.

*Koernicke* indicates the same form from the Magalisberg, Transvaal (*A. Schenk*) ; *Schenk's* plant is a form of *S. Caffrorum*. *K. Schumann* also describes (l.c. 44) a form *Holstii* from Usambara, distinguished by panicles with black and with yellow mature spikelets and often more hairy branches. Vernacular names "gobero" (*Kiseguha*), "gobelo," "kobero," "kikarrata" (the last a strain with much elongated panicles). See also *A. S.*, var. *charisianus*, subvar. *Holstii*, p. 148, ante.

25. *A. S.*, var. *Schumannii*, *Busse & Pilger in Engl. Jahrb.* xxxii. 186. Panicle lax, open, up to 1 ft. long ; rhachis much stunted with the branches umbellate or the rhachis half the length of the panicle and only the upper branches umbellate ; branches rather slender, spreading and pendulous, 6–7 in. long. Glumes rounded, shortly acute, rigid, slightly hairy at the base and sides, straw-colour

or finally turning black. Grain exserted, subglobose, slightly compressed,  $2\frac{1}{4}$ – $2\frac{1}{2}$  lin. by  $1\frac{3}{4}$  lin., fuscous or waxy-yellow.

**Mozambique Distr.** German East Africa: Uluguru; Kiroka, *Busse*, 1161; Usagara, *Busse*, 1236.

Probably a member of the *caudatum* group.

**26. A. S., var. Stuhlmannii**, *Koern. in Baumann, Massailand*, 295 (name); *ex K. Schum. in Engl. Pfl. Ost-Afr. B.* 41. Panicle erect, almost 1 ft. by 3 in., contracted; branches erect, tomentose at the base. Spikelets crowded, broad-rhombic to obovoid,  $1\frac{3}{4}$ –2 lin. long, firmly coriaceous, glossy black or very dark purple, sometimes with yellow tips, glabrous or nearly so, awned. Grain  $2\frac{1}{2}$  lin. by  $2\frac{1}{4}$  lin. by  $1\frac{1}{2}$  lin., red with a tinge of yellow, exceeding the glumes by  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin.

**Mozambique Distr.** German East Africa: Unyamwezi; Mzigua, *Stuhlmann*, 476; Mpwapwa, *Stuhlmann*, 230 (probably).

The specimen from Mpwapwa is said to have darker fruit and to yield a red flour. It is one of the most valued varieties of the district. Probably a member of the *caudatum* group.

**27. A. S., var. subbicolor**, *Koern. in Baumann, Massailand*, 295 (name).

**Mozambique Distr.** German East Africa: Urundi and West Usui, *Baumann*.

**28. A. S., var. transiens**, *Hack. in DC. Monogr. Phan.* vi. 508 (?); *Chiov. in Ann. Istit. Bot. Roma*, viii. 24.

**Nileland.** Eritrea.

Cultivated specimens grown at Rome from seed collected by Terracciano and Pappi in Eritrea. The specimens are described as much too immature to allow of precise determination.

**29. A. S., var. usaramensis**, *Busse & Pilger in Engl. Jahrb.* xxxii. 184. Panicle ample, loose, 10–16 in. long; rhachis indistinct upwards. Glumes 3 lin. long, brown-purple with involute margins when mature, sparingly pubescent on the sides. Grain shorter than the glumes,  $1\frac{3}{4}$ –2 lin. long, white or whitish-yellow.

**Mozambique Distr.** German East Africa: Usaramo; Pugu and Kisserawe and Usagara, Kilossa, *Busse*, 395, 1135, 1165.

No doubt a variety of *S. Roxburghii*.

**30. A. S., var. Usorum**, *Koern. in Baumann, Massailand*, 295, not in *Bull. Herb. Boiss.* ii. (1894) 226, nor in *Koern. & Werner, Handb. Getreideb.* i. 312 (?); *Chiov. in Ann. Istit. Bot. Roma*, viii. 24.

**Nileland.** Eritrea: Bogos; Keren-Agad, 2600 ft., *Terracciano & Pappi*, 2684.

**Mozambique Distr.** German East Africa: Urundi, *Baumann*.

*Sorghum Usorum*, Nees, is a form of *S. Caffrorum*. Hackel (in *DC. Monogr. Phan.* vi. 512) states that a form similar to typical var. *Usorum* was collected in Jur (*Schweinfurth*, 180) and in Abyssinia (Herb. Paris, *Schimper*, 112); but on p. 517, No. 180 (partly), of *Schweinfurth* is indicated as the basis of his var.





*caudatum*. What I have seen as No. 180, is decidedly not *S. Caffrorum*, and it is very likely that the Eritrea and Urundi specimens are also distinct and rather belong to the *caudatum* group. Schweinfurth (Pl. quæd. Nilot. 44) enumerates *S. Usorum* as cultivated at Khartum and sold under the name "es-ahmar" and in a glabrescent form as "khimegi."

31. A. S., var. *ussiensis*, Koern. in *Baumann, Massailand*, 295. Panicle loose, spreading. Glumes reddish-brown. Grain red.

**Mozambique Distr.** German East Africa: West Usui, *Baumann*.

32. A. S., var. *yemensis*, Koern. in *Baumann, Massailand*, 295 (name); in *Bull. Herb. Boiss.* ii. App. ii. 11. Panicle erect, contracted, oblong, about 10 in. by 2 in.; branches slender, flexuous, but erect. Glumes pale yellowish. Grain white.

**Mozambique Distr.** German East Africa: Meatu, *Baumann*.

According to Koernicke also in Yemen, where it is grown as fodder for cattle.

33. A. S., var. *Ziegleri*, *Busse & Pilger in Engl. Jahrb.* xxxii. 186. Panicle contracted, 6-9 in. long; rhachis not exceeding the middle of the panicle; branches compact, erect, the lower short, the upper umbellately arranged, 2-3 in. long. Glumes rotundate, straw-colour, then brown, shining, strigillose at the base and sides. Grain exceeding the glumes, subglobose, 2 lin. by  $1\frac{3}{4}$  lin., whitish.

**Mozambique Distr.** German East Africa: Meatu, *Baumann*. Ugogo; Ilindi, *Busse*, 275; Usagara; Sedia, *Busse*, 1237.

Evidently closely allied to var. *Schumannii* and like it a member of the *caudatum* group.

Several Sorghums cultivated on the middle Niger are described by Dumas (in *Agric. Prat. Pays Chauds*, v. i. 459-461) under their vernacular names. They are, apart from those mentioned already:—

*Bemberi*. Panicles very long. Glumes pointed, black. Grain equalling the glumes, quite free from them, pointed at both ends, brilliant white. Dumas places it next to "keniki" (see below) and it is no doubt one of the *guineense* or *margaritifera* group.

*Hiassa-Kala*. Panicle lax, flexible, with long drooping branches. Glumes white, slightly tinged with red, tightly enclosing and equaling the grain. Grain dark red, flat on one side, gibbous on the other. This is cultivated for its sweet stems, particularly in the Macina and Malinke country. The juice of the stem contains up to 12 per cent. of cane sugar. Dumas refers it to "*Sorghum saccharatum*."

*Keniki*. Culms slender, 12 to 15 ft. high. Panicle up to 2 ft. long, with drooping branches when mature; branches up to 8 in. long. Grain white, slightly spotted with red or black, oval, flattened, free between the spreading glumes and slightly exceeding them. The most common Sorghum grain in the markets of Bambara and

Malinke, very nutritious and keeping well. Evidently a member of the *guineense*-group.

*Nionifi*. Culms 12–15 ft. high. Leaf-blades 4–5 in. wide. Panicle erect, compact, with long rigid branches. Glumes rounded at the tips, usually black, tightly clasping the much exerted flattened grain which is white, tinged with red. A coarse grain which does not keep well, but an early and good yielder.

29. **CLEISTACHNE**, Benth. in Hook. Ic. Pl. xiv. 60, t. 1379.

Spikelets solitary, all alike, ♂, pedicelled on the tough rhachis of racemously arranged or paniced racemes, falling entire from the thickened tips of the pedicels. Florets 2, lower reduced to an empty valve, upper ♀. Glumes equal, very similar, with involute margins, more or less coriaceous, delicately 7–9-nerved, muticous. Valves hyaline, lower 2-nerved, upper 2-dentate or subentire, 3-nerved, with a twisted flexuous awn from the sinus or tip. Valvule very minute, ciliate. Lodicules 2, broad-cuneate, sparingly ciliate. Stamens 3. Stigmas laterally exerted, plumose. Grain oblong to obovoid-oblong, very obtuse to truncate; embryo half the length of the grain.—Annual, rather coarse grasses. Leaf-blades long, flat, with stout midribs. Panicles narrow, more or less contracted, greyish or fulvously hairy.

Species 3, in Tropical Africa and Western India.

Branches of panicle divided, at least below; panicle linear-oblong to oblong, greyish-pubescent; spikelets not quite  $2\frac{1}{2}$  lin. long ... .. 1. *C. sorghoides*.

Branches of panicle simple; panicle very narrow, brightly fulvous-pubescent; spikelets 3 lin. long 2. *C. macrantha*.

1. *C. sorghoides*, Benth. in Hook. Ic. Pl. xiv. 60, t. 1379. Annual. Culms up to 9 ft. high, sparingly branched from the base or simple (?), sometimes rooting from the lowest nodes, robust, glabrous. Leaf-sheaths terete, the lowest at length loose, otherwise tight, more or less hirsute from tubercles or glabrous, the lower prominently striate, glabrous at the nodes; ligules firmly scarious, rounded, up to over  $1\frac{1}{2}$  lin. long, brown; blades linear, tapering to a long fine point, very gradually narrowed towards the base and there narrower than the mouth of the sheath,  $\frac{1}{2}$ –3 ft. long and up to 4 lin. wide, flat, appressedly pubescent to hirsute with the hairs springing from tubercles, midrib stout downwards, rounded on the back, whitish, lateral nerves 4–6 on each side, fine, margins scabrid to spinulously ciliate. Panicle linear-oblong to oblong, up to 10 in. long and  $1-1\frac{1}{2}$  in. wide, rather dense; rhachis more or less grooved and scabrid to spinulously ciliate on the angles above or smooth below; branches usually 2-nate, divided from the base, the longest up to 3 in. long, secondary





branches often very few, representing slender narrow racemes up to 2 in. long, all hairy and often silky-villous at the thickened base; pedicels filiform with thickened tips, 2-1 lin. long, hairy, hairs up to 1 lin. long. Spikelets oblong, not quite  $2\frac{1}{2}$  lin. long, straw-coloured to chestnut-brown when young, at length dark, slightly glossy, densely greyish-pubescent, at length glabrescent on the back. Glumes thinly coriaceous, lower minutely truncate, finely 7-nerved, callus obscure, very shortly bearded; upper glume very similar. Valve of lower floret oblong, over  $\frac{1}{2}$  lin. long, hyaline, ciliolate, 2-nerved, of upper oblong, shortly 2-lobed, over 1 lin. long, ciliolate, finely 3-nerved below; awn  $1-1\frac{1}{4}$  in. long, twisted up to the middle, the twisted part often flexuous or curved; valvule shorter than the lodicules, ciliolate. Lodicules ciliolate. Anthers  $1\frac{1}{2}$  lin. long. Grain obovate-oblong, truncate, 1 lin. long, brown; embryo-mark obscure, about half the length of the grain.—Hack. in DC. Monogr. Phan. vi. 653. Durand & Schinz, Consp. Fl. Afr. i. 732; K. Schum. in Engl. Pfl. Ost-Afr. C. 99.

**Nileland.** Uganda: Entebbe, in swamps, *Fyffe*, 2251! and without precise locality, *Maitland*, 83, AB!

**Lower Guinea.** Belgian Congo: Katanga; Lukafu, *Verdick*, 468!

**Mozambique Distr.** Portuguese East Africa: Shupanga, in rich, moist soil, *Kirk*! Nyasaland: Namasi, *Cameron*, 24! Shire Highlands, *Buchanan*! Rhodesia: Gazaland; Chirinde, 3800 ft., *Swynnerton*, 416! Mazae, by river sides, *Eyles*, 283!

**2. C. macrantha, Stapf.** Annual. Culms up to over 7 ft. high, simple, rooting from the lowest nodes, rather slender, glabrous. Leaf-sheaths terete, the lowest loose, the others tight, more or less hirsute from tubercles or more often glabrous, slightly striate; ligules up to over  $\frac{1}{2}$  lin. long, firmly scarious, rounded; blades linear, tapering to a long fine point, gradually narrowed to the base, which is hardly narrower than the mouth of the sheath, up to 1 ft. long and almost 4 lin. wide, flat, appressedly pubescent on both sides, the larger hairs springing from minute tubercles, midrib somewhat stout downwards, rounded on the back, whitish, lateral nerves 3-4 on each side, fine, margins spinulosly ciliate. Panicle linear, up to 6 in. by  $\frac{1}{2}-\frac{3}{4}$  in., erect; rhachis angular upwards, ciliate on the angles; branches solitary or 2-nate, simple, suberect, up to 2 in. long, angular, ciliate; pedicels  $2-\frac{1}{4}$  lin. long, thickened at the tips, ciliate, upper cilia up to  $\frac{1}{2}$  lin. long, fulvous. Spikelets oblong, 3 lin. long, dark brown, somewhat glossy, densely and brightly fulvous-pubescent. Glumes coriaceous, lower minutely truncate, finely 7-9-nerved, the nerves only visible on the inner side; callus obscure, very shortly bearded; upper very similar. Valve of lower floret oblong, acuminate, almost  $2\frac{1}{2}$  lin. long, membranous, hyaline upwards, ciliolate, 2-nerved; of upper floret oblong, shortly 2-lobed, over  $1\frac{1}{2}$  lin. long, ciliolate, finely 3-nerved below; awn up to 1 in. long, twisted up to or beyond the middle, flexuous. Valvule

rotundate, as long as the lodicules, ciliolate. Lodicules sparingly ciliate. Grain obovate-oblong, very obtuse,  $1\frac{3}{4}$  lin. by almost 1 lin., dark brown; embryo-mark very obscure.—*C. sorghoides*, Pilg., in Engl. Jahrb. xxxiv. 127, not of Benth.

Nileland. British East Africa: Mombasa, *Hildebrandt*, 1956! *MS type det*

Mozambique Distr. German East Africa: Usambara, Lutindi, *Holst*, 3232! Bombo Valley, 1300 ft., *Holst*, 3233.

30. **VETIVERIA**, Thouars ex Virey in Journ. de Pharm. Ire sér.  
xiii. 499. 1817

Spikelets 2-nate, of each pair subsimilar, differing in sex, one sessile, the other pedicelled, on the articulate fragile rhachis of copiously whorled (rarely paniced) peduncled 3- to many-jointed racemes, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelet or at least the accompanying pedicel; joints and pedicels slender, slightly and gradually thickened upwards. Florets 2, lower reduced to an empty valve, upper ♀ in the sessile, ♂ in the pedicelled spikelets. Sessile spikelet laterally slightly compressed, awned or awnless. Glumes equal; lower more or less coriaceous or chartaceous with a broad rounded back and subinflexed margins, usually mucicous, upper boat-shaped, keeled upwards, with broad hyaline ciliate margins, mucicous, mucronate or aristulate. Valves hyaline, of lower floret 2-nerved, of upper minutely 2-dentate, mucicous or mucronulate or with a perfect or imperfect awn from the sinus. Valvule minute, hyaline, nerveless. Lodicules 2, glabrous. Stamens 3. Stigmas laterally exerted; styles subterminal. Grain oblong, top slightly oblique. Pedicelled spikelet dorsally compressed; glumes much thinner than in the sessile spikelet, like the valves usually awnless.—Coarse perennial glabrous grasses with stout rhizomes. Culms stout, more or less compressed below. Lower leaf-sheaths much compressed, flabellate-imbricate; blades firm to hard, conduplicate in bud, then flattening out at least upwards, gradually passing into the sheath. Panicles erect, long, of many-rayed whorls of slender simple or rarely compound racemes, glabrous except for the frequently minutely bearded calli.

Species about 7, in the tropics of the Old World, 1 introduced into the New World.

Spikelets  $2-2\frac{1}{4}$  lin. long, quite awnless; callus glabrous, very short, obtuse ... 1. *V. zizanioides*.

Spikelets  $2\frac{1}{2}-3\frac{1}{2}$  lin. long, more or less awned; callus bearded, beard exceeding the callus.

Sessile spikelets spinulosly muriculate more or less all over; callus short, almost square; awn a bristle, enclosed or more or less exerted ... 2. *V. nigritana*.

Sessile spikelets smooth on the back to beyond the middle, aculeolate on the sides, spinulosly scabrid at the tips, callus up to  $\frac{3}{4}$  lin. long, acute; awn perfect with the column exerted ... 3. *V. fulvibarbis*.

Bory in Linn. Bull Soc. Philom 1822: 43  
1822



*Wash. in Small, Fl. Southeast. U.S., 67, 1903.*  
1903.

1. *V. zizanioides*, Stapf in *Kew Bulletin*, 1906, 346-349, 362. Rhizome aromatic. Culms stout, up to over 6 ft. high, usually sheathed all along. Leaf-sheaths compressed, particularly the lower which are sharply keeled and fan-like imbricate, very smooth, firm; ligules reduced to a scarious rim; blades linear, acute, 1-3 ft. long, 2-5 lin. wide, erect, rigid, firm or somewhat spongy, usually glabrous, rarely more or less hairy downwards on the face, pale-green, midrib slender, lateral nerves close, 6 or more on each side, rather stout, slightly prominent, margin spinulously rough. Panicle oblong, up to over 1 ft. long, usually contracted; rhachis stout, smooth; whorls 6-10 with up to 20 rays; branches oblique to suberect, naked for up to 2 in., filiform, slightly rough. Racemes up to 2 (rarely 3) in. long, very slender; joints about as long as the sessile spikelets or sometimes distinctly exceeding them, smooth or more or less rough, minutely and unequally ciliate at the slightly oblique tips; pedicels similar but shorter. Sessile spikelet linear-lanceolate to almost linear, acute or subacute, 2-2½ lin. long, yellowish, olive- or violet-brown or purplish to almost black; callus obtuse, under ½ lin. long, glabrous. Glumes acute, coriaceous; lower muriculate all over the back, 5-nerved, lateral nerves close, very fine; upper glume spinulously muricate on the keel. Valve of lower floret as long as the glumes, acute, reversedly ciliate, upper floret up to 1½ lin. long, narrow, oblong-lanceolate, mucronulate, eciliate. Anthers 1-1½ lin. long. Pedicelled spikelet sparingly aculeolate or almost smooth; valve of upper floret entire, acute.—*V. odorata*, Virey in *Journ. de Pharm.* Ire sér. xiii. 499. *V. arundinacea* and *V. muricata*, Griseb. *Fl. Brit. W. Ind.* 559, 560. *Phalaris zizanioides*, Linn. *Mant. Alt.* 183. *Andropogon muricatus*, Retz. *Obs.* iii. 43. *A. festucoides*, J. S. Presl in *C. B. Presl, Reliq. Hænk.* i. 340. *A. squarrosus*, Hack. in *DC. Monogr. Phan.* vi. 542 (var. *genuinus*), not of Linn. f. *Agrostis verticillata*, Lam. *III. Gen.* i. 162. *Anatherum muricatum*, Beauv. *Agrost. Expl. Planch.* 15.

**Lower Guinea.** French Congo: Brazzaville, Chevalier, 11225! Belgian Congo: Boma, Gillet, Wilwerth; Stanley Pool Distr.; between Leopoldville and Mombasi, Gillet.

So far found in the wild state only in tropical Asia; cultivated on account of the aromatic roots in many parts of the tropics and therefore possibly also in the Congo region. It is the *Khas-Khas* of Anglo-Indians and the source of Vetiver oil (oleum *Andropogonis muricati*).

2. *V. nigrimana*, <sup>(Benth.)</sup> Stapf. Culms and leaves as in *V. zizanioides*. Panicle oblong, up to over 1 ft. long, rigid and contracted or often somewhat nodding and more or less open; rhachis moderately stout, smooth; whorls 8-10 with up to 15 rays; branches obliquely erect, often flexuous or curving, naked for up to over 2 in., finely filiform, smooth or nearly so. Racemes up to 6 in. long, very slender; joints filiform, as long as to twice as long as the sessile spikelets, smooth, tips somewhat oblique, very minutely ciliate; pedicels similar, but shorter. Sessile spikelet very narrowly linear-lanceolate to linear, acuminate, 3-3½ lin. long, dull-green or somewhat purplish;

callus short, almost square seen from the back, shortly bearded laterally. Glumes and valves as in the preceding species, but less coriaceous, the lower glume often mucronate and the upper valve with a bristle-like awn, 1-6 lin. long. Pedicelled spikelet 3 lin. long, otherwise as in *V. ziganioides*.—*Andropogon nigritanus*, Benth. in Hook. Niger Fl. 573. <sup>1549</sup> *A. squarrosus*, var. *nigritanus*, Hack. in DC. Monogr. Phan. vi. 544; Durand & Schinz, Consp. Fl. Afr. v. 727, and Étud. Fl. Congo, 319; Franch., Contr. Fl. Congo Franç. 20; K. Schum. in Engl. Pfl. Ost-Afr. C. 98; De Wild. & Durand, Reliq. Dewevr. 255. T. & Hél. Durand, Syll. Fl. Congol. 627. *Anatherum muricatum*, Rendle in Cat. Afr. Pl. Welw. ii. 153, not of Beauv. *Mandelorna insignis*, Steud. Syn. Pl. Glum. i. 359. <sup>1654</sup>

**Upper Guinea.** Senegal, *Roger*! Senegambia: Richard Toll, *Perrotet*, 929! Mbidjem, *Thierry*, 34! and without precise locality, *Heudelot*, 294! French Guinea: Farana, on the Upper Niger, *Scott Elliot*, 5359! Baffing Valley, *Pobéguin*, 1739! Kabarah, *Chevalier*, 1353! Gold Coast: Accra, *Vogel*! Togo: Koukomba Steppe, *Kersting*, A, 661! Dahomey: Cotonou, *Chevalier*, 4455! Northern Nigeria: Nupe, *Barter*, 1387! Katagum Distr.; *Dalziel*, 273! Southern Nigeria: Nun River, *Vogel*, 18! Oyan River, *Holland*, 9! Illah, *Macleod*, 15! Yola, *Macleod*! Cameroons: Lere, *Macleod* 113!

**Nileland.** White Nile: Meshera, *Schweinfurth*, 1270! Jur: Ghattas' Seriba, *Schweinfurth*, 2132! Bongo: Addai, *Schweinfurth*, 2201!

**Lower Guinea.** Lower Congo: Lukolela, *Hens*, C, 173! Bolobo, *Dewèvre*; Buffing, savannas, *Lecard*, 123! Angola: Massuca, River Lueloi, *Gossweiler*, 2695! Pungo Andongo, marshes, *Welwitsch*, 2780! 2867b! 2817! country of the Ganguellas and Benguellas, *Gossweiler*, 4118!

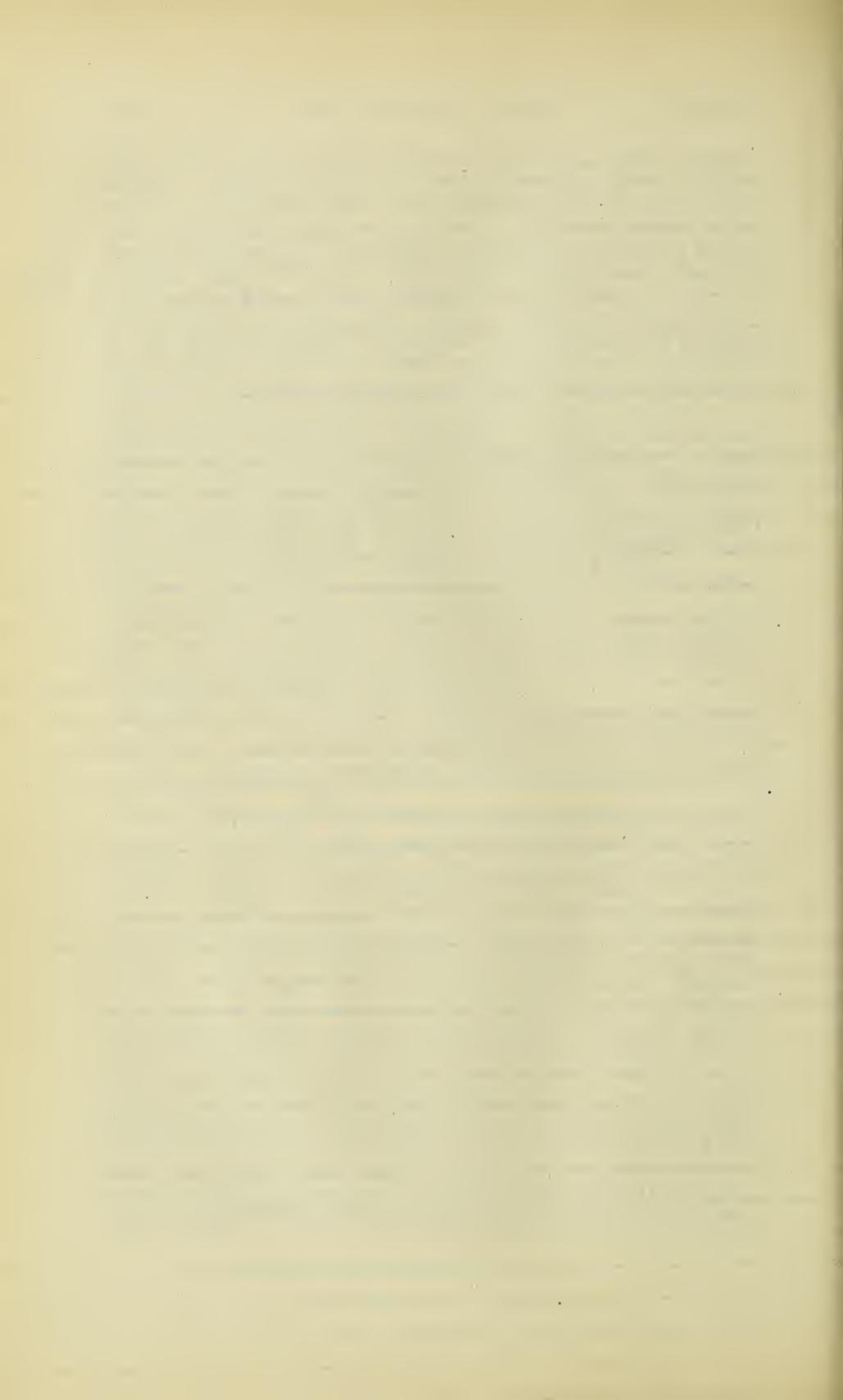
**South Central.** Rhodesia: Victoria Falls, *Allen*!

**Mozambique Distr.** "Zanzibar" (according to K. Schum., l.c.). Portuguese East Africa: Lower Zambesi; Shupanga and Mazzaro, covering large tracts, *Kirk*! Lower Buzi River, *Swynnerton*, 956!

There is no evidence that the rhizome of this species is aromatic like that of the preceding species. (*Trim.*)

**3. V. fulvibarbis**, *Stapf*. Culms moderately stout, sparingly branched, up to 6 ft. high, most of the middle and upper nodes exerted. Leaves very similar to those of the two preceding species, but rather smaller or at least narrower. Panicle oblong, 4-8 in. by 1½-2 in., slightly contracted, erect or more often slightly nodding and secund; rhachis slender, smooth; whorls 6-8 with up to over 12 rays; branches obliquely erect, usually slightly curved, naked for up to 1½ in., finely filiform, smooth or slightly rough. Racemes up to 2 in. long, very slender; joints 3-4 lin. long, tips very oblique, very minutely ciliolate, smooth; pedicels similar but shorter. Sessile spikelet subulate-linear (seen from the back), acuminate, 3-4 lin. long, pale; callus up to ¾ lin. long, acute, fulvously bearded on the sides and at the base of the upper glume, hairs up to 1 lin. long. Glumes subcoriaceous; lower rigidly ciliate or ciliolate on the sides, smooth on the back except sometimes towards the rough tips, finely 3-5-nerved; upper glume similarly ciliate from the keel, aristulate from the minutely 2-dentate tip, reversedly ciliate along the margins, faintly 3-nerved. Valve of lower floret almost as long as the glumes,







1. *C. montanus*, Trin. in Spreng. *Neue Entdeck.* ii. 93, var. *tremulus*, Stapf. Perennial, compactly cæspitose, up to 3 ft. high. Culms slender, 4-6-noded, erect, more or less compressed downwards, glabrous. Leaf-sheaths quite glabrous and smooth, the lower crowded, laterally compressed, keeled, subflabellate-imbricate, the upper shorter; ligules reduced to a minutely ciliolate rim; blades linear, acute, plicate or opening out, at the base passing imperceptibly into the sheath or the upper slightly contracted, up to over  $\frac{1}{2}$  ft. by 2 lin., somewhat firm, pale green to glaucous, quite glabrous or with a few tubercle-based stiff hairs at the lower margins, smooth, midrib very slender, lateral nerves about 3 on each side. Panicle shortly exerted, erect, ovate-oblong, 3-4 in. long, loose or somewhat contracted; rhachis very slender, smooth; branches in about 5 or 6 whorls of up to 10 rays, finely filiform,  $\frac{1}{2}$  to over 1 in. long, almost quite smooth, flexuous, tips slightly thickened and oblique, minutely ciliate; pedicels gradually thickened, glabrous below, ciliate-bearded upwards,  $1\frac{1}{2}$  lin. long; uppermost hairs  $1\frac{1}{2}$  lin. long, bright fulvous. Sessile spikelet linear-subulate (seen from the back), acute, 3-4 lin. long, pale. Glumes chartaceous, laterally much compressed, glabrous; lower distinctly shorter, 4-nerved, keel minutely scabrid upwards; upper 3-nerved, keeled, keel hispidulous towards the tip, produced into a scaberulous bristle of the length of the glume. Valve of lower floret lanceolate, up to almost  $2\frac{1}{2}$  lin. long, of upper up to  $1\frac{1}{2}$  lin. long, 1-nerved; awn  $\frac{3}{4}$ -1 in. long, pale. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet as long as the sessile, narrowly lanceolate, glabrous. Glumes thin, almost membranous, lower 7-nerved, passing into an awn up to 2 lin. long; upper of equal length with a fine point, 3-nerved, hyaline margins reversedly ciliate. Valves linear, 2- $2\frac{1}{2}$  lin. long, muticous, delicately hyaline, reversedly ciliate, lower finely 3-, upper 1-nerved.—*A. monticola*, var. *Trinii*, Stapf in Dyer, Fl. Cap. vii. 349. *A. tremulus*, Hack. in Bull. Herb. Boiss. 2me sér. i. 764.

**Mozambique Distr.** Portuguese East Africa: Boruma, *Menyharth*. Rhodesia: Victoria Falls, *Rogers*, 5712!

Also in South Africa and Madagascar.

One of the several races which constitute the rather polymorphic species *C. montanus*, Trin., whose area includes Southern Africa, Madagascar and India. The var. *tremulus* approaches very closely the var. *elatior*, Stapf, a large-spikeleted parallel to the var. *serrulatus*, Stapf (*Chrysopogon serrulatus*, Trin.), and differs from it apparently only in the almost quite smooth rhachis and branchlets (a few sharp-pointed hairs may be found under a high power) and the pedicels, which are glabrous almost up to the middle, and not ciliate from the base. The type from which the species was originally described has much smaller spikelets and is distributed through India from Ceylon to Lower Bengal. A plant collected in Madagascar (*Perrier de la Bathie*, 30!) may be referred to var. *tremulus*.

2. *C. Aucheri*, Stapf, var. *quinqueplumis*, Stapf in *Kew Bulletin*, 1907, 211, partly. Perennial; stem-bases elongated, wiry almost woody, abundantly and fastigiately branched, the branches forming fascicles of culms and short leafy branches covered below them with





the withered remains of the old firm leaf-sheaths. Culms very slender, 1 to over 2 ft. high, terete, glabrous, upper internodes exserted. Outer cataphylls of innovation-buds glabrous, smooth, the inner like the dorsal prophylls of the lower branches often densely silkily villous. Leaf-sheaths very tight except those enclosing the young panicles, terete, glabrous; ligules reduced to a ciliolate rim; blades linear, somewhat contracted at the base, tapering to a fine point or the shortest shortly acute to subacute, mostly over 1-4 in. long, 1-1½ lin. wide, usually flattening out, rather firm, straight or flexuous, glaucous, delicately puberulous on both sides, frequently with some stiff tubercle-based hairs from the lower margins, midrib and lateral nerves (2 on each side) fine, often obscure. Panicle shortly or long exserted, ovate-oblong to linear-oblong, 2-4 in. long, erect or slightly nodding, contracted or loose; rhachis very slender, slightly rough; branches in whorls of up to 12 or 6-2-nate, rarely solitary, almost capillary, very flexuous and nodding during flowering, ¼ to over 1 in. long, scaberulous or almost smooth, tips oblique, shortly bearded, hairs pale; pedicels finely filiform tapering downwards, shortly ciliate except near the tips where the hairs are sometimes up to 1 lin. long. Sessile spikelet linear-subulate (seen from the back), pale, excluding the callus 2¾-3½ lin. long; callus acute, over 1 lin. long, densely bearded, hairs pale fulvous. Glumes chartaceous, subequal; lower linear, subobtusate or acute, glabrous with the exception of a few hairs at the tips, finely 4-nerved; upper similar, entire or almost so, keel glabrous or nearly so, running out into a plumose awn about as long as to twice as long as the spikelet. Valve of lower floret narrowly oblong, as long as the glumes, reversedly ciliate, of upper floret very narrow, very minutely 2-lobed, glabrous, awn from less than 1 in. to over 1½ in. long, pale, almost straight. Anthers 2 lin. long. Pedicelled spikelet as long as or somewhat longer than the sessile, sparingly hairy, pale. Glumes membranous, with plumose awns 3-10 (mostly about 5-6) lin. long, lower 7-nerved, upper 3-nerved, reversedly ciliate upwards. Valves acute, lower as long as the glumes, lanceolate-oblong, reversedly ciliate all along, upper linear, ciliate near the tip only.—*Chrysopogon quinqueplumis*, A. Rich. Tent. Fl. Abyss. ii. 450. *Andropogon aristidoides*, Steud. Syn. Pl. Glum. i. 397. *A. quinqueplumis*, Hochst. ex Steud. l.c. i. 398. *A. Aucheri*, var. *quinqueplumis*, Hack. in DC. Monogr. Phan. vi. 561; Durand & Schinz, Consp. Fl. Afr. i. 707; Chiov. in Ann. Istit. Bot. Roma, viii. 25.

Nileland. Nubia: between Suakin and Berber, *Schweinfurth*, 316, 580! 707! 708; Erkwit Mountain, *Schweinfurth*, 284! Eritrea: Dalak Island, *Ehrenberg*! Assaorta, *Pappi*, 84! Mensa, *Terracciano & Pappi*, 2051, 2365. Abyssinia: in the valley of the Taccanze near Jelajeranne, *Schimper*, 726!

✓Var. *pulvinatus*, Stapf. Forming dense small-leaved cushions resting on numerous slender upwards wiry much-branched old stem-bases about 2 in. high, the filiform culms rising above them to ½-1 ft. Leaf-blades mostly ½-1 in. by ¾-1 lin., shortly acute to subacute. Panicle up to 2 in. long, scanty;

branches rarely much over  $\frac{1}{2}$  in. long, their tips elegantly fulvously bearded; pedicels up to 2 lin. long, conspicuously ciliate, cilia fulvous, up to over 1 lin. long. Sessile spikelets pale or purplish, excluding the callus 2–2 $\frac{1}{2}$  lin. long; callus fulvously bearded. Glumes rather thinner and relatively wider than in the preceding form. Plumose awns 2–3 $\frac{1}{2}$  lin. long; perfect awn over 1 lin. long. Pedicelled spikelets mostly purplish, 2 lin. long.—*C. Aucheri*, var. *quinqueplumis*, Stapf in Kew Bulletin, 1907, 211 (the Somaliland specimens). *Andropogon Aucheri*, var. *quinqueplumis*, Chiov. in Ann. Istit. Bot. Roma, vi. 164, not of Hackel.

**Nileland.** British Somaliland: Habr Awal, *Robecchi*; between Reres Sogair and Berbera, *Robecchi*; Little Bohotle and from Gararo to Upper Sheikh, *Appleton*! Golis Range, *Drake-Brockman*, 153! Upper Sheikh, *Drake-Brockman*, 558!

According to Appleton and Drake-Brockman an excellent fodder (vern. *Daremo*), requiring very little water. A barren specimen from Sokotra (*Schweinfurth*, 560!) has the same habit but longer leaves (up to 1 $\frac{1}{2}$  in.) and also appears to belong to this variety.

*C. Aucheri* seems to comprise several geographical races, the one from which the species was originally described extending from Arabia (*Schweinfurth*, Exped. Risbeck, 203!) through Southern Persia and Beluchistan to Scind. It is characterised by the lower glume of the pedicelled spikelet being usually awnless or in any case much more shortly awned than the upper, by the glume-awns not being ciliate or ciliate only at the base, and by the longer beards of the pedicels. Hackel says that part of Schimper's 726 from Jelajeranne represents the type; what I have seen of it is distinctly the variety *quinqueplumis*.

### 32. ARTHRAXON, Beauv. Agrost. 111.

Spikelets 2-nate, one sessile, the other pedicelled, similar or dissimilar (mainly owing to reduction), different in sex, or the spikelets solitary, sessile, with or without an accompanying often very rudimentary pedicel, on the fragile rachis of digitate or racemously digitate spike-like racemes or spikes, the sessile spikelets falling with the adjacent joint and pedicel; disarticulation sometimes tardy, transverse; joints filiform; pedicels similar or more or less reduced. Florets 2, lower reduced to an empty valve, upper ♂ in the sessile, ♂ or neuter in the pedicelled spikelets. Sessile spikelet laterally more or less compressed, usually awned. Glumes equal; lower rounded on the back and the sides, ecarinate or apparently 2-carinate owing to the presence of seriate lateral rows of tubercles or spines, usually chartaceous to coriaceous, very rarely membranous, many- (5- to more-) nerved with the nerves percurrent and more or less equally distributed, very rarely approximately 2-nerved, usually scabrid to coarsely muricate; upper glume much compressed, keeled upwards, thinner than the lower, 3-1- (rarely 5-) nerved. Valves hyaline, of lower floret 2-nerved or nerveless, of upper subentire, 1-nerved, with a dorsal or sub-basal perfect or more or less reduced awn, very rarely mucous. Valvule minute, hyaline, nerveless, or more often 0. Stamens 2 or 3. Stigmas plumose, exserted laterally near the base. Grain narrowly linear, terete; embryo half the length of the grain. Pedicelled spikelet, if fully developed, more or less like the sessile, but less rough, ♂ and always awnless, usually reduced in varying degrees or quite suppressed.—Usually slender, short grasses.





Leaf-blades lanceolate to lanceolate-ovate, cordate and amplexicaul at the base. Racemes or spikes slender to very slender.

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

Perennial; culms from a short rhizome, innovation-buds ovoid, covered with silky cataphylls; spikelets  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long ... .. 1. *A. serrulatus*.

Annual.

Racemes conspicuously hairy, more or less villous.

Culms erect or ascending, simple or sparingly branched, 1- $1\frac{1}{2}$  ft. high; spikelets always paired, the sessile  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long, the pedicelled reduced to a glume 1- $1\frac{1}{2}$  lin. long ... .. 2. *A. cuspidatus*.

Culms ascending from a more or less prostrate much-branched base, 2-8 in. high, very slender; spikelets solitary or the upper paired, the sessile 1- $1\frac{1}{2}$  lin. long, the pedicelled barren, more or less reduced ... .. 3. *A. lancifolius*.

Racemes not conspicuously hairy, with the joints shortly ciliate or glabrous; spikelets always solitary; pedicels reduced to a minute point or subule ... .. 4. *A. quartinianus*.

*not described there*

1. *A. serrulatus*, *Hochst. in Flora*, 1856, 188. Perennial; rhizome short, emitting fascicles of closely set culms and innovation-shoots, which are more or less thickened below and covered with reddish silky cataphylls. Culms rather slender, up to 2 ft. high, many-noded, usually finely pubescent, sometimes glabrous, with vegetative branches below and usually solitary flowering branches above, the latter subfastigiate. Leaf-sheaths terete, tight, slightly shorter than the internodes or exceeding them in the leafy shoots, more or less hairy with tubercle-based hairs and often softly pubescent at the nodes, the uppermost frequently glabrous; blades lanceolate to ovate-lanceolate, setaceously acuminate, with a caudate amplexicaul base, glaucous or greenish, 1-2 in. long and  $\frac{1}{2}$ - $\frac{3}{4}$  in. wide, margins cartilaginous, ciliate with the cilia springing from tubercles, smooth, very finely pubescent below or glabrous, primary lateral nerves about 8-11 on each side, fine, slightly raised below. Racemes 2-5, slender, greenish or suffused with purple,  $1\frac{1}{4}$  to over 2 in. long, on a short common axis, the fascicles borne on a slender peduncle, shortly or far exerted from the supporting bladeless or almost bladeless sheath. Rhachis fragile, shortly bearded at the nodes; joints narrowly linear,  $1\frac{1}{2}$ -3 lin. long, hairy on the back and the sides, or the lowest almost glabrous, hairs increasing upwards to more than 1 lin.; pedicels very similar, but much shorter and more slender. Sessile spikelet narrowly lanceolate-linear to linear, slightly tapering upwards, including the short puberulous callus  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long,  $\frac{1}{4}$ - $\frac{3}{8}$  lin. wide, glabrous. Glumes subequal; lower chartaceous, with a minutely truncate hyaline tip, very convex on the back, which is smooth or more often minutely muricate along the 4 indistinct or

faintly raised inner, spinulously muricate along the outer nerves, margins hyaline, comparatively wide; upper glume linear-lanceolate in profile, membranous, 3-nerved, glabrous or nearly so. Lower floret reduced to a valve which is linear, acute, up to almost 2 lin. long, hyaline, nerveless or obscurely 1-nerved at the base. Upper floret ♂: valve membranous at the base, hyaline upwards, narrowly lanceolate-linear in profile, 2-toothed, with the teeth minute, sometimes produced into short capillary bristles, 2-2½ lin. long, delicately 3-nerved, awned from near the base, awn 5-7 lin. long, very fine, kneed about the middle, twisted below. Anthers over 1 lin. long. Grain bacilliform, about 2 lin. long. Pedicelled spikelet ♂, linear-lanceolate, acute, about 2½ lin. long. Glumes subequal; lower herbaceous-chartaceous, acute, scaberulous along the outer and slightly so on the 4-5 inner nerves or almost smooth; upper glume slightly shorter, membranous, otherwise as in the sessile spikelet. Valve of lower floret as in the sessile spikelet, of upper floret linear-oblong, obtuse, nerveless, muticous.—*A. lanceolatus*, Hack. in DC. Monogr. Phan. vi. 348 (excl.  $\beta$  *echinatus*); Hook. f., Fl. Brit. Ind. vii. 143 (partly); *A. l.*, var. *genuinus*, subvar. *serrulatus*, Schweinf. in Bull. Herb. Boiss. 2me sér. ii. 10; Chiov. in Ann. Istit. Bot. Roma, viii. 22; *A. l.*, var. *serrulatus*, Durand & Schinz, Consp. Fl. Afr. 704; Stafp in Kew Bulletin, 1907, 209. *Andropogon serrulatus*, Link, Hort. Berol. i. 241 (the specimen: description partly erroneous?); A. Rich. Tent. Fl. Abyss. ii. 458. *A. prionodes*, Steud. Syn. Pl. Glum. i. 383. *Batratherum lanceolatum*, Nees in Edinb. New Phil. Journ. xviii. (1835) 181. *B. serrulatum*, Hochst. ex Steud. l.c.

Nileland. Gallabat: Matamma, *Schweinfurth*, 1077! Eritrea: Hamasen, Mount Lese, *Pappi*, 92! North Ginda, *Schweinfurth*, 144; between Mai-Baba and Belta, *Schweinfurth*, 1059; below Geleb, *Schweinfurth*, 1581; near Acrou, *Schweinfurth & Riva*, 1091! Barasio Valley, *Schweinfurth*, 695. Assaorta, *Pappi*, 2421; Oculè Cusai, *Pappi*, 4169! Mensa, *Terracciano & Pappi*, 669, 1045, 1384, 2048. Abyssinia: Mount Sholoda, near Adowa, *Schimper*, 1117! Dehli Dikeno, 4600 ft., *Schimper*, 256! and without precise locality, *Schimper*, 957! Somaliland: Golis range, *Drake-Brockman*, 476! and without precise locality, *Drake-Brockman*, 12! 22! 381! *Mrs. Lort Phillips*!

This also occurs in tropical Arabia and in India, including the bulk of the material referred to *Arthraxon lanceolatus*, as understood by most authors. *A. lanceolatus*, Hochst., was based on *Andropogon lanceolatus*, Roxb., a Coromandel plant, with larger and wider long-awned spikelets, the first glume of which is very minutely muricate towards the tips only. There is a figure of it in the Roxburgh collection at Kew.

2. *A. cuspidatus*, *Hochst. in Flora*, 1856, 188. Annual. Culms erect or ascending, 1-1½ ft. high, simple or with 1 or 2 flowering branches, many-noded, smooth, glabrous. Leaf-sheaths terete, tight, shorter than the internodes, grooved, more or less hirsute with tubercle-based hairs, bearded at the nodes, the uppermost glabrous; ligule short, hyaline, ciliate; blades lanceolate, finely acuminate, cordate at the amplexicaul base, 1½-2½ in. long and ½ in. wide, thin, flaccid, ciliate, with scattered hairs on both sides, which rise (like the





cilia) from tubercled bases, lateral nerves 3-5 on each side, like the midrib very fine. Racemes 4-5, fascicled,  $1\frac{1}{2}$ -2 in. long, slender, flexuous, villous, pale green, silvery, the fascicles borne on a common peduncle, usually exserted from the supporting sheath. Rhachis fragile; joints very slender, about  $1\frac{1}{2}$  lin. long, densely hairy, hairs up to  $1\frac{1}{2}$  lin. long; pedicels similar to the joints. Sessile spikelet linear-lanceolate, acuminate,  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long, including the short bearded callus. Glumes equal; lower membranous-chartaceous, gradually passing into a short and very fine hyaline point, very convex on the back, muriculate along the 9 green slender nerves; upper glume narrowly linear-lanceolate in profile, setaceously acuminate, membranous, 3-nerved, minutely and spinulously ciliate on the outer nerves. Lower floret reduced to a linear-oblong hyaline nerveless valve,  $1\frac{1}{2}$ -2 lin. long. Upper floret obliquely linear in profile, acute, hyaline, 2 lin. long, very faintly 2-nerved, awned from near the base, awn 8 lin. long, very fine, kneed and twisted below the middle, blackish. Stamens 2; anthers  $\frac{1}{4}$  lin. long. Pedicelled spikelet reduced to a linear-lanceolate 3-nerved glume,  $1-1\frac{1}{2}$  lin. long.—Hack. in DC. Monogr. Phan. vi. 353, excl. var. *micans*; Durand & Schinz, Consp. Fl. Afr. 703; K. Schum. in Engl. Pfl. Ost-Afr. C. 97. *Batratherum cuspidatum*, Hochst. in Flora, 1856, 178.

Nileland. Abyssinia: on mountains near Jelajeranne, *Schimper*, 1438! US

3. *A. lancifolius*, <sup>(Trin.)</sup> *Hochst. in Flora*, 1856, 188. Annual. Culms very slender, ascending from a more or less prostrate, much-branched and rooting base, 2-8 in. high, smooth, glabrous, with 2-4-nate flowering branches above, internodes mostly exserted. Leaf-sheaths lax, the uppermost slightly inflated and bladeless, glabrous except the bearded nodes and the sometimes hairy upper margins; ligules membranous, short, ciliate; blades oblong-lanceolate, from a cordate and amplexicaul base, finely acuminate,  $\frac{1}{2}$  to slightly over 1 in. long, 3-4 lin. wide, flaccid, more or less softly hairy on both sides, ciliate towards the base; primary lateral nerves 2-3 on each side, very fine, Racemes few or up to 9, in fascicles, borne on filiform ultimately long exserted peduncles,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, very slender, flexuous. Rhachis fragile; joints  $\frac{1}{2}$  lin. long, filiform, ciliate, the uppermost cilia up to 1 lin. long, or the lower joints glabrous or nearly so; pedicels (if present) like the joints, but shorter. Spikelets usually solitary, without a trace of a pedicel, or sometimes paired (1 sessile, the other pedicelled) in the upper part of the raceme. Sessile spikelet linear-lanceolate, laterally compressed, including the very minute puberulous callus,  $1-1\frac{1}{2}$  lin. long. Glumes subequal; lower membranous, acute or very minutely 2-toothed, scaberulous along the faint 5-7 nerves or almost smooth in the lower part; upper glume linear in profile, produced into a fine short bristle, slightly exceeding the lower glume, faintly 3-nerved. Lower floret reduced to an oblong or lanceolate nerveless hyaline valve, about  $\frac{1}{2}$  lin. long. Upper floret ♂;

valve linear-lanceolate in profile,  $\frac{2}{3}$  lin. long, awn from near the base, 3-5 lin. long, very delicate, kneed and twisted below the middle. Stamens 2; anthers under  $\frac{1}{4}$  lin. long. Grain bacilliform, 2 lin. long. Pedicelled spikelet, if present, oblong-lanceolate, 1 lin. long. Glumes membranous, equal, acutely subacuminate; lower 5-nerved, nerves greenish and scaberulous above, very faint below; upper glume very thin, finely 3-nerved, glabrous. Florets (if present) quite rudimentary.—*A. microphyllus*, Hochst. in *Flora*, 1856, 188; Hack. in DC. Monogr. Phan. vi. 351, including var. *lanceifolius*; Durand & Schinz, *Consp. Fl. Afr.* 704; Hook. f. *Fl. Brit. Ind.* vii. 147; Chiov. in *Ann. Ist. Bot. Roma*, viii. 22. *A. Schmidtii*, Hochst. in *Flora*, 1856, 189. *A. minor*, Hochst. l.c. 188, partly. *A. Schimperi*, Hochst. l.c., partly. *A. molle*, Balf. f. *Bot. Socotra*, 315. *A. ciliaris*, Henriq. in *Bolet. Soc. Brot.* xiii. 133, not of Beauv. *Andropogon lanceifolius*, Trin. in *Mém. Acad. Pétersb.* 6me sér. ii. (1833) 271. *A. microphyllus*, Trin. l.c. 275. *A. multicaulis*, Steud. *Syn. Pl. Glum.* i. 383. *Batratherum molle*, Nees & Arn. in *Edinb. New Phil. Journ.* xviii. (1835) 181. *B. Schimperi*, Nees ex Hochst. l.c. 179. *Psilopogon Schimperi*, Hochst. ex A. Rich. *Tent. Fl. Abyss.* ii. 447. *Pleuroplitis ciliata*, J. Schmidt, *Beitr. Fl. Cap Verd.* 152. *P. Schimperi*, Regel in *Bull. Acad. Pétersb.* x. (1866) 369. *Lucæa ciliata*, Steud. l.c. 414.

**Upper Guinea.** Cape Verd Archipelago: Fogo Island, *Newton!* *Lowe!* S. Antão Island, *Schmidt!*; S. Nicolao, *Cardoso!* French Guinea: Futa Jallon; Plateau of Dalaba Diaguissa, *Chevalier*, 18877! Soudan; Koulikoro, *Chevalier*, 2237! 2238!

**Nileland.** Eritrea: Assaorta, *Terracciano & Pappi*, 2788; *Pappi*, 3024, 3121; Oculè Cusai, *Pappi*, 3775. Abyssinia: Adowa, shady places on river banks, *Schimper*, 96! and without precise locality, *Schimper*, 1829! Socotra, *Schweinfurth*, 696! *Balfour*, 474!

Through Northern India to Tonkin and South-west China. The specimens enumerated here from the Cape Verd Islands and from the Futa Jallon are destitute of pedicelled spikelets, the pedicels themselves being reduced to almost microscopic points, very much as in the case of *Arthraxon quartinianus*, but the general appearance and the structure of the spikelets are entirely those of typical *A. lanceifolius*.

4. *A. quartinianus*, *Nash in North American Fl.* xvii. 99 (18 Sept. 1912). Annual. Culms very slender, ascending from a branched, sometimes prostrate and rooting base, from 3 in. to over 1 ft. high, smooth, glabrous or finely puberulous below the inflorescence, with solitary or 2- to 3-nate branches above, internodes mostly exserted. Leaf-sheaths lax, the upper often more or less inflated and bladeless, more or less hirsute in the upper part with tubercle-based hairs and densely ciliate along the upper margins, nodes shortly bearded; ligules membranous, ciliolate, short, truncate; blades ovate-lanceolate to oblong-lanceolate from a cordate amplexicaul base, finely acuminate, 1 to over  $1\frac{1}{2}$  in. long, 3-6 lin. wide, flaccid, with scattered tubercle-based hairs on both sides, ciliate towards the base, primary lateral nerves 3-4 on each side, very fine. Racemes 1 to about 9, in fascicles, borne on filiform, ultimately long-exserted peduncles,

1. Schimper 1879 in d. S. Hb. Lang. geb. 1879  
- A. quaternarius



1-6 in. long, very slender, flexuous. Rhachis fragile; joints  $1\frac{1}{2}$  lin. long, usually shortly ciliate, but the uppermost cilia sometimes up to  $\frac{3}{4}$  lin. long, sometimes glabrous or nearly so; pedicels reduced to a minute point or subule. Spikelets solitary, sessile, oblong-lanceolate in profile, somewhat oblique, laterally compressed, including the very minute glabrous or minutely puberulous callus,  $1\frac{1}{2}$ -2 lin. long. Glumes subequal; lower subchartaceous, acute, scaberulous along the very slender 7-9 nerves or almost smooth towards the base; upper glume obliquely lanceolate to linear-lanceolate in profile, acute or minutely mucronate, 3- (rarely 5-) nerved, eciliate. Lower floret reduced to an oblong obtuse hyaline obscurely 2-nerved valve, shorter by one-third than the glumes. Upper floret ♂: valve narrowly linear-lanceolate in profile,  $1-1\frac{1}{4}$  lin. long, awn from near the base, usually 3 lin. long, more rarely down to 2 or up to 4 lin. long, very delicate, kned and twisted below the middle. Stamens 2; anthers  $\frac{1}{4}$  lin. long.—Merrill in Philipp. Journ. Sc. Bot. vii. 229 (30 Sept. 1912). *A. major*, Hochst. l.c. 188. *A. coloratus*, Hochst. l.c. *A. plumbeus*, Hochst. l.c. 189. *A. violaceus*, Hochst. l.c. *A. Schimper*, Hochst. l.c., partly. *A. ciliaris*, Rendle in Cat. Afr. Pl. Welw. ii. 138, not of Beauv.; *A. c.*, subsp. *quartinianus*, Hack. in DC. Monogr. Phan. vi. 356 (excl. vars. *Hookeri* and *glabrescens*); Durand & Schinz, Consp. Fl. Afr. 70; Chiov. in Ann. Istit. Bot. Roma, viii. 23. *Alectoridia quartiniana*, A. Rich. Tent. Fl. Abyss. ii. 448, t. 99. *Lucæa major*, Steud. Syn. Pl. Glum. i. 414; Hochst. l.c. 179. *L. plumbea*, Steud. l.c. *L. violacea*, Steud. l.c. *L. Schimper*, Hochst. in Flora, 1856, 180 (the genuine). *Pleuroplitis plumbea*, Nees ex Steud. l.c. *P. violacea*, Nees ex Steud. l.c. *P. major*, Regel in Bull. Acad. Pétersb. 1866, 369, partly. *P. quartiniana*, Regel, l.c. 376, partly. *Andropogon violaceus*, Heyne ex Steud. l.c. *A. Alectoridia*, Steud. l.c. 383.

**Upper Guinea.** French Guinea: Timbo, *Pobéquin*, 1709!

**Nileland.** Eritrea: Decatesin, Asega, Ametsi, Medresin, etc., *Forte*; Saraè, Gaza Gobo, 6300 ft., *Pappi*, 63! Abyssinia: near Adowa, *Quartin*, 14! Debr Eski, Woina, 7000 ft., *Schimper*, 802! and without precise locality, *Schimper*, 911 (*Herb. Drake*)! 1532! Uganda: Kinafu, *Dümmer*, 1218! Ruwenzori, Kasamaga, *Scott Elliot*!

**Lower Guinea.** Angola: Golungo Alto, *Welwitsch*, 7214!

**Mozambique Distr.** Nyasaland: Kondowe to Karonga, 2000-6000 ft., *Whyte*!

The species, as understood here, extends to Ceylon and beyond the Deccan peninsula as far as Behar (Parasnath, *Clarke*, 24887). The specimens quoted from Tropical Africa cover a variety of forms, differing mainly in the size of the spikelets. *Quartin*'s specimen which has to be considered as the basis of the species represents a form with large spikelets, whilst *Schimper*'s 1532, the basis of *Arthraxon coloratus*, stands for the other extreme. Variations of a similar nature occur also among the Indian material. According to Nash, l.c., it has been introduced into Jamaica and Guadeloupe.

### 33. HYPOGYNIUM, Nees, Agrost. Bras. 364 (partly).

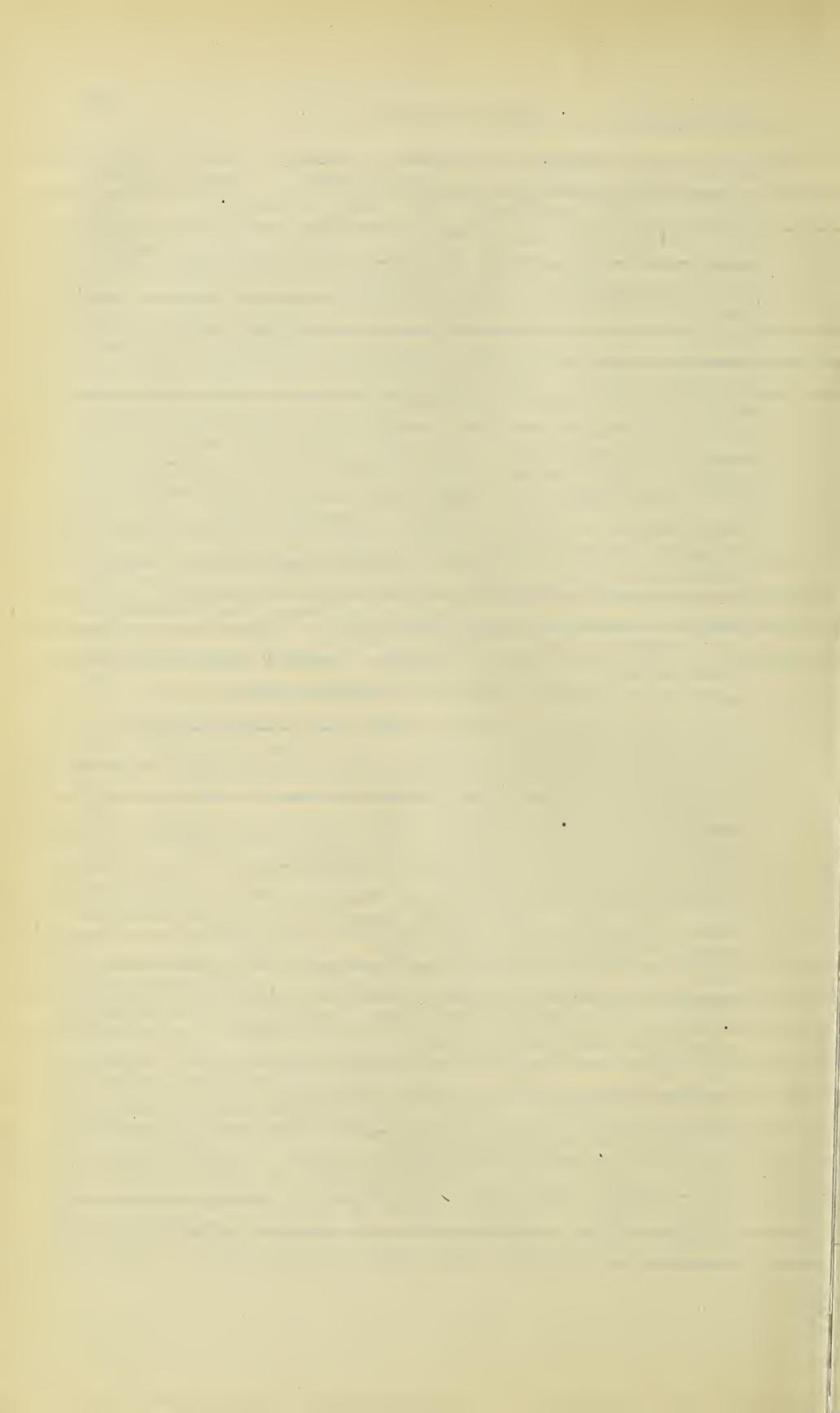
Spikelets 2-nate, one sessile, the other pedicelled, very similar in shape, different in sex, both awnless, on the fragile rhachis of several-

jointed solitary spatheate scattered or paniced and crowded racemes; joints and pedicels filiform, disarticulating subobliquely; spikelets deciduous, the sessile with the adjacent joint and pedicel. Florets 2, the lower reduced to an empty valve, the upper ♀ with minute staminodes in the sessile, ♂ in the pedicelled spikelets. Sessile spikelet dorsally compressed; callus small, glabrous on the back, scantily hairy or minutely bearded on the sides and the face. Glumes equal, chartaceous; lower 2-keeled with narrow inflexed margins very delicately or obscurely nerved apart from the keels; upper boat-shaped, 1-3-nerved, acutely keeled. Valves hyaline, of about equal size, of lower floret delicately 2-nerved, of upper floret 1-nerved, muticous or mucronulate. Valvule of upper floret hyaline, nerveless, about the length of the ovary. Staminodes 3, with capillary filaments and very minute globose barren anthers. Stigmas exerted laterally at or above the middle of the spikelet, longer than the styles. Grain unknown. Pedicelled spikelet: Glumes more-nerved and valves only slightly shorter than in the sessile spikelets. Stamens 3; anthers linear, perfect.—Perennial, densely tufted grasses, with wiry stems and hard leaf-blades. Racemes gathered in often decomposed much contracted panicles or scattered over the culm, terminal and lateral on solitary branches from the distant intermediate and upper leaf-axils, glabrous or nearly so. Spikelets small.

Species 2, 1 in tropical America and West Africa, the other in South Africa.

1. *H. spathiflorum*, Nees, *Agrost. Bras.* 366. Culms in dense tufts with intravaginal innovations, up to 3 ft. high, erect, wiry, terete, glabrous, simple below, much branched above, branches solitary or 2-nate, appressed to the culm, much divided, branchlets more or less imbricate, those of the last order bearing a solitary short raceme, all the ramifications supported by narrow spathes and the whole gathered into a contracted more or less dense panicle. Lower leaf-sheaths more or less compressed and keeled, hard, striate, glabrous, their bases long-persistent, upper terete, tight; ligules very short, scarious, rounded, glabrous; blades linear, acute or subacute, passing imperceptibly into the sheath, the lowest up to over 1½ ft. long, when unfolded 1-2 lin. wide, folded or flat, firm (particularly upwards) and often very rigid, glabrous, rarely ciliate towards the base, smooth, glaucous above, midrib slender, lateral nerves fine, close, often inconspicuous. Panicle narrow, interrupted, often over 1 ft. long, leafy, the leaves with short very narrow blades; spathes scarious, reddish, the primary from over 2½ in. long, decreasing upwards, the longest with short subulate blades, those supporting the racemes about 6-3 lin. long, all narrow, acute; peduncles finely filiform, puberulous, about half as long as the supporting spathe and enclosed in it. Racemes very slender, 6-3 lin. long, 7-3-jointed; joints ¼-⅓ lin. long, scaberulous; pedicels very similar, shorter. Spikelets linear-lanceolate to linear, 1¾-2 lin. long, acute, pale brown or greenish-





brown; callus  $\frac{1}{4}$  lin. long. Lower glume subacute, smooth on the flat back, keels scabrid, intracarinal nerves few, very indistinct, upper glume very acute, 1-nerved, margins minutely ciliolate, keel scabrid. Valves linear, acute, slightly over 1 lin. long.—*Andropogon spathiflorus*, Kunth, Enum. i. 496; Steud. Syn. Pl. Glum. i. 370; Hack. in Mart. & Eichl. Fl. Bras. ii. iii. 295, t. 68, fig. 1, and in DC. Monogr. Phan. vi. 397. *A. inermis*, Steud. l.c. 370. *A. festucaformis*, Rendle in Cat. Afr. Pl. Welw. ii. 145. *Anatherum spathiflorum*, Griseb. Cat. Pl. Cub. 236. *A. inerme*, Griseb. l.c.

**Lower Guinea.** Belgian Congo: Stanley Pool Distr., Kimuenza, Gillet, 1567! Angola: Huilla; Humpata District, in boggy places, Welwitsch, 7505!

Tropical America, from Cuba to Brazil.

### 34. CAPILLIPEDIUM, Stapf.

Spikelets 2-nate, one sessile, the other pedicelled, similar in shape but differing in sex, in 1-2- (rarely up to 8-) jointed racemes at the ends of the capillary primary and secondary and often tertiary or even quaternary branches of a loose panicle; joints and pedicels finely filiform, longitudinally grooved and hyaline in the groove, disarticulating horizontally; sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. Florets 2 in the sessile spikelet, lower reduced to an empty valve or quite suppressed in the pedicelled spikelets, upper  $\text{\char"26}$ ; 1,  $\text{\char"27}$  or neuter, in the pedicelled spikelet. Sessile spikelet dorsally compressed, awned; callus small, shortly bearded. Glumes equal, membranous to subherbaceous; lower 2-keeled, with narrow inflexed margins; upper boat-shaped, 3-nerved, keeled, grooved on both sides along the obtuse keel. Valve of lower floret hyaline, nerveless, of upper floret reduced to a hyaline, linear stipe, firmer upwards, passing into a slender awn. Valvule 0. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exerted laterally, longer than the styles. Grain oblong-ellipsoid or oblong, dorsally slightly compressed; embryo exceeding half the length of the grain. Pedicelled spikelet awnless, valve (if present) hyaline, nerveless.—Annual or perennial grasses with slender culms, simple or branched (sometimes very copiously), frequently bearded at the nodes. Leaf-blade with a rather conspicuous white midrib. Panicles delicate, when much divided the branchlets at length more or less divergent. Spikelets small.

Species 6, in tropical and subtropical Asia, Polynesia and Australia, 1 extending to tropical Africa.

(R. Br.)

1. *C. parviflorum*, Stapf. Perennial; innovation-shoots extra-axillary, their cataphylls more or less hairy, at length glabrescent. Culms tufted, to over 3 ft. high, erect or shortly ascending at the base, simple or sparingly branched, terete, internodes sometimes channelled on the side facing the subtending leaf, glabrous. Leaf-sheaths terete, tight or at length slipping off the culms, the lowest longer,

the others usually shorter than the internodes, glabrous or more or less hairy and frequently villous outside at the junction with the blade, mostly bearded at the nodes; ligules very short, truncate, ciliate; blades linear from an often narrowed and slightly constricted base, long-tapering to a fine point up to almost 1 ft. long, 1-2½ lin. broad, rather rigid and often spreading, flat, glabrous or more often pubescent all over to hirsute, particularly just above the ligule, margins rough, lateral nerves fine, 3-4 on each side. Panicle oblong, 4-9 in. long, 1-2½ in. wide, erect, more or less decompound; primary branches semiverticillate, often 5-7 or more from the lowest node, unequal, divided from low down and up to the third degree, glabrous or hairy at their insertion, rarely minutely puberulous all along, usually dark purple to almost black, ultimate branchlets (peduncles) 6-1 lin. long. Racemes reduced to 1 sessile and 2 pedicelled spikelets (always so in the African specimens) or 2- rarely 3-jointed (2 or 3 sessile and 3 or 4 pedicelled spikelets); joints and pedicels  $\frac{3}{4}$  lin. long, shortly ciliate or sometimes glabrous. Sessile spikelet oblong, 1¼ to almost 2 lin. long, usually dark purplish or reddish to olive-brown. Glumes more or less membranous; lower minutely truncate, very shallowly concave along the middle on the back, about 6-nerved (2 intracarinal), scabrid all over, ciliate upwards on the keels; upper scaberulous upwards on the keel. Valve of lower floret  $\frac{3}{4}$  to almost 1 lin. long; awn (including stipe)  $\frac{1}{2}$ - $\frac{2}{3}$  in. long, fine. Anthers  $\frac{2}{3}$ - $\frac{3}{4}$  lin. long. Pedicelled spikelet usually ♂, very similar to the sessile or somewhat smaller, narrower and paler. Lower glume acute, 7-nerved, keels ciliate upwards. Upper floret suppressed.—*Holcus parviflorus*, R. Br. Prodr. 199. *H. cærulescens*, Gaud. in Freycin. Voy. Bot. 411, t. 27. *Sorghum parviflorum*, Beauv. Agrost. 132. *S. quartinianum*, Aschers. in Schweinf. Beitr. Fl. Aeth. 306. *Anatherum parviflorum*, Spreng. Syst. l. 290. *Andropogon micranthus*, Kunth, Rév. Gram. i. 165; Enum. Pl. i. 504; Steud. Syn. Glum. i. 396; Hack. in DC. Monogr. Phan. vi. 488. (incl. vars. *villosulus* and *quartianus*); Hook. f. Fl. Brit. Ind. vii. 178. *A. alternans*, J. S. Presl. in C. B. Presl, Reliq. Hænk. i. 342. *A. violascens*, Nees ex Steud. Syn. Pl. Glum. i. 396. *A. parvispica*, Steud. l.c. 397. *A. capilliflorus*, Steud. l.c. and in Zoll. Syst. Verz. 58. *A. quartinianus*, A. Rich. Tent. Fl. Abyss. ii. 469; Durand & Schinz, Consp. Fl. Afr. i. 721. *A. serratus*, Miq. Ann. Mus. Lugd.-Bat. i. 290, not of Thunb. *Rhaphis cærulescens*, Desv. Opusc. 69. *R. villosula*, Nees ex Steud. l.c. 397. *R. microstachya*, Nees ex Steud. l.c. 397. *Chrysopogon violascens*, Trin. in Mém. Ac. Pétersb. 6me sér. ii. 319. *Ch. parviflorus*, Benth. Fl. Austr. vii. 537, partly.

**Nileland.** Abyssinia: Shire Province, *Quartin-Dillon*! Beless, *Quartin-Dillon & Petit*!

**Mozambique Distr.** Rhodesia: Salisbury, *Mrs. Craster*, 65!

Widely distributed throughout tropical Asia, Australia, and Polynesia.





*Bathriochloa Kuntze 1891.*

accepted by *Hubb. Kew Bull 1934: 109.*

35. (AMPHILOPHIS, Nash in Britt. Man. Fl. N. U.S., ed. i. 71. 1901.)

Spikelets 2-nate, one sessile, the other pedicelled, similar in shape or the pedicelled reduced and smaller, the latter always different in sex except sometimes the lowermost pair which may be homogamous (♂ or neuter), on the fragile rhachis of many-jointed shortly peduncled subdigitate or paniced racemes; joints and pedicels filiform, longitudinally grooved and hyaline in the groove, disarticulating horizontally; sessile and pedicelled (always ?) spikelets deciduous, the former with the adjacent joint and pedicel. Florets 2 in the sessile spikelets, lower reduced to an empty valve, upper ♀, 2 or 1 in the pedicelled spikelet, the lower ♂ or neuter, the upper neuter or usually quite suppressed. Sessile spikelet dorsally compressed, awned; callus small, shortly bearded. Glumes equal, thinly chartaceous to membranous; lower 2-keeled, with narrow sharply inflexed margins; upper boat-shaped, 3-nerved, acutely keeled. Valve of lower floret hyaline, nerveless, of upper floret reduced to a hyaline linear stipe, firmer upwards, passing into a slender awn. Valvules 0 or very minute. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exerted laterally usually low down, longer than the styles. Grain oblong, obtuse, dorsally slightly compressed; embryo about half the length of the grain. Pedicelled spikelet awnless, valves (if present) hyaline, nerveless.—Perennial grasses with slender simple or branched culms, bearded or beardless at the nodes. Panicles mostly subdigitate with a short primary axis, rarely the racemes on branches of the second order; racemes always shortly peduncled. Spikelets small.

Species probably over 25, mostly in tropical Asia, many of them closely allied and difficult to differentiate.

Primary axis elongated, much longer than the lowest racemes (see also *A. insculpta*, var. *vegetior*); lower branches, or at least the strongest, sparingly divided, but not beyond the second degree ... 1. *A. glabra*.

Primary axis short, much overtopped by the racemes. Lower glume of sessile spikelets typically pitless ... 2. *A. radicans*.

Lower glume of sessile spikelets pitted or only some of a panicle without a pit.

Pedicelled spikelets without pits; sessile spikelets distinctly hairy below, not glossy, up to 2 lin. long, pale.

Sessile spikelets linear- or lanceolate-oblong, tips very minutely truncate, often reddish; pits small, often absent or present in the same panicle ... 3. *A. intermedia*, var. *[acidula]*.

Sessile spikelets oblong; pits very conspicuous and deep ... 4. *A. pertusa*.

Pedicelled spikelets with 1-3 pits; sessile spikelets glabrous, more or less glossy, often over 2 lin. long, usually olive-green or flushed with purple or violet... 5. *A. insculpta*.

*35 in herb sub Andr. p*

1. *A. glabra*, Stapf. Perennial; rhizome very short, hard, innovations extravaginal, cataphylls ovate to lanceolate, acute, hard, smooth. Culms tufted, erect or shortly ascending, to over 3 ft. high, terete, rather stout below, glabrous, 5-7-noded, simple or very sparingly branched. Leaf-sheaths terete, glabrous, smooth, the intermediate and upper mostly shorter than the internodes, nodes glabrous or the upper bearded; ligules truncate, very short, scarious; blades linear, long-tapering to a setaceous point, hardly broader, not or slightly contracted at the base, up to over 1 ft. by 4 lin. (mostly narrower), pale green, often turning reddish or purplish, glabrous, rarely with very fine long spreading white hairs at and above the ligule, smooth except at the margins, midrib rather stout to very stout downwards, lateral nerves 3-4 on each side. Panicle narrowly oblong, 4-9 by 1-1½ in., erect, primary axis much longer than the lowest racemes, somewhat stout and (at least when mature) stiff, smooth, shortly bearded at the branch axils, otherwise glabrous and smooth; branches whorled, up to 6 in a whorl or semiverticillate, or 2-nate or solitary from the weaker nodes, straight, 1-3 in. long, the longer divided from ½ in. above the base, few- to 7-noded, secondary branches simple. Racemes ½-1½ in. long, straight or flexuous, usually purplish, inconspicuously white-villous; joints and pedicels 1-1½ lin. long, ciliate, uppermost cilia much longer than the rest, up to ½ lin. long. Sessile spikelet pale green or purplish throughout, including the small minutely bearded callus 1½-1¾ lin. long. Glumes equal; lower truncate, slightly concave on the back, chartaceous-membranous, hairy below the middle, more rarely glabrous, keels rigidly ciliate upwards, intracarinial nerves 4-5, very fine, evanescent upwards with (always in the African specimens) or without a pit above the middle; upper glume lanceolate, acute, 3-nerved, keel scabrid upwards, margins sparingly ciliate. Valve of lower floret oblong, 1¼ lin. long, hyaline, nerveless, ciliate; awn of upper floret 3-6 lin. long, brown below, pale above the bend. Pedicelled spikelet neuter, mostly reduced to the glumes, narrowly linear-oblong to linear, 1¼-1½ lin. long, glabrous, of the same colour as the sessile. Lower glume rigidly and minutely ciliate, 5-9-nerved, often rolled in, not pitted, upper hyaline, nerveless, often minute.—*Andropogon glaber*, Roxb. Fl. Ind. i. 271; ed. Carey, i. 367; Steud. Syn. Pl. Glum. i. 392. *A. punctatus*, Trin. Ic. t. 328, not of Roxb. *A. intermedius*, var. *punctatus*, subvar. *glaber*, Hack. in DC. Monogr. Phan. vi. 487; Durand & Schinz, Consp. Fl. Afr. 715, and Étud. Fl. Congo, 316; Rendle in Cat. Afr. Pl. Welw. ii. 149; Th. & Hél. Durand, Syll. Fl. Congol. 625. *A. intermedius*, K. Schum. in Engl. Pf. Ost-Afr. C. 98; Hook. f. Fl. Brit. Ind. vii. 175. *A. intermedius*, var. *punctatus*, Stapf in Dyer, Fl. Cap. vii. 345.

Upper Guinea. Northern Nigeria: Katagum District, Dalziel, 257!  
 Nileland. British East Africa: Rabai Hills, Taylor!





**Lower Guinea.** Belgian Congo: Matadi District; Tondoa, Büttner. Angola: Golungo Alto?, Welwitsch, 2964!

**Mozambique Distr.** Zanzibar, Last! German East Africa: Usambara, Masheua, Holst, 8745! Portuguese East Africa: Msalu River, Allen, 143! Rhodesia: Mashonaland: Mazoe District, Mundy! Salisbury, Mrs. Craster, 75! Leshumo Valley, Holub! Upper Buzi River, Swynnerton, 986!

Widely distributed through tropical Asia, also in N.E. Australia and Madagascar. The unpitted form which corresponds to Hackel's variety *hænkeanus* of *Andropogon intermedius* (*A. Haenkei*, J.S. Presl in C.B. Presl, Reliq. Hænk. i. 340: *A. Vachelii*, B, *perfectior*, W. Hook. & Arn. in Beechey's Voy. 243: *A. leptanthus*, Steud. Syn. Pl. Glum. i. 391: *Rhaphis stricta*, Nees in Hook. Kew Journ. ii. 95) occurs along with the pitted in Asia, but has not been observed in continental Africa.

2. *A. radicans*, <sup>(Lehm.)</sup> Stapf. Perennial; rhizome very short, innovations extra- and intra-vaginal; cataphylls glabrous. Culms slender, terete, 3-6-noded, erect or ascending or prostrate and then sending up bunches of short leafy shoots and culms, sometimes also rooting at the nodes, if erect usually simple or sparingly branched, more or less channelled on the side facing the branches. Leaf-sheaths of the innovation-shoots more or less compressed and keeled, short, all others terete, glabrous, smooth, bearded at the nodes or some of the nodes (particularly the upper) beardless; ligules very short, truncate, ciliolate; blades linear, gradually attenuated to a fine point, slightly or not at all contracted at the base, of innovations short, of culms up to 3 in. by  $1\frac{1}{2}$ -2 lin., glaucescent, glabrous or sparingly hairy with minutely tubercle-based hairs, margins smooth except towards the tips, midrib slender, lateral nerves fine, 2-3 on each side. Panicle subdigitate, up to 3 in. long; primary axis filiform,  $\frac{1}{2}$ -1 in. long, glabrous; branches opposite or solitary, naked for 2-3 lin., simple, glabrous, smooth. Racemes few to 9, slightly arching, up to almost 2 in. long, greyish-villous; joints and pedicels very similar, 1 lin. long, ciliate, cilia gradually longer upwards, the uppermost of the pedicels almost 1 lin. long. Sessile spikelet pale, linear-oblong, up to 2 lin. long, including the small shortly bearded callus. Glumes equal; lower minutely truncate, slightly concave on the back, thinly chartaceous-membranous, hairy towards the base and somewhat higher up on the sides, otherwise glabrous, always unpitted, intracarpal nerves about 7, very faint, keels rigidly ciliolate upwards; upper glume lanceolate, acute, 3-nerved, ciliolate upwards. Valve of lower floret slightly shorter than the glumes, oblong, subacute, hyaline; awn of upper floret including the stipes 5-9 lin. long, column brown, bristle yellowish. Anthers  $1-1\frac{1}{4}$  lin. long. Pedicelled spikelets ♂ or neuter, linear, subacute, as long as the sessile or shorter, slightly darker. Glumes equal or the upper shorter, lower glabrous, about 9-nerved, upper 3-nerved. Valve if present like that of the lower floret of the sessile spikelet.—*Andropogon radicans*, Lehm. in Ind. Sem. Hort. Hamb. 1828; Kunth, Enum. i. 499; Nees, Fl. Afr. Austr. 106; Steud. Syn. Pl. Glum. i. 380. *A. Ischæmum*, var. *radicans*, Hack. in DC. Monogr. Phan. vi. 476 and in Bull. Herb. Boiss. iv. App. iii. 11; Durand & Schinz,

Consp. Fl. Afr. v. 715; Chiov. in Ann. Istit. Bot. Roma, vii. 60; Stapf in Dyer, Fl. Cap. vii. 344. *A. Ischæmum*, var. *somalensis*, Stapf in Kew Bulletin, 1907, 210.

**Nileland.** British Somaliland: Burao and Upper Sheikh, *Appleton*. Galla Country: Melele, near Coromma, *Riva*, 1221. British East Africa: Makindi, *Linton*, 172!

**Lower Guinea.** Hereroland: without precise locality, *Lüderitz*, 69, 74.

The specimens seen are imperfect and the determination is therefore somewhat doubtful.

*Andropogon Ischæmum*, var. *lavifolius*, Chiov. in Ann. Istit. Bot. Roma, viii. 23, from Eritrea (Bogos, *Terracciano & Pappi*, 2653) may be this.

3. *A. intermedia*, <sup>(R. Stapf)</sup> (?), var. *acidula*. *Stapf*. Perennial; rhizome short, hard; innovations extra- and intra-vaginal; cataphylls ovate to lanceolate, acute, hard, smooth. Culms erect or more often shortly ascending, up to over 3 ft. high; rather slender, glabrous, many-noded, mostly producing short leaf-branches from the lower and intermediate nodes. Leaf-sheaths terete, rarely slightly compressed, quite glabrous or sometimes pubescent at the nodes, very smooth, longer or shorter than the internodes; ligules truncate, very short, firmly scarious; blades linear, long-tapering to a setaceous point, hardly broader and slightly contracted at the base, 3-8 in. by 1-2½ lin., pale green or glaucescent or turning reddish, glabrous apart from usually scanty very fine spreading white hairs at and above the ligule, smooth except at the tips, midrib prominent, lateral nerves 3-4 on each side. Panicle subdigitate, obovoid, 2-3 in. long; primary axis up to 2 in. long, filiform, glabrous, rarely obscurely bearded in the branch axils; lower branches opposite, upper or uppermost alternate, rarely all alternate, straight, undivided or the lowermost bearing 2 (rarely 3 or 4) racemes. Racemes 10-15 or sometimes more, 1-2 in. long, often flexuous, pale or purplish, white-villous; joints and pedicels 1-1¼ lin. long, ciliate, cilia increasing from the middle upwards, the uppermost 1½ (rarely 2) lin. long. Sessile spikelet linear- or lanceolate-oblong, pale with reddish tips or more or less purplish all over, including the small minutely bearded obtuse callus about 1¾ lin. long. Glumes equal; lower truncate, flat or very slightly concave on the back, chartaceous-membranous, pubescent below the middle, keels rigidly ciliate upwards, intracarpinal nerves 4-5, very fine and obscure or distinct upwards, with or without a pit above the middle; upper glume lanceolate, acute or mucronulate, obscurely 1-3-nerved, keel scabrid above, margins sparingly ciliate. Valve of lower floret linear-oblong, subacute, 1¾ lin. long, hyaline, nerveless, ciliate, awn of upper floret, including the stipe 4½-6 lin. long, pale brown below and whitish above the centre. Anthers ¾ lin. long. Pedicelled spikelet neuter, rarely imperfectly ♂, narrowly oblong, 1½-1¾ lin. long, glabrous, of the same colour as the sessile. Glumes equal or the lower shorter, lower rigidly ciliate, 7-1-nerved, upper oblanceolate, acute, subhyaline, 5-nerved, ciliate. Valve linear-lanceolate

Sp. made here too  
Dec. 9. 1894





or 0.—*Andropogon pertusus*, Stapf in Kew Bulletin, 1895, 209, not of Willd. *A. Ischæmum*, var. *lævifolius*, Hack. in DC. Monogr. Phan. vi. 476, partly (?); Rendle in Cat. Afr. Pl. Welw. ii. 149.

**Upper Guinea.** Cape Verd Islands: S. Antão, *Lowe!* S. Nicolao, *Bolle!* *Lowe!* S. Jago; Os Orgaos, *Lowe!* Gold Coast: Christiansborg, *Johnson, 1017!* Accra, *Don!*

**Lower Guinea.** Angola: Loanda, *Welwitsch!* 7348! 7375. Mossamedes; Chiriqua and Humbe, *Newton!*

Also in the West Indies whence it was received as one of the "sour grasses" of those islands. A somewhat obscure plant.

The original *Andropogon intermedium* of R. Brown was described from Northern Australia. It is a more robust plant with much less hairy racemes and on the whole longer and not pitted spikelets. Other forms occur in India and Southern China and probably other parts of tropical Asia.

4. *A. pertusa*, <sup>(L.)</sup> *Stapf.* Perennial; rhizome short, innovations extra- or more often intra-vaginal; cataphylls glabrous. Culms slender, terete, many-noded, suberect or geniculately ascending or often weak, trailing or rambling over the ground, rooting and throwing up tufted or single shoots from the nodes, glabrous. Leaf-sheaths of the innovation-shoots compressed, more or less keeled, the others terete, glabrous, smooth, intermediate and upper often much shorter than the internodes, usually bearded from the nodes; ligules very short, truncate or of lower leaves up to 1 lin. long and rounded, membranous, ciliolate; blades linear, long-attenuated to a fine point, hardly contracted at the base, of innovations short, rarely over 2 in. long, of culms up to 6 in.,  $1\frac{1}{2}$ –2 lin. wide, pale green to glaucous, glabrous, pubescent or hirsute, often with tubercle-based hairs, particularly towards the ligule, margins rough upwards, midrib slender, lateral nerves fine, 2 or 3 on each side. Panicle subdigitate, about 2 (rarely 3) in. long; primary axis filiform, from less than  $\frac{1}{2}$  to 1 in. long; branches opposite or solitary, rarely in scanty whorls, naked for 2 (rarely 3) lin., simple, glabrous, smooth. Racemes  $1\frac{1}{2}$ – $2\frac{1}{2}$  lin. long, often flexuous, pale or dull purplish, whitish, silkily villous; joints and pedicels very similar, not much over 1 lin. long, ciliate, cilia much longer at the tips (of the pedicels to  $1\frac{1}{2}$  lin.). Sessile spikelet oblong, pale-greenish, including the shortly bearded callus 2 lin. long, beard up to 1 lin. long. Glumes equal; lower very minutely truncate, flat on the back, chartaceous-membranous, hairy below the middle, keels rigidly ciliolate upwards, intracarpal nerves 5–7, more marked upwards, pit always present, usually very pronounced, corresponding to a firm bulb-like protuberance on the inner side; upper glume lanceolate, acute or mucronulate, 3-nerved, keel scaberulous, margins ciliate upwards. Valve of lower floret oblong, obtuse, not much over 1 lin. long, hyaline, nerveless, minutely ciliolate at the top; awn of upper floret including the stipe 6–10 lin. long. Pedicelled spikelet ♂, very like the sessile in shape and size, but usually darker, or neuter and then often rolling in and narrower. Glumes subequal, lower not pitted, about 7-nerved. Valve like that

of the lower floret of the sessile spikelet or more or less reduced.—*Holcus pertusus*, Linn. Mant. Alt. 301. *Andropogon pertusus*, Willd. Sp. Pl. iv. 922; Beauv. Agrost. 131, t. 23, fig. 2; Kunth, Enum. Pl. i. 498; Steud. Syn. Pl. Glum. i. 364; Baker, Fl. Maurit. 444 (excl. some syn.); Boiss. Fl. Or. v. 464; Hack. in DC. Monogr. Phan. vi. 479 (vars. *genuinus* and *Wightii*); Durand & Schinz, Consp. Fl. Afr. i. 718 (var. *genuinus*); Balf. f. Bot. Socotra, 316; Klatt in Jahrb. Hamb. Wiss. Anst. ix. (1891) 122; Penzig in Atti Congr. Bot. Genova, 1893, 364; K. Schum. in Engl. Pf. Ost-Afr. C. 98 (partly?); Schweinf. in Bull. Herb. Boiss. ii. App. ii. 10, 93; Chiov. in Ann. Istit. Bot. Roma, viii. 23. *Lepeocercis pertusa*, Nees ex Steud. l.c.

**Upper Guinea.** Cape Verd Islands: S. Nicolao, 2000 ft., *Lowe*!

**Nileland.** Eritrea: in shrubberies along the torrent Lava above Maigerhebit, *Penzig*; Geleb, 3600–6600 ft., *Schweinfurth*, 1161, 1330, 1373; Ginda, 3000 ft., *Schweinfurth*, 156, 162, 412; Ambelaco, 6600 ft., *Schweinfurth*. Mensa, *Terracciano & Pappi*, 1189. Abyssinia: Somak Efat, *Roth*! Somaliland: Golis Range, *Drake-Brockman*, 128! Socotra, *Balfour*, 308! *Schweinfurth*, 695.

**Mozambique Distr.** Zanzibar, *Stuhlmann*. German East Africa: Usambara (according to *Durand & Schinz*, l.c.).

Also in Arabia and in India from Afghanistan to Ceylon and Behar. Introduced in Mauritius and Jamaica. A valuable fodder in India for grazing as well as for stacking, very common and characteristic in cattle compounds. The "sour grass" of the West Indies, usually referred to *Andropogon pertusus* is not this species, but partly *Amphilophis feracidula*, Stapf, and partly *A. intermedia* (?), var. *acidula*, Stapf.

5. *A. insculpta*, <sup>(Hegn.)</sup> Stapf. Perennial; rhizome very short, innovations intra- and extra-vaginal; cataphylls glabrous. Culms slender, to over 3 ft. high, terete, many-noded, erect or geniculate, ascending, lower internodes often much lengthened and wiry, upper easily compressible and often deeply hollowed on the side facing the subtending leaf. Leaf-sheaths of the innovation-shoots more or less compressed and keeled, all others terete, glabrous, sometimes bearded from the mouth, smooth, long-bearded from the nodes, shorter than the internodes; ligules short and truncate or broad-ovate and up to  $1\frac{1}{2}$  lin. long, scarious; blades linear, long-attenuated to a fine point, rounded and distinctly contracted at the base, of innovations short, of culms up to over 9 in. by  $1\frac{1}{2}$ – $2\frac{1}{2}$  lin., pale green to glaucous, usually glabrous, rarely pubescent or sparingly beset with long fine hairs, sometimes rough all over beneath, margins smooth except towards the tips, midrib slender, lateral nerves fine, 3 on each side. Panicle subdigitate, 3–4 in. long; primary axis filiform,  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. long, finely hairy at the branch-axils, branches opposite or solitary, sometimes in whorls of 3, naked for  $2\frac{1}{2}$ –4 lin., simple, glabrous, smooth. Racemes 6 to 12, rarely more, usually over 2 in. long, flexuous, olive-green, variously flushed with dull purple, slightly silvery-villous; joints and pedicels very similar,  $1\frac{1}{2}$  lin. long, ciliate, cilia gradually longer upwards, uppermost  $1\frac{1}{2}$  lin. long. Sessile spikelet linear-oblong, more or less olive-green, or tinged with dull purple or violet, including the short bearded callus 2– $2\frac{3}{4}$





lin. long, beard up to  $1\frac{1}{2}$  lin. long. Glumes equal; lower very minutely truncate, flat or slightly concave on the back, firmly chartaceous-membranous, glabrous, more or less glossy, keels rigidly ciliolate upwards, intracarinar nerves about 7, often very faint, pit nearly always present, small; upper glume lanceolate, acute or mucronulate, 3-nerved, keel scaberulous, margins scantily ciliate upwards. Valve of lower floret oblong, obtuse, hyaline, almost eciliolate, awn of upper floret including stipe 9–11 lin. long, column very dark, bristle fulvous. Anthers almost 1 lin. long. Pedicelled spikelet ♂ or neuter, linear-oblong to lanceolate, subacute,  $1\frac{3}{4}$ – $2\frac{1}{2}$  lin. long, usually darker than the sessile. Glumes more or less unequal, lower with 2–3 (rarely 1 or 0) shallow pits, with numerous close nerves, upper 5–7-nerved. Valve, if present, as in the lower floret of the sessile spikelet, rarely valves 2, the upper narrower than the lower.—*Andropogon insculptus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 488. *A. pertusus*, Nees, Fl. Austr. 107; Rendle in Journ. Linn. Soc. xl. 222, not of Willd. *A. p.*, var. *capensis*, and var. *insculptus*, subvar. *trifoveolatus*, Hack. in DC. Monogr. Phan. vi. 482. *A. p.*, vars. *capensis* and *insculptus*, Durand & Schinz, Consp. Fl. Afr. 718. *A. p.*, var. *capensis*, Stapf in Dyer, Fl. Cap. vii. 345. *A. p.*, var. *insculptus*, subvar. *trifoveolatus*, Chiov. in Ann. Istit. Bot. Roma, viii. 23.

Nileland. Abyssinia: Adowa; Sholoda Mountain, *Schimper*, 80! and without precise locality, *Schimper*, 906! 1990! British East Africa: Nairobi, 5600 ft., *Battiscombe*, 443! 518! *Miss Johnstone*, 52! *Linton*, 16! Boura Mountains, near Taita, 3600 ft., *Sacleux*, 2293!

Lower Guinea. Damaraland, *Een*!

Mozambique Distr. Zambesi basin, *Serpa Pinto* (according to *Durand & Schinz*). Rhodesia: Gazaland, *Swynnerton*, 7! 1613! 1713! Victoria, *Monro*, 945A! 983!

Also in South Africa, from Natal westward to Komgha Division, and in the Indian Peninsula (Pulney mountains).

✓ Var. *vegetior*, <sup>(H. & C. B. P.)</sup> Stapf. Leaf-blades up to 1 ft. by 6 lin., usually very rough all over on the back except towards the base. Primary axis of the panicle elongated, up to 3 in. long.—*A. pertusus*, var. *vegetior*, Hack. l.c. 481; Chiov. l.c.

Nileland. Eritrea: Gerba, Atbara, *Bartolommei-Gioli*. Gallabat: Matamma, *Schweinfurth*, 1027!

Possibly only a very robust condition, but rather striking on account of its reed-like rough leaves.

### 36. DICHANTHIUM, Willemet in Usteri, Ann. xviii. (1796), 11.

Spikelets 2-nate, one sessile, the other pedicelled, similar in shape, different in sex, except the lowermost 1 or 2 pairs of each raceme which are (with occasional exceptions in *D. annulatum*) homogamous (♂ or neuter), in many-jointed shortly peduncled subdignite, rarely subpanicled or racemosely arranged, racemes; joints and pedicels filiform, solid, disarticulating subhorizontally except the lowest barren pairs; fertile sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. Florets 2 in the fertile sessile spikelets (lower reduced to an empty valve,

36 in 36 var. *vegetior*

upper ♂), 1 in the barren sessile and all the pedicelled spikelets, ♂ or neuter, or suppressed. Sessile spikelet dorsally compressed, awned (except the basal homogamous ones); callus small, shortly bearded. Glumes equal, thinly chartaceous; lower usually very obtuse, 2-keeled with narrow sharply inflexed margins; upper boat-shaped, 3-nerved, acutely keeled. Valve of lower floret hyaline, nerveless, of upper floret reduced to a hyaline upwards firmer linear stipe, passing into a slender awn (very rarely finely 2-toothed with the awn from the sinus in a doubtful or aberrant Indian species). Valvule 0 or minute. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exerted laterally at or above the middle or near the tips. Grain oblong, obtuse, dorsally compressed; embryo rather more than half the length of the grain. Pedicelled spikelet awnless; valve if present hyaline, nerveless.—Perennial, very rarely annual, grasses with simple or branched usually many-noded culms, bearded or beardless at the nodes. Panicles usually subdigitate with a short or very short primary axis, rarely the latter elongated; racemes always shortly peduncled. Spikelets small, rarely the male somewhat larger.

Species 8, in the tropical and warm-temperate regions of the Old World.

Lower glume of sessile ♂ spikelets without a semilunar row of long tubercle-based cilia below the hyaline tip; blade margins not revolute ... 1. *D. annulatum*.

Lower glume of sessile ♂ spikelets with a semilunar row of long tubercle-based cilia below the hyaline tip; blade margins at length revolute ... 2. *D. papillosum*.

1. *D. annulatum* <sup>(Forst.)</sup> Stapf. Perennial, densely caespitose, innovations extra- and intra-vaginal. Culms up to over 3 ft. high, sub-erect or geniculate-ascending, usually slender, terete, grooved on alternate sides of internodes, simple or very frequently branched, smooth. Leaf-sheaths terete, tight, striate, glabrous, mostly bearded at the nodes; ligules firmly scarious, oblong, obtuse, up to over 1 lin. long; blades linear, tapering to a fine point, slightly contracted at the base, up to 1 ft. (usually much less) by 1½–2 (rarely 3) lin., glaucous, more or less rigidly glabrous or sparingly hairy often from tubercles, smooth below, more or less rough above, margins cartilaginous and scaberulous upwards, midrib whitish above; lateral nerves 3–4 on each side, firm. Inflorescence subdigitate, erect; common rhachis filiform, 3–8 (rarely 12) lin. long, shortly bearded at the branch axils; branches solitary, usually simple, naked up to 3 (rarely 4) lin., quite glabrous. Racemes 3–9, rarely only 1 or more than 12 (up to over 20), slender, somewhat flaccid, up to over 2 in. long, pale or flushed with purple; joints and pedicels finely filiform, solid, ½ to almost 1 lin. long, ciliate (sometimes on one side only) or the lowest almost glabrous, uppermost cilia often as long as the joint. Sessile spikelets subimbricate, oblong, obtuse, 1½–2 lin. long, usually that of the lowest pair ♂ or neuter and awnless; callus very small, shortly bearded. Lower glume thinly





chartaceous, often with purplish tips, slightly concave, at least above the middle, sharply ciliate from the middle upwards, otherwise with (rarely without in the African specimens) some long very fine spreading hairs from near the keels, particularly in the upper part, glabrous or sparingly pubescent on the back; upper glume acute, minutely ciliate, glabrous. Valve of lower floret linear to oblong, hyaline, glabrous or ciliate; awn of upper floret 8-10 lin. long, very fine. Anthers  $\frac{1}{2}$  lin. long. Grain oblong, 1 lin. long, dorsally compressed; scutellum over  $\frac{1}{2}$  lin. long. Pedicelled spikelet about as long as the sessile, ♂ or neuter, usually darker. Lower glume semiconvolute, up to 13-nerved; lower glume and valve as in the sessile or more or less reduced.—*Andropogon annulatus*, Forsk. Fl. Ægypt.-Arab. 173; Delile, Fl. Égypte, 13, t. 7, fig. 2; Steud. Syn. Pl. Glum. i. 380; Coss. & Dur. Expl. Scient. Alg. ii. 47; Ball in Journ. Linn. Soc. xvi. 734; Duthie, Fodder Grass. N. Ind. 33, t. 20; Hack. in DC. Monogr. Phan. vi. 570; Durand & Schinz, Consp. Fl. Afr. 705; Penzig in Atti Congr. Bot. Genova, 1893, 364; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 13, 93; Hook. f. Fl. Brit. Ind. vii. 196; Stapf in Dyer, Fl. Cap. vii. 350; Rendle in Ind. Fl. Sin. in Journ. Linn. Soc. xxxvi. 369. *A. Bladhii*, Roxb. Fl. Ind. i. 263; ed. Carey, i. 259; Steud. l.c. 379; Trin. Ic. Spec. Gram. t. 325; Duthie, l.c. 33. *A. scandens*, Roxb. l.c. 263; ed. Carey, i. 258; Steud. l.c. 381. *A. obtusus*, Nees in Hook. & Arn. Beech. Voy. 243 (partly). *A. comosus*, Link, Hort. Berol. i. 239, not of Spreng. *A. garipensis*, Steud. l.c. 379. *Lipeocercis annulata*, Nees, Fl. Afr. Austr. 98.

**Nileland.** Sudan: Red Sea Province; near Tokar, *Massey*! Wadi Yumga, *Schweinfurth*, 703! Wadi Laemeb, *Schweinfurth*, 579! Geraschab, *Schweinfurth*, 758! Kordofan; Abu Gerad, *Kotschy*, 45! Eritrea: Schegolgor Mantai, on the upper Barka River, *Schweinfurth*, 39! 94! Ginda; Donkollo Hill, *Schweinfurth*, 208; near Geleb, between Geleb and the Bambit Valley, and top of Mount Sabbar, *Penzig*. Gallabat: Matamma, *Schweinfurth*, 1031! Socotra, 3000 ft., *Schweinfurth*, 695!

**Mozambique Distr.** Portuguese East Africa: Zambesi Delta, Expedition Island, *Kirk*! Nyasaland: Shire Valley, *Kirk*!

From Morocco through North Africa, the Orient and India to China and Australia. Considered good fodder in India.

(*Hoehst.*)

2. *D. papillosum*, *Stapf*. Perennial, innovations extra- and intravaginal. Culms up to over 3 ft. high, erect or slightly geniculate-ascending, somewhat robust, terete, more or less wiry below, 7-9-noded, sparingly branched, branches suberect. Leaf-sheaths terete, tight, strongly striate, bearded at the nodes, and sometimes ciliate towards the mouth, otherwise glabrous; ligules up to 1 lin. long, truncate or rounded, ciliate; blades linear, tapering to a long fine point, scarcely contracted at the base, up to over 6 in. by  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin., rather rigid, glaucous, flat, at length revolute, somewhat rough on the upper side from minute tubercle-based hairs, margins cartilaginous, scaberulous upwards, midrib slender, lateral nerves 3-4 on

each side, fine. Inflorescence subdigitate, erect; common rachis filiform, about 9 lin. long, shortly bearded at the branch axils; branches solitary, simple, naked up to 4 lin., quite glabrous. Racemes 3-5 (or 7 according to Hackel), rather stout, more or less flexuous, about 2 in. long, purplish-grey; joints and pedicels finely filiform, solid,  $\frac{3}{4}$ -1 lin. long, ciliate on both or only on one side, upper cilia longer than the joint or pedicel. Sessile spikelets imbricate, broad-oblong, very obtuse, 2-2 $\frac{1}{2}$  lin. long; callus very small, shortly bearded. Lower glume thinly chartaceous with tips hyaline and whitish between the keel ends, obscurely concave on the back, minutely asperulous on the keels, long-ciliate from small tubercles placed along the margins and in a semilunar row across the glume just below the hyaline tip, hairy on the back, intracarinal nerves above 5, more marked upwards, upper glume minutely truncate, glabrous. Valve of lower floret linear to oblong, hyaline, glabrous or ciliate; awn of upper floret up to 9 lin. long, column puberulous. Anthers 1 lin. long. Stigmas exerted terminally or subterminally. Pedicelled spikelet ♂, very similar to the sessile. Lower glume long-hairy all over, up to 13-nerved, upper 3- to sub-5-nerved, ciliate upwards. Valve oblong, ciliate at the obtuse top.—*Andropogon papillosus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 457; Hack. in Bolet. Soc. Brot. iii. 139, and in DC. Monogr. Phan. vi. 573; Durand & Schinz, Consp. Fl. Afr. v. 719. *A. annulatus*, var. *papillosus*, Rendle in Cat. Afr. Pl. Welw. ii. 150, not of Hook. f.

Nileland. Abyssinia: Jaja, 6000 ft., *Schimper*, 320! Shire Province; Jogarti, in swampy meadows, *Schimper*, 526!

Lower Guinea. Angola: Monhino, *Newton*; Loanda; sandy damp plains between Os dois Imbondeiros and Quicuxe, *Welwitsch*, 2912! from Quicuxe to Cacucaco, *Welwitsch*, 7315!; and without precise locality, *Welwitsch*, 7323! Mossamedes; banks of the Bero River, *Welwitsch*, 2609!

37. **EUCLASTA**, Franch. in Bull. Soc. Hist. Nat. Autun, viii. (1895), 335.

Spikelets 2-nate, one sessile, the other pedicelled, more or less similar in shape, different in sex, except the lowermost 1-3 pairs of each raceme which are homogamous (♂ or neuter), in many-jointed delicately peduncled nodding subdigitate or corymbose or subpaniced racemes; joints and pedicels filiform, much compressed, hyaline and balsamiferous between the thickened margins, disarticulating horizontally, except in the sterile basal portion of the raceme; fertile sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel, but the sterile basal pairs persistent. Florets 2 in the fertile sessile spikelets (lower reduced to an empty valve, upper ♀), 2 or 1 in the barren sessile and all the pedicelled spikelets, ♂ or neuter or quite suppressed. Fertile sessile spikelets dorsally compressed, awned; callus small, minutely bearded. Glumes equal, thinly chartaceous; lower truncate, 2-keeled, with the

37 in herb. sub Androp.





margins narrowly and sharply inflexed down to the middle, thence slightly involute; upper boat-shaped, 3-nerved, keeled. Valve of lower floret small, hyaline, nerveless, of upper floret reduced to a hyaline upwards firmer linear stipe, passing into a perfect awn. Valvule 0. Lodicules 2, minute, glabrous. Stamens 3; anthers of ♂ spikelets minute, about as long as broad, of ♂ larger, several times longer than broad. Stigmas slender, exerted laterally above the middle or near the tips of the spikelets, suberect. Grain obovoid-oblong, subobtuse, dorsally compressed; embryo rather more than half the length of the grain. Pedicelled and barren sessile spikelets similar to the fertile sessile, but somewhat larger and usually differing in colour. Glumes equal or unequal, lower many-nerved.—An annual grass with usually branched many-noded bearded culms. Panicles of few to 15 usually nodding racemes, with long beards from the nodes.

Species 1, in Tropical Africa and America.

1. *E. condylotricha*, <sup>(Hochst.)</sup> Stapf. Annual. Culms up to over 5 ft. high, usually geniculately ascending and often rooting from the lowest nodes, or more or less erect, slender, usually branched, terete, smooth. Leaf-sheaths terete, tight or the upper and those supporting a branch slightly inflated, striate, glabrous or sparingly hairy, particularly along the upper margins and at the mouth, rarely softly hairy all over, always bearded at the nodes; ligules short, membranous, ciliate; blades linear, long-tapering to a setaceous point, more or less attenuated towards and contracted at the base, up to 1 ft. by 2–4 (rarely 5) lin., somewhat flaccid, green, usually hairy below and very sparingly so above, the hairs fine, soft, springing from minute tubercles, rarely glabrous, margins and nerves near them rough, midrib very slender, whitish above, primary lateral nerves 3–4 on each side, very fine. Panicles terminal and from the intermediate and upper branches, usually shortly exerted, the lateral often very scanty (sometimes reduced to a solitary raceme); primary axis filiform, up to  $\frac{1}{2}$  in. long; branches simple or the lowest sometimes very sparingly again divided, subcapillary, up to over  $\frac{1}{2}$  in. long, flexuous, usually nodding or sometimes sigmatoid, glabrous; hairs at the nodes spreading, up to over 2 lin. long. Racemes flexuous, rather loose when ripe, very readily breaking up down to the persistent barren basal portion, 1–2 in. long; joints and pedicels of the fertile part of the raceme very similar, about 1 lin. long, densely and shortly ciliate, cilia equally long, transparent portion green, often at length turning black and then very conspicuously contrasting with the white fringe of cilia. Fertile sessile spikelets oblong, pale to almost whitish, 2 lin. long. Lower glume minutely truncate, more or less hairy towards the base and on the sides, keels scaberulous, intracarpal nerves 4–5, ending below the hyaline tip, upper acute to subobtuse. Valve of lower floret ovate, about  $\frac{3}{4}$  lin. long, glabrous; awn 1–1 $\frac{1}{2}$  in. long. Anthers  $\frac{1}{5}$ – $\frac{3}{4}$  lin. long. Grain

not quite 1 lin. long. Pedicelled and barren sessile spikelets  $2\frac{1}{2}$ -3 lin. long, oblong to lanceolate-oblong. Lower glume very minutely truncate to subacute, more or less hairy, often from the tubercles, nerves 10-17, very marked and prominent in the spikelets of the basal barren portion, upper shorter, 3-5-nerved, ciliolate upwards. Valves oblong to linear, shorter than the lower glume to quite small. Anthers linear, up to almost 1 lin. long.—*E. glumacea*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 335; De Wild. & Durand, Contrib. Fl. Congo, i. fasc. 2, 77. *E. graminea*, Th. & Hél. Durand, Syll. Fl. Congol. 649. *Andropogon condylotrichus*, Hochst. in Steud. Syn. Fl. Glum. i. 377; Hack. in DC. Monogr. Phan. vi. 650; Durand & Schinz, Consp. Fl. Afr. 728; Chiov. in Malpighia, xii. (1898), 76, 77. *A. piptatherus*, Hack. in Mart. & Eichl. Fl. Bras. ii. iii. 293, and in DC. Monogr. Phan. l.c. 579; Durand & Schinz, l.c. 719; K. Schum. in Engl. Pfl. Ost-Afr. C. 98; Rendle in Cat. Afr. Pl. Welw. ii. 150; Hitchcock in Contrib. U.S. Nat. Herb. xvii. iii. 208. *Sorghum piptatherum*, O. Kuntze, Rev. Gen. Pl. 792. *Amphilophis piptatherus*, Nash in North Amer. Fl. xvii. 127.

**Upper Guinea.** French Guinea: Timbo, cultivated land, *Pobéquin*, 1775! French Sudan: Koulikoro, *Chevalier*, 2346! Northern Nigeria: junction of the Niger and Benué Rivers, *Barter*! Abinsi, on the river banks, *Dalziel*, 887! Cameroons: Adamaoua, *Gelombe*, *Macleod*, 106! Nogolo, *Macleod*, 90!

**North Central.** French Congo: Oubangui Territory; basin of the Upper Umbella River, at Doti, *Chevalier*, 5763!

**Nileland.** Sudan: Sennar; Fazoki, *Figari*! and without precise locality, *Rosiani*. Gallabat: Matamma, *Schweinfurth*, 1025! Abyssinia: without precise locality, *Schimper*, 204!

**Lower Guinea.** Gaboon: Niari region, *Thollon*! Belgian Congo: Kisantu, *Gillet*, 960! Boma District; Cabre, *Tijlman*, 4543. Bangala District, Upoto, *Wilwerth*; Katanga District; Albertville, *Descamps*. Angola: Golungo Alto (?), *Welwitsch*, 7244!

**Mozambique Distr.** Zanzibar: on coral limestone, *Hildebrandt*, 1076! Kavala Islands, in Lake Tanganyika, *Carson*!

Also in Tropical America from Mexico to Brazil. The varieties proposed by Hackel in his monograph of the *Andropogoneæ* represent hardly more than ordinary fluctuations.

Franchet described the sessile spikelets as ♀, having evidently overlooked the very small anthers. It is very doubtful whether they ever become exerted from the spikelets, as are the long narrow stigmas. It may be that these spikelets behave like cleistogamic flowers during the earlier stages of flowering. The anthers, small as they are, contain pollen which is apparently quite sound.

### 33. EREMOPOGON, Stapf.

Spikelets 2-nate, one sessile, the other pedicelled, similar in shape, different in sex, on the fragile rhachis of many-jointed solitary spatheate racemes which are frequently gathered in fastigiate bundles, rarely the lowermost 1-3 pairs homogamous; joints and pedicels filiform, compressed, solid or slightly grooved, disarticulating horizontally; spikelets deciduous, the sessile with the adjacent joint and pedicels. Florets 2 in the fertile spikelets, the lower





reduced to an empty valve, the upper ♂; 1 (the lower) in the pedicelled spikelets ♂ or neuter, the upper quite suppressed, or both suppressed. Sessile spikelet dorsally compressed, awned; callus small, shortly bearded. Glumes equal, thinly chartaceous to membranous, lower 2-keeled, with narrow inflexed margins, upper boat-shaped, 3-nerved, acutely keeled. Valve of lower floret hyaline, nerveless, of upper floret reduced to a hyaline upwards firmer linear stipe passing into a slender awn. Stamens 3. Stigmas exerted laterally near the middle of the spikelet, longer than the styles. Grain unknown. Pedicelled spikelet awnless; valve if present hyaline, nerveless.—Perennial, rarely annual, grasses with slender culms simple below, more or less branched above, the branches often gathered in fastigiata bundles, each supported by a bladeless sheath and terminated by a solitary raceme. Spikelets small.

Species about 4, in the tropical and warm-temperate parts of the Old World.

(Del.)  
 1. *E. foveolatus*, Stapf. Perennial, densely tufted from short and much branched rhizomes. Culms very slender,  $\frac{1}{2}$  to almost 2 ft. high, geniculate at the base, rarely quite erect, about 3-noded and usually simple below the flowering branches, terete, glabrous below the bearded nodes, sometimes scaberulous or puberulous. Basal leaf-sheaths short, broad, whitish, thin, more or less silky, those of the culms terete, glabrous except at the nodes, pale green, slightly scaberulous; ligules hyaline, rounded, ciliate,  $\frac{1}{2}$  lin. long, continued into the sheath-margins; blades linear, acute, 1–3 in. long and  $\frac{1}{2}$ –1 lin. wide, tightly folded or at length more or less flat, glaucous, pruinose to minutely puberulous on both sides, margin cartilaginous, smooth or nearly so, generally with a few cilia near the base, midrib keeled below, primary lateral nerves 2 on each side. Flowering branches solitary or fascicled, slender, simple, sometimes flexuous or geniculately ascending, more or less fastigiata; spathes very narrow, acute,  $1\frac{1}{2}$  to over 2 in. long, scaberulous; peduncles filiform, at length exerted from the spathe, puberulous above, tips hardly thickened. Racemes slender, dense, 1– $1\frac{1}{2}$  in. long, erect or nodding, somewhat silky; joints and pedicels filiform, disarticulating obliquely with a short ovate transparent appendage about  $\frac{3}{4}$  lin. long, densely ciliate along the margins, the uppermost cilia up to over 1 lin. long. Sessile spikelet lanceolate, including the short callus, the beard of which reaches more or less up to the middle of the spikelet, 2 lin. long, pale and shining with reddish tips. Glumes equal, sub-chartaceous to almost membranous, glabrous; the lower minutely 2-toothed or subentire and minutely truncate, slightly concave on the back, inflexed margins narrow, forming scaberulous keels upwards, intracarpal nerves 2, with a circular pit between them above the middle; upper glume oblong, obtuse, semimucronulate, broadly rounded on the back, 3-nerved, ciliate. Lower floret reduced to a linear-oblong hyaline very sparingly ciliate nerveless valve, not

much over 1 lin. long. Upper floret ♂ : valve reduced to an awn 6–10 lin. long, with a short white stipe, the remainder divided about equally into a slender brown column and a paler bristle, both scaberulous. Anthers  $\frac{3}{4}$  lin. long. Pedicelled spikelet as long as or slightly longer than the sessile, oblong, barren. Glumes equal, greenish tinged with red or more or less suffused with purple; the lower 2-keeled all along, intracarinal nerves 3, the lateral close to the keels; upper glume lanceolate, acute, subhyaline, 3-nerved, ciliolate. Valve, if present, like the lower of the sessile spikelet.—*Andropogon foveolatus*, Del. Fl. Égypte, 16, t. 8, fig. 2; Steud. Syn. Pl. Glum. i. 366; Schweinf. in Verh. Zool.-Bot. Gesellsch. Wien, (1865) 556; Mart. Fl. Mass. in Nuov. Giorn. Bot. Ital. xx. (1888) 369; Duthie, Fodder Grasses N. India, 35, t. 22; Hack. in DC. Monogr. Phan. vi. 402; Penzig in Atti Congr. Bot. Genova, 1893, 364; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 10; Franch. Pl. Tadj. in Journ. de Bot. i. (1887), 136; Terracciano in Ann. Istit. Bot. Roma, v. (1894), 94; Durand & Schinz, Consp. Fl. Afr. v. 712; Hook. f. Fl. Brit. Ind. vii. 168; Chiov. in Ann. Istit. Bot. Roma, vii. 23; Stapf in Kew Bulletin, 1907, 209. *A. foveolatus*, var. *plumosus*, Terracciano, l.c. *A. monostachyus*, Spreng. Pug. ii. 9.

**Upper Guinea.** Cape Verd Islands: S. Antonio, *Vogel*, 63 c! S. Vincent, *Moseley*! *Bolle*! Santa Lucia, *Bolle*.

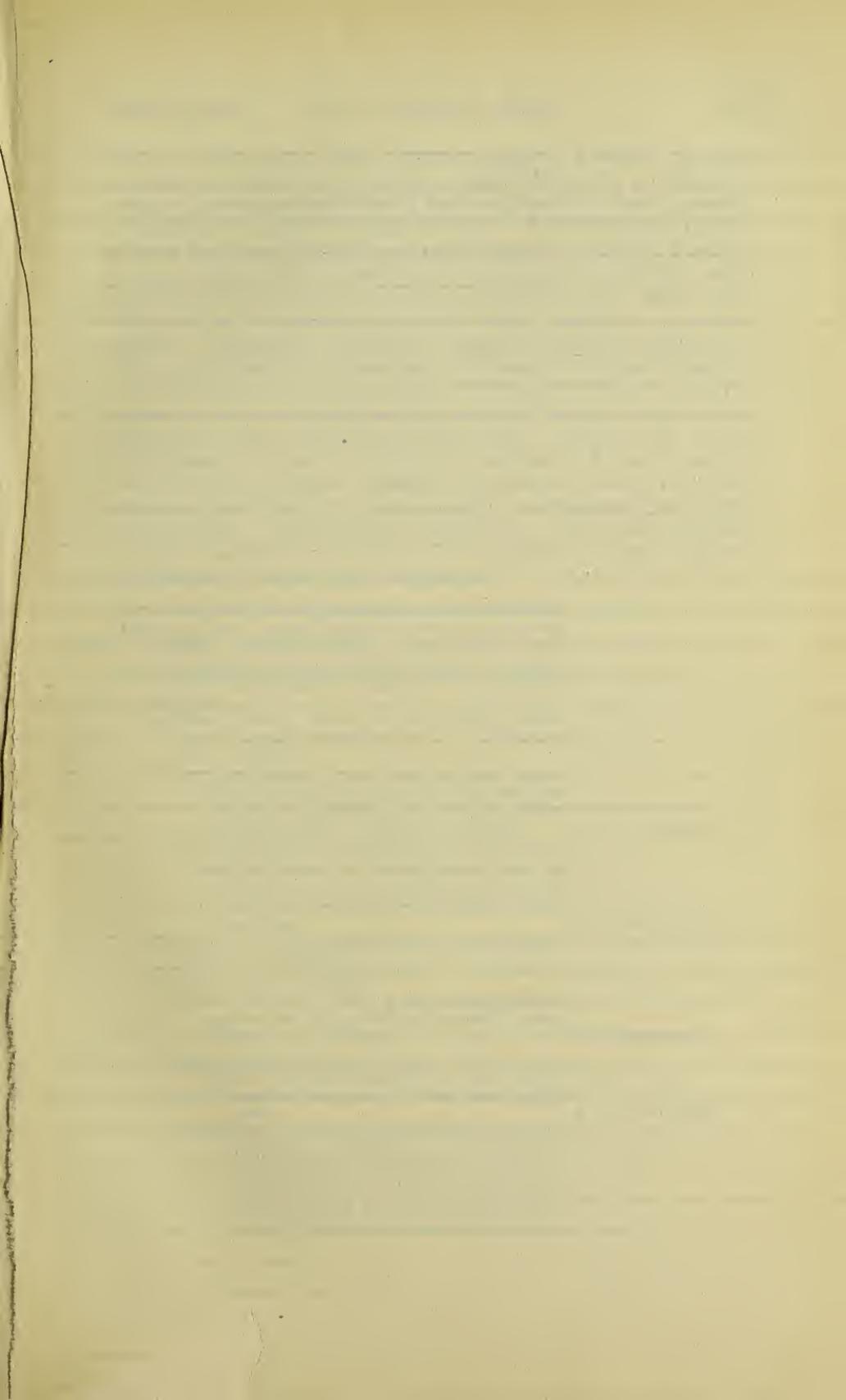
**Nileland.** Nubia: Soturba Mountains, *Schweinfurth*, 1021! sea coast, *Bent*! Eritrea: Massowa, *Beccari*! *Cocastelli*! Hamasen, Sabarguma plain, *Pappi*, 178! Arcadipane, Samhar plain, *Schweinfurth*, 1765! Saati, *Penzig*; Ras Geror, *Beccari*! Dahalak Archipelago, *Terracciano*. Hamfila Bay; islands and mainland, *Terracciano & Pappi*, 2593; Assaorta, *Terracciano*, 2595, 2596; Habab, *Terracciano & Pappi*, 1609; Dannakil country, *Hildebrandt*, 709; Assab, *Beccari*. British Somaliland: Berbera maritime plain, *Drake-Brockman*, 456! *Wykeham-Perry*! *Bulhar*, 615! 618! Saad-ud-din, *Drake-Brockman*, 887!

Also in the Canaries, and from Egypt and tropical Arabia to India, where it is considered good fodder.

### 39. SCHIZACHYRIUM, Nees, Agrost. Bras. 331.

Spikelets 2-nate, of each pair differing in sex and mostly also more or less in shape and size, one sessile, the other pedicelled, on the articulate fragile rachis of many-jointed solitary racemes terminating the culms and their branches, supported by spathes and frequently collected into a false panicle, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelet; joints and pedicels thickened upwards, often rather stout with a scarious cupuliform and more or less dentate terminal appendage. Florets 2, lower reduced to an empty valve, upper ♂ in the sessile, ♂, neuter or 0 in the pedicelled spikelets or both suppressed in these. Sessile spikelets dorsally compressed or sometimes in their lower half almost terete, awned; callus short with a short beard at the very base. Glumes equal or subequal, lower chartaceous (often thinly) to subcoriaceous, more or less convex (to subsemiterete) or flat on the back with, at least from the middle upwards,

39 in herb sub Androp.





sharply inflexed and mostly narrow margins, 2-keeled, the keels running out into teeth or mucros; upper thinner to membranous, narrowly boat-shaped to dorsally flattened, keeled (at least upwards), 1-3-nerved, the delicate margins ciliolate. Valves ciliolate, hyaline, of lower floret membranous downwards and often purplish, 2-nerved, of upper usually 2-fid, sometimes very deeply, or 2-dentate, rarely entire, awned, awn from the sinus or continuing the entire valve. Valvule 0 or a microscopic hyaline scale. Lodicules 2, minute, glabrous. Stamens 3, rarely 2. Stigmas laterally exerted low down; styles terminal. Grain narrowly linear in outline or tapering upwards, subterete; embryo short. Pedicelled spikelet similar to the sessile, but usually relatively broader and flatter, or more or less reduced and then sometimes quite small. Glumes more or less membranous, the lower aristulate or muticous. Valves if present hyaline, ciliate, muticous.—Annual or perennial grasses, rarely suffrutescent, never very tall. Culms slender. Leaf-blades folded in bud, usually narrow. False panicles varying from very loose and scanty to densely fascicled with the spathes mostly very narrow scarious, membranous or lower down herbaceous.

Species about 50, in the tropics of both hemispheres.

Fertile valve of sessile spikelets 2-fid to beyond the middle, sometimes almost to the base; their lower glume chartaceous to subcoriaceous, usually more or less rounded on the back, very obscurely nerved.

Leaf-blades linear, obtuse to very shortly acute; culms usually ascending from a decumbent base; annual.

Culms very delicate, much branched from below; leaf-blades rarely over  $1\frac{1}{2}$  lin. wide, and then only on the primary axis; sessile spikelets up to  $1\frac{1}{2}$  lin. long; anthers  $\frac{1}{2}$  lin. long ... 1. *S. brevifolium*.

Culms rather robust, usually with solitary branches from the lower and without such from the intermediate nodes; leaf-blades mostly 2-4 lin. wide; sessile spikelets 2 lin. long; anthers  $\frac{3}{4}$ -1 lin. long ... 2. *S. platyphyllum*.

Leaf-blades very gradually tapering to a fine point; culms more or less erect.

Annual (see 8, *S. griseum*).

Sessile spikelets under 2 lin. long, glabrous except for the minutely bearded callus; racemes very slender ... 3. *S. delicatum*.

Sessile spikelets  $2\frac{1}{2}$ -4 lin. long.

Racemes glabrous except for a silky tuft of hairs at the base of the joint, rather stout ... 4. *S. urceolatum*.

Racemes more conspicuously hairy, the indumentum extending to or beyond the lower halves of the joints, pedicels and back of the lower glume or at least the lower glume of the sessile spikelet hairy all over when young (6, *S. glabrescens*).

- Racemes subsessile in the spathe, slender; hairs rather long and somewhat loose 5. *S. exile*.
- Racemes on elongated peduncles almost as long as to longer than the spathe.
- Racemes very slender; joints and pedicels almost glabrous; lower glume of sessile spikelets hairy all over when young, then glabrescent except along the sides... .. 6. *S. glabrescens*.
- Racemes stouter; joints, pedicels and lower glume of sessile spikelets hairy on the back.
- Peduncles not or very slightly exceeding the spathe; racemes interruptedly and densely silvery villos; joints clavate, 2 lin. long 7. *S. nodulosum*.
- Peduncles at length much exceeding the spathe; racemes greyish-pubescent, joints subcylindric, 3 lin. long (perennial?) ... .. 8. *S. griseum*.
- Perennial; lower glume of sessile spikelets much rounded on the back, subcoriaceous, glabrous, very obscurely nerved, 3-3½ lin. long ... .. 9. *S. semiberbe*.
- Fertile valve of sessile spikelets shortly 2-fid, 2-toothed or entire, rarely divided to the middle (10, *S. ursulus*), their lower glume thinly chartaceous, usually almost flat on the back, very finely but distinctly nerved; perennial, rarely annual (15, *S. scintillans*) or suffrutescens (17, *S. Kelleri*).
- \* Culms simple and usually few-noded below the flowering branches, never suffrutescens.
- Joints and pedicels filiform, thickened upwards, like the sessile spikelets densely hairy all over.
- Leaves more or less hirsute (usually densely so); blades without spinelets; sessile spikelets 3½ lin. long, their fertile valve 2-fid to one half of its length ... .. 10. *S. ursulus*.
- Leaves quite glabrous; blades scabrid from distant spinelets; sessile spikelets 4-4½ lin. long, their fertile valve 2-fid to one quarter of its length ... .. 11. *S. Jeffreyi*.
- Joints and pedicels linear to clavate, like the spikelets glabrous or variously hairy, but never densely so all over.
- Sessile spikelets close, almost imbricate, twice as long as the joints; racemes practically glabrous except the shortly bearded callus; column of awn long-exserted ... .. 12. *S. Schweinfurthii*.
- Sessile spikelets more distant, about as long as or only slightly longer than the joints; racemes distinctly hairy.
- Flowering branches distant, very long and slender; racemes not plumose, the longest cilia of the joints and pedicels not exceeding 2 lin.
- Perennial; fertile valve of the sessile spikelet shortly 2-fid or 2-dentate.

*S. ... ..* 11. *S. ... ..*  
 5897





- Spikelets linear-lanceolate, 2-2½ lin. long ;  
awn 4 lin. long with a very short or  
obscure column ... .. 13. *S. Thollonii*.
- Spikelets lanceolate, 3-4 lin. long ; awn  
7-8 lin. long, kneed and twisted  
below the middle ... .. 14. *S. compressum*.
- Annual ; culms very slender ; racemes  
sparkling from the dense short silvery  
lines of the cilia and the very short  
dorsal hairs of the spikelets, these 2½  
lin. long ; fertile valve of sessile spike-  
let entire ... .. 15. *S. scintillans*.
- Flowering branches gathered in a terminal  
bunch ; racemes plumose from the long  
hairs (3 lin.) covering the joints and pedi-  
cels all over ; fertile valve of sessile  
spikelet entire ... .. 16. *S. pulchellum*.
- Copiously branched, suffrutescent or with numerous  
barren branches below the flowering.
- Suffrutescent ; leaf-blades up to 2½ in. long ;  
racemes silky-villous owing to the long hairs  
of the joints and pedicels ... .. 17. *S. Kellerei*.
- Culms wiry below with numerous barren branches  
below the flowering ; cilia of joints and pedi-  
cels short ... .. 18. *S. rupestre*.

1. *S. brevifolium*, *Nees, Agrost. Bras.* 332. Annual. Culms weak, up to 2 ft. long, usually ascending from a decumbent base, rarely erect, many-noded, branched from most of the nodes ; branches often 2-4-nate and dividing again, very slender to filiform, geniculate, glabrous, the lower internodes usually much compressed. Leaf-sheaths compressed, the lower keeled, somewhat lax, glabrous, smooth, the uppermost spathe-like ; ligules membranous, very short, ciliolate ; blades linear, constricted at the junction with the sheath, the lower and those of the primary branches obtuse or subobtuse or suddenly narrowed to a sharp point, 1-1½ in. long and 1-3 lin. wide (flattened out), the upper and those of the secondary and tertiary branches much narrower and more acute, folded or flat, often glaucescent, glabrous, smooth except along the margins and the lower side of the midrib, nerves very fine ; leaves like the spathe of the inflorescence ultimately turning reddish ; spathes on subcapillary curved or flexuous branchlets, very narrow, acute, reaching to the base of the racemes or slightly exceeding them, 1½-¾ in. long ; racemes borne on filiform upwards clavate peduncles, slender, from less than ½ in. to slightly over 1 in. long, 5-11-jointed ; joints 1-1¼ lin. long, widening upwards from a slender base, often more or less clavate, tips 2-toothed, glabrous, smooth ; pedicels as long as the joints, very slender and only slightly thickened upwards. Sessile spikelets linear-lanceolate, acuminate, more or less convex on the back, pale green, including the minute callus, which is more or less shortly bearded, at least on the sides, about 1½ lin. long. Glumes

*S. tenuispicuum* Agrost. Bras. 332. Annual. Culms weak, up to 2 ft. long, usually ascending from a decumbent base, rarely erect, many-noded, branched from most of the nodes ; branches often 2-4-nate and dividing again, very slender to filiform, geniculate, glabrous, the lower internodes usually much compressed. Leaf-sheaths compressed, the lower keeled, somewhat lax, glabrous, smooth, the uppermost spathe-like ; ligules membranous, very short, ciliolate ; blades linear, constricted at the junction with the sheath, the lower and those of the primary branches obtuse or subobtuse or suddenly narrowed to a sharp point, 1-1½ in. long and 1-3 lin. wide (flattened out), the upper and those of the secondary and tertiary branches much narrower and more acute, folded or flat, often glaucescent, glabrous, smooth except along the margins and the lower side of the midrib, nerves very fine ; leaves like the spathe of the inflorescence ultimately turning reddish ; spathes on subcapillary curved or flexuous branchlets, very narrow, acute, reaching to the base of the racemes or slightly exceeding them, 1½-¾ in. long ; racemes borne on filiform upwards clavate peduncles, slender, from less than ½ in. to slightly over 1 in. long, 5-11-jointed ; joints 1-1¼ lin. long, widening upwards from a slender base, often more or less clavate, tips 2-toothed, glabrous, smooth ; pedicels as long as the joints, very slender and only slightly thickened upwards. Sessile spikelets linear-lanceolate, acuminate, more or less convex on the back, pale green, including the minute callus, which is more or less shortly bearded, at least on the sides, about 1½ lin. long. Glumes

equal; lower thinly chartaceous, 2-dentate, scaberulous along the keels, with very faint intracarinal nerves, smooth or very minutely scaberulous on the back; upper glume boat-shaped, acute, 1-nerved, ciliolate. Lower floret reduced to an elliptic obtuse hyaline nerveless ciliolate valve, distinctly shorter than the glumes. Upper floret ♂: valve 2-fid almost to the base,  $\frac{3}{4}$  lin. long, segments linear-oblong, subobtuse, sparingly ciliolate; awn 4-6 lin. long. Anthers  $\frac{1}{4}$  lin. long, deep red or purple. Grain sublinear, tapering upwards. Pedicelled spikelet reduced to a minute glume, often passing indistinctly into the pedicel and produced into a bristle-like awn, about 2 lin. long.—Miq. Fl. Ind. Bat. iii. 495; Nash in North Amer. Fl. xvii. 101. *Andropogon brevifolius*, Sw. Prodr. Veg. Ind. Occ. 26; Fl. Ind. Occ. i. 209; Kunth, Rév. Gram. ii. 563, t. 196; Enum. Pl. i. 488; Suppl. 399; Steud. Syn. Pl. Glum. 366; Hack. in DC. Monogr. Phan. vi. 363 (excl. var. *fragilis*); Durand & Schinz, Consp. Fl. Afr. v. 707 and Étud. Fl. Congo, 315; Franchet, Contr. Fl. Congo Franç. 15; Hook. f. Fl. Brit. Ind. vii. 165; Rendle in Cat. Afr. Pl. Welw. ii. 142; Hitchcock in Contr. U.S. Nat. Herb. xii. 143; Th. & Hél. Durand, Syll. Fl. Congol. 624 (partly); Pilger in Engl. Pflanzenw. Afr. ii. 166, fig. 122. *A. obtusifolius*, Poir. Encycl. Suppl. i. 583. *A. parvifolius*, Roxb. Fl. Ind. i. 277; ed. Carey, i. 274. *A. tenellus*, Presl, Rel. Hænk. i. 335. *A. debilis*, Kunth, Enum. Pl. i. 488. *A. floridus*, Trin. in Mém. Acad. Pétersb. 6me sér. ii. 265. *Pollinia brevifolia*, Spreng. Syst. i. 288.

**Upper Guinea.** Los Islands, *Jardin*! Senegambia, *Leprieur*. Sierra Leone: near Regent, *Elliot*, 4187b! Roruk, *Thomas*, 5699! French Guinea: Timbo, *Pobéquin*, 1792! 1793! Kouroussa, *Pobéquin*, 522! Bamako, *Chevalier*, 205! Koulikoro, *Chevalier*, 2350! Northern Nigeria: Nupe (?), *Barter*! Southern Nigeria: without precise locality, *Thomas*, 1072! Cameroons: Yaunde, *Zenker*, 539!

**North Central.** French Equatorial Africa: Pogo-Ham, near the Logone River, *Macleod*, 149! Shari region, *Chevalier*, 6122!

**Nileland.** Abyssinia: Shahaganne, 5000 ft., *Schimper*, 1056 (1050 in Herb. Kew)!

**Lower Guinea.** Gaboon: Sibange Farm, *Soyaux*, 431! Angola: Benguella; country of the Ganguellas and Ambuellas, *Gossweiler*, 3470! between Camandai and Cazenga, *Gossweiler*, 5767! Golungo Alto; slopes of Alta Queta Mountains, *Welwitsch*, 7205! 7250! Pungo Andongo; slopes of Pedras de Quinga, *Welwitsch*, 7043!

**South Central.** Belgian Congo: Bangala District; Lisha, *Hens*, C. 171!

**Mozambique Distr.** Nyasaland: Kondowe to Karonga, 2000-6000 ft., *Whyte*! Rhodesia: without precise locality, *Allen*, 748!

Var. *flaccidum*, <sup>(Rich.)</sup> Stapf. Joints and pedicels ciliate and lower glume more or less hairy on the back, hairs white, otherwise as in the ordinary state of *S. parviflorum*.—*Andropogon flaccidus*, A. Rich. Tent. Fl. Abyss. ii. 452. *A. brevifolius*, var. *flaccidus*, Hack. in DC. Monogr. Phan. vi. 364.

**Nileland.** Abyssinia: Shire; Beless Plateau, *Quartin-Dillon*.

**Mozambique Distr.** Nyasaland: Zomba Rock, *Whyte*!

The species widely distributed throughout the tropics.

(Franch.)

2. *S. platyphyllum*, <sup>(Franch.)</sup> Stapf. Annual (?). Culms ascending or erect, many-noded, usually with barren or tardily flowering solitary





branches from the lower nodes and not branched from the middle nodes, rather stout, compressed, glabrous and smooth, 3 to over 5 ft. high including the panicle. Leaf-sheaths glabrous, compressed keeled, as long as or slightly longer than the internodes, but early slipping off the latter, more or less exposing them, glabrous, smooth, brown; ligules membranous, very short, truncate, ciliolate; blades linear, from a suddenly much contracted round base, very shortly acute or subobtuse and apiculate,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. long, 1–4 lin. wide, at first folded, then flat, glabrous, except for some occasional pubescence above the ligule, smooth apart from the scabrid margins, midrib very slender, raised below, lateral nerves numerous, very fine. Inflorescence up to 1 ft. long, often much compound, lax; lower primary branches solitary, the following paired or the upper ternate to quaternate, divided again with the branchlets unequal, in twos, threes, or fours, secondary branches with internodes 2–3 in. long, ultimate raceme-bearing branchlets of 2 internodes, the upper of which (the sheathed peduncle) spreads at length more or less horizontally; spathes very narrowly lanceolate to linear, acute, glabrous, scabrid on the keels, the ultimate 7–10 lin. long; peduncles enclosed in the spathe or at length shortly exerted, slightly thickened upwards, glabrous, tips minutely cupular. Racemes  $2\frac{1}{2}$ –3 in. long, very slender, 7–9-jointed; joints slender, cuneate-linear,  $1\frac{1}{2}$  lin. long, with a 2-toothed appendage, glabrous and smooth except on the slightly scaberulous margins; pedicels sublinear, slightly wider above, flat, as long as the joints or very shortly exceeding them, without an appendage, glabrous. Sessile spikelet lanceolate-linear, slightly convex on the back, including the very short callus which is minutely bearded on the back and bears a tuft of long hairs on the face, about 2 lin. long. Glumes equal; lower more or less 2-dentate or minutely truncate, thinly chartaceous, finely scaberulous, inflexed margins very narrow, keels scaberulous above, intracarinal nerves 3–5; upper glume obliquely linear in profile, acute, membranous, 1-nerved. Lower floret reduced to a linear-oblong hyaline faintly 2-nerved and ciliolate valve, as long as the glumes. Upper floret ♂; valve almost as long as that of the lower floret, 2-fid almost to the base, segments linear, acute, ciliolate; valvule 0. Anthers  $\frac{3}{4}$ –1 lin. long. Pedicelled spikelet reduced to an oblong glume,  $\frac{1}{2}$  lin. long, ending in a bristle up to 1 lin. long.—*Andropogon brevifolius*, var. *platyphyllus*, Franch. Contr. Fl. Congo Franç. 16. *A. brevifolius* (?), Pilger in Schlechter, Westafr. Kautschuk-Exped. 267. *A. brevifolius*, De Wild. & Durand, Pl. Gillet. in Bull. Herb. Boiss. 2me sér. i. 60; Th. & Hël. Durand, Syll. Fl. Congol. 624 (partly), not of Sw.

**Upper Guinea.** French Guinea: Baffing Valley, *Pobéguin*, 1800!

**North Central.** Dar Banda: Konkouru River, *Chevalier*, 6572!

**Lower Guinea.** French Congo: Mpila Plain, near Brazzaville, *Thollon*, 46! Ogowé, *Thollon*, 789! Belgian Congo: Stanley Pool, *Schlechter*, 12514; Kisantu, *Gillet*, 847! 848!

3. *S. delicatum*, Stapf. Annual. Culms up to over 1 ft. high, very slender, subcompressed below, terete above, 4-6-noded, sparingly branched from above the 2nd or 3rd node, with all the branches flowering and erect, rarely almost simple, glabrous and smooth. Leaf-sheaths tight, the lower somewhat compressed and keeled, the upper rounded, all glabrous and smooth; ligules very short, truncate, glabrous; blades very narrowly linear, tapering to a fine point, the lowest  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long by  $\frac{1}{2}$  lin. wide, the following up to  $2\frac{1}{2}$  in. long and less than  $\frac{1}{2}$  lin. wide, all folded at first, then flat, glabrous or with scattered hairs, smooth except towards the tips, reddish, midrib wide and whitish above, slender and raised below; flowering branches geminate or the uppermost solitary, simple, finely filiform; spathe very slender and tight,  $1-1\frac{1}{2}$  in. long, with or without rudimentary subulate blades, reddish, glabrous or hairy upwards; peduncles at length exerted by 1-2 in., thickened at the cupular tips which are expanded into an oblique ovate scarious appendage,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long. Racemes up to 8 lin. long, very slender, pale brownish, very fragile, 4-6-jointed; joints cuneate-linear, up to 1 lin. long, glabrous, with a cupular unequally 2-toothed appendage; pedicels very slender, linear, slightly longer than the joints, without an appendage, densely and subequally ciliate on the outer angle. Sessile spikelets narrowly linear-lanceolate,  $1\frac{1}{2}$ - $1\frac{3}{4}$  lin. long, including the shortly bearded small callus, glabrous. Glumes unequal; lower chartaceous, 2-mucronate, convex on the back, smooth below, scaberulous above the middle, keels very narrowly winged; upper glume not much over 1 lin. long, membranous, obliquely lanceolate in profile, mucronulate, 1-nerved. Lower floret reduced to an oblong obtuse hyaline purplish valve, faintly 2-nerved and ciliate, 1 lin. long. Upper floret ♂: valve oblong, 2-fid to beyond the middle, 3-nerved at the base; segments linear-lanceolate, acute, ciliate; awn up to 8 lin. long, very slender, kneed at and twisted below the middle, very minutely scaberulous; valvule 0. Anthers  $\frac{1}{2}$  lin. long. Pedicelled spikelet barren, slightly over  $1\frac{1}{2}$  lin. long. Glumes very unequal; lower oblong, produced into a short bristle, keels broadly winged, wings whitish, intracarinial nerves very faint, about 4; upper glume lanceolate, acuminate, 1 lin. long, finely 3-nerved or often much reduced or quite suppressed. Florets 0.

Upper Guinea. French Guinea: Timbo, *Pobéguin*, 1791!

(Hack.)

4. *S. urceolatum*, Stapf. Annual. Culms erect, up to 1 ft. high, slender, slightly branched above, branches flowering, solitary, appressed, simple, short. Leaf-sheaths compressed or loose, glabrous, the uppermost spathiform; ligules membranous, truncate, glabrous; blades linear, acuminate, flat, the lowest small, the intermediate up to 2 in. long by  $1\frac{1}{2}$  lin. wide, reddish, glabrous or with a few long tubercle-based hairs, scaberulous above, scabrid along the





margin and the keel; spathes narrow, inflated above,  $1-1\frac{1}{4}$  in. long, reddish, glabrous, often with a rudimentary blade. Racemes on peduncles which are at length slightly exerted and thickened at the tips, with a large calceoliform appendage,  $1-1\frac{1}{4}$  in. long, 6-8-jointed, purplish; joints stout, clavate, gradually widening upwards, about 3 lin. long, including the asymmetrical urceolate denticulate appendage, glabrous except for a basal tuft of snow-white hairs, reddish above, paler below; pedicels similar but more linear and with a much smaller appendage. Sessile spikelet linear-subulate, including the glabrous callus,  $3\frac{1}{2}-4$  lin. long, pale below, slightly reddish above. Glumes equal; lower slightly convex on the back, with a 2-setulose acumen, subcoriaceous, minutely granular on the back, with 5 very fine intracarinal nerves; upper glume acuminate, passing into a bristle  $1-1\frac{1}{2}$  lin. long, delicately 3-nerved. Lower floret reduced to a hyaline nerveless valve. Upper floret 2-fid to three-quarters of its length; awn 7-8 lin. long, with a dark column. Pedicelled spikelet barren, subulate, lanceolate, reddish,  $1\frac{1}{2}-2$  lin. long; lower glume 5-nerved, with a short bristle from between 2 minute teeth; upper 1-nerved, also with a short bristle. Florets reduced to a minute hyaline valve.—*Andropogon urceolatus*, Hack. in Flora, 1885, 115, and in DC. Monogr. Phan. vi. 368; Durand & Schinz, Consp. Fl. Afr. v. 727.

**Nileland.** Gallabat: Matamma, *Schweinfurth*, 1031, partly!

*Schweinfurth*, 1031, is represented in the herbarium of the British Museum by a large complete specimen of *S. exile*, accompanied by a capsule, containing the fragments of what is evidently a raceme of Hackel's *Andropogon urceolatus*. This is all I have seen of his species.

(*Нордхейт*.)

5. *S. exile*, Stapf. Annual. Culms fascicled, from few to very many, erect, many-noded, from  $\frac{1}{2}$  to over 2 ft. high, terete or slightly compressed below, branched from the base or at least from the upper nodes, branches 2 to many from a node, dividing again, very slender to filiform, glabrous. Leaf-sheaths somewhat loose, terete, or the lower ones compressed and keeled, the lower easily slipping off the internodes, glabrous, smooth, the uppermost spathaceous; ligules membranous, short, rounded; blades linear, tapering to an acute point, very variable in length, from less than 1 in. to 6 in. long,  $1-1\frac{1}{2}$  lin. wide (when flattened), glabrous or with some very long fine hairs towards the junction with the sheath, scabrid along the margin and towards the tip, green, soon turning red, midrib prominent below, whitish, lateral nerves numerous, very fine; spathes narrow, acute, 1 to over  $1\frac{1}{2}$  in. long, as long as or slightly shorter than the racemes, narrowly linear-lanceolate, acute, at length often turning brilliantly red. Racemes sessile in the spathe, or on distinct, but very short, peduncles with hollowed out clavate tips which on one side are produced into a short obtuse appendage,  $\frac{3}{4}-1\frac{1}{2}$  in. long, 8-12-jointed; joints 2-3 lin. long, gradually widening

upwards, clavate, pinkish above, pale below, with an oblique membranous minutely denticulate or almost entire appendage, which is tubular at the base and  $\frac{1}{2}$  to over 1 lin. long, hairy on the back up to or beyond the middle, hairs white, up to  $1\frac{1}{2}$  lin. long; pedicels slender, sublinear, slightly shorter than the joint, hairs as on the joint. Sessile spikelet narrowly linear-lanceolate, slightly convex on the back, including the bearded callus up to 4 lin. long, greenish or turning red. Glumes equal; the lower subcoriaceous, more or less convolute, lanceolate when flattened out, produced into a narrow more or less 2-dentate acumen, with long white hairs on the back to beyond the middle, scaberulous along the keels of the beak, intracarinar nerves 2, very faint or quite obscure; upper linear, subulate in profile, with a long fine point, membranous, 1-nerved, keeled above the middle. Lower floret reduced to a linear-lanceolate acute hyaline ciliolate nerveless valve, up to 2 lin. long. Upper floret ♂ : valve 2-fid to a quarter from the base, not quite 2 lin. long, segments acute, glabrous; awn 6–10 lin. long, kneed at or slightly below the middle, column brown, bristle white. Stamens 2 (?); anthers narrowly linear,  $\frac{3}{4}$ –1 lin. long, often much smaller. Grain very slender, linear, almost 2 lin. long; embryo about half of its length. Pedicelled spikelet reduced to a lanceolate-subulate glume, which is 2-keeled with 1 intracarinar nerve and produced into a bristle-like awn, 3–4 lin. long, with or without minute mucros at its base, very rarely a rudimentary second glume.—*Andropogon exilis*, Hochst. in Flora, 1844, 241; Hack. in DC. Monogr. Phan. vi. 365 (incl. var. *petitianus*); Durand & Schinz, Consp. Fl. Afr. v. 711; Hook. f. Fl. Brit. Ind. vii. 166 (by error *A. axilis*). *A. petitianus*, A. Rich. Tent. Fl. Abyss. ii. 451. *A. fragillimus*, Steud. Syn. Pl. Glum. i. 384. *A. fragillissimus* (sic), Hochst. ex Hack. in DC. Monogr. Phan. vi. 366. *A. faveolatum*, Zarb in Rapp. Spéc. Bot. Pfund, 39.

**Upper Guinea.** Northern Nigeria: Sokoto Province, *Dalziel*, 491! Katakum District, *Dalziel*, 259! Lokoja, *Dalziel*, 279!

**North Central.** Shari District: between Fort Lamy and Mandjafa, *Chevalier*, 10294!

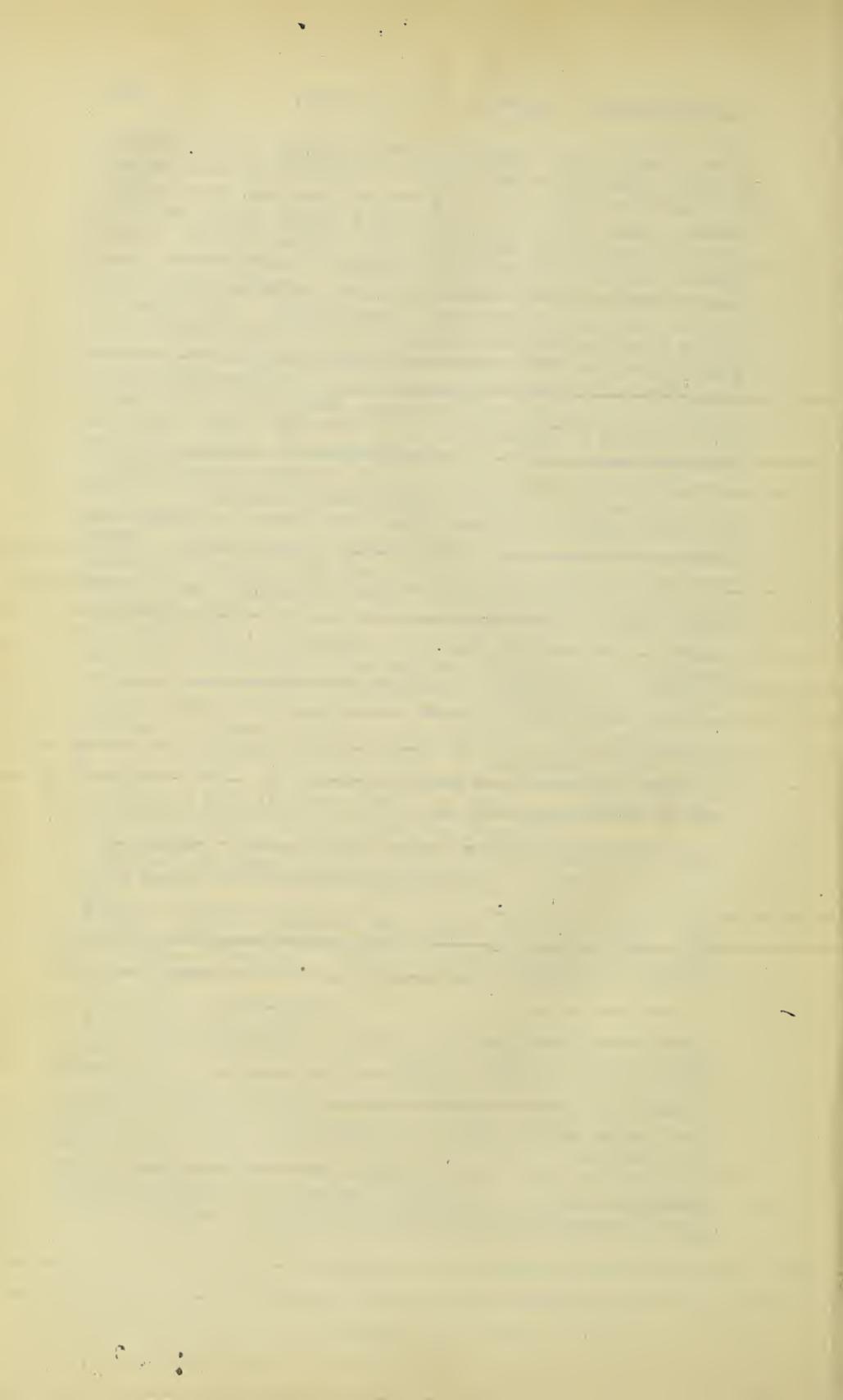
**Nileland.** Gallabat: Matamma, *Schweinfurth*, 1055! 1031 partly! 1032! Abyssinia: Jelajeranne, *Schimper*, 2057! Begemeder, *Schimper*, 1055! Dardur: El Facher, *Pfund*, 597! Kordofan: El Obeid, *Pfund*, 6! Araschkol Mountain, *Kotschy*, 19! 370! Jur: Ghattas' Seriba, *Schweinfurth*, 2416!

Also in India.

(*Rendle*)

6. *S. glabrescens*, *Stapf*. Annual. Culms fascicled, erect, many-noded, up to 3 ft. high, terete or slightly compressed below, simple for up to 1 ft., then branched, all the branches flowering and gathered in a narrow false panicle, the lower solitary, the following paired or (upwards) fascicled, very unequal, the longer divided again, finely filiform, erect. Leaf-sheaths terete or the lowest somewhat compressed and keeled, the upper tight and shorter than the internodes, glabrous, smooth, the uppermost spathaceous; ligules very short, truncate, ciliolate; blades narrowly linear, long-attenuated to a fine





point, up to 6 in. by 1-2½ lin. (when flattened out), reddish, glabrous or sometimes sparingly hirsute towards the base, midrib slender, pale, raised below, lateral nerves numerous, fine; spathes narrow, acute, 1-1½ in. long, the lowest with a rudimentary blade, reddish. Racemes on finely filiform peduncles (a few lines to ½ in. long and slightly thickened and cupular at the tips), very slender, exceeding the spathe by up to ½ in. (rarely 1 in.); joints up to 3 lin. long, narrowly linear-cuneate, semiterete, with a short asymmetrical urceolate 2-dentate appendage, smooth and glabrous on the back, obscurely and imperfectly ciliolate on one or both margins, dark reddish; pedicels similar, but hardly cuneate, very shortly ciliate on the outer edge, hairs decreasing upwards. Sessile spikelet subulate, including the shortly silvery-bearded callus 3½ lin. long, dark reddish-brown. Glumes equal; lower subcoriaceous, thin, subconvolute, when flattened out linear-lanceolate, produced into a narrow 2-dentate acumen, silvery hairy all over when young, soon glabrescent on the back, nerves few, very obscure; upper firmly membranous, subulate, acuminate, 1-nerved, keel scaberulous. Lower floret reduced to a linear acute valve, hyaline, nerveless or almost so, ciliolate. Upper floret: valve 2-fid to more than half of its length, segments narrowly lanceolate, acute, ciliolate; awn very fine, 5-6 lin. long, kneed at the middle, column dark, bristle whitish; valvule 0. Stamens unknown. Grain linear, very slender, laterally slightly compressed, over 1 lin. long. Pedicelled spikelet reduced to a minute 2-keeled glume about ½ lin. long with a whitish bristle four to five times longer.—*Andropogon exilis*, var. *glabrescens*, Rendle in Cat. Afr. Pl. Welw. ii. 142.

**Lower Guinea.** Angola: Pungo Andongo; in damp woods at Mopopo, on the Cuanza River, *Welwitsch*, 7423!

The structure of the racemes of *S. exile* is very uniform in all the specimens enumerated under that species, and no approach has been observed towards the type represented by *S. glabrescens*.

(Hacke.)

7. *S. nodulosum*, Stapf. Annual. Culms erect, slender, ½-1½ ft. high, solitary or fascicled, usually branched from the middle upwards, 6-9-noded, all branches flowering, solitary, internodes more or less exserted, terete, glabrous or pubescent below the nodes. Leaf-sheaths somewhat loose, the lowest compressed and keeled, all glabrous or very sparingly pubescent, sometimes bearded at the nodes; ligules membranous, short, truncate; blades linear, tapering to an acute point, 1½ to over 3 in. long, up to 1½ lin. wide, flat or folded, glabrous, or sometimes with scattered long hairs near the junction with the sheath, very slightly rough along the margin, greenish or reddish, primary lateral nerves 2, slightly stronger than the secondary; spathes narrow, lanceolate, 1-1½ in. long, bearing narrow blades, well developed in the lower, more or less reduced, to almost setaceous in the upper, all pale or dark reddish, glabrous.

\* Issued January 29, 1919  
(Kew Bull. 1932: 208)

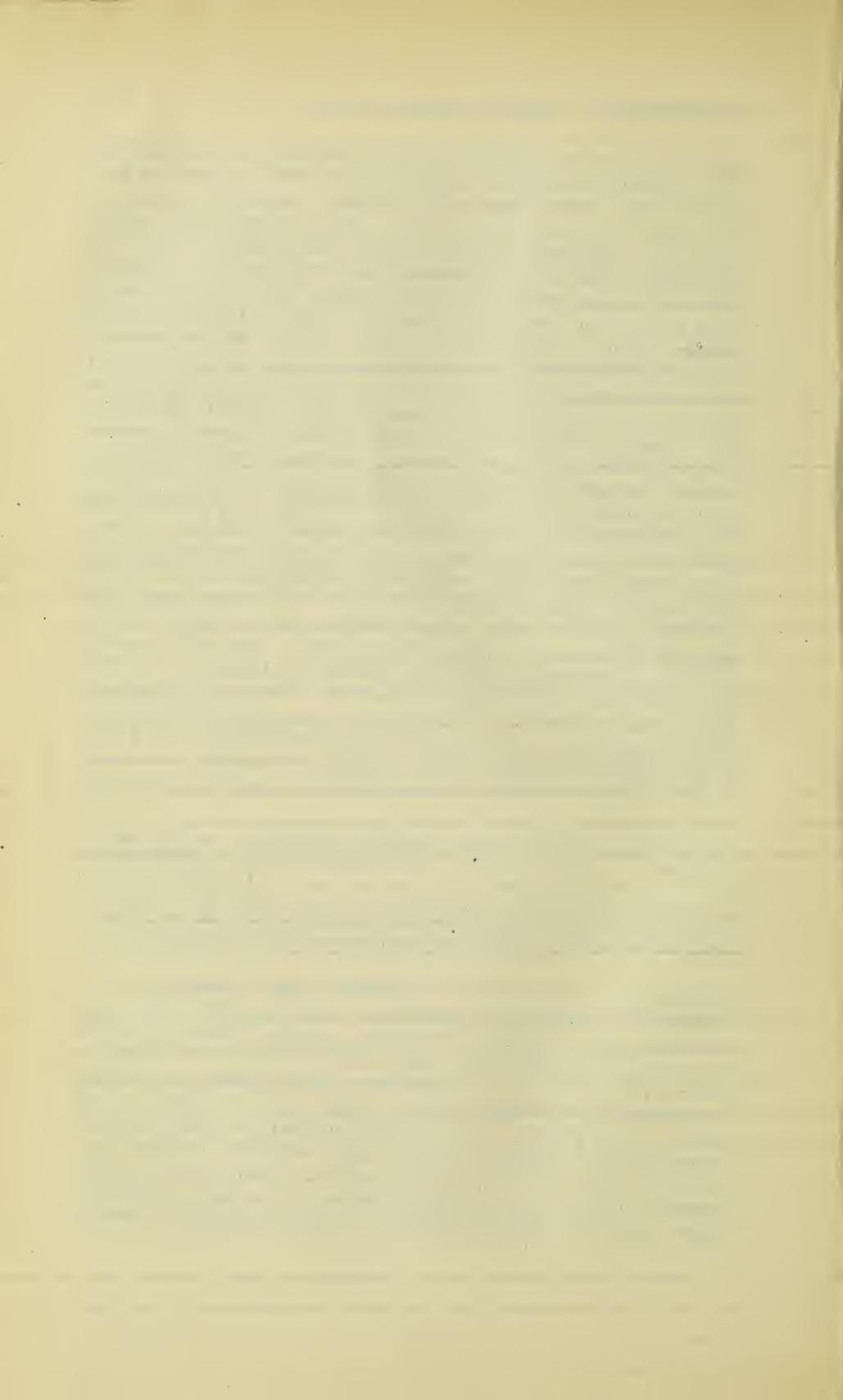
Racemes erect on peduncles as long as or almost as long as the spathe and terminating with an asymmetrical cupuliform appendage, 1-1½ in. long, 8-10-jointed, reddish with silvery hairs; joints clavate, rather stout, slightly curved, concave on the inner face, about 2-2½ lin. long, including the oblique tubular denticulate appendage, which may be up to 1½ lin. long, scaberulous on the back, increasingly pubescent downwards, with the hairs at the base (callus) ¾ lin. long; pedicels linear in outline, concave on the face, with a short membranous rim at the top, hairs as in the joints. Sessile spikelet linear-lanceolate, slightly convex on the back, including the obconical obtuse densely villous callus 2½-3 lin. long, whitish-green or tinged with red. Glumes equal; lower chartaceous-membranous, acuminate, 2-dentate, keels narrowly winged upwards, densely silky from the middle downwards, glabrous above, intracarinial nerves 3, obscure; upper glume lanceolate, membranous, narrowly mucronate-acuminate, 1- to sub-3-nerved, glabrous apart from the ciliate margins and keel. Lower floret reduced to an ovate-oblong sub-obtuse hyaline ciliolate nerveless valve, slightly over 1 lin. long. Upper floret ovate, 2-fid to beyond the middle, lobes linear-lanceolate, acute, awn 5-6 lin. long, kneed below the middle, column dark brown, bristle white; valvule minute, ovate, ciliolate, nerveless. Anthers ½ lin. long. Grain linear-lanceolate in outline, 1½ lin. long, slightly compressed on the back, scutellum elliptic-oblong, not quite reaching to the middle. Pedicelled spikelet 1½ lin. long, reduced to 2 glumes; the lower greenish, membranous, scaberulous, many-nerved, with a short bristle from between 2 minute teeth; the upper hyaline, 3-nerved.—*Andropogon nodulosus*, Hack. in Flora, 1885, 116, and in DC. Monogr. Phan. vi. 367; Durand & Schinz, Consp. Fl. Afr. v. 719.

**Upper Guinea.** Senegambia: without precise locality, *Heudelot*, 303! French Guinea: Koulikoro, *Chevalier*, 2401! Southern Nigeria: on the Niger, near Abo, *Barter*, 371!

Pilger (in Engl. Jahrb. xxxiv. 127) describes a var. *glabrescens* collected by Kersting, No. 260, in the savannahs of Kirikiri, Togoland, characterising it by the raceme being glabrous with the exception of white beards at the base of the joints.

✓ **8. *S. griseum*, Stapf.** Annual (?). Culms erect, very slender, over 1 ft. high, sparingly and distantly branched, all branches flowering, usually solitary, internodes exerted, terete, glabrous, or finely pubescent below the nodes. Leaf-sheaths tight, more or less hirsute upwards, slightly pubescent or minutely bearded at the nodes; ligules scarious, short, ciliolate; blades linear, tapering to an acute point, to over 3 in. by 1½ lin., flat, slightly hirsute at the base, otherwise glabrous, rough along the margins, brownish-green, primary lateral nerves 2-3 on each side, hardly stronger than the secondary; spathes very narrow and tight, 1½-2 in. long, bladeless, glabrous. Racemes erect, on filiform straight peduncles which





exceed the spathe by  $\frac{1}{2}$ - $\frac{3}{4}$  in., to over 2 in. long, to over 10-jointed, slender, greyish-red; joints almost linear, very slightly widened upwards,  $2\frac{1}{2}$  lin. long including the tubular subdentate suboblique appendage, delicately greyish-pubescent on the back with the hairs at the base (callus)  $\frac{1}{2}$  lin. long; pedicels linear with a short 2-toothed appendage, hairs as in the joint, but rather longer and at least the outer edge distinctly ciliate. Sessile spikelet narrowly linear, including the callus 3 lin. long, greyish. Glumes equal; lower firmly chartaceous, gradually passing into a thinner 2-dentate beak, slightly convex on the back, densely greyish-pubescent except on the glabrous beak, intracarinial nerves 3, obscure; upper obliquely lanceolate, acuminate, firmly membranous below, 1-nerved, subciliolate, Lower floret reduced to an oblong hyaline nerveless or 2-nerved often purplish valve. Upper floret narrowly linear-lanceolate in profile, 2-fid to beyond three-quarters of its length, 2 lin. long, lobes narrow, acute, ciliolate; awn 6 lin. long, kneed at and twisted below the middle, column brown, bristle white. Pedicelled spikelet ♂, lanceolate, acuminate,  $2-2\frac{1}{2}$  lin. long, reddish; lower glume membranous, finely 5-nerved, ending in a short fine bristle, sparingly hairy on the sides, otherwise glabrous, upper faintly 3-nerved. Valves of both florets oblong, subacute, hyaline, faintly 3-nerved, ciliolate.

✓ Upper Guinea. French Guinea: Baffing Valley, *Pobeguïn*, 1774!

*Africa*

9. *S. semiberbe*, *Nees, Agrost. Bras.* 336. Perennial. Culms rising from a short rhizome, 2-5 ft. high, erect or slightly geniculate at the base, many-noded, branched from the base or undivided for the first 3-5 internodes, rather stout, terete or compressed towards the base, smooth, glabrous, the lower branches suberect, solitary or the upper fascicled and of unequal length, the longer divided again, all ending in racemes which are collected into a subfastigate foliose panicle. Leaf-sheaths firm, striate, glabrous or more or less hirsute, the lowest compressed and keeled, the upper terete, tight, those of the panicles spathe-like; ligules scarious, truncate, ciliolate; blades linear, shortly acute, gradually passing into the sheath or slightly constricted at the base, up to 1 ft. long, the lower usually shorter,  $1-2\frac{1}{2}$  lin. wide, flat or folded when young, rather firm, glabrous, rarely sparingly hairy, particularly at the junction with the sheath, smooth below, scabrid above and along the margins, midrib slender, keeled below, lateral nerves numerous, fine, somewhat prominent above; spathe very narrow,  $1\frac{3}{4}-2\frac{1}{2}$  in. long, the upper bladeless or with a rudimentary subulate blade, dull green or purplish-brown. Racemes on peduncles which are entirely or almost entirely enclosed in the spathe and thickened towards the urceolate minutely denticulate tips, 2 to almost 3 in. long, 8-14-jointed, slender; joints  $2\frac{1}{2}-3\frac{1}{2}$  lin. long, linear-cuneate, semiterete, with an asymmetrical urceolate 2-dentate appendage, smooth on the back, glabrous or rarely obscurely ciliolate on the margins, straw-coloured or reddish; pedicels

similar,  $1\frac{1}{2}$ – $2\frac{1}{2}$  lin. long, ciliate along the outer edge (rarely almost glabrous), hairs increasing upwards, the uppermost up to 1 lin. long. Sessile spikelet subulate-lanceolate to linear, 2-dentate, including the shortly bearded callus 3–4 lin. long, glabrous. Glumes subequal; lower subcoriaceous, reddish or dark brown, rounded and smooth on the back to beyond the middle, then thinner, pale, flat and distinctly 2-keeled, with the keels scaberulous, intracarpal nerves 2–4, very obscure; upper glume slightly shorter, firmly membranous, rather thin above the middle, subulate, acuminate, 1-nerved, keel scaberulous, margins ciliate. Lower floret reduced to a linear-oblong acute valve, up to  $2\frac{1}{2}$  lin. long, sub-2-nerved, hyaline, ciliate. Upper floret ♂: valve 2 lin. long, divided to three-quarters of its length, base obovate, segments lanceolate, acute, ciliate; awn 7–8 lin. long, kneed at the middle, column dark, bristle whitish; valvule 0 or a microscopic scale. Stamens 3; anthers  $\frac{1}{2}$  lin. long. Grain cylindrical, over 1 lin. long, scutellum less than half the length. Pedicelled spikelet ♂ (or neuter and more or less reduced), narrowly lanceolate, acuminate, about 2 lin. long, glabrous; lower glume flat, 2-keeled, minutely 2-dentate, with a short bristle, minutely scaberulous upwards, intracarpal nerves 5–7; upper glume subhyaline, sub-3-nerved, ciliate. Valve of lower floret as in the sessile spikelet. Valve of upper floret entire, linear-oblong, subacute, over 1 lin. long, hyaline, 1-nerved, ciliate, awnless.—Nash in North Amer. Fl. xvii. 104. *Andropogon semiberbis*, Kunth, Enum. i. 489; Steud. Syn. Pl. Glum. i. 365; Hack. in DC. Monogr. Phan. vi. 370 (subvars. *typicus*, *leptostachyus*, *pruinatus*); Franch. Contr. Fl. Congo Franç. 16; Schum. in Engl. Jahrb. xxiv. (1898), 328. *A. semiberbis*, subvar. *leptostachyus*, Hack. l.c.; Durand & Schinz, Consp. Fl. Afr. v. 723; Schum. in Engl. Pf. Ost-Afr. C. 97. *A. leptostachyus*, Benth. in Hook. Niger Fl. 571; Steud. l.c. 384. *A. Pseudograya*, Steud. l.c. 365; Hack. l.c.; Hook. f. Fl. Brit. Ind. vii. 167. *A. hirtiflorus*, Hook. f. l.c.; Rendle in Cat. Afr. Pl. Welw. ii. 142 partly; not of Kunth; var. *gracilis*, Rendle, l.c. 143; var. *semiberbis*, Stapf in Dyer, Fl. Cap. vii. 337; Rendle in Journ. Linn. Soc. Bot. xl. 225; Eyles in Trans. Roy. Soc. S. Afr. v. 296.

**Upper Guinea.** French Guinea: Segou, *Chevalier*, 2354! Gold Coast: Accra, *Brown*, 428! Togo: Misahöhe, *Baumann*, 352! Dahomey, *Newton*! Northern Nigeria: Lokoja, *Macleod*! Nupe, *Barter*, 1360! Abinsi, *Dalziel*, 869. Southern Nigeria: Quorra River, *Vogel*! Cameroons: Bogalo, on the River Benue, *Macleod*!

**Nile Land.** British East Africa: Tanalena, *Linton*, 198!

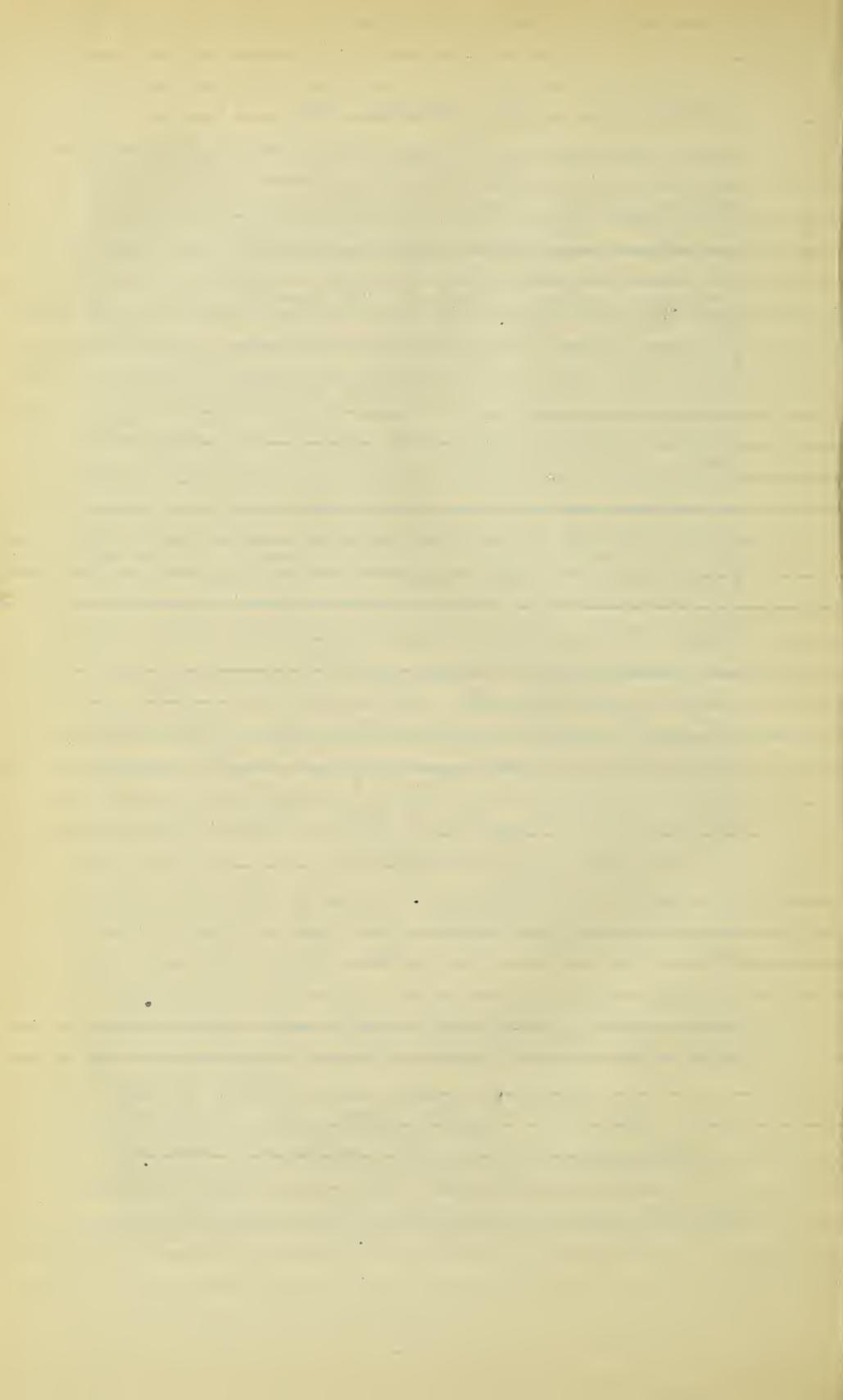
**Lower Guinea.** Angola: Pungo Andongo (?), *Welwitsch*, 2869! Huilla; in marshy places near Catumba, *Welwitsch*, 2650!

**South Central.** Belgian Congo: Batika Country; Osika, *Brazza*, 230.

**Mozambique Distr.** German East Africa: Muoa, *Holst*, 3047! Rhodesia: Gazaland; Chirinde, *Swynnerton*, 1821! Melsetter, *Swynnerton*, 1607!

✓ **Var. *floculiferum*, Stapf.** Culms sometimes very stout, up to 3 lin. thick; blades up to 3 lin. wide. Racemes numerous, up to 4 in. long, up to over 15-





jointed; joints 3-4 lin. long; pedicels long-ciliate upwards, the hairs like a lateral flake on the outer edge, up to  $1\frac{1}{2}$  lin. long. Sessile spikelets 4- $4\frac{1}{2}$  lin. long. Pedicelled spikelets ♂.

- + Lower Guinea. Angola: Benguella; country of the Ganguellas and Am-buellas, Gossweiler, 20! 1615! 3730! Cassuango-Kuiriri, Gossweiler, 2980! Plateau near Humpata, 6000 ft., Pearson, 2751! MS
- ✓ Var. *hemileium*, Stapf. Similar to the preceding variety, but the joints and pedicels pilose on the back.—*A. hirtiflorus*, Rendle in Cat. Afr. Pl. Welw. ii. 142 partly; not of Kunth.
- + Lower Guinea. Angola: Loanda; (common at Capimeta, near Quicuxe, Welwitsch, 7326!

*S. semiberbe* has been referred to *Andropogon hirtiflorus*, Kunth (*Schizachyrium domingense*, Nash), which has not only the backs of the joints and pedicels, but also that of the lower glume hairy all over. This state has so far not been observed outside tropical South America. In Brazil both *S. semiberbe* and *S. domingense* seem to grow together and have repeatedly been distributed together in the same collecting (e.g., Glaziou, 22540 from Goyaz, 17441 from Minas Geraes; Burchell, 6877 and 6885 from the same locality near Goyaz, etc.). The variety *leptostachyus* as defined by Hackel is apparently only a much branched growth-form of the variety *imberbis*, occurring in tropical West Africa along with the less branched state of typical *S. semiberbe*. *S. semiberbe* ranges all over tropical Asia and a great part of tropical America.

- ✓ 10. *S. ursulu s* Stapf. Perennial, compactly caespitose, with intravaginal innovations. Culms erect or shortly ascending, wiry, about 5- to many-noded, slightly compressed below, terete above, with the internodes shortly exserted, fastigiately branched from the lower nodes upwards; branches solitary, the lower up to 5-noded, all flowering. Leaves more or less hirsute or villous all over, indumentum greyish or fulvous, at length partly evanescent, lower sheaths much compressed, keeled, firm, long-persistent, upper terete; ligules very short, truncate, scarios; blades narrowly linear, acute, usually folded, flexuous, up to 9 in. by 1 lin. (unfolded), firm, midrib very slender, primary lateral nerves very close, about 3-4 on each side; spathes very narrow, with rudimentary setaceous or mucro-like blades. Racemes on filiform peduncles, slightly thickened upwards, which are enclosed in or shortly exserted from the spathes and  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, fulvously villous all over, somewhat flexuous,  $1\frac{1}{4}$ -2 in. long; joints filiform, thickened upwards with a subdentate cupular appendage, densely hairy on the back and sides, hairs increasing upwards, 2- $2\frac{1}{2}$  lin. long; pedicels similar, but slightly shorter. Sessile spikelets narrowly linear-lanceolate, acuminate,  $3\frac{1}{2}$  lin. long, including the shortly bearded callus which is  $\frac{3}{4}$  lin. long. Glumes subequal; lower 2-dentate, thinly chartaceous, flat on the back, with narrow sharply inflexed margins, with about 6 inconspicuous intracarinal nerves; upper narrowly lanceolate, acuminate, membranous, pubescent, ciliolate, finely 3-nerved. Lower floret reduced to an oblong purplish hyaline 2-nerved ciliolate valve 3 lin. long. Upper floret ♀: valve linear-oblong, 2-fid to the middle, hyaline, ciliolate, 3-nerved, lobes linear, acute; awn fine, about

6-7 lin. long, kneed at and twisted below the middle, column brown, bristle pale. Valvule 0. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet ♂, narrowly lanceolate, aristulate, 5 lin. long. Lower glume hairy, about 7-nerved, bristle  $1\frac{1}{2}$ -3 lin. long; upper linear-oblong, acutely acuminate, hyaline, 3-nerved. Lower valve oblong, almost  $2\frac{1}{2}$  lin. long, 2-nerved; upper similar, but shorter and 3-nerved; both ciliolate.

† **Lower Guinea.** Angola: Benguella; country of the Ganguellas and Ambuellas, *Gossweiler*, 2988!

(Hacq.)

✓ **11. S. Jeffreysii**, *Stapf*. Perennial; rhizome creeping, wiry; stolons short, covered with tough glabrous prominently striate cataphylls. Culms loosely tufted, up to  $1\frac{1}{2}$  ft. high, ascending, subcompressed below, about 8-noded, wiry, glabrous, simple or more often with short barren branches below and 2-5 distant flowering branches from above the middle. Leaf-sheaths slightly longer or shorter than the internodes, rather firm, faintly striate, glabrous, the lower compressed, keeled, the upper subterete, all dull pale green like the blades except the basal, which are yellow to brown; ligules very short, truncate, ciliolate; blades folded or involute upwards when young, at length flat, linear, long attenuated to an acute point, very slightly constricted at the base, 3-6 in. long, or those of the barren shoots much shorter,  $1\frac{1}{2}$  to almost 2 lin. wide, firm, more or less hairy towards the junction with the sheath (hairs very fine, white, spreading,  $1-1\frac{1}{2}$  lin. long), or glabrous, smooth on both faces, rough on the margins, midrib very slender, prominent below, lateral nerves numerous, fine; spathes very narrow, up to 2 in. long, with or without a rudimentary blade, dull purplish or reddish. Racemes on slender peduncles which are slightly thicker towards the tips and terminate in an oblique cupule, at length mostly long-exserted from the spathe, fragile,  $2\frac{1}{2}$ -3 in. long, 8-12-jointed, silky-villous; joints  $3\frac{1}{2}$  lin. long, narrowly linear-cuneate with an asymmetrical toothed appendage, greenish, tinged or mottled with purple, loosely hairy on the back, ciliate, uppermost cilia up to 2 lin. long; pedicels similar, but more slender, with a very oblique appendage. Scssile spikelet linear-lanceolate, including the obtuse bearded callus  $3\frac{1}{2}$ - $4\frac{1}{2}$  lin. long, loosely hairy on the back. Glumes subequal; lower chartaceous, 2-mucronulate, dull green or tinged with red, rather flat on the back, scaberulous on the keels, intracarinal nerves about 6, obscure; upper glume slightly shorter, membranous, acute, 3-nerved, keels scaberulous upwards, margins obscurely ciliate. Lower floret reduced to an oblong valve up to  $3\frac{1}{2}$  lin. long, 2-nerved, hyaline, tinged with carmine below. Upper floret ♀: valve over 3 lin. long, 2-fid to one-quarter or one-third of its length; lobes lanceolate, acute, ciliate; awn about 7-10 lin. long, column dark, slender, bristle white, usually much longer than the column. Valvule 0. Stamens 3, anthers  $1\frac{1}{2}$  lin. long. Grain lanceolate





in outline, acute,  $2\frac{1}{4}$  lin. long; scutellum about half its length. Pedicelled spikelet ♂ or neuter (*Hackel*), lanceolate, acuminate,  $3\frac{1}{2}$  lin. long, shortly hairy; lower glume rather flat, 2-keeled, minutely 2-toothed with a short bristle, shortly hairy below, often purplish upwards, intracarpal nerves numerous; upper glume lanceolate-oblong, subhyaline, 3-nerved, ciliate. Valve of lower floret as in the sessile spikelet, but narrower. Valve of upper floret entire, oblong-lanceolate, acute, almost 3 lin. long, 3-nerved, ciliolate, awnless. Anthers 2 lin. long.—*Andropogon Jeffreyssii*, Hack. in Proc. Rhodesia Scient. Assoc. vii. ii. (1908) 70, and in Fedde, Repert. vi. 324; Eyles in Trans. R. Soc. S. Afr. v. 296.

+ **Mozambique Distr.** Rhodesia: (Mapanza and Matopo Hills, *Rogers*, 7950!) Bulawayo, *Jeffreys*, 78!

*Hackel* describes the leaves as remotely spinulose; in the case of *Roger's* plant this is only true of the upper margins of some of the leaves, the margins as a rule being uniformly scabrid.

(*Hackel*.)

✓ 12. *S. Schweinfurthii*, *Stapf*. Culms over 2 ft. high, terete, simple for the first 3 or 4 nodes, then giving off flowering branches, smooth, glabrous. Leaf-sheaths (the basal ones unknown) terete, striate, glabrous; blades narrowly linear, tapering to a long fine point, up to 8 in. long by almost  $1\frac{1}{2}$  lin. wide (when flat), rigid, pale green, more or less loosely hairy on both sides or glabrescent, margins scabrid, midrib slender, prominent below, primary lateral nerves 2-3 on each side, somewhat raised. Inflorescence made up of few to many flowering branches, rising solitary or in pairs from the upper nodes, simple or divided once again, ultimate divisions 1- or 2-noded, filiform, erect or suberect, the lower  $\frac{1}{2}$  to almost 1 ft. long; spathes very narrow, up to 2 in. long, glabrous, with a short setaceous scabrid and sometimes sparingly hairy blade; peduncles very slender, more or less exserted from the spathe, tips very slightly thickened, ending with a small oblique cupule. Racemes  $1\frac{1}{2}$  to over 2 in. long, up to 2 lin. wide, very dense and almost glabrous, green tinged with purple-brown, 16-20-jointed; joints  $1\frac{1}{4}$  lin. long, linear, slightly widened upwards, somewhat curved, glabrous or ciliate on the outer angle, tips with a very shallow unequally 2-toothed cupule; pedicels linear, up to  $1\frac{3}{4}$  lin. long, glabrous, or ciliate along the outer angle. Sessile spikelet including the short broad minutely bearded callus 3 lin. long, lanceolate, acuminate, greenish up to the middle, then purplish-brown. Glumes subequal; lower thinly chartaceous, acute or obscurely 2-dentate, almost flat on the back, glabrous and smooth, inflexed margins very narrow, keels scabrid upwards, intracarpal nerves 5, faint; upper glume boat-shaped, subgibbous, produced into a long fine acumen or a short bristle, membranous, 3-nerved, scabrid on the keel, ciliolate. Lower floret reduced to a hyaline oblong faintly 2-nerved ciliolate valve,  $2\frac{1}{2}$  lin. long. Upper

floret ♂, slightly shorter than the lower : valve obliquely lanceolate in profile, shortly 2-fid, 3-nerved, ciliate, awn 8–10 lin. long, kneed and loosely twisted below the middle, bristle whitish ; valvule minute, oblong, truncate. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelet similar to the sessile, but slightly broader and purplish all over ; lower glume very flat on the back, produced into a short whitish bristle from between 2 minute teeth ; upper glume broadly rounded on the back, obscurely keeled upwards. Upper floret ♂, with an entire acute awnless valve, or like the lower reduced to a valve, or only one valve present.—*Andropogon Schweinfurthii*, Hack. in Flora, 1885, 118, and in DC. Monogr. Phan. vi. 375 ; Durand & Schinz, Consp. Fl. Afr. v. 723.

Upper Guinea. Northern Nigeria : Lokoja, *Dalziel*, 289 !

Nile Land. Jur : Tokuto River, *Schweinfurth*, 4271 !

(*Franch.*)

✓ 13. *S. Thollonii* *Stapf*. Perennial, compactly cæspitose ; rhizomes branched and densely covered with the remains of the cataphylls ; innovations extravaginal, numerous, closely tufted with the culms. Culms including the inflorescence about 2–3 ft. high, more or less compressed, about 2–3-noded below the panicle, with the internodes exserted, glabrous, smooth, branched from about the middle ; branches forming a narrow, very lax inflorescence. Leaf-sheaths glabrous, compressed, keeled, the lower long-persistent, pale reddish or brown ; ligules short, truncate, membranous ; blades linear, acute, folded or flat, of the innovations up to over  $\frac{1}{2}$  ft. long and  $1\frac{1}{2}$  lin. wide (flattened out), loosely hairy towards the base, otherwise like the short culm-blades glabrous, finely scaberulous on the sides, reddish or somewhat glabrescent, midrib very slender, nerves numerous, fine. Inflorescence up to 1 ft. long, of distant simple branches, geminate from the intermediate nodes, solitary towards both ends, filiform, unequal, when paired of 2 internodes ; spathe filiform, acute,  $1\frac{1}{2}$ – $1\frac{3}{4}$  in. long, glabrous ; peduncles at length long-exserted from the spathe, erect, rarely flexuous, filiform, slightly thickened upwards, tip with a small oblique crenulate appendage, sometimes with a few hairs below it. Racemes 1– $1\frac{1}{2}$  in. long, slender, villous, 8–9-jointed ; joints cuneate from a subfiliform base, 2– $2\frac{1}{2}$  lin. long, with a short urceolate obtusely dentate or crenulate appendage, hairy on the back and long-ciliate on both sides from the base upwards, the uppermost hairs up to 2 lin. long ; pedicels similar but much more slender and somewhat shorter. Sessile spikelets linear-lanceolate, acutely acuminate, 2– $2\frac{1}{2}$  lin. long, including the shortly bearded callus. Glumes subequal ; lower very minutely truncate or 2-dentate, almost membranous, flat on the back, more or less white hairy along the middle up to half the length of the glume, inflexed margins very narrow, keels obscurely scaberulous, intracarpal nerves 4–5, slightly raised ; upper glume somewhat shorter, broadly rounded on the back, linear-oblong, acute, 3-nerved,





minutely puberulous upwards, ciliolate. Lower floret reduced to a linear-oblong truncate hyaline 2-nerved ciliolate valve, 2 lin. long. Upper floret ♂, as long as the lower or nearly so; valve linear, hyaline, shortly 2-fid, faintly 3-nerved, sparingly ciliolate; awn about 4 lin. long, very fine, kneed and twisted near the base, bristle whitish; valvule 0. Stigmas laterally exerted, 1 lin. long. Pedicelled spikelet similar to the sessile, but slightly smaller and narrower, glabrous. Glumes unequal; the lower produced into a long fine point; the upper and the lower valve as in the sessile spikelet. Upper floret ♂, (always?) awnless. Anthers 1 lin. long.—*Andropogon Tholloni*, Franch. Contr. Fl. Congo Franç. 16. *A. lopollensis*, Rendle in Cat. Afr. Pl. Welw. ii. 143.

Lower Guinea. French Congo: Brazzaville; sandy plains near Mpila, Braza & Thollon, 61! 62! Belgian Congo: Kisantu, Gillet, 1387! Kimuena, Gillet, 1718! Angola: Huilla; Lopollo, Welwitsch, 2641!

(Stapf)  
✓ 14. *S. compressum*, Stapf. Perennial, compactly caespitose; rhizome short, emitting stout black roots, innovations intra- and extra-vaginal. Culms numerous, up to 3 ft. high, more or less compressed below or sometimes stout (up to 2 lin. in diam.) and terete, 3-noded below the inflorescence, with the internodes exerted, glabrous, smooth, branching from the middle upwards, branches solitary or 2-4-nate, distant. Leaf-sheaths glabrous, those of the innovations much compressed, keeled, long-persistent, at length brown and shining, those of the culms terete, tight, glaucescent, short; ligules scarious, very short; blades of the innovations folded, linear, acute, up to 1-3 in. long and  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. wide, or some up to 16 in. long and  $3\frac{1}{2}$  lin. wide (when flattened out), firm, glabrous, glaucescent or dull or purplish, at length reddish, of the culms similar, but flat with a constricted base, 2 to over 3 in. long, 3-5 lin. wide, sometimes slightly hairy above the ligules, scaberulous along the margin, midrib glaucous above, lateral nerves 6-7; spathes subobtusate, widened upwards from a very narrow base,  $1\frac{1}{2}$ -3 in. long, subglaucous or livid. Racemes on filiform glabrous enclosed peduncles, laterally exerted below the tips of the spathe, 1 to almost 2 in. long, 5-9-jointed; joints slender, slightly dilated upwards,  $2\frac{1}{2}$  or the lowest up to 3 lin. long, ciliate on the outer side from the base, on the inner from the middle, with the hairs increasing upwards to  $1\frac{1}{2}$ -2 lin. long, glabrous on the back or almost so; pedicels very similar, but with the tips produced into a minute appendage. Sessile spikelet lanceolate, acuminate,  $3\frac{1}{2}$ -4 lin. long and slightly over 1 lin. wide, pale. Glumes subequal; lower minutely 2-dentate, thinly chartaceous, rather flat on the back, with narrow inflexed margins, upwards scaberulous, keels and 3 intracarpal nerves sparingly hairy from the back; upper glume slightly shorter, acute, obtusely keeled, hyaline, 3-nerved, sparingly ciliate. Lower floret reduced to a linear-oblong minutely truncate hyaline 2-nerved

ciliate valve,  $2\frac{1}{2}$  lin. long. Upper floret ♂ : valve equalling the lower, linear-lanceolate, shortly 2-fid, faintly 3-nerved, ciliate, awn 7-8 lin. long, kneed below the middle, bristle whitish; valvule 0 or very minute. Pedicelled spikelet ♂, similar to the sessile, but slightly larger, glabrous on the back and with the valve of the upper floret mucronulate from a minute sinus. Anthers 3 lin. long.—  
 + *Andropogon compressus*, Stapf in Journ. de Bot. xxii. (1909) 204, incl. var. *pleiocladus*, Stapf, l.c. 205.

**Upper Guinea.** French Sudan: clearings in the bush at Morigueyo, *Chevalier*, 435! Senegambia: Sinidore, on the Casamanze River, *Chevalier*, 2348!

**North Central.** Shari District: Dar Rounga; Mosonbourta, *Chevalier*, 7875!

✓ 15. *S. scintillans*, Stapf. Annual. Culms very slender, scantily fascicled, about 1 ft. high, slightly compressed below, terete upwards, smooth, glabrous, few- to 6-noded, with the nodes exserted, branched from the lowest or intermediate nodes upwards, all branches flowering, solitary or 2-nate. Leaf-sheaths glabrous, the lowest compressed and keeled, the others terete, tight; ligules membranous, truncate, short; blades narrowly linear to filiform, tapering to a fine point, up to 2 in. by  $\frac{3}{4}$  lin., soft, with scattered long very fine hairs, midrib very fine, primary lateral nerves 1 on each side; spathes very narrow with a setiform scaberulous blade, 1-4 lin. long. Racemes on filiform, more or less flexuous glabrous peduncles which are slightly thickened at the tips for 1-2 lin. and terminated by a small cupular appendage, at length more or less (by up to  $\frac{1}{2}$  in.) exserted from the spathe,  $\frac{3}{4}$ -1 in. long, pale brown, marked with patches of brilliantly silvery hairs, 4-6-noded; joints cuneate-subulate, slightly curved,  $1\frac{3}{4}$  lin. long, with a minute cupular entire-rimmed appendage, minutely granular on the back, shortly and very densely ciliate on the inner edge up to about two-thirds of its length and longer-ciliate on the outer edge from the middle upwards, cilia like all the hairs of the inflorescence glistening, silvery; pedicels very similar, but shorter, with a 2-dentate appendage. Sessile spikelet lanceolate, acuminate, about  $2\frac{1}{2}$  lin. long, with a minute shortly bearded callus. Glumes unequal; lower almost flat on the back, 2-mucronulate, with narrow sharply inflexed margins, thinly chartaceous, with distinct or more or less obliterated longitudinal lines of short hairs on the back, keels obscurely scaberulous, intracarinal nerves 3, faint; upper glume dorsally compressed, shorter than the lower, oblong, shortly acute, membranous below, white-hyaline upwards, 1-nerved, often finely mucronate, ciliolate upwards. Lower floret reduced to an oblong truncate or 2-dentate valve,  $1\frac{1}{2}$  lin. long, hyaline, ciliolate, finely 2-nerved. Upper floret ♂ : valve linear, stipitiform,  $1\frac{1}{2}$  lin. long, white, hardened upwards and passing rather abruptly into the awn, 3-nerved, lateral nerves very indistinct; awn about 6-8 lin. long, kneed and twisted below the middle,





column brown, bristly, yellowish. Valvule 0. Stamens 3; anthers oblong,  $\frac{3}{4}$  lin. long. Pedicelled spikelet neuter, lanceolate, acuminate, up to 2 lin. long, pale brown, glabrous. Lower glume terminating with a fine bristle up to  $1\frac{1}{2}$  lin. long, intracarpal nerves about 5; upper oblong, acute, hyaline, 3-nerved, ciliolate. Florets represented by a solitary hyaline oblong valve, about 1 lin. long.

+ **Upper Guinea.** French Guinea: Futa Jallon; between Soumbalako and Boulivel, *Chevalier*, 18664!

(D. Don)

✓ **16 S. pulchellum**, *Stapf*. Perennial. Culms erect, up to over 2 ft. high, many-noded, simple below the foliose panicle, terete, smooth and glabrous, the internodes enclosed in the sheath. Leaf-sheaths terete, tight, glabrous, smooth, often glaucescent, the uppermost spathe-like; ligules membranous, very short; blades linear, shortly acute or subacute, more or less constricted at the base,  $1\frac{1}{2}$ -2 in. long,  $\frac{3}{4}$ - $1\frac{1}{4}$  lin. wide, flat or folded, glabrous and quite smooth, also along the cartilaginous margins, somewhat fleshy, nerves faint; spathes rather crowded on short peduncles, narrowly lanceolate, acute, with or without rudimentary subulate blades, reddish or purplish and more or less glaucous. Racemes peduncled, more or less enclosed in the spathe or ultimately almost entirely exerted, about  $1\frac{1}{2}$  in. long, 5-6-jointed; joints clavate, gradually widening upwards, 3-4 lin. long, with a very short membranous denticulate appendage, covered with white spreading hairs,  $1\frac{1}{2}$ - $1\frac{3}{4}$  lin. long, all over except on the inner face; pedicels similar but more slender and as long as or slightly longer than the joints, with an oblique and much produced entire appendage on the inner side. Sessile spikelets lanceolate, acute, 3- $3\frac{1}{2}$  lin. long, glabrous, reddish or purplish and glaucous. Glumes equal; lower chartaceous, flat on the back, acutely 2-dentate, the teeth often very close, glabrous, intracarpal nerves conspicuous, 5, slender, raised; upper glume similar to the lower, thinner, 3-nerved, slightly keeled above, very smooth. Lower floret reduced to a linear-oblong minutely truncate or subacute 2-nerved ciliolate valve. Upper floret ♀: valve narrowly linear-lanceolate, entire, delicate, produced into a bristle-like awn, up to  $2\frac{1}{2}$  lin. long, 3-nerved; valvule hyaline, oblong, truncate, nerveless, slightly exceeding the ovary. Anthers almost 2 lin. long. Pedicelled spikelet similar to the sessile, but slightly smaller and ♂, with the upper floret awnless.—*Andropogon pulchellus*, D. Don in Hook. Niger Fl. 571; Hack. in DC. Monogr. Phan. vi. 366; Durand & Schinz, Consp. Fl. Afr. v. 720. *A. guineensis*, Hochreut. in Ann. Jard. Genève. ii. (1898), 99.

+ **Upper Guinea.** Gambia, *Don*! Senegambia: Niayes, *Chevalier*, 2366  
Southern Nigeria: Oware, *Beauvois*! Cameroons, *Ledermann*!

**Lower Guinea.** Lower Congo, *Smith*!

(Hack.)

- ✓ 17. *S. Kelleri*, Stapf. A shrublet; main stems more or less prostrate or ascending, the branches repeatedly divided, producing dense fascicles of very slender culms up to over 1 ft. high. Culms more or less geniculate, few-noded, filiform, glabrous and smooth. Leaf-sheaths glabrous, the lower very firm, persistent, turning blackish, of the culms pale, all terete and tight; ligules reduced to a short minutely ciliate rim; blades linear, tapering to a fine point,  $\frac{3}{4}$ – $2\frac{1}{2}$  in. long, up to 1 lin. wide, flat, somewhat rigid, often twisted, glabrous, smooth, pale reddish, nerves very fine; spathes very narrow, cylindric,  $\frac{3}{4}$  to over 1 in. long, usually with a very short blade; peduncles filiform, erect,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, exserted, tips cupular, with a minutely denticulate margin and a tuft of hairs about 2 lin. long. Racemes  $\frac{2}{3}$  to over 1 in. long, dense, silky-villous, 4–6-jointed; joints  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin. long, slender, slightly thickened upwards with an obliquely cupular appendage, densely ciliate along both sides and on the back above the middle, the longest hairs up to  $2\frac{3}{4}$  lin. long; pedicels very similar, more slender, mostly glabrous all over the back. Sessile spikelet linear-lanceolate,  $2\frac{1}{2}$ –3 lin. long (including the very short minutely bearded callus). Glumes subequal; lower chartaceous, except at the membranous tips, acute or very shortly 2-mucronate, slightly concave on the back, inflexed margins narrow, keels asperulous above, margins sparingly ciliate upwards; upper glume oblong-lanceolate in profile, mucronate, membranous, 3-nerved, densely ciliate upwards. Lower floret reduced to a hyaline linear-oblong more or less acute nerveless upwards ciliate valve, 2 lin. long. Upper floret ♀: valve linear-oblong, 2-fid for a quarter of its length, 3-nerved at the base, awn 7–8 lin. long, kneed at and twisted below the upper third; valvule very minute, scale-like, hyaline, ciliate from the top. Pedicelled spikelet similar to the sessile but rather narrower. Lower glume 6–7-nerved; upper 3- to sub-5-nerved. Florets similar to those of the sessile spikelet, but the upper entire, awnless, 1-nerved, with a ♂ flower. Anthers + 1 lin. long.—*Andropogon Kelleri*, Hack. in Mém. Herb. Boiss. No. 20 (1900), 6; Stapf in Kew Bulletin, No. 6 (1907), 209.

† Nile Land. Somaliland: Tuju Steppe, Keller, 1356! Ogaden Steppe, Keller, 129. Haud; Kirrit, Drake-Brockman, 497! Ahl Mountains, Hildebrandt, 874!

(Schum.)

- ✓ 18. *S. rupestre*, Stapf. Perennial. Culms erect or ascending,  $1\frac{1}{2}$  ft. high, much branched below, lower and intermediate branches mostly vegetative, with a few flowering ones rising from among them, many-noded, wiry, compressed below, terete above, quite glabrous and smooth, internodes shortly exserted or the lower enclosed. Leaf-sheaths tight, the lower compressed, keeled, dark brown, more or less hirsute, the upper terete and usually glabrous with the exception of loose hairs upwards and a beard at the mouth, finely striate; ligules very short, truncate, scarious; blades folded or sometimes

Keller 1356

error for Keller 156 - Intypes N.H.



at length flat, linear, tapering to a fine point, not or only slightly constricted at the base, often curved, from a few to 6 in. long,  $\frac{3}{4}$ –1 lin. wide (when flattened out), glabrous except for a few hairs near the base, slightly glaucous when young, turning brown when old, slightly rough above and on the margins, smooth below. Inflorescence made up of few distant flowering branches, rising solitary from the axils of mostly well developed leaves; branches of 3–4 internodes, erect or obliquely spreading, filiform, glabrous; spathe almost filiform, very acute or continued in a short subulate blade, about 1 in. long, glabrous, at length reddish; peduncles enclosed, filiform, glabrous, with minutely cupular tips. Racemes exerted from near the mouth of the spathe, up to 1 in. long, slender, 6–7-jointed; joints clavate, cuneate from a filiform base, up to 2 lin. long, with urceolate crenulate tips, shortly ciliate on the outer angle from the base upwards, on the inner face from the middle upwards to near the tips, the clavate portion reddish; pedicels similar but much more slender and slightly shorter, with the uppermost hairs of the outer angle up to 1 lin. long, those of the inner very short. Sessile spikelets lanceolate, including the short bearded callus 2 lin. long, pale green tinged with red. Glumes subequal; the lower thinly chartaceous, acuminate, 2-mucronate, almost flat on the back, glabrous, with very narrow inflexed margins, keels scaberulous, intracarinal nerves 4–5, raised upwards; upper glume broadly rounded on the back, or almost flat, lanceolate, acute or mucronulate, membranous, finely 3-nerved, ciliolate. Lower floret reduced to an oblong obtuse or sub-3-dentate hyaline faintly 2-nerved ciliolate valve,  $1\frac{1}{2}$ – $1\frac{3}{4}$  lin. long. Upper floret ♂: valve narrowly ovate-lanceolate, very shortly 2-fid or 2-toothed, 3-nerved, ciliate; awn rising from between the teeth, about 6–8 lin. long, kneed at and twisted below the middle. Anthers over 1 lin. long. Pedicelled spikelet similar to the sessile, but somewhat smaller and narrower, ♂. Lower glume produced into a short bristle; upper more boat-shaped and keeled above the middle. Valve of the flowering glume awnless.—*Andropogon rupestris*, K. Schum. in Engl. Jahrb. xxiv. 327.

Upper Guinea. Togo: in fissures of rocks on the Agome Mountains, near Misahöhe, *Baumann*, 361!

*Imperfectly known species.*

19. *Andropogon simplex*, *Vahl in Schumach. & Thonn. Beskriv. Guin. Pl.* 49. Culms filiform, tough, up to over 1 ft. high; lower branches few, erect, simple; flowering branches distant, very slender, 2–3-nate or the upper solitary. Leaf-blades linear-lanceolate, rough along the margins, rarely hairy at the base; spathes erect, lanceolate, with setaceous tips, not quite 1 in. long, reddish, glabrous. Racemes subsessile, about as long as the spathe; joints hairy. Spikelets lanceolate, hairy on the sides; awn hardly 1-in. long,

kneed, reddish, glabrous. Pedicelled spikelets muticous.—Hack. in DC. Monogr. Phan. vi. 366; Durand & Schinz, Consp. Fl. Afr. v. 728.

**Upper Guinea.** Gold Coast (?), *Thonning*.

This is probably allied to *Schizachyrium exile*, Stapf, as suggested by Hackel, l.c., but the scanty branching, the laterally hairy sessile spikelets and muticous pedicelled spikelets distinguish it sufficiently.

**40. DICTOMIS**, Kunth in Mém. Mus. Hist. Nat. Paris, ii. 69, and in Humb. & Bonpl. Nov. Gen. et Spec. i. 193, t. 64; not of Beauv.

Spikelets 2-nate, of each pair differing in sex and shape, one sessile, the other pedicelled on the articulate fragile rachis of many-jointed solitary racemes, terminating the culms and their branches, supported by a spathe and collected in a false subfastigate panicle, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelet; joints and pedicels slender, cuneately widened upwards, tips with a small 2-dentate appendage. Florets 2; the lower reduced to an empty valve; upper ♂ in the sessile, neuter in the pedicelled spikelet. Sessile spikelet laterally compressed, wedged in between joint and pedicel, awned; callus short, shortly bearded. Glumes subequal; lower deeply sulcate and strongly 2-keeled, membranous in the groove, firmer towards the keels; upper firmly membranous, boat-shaped, broad when seen from the side, 2-dentate, keeled, with a fine bristle from the sinus, 3-nerved, ciliate. Valves hyaline, ciliate, of lower floret entire, 2-nerved, of upper 2-dentate, awned, awn from the sinus, perfect. Valvule hyaline, nerveless. Stamens 3. Stigmas exerted laterally low down. Grain obovate-oblong, laterally compressed; embryo about half the length of the grain. Pedicelled spikelets very dissimilar, more acute. Glumes very unequal; lower large, flat, herbaceous, many-nerved, aristulate from between 2 terminal mucros; upper shallowly boat-shaped, entire, shortly aristulate, 3-nerved, ciliate. Valves very narrow, 3-nerved, muticous.—Annual. Leaf-blades very narrow, flat, rather flaccid. False panicles rather loose; their peduncles flexuous or nodding, filiform; pedicelled spikelets often purplish or reddish, contrasting strikingly with the usually long whitish hairs of the joints and pedicels.

Species 1, in the tropics of both hemispheres.

The name *Dictomis* appears for the first time in Palisot de Beauvois (Essai d'une Agrostographie, 132), but the description given under that name and the figure quoted (t. xxiii. fig. v.) are those of *Apluda*, whilst under *Apluda* a grass is described which from the description and the figure cited (t. xxiii. fig. vi.) is an *Anadelphia* as Hackel (in DC. Monogr. Phan. vi. 396) has already suggested. According to him this was corrected in a supplementum "errorum," which I have not seen, in the sense that fig. vi. of plate xxiii. should illustrate the genus *Dictomis*. But even admitting this correction there is so much inexplicable





confusion left that it seems best to date the establishment of *Diectomis* from Kunth's article quoted above and to adopt his definition of it which at any rate is supported by Beauvois' reference to *Andropogon fastigiatus* as the typical representative of the genus.

1. *D. fastigiata*, Kunth in *Humb. & Bonpl. Nov. Gen. et Spec.* i. 193, t. 64, excl. syn. Beauv. Annual. Culms up to over 5 ft. high, fascicled, erect or geniculate at the base, terete, smooth, glabrous, or the upper portions of the internodes finely puberulous, branched almost from the base or from the third or fourth node, all the branches flowering. Leaf-sheaths lax, more or less compressed, keeled, glabrous, smooth, the upper tighter, terete, all glabrous and smooth; ligules ovate-lanceolate, acute, scarious, nerved, 3-5 lin. long, glabrous; blades narrowly linear, long-tapering to a setaceous point, the lowest up to over 1 ft. long, 1-1½ lin. wide (when flattened out), pale green, rather flaccid, glabrous and smooth below, finely scaberulous or minutely puberulous above, margins scabrid, midrib white and rather broad above, slender below; lateral nerves very fine, 2-3 on each side, more prominent. Inflorescence more or less fastigiate, formed by the solitary 2- or 3-nate simple or sparingly divided erect or suberect and frequently flexuous and filiform flowering branches; spathe linear-lanceolate or narrowly linear, acuminate, bladeless, turning reddish, 2-3 in. long, glabrous; peduncles almost as long as or at length longer than the spathe, pubescent upwards, slightly widened into the very obliquely cupula tip. Racemes 1½-2 in. long, rather stout on account of the enlarged pedicelled spikelet, reddish, villous, very fragile, 12-15-jointed; joints narrowly cuneate from a linear base, 1½ lin. long, densely ciliate on both sides, with the uppermost hairs up to 1 lin. long, otherwise glabrous, tip 2-toothed; pedicels very similar. Sessile spikelet including the callus 2-2½ lin. long, pale green, glabrous or more usually hairy. Glumes subequal; lower linear, subacuminate, 2-denticulate, sides greenish, 3-nerved, narrowly inflexed, rounded, passing in the acumen into scaberulous keels, with the narrow sunk middle portion membranous and nerveless, usually hairy upwards; upper glume shorter, with a fine bristle, up to 5 lin. long, from between the teeth, long-ciliate. Lower floret reduced to a linear-oblong acute hyaline 2-nerved ciliolate valve, 2 lin. long. Upper floret ♂, slightly shorter than the lower: valve oblong, 2-dentate, ciliolate; awn 1¼ to almost 2 in. long, kneed at the middle, column brown, twisted, smooth, very minutely scaberulous, bristle yellowish; valvule linear-lanceolate, nerveless, glabrous. Anthers almost 1 lin. long. Pedicelled spikelet barren, very different from the sessile. Glumes very unequal; lower obliquely obovate-oblong, with a fine bristle from between the mucros, up to 5 lin. long and 1½ lin. wide, thinly chartaceous, very flat, green tinged with purple or quite purplish or reddish, many-nerved, margins rigidly ciliolate; upper glume with a broad rounded

back, from 2 to 2½ lin. long. Lower floret represented by a linear-lanceolate acute hyaline ciliolate 3-nerved valve, and a linear-oblong emarginate hyaline nerveless valvule, over 1 lin. long. Upper floret reduced to a linear-oblong hyaline sub-3-nerved valve, which passes gradually into a long fine point.—*Andropogon fastigiatus*, Sw. Prodr. 26, and Fl. Ind. Occ. 207; Hack. in DC. Monogr. Phan. vi. 393; Durand & Schinz, Consp. Fl. Afr. v. 711; Hook. f. Fl. Brit. Ind. vii. 167, 422: Rendle in Cat. Afr. Pl. Welw. ii. 144; Chiov. in Ann. Istit. Bot. Roma, viii. 279. *A. Hochstetteri*, Steud. Syn. Pl. Glum. i. 384. *A. diatherus*, Hochst. ex Steud. l.c. *Pollinia fastigiata*, Spreng. Pug. ii. 13. *Heteropogon Hochstetteri*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 306.

**Upper Guinea.** French Guinea: Valley of Baffing River, *Pobéquin*, 1814! Timbo, very common, *Pobéquin*, 1781! Futa Jallon: between Soumbalako and Boulivel, *Chevalier*, 18647! between Dalaba and Souguéta, *Chevalier*, 20181! Northern Nigeria: Lokoja, *Dalziel*, 283! Abinsi, common bush grass, *Dalziel*, 894!

**Nile Land.** Sudan: Sennar, *Kotschy*, 240! 302! Eritrea: Bogos; Moccada, *Pappi*, 2456; Dembelas; Ferfer, *Pappi*, 6142. Abyssinia: Begemeder, *Schimper*, 1019!

**Lower Guinea.** Angola: Pungo Andongo; banks of the Cuanza River, *Welwitsch*, 7405! between Catete and Luxillo, *Welwitsch*, 7416! Pedra de Cabindo, *Welwitsch*, 2820 partly!

**Mozambique Distr.** Rhodesia: Salisbury, *Allen*, 749!

Tropics generally.

#### 41. ANDROPOGON, Linn.; Benth. et Hook. f. Gen. Pl. iii. 1133, partly.

Spikelets 2-nate, those of each pair differing in sex (except in 11, *A. homogamus*) and mostly also more or less in shape and size, or those of the lowest pair of the lowest raceme homogamous (♂ or imperfect), one sessile, the other pedicelled on the articulate fragile rhachis of many-jointed paired (very rarely solitary) or corymbose (digitate or subdigitate) racemes terminating the culms, and, if these be branched, also their branches or at least the upper; raceme-pairs or corymbs supported by a spathe or spatheole and frequently collected into a false panicle; the sessile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels filiform or thickened upwards (rarely stout in members of § *Piestium*) and then the tips frequently more or less cupular or auricled. Florets 2, lower reduced to an empty valve, upper ♀ in the sessile spikelets of the heterogamous pairs, ♂, neuter or suppressed in those of the homogamous pairs and in the pedicelled spikelets (see, however, 10, *A. humilis*, and 11, *A. homogamus*). Sessile spikelets dorsally or laterally compressed, nearly always awned: callus short, mostly quite obtuse, shortly bearded. Glumes equal or subequal, subcoriaceous to membranous, the lower flat or concave or channelled on the back with at





least from the middle upwards sharply inflexed margins, 2-keeled, the upper more or less boat-shaped, keeled upwards, 3-1-nerved, sometimes aristulate. Valves ciliate or ciliolate, rarely glabrous, of lower floret hyaline, 2-nerved, of upper 2-fid or 2-dentate, hyaline or firmer and sometimes substipitiform below the insertion of the awn. Valvule a hyaline nerveless scale, or 0. Lodicules 2, minute, glabrous. Stamens 3. Stigmas laterally exerted; styles terminal. Grain narrowly lanceolate to oblong in outline, subterete to plano-convex; embryo about half the length of the grain. Pedicelled spikelets often very different from the sessile in shape and less so in size, always more or less compressed dorsally, never concave or channelled on the back, sometimes reduced and then often small or quite suppressed. Glumes herbaceous-chartaceous to membranous, the lower muticous or very rarely aristulate. Valves, if present, hyaline, ciliate, muticous.—Mostly perennial grasses of varying habit (see below).

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

The genus *Andropogon*, even in the restricted sense in which it is understood here, is probably more heterogeneous than any other genus of *Andropogoneæ*. *A. distachyus*, Linn., has been accepted as its type, and the species immediately allied to it (about 12) are taken to constitute the subgenus *Eu-Andropogon*, an Old-World group. The remainder falls into 3 fairly natural groups which are only loosely connected with *Eu-Andropogon* and may even be entitled to rank as distinct genera.

The total inflorescences of *Andropogon* and, to a still greater degree, of the immediately following genera are sometimes very complicated, and therefore require some explanation. The culms of *Andropogon* are either simple, terminating with a corymb or pair of racemes (very rarely with a single raceme), or they are branched; if branched, the branches (1) may be confined to the base, when they are either barren or mixed, that is, terminating with racemes after giving off a few barren leaves, or (2) the branches may extend over all the nodes of the culm, resulting in a suffrutescent habitus (24, *A. cyrtocladus* and 25, *A. Bentii*), or (3), they are restricted to the upper region, with a more or less pronounced tendency towards the formation of "false" or spatheate panicles in which the branches, and their divisions, are specialised for the production of racemes. This is the usual type, to which the remarks below apply.

Whether the culms be simple or divided, the corymbs or pairs of racemes always develop inside the sheath of a more or less modified leaf, and where such corymbs or pairs are gathered in groups, the groups behave in the same way. The modification of these protective leaves becomes the more pronounced the more composite the branching, and within the branch system, the nearer the leaf approaches to the summit or periphery. It finds its expression in a progressive suppression of the blade and in the widening and thinning, and the temporary or permanent inflation of the sheath. These modified leaves are generally designated "spathes." More composite branching systems are often distinguished as having "common" and "special" spathes, according to whether they embrace several branch-divisions or only the final elements. The "special" spathes are termed here "*spatheoles*" whilst all the others are simply spoken of as "subtending leaves" or "spathes" according to whether they more resemble the uppermost vegetative leaves or the *spatheoles*.

As the racemes represent an easily recognizable definite and complex unit in the building up of the spatheate panicle, so they themselves enter into the formation of a still higher and more complex unit, marked off by the *spatheoles* from the system of axes that constitutes the framework of the panicle. This unit is made up of the raceme or racemes, the internode which serves as their

peduncle, and the spatheole, the function of which has already been indicated. The racemes of these units are usually gathered into pairs or digitate corymbs or they may be solitary (very rarely in *Andropogon*, more often and typically so in other genera of *Andropogoneæ*). According to the number of racemes these units or special inflorescences may be termed "*Monostachya*," "*Distachya*," and "*Polystachya*." The peduncle carrying the racemes has, if they occur in pairs or corymbs, been called their "common peduncle" in contradistinction to the "special peduncles," that is the short barren bases of the racemes themselves. In this work they will be spoken of as "*peduncle*" and "*raceme-base*" or "*base*" respectively, but with this modification, that the term "*base*" covers the whole of the axis of the raceme below the lowest fertile spikelet. The bases carry therefore any homogamous pairs that may be present, and often persist with them long after the fertile portion of the raceme has broken up. Finally, however, they too disintegrate, leaving the bare peduncle behind.

Starting from the mono-, di- or polystachya as ultimate units, we find that the spatheate panicles represent a mixed inflorescence in which the primary branching is racemose, whilst the secondary is largely of a peculiar cymose type. The primary branches are everywhere arranged spirally and sometimes distichously on the main-axis of the panicle. The lowest one or two (rarely more) may start with an elongated internode and beyond that behave like the main-axis itself. In most cases, however, the cymose branching commences at the base of the panicle, each branch giving off near its base and toward one side of its abaxial face a secondary branch. This in turn does the same, but in such a way that its offsplit is nearer the other side, and so on, with the result that a succession of branches of a steadily increasing order is produced: these branches stand alternately on the right and the left side of a very short common compound axis or sympodium. Thus the whole forms a cincinnus or helicoid cyme which, owing to the convergence of its members towards the median plane, approaches a drepanium or sickle-cyme. These drepanoid cincinnati are here briefly spoken of as "*tiers*" and their members as "*rays*." The rays of the upper and peripheral tiers of decompound panicles, and very frequently of all or at least the majority of more sparingly divided panicles, are simple. But in the more proliferous lower or inner tiers the innermost or adaxial ray (rarely rays) divides again racemously, and, if strong enough, also cymosely from the base of its branches, thus forming secondary tiers. These in the case of very complex panicles may repeat the process and produce tertiary tiers. Such branching rays are called "*compound rays*," and tiers containing compound and simple rays are designated "*mixed*." Towards the apex of the main-axis of compound rays no division of the branches takes place, but as the branches behave like the simple rays of an ordinary tier, we are justified in speaking of them as the rays of 1-rayed tiers. Similarly the terminal raceme-corymbs or pairs, with their subtending modified leaf, conform so completely with simple rays that the description of the latter may be taken as applying to them. These *simple* rays, whether members of true or of "1-rayed" tiers or merely the subterminal internodes of racemously branched axes, are thus the direct carriers of the synthetically ultimate units of a spatheate panicle. All the divisions of the spatheate panicle below the spatheole start with a dorsal prophyll. These prophylls may, when studied more thoroughly, afford additional distinctive characters, but, as known at present, they are of little help for the discrimination of the species and have therefore been here generally passed over.

It may finally be observed that this analysis holds good for all the *Andropogoneæ* with spatheate panicles, and may therefore be also applied to those which have already been dealt with in this volume.

#### KEY TO THE SECTIONS.

Joints and pedicels linear (sometimes slightly widened upwards in sect. *Eu-Andropogon*) to finely filiform.

Culms simple or very sparingly branched upwards; racemes usually paired, dense; joints and pedicels





linear, straight; lower glume more or less lanceolate to oblong and flat on the back with frequently winged keels and several rather evenly distributed intracarinal nerves, one of them usually median (but see 2, *A. Lima* and 9, *A. Mannii*); upper glume aristulate from a minute notch; valvule 0 or very minute (3, *A. distachyus*) ... ..

[POGON.  
I. EU-ANDRO-

Culms simple to much branched upwards or branched all along and suffrutescent (24, *A. cyrtocladus* and 25, *A. Bentii*); racemes paired or more frequently in corymbs or corymboid panicles, more loose to very loose; joints and pedicels mostly filiform to finely filiform and then usually somewhat curved; lower glume narrow, mostly linear-lanceolate, with always wingless keels, shallowly concave between them and without or with only 2 delicate intracarinal nerves, one close to each keel (see, however, 18, *A. chrysostachyus*); upper glume acute, rarely produced into a minute mucro or small bristle (24, *A. cyrtocladus*); valvule present, rather small ... ..

II. LEPTOPOGON.

Joints and pedicels distinctly swollen upwards, clavate or cuneate; valvule always present, distinct.

Lower glume of <sup>sessile</sup> spikelets laterally compressed, wedged in between joint and pedicel; its back narrow, deeply grooved, the keels often approaching over the groove; upper glume acute or produced into a mucro or small bristle ... ..

III. PIESTIUM.

Lower glume of <sup>sessile</sup> spikelets dorsally flattened, only the upper glume wedged in; its back with a shallow median groove; upper glume neither mucronate nor aristulate; coarse often tall grasses ... ..

IV. NOTOSOLEN.

I. EU-ANDROPOGON.

\*Pedicelled spikelets ♂ or neuter, or if with an (apparently ?) perfect pistil then more or less differing in shape from the sessile.

Leaf-blades rigid, long and very narrow (under 1 lin. wide) with a relatively stout midrib and narrow revolute herbaceous sides; compactly cæspitose with intravaginal innovations.

Racemes 2-3 in. long; sessile spikelets 3-3½ lin. long; intracarinal nerves of lower glume 5-7 in the sessile, 7-11 in the pedicelled spikelet, evenly distant ... ..

[*stinus*.  
1. *A. amethy-*

Racemes 3-5 in. long; sessile spikelets 4½ lin. long; intracarinal nerves 2 on each side, close to the keels, without a middle nerve in the sessile, but with a middle nerve in the pedicelled spikelet...

2. *A. Lima*.

Leaf-blades usually over 1 lin. to 2½ lin. wide, with a very slender midrib, rarely compactly cæspitose.

†Sessile spikelets 3-5½ lin. long, with the lower glume more or less winged at the keels.

Perennial.

Sessile spikelets 4½-5½ lin. long; cataphylls of innovation-buds more or less hairy to villous

3. *A. distachyus*.

- 6-8
- Sessile spikelets 3-4 lin. long; cataphylls glabrous.
- Stoloniferous; rhizome slender, creeping; spikelets glabrous or sparingly hairy; joints and pedicels shortly ciliate; pedicelled spikelets ♂ ... .. 4. *A. pratensis*.
- Not stoloniferous; rhizome short, throwing up dense tufts of very slender culms and leafy innovations; sessile spikelets long villous; joint and pedicels long ciliate; pedicelled spikelets reduced to the glumes 5. *A. pilosellus*.
- Annual.
- Racemes densely whitish villous; joints hairy on the back and sides ... .. 6. *A. abyssinicus*.
- Racemes loosely hairy on one side, very sparingly on the other; joints glabrous on the back ... .. 7. *A. polyatherus*.
- ††Sessile spikelets 2½-3 lin. long; lower glume wingless. Perennial, compactly caespitose with low culms and short leaf-blades
- Racemes 2-nate, densely villous; cilia of joints and pedicels dense, 1 lin. long; lower glume of ♂ spikelet hairy on the back ... .. [scharicus]. 8. *A. kilimand-*
- Racemes usually 3, digitate, not villous; cilia of joints and pedicels ½ lin. long; lower glume of ♀ spikelet glabrous ... .. 9. *A. Mannii*.
- Annual, weak, with flowering branches from all the nodes; racemes almost glabrous ... 10. *A. humilis*.
- \*\*Pedicelled and sessile spikelets homogamous (at least apparently), very similar in shape and structure except for the awnless upper floret of the former; compactly caespitose with short soft leaf-blades ... 11. *A. homogamus*.

## II. LEPTOPOGON.

\*Culms erect, not copiously branched and suffrutescent below; leaf-blades usually long.

†Racemes 3-15 (mostly 5 or more), in corymbs or corymboid panicles.

Racemes plumose; hairs of joints and pedicels silvery, as long as these to several times longer; pedicelled spikelets rudimentary or 0.

Hairs of joints and pedicels several times longer than these; sessile spikelets 1-1½ lin. long.

Sessile spikelets awnless ... .. [chrysus]. 12. *A. leucosta-*

Sessile spikelets with a straight fine bristle-like awn, 6-9 lin. long ... .. 13. *A. eucomus*. ✓

Hairs of joints and pedicels as long as these or slightly longer; sessile spikelets 2-2½ lin. long, awned ... .. 14. *A. huillensis*. ✓

Racemes not plumose; hairs of joints and pedicels much shorter than these, rarely 0 (17, *A. Brazzæ*); pedicelled spikelets almost as large as or as large as the sessile, neuter, but mostly with both glumes and valves developed, or more usually ♂.



20 + A. Schliebent

Culms terete, very tall, with tiers of flowering branches from the intermediate and upper nodes, bearing corymboid panicles of racemes; blades spinulosly ciliate from the base.

Joints and pedicels shortly ciliate; sessile spikelets awned,

Racemes up to 1½ in. long, on erect straight peduncles; pedicelled spikelets neuter... 15. *A. calvescens*.

Racemes up to 3 in. long, very flexuous, on curved peduncles ... .. 16. *A. tenuiberbis*. ✓

Joints and pedicels glabrous or nearly so; sessile spikelets awnless ... .. 17. *A. Brazzæ*.

Culms compressed below and coated by the strongly compressed keeled sheath-bases, up to 3 ft. high, simple or remotely branched from the upper 1-3 nodes; racemes numerous or if few then long and flexuous; blades 4-12 in. long.

Joints with subcupular irregularly toothed tips; lower glume of sessile spikelet subcoriaceous to chartaceous, fulvously hairy, with 4-7 intracarpal nerves; fertile valve deeply 2-fid ... .. 18. *A. chryso-*

[*stachyus*.

Joints truncate; lower glume of sessile spikelet thinner, chartaceous to subchartaceous; fertile valve shortly or obscurely 2-fid.

Spikelets very pale, greenish, 3-3½ lin. long; lower glume of sessile spikelet without intracarpal nerves; anthers 1½-2 lin. long 19. *A. Stolzii*. ✓

Spikelets a rich violet or blackish-purple, the sessile 3-3½ lin., the pedicelled 3½-4½ lin. long; lower glume of the sessile spikelet with 1 or 2 intracarpal nerves; anthers of sessile spikelet effete, of pedicelled 2½ lin. long ... .. 20. *A. purpureus*. ✓

†† Racemes 2-, rarely 3-4 nate; culms erect, not branched and suffrutescent below; leaf-blades long.

Cilia of joints and pedicels conspicuous, as long as these; flowering branches few; racemes 2-4 nate; pedicelled spikelets neuter to rudimentary 21. *A. laxatus*.

Cilia of joints and pedicels very short; racemes usually 2-nate; pedicelled spikelets ♂ or neuter, but not much reduced.

Flowering branches numerous; awn of sessile spikelet very fine, column 2-2½ lin. long ... 22. *A. africanus*. ✓

Flowering branches few; awn of sessile spikelet relatively stout, column 4 lin. long ... .. 23. *A. linearis*. ✓

\*\* Suffrutescent; culms much branched below; branches curved ascending, hard; leaf-blades ½-1½ in. long; racemes 2-nate, silky-villous.

Racemes 10-15 lin. long; sessile spikelet 3-3½ lin. long; awn 7-8 lin. long ... .. 24. *A. cyrtocladus*.

Racemes 5-10 lin. long; sessile spikelet 2½ lin. long; awn very fine, 4 lin. long ... .. 25. *A. Benii*.

## III. PIESTIUM.

## \*Racemes 2-nate.

Annual; raceme-pairs in much branched spathaceous panicles, usually exerted laterally or subterminally from the spathes, rather loose and delicate; awn relatively long and conspicuous; upper glume of sessile and lower of pedicelled spikelet with a bristle-like awn 5-6 lin. long ... ..

26. *A. pseudapri-*  
[*cus*.

Perennial; raceme-pairs few with each culm, rarely in scanty spathaceous panicles, rather stout and dense.

Leaf-blades broad and rounded to cordate and more or less amplexicaul at the base ... ..

27. *A. amplexens*.

Leaf-blades narrowed or at least not widened towards the base.

†Lower glume of sessile spikelet deeply grooved between the approximate keels.

Joints and pedicels long and densely ciliate (cilia 2 lin. long); racemes villous on both sides or, when seen from the back, at least between the rows of pedicelled spikelets, 2-5 in. long.

Culms wiry to almost woody below, with often fascicled barren branches; racemes rather loose, about equally villous on both sides; upper glume of sessile spikelets and both glumes of the pedicelled spikelets with a bristle-like awn (up to 5 and 3 lin. long respectively) ... ..

28. *A. Schinzii*.

Culms not wiry, without barren branches; racemes dense, very markedly dorsiventral, villous on the back between the pedicelled spikelets ... ..

29. *A. shirensis*.

Joints and pedicels shortly ciliate (uppermost cilia rarely over 1 lin. long), often imperfectly so on the inner angle or on both, or almost or quite glabrous.

Innovations and bases of the very slender culms coated with the firm remnants of old sheaths, often broken up into fibres, the whole of them forming hard compact tufts; racemes slender, dense; uppermost outer cilia of cuneate-linear joints and pedicels sometimes up to over 1 lin. long and then the racemes shortly and loosely villous on the back ... ..

30. *A. Dummeri*.

Innovations and bases of culms not so coated; all the cilia of the joints and pedicels short or scanty or 0.

Culms not wiry, very sparingly branched from the upper nodes or quite simple; leaf-blades very narrow, up to 1½ lin. wide or if up to 2 lin. wide, then over 1 ft. long.

Sessile spikelets 3½ lin. long; upper glume of sessile spikelet and usually also lower glume of pedicelled spikelet aristulate; joints and pedicels slender, linear-cuneate ... ..

[*Schinzii*.  
31. *A. Pseudo-*





Sessile spikelets up to 2½ lin. long; none of the glumes distinctly aristulate, though sometimes mucronate; joints and pedicels stout.

Sheath-auricles and ligules up to 6 lin. long; blades rigid, to over 1 ft. by 2 lin. ... 32. *A. pertigulatus.*

Sheath-auricles and ligules up to 1½ lin. long.

Culms sparingly branched upwards, slender; blades up to 1 ft. by 1½ lin. ... 33. *A. canaliculata* [fus.

Culms simple, very slender; blades up to 4 in. by ½-1 lin. ... 34. *A. tumidulus.*

Culms very wiry, branched almost all along; stem-nodes often swollen; leaf-blades linear from a constricted and rounded base, 4-6 in. by 2 lin.; joints and pedicels of racemes quite glabrous except at the base, stout, shining; anthers of sessile spikelets much smaller than those of pedicelled 35. *A. heteran-* [therus

††Lower glume of sessile spikelet concave on the back with the keels distant; joints and pedicels stout, clavate, shortly ciliate; culms sparingly branched from the upper nodes ... 36. *A. pinguiipes.*

\*\*Racemes solitary.

Racemes 1½-2½ in. long; sessile spikelets 2½-3 lin. long; upper glume with a terminal bristle, 2 lin. long; leaf-blades laterally compressed, folded, midrib forming a high keel; culm sparingly branched above ... 37. *A. textilis.*

Racemes 1½ in. long; sessile spikelets 2 lin. long; upper glume without a terminal bristle; leaf-blades flat, midrib very slender; culm with appressed barren branches almost all along ... 38. *A. Macleodiæ.*

IV. NOTOSOLEN.

Leaf-blades rather thin; spatheate panicle very large, decomposed; racemes 1-1½ in. long; joints and pedicels linear, slightly widened at the tips, subtransparent; sessile spikelets 2½ lin. long ... 39. *A. tectorum.*

Leaf-blades somewhat firm to very firm; spatheate panicle not or hardly decomposed, usually more or less contracted; racemes 1½-2½ in. long; joints linear to clavate-cuneate, stout and firm; sessile spikelets 2¼-4½ lin. long.

Leaf-blades rarely over 8 lin. wide, much attenuated at the base and there often reduced to the terete midrib, somewhat firm; joints and pedicels clavate-cuneate.

Mouth of leaf-sheaths produced laterally into long (2 to more than 5 lin.) acute lanceolate auricles, at first adnate to the longer ligule, at length often breaking away from it; blades up to 4 lin. wide 40. *A. auriculatus.*

Mouth of leaf-sheaths forming rounded shoulders or only slightly produced and adnate to the short (rarely much over 1 lin. long) ligule.

Spikelets  $2\frac{1}{2}$ –3 lin. long; joints and pedicels shortly ciliate; awns very slender, up to 4–6 lin. long... .. 41. *A. gabonensis*.

Spikelets 3–4 lin. long; joints and pedicels villously-ciliate on one or both sides; awns usually 9–15 lin. long ... .. 42. *A. gayanus*.

Leaf-blades very large (to over 2 ft. by  $1\frac{1}{2}$  in.), usually broad at the base and gradually passing into the sheath, very firm and rigid; joints and pedicels linear ... .. 43. *A. macrophyll-*<sup>[us.]</sup>

1. **A. amethystinus**, *Steud. Syn. Pl. Glum.* i. 371. Perennial, compactly caespitose, 1 to over  $1\frac{1}{2}$  ft. high. Culms simple, slender, erect, 1-noded, terete, glabrous, smooth, the internodes grooved downwards. Leaf-sheaths terete, tight, glabrous, firm, the lower up to 3 in. long, more or less persistent; ligules oblong to oblong-lanceolate, up to  $2\frac{1}{2}$  lin. long, decurrent on the sheath, membranous, glabrous; blades very narrowly linear, tapering to a fine point, up to over 1 ft. long,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. wide, rigid or slightly flexuous, flat or revolute along the margins, glabrous, smooth apart from the scabrid margins; midrib relatively stout, whitish, prominent below; lateral nerves about 3 on each side, very fine and close. Peduncles filiform, glabrous or more or less hairy towards the tips, to over 1 ft. long. Racemes 2-nate, 2–3 in. long, one subsessile, the other (rarely both) with a short more or less hairy base, olive-green to dull violet; joints linear,  $1\frac{1}{2}$ –2 lin. long, shortly and densely ciliate on both sides, tips truncate; pedicels very similar if not slightly more slender. Sessile spikelets linear-lanceolate, 3– $3\frac{1}{2}$  lin. long; callus obtuse, shortly and densely bearded. Glumes subequal, lower chartaceous, minutely and more or less unequally 2-denticulate, flat or very shallowly grooved downwards on the back, glabrous or sparingly hairy, keels not or obscurely winged, wings like the inflexed margins equal on both sides or nearly so; intracarpal nerves 5–7, prominent, evenly distributed, slightly rough; upper glume slightly shorter, submembranous, narrowly boat-shaped, 3-nerved, ciliate, with a bristle up to 3 lin. long from a minute terminal notch. Lower floret reduced to a hyaline oblong obtuse 2-nerved ciliate valve 3 lin. long. Upper floret ♀: valve oblong, over  $2\frac{1}{2}$  lin. long, 2-fid to one-third from the base with narrow linear lobes; awn slender, 5–8 lin. long, kneed at and twisted below the middle; valvule 0. Anthers  $1\frac{3}{4}$  lin. long. Pedicelled spikelet ♂ or neuter, lanceolate-oblong, acuminate, up to 3 lin. long, glabrous or sparingly hairy; lower glume thinly chartaceous, unequally 2-dentate, with a short bristle from between the teeth; intracarpal nerves 7–11; upper glume very acute, sometimes produced into a mucro or short bristle, up to  $1\frac{1}{2}$  lin. long, ciliate; valves of both florets if present





delicately hyaline, ciliate, 2- and 1-nerved respectively or almost nerveless.—Hack. in DC. Monogr. Phan. vi. 464 (excl. var. *Lima*); Durand & Schinz, Consp. Fl. Afr. v. 705 (excl. var. *Lima*); K. Schum. in Engl. Pfl. Ost-Afr. C. 98; Pilger in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr. ii. 42.

**Nile Land.** Abyssinia: Simen; Mount Bachit, 11,000–12,000 ft., *Schimper*, 95! Acallo Meda, 10,500 ft., *Schimper*, 358!

**Mozambique Distr.** German East Africa: Kilimanjaro; above Romba, 9200 ft., *Volkens*, 1920! Ruanda; between Mount Sabuya and Mount Mghinga, in meadows, 8200–8500 ft., *Mildbraed*, 1740.

Hackel's varieties *genuinus* (*Schimper*, 350—the number should probably read 358) and *breviaristatus* (*Schimper*, 95), represent evidently individual variations. Both were collected on Mount Bachit by Schimper.

(Hack.)

- ✓ 2. A. *Lima*, *Stapf*. Perennial, compactly caespitose, up to 3 ft. high. Culms simple, slender, 2–3-noded, terete, or slightly compressed towards the nodes, glabrous, smooth, the internodes not grooved. Leaf-sheaths terete, tight, glabrous, firm, the basal up to over 6 in. long, more or less persistent; ligules oblong, up to 2 lin. long, decurrent on the sheath, membranous, glabrous; blades very narrowly linear to filiform, tapering to a slender point, up to over 1 ft. long,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. wide, very rigid and tough, flat or revolute along the margins, very scabrid above on the outer lateral nerves and the margins or all over upwards, otherwise less so or almost smooth; midrib very broad, flat and whitish above, narrower and rounded below, lateral nerves about 3 on each side, very close, prominent. Peduncles filiform, glabrous, to over 1 ft. long. Racemes 2-nate,  $\frac{1}{2}$ – $\frac{4}{5}$  in. long, both with a more or less hairy base, sometimes with an additional 1-noded raceme at the base; racemes 3 to over 6 in. long, very slender and flexuous, rather dense, olive-green and tinged with dull purple or violet; joints linear, 2–2 $\frac{1}{2}$  lin. long, very shortly and appressedly ciliate on one side, glabrous or almost so on the other, tips obliquely truncate; pedicels very similar, if not more slender. Sessile spikelets linear-oblong, 4 $\frac{1}{2}$  lin. long; callus very short and shortly bearded. Glumes equal; lower chartaceous, minutely unequally 2-denticulate, shallowly concave on the back, glabrous, narrowly and subequally winged on the scabrid keels, inflexed margins very narrow, equal on both sides; intracarpal nerves 2 on each side very close to the keels, none in the middle; upper glume subchartaceous, narrowly boat-shaped, 3-nerved, ciliate with a bristle up to 2 lin. long from a minute terminal notch. Lower floret reduced to a hyaline narrowly oblong obtuse 2-nerved ciliate valve, 3 $\frac{1}{2}$  lin. long. Upper floret ♂: valve oblong, 2 $\frac{1}{2}$  lin. long, 2-fid to the middle with narrow linear acute subciliate lobes, chartaceous below; awn 5–7 lin. long, kneed at and twisted below the middle; valvule 0. Pedicelled spikelet linear to lanceolate-oblong, subacute, up to 4 lin. long, glabrous; lower glume thinly

chartaceous, obscurely and unequally 2-denticulate, with a short terminal bristle; keels indistinctly winged, intracarinal nerves 2 on each side very close to the keels, and one middle nerve; upper glume very acute, mucronate, sub-3-nerved, ciliate; valve of lower floret oblong, 2-nerved, ciliate; upper floret reduced to a perfect or imperfect ♂ flower.—*A. amethystinus*, var. *Lima*, Hack. in DC. Monogr. Phan. vi. 464; Durand & Schinz, Conspr. Fl. Afr. v. 705. *A. brachyatherus*, Hook. f. in Journ. Linn. Soc. Bot. vii. 231.

**Upper Guinea.** Cameroons: Cameroon Peak, 8000 ft., *Mann*, 2084!

The affinity of this species with the preceding is so evident that it must be placed here in spite of the presence of a nerveless median groove in the lower glume of the sessile spikelet, a character which would seem to point rather to the section *Leptopogon*.

**3. *A. distachyus***, *Linn. Sp. Pl. ed. i.* 1046. Perennial, caespitose, 1–2½ ft. high, with a short oblique rhizome and extravaginal innovations; their cataphylls hairy to villous at the base. Culms erect, slender, terete, about 3-noded, simple or branched below, glabrous, internodes exserted. Leaf-sheaths terete, tight, glabrous or, particularly the lowest, hairy; ligules hairy, truncate, very short, up to 1 lin. long, ciliolate; blades linear, tapering to a long and sometimes setaceous point, 2 to over 8 in. by  $\frac{3}{4}$ –2, rarely 2½, lin., flat, rigid to flaccid, more or less hairy, at length often glabrescent, or glabrous from the beginning, more or less rough above and scabrid on the margins, midrib fine, whitish; primary lateral nerves 3–4 on each side, fine; subtending leaves often spathaceous, subherbaceous to herbaceous, soon tightly convolute, 3–5 in. long excluding the setaceous to foliaceous short blade. Peduncles filiform, glabrous, 5–9 in. long, tips articulate, shortly bearded, truncate. Racemes 2-nate (exceptionally 3–5-nate), one sessile, the other with a short base, rather robust, straight or curved, greenish, often tinged with a dull or livid purple, 2–4 in. long; joints cuneate-linear, hollow and very slightly inflated, rarely slender, up to 1½–2 lin. long, semitransparent along the middle, glabrous to subpubescent on the back, ciliate along the outer margin, cilia  $\frac{1}{2}$  to almost 1 lin. long; tips slightly cupular; pedicels similar, slightly longer and more translucent. Sessile spikelets all heterogamous (or the lowest of the sessile raceme usually imperfect), broad-lanceolate to acuminate, 4½–5½ lin. long, pale green, tips often purplish; callus short, obtuse, shortly bearded. Glumes unequal; lower subherbaceous or chartaceous or hyaline in the slender acumen, flat on the back, glabrous or puberulous, rarely villous; keels running out into mucros or fine bristles, distinctly winged, wings thin, whitish or purplish; intracarinal nerves 7–11, partly evanescent below, evenly distributed; upper glume distinctly shorter, rigidly membranous, boat-shaped, 3-nerved, softly ciliate, tips minutely 2-toothed, with an interposed bristle up to 3 lin. long. Lower floret reduced to an oblong subacute or acute





2-nerved ciliate hyaline valve,  $2\frac{1}{2}$ -3 lin. long. Upper floret ♂: valve of almost the same length as that of the lower, slightly gibbous on the back, 2-fid to beyond the middle, chartaceous and 3-nerved below, lobes lanceolate, glabrous; awn slender, about 1 in. long, kneed at and twisted much below the middle; valvule very minute or 0. Anthers  $1\frac{1}{2}$  lin. long. Grain oblong, 1 lin. long. Pedicelled spikelet similar to the sessile, but narrower, about 4 lin. long, with the lower glume very narrowly winged and terminated by a bristle up to over 3 lin. long; upper glume much shorter than the lower, membranous, 3-nerved, shortly aristulate; valves of both florets delicately hyaline,  $2\frac{1}{2}$ -2 lin. long, of the lower ciliolate and faintly 2-nerved, of the upper glabrous, 1-nerved and slightly notched.—Jacq. Ic. iii. 630; Host, Gram. Austr. iii. 2; Sibth. & Sm. Fl. Græc. i. 53. t. 69; Kunth, Enum. i. 491; Steud. Syn. Pl. Glum. i. 372; Hook. f. in Journ. Linn. Soc. Bot. vii. 231; Hack. in DC. Monogr. Phan. vi. 461; Durand & Schinz, Consp. Fl. Afr. v. 710; Klatt in Jahrb. Hamb. Wiss. Anst. ix. 121; Penzig in Atti Congr. Bot. Genova, 364; Schweinfurth in Bull. Herb. Boiss. ii. App. ii. 10 and 93; Klatt in Durand & De Wild. Mat. Fl. Congo, i. 44; Stapf in Dyer, Fl. Cap. vii. 343; De Wild. & Durand, Contr. Fl. Congo, i. fasc. 2, 75 and Reliq. Dewèvr. 254; Th. & Hël. Durand, Syll. Fl. Congol. 625; Chiov. in Ann. Istit. Bot. Roma. viii. 24, 280.

**Upper Guinea.** Cameroons: Cameroon Peak, 7000-9000 ft., *Mann*, 1345! 2078!

**Nile Land.** Eritrea: Mensa; Gheleb, *Penzig*. Amasen; Asmara, *Pappi*, 2129! 2144, 4359; Mount Bizen, *Schweinfurth*, 2023; Saganeiti, *Schweinfurth & Riva*, 1197! between Anseba and Az Taclesan, *Tellini*, 455; Mount Lesa, *Pappi*, 83! 4614! 4624; Mai-Hinzi, *Pappi*, 3338, 3361, 3382; Dongollo, near Ghinda, *Pappi*, 4544; Mount Arbaroba, *Pappi*, 4575; Addi-Nepas, *Pappi*, 4156, 4159; Medrizien, *Pappi*, 3553; At-Zien, *Pappi*, 5285. Oculé-Cusai; Mount Saic-Ara, 9600 ft., *Pappi*, 86! 2008! Soyra Mountains; Mount Mamahot, up to 9800 ft., *Pappi*, 1261, 1269, 1275; Mount Metaten, 8100 ft., *Pappi*, 1572; Addi Caje, *Pappi*, 1917; Halai, 8400 ft., *Pappi*, 1967; Plateau of Kohaito, *Schweinfurth*, 43! Ambelaco; near Maldi, *Schweinfurth*, 44. Assaorta; Mount Rijot, *Pappi*, 2969. Abyssinia: near Adowa, *Schimper*, 290 partly! Debra Eski, up to 9800 ft., *Schimper*; Bellaka, *Schimper*; Tigre or Begemeder, *Schimper*, 1027! 1831! Ankober, *Roth*, 167!

**Lower Guinea.** Belgian Congo: Boma, *Dewèvre*; Bingila and Kisantu, *Gillet*.

**Mozambique Distr.** Portuguese East Africa: Quilimane, *Stuhlmann*.

Widely distributed through the Mediterranean Region from the Canaries and Southern Europe to Syria, also in South Africa and in Tropical Arabia.

Several subvarieties have been distinguished; of these the following are recorded from Eritrea by Hackel, l.c., and by Chiovenda, l.c. 281:—1, *genuinus*, Hack., with glabrous spikelets; 2, *pubescens*, Parl., with hairy spikelets; 3, *dasytachyus*, Hack. l.c. 462, with still more hairy spikelets; 4, *luxurians*, Chiov., a robust state with 3-4-nate racemes and glabrous spikelets; and 5, *alpina*, Chiov., a dwarfed condition, hairy all over, with short racemes and small scaberulous spikelets,  $3\frac{1}{2}$ -4 lin. long. It seems to me that none of these forms, with the possible exception of the last, are more than individual variations or ecological states.

4. *A. pratensis*, *Hochst. ex Hack. in DC. Monogr. Phan.* vi. 463. Perennial, stoloniferous, throwing up fascicled culms and innovations

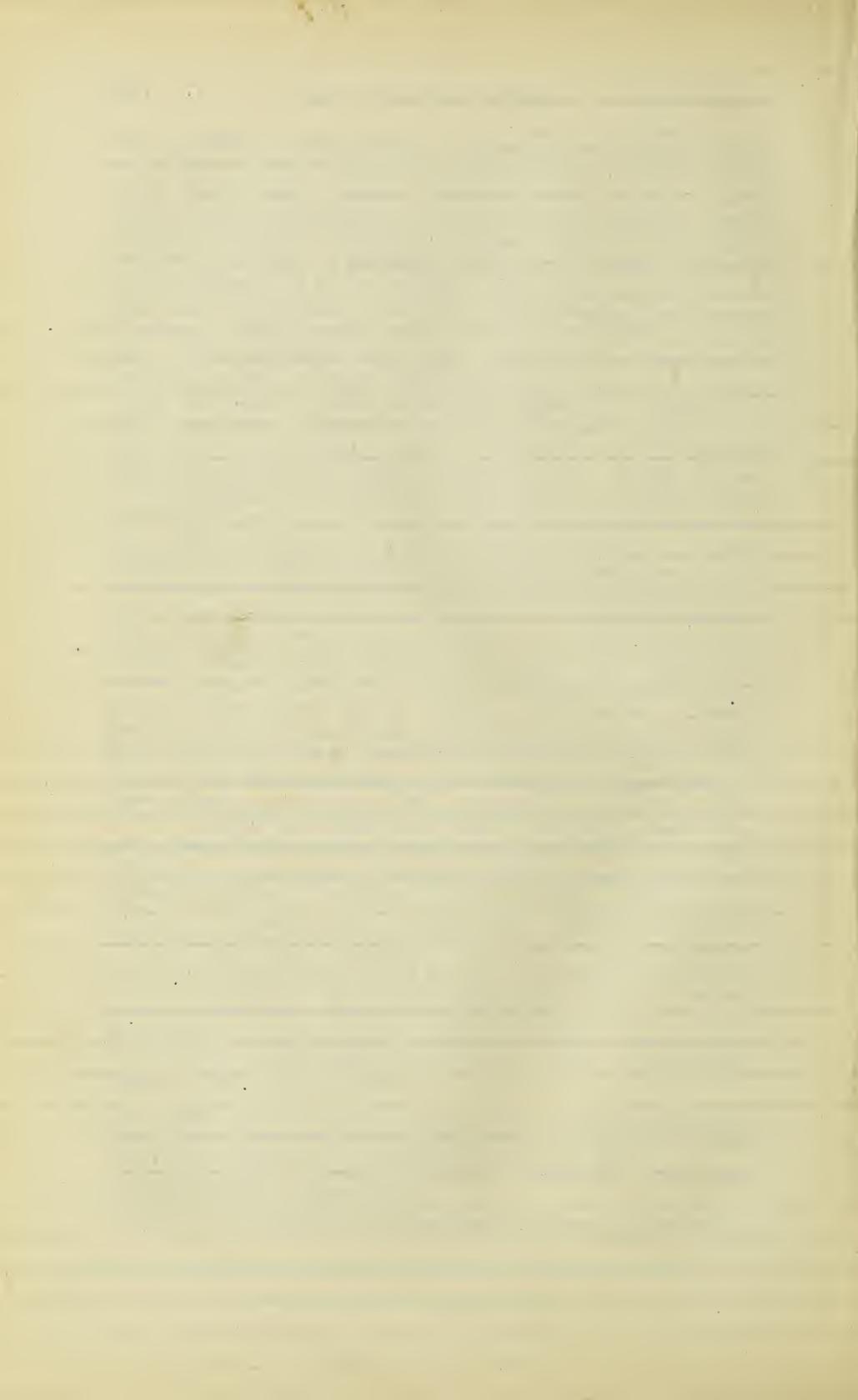
from a slender creeping rhizome; innovations extravaginal, coated at the base with short glabrous smooth cataphylls. Culms to over  $1\frac{1}{2}$  ft. high, slender, simple, 1-2-noded, terete, glabrous. Leaf-sheaths terete, tight, glabrous, or more or less hairy upwards; ligules very short, truncate, membranous, ciliolate; blades linear, slightly rounded at the base or gradually passing into the sheath, tapering to a fine point, 2-3 in. by  $1-1\frac{1}{2}$  lin. or the cauline much reduced, pale green, loosely hairy, hairs very fine, spreading from minute tubercles; midrib very fine, primary lateral nerves about 2 on each side. Peduncles filiform, 4-9 in. long. Racemes 2-nate, one sessile, the other, or both, with short filiform glabrous or more or less hairy bases, dull violet to almost slate-colour, dense,  $1\frac{1}{2}$  to almost 2 in. long; joints linear, slightly and gradually widened upwards,  $1\frac{1}{2}$  lin. long, more or less shortly ciliate on both sides, tips subobliquely truncate; pedicels very similar but more slender. Sessile spikelets all heterogamous (or the lowest of the sessile or subsessile raceme imperfect), linear-oblong or linear-lanceolate,  $3\frac{1}{2}$  to slightly over 4 lin. long; callus obtuse, up to  $\frac{1}{2}$  lin. long, minutely bearded. Glumes subequal, lower thinly chartaceous, unequally 2-denticulate, flat or shallowly grooved downwards on the back, glabrous or sparingly hairy, more or less unequally keeled, one keel markedly winged upwards and often running out into a mucro, the other very narrowly and shortly winged, margins sharply inflexed, unequally wide; intracarpal nerves prominent, about 5-7, evenly distributed, scaberulous upwards; upper glume slightly shorter, submembranous, narrowly boat-shaped, 3-nerved, ciliate, aristulate from the minute notch; bristle about 2 lin. long. Lower floret reduced to a hyaline oblong obtuse 2-nerved ciliate valve, up to 3 lin. long. Upper floret ♂: valve oblong, up to almost 3 lin. long, gibbous below the middle, 2-fid to beyond the middle with narrow lanceolate ciliate lobes; awn slender, 5-8 lin. long, bent and twisted below the middle; valvule 0. Grain oblong,  $1\frac{1}{2}$  lin. long, slightly convex on the back. Pedicelled spikelet ♂ or neuter (?), linear, oblong,  $2\frac{1}{2}-3\frac{1}{2}$  lin. long, glabrous or sparingly hairy; lower glume thinly chartaceous to membranous, unequally 2-dentate with a short bristle from between the teeth, intracarpal nerves 3 or more; upper glume somewhat shorter, subhyaline, very acute, mucronulate, ciliate, 3-nerved; valves of both florets delicately hyaline, ciliolate, 2- and 1-nerved respectively or almost nerveless.—Durand & Schinz, *Consp. Fl. Afr.* v. 720; Chiov. in *Ann. Istit. Bot. Roma*, viii. 281. *A. seemenianus*, Pilger in *Engl. Jahrb.* xliii. 384.

**Nile Land.** Eritrea: Amasen; Asmara, 7500 ft., *Pappi*, 2219, 2222; Taclesan, 7200 ft., *Terracciano & Pappi*, 386; Ocule Cusai; Addi Cajé, 8000 ft., *Pappi*, 1916. Abyssinia: Debra Eski, 9300 ft., *Schimper*, 1001!

**Mozambique Distr.** German East Africa: Kilimanjaro; Kimo Gorge, gregariously, 9200 ft., *Volkens*, 1158!

Hackel, l.c., distinguishes two subvarieties, (1) *genuinus*, (2) *pilosus*. To





these Chioventa adds a var. *pseudoabyssinicus*. They differ in the presence or absence of hairs on the back of the first glume of the spikelets. These forms evidently grow together and represent merely individual fluctuations.

- ✓ 5. **A. pilosellus**, Stapf. Perennial, densely tufted, with numerous innovations from a short oblique rhizome,  $1\frac{1}{2}$  ft. high. Culms geniculate or straight, erect, very slender, 2-3-noded, simple, somewhat compressed below and grooved on one side, glabrous, smooth, internodes (at least the intermediate and upper) exerted. Leaf-sheaths tight, the lowest more or less compressed and very narrow,  $1-1\frac{1}{2}$  in. long, with their glabrous bases persistent, smooth, more or less finely hirsute upwards and bearded at the mouth; ligules delicately membranous, ciliolate and sparingly long-hairy from the back,  $\frac{1}{2}-\frac{3}{4}$  lin. long; blades narrow-linear, slightly attenuated at the base, long-tapering to a fine point, 4-6 in. by  $\frac{3}{4}-1\frac{1}{4}$  lin., slightly rigid, flat, subglaucous, shortly and finely hirsute on both sides but particularly below, pruinose above, scabrid along the margins almost from the base, midrib very slender throughout, whitish, primary lateral nerves 2-3 on each side, very fine; subtending leaves spathaceous, soon convolute and very narrow,  $3-3\frac{1}{2}$  in. long, excluding the more or less rudimentary herbaceous blade. Peduncles filiform, very slender, long-exserted, hairy towards the tips. Racemes 2-nate, one sessile, the other with a short hairy base,  $1\frac{1}{2}$  to over 2 in. long, slender, dense, villous, greyish, subflexuous; joints linear, slightly wider upwards,  $1\frac{1}{4}$  lin. long, subtransparent between the thickened edges, densely and long ciliate on both sides (cilia up to over  $1\frac{1}{2}$  lin. long), glabrous on the back, at least along the middle, but often hidden by the callus hairs and cilia lying across it; tips obscurely cupular, truncate; pedicels similar, but more slender and transparent and less copiously ciliate, up to  $1\frac{3}{4}$  lin. long. Sessile spikelets heterogamous (except the lowest of the sessile raceme which is awnless and imperfect), lanceolate-oblong,  $3\frac{1}{2}$  lin. long; callus short, obtuse, with a dense beard somewhat exceeding it. Glumes subequal; lower subchartaceous, long-hirsute from the flat back, unequally 2-dentate, the longer tooth produced into a very fine mucro, unequally winged from the keels, one wing very narrow, intracarinal nerves very fine and close, about 9; upper glume membranous, narrowly boat-shaped, loosely hairy on the back, aristulate from the minutely notched tips, 3-nerved, ciliate. Lower floret produced to an oblong truncate 2-nerved ciliate hyaline valve, up to  $2\frac{1}{2}$  lin. long. Upper floret ♂: valve  $2\frac{1}{2}$  lin. long, 2-fid to below the middle, cuneate-oblong and subchartaceous below the linear-lanceolate acute ciliate lobes, gibbous on the back, awn slender, 7-8 lin. long, bent at and twisted below the middle; valvule 0. Pedicelled spikelet neuter, reduced to the glumes, up to  $2\frac{1}{2}$  lin. long; lower glume lanceolate-oblong, more or less involute, minutely 2-toothed and shortly aristulate, keels very narrowly winged, hirsute, intracarinal nerves about 2,

fine; upper glume hyaline, oblong, truncate, about half the length of the lower, sub-2-nerved, ciliolate.—*A. abyssinicus*, Chiov. in Ann. Istit. Bot. Roma, viii. 281, partly, not R. Br.

+ Nile Land. Eritrea: Amasen; At-Zien, 8200 ft., *Pappi*, 5285

6. *A. abyssinicus*, R. Br. ex Trev. in Mus. Senkenb. ii. (1837) 146. Annual, loosely tufted, up to 2 ft. high. Culms geniculate, erect, few-noded, simple or sparingly branched from below or the middle, with the branches solitary, erect and flowering, terete, glabrous, smooth, the internodes channelled downwards. Leaf-sheaths terete, loose, glabrous, smooth, shorter than the internodes; ligules short, membranous, truncate, ciliolate, hairy; blades narrowly linear, long-tapering to a fine point, 5–9 in. by  $1\frac{1}{2}$ –2 lin., soft, flat, green, glabrous or sparingly hairy from minute tubercles, smooth; midrib slender, prominent below, broader and whitish above, primary lateral nerves 2–3; subtending leaves spathaceous, subherbaceous, narrow, 3–6 in. long, soon convolute, with a herbaceous more or less reduced short blade. Peduncles filiform, up to 9 in. long. Racemes 2-nate, one subsessile, the other with a short hairy base, rather stout, more or less flexuous, densely whitish-villous, 3–4 in. long; joints narrowly cuneate-linear,  $1\frac{1}{2}$  lin. long, transparent between the thickened edges, densely hairy on the back and sides, hairs up to  $1\frac{1}{2}$  lin. long, tips on one side produced into a short membranous crenulate auricle; pedicels very similar but up to more than 2 lin. long. Sessile spikelets oblong-lanceolate, acuminate, 3–4 lin. long including the callus; callus obtuse,  $\frac{3}{4}$  lin. long, with 2 oblong transparent areoles and a beard up to 2 lin. long. Glumes subequal, membranous; lower unequally minutely 2-dentate, densely hairy on the back, hairs 2– $2\frac{1}{2}$  lin. long, keels with very narrow subhyaline wings, intracarinal nerves about 6–7, very fine, evenly distributed; upper glume narrowly boat-shaped, sparingly hairy, 3-nerved, ciliolate, with a bristle up to 3 lin. long from a small terminal notch. Lower floret reduced to a linear-oblong delicately hyaline almost nerveless ciliate valve. Upper floret ♀: valve gibbous, up to over  $2\frac{1}{2}$  lin. long, 2-fid to the middle, cuneate-oblong and 3-nerved below; lobes lanceolate, very acute, ciliate; awn 8–12 lin. long, fine, flexuous, bent at and twisted below the middle; valvule 0. Anthers imperfect, without pollen, white,  $\frac{1}{2}$ – $\frac{2}{3}$  lin. long, on capillary filaments. Pedicelled spikelet ♂ or ♀ or functionally ♀, lanceolate, acuminate, 3 lin. long; lower glume long-hairy on the back like that of the sessile spikelet, 2-mucronate, with a fine bristle up to  $2\frac{1}{2}$  lin. long from between the mucros; keels delicately winged, intracarinal nerves numerous, very fine and close, the middle one more marked than the remainder; upper glume subhyaline, acute, aristulate, 3-nerved, ciliate; valve of lower floret oblong-obtuse, 2– $2\frac{1}{2}$  lin. long,





sub-2-nerved, ciliate, of upper floret lanceolate-oblong, 2-fid, ciliate, with a mucro from the sinus or more or less reduced and entire, with a ♂ or ♀ flower, the slender anthers 1-1½ lin. long, or as in the sessile spikelet.—A. Rich. Tent. Fl. Abyss. ii. 454; Hack in DC. Monogr. Phan. vi. 465; Durand & Schinz, Consp. Fl. Afr. v. 705.

**Nile Land.** Abyssinia: in wet places on Mount Sholoda, near Adowa, *Schimper*, 223 b! Bellaka, 6000-7000 ft., *Schimper*, 424! and without precise locality, *Schimper*, 922!

*Schimper*, 424, has the appearance of a weak specimen of *A. abyssinicus*, but the backs of the joints and pedicels are either appressedly pubescent or scantily covered with longer and more spreading hairs.

**7. *A. polyatherus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 455.**  
 Annual, ½-1½ ft. high. Culms in loose fascicles, geniculate, erect, about 2-noded, very slender, simple or with a branch from the lower node enclosed in a sheath, glabrous, smooth, internodes exerted. Leaf-sheaths rather loose, striate, glabrous, smooth; ligules membranous, glabrous, up to 1 lin. long, truncate; blades linear, tapering to a fine point, 3-9 in. long, 1-2 lin. wide, green, flaccid, loosely hairy, hairs very fine, spreading from very minute tubercles; margins smooth or slightly rough upwards; midrib very slender, prominent below, primary lateral nerves 2-3 on each side; subtending leaves spathaceous, subherbaceous, glabrous, smooth, 2-3 in. long, excluding the herbaceous blades. Peduncles filiform, 4 to over 6 in. long, glabrous. Racemes 2-nate, both with very short unequal and hairy bases, 2 in. long, rather robust, dense, subflexuous, loosely hairy on one side, very sparingly on the other; joints stoutly linear, slightly wider upwards, 1½ lin. long, transparent between the thickened edges, glabrous on the back, densely appressedly and shortly ciliate (cilia up to 1 lin. long), tips on one side produced into a small membranous auricle; pedicels similar but 2-2¼ lin. long and appressedly pubescent on the back. Sessile spikelets ♀, elliptic-lanceolate, 3-3¼ lin. long including the callus, pale greenish; callus obtuse, ½-⅔ lin. long, not or obscurely transparent, bearded. Glumes subequal, lower submembranous, shortly acuminate, unequally and minutely 2-dentate, flat on the back, up to over 1 lin. wide, loosely hairy (hairs up to 1½ lin. long), keels with subequal transparent wings, intracarinal nerves about 7, fine, evenly distributed, stopping short of the acumen which is hyaline between the keel-nerves; upper glume membranous, boat-shaped, gibbous, 3-nerved, with a bristle up to over 3 lin. long from a small terminal notch. Lower floret reduced to an oblong hyaline 3-nerved ciliate valve, 2½ lin. long. Upper floret ♂; valve over ½ lin. long, 2-fid to and gibbous at the middle, cuneate-oblong below, lobes linear-lanceolate, acute, ciliate; awn up to 8 lin. long, very slender, kneed at and twisted

below the middle; valvule 0. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelets ♂ or neuter, rarely ♀, broad-lanceolate, 3 lin. long, greenish or somewhat livid; lower glume submembranous, very sparingly hairy to glabrous, unequally 2-dentate, with a bristle  $3-3\frac{1}{2}$  lin. long from between the teeth, keels narrowly winged, intracarinal nerves numerous, close, fine, the middle one more distinct; upper glume subhyaline, acutely acuminate, with a bristle about  $1\frac{1}{2}$  lin. long, 3-nerved; valves of both florets delicately hyaline, sparingly ciliate, of the lower 2-nerved, of the upper nerveless and shortly 2-fid,  $2\frac{1}{2}$  and 2 lin. long respectively. Anthers (if any) over 1 lin. long.—Hack. in DC. Monogr. Phan. vi. 466; Durand & Schinz, Consp. Fl. Afr. v. 720; K. Schum. in Engl. Pf. Ost-Afr. C. 98; Chiov. in Ann. Istit. Bot. Roma, viii. 282.

**Nile Land.** Eritrea: Amasen; At-Zien, 8200 ft., *Pappi*, 5295 (a); Asmara, *Pappi*, 4347 (a), 4360 (β); between Halibaret and Asmara, *Tellini*, 678 (β); between Halibaret and Amba Derho, *Tellini*, 968 (β); Sala Dharó, 7550 ft., *Pappi*, 2296 (a, 5); Bogos; Keren, *Tellini*, 874 (a, 1); Saraé, along the Mareb near Debarroa, 6200 ft., *Pappi*, 500 (a, 1); near Gundet, 5570 ft., *Pappi*, 357, 374 (a, 5); Gaza Gobò, 7550-8200 ft., *Pappi*, 116, 187, 222, (a, 2) 200 (a, 5); Adi Ugri, 6200 ft., *Pappi*, 32 (a, 5); Schimezano; plateau of Gheleba, 8150 ft., *Pappi*, 831 (β); Oculè Cusai; Deca Merè, 6550 ft., *Pappi*, 2443 (a, 5). Abyssinia: hills near Adowa, *Schimper*, 290 (a, 1)! 1115 (a, 4)! 1981 (a, 1)! Loetho, 8000 ft., *Schimper*, 476 (a, 1 & 3)! Debra Eski, *Schimper* (a, 2); near Gadia, *Schimper*, 805 (a, 3)! and without precise locality, *Schimper*, 223, (a) (β).

Hackel, l.c., distinguishes 2 varieties, one of them with 5 subvarieties. They may be keyed as follows, the letters and numbers used in the key and in the above enumeration corresponding to his designations.

- Pedicelled spikelets ♂, their fertile valve muticous, 2-dentate ... .. a. *genuinus*.  
 Sessile spikelets  $3-3\frac{1}{2}$  lin. long, ovate- or broad-lanceolate; lower glume narrowly or very narrowly winged, awn 8-10 lin. long.  
 Sessile spikelets more or less hairy; joints ciliate on both sides.  
 Racemes  $1\frac{2}{3}-2\frac{1}{2}$  in. long, wings almost suppressed, awn 8 lin. long ... .. a. 1 *genuinus*.  
 Racemes  $1\frac{1}{2}$  in. long, wings narrow, awn 10 lin. long ... .. a. 2 *apterus*.  
 Sessile spikelet glabrous; joints ciliate on one side only; racemes  $1\frac{1}{3}-1\frac{2}{3}$  in. long; wings narrow; awn  $8\frac{1}{2}$  lin. long (*A. glabrescens*, Hochst. ex Hack. l.c. 467) ... .. a. 4 *glabrescens*.  
 Sessile spikelets 4-5 lin. long; racemes  $3-3\frac{1}{3}$  in. long; joints ciliate on both sides.  
 Sessile spikelet glabrous, lanceolate, wings indistinct and short ... .. a. 3 *scabriglumis*.  
 Sessile spikelet hairy, broad ovate-lanceolate, wings broad ... .. a. 5 *multinervis*.  
 Pedicelled spikelets ♀, their fertile valve awned; racemes to over 4 in. long; sessile spikelets 5 lin. long, ovate-lanceolate, hairy, wings narrow (*A. plagiopus*, Hochst. ex Hack. l.c. 467) ... .. β. *plagiopus*.

I suspect that all these forms are either determined by conditions of nutrition or come within the range of individual variations. The size and width of the





spikelets, the width of the wings, and the degree of hairiness differ within the racemes of the same individual; the sexual conditions are similarly unstable in this and the immediately allied species. The specimen at Kew from Loetha, Schimper, 476, differs in no way from what Hackel calls typical *A. polyatherus*. A. Richard evidently came to the same conclusion in so far as the subvarieties 1, 4 and 5—the only ones known to him—are concerned, and abstained from giving them a special status within the species.

**8. *A. kilimandscharicus*, Pilger in Engl. Jahrb. xliii. 384.** Perennial, compactly caespitose, innovations intravaginal, very numerous, usually very short. Culms simple, slender, erect, 3–9 in. high, compressed below, glabrous, smooth or hairy towards the tips, 1–2-noded. Leaf-sheaths smooth, striate, glabrous except for a beard of hairs at the mouth, those of the innovations compressed and more or less keeled, 1 to over 2 in. long, the cauline terete, rather tight, up to  $2\frac{1}{2}$  in. long; ligules very short, rounded or truncate, long-ciliate; blades very narrow, linear to filiform, subacute, somewhat rigid,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long,  $\frac{1}{2}$ –1 lin. wide, flat or convolute, glabrous, more or less scabrid, particularly upwards and along the margins, midrib very slender, primary nerves about 2 on each side, very fine; subtending leaves spathaceous, subherbaceous, narrow, soon convolute and tight, with short subfiliform blades. Peduncle 2–4 in. long, hairy towards the tips. Racemes 2-nate, one sessile, the other with a short base,  $1$ – $1\frac{1}{2}$  in. long, erect, densely villous; joints and pedicels linear, hardly widened upwards,  $1\frac{1}{2}$  lin. long, densely ciliate on both sides, cilia 1 lin. long, tips truncate. Sessile spikelets all heterogamous (except the lowest of the sessile raceme which is ♂ and awnless), linear-lanceolate, 3 lin. long; callus short, obtuse, bearded. Glumes subequal, lower chartaceous, finely acuminate, minutely 2-denticulate, white-hairy on the back, keels minutely scaberulous, intracardinal nerves 2, with 1–2 additional short ones above the middle, tips nerveless and hyaline between the keels; upper glume subchartaceous, narrowly boat-shaped, 3-nerved, with a small bristle from a terminal notch, hyaline margins broad upwards, densely ciliate. Lower floret reduced to an oblong subobtuse 2-nerved ciliate hyaline valve. Upper floret ♀: valve over 2 lin. long, shortly oblong, shortly 2-fid, with acute lobes, ciliate, 3-nerved below; awn very fine, 3–6 lin. long, kneed at and twisted below the middle; valvule 0. Pedicelled spikelet ♂, oblong-lanceolate, acute,  $2$ – $2\frac{1}{2}$  lin. long; lower glume subchartaceous, more or less hairy, with a distinct raised middle nerve and three very close and fine nerves in the keels, upper acutely acuminate, 3-nerved; valve of lower floret oblong, acuminate, 2 lin. long, hyaline, 2-nerved, ciliate, of upper linear-oblong,  $1\frac{1}{2}$  lin. long, 1-nerved, minutely emarginate; anthers  $1\frac{1}{4}$  lin. long.

**Mozambique Distr.** German East Africa: Kilimanjaro; in the crater, 10,500 ft., *Volkens*, 1860!

A raceme infested with *Sphacelotheca* had diseased ovaries in some of the pedicelled spikelets.

9. **A. Mannii**, *Hook. f. in Journ. Linn. Soc. Bot.* vii. 232. Perennial, densely tufted, with numerous intravaginal innovation shoots,  $\frac{2}{3}$  to over 1 ft. high. Culms slender, erect or subgeniculate, strongly compressed, 1-noded, simple, appressedly hairy below the racemes, otherwise glabrous. Leaf-sheaths glabrous, smooth, those of the innovations and base of the culm strongly compressed and keeled,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, the only cauline sheath about  $2\frac{1}{2}$  in. long, somewhat loose; ligules very short, membranous, truncate, ciliolate; blades linear from a very shortly and slightly narrowed base, acute, the basal up to 3 in., the cauline up to 1 in. long, 1 to almost 2 lin. wide, green, folded or flat, glabrous with the exception of a few fine spreading hairs at the base, margin scaberulous, midrib fine, primary lateral nerves about 3 on each side. Peduncle 3–9 in. long, long-exserted. Racemes usually 3, rarely 2 or 4, digitate or subdigitate with short more or less hairy bases or the lateral sessile, dull greenish, tinged with violet,  $1\frac{1}{4}$  to nearly 2 in. long, erect; joints and pedicels filiform, not or very obscurely thickened upwards, up to  $1\frac{1}{2}$  lin. long, shortly ciliate on both sides, cilia about  $\frac{1}{2}$  lin. long, tips truncate, not or very obscurely cupular. Sessile spikelets all heterogamous, narrowly lanceolate, 3 lin. long, acuminate, olive-green, more or less tinged with purple; callus very short, obtuse, shortly bearded. Glumes equal, subchartaceous to membranous, glabrous; lower minutely 2-dentate, slightly concave on the back at least below the middle, very smooth and glossy, with 2 closely approximate nerves in each keel, keels acute and scaberulous upwards; upper glume narrowly boat-shaped, aristulate from the minute notch, 3-nerved, lateral nerves very faint. Lower floret reduced to a linear-oblong obtuse hyaline 2-nerved obscurely ciliate valve over 2 lin. long. Upper floret ♀: valve sublinear, under 2 lin. long, 2-fid to the middle with the lobes subulate and obscurely ciliate, awn fine, up to  $\frac{1}{2}$  in. long, kneed at and twisted below the middle; valvule a minute truncate scale. Anthers over 1 lin. long. Pedicelled spikelets ♂, lanceolate, acuminate, to over 3 lin. long, green or livid purple, glabrous; lower glume submembranous, with a more or less prominent median nerve and 2 or 3 slender nerves close to the keel; upper glume membranous, 3-nerved, mucronulate; lower floret reduced to a hyaline oblong nerveless obscurely ciliate valve; upper floret reduced to the ♂ flower; anthers up to  $1\frac{1}{2}$  lin. long.—Hack. in DC. Monogr. Phan. vi. 460; Durand & Schinz, *Consp. Fl. Afr.* v. 717. *Gymnandropogon sp.*, Hook. f. in *Journ. Linn. Soc. Bot.* vi. 23.

**Upper Guinea.** Fernando Po: Clarence Peak, 8500–9000 ft., *Mann*, 654! 1475!  
The anthers of some of the pedicelled spikelets appear to be atrophied.

10. **A. humilis**, *Hochst. ex A. Rich. Tent. Fl. Abyss.* ii. 453. Annual, 6–8 in. high. Culms very slender, geniculate, erect, about 3-noded, with simple flowering branches from all the nodes, glabrous,





smooth, internodes shorter than the sheaths. Leaf-sheaths thin, loose, soon slipping away from the culms, glabrous, smooth; ligules membranous, broad-oblong, up to 1 lin. long, glabrous; blades linear, tapering to a fine point, 2-5 in. by 1-1½ lin., green, flaccid, loosely and shortly hairy from small tubercles, smooth except for the margins which are more or less scaberulous upwards, midrib relatively broad above, very prominent and rounded below; subtending leaves spathaceous, thin, subherbaceous, glabrous, up to 2½ lin. long, at length convolute and narrow, mostly with herbaceous blades. Peduncles finely filiform, at length sometimes very shortly exerted. Racemes 2-nate, one sessile or subsessile, the other with a short slender base, 1-1½ in. long, slender, rather dense, pale green, almost glabrous, conspicuously marked by the blackish stigmas; joints slender, 1¼ lin. long, filiform, slightly thickened upwards, minutely scaberulous, sparingly and loosely ciliate, tips truncate; pedicels very similar, slightly longer. Sessile spikelets heterogamous (except the lowest of the sessile raceme which is often imperfect), oblong, acute, 2½-2¾ lin. long, greenish, darker upwards, glabrous; callus obtuse, like its dense beard very short. Glumes equal; lower shortly acuminate, minutely denticulate, slightly concave on the back, almost hyaline between the firmer sides, keels wingless, scaberulous, intracarinial nerves 2, green, close to each keel-nerve, and 1 or 2 short median below the hyaline acumen; upper narrowly boat-shaped, acute, 3-nerved, with a fine bristle up to 2 lin. long from between the teeth, ciliolate. Lower floret reduced to a linear-oblong truncate ciliate 2-nerved hyaline valve, over 2 lin. long. Upper floret ♂ or ♀; valve slightly shorter than the lower, gibbous at the middle and 2-fid beyond it, subchartaceous below, lobes linear-lanceolate, acute, ciliolate; awn very fine, 5-8 lin. long, bent at and twisted below the middle; valvule 0. Anthers 1¼ lin. long or barren, quite empty and transparent, up to ½ lin. long, on capillary filaments; stigmas over 1 lin. long, almost black, exerted from the middle. Pedicelled spikelets ♂, ♀ or ♂, narrowly lanceolate-oblong, acute, glabrous, 2¾ lin. long; lower glume submembranous, obscurely 2-denticulate, with a terminal bristle up to 1 lin. long, wingless, inflexed margins extremely narrow, intracarinial nerves about 7-9, very close, fine, the middle one more distinct; upper glume somewhat shorter, acutely acuminate, aristulate, 3-nerved, ciliate; valve of lower floret delicately hyaline, linear-oblong, truncate, 1½ lin. long, faintly 2-nerved, ciliolate, of upper suppressed; flower as in the sessile spikelet or ♂, with anthers 1 lin. long.—Hack. in DC. Monogr. Phan. vi. 467; Durand & Schinz, Consp. Fl. Afr. v. 715.

**Nile Land.** Abyssinia: on rocks near Jenausa, *Schimper*, 850!

All spikelets, whether sessile or pedicelled, examined by me were functionally ♀, with minute barren anthers. Hackel, however, describes the sessile as ♂ and the pedicelled as ♂ or ♂.

✓ 11. **A. homogamus**, *Stapf*. Perennial, compactly caespitose, with short intravaginal innovations, coated at the base with the glabrous ultimately fibrous sheath-bases, not much over  $\frac{1}{2}$  ft. high. Culms very slender, 1-noded, simple, geniculate, erect, glabrous, smooth. Leaf-sheaths glabrous or very sparingly hairy upwards, those of the innovations slightly compressed and keeled, about 1 in. long; ligules membranous, subtruncate, ciliolate,  $\frac{1}{2}$  lin. long; blades linear, tapering to an acute point, 2-4 in. by 1-2 lin., soft, pale green or almost glaucous, sparingly and shortly hairy from minute tubercles, margins scaberulous, midrib very slender, whitish, prominent below, primary lateral nerves 3-4, very fine; subtending leaf spathaceous, soon tightly convolute,  $2\frac{1}{2}$  in. long, with short herbaceous blades. Peduncle filiform, 4-5 in. long, glabrous. Racemes 2-nate, erect, slightly curved, dense, subglabrous,  $1\frac{1}{4}$ -2 in. long, one subsessile, the other with a very short base; joints linear, slender,  $1\frac{1}{2}$  lin. long, very shortly ciliate on both sides with the cilia about  $\frac{1}{2}$  lin. long and not developed on the inner side below the obliquely truncate subcupular tip; pedicels very similar, but more slender and slightly longer, like the joints more or less translucent along the middle. Sessile spikelets homogamous with the pedicelled and very similar to them except for the awns and bristles, broad-lanceolate, 3 lin. long, dull or olive green, glabrous; callus short, obtuse, glabrous. Glumes equal; lower chartaceous, flat on the back, unequally and minutely 2-toothed, keels indistinctly winged, intracarpal nerves about 6, very distinct, evenly distributed, tips subhyaline, inflexed margins narrow; upper glume submembranous, boat-shaped, with a fine bristle  $1\frac{1}{2}$  lin. long from a small terminal notch, 3-nerved, ciliate. Lower floret reduced to an oblong truncate 2-nerved ciliate hyaline valve. Upper floret ♀: valve slightly gibbous in the middle, 2-fid to half-way, cuneate-oblong and firmer below, segments lanceolate-acute, sub-eciliate; valvule 0. Pedicelled spikelet slightly narrower than the sessile; lower glume with about 9 intracarpal nerves and a short bristle from between the minute teeth; upper glume rounded or almost flat on the back, 3-nerved, with a terminal bristle like that of the lower; lower floret as in the sessile spikelet, valve of upper obovate-oblong, emarginate,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. long, very delicate, ciliate, 1-nerved, the nerve often running out into a minute point; anthers  $\frac{3}{4}$  lin. long; pistil apparently perfect, with the stigmas  $1\frac{1}{2}$  lin. long, laterally exerted.

† Nile Land. Abyssinia: Ankober, in moist places, *Roth*, 15!

A very striking grass on account of the great similarity of the homogamous sessile and pedicelled spikelets, but otherwise with all the characters of the species of the *distachyus* group. No anthers were seen in the sessile spikelets, but the long filaments present suggest that they had already been shed; the stigmas of the pedicelled spikelets are very conspicuous, and it is difficult to assume that their ovaries would be barren, although the awns which generally go with fertile pistils in this group are absent.

how long is awn of *C. florid.* ?  
wanting Do they fall ?



12. *A. leucostachyus*, *H. B. & K. Nov. Gen. et Sp.* i. 187. Perennial, densely tufted. Culms 1-3 ft. high, slightly compressed below, glabrous, few- to 5- or more-noded, simple to one-third or more usually to or beyond the middle. Leaf-sheaths glabrous, firm, those of the innovations and at the base of the culms much compressed and keeled, the remainder more or less terete or keeled only upwards and usually at length shorter than the internodes; ligules membranous, very short, truncate, minutely ciliate; blades linear, shortly acute, very gradually passing into the sheath, tightly folded or sometimes flat, glabrous, rarely hairy to villous, pale or dull green, usually also smooth along the margin, midrib slender, lateral nerves fine and close. Inflorescence a subfastigate or elongated and interrupted spatheate panicle; tiers few, rarely more than 4, usually 2-rayed, the lower often mixed; spathes lanceolate to linear-lanceolate, acuminate, with or without small rudimentary blades, greenish or tinged with purple, glabrous, at length tightly inrolled: rays filiform, strict, erect, glabrous, if compound their lower internode up to over 6 in. long. Spatheoles similar to the spathes, up to 2 in. long; peduncle at length usually exerted from the spatheole, or of the outermost rays permanently shorter. Racemes in subdigitate corymbs of 2-5, slender, 1-2 in. long, densely silky-plumose, erect; joints finely filiform, shorter than the spikelets, silky with soft long (about 4-5 lin.) hairs; pedicels similar, more or less curved. Sessile spikelet very narrow, almost linear, when seen from the back,  $1\frac{1}{2}$  lin. long, pale green or slightly tinged with purple; callus very short, long-bearded. Glumes unequal, membranous, acute; the lower nerveless and sunk between the scaberulous somewhat stout keels; upper glume equalling two-thirds or three-quarters of the upper, broadly boat-shaped, mucronulate, 1-nerved, scabrid on the keel, ciliate upwards. Lower floret reduced to an oblong subacute hyaline obscurely 2-nerved reversedly ciliate valve about  $\frac{3}{4}$  lin. long. Upper floret ♀: valve similar to the lower but narrower and 1-nerved, awnless or with a minute hair-like bristle; valvule very narrow, oblong, ciliate at the tips, up to  $\frac{1}{2}$  lin. long. Anthers  $\frac{1}{3}$ - $\frac{2}{3}$  lin. long. Grain fusiform, over  $\frac{1}{2}$  lin. long. Pedicelled spikelet reduced to a subulate scaberulous glume, up to  $\frac{1}{2}$  lin. long.—Hitchcock in *Contrib. U.S. Nat. Herb.* xii. 193 and xvii. 205; Nash in *North Amer. Fl.* xvii. 118. *A. leucostachyus*, subsp. *genuinus*, subvar. *typicus*, Hack. in *DC. Monogr. Phan.* vi. 420; Durand & Schinz, *Consp. Fl. Afr.* v. 717. *A. lanuginosus*, *H. B. & K. l.c.* *A. virginicus*, Trin. in *Mém. Acad. Pétorsb.* 6me sér., ii. 269; Hack. in *Mart. Fl. Bras.* ii. iii. 285; not of Linn. *Sp. Pl.* ed. i. 1046. *A. Dianæ*, Steud. *Syn. Pl. Glum.* i. 371? *A. domingensis*, Fourn. *Mex. Pl. Gram.* 61. *Anatherum virginicum*, Spreng. *Pug.* ii. 16, partly; Nees, *Agrost. Bras.* 322. *A. domingense*, Roem. & Schult. *Syst.* ii. 809. *Euklastaxon tenuifolius*, Steud. *Syn. Pl. Glum.* i. 412.

**Upper Guinea.** Senegambia, *Leprieur, Perrottet*, 1828.

Widely distributed throughout tropical and subtropical America; possibly introduced into Senegambia. *A. Dianæ*, from St. Helena, is probably this.

**13. A. eucomus**, *Nees, Fl. Afr. Austr.* 104. Perennial, densely tufted, with numerous short innovation-shoots. Culms 1-3 ft. long, compressed below, glabrous, 4-6- or more-noded, simple to or beyond the middle. Leaf-sheaths glabrous or hairy near the mouth, rarely lower down, firm, those of the innovations and at the base of the culms compressed and keeled, the remainder shorter than the internodes, terete, distant, the uppermost subtumid; ligules membranous, very short, truncate, ciliolate; blades linear, acute, folded, from 3 in. to 1 ft. long, 1-1½ lin. wide (when unfolded), glabrous or sparingly hairy, pale green, smooth or slightly scaberulous on the margin, midrib slender, prominent below, lateral nerves 4-5 on each side, very fine. Inflorescence a subfastigate or elongated and interrupted spatheate panicle; tiers few, rarely more than 4, distant, the lowest sometimes mixed; spathes linear-lanceolate, acuminate or acute, usually without a blade, glabrous, pale-green or tinged with purple or red, at length tightly inrolled; rays filiform, strict, glabrous, rarely over 3 in. long. Spatheoles similar to the spathes, up to 3 in. long; peduncles at length often long-exserted, often slightly arching. Racemes 2-5, subdigitate, very rarely solitary, very slender, 1-2 in. long, plumose, often nodding; joints finely filiform, shorter than the spikelets, silky with soft long (about 5 lin.) hairs; pedicels similar, more or less exceeding the spikelets, quite barren. Sessile spikelet narrowly lanceolate-oblong, 1 to over 1½ lin. long, often purplish, glabrous; callus minute, long-bearded. Glumes equal, membranous, acute, the lower nerveless between the scabrid keels, the upper 1-nerved. Lower floret almost as long as the glumes, reduced to a nerveless ciliate valve. Upper floret ♀: valve lanceolate-oblong, very narrow, ciliolate, 2-fid to one-third; lobes finely subulate; awn a fine bristle, 6-9 lin. long; valvule very minute. Anthers ¼ lin. long. Grain linear-lanceolate in outline, subcylindric, purplish, over ½ lin. long.—*Steud. Syn. Pl. Glum. i.* 390; *Oliv. in Trans. Linn. Soc. xxix.* 176; *Ficalho & Hiern in Trans. Linn. Soc. ser. 2, Bot., ii.* 34; *Hack. in Bolet. Soc. Brot. iii.* (1884) 137, and in *DC. Monogr. Phan. vi.* 421; *Durand & Schinz, Consp. Fl. Afr. v.* 711; *K. Schum. in Engl. Pfl. Ost-Afr. C.* 97; *Rendle in Cat. Afr. Pl. Welw. ii.* 146; *Stapf in Dyer, Fl. Cap. vii.* 338; *Eyles in Trans. Roy. Soc. S. Afr. v.* (1916) 295. *Eriopodium Kraussii*, *Hochst. ex Krauss in Flora, 1846,* 115 and in *Beitr. Fl. Cap- und Natal.* 186.

**Nile Land.** Uganda: Unyoro (according to *K. Schumann*).

**Lower Guinea.** Angola: Pungo Andongo; in rather dry meadows near Bumba, *Welwitsch*, 7442! Benguella; country of the Ganguellas and Ambuellas; Fort Princesa Amelia, *Gossweiler*, 2324! banks of the Rio Fiengo, *Gossweiler*, 2587! between the Huilla Mission Station and Chibia, *Pearson*, 2690 partly! common on the banks of the Cuculovar River, near Chibia,





Pearson, 2709! Humpata; by the Nene River, Newton; Ninde River, 14° 46' S. Lat., 20° 56' E. Long., *Serpa Pinto*, 39.

Mozambique Distr. German East Africa: coast, north of 7° S. Lat., *Hannington*! in marshy ground near Tabora, *Speke & Grant*! Gonda, on Lake Tanganyika, *Böhm*. Portuguese East Africa: Kongone River, mouth of the Zambezi, in wet hollows, *Kirk*! Rhodesia, *Appleton*!

Also in Madagascar and throughout South Africa.

Fairly good fodder when young (*Appleton*).

**14. A. huillensis**, *Rendle in Cat. Afr. Pl. Welw.* ii. 146. Perennial, caespitose from a short oblique rhizome, with thick root-fibres. Culms erect, 3-6 ft. high, stout, terete, about 5- or more-noded, glabrous, very smooth, simple up to the third or fourth node. Leaf-sheaths firm, tight, quite glabrous and smooth, the lowest 6-9 in. long and sometimes compressed and keeled or like the remainder terete; ligules short, firm, scarious and ciliate; blades linear, very long-tapering to a fine point, flat or folded, up to 1 ft. long and up to 1½ lin. wide, firm and hard, the upper almost reduced to the midrib, convex on the back and deeply channelled on the face, smooth and glabrous or sparingly hairy towards the ligules, lateral nerves fine and close. Inflorescence an elongated scanty or ample spatheate panicle up to 2½ ft. long, of 3-5 distant often mixed 2-4-rayed tiers; spathes glabrous, the lowest resembling the preceding leaves; rays filiform, erect, strict throughout or more or less arching upwards, if compound the lower internode often over 6 in. long. Spatheoles narrow, linear-lanceolate to linear, tapering to an acute point, up to about 3 in. long, reddish, at length tightly inrolled; peduncles at length exceeding the spatheoles or permanently shorter (outer rays). Racemes usually 5, subdigitate, very slender, 2-3 in. long, very loose, plumose, flexuous and often nodding, with bare bases up to 3 lin. long, or sessile; joints finely filiform, as long as or slightly shorter than the spikelets, often curved, silky with fine long (2-3 lin.) hairs; pedicels similar, with a barren or subulate glume, about 1 lin. long. Sessile spikelet linear-lanceolate, 2-2½ lin. long, more or less tinged with purple, glabrous; callus minute. Glumes firmly membranous, the lower 2-mucronulate, nerveless, more or less sunk between the slightly scaberulous keels, the upper 1-nerved, mucronulate. Lower floret reduced to a linear-oblong acute valve, 1½ lin. long, hyaline, ciliate. Upper floret ♀: valve narrowly linear-lanceolate, 2-dentate, 1½ lin. long, ciliate; awn a fine bristle 4-6 lin. long, usually twisted and bent below the middle; valvule minute. Anther ¾ lin. long.

**Lower Guinea.** Angola: Benguella; wet banks of the Rio Fiengo, *Gossweiler*, 2576! 4075! Huilla; wooded meadows at Humpata, *Welwitsch*, 2670! damp pastures on the Monino River, *Welwitsch*, 2644!

*Welwitsch*, 2644, was described by *Rendle*, l.c. 147, as var. *minor*; it has smaller inflorescences and smaller spikelets and is in my opinion only a weaker state.

✓ 15. *A. calvescens*, Stapf. Perennial. Culms (upper part only known) up to 10 ft. high, erect, stout, terete, glabrous, pruinose below the nodes. Leaf-sheaths firm, terete, tight, quite glabrous and smooth, the lower up to 1 in. wide when flattened out; ligules narrow, ciliolate; blades linear, long-tapering to a fine point, flat or involute, over  $1\frac{1}{2}$  ft. long, up to 2 lin. wide at the middle, widened towards the base, very firm and hard, glabrous, spinulously ciliolate along the revolute margins, slightly rough above, smooth below, midrib flat and obscure, lateral nerves fine and numerous. Inflorescence a very long narrow interrupted spatheate panicle of numerous mixed or upwards simple 4-5-rayed distant tiers; lower and intermediate spathes resembling the preceding leaves; even the uppermost with a subulate upwards spinulously ciliate rigid blade, glabrous; rays filiform, erect, strict throughout or more or less arching upwards, if compound the lower internode about 3 in. long. Spatheoles narrow, tapering to a long fine point or a short subulate blade, up to 3 in. long, at length tightly inrolled, pale brown; peduncles at length more or less (usually shortly) exerted. Racemes about 5-6, subdigitate, very slender,  $1\frac{1}{4}$  to  $1\frac{1}{2}$  in. long, very lax, loosely plumose, flexuous and often nodding, with a scaberulous base (up to  $2\frac{1}{2}$  lin. long) or sessile; joints finely filiform,  $1\frac{1}{2}$  to almost 2 lin. long, loosely ciliate, hairs up to  $1\frac{1}{2}$  lin. long; pedicels similar, but finer and shorter. Sessile spikelet linear-lanceolate,  $2\frac{1}{4}$  lin. long, purplish, glabrous; callus minute. Glumes membranous, the lower 2-mucronulate, nerveless and slightly sunk between the scaberulous keels, the upper acute, 1-3-nerved, ciliolate. Lower floret reduced to a linear-oblong acute valve,  $1\frac{1}{2}$  lin. long, hyaline, ciliolate. Upper floret ♂: valve narrow linear-lanceolate, shortly 2-fid, over  $1\frac{1}{2}$  lin. long and ciliolate; awn a fine flexuous bristle, about 4 lin. long; valvule ovate, acute,  $\frac{1}{2}$  lin. long. Anthers and grains unknown. Pedicelled spikelet neuter, narrowly lanceolate, about 2 lin. long, acutely acuminate, dark purplish; lower glume 3-nerved; upper slightly shorter and 1-nerved; both florets reduced to hyaline ciliolate valves, the upper much narrower.

+ Upper Guinea. French Guinea: Baffing valley, in marshy ground, *Poëguin*, 1802!

16. *A. tenuiberbis*, Hack. in DC. *Monogr. Phan.* vi. 435. Perennial. Culms (base not known) 15 ft. high, stout, terete, smooth and glabrous upwards, from the upper nodes. Leaf-sheaths terete, tight, glabrous, smooth, produced at the mouth into erect oblong to lanceolate auricles; ligules reduced to a ciliolate rim; blades linear from the base, tapering to an acute point over 1 ft. long, 2- $2\frac{1}{2}$  lin. wide, rigid and firm, bearded or ciliate towards the ligules, otherwise glabrous, margins spinulose, ciliate, spinules very sharp and firm towards the tips, midrib slender, keeled below, lateral





nerves somewhat stout, prominent, close. Inflorescence an elongate lax spatheate panicle up to  $2\frac{1}{2}$  ft. long, of about 6 distant 2-4-rayed often mixed tiers; spathes like the preceding leaves but with narrow to subulate spinulosly ciliate blades; rays very slender, filiform, very unequal, if compound 2-noded and up to over 1 ft. long. Spatheoles very narrow, acute or with small subulate blades, at length tightly inrolled, reddish, glabrous,  $2\frac{1}{2}$ -3 in. long; peduncles erect or arching, ultimately exceeding the sheaths by 1-2 in. Racemes 4-8, in a corymboid panicle, the lateral sessile,  $1\frac{1}{2}$ -3 in. long, lax, slender, flexuous; joints filiform, much compressed towards the base, very gradually and slightly widened upwards,  $2\frac{1}{2}$ -5 lin. long, all shortly ciliate from the middle upwards, sometimes more on one side than the other, hairs  $\frac{1}{2}$ -1 lin. long, tips slightly cupular. Pedicels similar, up to 2 lin. long. Sessile spikelet linear-lanceolate, reddish or purplish,  $2\frac{1}{2}$ - $2\frac{3}{4}$  lin. long; callus and its beard very short. Glumes subequal, firmly membranous, lower minutely 2-denticulate, slightly sunk between the stout and scabrid keels, and with one nerve inside and close to each keel; upper glume acute, 3-nerved, ciliolate. Lower floret reduced to a hyaline oblong acute ciliolate valve faintly 2-nerved upwards, 2 lin. long. Upper floret ♀: valve narrow, oblanceolate-oblong, shortly 2-fid with the lobes narrow and very acute, ciliolate,  $1\frac{3}{4}$  lin. long, 3-nerved below; awn up to 4 lin. long, very fine, flexuous, indistinctly differentiated into column and bristle; valvule ovate-oblong,  $\frac{3}{4}$  lin. long, hyaline, glabrous. Anthers up to  $\frac{3}{4}$  lin. long. Pedicelled spikelets ♂, lanceolate, acutely acuminate, 2- $2\frac{1}{2}$  lin. long, usually darker than the sessile, occasionally much reduced, neuter and subulate; glumes chartaceous, subequal, the lower 5-7-nerved, the upper 3-nerved; valves of both florets hyaline, 3-1-nerved, ciliolate,  $1\frac{1}{2}$ - $1\frac{1}{4}$  lin. long.—Durand & Schinz, *Consp. Fl. Afr.* v. 727.

Nile Land. Sudan: Jur; Genana, near Ghattas' Great Seriba, *Schweinfurth*, 2600! Kutschuk Ali's Seriba, *Schweinfurth*, 4240!

17. *A. Brazzæ*, *Franch. in Bull. Soc. Hist. Nat. Autun*, viii. (1895) 326 (18 of reprint). Perennial. Culms (base not known) erect, tall, smooth, glabrous. Leaf-sheaths terete, striate, glabrous and smooth, not auriculate; ligules a narrow ciliolate scarious rim; blades linear, gradually passing at the base into a sheath, long-attenuate to a fine point, the upper up to  $\frac{1}{2}$  ft. by  $1\frac{1}{2}$  lin. wide (at the middle), glabrous or with a few hairs at the base, margin scabrid, spinulosly ciliate upwards, midrib slender, lateral nerves close. Inflorescence an elongated spatheate panicle up to almost 2 ft. long, of about 6 distant 2- (rarely 3-) rayed tiers or the lowest branch undivided at the base, 1-noded; spathes like the preceding leaves, but with more reduced blades; rays very slender, filiform, very unequal, erect, strict, lower internode  $1\frac{1}{2}$ -2 in. long. Spatheoles very narrow, acute,

tightly inrolled, glabrous,  $1\frac{1}{2}$ -2 in. long; peduncle more or less exerted terminally. Racemes 3-15, in corymboid panicles, the lateral sessile, 1 to over 2 in. long, very slender, flexuous and loose, glabrous; joints finely filiform,  $1\frac{1}{2}$  to over  $2\frac{1}{2}$  lin. long, very slightly thickened upwards, quite glabrous, with scaberulous margins or sometimes with a few very short cilia, tips minutely cupular and denticulate; pedicels similar, up to  $1\frac{1}{2}$  lin. long, more often obscurely ciliate. Sessile spikelet narrow, linear-lanceolate, about 2 lin. long, dull brownish-green, quite glabrous including the very short callus. Glumes subequal, lower acuminate, acute or sub-2-denticulate, nerveless and slightly sunk between the stout upwards scaberulous keels; upper very acute, 1-nerved, slightly shorter, 2- to sub-3-nerved. Lower floret reduced to a linear-oblong 2-nerved hyaline valve, minutely ciliate at the tips,  $1\frac{1}{2}$  lin. long. Upper floret ♂: valve lanceolate-oblong, very narrow, entire, 1-nerved, mucronate, eciliate; valvule ovate-oblong,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long, nerveless. Anthers over 1 lin. long. Pedicelled spikelets ♂, lanceolate, acuminate, about 2 lin. long; glumes subequal, lower chartaceous, 3-nerved, mucronulate, upper slightly shorter, 1-nerved to sub-3-nerved, acute; valves of both florets hyaline, of the lower  $1\frac{1}{2}$  lin. long and 2-nerved, of the upper slightly shorter, sub-3-nerved, obscurely mucronulate.—Th. & Hél. Durand, Syll. Fl. Congol. 624. *A. appendiculatus*, var. *genuinus*, Durand & Schinz, Études Fl. Congo, 314; Th. & Hél. Durand, l.c.; not of Hack.

**Lower Guinea.** French Congo: between Mokino and Mongol, *Brazza*, 234! Belgian Congo: in dry sands at Stanley Pool, *Hens*, 319 partly!

**18. A. chrysostachyus**, *Steud. Syn. Pl. Glum.* i. (1855) 377. Perennial, densely tufted, with intravaginal innovations, over 3 ft. high, few-noded, simple or with 1-2 slender undivided flowering branches from the upper nodes, smooth, glabrous, the lowest internode deeply grooved on one side. Leaf-sheaths subterete or the lower and particularly those of the innovations compressed and keeled, glabrous or sparingly hairy, very smooth, the basal persistent; ligules membranous, very short, truncate, ciliate with a beard of hairs behind them; blades linear from an equally wide base, long-attenuated to a setaceous point, the lower up to over 6 in. long and 2 lin. wide, flat, subglaucous, somewhat rigid, somewhat bearded at the base, otherwise glabrous or very loosely hairy on the back all along, smooth except at the spinulosely scabrid margins, midrib whitish, slender, rounded and prominent below, lateral nerves faint; subtending leaves with a spathaceous subherbaceous narrow sheath up to over 6 in. long, usually with a short herbaceous blade. Inflorescence a scanty corymb or corymboid panicle of 3-5 racemes; common axis 4-9 lin. long, rarely shorter, the bare bases of the lowest racemes up to 3 and even 6 lin. long, filiform,





more or less hairy on the inner side; upper racemes sessile or subsessile. Racemes rather lax, flexuous, 1-4 in. long, brownish, fulvously hairy to villous; joints and pedicels filiform, dorsally compressed,  $1\frac{3}{4}$ -2 lin. long (the pedicels more slender), margins densely but shortly fulvously ciliate, the uppermost cilia up to 1 lin. long, the others much shorter, tips minutely and obscurely cupular. Sessile spikelets all heterogamous, oblong-lanceolate, yellowish to chestnut-brown; callus very short, obtuse and shortly bearded. Glumes equal; lower glume chartaceous to subcoriaceous, minutely truncate and 2-dentate, flat on the more or less fulvously hairy back, keels acute, scabrid upwards, intracarinal nerves 4-7, equally distant or the innermost more apart leaving a thinner median zone between them; upper boat-shaped, subcoriaceous to subchartaceous, very acute, 3-nerved, glabrous or very sparingly hairy, ciliolate, keel scabrid upwards. Lower floret reduced to a broad oblong hyaline ciliate sub-2-nerved valve over  $2\frac{1}{2}$  lin. long. Upper floret ♀: valve linear, 2-fid to half-way, lobes oblong, obtuse, ciliolate; base chartaceous, sub-3-nerved; awn about 6-7 lin. long, bent at and twisted below the middle; column and bristle hispidulous; valvule 0 or obsolete. Anthers  $2\frac{1}{2}$  lin. long. Pedicelled spikelet lanceolate, finely acuminate, of the same colour as the sessile or darker,  $3\frac{1}{2}$  lin. long; glumes membranous, unequal, lower glabrous or sparingly hairy on the back, with close nerves (up to 11) and scabrid keels; upper slightly shorter, acute, thinner, 3-nerved, ciliate; valve of lower floret broad-oblong, equalling the lower glume, 3-nerved, otherwise as in the sessile spikelet, of the upper floret narrow, lanceolate, over 2 lin. long, mucronate, 1-nerved, ciliate.—Hack. in DC. Monogr. Phan. vi. 445; Durand & Schinz, Consp. Fl. Afr. v. 708. *A. ferrugineus*, Hochst. ex Steud. l.c.

**Nile Land.** Abyssinia: Debra-Eski, in meadows, 9300 ft., *Schimper*, 1010! Tigre or Begemeder, *Schimper*, 1215! British East Africa: Leikipia Plateau and Aberdare Range, *Routledge*!

*Routledge*'s specimens differ from *Schimper*'s in the more contracted inflorescences and more hairy leaves, but are otherwise identical in structure.

This breaks away from the *Stenopogon* type in the venation of the lower glume of the ♀ spikelets; but it comes so close in other respects to the following 2 or 3 species that it must be placed near them.

✓ **19. A. Stolzii, Stapf.** Perennial, compactly cæspitose, up to over 3 ft. high, with extra- and intra-vaginal innovations. Culms erect, somewhat compressed below, stout, at least at the base, glabrous, smooth, about 3-noded, simple. Leaf-sheaths and the firm cataphylls of the innovations perfectly smooth and glabrous, basal sheaths very firm, long-persistent, tight, much compressed and keeled, produced at the mouth into short triangular to lanceolate auricles; ligules membranous, truncate, ciliolate, laterally adnate or at length free from the auricles of the sheath, up to 1 lin. long;

blades linear, slightly tapering to an acute point, 5-9 in. by 1-1½ lin., folded or flat, rigid and firm, pale green-glaucous, glabrous or with a few scattered fine hairs, smooth below, scaberulous above, rough along the margins, midrib very slender, prominent below, lateral nerves many, close and prominent above; subtending leaf with a spathaceous, at length tightly convolute, subherbaceous sheath, 5-6 in. long, and a rudimentary setaceous or foliaceous blade. Peduncles glabrous, except at the articulated and shortly bearded tips. Inflorescence a corymboid, often scanty panicle, 3-5 in. long; common axis glabrous or sparingly ciliate, smooth, bearded at the nodes, 1-3 in. long; lowest branches undivided to ½ or nearly 1 in. Racemes 5-10, 1½-3 in. long, flexuous, loosely hairy, very pale green; joints linear, slender, very slightly thickened upwards, 2-2½ lin. long, more or less transparent along the middle line, truncate, loosely ciliate on both sides, cilia white, about 1 lin. long; pedicels similar but more slender and slightly longer. Sessile spikelets all heterogamous, loose between joints and pedicels, linear to linear-oblong in front view, subacuminate, 3-3½ lin. long; callus short, obtuse, bearded from the very base, beard up to 1 lin. long. Glumes equal; lower concave to deeply grooved on the back, with a hyaline tip, otherwise chartaceous to subchartaceous, glabrous, keels very slightly scaberulous upwards, intracarinial nerves 0; upper glume membranous, narrowly boat-shaped, almost straight on the back, shortly or acutely acuminate, sub-3-nerved, ciliate. Lower floret reduced to a linear-oblong obtuse faintly 2-nerved ciliate hyaline valve, about 2½ lin. long. Upper floret ♀; valve very narrowly oblong, 2-fid to a quarter, with the lobes narrow and acute, ciliate, 3-nerved below; awn very fine, 5-6 lin. long, kneed at and twisted below the middle; valvule a hyaline oblong scale up to 1 lin. long. Anthers 1½ to almost 2 lin. long. Pedicelled spikelet lanceolate-acute, 3-3½ lin. long; lower glume membranous or submembranous with 2 close nerves in each keel and a somewhat prominent middle nerve; upper glume 3-nerved, acutely acuminate; valves of both florets subequal, 2½-2¾ lin. long, delicately hyaline, ciliolate, of the lower faintly 3-, of the upper 1-nerved and notched.

+ **Mozambique Distr.** German East Africa: Kymbila; Pololo Ridge, 6000 ft., *Stolz*, 2389!

✓ **20. A. purpureus, Stapf.** Perennial, compactly caespitose, with intravaginal innovations from a short oblique rhizome, with stout root-fibres, not much over 1½ ft. high. Culms compressed below, about 2-noded, erect, simple, glabrous except upwards, smooth. Leaf-sheaths of innovations at the base of the culms strongly compressed and keeled, very firm and long-persistent, up to 5 in. long and ¼ to almost ½ in. wide (when seen from the side), glabrous and very smooth below, more or less hairy to subvillous upwards, at least when

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*Andropogon purpureus Stapf. N. Mozambique and Stolz*



20 + A. Schliebenii Polg Targamycka Tern  
Schlieben 14080

young; ligules reduced to a ciliate rim; blades linear, very acute, passing almost imperceptibly into the sheath, tightly folded or opening out upwards, up to 6 or sometimes 8 in. long, 1-3 lin. wide (unfolded), very firm, rigid, pale green or subglaucous, turning russet, almost villous at the junction of the blade, otherwise sparingly hairy or at length quite glabrous, smooth, margins scaberulous, midrib compressed downwards into a narrow acute keel, up to almost 1 lin. high, lateral nerves numerous, close, slightly raised; subtending leaf with a spathaceous subherbaceous early convolute sheath, up to 5 lin. long, and a short herbaceous blade. Peduncle stoutly filiform, hairy above with truncate bearded tips. Inflorescence a true more or less fastigiata panicle, 2-3 in. long; common axis up to 1 in. long, filiform, grey, hairy to villous; basal branches 2-nate to sub-3-nate, all the branches representing sessile, or the lowest bare-based (base up to 5 lin. long) racemes. Racemes about 5, very lax and flexuous, rich purple, 1-2 in. long; joints and pedicels very similar, filiform, about  $2\frac{1}{2}$  lin. long, equally and shortly ciliate on both sides, cilia silvery,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long. Sessile spikelets normally linear and acuminate in front view, 3-3 $\frac{1}{2}$  lin. long, glabrous, rich or brownish violet; callus short, obtuse, bearded from the very base, beard silvery,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long. Glumes equal, the lower chartaceous, more or less concave, minutely 2-denticulate, keels acute and very finely scaberulous upwards, intracarinal nerves 1 or 2, faint, very slightly raised in the upper part; upper narrowly boat-shaped, very gently curved on the back, subchartaceous, 3-nerved, mucronulate, ciliolate. Lower floret reduced to a narrow oblong obtuse 2-nerved sub-eciliate valve,  $2\frac{1}{2}$  lin. long. Upper floret functionally ♀: valve reduced to a chartaceous sublinear stipe, produced into delicate hairlike lobes, its body  $1\frac{3}{4}$  lin. long, glabrous; awn about 5 lin. long, kneed at and twisted below the middle, the bristle usually flexuous and often reflexed; valvule 0. Anthers reduced to very minute empty 2-lobed bodies on short hair-like filaments. Pedicelled spikelet lanceolate, acute, 3 $\frac{1}{2}$ -4 $\frac{1}{2}$  lin. long, violet, glabrous; glumes equal, submembranous, very similar, 5-nerved, with the middle nerve more marked and distant from the paired marginal nerves; valve of lower floret oblanceolate, 1-nerved, sub-eciliate, hyaline, as long as the glumes; of upper floret very narrow, linear, up to  $1\frac{1}{2}$  lin. long, nerveless or obscurely 1-nerved or 0; anthers 2 $\frac{1}{2}$  lin. long; pistil 0.

+ **Mozambique Distr.** German East Africa: Kymbila; north of Lake Nyasa, in mountain meadows, 6550-7250 ft., *Stolz*, 2281!

A very beautiful grass on account of its large violet spikelets. All the specimens seen have panicles which are to some extent anomalous in that the sessile spikelets at some of the nodes are exactly like the pedicelled spikelet in shape and sex, or are reduced and barren or altogether absent.

✓ **21. A. laxatus, Stapf.** Perennial, compactly caespitose, with strong root-fibres. Culms up to 2 ft. high, terete, somewhat compressed

below, sometimes pruinose below the lower nodes, glabrous, smooth, 1-noded below the inflorescence. Leaf-sheaths firm, glabrous, smooth, the lowest 1–2½ in. long, compressed, keeled, the upper looser, much longer and more or less terete; ligules scarious, short, rounded or truncate, up to ½ lin. long, glabrous; blades linear, gradually passing into the sheath, subacute, 1½–6 in. long, ¾–1 lin. wide, usually tightly folded, firm, flexuous or straight, glabrous or with a few hairs at the mouth of the sheath, smooth, pale green, midrib very slender, primary lateral nerves 3–4, fine. Inflorescence consisting of a terminal pair or corymb of racemes augmented by 1–3 distant simple branches or 2-rayed tiers; rays filiform, erect, strict, internode 4–5 in. long; spathes resembling the preceding leaves with short blades. Spatheoles very narrow, acute, 2–3 in. long, at length tightly inrolled, tinged with purple; peduncles long-exserted, minutely bearded at the tips. Racemes 2–4 on a short common axis, about 1½ in. long, silkily plumose, slightly flexuous or nodding, with short bare bases or the upper sessile; joints filiform, slightly shorter than the spikelet, widened at the tip into a crenulate bearded cupule, densely hairy all over, hairs spreading, the uppermost up to 2½ lin. long; pedicels very similar, but the tips not cupulate. Sessile spikelet narrowly lanceolate, 3 lin. long, glabrous except for the small obtuse shortly bearded callus, more or less dull purplish. Glumes equal, firmly membranous, the lower 2-mucronulate, 2-nerved and slightly sunk between the scaberulous keels, nerves close to the keels, thinning out downwards; upper glume 1- to 3-nerved, ciliate, shortly aristulate. Lower floret reduced to an oblong acute hyaline 2-nerved reversedly ciliate valve, 2½ lin. long. Upper floret ♀; valve narrowly oblong, 2-fid almost to the middle, 2¼ lin. long, hyaline, ciliate; awn slender, 8–10 lin. long, kneed and twisted below, bristle twice as long as the smooth column; valvule oblong, nerveless, ciliate upwards, 1½ lin. long. Pedicelled spikelet of the shape and size of the sessile but darker and neuter or more reduced, sometimes quite rudimentary; glumes acutely acuminate, the lower up to 5-nerved, the upper shorter, 3-nerved; valves of both florets, if present, narrowly oblong, acute, 1-nerved, ciliate.—*A. ternatus*, var. *africanus*, Rendle, Cat. Afr. Pl. Welw. ii. 147.

+ Lower Guinea. Angola: dry, wooded pastures near Humpata, *Welwitsch*, 2693!

(Mozambique Distr. Rhodesia: Mashonaland; Inyanga District, *Mundy*! Salisbury, *Mundy*!)

✓ Var. *ligulata*, Stapf. Ligules produced, ovate, very firm, up to 1½ lin. long; blades much narrower at the base than the mouth of the sheath and often withdrawn from the ligule which stands up quite free and in direct continuation of the sheath. Pedicelled spikelets ♂.

+ Mozambique Distr. Rhodesia: Mashonaland; Charter District, *Mundy*!

The South American *A. ternatus*, Nees, has much denser racemes and smaller spikelets, but is in other respects very similar.





**22. A. africanus**, *Franch. in Bull. Soc. Hist. Nat. Autun*, viii. 325 (17 of reprint). Perennial; culms over 3 ft. high, erect, 2-3-noded below the spatheate panicle. Leaf-sheaths tight, firm, quite glabrous, the lower keeled upwards, long-persistent, the intermediate and upper much shorter than the internodes; ligules very short, ciliolate; blades folded, linear from the base, shortly acute, up to 8 in. long and 2 lin. wide (when expanded), firm, glabrous, scaberulous upwards and on the margins, nerves fine, close. Inflorescence a lax scanty spatheate panicle about 3 ft. long, of 5-7 distant downwards mixed 2-3-rayed tiers; lower and intermediate spathes resembling the preceding leaves, except for the shorter blades; rays filiform, erect, strict or more or less flexuous and arching, if compound the lower internode up to over 4 in. long. Spatheoles very narrow, acute, or bearing rudimentary subulate or mucroniform blades, 3-4 in. long, slightly purplish, at length tightly inrolled; peduncles at length distinctly and often long-exserted. Racemes usually paired, rarely ternate, the basal 1 (or 2) sessile,  $1\frac{1}{2}$ -2 in. long, loose, flexuous; joints filiform, slightly widened upwards and ending in a small dentate cup, 2 lin. long, ciliate, hairs white, up to  $\frac{1}{2}$  lin. long; pedicels very similar, more slender. Sessile spikelet narrow, linear-lanceolate, acute, 2-3 lin. long, dull purplish or yellowish; callus very shortly bearded. Glumes subequal; lower minutely 2-dentate, nerveless and depressed between the scaberulous keels; upper very acute, sub-3-nerved, ciliate. Lower floret reduced to a narrow lanceolate acute 2-nerved reversedly ciliate valve, almost  $2\frac{1}{2}$  lin. long. Upper floret ♀: valve linear-oblong, 2-fid to about one-quarter, with acute lobes, awn very fine, 5-8 lin. long, column 2- $2\frac{1}{2}$  lin. long, dark, bristle 3-5 lin. long. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet ♂, lanceolate, 2- $2\frac{3}{4}$  lin. long, reddish or purplish; lower glume produced into a short fine bristle, 3-5-nerved; upper similar, 3-nerved, ciliate; valve of lower floret similar to the upper glume but hyaline, of the upper floret shorter, 1-nerved; valvule oblong, nerveless,  $\frac{1}{4}$  lin. long.—*Andropogon prolixus*, Stapf in *Bull. Soc. Bot. Fr.* lx. (1908), *Mém.* 8b, 102.

**North Central.** French Congo: Fort Possel, *Chevalier*, 5365!

**Lower Guinea.** French Congo: Plain of Mpilu, near Brazzaville, *Thollon*, 55!

This is no doubt the *A. glaucescens* (from the same locality as *Thollon*, 55) of Bureau, in *Comptes-rendus*, 103 (1886), p. 7, but not of Kunth, which is a species of western South America of very similar habit but with much longer hairs on the joints and pedicels. *Thollon's* specimen, which is the type of the species, has distinctly smaller spikelets (about 2 lin. long) than *Chevalier's*, but represents probably a weak flowering state. A young incomplete specimen collected by Miss Macleod at Illah on the Niger probably also belongs here.

✓ **23. A. linearis**, *Stapf*. Perennial, compactly caespitose; culms erect, up to over 3 ft. high, slender, about 3-noded below the inflorescence, glabrous, smooth. Leaf-sheaths moderately firm, the basal more or less compressed, glabrous and smooth, often purple,

the remainder terete, tight, much shorter than the internodes; ligules very short, truncate, ciliate; blades folded, linear from the base and there narrower than the mouth of the sheath, acute or subacute, the lowest over 6 in. long, the upper gradually shorter,  $1\frac{1}{2}$  lin. wide (when unfolded), glabrous or particularly the upper with very fine spreading hairs towards the ligule, smooth, pale-green. Inflorescences consisting of a terminal corymb of racemes augmented by 1 or 2 distant simple branches or 2-rayed tiers; spathes very narrow, with subulate blades; rays filiform, erect, strict or slightly arching, their lower internodes 2-4 in. long. Spatheoles subacute, about 2 in. long, glabrous, at length tightly inrolled; peduncles at length distinctly and sometimes long-exserted terminally. Racemes flexuous or nodding, paired, one sessile, the other with a short base, about  $1\frac{1}{2}$  in. long, loosely hairy; joints filiform with clavate cupular obliquely dentate tips, ciliate,  $1\frac{1}{2}$ -2 lin. long, hairs white, about  $\frac{1}{2}$  lin. long; pedicels very similar, produced on one side into a subulate or narrowly linear tooth. Sessile spikelets ♂, except the basal of the sessile raceme which is ♂ or barren and like its pedicelled companion, linear-lanceolate, 2-2½ lin. long, tinged with purple; callus and its beard very short. Glumes about equal, the lower very minutely dentate, nerveless and deeply sunk between the slightly scaberulous keels, the upper acute, 1-nerved, ciliate. Lower floret reduced to a linear-oblong faintly 2-nerved reversedly ciliate valve, 2 lin. long. Upper floret ♀: valve lanceolate-oblong, 2-fid to one-third, sparingly ciliate; awn about 6-10 lin. long, column 4 lin. long, brown, bristle yellow. Anthers 1 lin. long. Pedicelled spikelet ♂ or neuter, linear-lanceolate, acuminate, purple, 2-2½ lin. long; glumes unequal, the lower often produced into a fine bristle, up to  $1\frac{1}{2}$  lin. long, 3-nerved, the upper short or 1-nerved; flowers reduced to their valves; valves oblong, 2 lin. long, hyaline, 1- to sub-3-nerved, ciliate, or more or less reduced; stamens, if present, as in the ♂ spikelet.

+ **Upper Guinea.** French Guinea: (Baffing Valley, on flooded ground,) *Potéguin*, 1787! Futa Jallon; (between Soumbulako and Boulivé,) *Chevalier*, 18666!

**24. A. cyrtocladus**, *Stapf in Kew Bulletin*, 1907, 209. Suffrutescent, up to over 6 ft. high, with much-branched many-noded main-culms; branches usually ascending in curves, glabrous, terete, hard; lower internodes more or less exserted from the persistent or slowly decaying sheaths, whitish-glaucous, up to  $2\frac{3}{4}$  in. long, upper much shorter to very short. Leaves crowded on the young branches or more or less distant, glabrous; sheaths terete, tight, firm, smooth; ligules reduced to a minute membranous rim; blades attenuated from a slightly rounded base into a long setaceous point, from less than 1 to  $1\frac{1}{2}$  in. long, 1 lin. wide, more or less glaucous or reddish, smooth, with about 3 primary nerves on each side; spathes very narrow,  $1\frac{1}{2}$  in.





long, often with a subulate rudimentary blade. Peduncles filiform, exserted, with a tuft of hairs at the upper end. Racemes paired, one sessile, the other with a slender base ( $2\frac{1}{2}$ –3 lin. long), subparallel, silky,  $1$ – $1\frac{1}{4}$  in. long; joints filiform,  $2\frac{1}{2}$  lin. long, with slightly widened and minutely cupular and denticulate tips, densely hairy all over the back and the edges, hairs very fine, white, up to  $2\frac{1}{2}$  lin. long; pedicels similar but slightly shorter, tips very obscurely or not at all toothed. Sessile spikelet narrowly linear-lanceolate, acuminate,  $3$ – $3\frac{1}{2}$  lin. long, straw-coloured, often tinged with red or purple. Glumes glabrous, membranous; lower minutely truncate, nerveless and slightly sunk between the fine scaberulous keels; upper shortly aristulate, 3-nerved and ciliate upwards. Lower floret reduced to a lanceolate-oblong acute 1-nerved ciliolate valve, about 3 lin. long. Upper floret ♂; valve lanceolate, deeply 2-fid, 1-nerved,  $2\frac{1}{2}$  lin. long; awn 7–8 lin. long, kneed at or below the middle; valvule ovate, less than 1 lin. long, glabrous. Anthers 2 lin. long. Pedicelled spikelets ♂, linear-lanceolate,  $3\frac{1}{2}$  lin. long, glabrous, purplish; lower glume shortly aristulate, 6–7-nerved, upper hyaline, 3-nerved; valves of both florets hyaline, 1-nerved,  $2\frac{1}{2}$ –3 lin. long.

**Nile Land.** British Somaliland: common in the Haud and at Bohotle, *Appleton*! and without precise locality, *Drake-Brockman*, 43! 44!

A very valuable fodder grass. Vernacular name "*Dur*." According to *Appleton* it grows thickly in most parts of Italian Somaliland.

**25. A. Bentii**, *Stapf in Kew Bulletin*, 1907, 224. Suffrutescent, many-noded; branches spreading, recurved or ascending, glabrous, terete, hard, internodes of the flowering branches more or less exserted, those of the main culms up to 1 in. long, of the branches about  $\frac{1}{2}$  in. long. Leaves glabrous; sheaths persistent, terete, tight, firm, smooth; ligules reduced to a minute membranous rim; blades attenuated from a slightly rounded base to a fine point, 5–10 lin. long,  $\frac{1}{2}$ – $\frac{2}{3}$  lin. wide, subglaucous, firm, smooth, primary lateral nerves about 2 on each side; subtending leaf with a very narrow greenish sheath, about 1 in. long and with or without a rudimentary blade. Peduncles finely filiform, up to  $1\frac{1}{4}$  in. long, shortly exserted, bearded at the tips. Racemes 2-nate (one sessile, the other with a short base) or solitary, 5–10 lin. long, loosely silky-villous; joints filiform, very slightly wider upwards,  $1\frac{1}{2}$  lin. long, with straight or almost straight tips, hairy along the edges only, hairs white, lower short, uppermost up to  $1\frac{1}{2}$  lin. long; pedicels like the joints. Sessile spikelet lanceolate, acute,  $2\frac{1}{2}$  lin. long, pale; callus minute, very shortly bearded. Glumes equal, lower chartaceous, smooth and shining on the back, with a shallow groove and 3 greenish nerves on each side. Upper finely 3-nerved, ciliate. Lower floret reduced to a lanceolate acute valve, hyaline, faintly 3-nerved, ciliolate,  $1\frac{1}{2}$  lin. long. Upper floret ♂: valve lanceolate, 2-fid to one-third,  $1\frac{1}{4}$  lin. long; awn about  $\frac{1}{4}$  lin. long, very fine, kneed at or below the middle; valvule ovate

or oblong,  $\frac{3}{4}$  lin. long. Anthers 1 lin. long. Pedicelled spikelet ♂ or neuter, lanceolate, acute,  $2\frac{1}{2}$  lin. long; glumes subequal, lower 7-9-nerved, upper 3-nerved; valves of both florets hyaline, 1-nerved,  $1\frac{1}{2}$  lin. long.

Nile Land. Socotra, Bent! Balfour, 764!

✓ 26. *A. pseudapricus*, Stapf. Annual, rarely perennial, with a few intravaginal innovations, usually 2-4 ft. high, occasionally much higher. Culms slender, erect, simple except for the inflorescence or with a long branch resembling the primary culm from one of the upper nodes, up to over 6-noded below the panicle, terete, glabrous, smooth. Leaf-sheaths terete, tight, striate, often flushed with purple below, glabrous, rarely loosely hairy, smooth, produced at the mouth into short auricles; ligules scarious, truncate, adnate to the auricles of the sheath, up to 1 lin. (rarely more) long; blades linear from a narrow base, long-tapering to a setaceous point, up to over  $\frac{1}{2}$  (sometimes 1) ft. long,  $1-1\frac{1}{2}$  (rarely  $2\frac{1}{2}$ ) lin. wide, rather firm, but flexuous, glabrous or sparingly hairy, pale green, turning reddish, scaberulous, particularly upwards, midrib slender, whitish, primary lateral nerves 2-3 on each side, very fine. Inflorescence an elongate or fastigiate obpyramidal and often ample spatheate panicle,  $\frac{1}{2}-1\frac{1}{2}$  ft. long, of 5-7 frequently mixed tiers, approximate upwards and up to 5- (rarely 7-) rayed; lowest spathes like the preceding leaves, but with shorter, almost setaceous blades, the following rapidly approaching the spatheoles in shape and size; rays slender, filiform, those of mixed tiers usually very unequal, the compound ones often overtopping the next or 2 next tiers, the simple  $\frac{3}{4}$  to over  $1\frac{1}{2}$  in. long. Spatheoles more or less scarious, linear-lanceolate, long-tapering upwards, acute to setaceously acuminate, glabrous or nearly appressedly hairy,  $2-2\frac{1}{2}$  (rarely 3) in. long and at length tightly inrolled; peduncles finely filiform, at length slightly (rarely much) exceeding the spatheole or permanently shorter than it, puberulous or scaberulous towards the subcupular tips. Racemes 2-nate, one subsessile, the other with a short base, from less than 1 to  $2\frac{1}{2}$  in. long, flexuous, villous, mostly laterally exerted from the spathe, at least before maturity; joints and pedicels clavate-cuneate, attenuated to a very slender base, tips very obliquely truncate, obscurely hollowed out, the pedicels often unequally 2-toothed, margins silky-ciliate, upper cilia up to  $1\frac{1}{2}$  (rarely 2) lin. long. Sessile spikelets of all pairs heterogamous (or those of the subsessile more or less imperfect), laterally much compressed, loosely wedged in between joint and pedicel, narrowly linear in front view,  $2\frac{1}{2}-2\frac{3}{4}$  lin. long, pale yellowish-green; callus slender, subacute,  $\frac{1}{2}$  lin. long, shortly and densely bearded. Glumes equal, lower chartaceous along the keels, otherwise membranous, deeply and narrowly grooved between the narrow keels which are smooth below and scaberulous near the tips, minutely truncate, glabrous or very sparingly and





minutely hairy upwards, nerves 2 or 3, very fine and close in each keel; upper glume submembranous, boat-shaped, acute, 1-nerved, eciliate, with a fine terminal bristle up to 4 lin. long. Lower floret reduced to an oblong hyaline ciliate 2-nerved valve, 2 lin. long. Upper floret ♂: valve narrow, oblong, shortly 2-fid, up to 2 lin. long, ciliate; awn  $1-1\frac{1}{2}$  in. long, slender, column  $\frac{1}{2}-\frac{2}{3}$  in. long, scaberulous, dark brown, bristle yellowish; valvule an oblong obtuse hyaline scale. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelet ♂ or neuter, lanceolate-oblong,  $2\frac{1}{2}-3$  lin. long, greenish or sometimes dull brown or purple; lower glume membranous, about 7-nerved, scaberulous and often more or less hairy upwards on the back (hairs up to  $2\frac{1}{2}$  lin. long), with a fine terminal bristle up to 6 lin. long; upper glume subhyaline, acute, with or without a bristle, 3-nerved; valves of both florets hyaline, ciliate, slightly shorter than the glumes, of the lower 2-, of the upper 3-nerved; the latter awnless.

—*A. apricus*, var. *africanus*, Hack. in DC. Monogr. Phan. vi. 457; Durand & Schinz, *Consp. Fl. Afr.* v. 706 and *Études Fl. Congo*, 315; Pobéguin, *Ess. Fl. Guin. Franç.* 216; Th. & Hél. Durand, *Syll. Fl. Congol.* 624. *A. appendiculatus*, var. *genuinus*, Durand & Schinz, *Études Fl. Congo*, 314 (partly).

**Upper Guinea.** French Guinea: Timbo, *Pobéguin*, 1781b! 1782! 1783! 1785! Baffing Valley, *Pobéguin*, 1783b! Kankan, *Bardou*, 24! Kouroussa, *Pobéguin*, 516! 518! between Nyamina and Koulikoro, *Chevalier*, 2347! Northern Nigeria: Lokoja, *Dalziel*, 287! Nupe, *Barter*, 936! Katagum District, *Dalziel*, 264! Sokoto, *Dalziel*, 490! 490a!

**North Central.** Bagirmi: region of Lake Fitri, near Massenia, *Chevalier*, 9634!

**Lower Guinea.** Belgian Congo: Lutete, borders of streams, *Hens*, 290! Stanley Pool, in sand, *Hens*, 319 partly! Kisantu, *Gillet*, 878! Angola: moist meadows at Old Munonque, *Gossweiler*, 4153!

**Mozambique Distr.** Nyasaland: Zomba, *Whyte*!

Gossweiler's specimens are the only ones which are distinctly perennial. They are at the same time very robust with more elongated and loose panicles, the racemes being generally exerted by  $1-1\frac{1}{2}$  in. from the tops of the spatheoles and of a slightly greyish colour. Their facies on that account is not quite that of ordinary *A. pseudapricus*. Yet the structure of the spikelets as to shape and size is so like that of the common state that we may assume the difference to be due to conditions of habitat or to a slight racial deviation.

*A. apricus*, Trin. (*A. apricus*, var. *genuinus*, Hack. l.c.) has scantier panicles with very slender racemes and slender joints and pedicels, but is in other respects very similar to meagre specimens of *A. pseudapricus*. It seems to be confined to tropical America. Hackel's Indian variety of *A. apricus* is a distinct caespitose perennial. It is *A. ascinodis*, C. B. Clarke.

**27. A. amplectens**, Nees, *Fl. Afr. Austr.*, 104. Perennial, densely tufted. Culms 2-5 ft. high, slender, few- to 9-noded. Leaf-sheaths terete, tight, glabrous, the lowest and those of the innovations short, sometimes purplish, subpersistent; ligules membranous, short, truncate or rounded; blades linear from a wider rounded base, or those of the culms subcordate and amplexicaul, tapering to a long setaceous point, of the innovations up to  $\frac{1}{2}$  ft. by 1-2 lin., of the

culms up to over 1 ft. by (at the base) up to over  $\frac{1}{2}$  in., flat or convolute above, rather firm, subglaucous or suffused with purple, glabrous or with a few scattered hairs, rough upwards on the margins or almost quite smooth; midrib slender, primary lateral nerves up to 6 or more on each side. Inflorescence consisting of a terminal pair of racemes frequently augmented by 1 or 2 distant simple 1-noded branches or occasionally by a 2-rayed tier; spathes linear-lanceolate, long-narrowed upwards, glabrous, pale green, at length tightly inrolled; rays filiform, erect, strict,  $2\frac{1}{2}$ –6 in. long. Spatheoles with a generally much reduced blade similar to the spathes, about 3 in. long, tapering to a setaceous point; peduncles at length long-exserted. Racemes 2-nate, one subsessile, the other with a short base, 2–3 in. long, straight or somewhat flexuous; joints and pedicels very similar, linear, about 3 lin. long, shortly ciliate along the margins; tips produced into a very oblique obscurely denticulate cupule. Sessile spikelets heterogamous (except the lowest of the subsessile raceme), laterally compressed, wedged in between the pedicel and the joint, linear-oblong seen from the back, including the callus  $3\frac{1}{2}$ – $4\frac{1}{2}$  lin. long, glabrous, green, often reddish towards the tips; callus acute, up to 1 lin. long, shortly bearded. Glumes equal; lower acuminate, 2-toothed, keels rounded, broad and smooth below, acute and scabrid near the tips, with a distinct groove or fold extending between them to the acumen, and with 2 fine lateral furrows in the upper third; upper subcoriaceous, 1-nerved, mucronate or aristulate. Lower floret reduced to a lanceolate 3-nerved softly ciliate valve. Upper floret ♀: valve linear-lanceolate, deeply 2-fid with lanceolate ciliate lobes; awn somewhat stout,  $1\frac{1}{4}$  to almost 2 in. long, kneed and pubescent below the middle; valvule linear-oblong, 1 lin. long, nerveless, ciliate. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet ♂, lanceolate-acuminate, dorsally compressed, 5–6 lin. long; lower glume subherbaceous, with many fine nerves between the scabrid keels, usually aristulate; upper linear-lanceolate, 3- to sub-5-nerved, ciliate; valve of lower floret membranous, linear-acuminate, of upper similar but shorter, 2-toothed, mucous.—Staud. Syn. Pl. Glum. i. 372; Hack. in DC. Monogr. Phan. vi. 453; Durand & Schinz, Consp. Fl. Afr. v. 705; Stapf in Dyer, Fl. Cap. vii. 342; Chiov. in Ann. Istit. Bot. Roma, vii. (1898) 60; Wood, Natal Pl. t. 116; Eyles in Trans. Roy. Soc. S. Afr. v. (1916) 295.

Nile Land. South East Abyssinia: Bideluma, *Riva*, 522.

Lower Guinea. Angola: Huilla; Humpata, 6000–6500 ft., *Pearson*, 2603! Manyino, *Herb. Huilla*, 423!

Mozambique Distr. Rhodesia: Insiza District, *Mundy*, 2133! 2141! Mazoe District, *Mundy*! Sykinga, *Nobbs*, 646! Heaney Junction, *Jeffreys*, 8, 21; Somabula, *Govt. Herb.* 668.

✓ Var. *diversifolius*, Stapf. Blades of the cauline leaves  $\frac{3}{4}$  to over 1 in. wide at the base, rapidly tapering upwards. Inflorescence a scanty panicle of 3–4 distant 2-rayed usually simple tiers, or sometimes the lowest branch undivided at the base, several-noded, otherwise as in the type.—A *diversifolius*, Rendle in Cat. Afr. Pl. Welw. ii. 148.





Upper Guinea. French Guinea: Futa Jallon; between Daloba and Sangueta, *Chevalier*, 20187! Timbo, *Pobéguin*, 1779!

Lower Guinea. Angola: Pungo Andongo; in rocky wooded places between Caghui and Candumba, *Welwitsch*, 2835! Benguella; in thickets at the sources of the Cuariri River, *Gossweiler*, 2716!

The typical form extends southwards through Basutoland and the Transvaal to Natal.

**28. A. Schinzii**, *Hack. in DC. Monogr. Phan.* vi. 458. Perennial, densely tufted, 2-4 ft. high. Culms erect, slender, glabrous, terete, simple and sometimes woody below, with barren solitary or fascicled branches from the lower nodes, and with few solitary (rarely 2-3-nate) leafy long and erect flowering branches higher up. Leaf-sheaths terete, tight, glabrous, firm, the lower and intermediate mostly longer than the internodes, shortly auricled at the mouth, the basal long, persistent; ligules membranous, truncate, laterally produced and adnate to the auricles of the sheath,  $\frac{1}{2}$ -1 lin. long; blades linear from a slightly narrower base, long-tapering to a fine point, 4-8 in. by 2-3 $\frac{1}{2}$  lin., flat, rigid, glaucous, slightly rough or puberulous on both sides, rarely with some additional very long and fine spreading hairs, midrib whitish, rather slender, lateral primary nerves 3-4 on each side, very fine. Inflorescence of the culms and their leafy branches reduced to a terminal raceme-pair or augmented by 1-2 distant simple 1-noded branches or 2-3-rayed tiers; spathes subherbaceous, green, sometimes faintly tinged with purple, at length tightly inrolled, with a more or less reduced blade; rays filiform, erect, strict, up to over 3 in. long. Spatheoles similar to the spathes, generally with an acute or setaceous point and up to 3 in. long; peduncles at length long-exserted, straight or flexuous, terminating with a frequently bearded cupule. Racemes 2-nate, one sessile, the other with a short base, 2-3 in. long, straight or flexuous, villous; joints and pedicels equal or subequal, cuneate, stout above, much attenuated towards the base, 2-2 $\frac{1}{2}$  lin. long, rigidly ciliate on both sides, cilia up to over 2 lin. long, tips obliquely cupular, minutely toothed. Sessile spikelets of all pairs heterogamous (except the lowest 1 or 2 of the sessile raceme—rarely also of the pedicelled—which are more or less reduced or ♂ and occasionally approach their pedicelled companions in shape), laterally compressed, loosely wedged in between joint and pedicel, narrowly linear in front view, 3-3 $\frac{1}{2}$  lin. long, glabrous; callus short, obtuse, shortly bearded. Glumes somewhat unequal, the lower slightly shorter, subcoriaceous, dull green, with a deep narrow hyaline groove between the keels which are obtuse and smooth up to three-quarters, then acute and scaberulous, tips minutely 2-toothed, purplish, nerves 4 on each side, one close to the groove, the others in the keels, green in transmitted light; upper glume boat-shaped, submembranous, 3-nerved, ciliate, with a terminal bristle up to 5 lin. long. Lower floret reduced to a linear-oblong acute 2-nerved ciliate hyaline valve

2-2½ lin. long. Upper floret ♂: valve oblong, 2-fid, with very acute lobes, 3-nerved below, ciliate; awn slender, about 1 in. long, kneed at and scaberulous below the middle; valvule linear-oblong, hyaline, nerveless, 1½ lin. long. Anthers 1½ lin. long. Pedicelled spikelet ♂, dorsally compressed, oblong or lanceolate-oblong, acute, 2½-3½ lin. long, purplish or reddish; lower glume 2-toothed, with an interposed bristle 2-3 lin. long, keels scabrid and sometimes ciliate, intracarpal nerves 7-9; upper glume submembranous, 3-nerved, ciliolate, aristulate like the lower; valves of both florets hyaline, ciliate, that of the lower finely 2-keeled, of the upper shorter, 3-nerved, mucronulate.—Durand & Schinz, *Consp. Fl. Afr.* v. 721; Hack. in *Bull. Herb. Boiss.* iv. App. iii. 11; Stapf in *Dyer, Fl. Cap.* vii. 341.

**Nile Land.** Abyssinia: Boran, *Stordy*! Uganda: Mbuyuni, *Scott Elliot*, 6236!

**Lower Guinea.** Belgian Congo: without precise locality, *Rogers*, 10989! Amboland: Oshando, very common, *Schinz*, 670! Awass Mountains, between Haris and Aub, *Pearson*, 9601!

**Mozambique Distr.** Rhodesia: Broken Hill, *Rogers*, 8542! Gazaland: Northern Melsetter, 4000-6000 ft., *Swynnerton*, 1614!

Also in Griqualand and the Transvaal (Johannesburg, *Pillans*, 1822!)

**29. A. schirensis**, *Hochst. in A. Rich. Tent. Fl. Abyss.* ii. 456. Perennial, 3-10 ft. high, densely tufted. Culms erect, slender, glabrous, terete, about 4-noded, simple, rarely with a flowering branch from one of the upper internodes. Leaf-sheaths terete, tight, glabrous, rarely hairy to almost tomentose, shorter than the internodes; ligules very short, truncate, glabrous; blades linear from a somewhat narrower base, long-tapering to a fine point, up to 1½ ft. long, 3-7 lin. wide, flat, rigid, more or less glaucous, often turning reddish, glabrous or sometimes shortly pubescent or loosely hirsute to almost villous, particularly at the base, smooth or more or less rough on both sides, margins scabrid, midrib slender, projecting below, primary lateral nerves very fine, 4-5; subtending leaf with an ultimately very tight and narrow sheath, 6-10 in. long, and a long setaceous blade. Peduncles stoutly filiform, erect, terminating with a minute crenulate cupule. Racemes 2-nate, one sessile, the other with a short base (exceptionally several, up to 5, on a very short common axis), 2½-5 in. long, flexuous, silky-villous, conspicuously dorsi-ventral, exhibiting on one side the sessile spikelets with their joints and the pedicels in profile flanking them, and on the other the broad backs of the pedicelled spikelets with the dense cilia of the pedicels between them; joints and pedicels clavate-cuneate, 2-2½ lin. long, densely ciliate on both sides; short except towards the tips where they increase rapidly in length up to 2 lin. long; tips obliquely cupular or in the pedicels produced into a broad tooth. Sessile spikelets of all pairs heterogamous (except the lowest of the lower raceme—occasionally also of the upper—more or less reduced and awnless) laterally very much compressed, tightly wedged in between joint and pedicel, narrowly linear in face





view,  $2\frac{1}{2}$ – $3\frac{1}{2}$  lin. long, glabrous, yellowish to olive-green, often dull purplish upwards; callus  $\frac{1}{2}$  lin. long, obtuse, shortly bearded. Glumes equal, the lower thinly coriaceous with a deep narrow hyaline groove or fold between the keels which are obtuse and smooth below and more or less scaberulous above the middle, tips obscurely 2-toothed, nerves none besides the keels; upper glume subcoriaceous, rounded on the back up to beyond the middle, then tightly compressed and keeled, truncate, mucronulate, 1-nerved, hyaline, margins very narrow, ciliate. Lower floret reduced to a narrow oblong subobtuse 2-nerved hyaline valve about 2 lin. long. Upper floret ♂: valve narrow-oblong, 2-fid almost to the middle, 2 lin. long; lobes acute, eciliate; awn slender, 1– $1\frac{1}{2}$  in. long, column bent at the middle, obscurely scaberulous, light brown, bristle yellowish, as long as the column; valvule ovate-oblong, obtuse,  $1\frac{1}{2}$  lin. long, nerveless. Anthers  $1\frac{3}{4}$  lin. long. Pedicelled spikelets ♂, oblong, dorsally much compressed, 3–5 lin. long,  $\frac{3}{4}$ –1 lin. broad, usually reddish or purplish-brown; lower glume subherbaceous, acute or acuminate, glabrous. intracarpal nerves up to 13 or 15, very close, keels rigidly ciliolate, inflexed margins very narrow; upper glume membranous, very acute, 3-nerved, ciliolate; valves of both florets hyaline, ciliolate, of the lower 2-nerved and acute, of the upper 1-nerved, emarginate; valvule linear, over 1 lin. long. Anthers 2 lin. long.—Staud. Syn. Pl. Glum. i. 371; Hack. in DC. Monogr. Phan. vi. 452; Durand & Schinz, Consp. Fl. Afr. 722; K. Schum. in Engl. Pf. Ost-Afr. C. 98; Rendle in Cat. Afr. Pl. Welw. ii. 148, and in Journ. Linn. Soc. Bot. xl. 225; Pobéguin, Ess. Fl. Guin. Franç. 216; Eyles in Trans. Roy. Soc. S. Afr. v. (1916) 297. *A. congoensis*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. (1895) 325 (reprint 17).

**Upper Guinea.** Sierra Leone: Mamaha, *Thomas*, 4342! French Guinea: Futa Jallon; between Soumbalako and Boulivel, *Chevalier*, 18645! Kouroussa, *Pobéguin*, 503, 509! Timbo, *Pobéguin*, 1780! Lagos, *MacGregor*, 153! Northern Nigeria: Lokoja; Mount Patti, *Dalziel*, 290! Jeba, *Barter*! Abinsi, abundant in the bush, *Dalziel*, 906!

**North Central.** Oubangui territory: Bagao Country, *Chevalier*, 5601!

**Nile Land.** Gallabat: Chor Utrub, *Schweinfurth*, 1039! Abyssinia: Gaffa, *Schimper*; and without precise locality, *Schimper*, 1807. Soudan: Jur; Ghattas' Great Seriba, *Schweinfurth*, 2336! British East Africa: Nairobi, *Dowson*, 237!

**Lower Guinea.** French Congo: Osika, *Brazza*, 232! Belgian Congo: Kisantu, *Gillet*, 626! 627!

**Mozambique Distr.** German East Africa: Usambara; Duga, *Holst*, 3214! Nyasaland: Nyika Plateau, *McClouvie*, 21! Shire Highlands, *Buchanan*, 53! Rhodesia: Inyanza District, *Mundy*! Gazaland: Chirinda, *Swynnerton*, 1624! ✓ *Var. angustifolius*, Stapf in Dyer, Fl. Cap. vii. 340. Leaves 1–2 lin. wide, those of the innovations convolute, filiform.—Wood, Natal Pl. t. 115. *A. amplexens*, var. *natalensis*, Hack. in Mém. Herb. Boiss. no. 20, 9.

**Lower Guinea.** Angola: Benguella; country of the Ganguellas and Amboellas, *Gossweiler*, 2780! 3776 a!

The variety also occurs in South Africa, from the Transvaal to Natal.

Here probably also belongs a form from the Cameroons with very long and narrow leaves, *Preuss*, 821!

✓ 30. *A. Dummeri*, Stapf. Perennial, densely tufted,  $1\frac{1}{2}$ –3 ft. high, with numerous innovations, coated at the base with long-persistent fibrous sheaths. Culms erect, very slender, simple, 2–3-noded, glabrous, smooth, internodes often long-exserted. Leaf-sheaths terete, tight, glabrous, the lowest short, persistent and usually breaking up into fibres; ligules short, rounded, membranous,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. long; blades linear, somewhat attenuated towards the base, long-tapering to a fine point, up to over 6 in. by 1–2 lin., somewhat soft or at least flexuous, at length turning brown, scattered with fine white long more or less spreading hairs above in the lower part, otherwise glabrous, margins more or less spinulously scabrid, midrib slender, prominent below, lateral nerves 3–5 on each side, very fine; subtending leaf with a very narrow soon convolute sheath, and usually a filiform or setaceous blade. Peduncle filiform, slender, at length usually long-exserted, tips imperfectly articulated, usually minutely bearded. Racemes 2-nate, one sessile or subsessile, the other with a short base, slightly flexuous or straight,  $1\frac{1}{2}$ –3 in. long, slender, rather dense, olive-green, tinged with purple or brown; joints cuneate down to the middle, then linear, 2 lin. long, mostly shortly and loosely ciliate on the outer side all along, on the inner side up to the middle, outer and uppermost cilia rarely over 1 lin. long, tips obliquely and shallowly cupular and crenulate. Sessile spikelets heterogamous (except the lowest of the sessile racemes—rarely of both racemes—which is imperfect and awnless), laterally much compressed, tightly wedged in between joint and pedicel, linear-lanceolate in front view,  $2\frac{1}{2}$ – $2\frac{3}{4}$  lin. long including the callus which is subobtuse, over 2 lin. long, and scantily bearded from the very base. Glumes equal, chartaceous, glabrous, the lower acuminate, 2-denticulate, deeply grooved between the very narrow and upwards acute and scaberulous keels, nerveless between the keels, the upper boat-shaped, subacute, 1-nerved, or with very obscure marginal nerves, ciliate. Lower floret reduced to an oblong subobtuse 2-nerved ciliolate subhyaline valve. Upper floret ♂; narrow linear-oblong, shortly 2-fid,  $1\frac{1}{2}$  lin. long, ciliolate, 3-nerved below; awn fine,  $\frac{3}{4}$ –1 in. long, bent at and twisted about the middle, more or less flexuous; valvule lanceolate-oblong, acute, over 1 lin. long, awnless. Anthers up to  $1\frac{1}{2}$  lin. long. Pedicelled spikelets ♂, broadly lanceolate to lanceolate-oblong, acute or acuminate,  $2\frac{1}{2}$ – $3\frac{1}{2}$  lin. long, up to 1 lin. wide, usually convex or almost flat on the back, glabrous, often dark and dull purplish; lower glume subherbaceous with numerous close nerves of which the central and the outer are percurrent, keels scabrid above; upper membranous, acuminate, finely 3-nerved, ciliate; valves of both florets hyaline, oblong, slightly shorter than the glumes, of the lower 2-nerved, ciliolate, of the upper 1-nerved, ciliolate; valvule linear, 1 lin. long.

+ Nile Land. Uganda: Mabira Forest; (near Kiwala, in low grass land 4000 ft.), *Dummer*, 2979! Kibanga, (by the lake, 3780 ft.), *Dummer*, 1405!





Kijanja, 4500 ft., *Dummer*, 1066! (and without precise locality, *Maitland*, 68  
British East Africa: Mau, 9000 ft., *Battiscombe*, 281! 294!

Mozambique Distr. German East Africa: Usambara; Kwa Mshuza  
*Holst*, 8940! Chibenga Stream, *Kässner*, 2088!

✓ Var. *calvus*, Stapf. Basal sheaths firmer than in the type, not breaking up  
into fibres; blades 3-4 in. long, rigid. Racemes subglabrous, with the joints  
and pedicels very sparingly ciliate or quite glabrous.

† Lower Guinea. Angola: Malange District, *Gossweiler*, 806!

It is worth noting that in one of the specimens one culm bears a solitary  
raceme, whilst another culm has a pair of racemes as usual; the structure of  
the spikelets of this form is exactly as in typical *A. Dummeri*.

✓ 31. **A. Pseudo-Schinzii**, Stapf. Perennial, 2-3 ft. high. Culms  
erect, slender, glabrous, terete, simple below, then with a solitary long  
leafy branch and above it with a few distant erect solitary flowering  
branches. Leaf-sheaths terete, tight, glabrous, moderately firm,  
the lower and intermediate longer or only slightly shorter than the  
internodes, produced at the mouth into narrow acute auricles, up  
to 4 lin. long; ligules membranous, laterally adnate to the auricles  
of the sheath; blades very narrow from the base, long-tapering to  
a fine point, up to over 6 in. by 1-1¼ lin., flat or convolute, slightly  
rough or puberulous on both sides, midrib whitish, rather slender,  
rounded and prominent on the back, lateral nerves obscure; sub-  
tending leaf with a somewhat tumid at length very narrow and  
tight sheath, with or without a setaceous rudimentary blade.  
Peduncles filiform, 4-6 in. long, straight, terminating with a minute  
glabrous or scantily bearded cupule. Racemes 2-nate, one sessile,  
the other with a short base, 1½-2¼ in. long, straight, slightly villous;  
joints and pedicels equal or subequal, linear-cuneate, very slender  
towards the base, up to over 2 lin. long, shortly ciliate on both sides,  
cilia ½ lin. long, tips obliquely cupular, minutely toothed. Sessile  
spikelets of all pairs heterogamous (or the lowest of the sessile raceme  
more or less reduced or ♂), laterally much compressed, loosely wedged  
in between joint and pedicel, narrowly linear in front view, 3½ lin.  
long, glabrous; callus very short and minutely bearded. Glumes  
equal, lower subcoriaceous, dull green, with a deep narrow hyaline  
groove between the keels which are obtuse and smooth up to over  
three-quarters, then acute and subscaberulous, tips minutely 2-  
toothed, nerves 3 in each keel, a short fourth inside each keel; upper  
glume boat-shaped, submembranous, 1-nerved, ciliolate with a  
terminal bristle up to 2 lin. long, rising from the sinus of 2 small  
hyaline teeth. Lower floret reduced to a narrow linear hyaline  
2-nerved ciliate valve. Upper floret ♀; valve oblong, 2-fid with  
acute lobes, ciliate, awn very slender, ¾ in. long, kneed at and  
scaberulous below the middle; valvule an oblong hyaline scale, 1 lin.  
long. Anthers up to 2 lin. long. Pedicelled spikelet ♂, dorsally  
compressed, oblong, acute, 2½-3 lin. long, pale brownish; lower  
glume submembranous, with a terminal mucro or short bristle and

rigidly ciliolate or ciliate keels, finely 9-nerved, 3 nerves with each keel and 3 in the middle separated from the keel-nerves by a broad nerveless space; upper thinner, mucicous, very acute, 3-nerved, ciliolate; valves of both florets hyaline, ciliolate, of the lowest 2-nerved, of the upper 3-nerved, mucicous.

+ **Mozambique Distr.** Nyasaland: Shire Highlands, *Buchanan*, 67!

**32. *A. perligulatus***, *Stapf in Kew Bulletin*, 1908, 410. Perennial, up to over 3 ft. high. Culms slender, at least 3-4-noded, terete, glabrous, smooth. Leaf-sheaths terete, glabrous or more or less hirsute upwards, glaucous, produced at the mouth into lanceolate acute auricles up to over 6 lin. long; ligules scarious, as long as and adnate to the auricles of the sheath; blades linear, long and narrowly attenuated towards the base and there generally much longer than the sheath, long-tapering to a fine point, up to over 1 ft. long and 2 lin. wide, firm, rigid, glabrous or loosely hairy, particularly below, rough all over or smooth on the upper surface towards the base, midrib whitish, rather stout and prominent downwards, primary lateral nerves 2-3, raised above, obscure below. Inflorescence a very scanty spatheate panicle, up to 2½ ft. long, of up to 4 very distant 2-rayed tiers, or the lowest branch undivided at the base; spathes like the preceding leaves, the lower with well developed blades; rays often very unequal, the primary often up to over 1 ft. long, filiform, erect, strict. Spatheoles linear-lanceolate, 3-4 in. long, passing into a short to very short subulate or setaceous rudimentary blade, subherbaceous to scarious, greenish or very slightly tinged with red or brown, glabrous, at length more or less tightly inrolled; peduncle terminally shortly exerted. Racemes 2-nate, one sessile, the other with a very short base, slender, flexuous, up to 3 in. long, tinged with purple or violet, conspicuously dorsiventral, one side exhibiting the grooved sessile spikelets with the joints and the pedicelled spikelets in profile and the other the backs of the pedicelled spikelets and between them the broad backs of the upper glumes; joints and pedicels broad-linear to cuneate-linear, 1½ lin. long, shortly ciliate, glossy, tips obliquely truncate, obscurely concave. Sessile spikelets heterogamous or of the lowest pair of the sessile raceme homogamous or imperfect, wedged in between the joint and pedicel, laterally much compressed, linear in front view, 2½ lin. long, glabrous, yellowish, reddish or brownish at the tips; callus short, very shortly bearded. Glumes equal, the lower subcoriaceous, minutely truncate, with a deep and narrow groove between the keels which are smooth up to two-thirds and then spinulously ciliate, one nerve on each side of the groove, 2-3 in or close to the keels; upper glume boat-shaped with a broad rounded back below and a scaberulous keel upwards, 3-nerved, margins narrow, hyaline, ciliolate. Lower floret reduced to an oblong 2-nerved hyaline ciliolate valve, slightly shorter than the glumes. Upper floret ♂: valve broad-oblong,





2-lobed,  $1\frac{3}{4}$  lin. long, ciliate; awn fine, kneed at about the middle, column and bristle each about 5-6 lin. long; valvule oblong, 2-nerved, over 1 lin. long, eciliate. Anthers  $1\frac{3}{4}$  lin. long. Pedicelled spikelets lanceolate, acute, reddish,  $2\frac{1}{2}$ -3 lin. long; lower glume mucronate, about 13-nerved, keels spinulosly ciliate, upper mucronate, 3-5-nerved, ciliate; valves of both florets oblong, hyaline, the lower 2-, the upper 3-nerved,  $2\frac{1}{2}$  lin. long; valvule as in the sessile flower but nerveless.

**Upper Guinea.** Togo: Misahöhe, *Baumann*, 318! Northern Nigeria: Abinsi, *Dalziel*, 906a.

**33. A. canaliculatus**, *Schumach. in Schumach. & Thonn. Beskr. Guin. Pl.* 52. Perennial. Culms slender, glabrous, smooth, 4-6-noded, up to 3 ft. high. Leaf-sheaths firm, glabrous, terete, rarely with a small beard at the mouth, smooth, strongly striate, produced at the mouth into lanceolate auricles, up to  $1\frac{1}{2}$  lin. long; ligules scarious, truncate, glabrous, adnate to the auricles of the sheath; blades very narrow, linear, long-tapering to a subacute point, usually much narrower at the base, up to 1 ft. long and  $1\frac{1}{2}$  lin. wide, convolute or with recurved margins, flat, glabrous or hirsute above the ligule, smooth except near the tips and along the margins, or rough all over above, midrib slender, raised below, primary lateral nerves about 2 on each side. Inflorescence consisting of a terminal raceme-pair, augmented by 2 or 3 very distant 2-rayed mixed or simple tiers; spathes resembling the preceding leaves with more or less well developed blades; rays slender, filiform, very unequal, erect, strict, the primary up to over  $\frac{1}{2}$  ft. long. Spatheoles subscarious, acute, glabrous, 3-4 in. long, with much reduced subulate or short bristle-like blades, finally more or less tightly inrolled; peduncle often of the same length as the rays, long-exserted. Racemes 2-nate, erect, subflexuous,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, one sessile, the other with a short base, sparingly hairy; joints oblong-cuneate from a slender base, stout upwards, much rounded on the back and deeply concave on the face, over  $1\frac{1}{2}$  lin. long, ciliate with a tuft of short hairs near the base of the outer angle and shortly ciliate along the inner up to the middle, otherwise glabrous and smooth, tips slightly emarginate, hardly hollowed out; pedicels very similar, slightly shorter. Sessile spikelets all (?) heterogamous, linear in front view, including the minute and shortly bearded callus  $2\frac{1}{2}$  lin. long, pale. Glumes subequal; lower thinly chartaceous along the middle, firm towards the keels, minutely 2-dentate, deeply and narrowly grooved between the keels, glabrous, smooth except for the upwards scaberulous keels, inflexed margins rather narrow, 7-nerved, 1 nerve on each side of the groove and 2 close to each keel; upper glume boat-shaped, rounded on the back below, keeled above, produced into a short curved mucro, membranous, 3-nerved, ciliate, scabrid on the keel above the

middle. Lower floret almost as long as the glumes, reduced to an oblong acute hyaline 2-nerved ciliate valve. Upper floret ♂, slightly shorter than the lower: valve oblong, 2-fid to one-third, with the lobes oblong and subobtusate, 3-nerved, ciliate, awn fine, 4-8 lin. long, kneed at and twisted below the middle, column like the bristle scaberulous; valvule linear-oblong, over  $1\frac{1}{2}$  lin. long, obtuse, nerveless, ciliate. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet ♂, dorsally compressed, lanceolate, acuminate,  $2\frac{1}{4}$ - $2\frac{1}{2}$  lin. long; lower glume thinly chartaceous, with 5 intracarinal nerves, tips acute, with or without a minute bristle; upper glume and florets similar to those in the sessile spikelet, but the upper valve acute and awnless.—Hack. in DC. Monogr. Phan. vi. 470; Durand & Schinz, Consp. Fl. Afr. v. 707. *A. eucnemis*, A. Trin. in Mém. Acad. Pétersb. 6me sér. ii. 275; Hack. l.c.; Durand & Schinz, l.c., 711. *A. shirensis* (var.), Pobéguin, Ess. Fl. Guin. Franç. 216.

**Upper Guinea.** Gold Coast: Christianborg, *Johnson*, 1030! Accra, *Don*! and without precise locality, *Thonning*.

✓ **Var. *fastigiatus*, Stapf.** Panicle fastigiate, over 1 ft. long, of 3 or 4 distant 2-3-rayed mixed or simple tiers, the lowest developing much later than the upper.

+ **Upper Guinea.** French Guinea: Timbo, *Pobéguin*, 1776! Kouroussa, *Pobéguin*, 513! San, *Chevalier*, 2439!

**Nile Land.** Uganda: (low grassy swamp near Utakafuum), *Dummer*, 825!

✓ **Var. *Fyffei*, Stapf.** Culms densely tufted, with few barren innovation shoots; leaf-sheaths not auricled; ligules very short; blades soft, 3-5 in. by  $1\frac{1}{2}$  lin., loosely hairy below, pubescent to subglabrous above, midrib very slender. Inflorescence as in var. *fastigiatus* or much more reduced, sometimes with only one 1-noded branch. Sessile and pedicelled spikelets exactly as in the type.

+ **Nile Land.** Uganda: Entebbe, on the lake shore, *Fyffe*, 186! *US type*

The specimens have almost the appearance of a tufted annual and may be in their first year. This and the station on the lake shore may also account for the softer leaves. The spikelets are in all their parts indistinguishable from those from West Africa.

✓ **34. *A. tumidulus*, Stapf.** Perennial, forming small tufts with very few slender innovations,  $1\frac{1}{2}$ -3 ft. high. Culms very slender, simple, 2-4-noded, glabrous, smooth, internodes long-exserted. Leaf-sheaths terete, very tight, striate, smooth, glabrous, produced at the mouth into narrow acute auricles; ligules scarious, adnate to the auricles of the sheath, 1 to over  $1\frac{1}{2}$  lin. long, truncate; blades very narrow, linear, tapering to a fine point, up to 4 in. by  $\frac{1}{2}$ -1 lin., pale green or purple, glabrous or very sparingly hairy towards the base, scabrid or scaberulous on both sides and along the margins; subtending leaf with a spathaceous sheath which soon becomes very narrow and convolute and a setaceous rudimentary blade. Peduncles finely filiform, striate, firm, imperfectly articulated and bearded at the tips. Racemes 2-nate, one sessile, the other or both with a short base, slender, rather dense, 1-2 in. long,





straw-coloured or greenish and tinged with purple; joints cuneate-oblong,  $1\frac{1}{2}$  lin. long, shortly ciliate up to two-thirds on one side and almost up to the middle on the other (cilia  $\frac{1}{2}$  lin. long), sub-obliquely truncate, the pedicels less convex on the back than the joints. Sessile spikelets all (?) heterogamous, tightly wedged in between joint and pedicel, linear in front view, about  $2\frac{1}{2}$  lin. long, including the minute obtuse shortly bearded callus. Glumes unequal, lower slightly shorter than the upper, firmly chartaceous, minutely truncate, deeply and narrowly grooved between the keels which are smooth and obtuse below and scabrid to spinulously ciliate about the middle, intracarinal nerves 2, rather stout, 1 on each side of the bottom of the groove, keel-nerves one, or if two very close; upper glume boat-shaped, acuminate, mucronate or subaristulate, sub-chartaceous, 1-nerved, broadly rounded on the back below, keeled upwards, keel rigidly ciliate, margins minutely ciliate. Lower floret reduced to a narrow oblong 2-nerved ciliate subhyaline valve 2 lin. long. Upper floret ♂: valve oblong,  $1\frac{1}{2}$  lin. long, very shortly 2-lobed, acute, margins conspicuously ciliate, awn fine, about  $\frac{3}{4}$ –1 in. long, flexuous, kneed at and twisted below the middle; valvule a hyaline nerveless linear-oblong scale, 1 lin. long. Anthers over 1 lin. long. Pedicelled spikelets ♂ or neuter, and more or less reduced, lanceolate-oblong, acute, 2–3 lin. long, greenish or purplish; glumes equal, membranous, the lower with about 7–9 scaberulous intracarinal nerves, shortly aristulate, keels rigidly ciliate; upper glume acuminate, mucronate, sub-3-nerved; valves of both florets if perfectly developed hyaline, oblong, acute, ciliate, up to over 2 lin. long, the lower 2-, the upper sub-3-nerved, and with a ciliate valvule almost half as long.

+ **Lower Guinea.** Angola: Benguela; (country of the Ganguellas and Amboellas, *Gossweiler*, 2585 !

+ **Mozambique Distr.** Rhodesia: Salisbury, *Mrs. Craster*, 61 !

**35. A. heterantherus**, *Stapf in Kew Bulletin*, 1908, 409. Perennial. Culms tightly fascicled, with a few extravaginal innovation-shoots springing from the short slender rhizome,  $1\frac{1}{2}$  ft. high or higher, glabrous, smooth, 5- or more-noded, branched almost all along or simple below, internodes slender, the lowest wiry, mostly shortly exerted from the sheath, stem-nodes usually slightly swollen. Leaf-sheaths tight, finely striate, glabrous or the upper more or less hirsute; ligules scarious, very short, truncate; blades linear, constricted and rounded at the base, tapering to a long setaceous point, 4–6 in. by 3 lin., flat, green, with long white hairs scattered along the margins and collected into a beard above the ligule, smooth, midrib slender, primary lateral nerves above 5 on each side; subtending leaf with a permanently somewhat loose sheath, about 3 in. long, glabrous, and a very narrow reduced blade. Peduncles filiform, glabrous, 5–6 in. long; tips truncate. Racemes 2-nate, one sessile,

the other with a base, which is about  $2\frac{1}{2}$  lin. long, almost quite glabrous; joints and pedicels stout, clavate or oblong-clavate, truncate, much contracted at the base and shortly bearded there, otherwise glabrous, shining, yellowish. Sessile spikelets all heterogamous, laterally compressed, tightly wedged in between joint and pedicel, linear-lanceolate in front view, acuminate,  $3\frac{1}{2}$ –4 lin. long, including the glabrous callus. Glumes equal, lower firmly chartaceous, shining, shortly 2-dentate, deeply concave or grooved between the keels which are obtuse and smooth up to the acumen, and acute and scaberulous in the acumen, nerves 3 on each side in and near the keel; upper glume boat-shaped, acute, chartaceous, ciliolate, 3-nerved, keel acute above and almost smooth. Lower floret reduced to an oblong acute ciliolate 2-nerved valve. Upper floret ♂: valve oblong, 2-fid, eciliate,  $1\frac{1}{2}$  lin. long, awn slender, 7–8 lin. long, kned at the middle; valvule oblong, 2-fid, nerveless,  $\frac{3}{4}$  lin. long. Anthers  $\frac{1}{4}$  lin. long. Grain oblong, over 1 lin. long. Pedicelled spikelet lanceolate, acutely acuminate, about 3 lin. long, greenish, glabrous; lower glume mucronulate, with about 9 very close and fine nerves; upper somewhat shorter, very acute, 3–5-nerved, ciliolate, membranous; valves of both florets hyaline, of the lower  $2\frac{1}{2}$  lin. long, 2-nerved and ciliolate, of the upper somewhat shorter, 1-nerved, mucronulate; valvule deeply 2-fid; anthers  $1\frac{1}{2}$  lin. long.—*Ischaemum chrysatherum*, K. Schum. in Engl. Glied. Veg. Usambara, 14 (*chrysanthemum*) and 28 (name only).

**Mozambique Distr.** German East Africa: Usambara; in bush near Muou, *Holst*, 3073! Amboni, *Holst*.

**36. A. pinguipes**, *Stapf in Kew Bulletin*, 1908, 411. Perennial? (base unknown). Culms erect, slender, over  $1\frac{1}{2}$  ft. long, glabrous, smooth. Leaf-sheaths tight, terete, glabrous, smooth, striate, shortly auricled, auricles triangular, acute; ligules truncate, scarious, ciliolate, adnate to the auricles of the sheath; blades linear, long-attenuated at the base or contracted into a narrow petiole, tapering to a setaceous point, up to 8 in. by  $2\frac{1}{2}$  lin. wide, flat, flaccid, puberulous on both sides, turning reddish, scaberulous along the margins and nerves, midrib whitish, slender, lateral nerves very fine. Inflorescence a very narrow spatheate panicle up to 1 ft. long, of up to 4 distant 2-rayed tiers, sometimes reduced to a few simple 1-noded branches; spathes resembling the preceding leaves with more or less well-developed blades; rays very slender, subequal, erect, strict, 2– $2\frac{1}{2}$  in. long. Spatheoles lanceolate-oblong, with a small setaceous point or blade, subscarious, slightly tinged with purple, glabrous, about  $2\frac{1}{2}$ –3 in. long, finally more or less tightly inrolled; peduncles at length shortly exserted. Racemes 2-nate, one sessile, the other with a short base,  $1\frac{1}{4}$ – $1\frac{3}{4}$  in. long, yellowish, nearly quite glabrous; joints and pedicels very similar, stout, clavate, very convex





and glossy on the back, not quite 2 lin. long, shortly ciliate, obliquely truncate. Sessile spikelets heterogamous (except the lowest of the sessile raceme which is more or less reduced and awnless), laterally compressed, tightly wedged in between joint and pedicel, lanceolate-oblong,  $2\frac{1}{2}$ –3 lin. long, including the short and shortly bearded callus, yellowish or greenish upwards. Glumes equal, lower minutely truncate, concave on the back, firmly chartaceous, glabrous, smooth and shining up to the middle, scaberulous upwards, nerves 7–8, the innermost distant from each other and from the remaining nerves; keels scabrid upwards; upper glume boat-shaped, subacute, thinly chartaceous, 3-nerved, keel almost smooth, margins ciliate. Lower floret reduced to a hyaline oblong 2-nerved ciliate valve almost as long as the glumes. Upper floret ♀: valve narrow, oblong, 2-lobed,  $1\frac{3}{4}$  lin. long, ciliate, awn about 9 lin. long, slender, kneeed at the middle. Anthers  $1\frac{3}{4}$  lin. long. Pedicelled spikelet ♂, elliptic-oblong,  $3$ – $3\frac{1}{4}$  lin. long, greenish; lower glume aristulate, very closely and finely nerved, nerves up to over 20; upper glume as long as the lower, acute, 3-nerved, ciliate; valve of the lower floret almost as long as the glumes, oblong, obtuse, hyaline, 3-nerved, of the upper slightly shorter, minutely 2-toothed, 1-nerved, eciliate.

**Upper Guinea.** Senegambia: M'Bidjem, *Thierry*, 92!

**37. A. textilis**, *Rendle in Cat. Afr. Pl. Welw.* ii. 144. Perennial, densely caespitose, with numerous intravaginal innovations. Culms erect, simple or very sparingly branched upwards, slender, up to 3 ft. high, terete, channelled on one side, glabrous, about 4–5-noded, middle and upper internodes exserted, more or less rough or minutely puberulous towards the upper end. Leaf-sheaths tight, the lowest compressed and keeled, firm and persistent, the others terete, striate, smooth; ligules lanceolate, very acute, scarious, nerved and firm along the sides,  $2\frac{1}{2}$ –5 lin. long, glabrous; blades narrowly linear to junciform, hard, laterally compressed, tightly folded, or channelled towards the base, long-attenuated to a fine point, up to over 1 ft. (those of the culm much shorter) by  $\frac{1}{3}$ – $\frac{3}{4}$  lin., glabrous below, scaberulous or minutely puberulous above, scaberulous along the margins, midrib laterally compressed, keeled below, primary lateral nerves about 3 on each side, distinctly raised on the upper side. Inflorescence very scanty, reduced to a single terminal raceme or augmented by 1–3 distant undivided very long 1-noded branches, each bearing a solitary raceme; leaves subtending the branches like the preceding culm-leaves. Spatheoles narrowly lanceolate, attenuated into a fine setaceous point, 2–4 in. long, sub-herbaceous, glabrous, ultimately tightly inrolled; peduncles filiform, sometimes flexuous, 6 to over 9 in. long, more or less rough or minutely puberulous towards the tips. Racemes rather dense, straight or flexuous,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, greenish, slightly villous; joints

subclavate,  $1\frac{1}{2}$ –2 lin. long, glossy and yellow, glabrous on the back, densely ciliate along the sides, hairs dirty white to yellowish, those of the outer edge up to 2 lin. long, tips slightly oblique, obscurely 2-auriculate; pedicels very similar. Sessile spikelets wedged in tightly between joint and pedicel, linear in face view, including the very small shortly bearded callus  $2\frac{1}{2}$ –3 lin. long, yellowish below, greenish upwards. Glumes equal; lower chartaceous below and along the rounded sides, membranous towards the middle and the tips, 2-mucronate or 2-aristulate, deeply grooved up to near the tips, densely pubescent on the back in the groove and puberulous all over the tips and the sides on the inner face, 2-keeled above the middle, with the keels scabrid, intracarinal nerves 6, close to the keels; upper glume boat-shaped, emarginate, with a fine bristle about 2 lin. long from the notch, membranous, ciliate, 3-nerved, lateral nerves submarginal. Lower floret reduced to a linear-oblong valve, concave on the back,  $2\frac{1}{2}$  lin. long, hyaline, somewhat firmer below, ciliate, 2-nerved. Upper floret ♀: valve broadly oblong, 2-fid to the middle,  $2\frac{1}{2}$  lin. long, hyaline, 3-nerved, ciliate, segments ovate-lanceolate, acute, awn up to 9–10 lin. long, more or less kneed at and twisted below the middle, column dark, very minutely puberulous, bristle pale, scabrid; valvule linear-oblong, hyaline, sub-2-nerved or nerveless, ciliate upwards and  $1\frac{1}{2}$  lin. long. Anthers 2 lin. long. Grain oblong, 1 lin. long, subterete; scutellum elliptic, half the length of the grain. Pedicelled spikelet ♂, broadly oblong-lanceolate, subacuminate, somewhat purplish,  $2\frac{1}{2}$ –3 lin. long; glumes subequal; lower aristulate, rather flat on the back, about 13-nerved, keels acute, rigidly ciliate, bristle up to 2 lin. long; upper glume submembranous, lanceolate, acute, 5-nerved, ciliate; valves linear-oblong, acute, 3-nerved, upper accompanied by a valvule like that of the sessile floret and a ♂ flower.

**Lower Guinea.** Angola: Pungo Andongo; common in damp meadows between N'billa and Bumba, *Welwitsch*, 7440! Benguella; country of the Ganguellas and Amboellas, *Gossweiler*, 2415!

✓ **38. A. Macleodiæ, Stapf.** Perennial, over  $1\frac{1}{2}$  ft. high. Culms erect, 5- or more-noded, with 2-nate or solitary barren appressed branches from most or all nodes, wiry, glabrous, smooth. Leaf-sheaths firm, the upper herbaceous, very tight, terete, produced at the mouth into short auricles; ligules scarious, truncate, laterally adnate to the auricles of the sheath, up to  $\frac{1}{2}$  lin. long; blades very narrow, linear, long-tapering to a fine point, 3–6 in. long, up to  $1\frac{1}{2}$  lin. wide, usually much narrower, dull dark green, glabrous, smooth, margins slightly rough; midrib and lateral nerves fine; subtending leaf with a soon convolute and very narrow sheath  $1\frac{1}{2}$  in. long, and a rudimentary blade. Peduncle finely filiform, about 2 in. long, imperfectly articulated. Racemes solitary, straight, narrow, somewhat dense,  $1\frac{1}{2}$  in. long; joints cuneate,  $1\frac{1}{2}$  lin. long, convex and





shining on the back, sparingly and shortly ciliate on the inner side, glabrous on the outer, tips subobliquely truncate; pedicels similar, but oblong with a cuneate base. Sessile spikelets all heterogamous (or the lowermost imperfect), laterally much compressed, wedged in between joint and pedicel, linear in face view, glabrous; callus very small, obscurely bearded. Glumes subequal, lower firmly chartaceous, 2-denticulate, deeply and narrowly grooved on the back, keels scabrid above, intracarinal nerves one near each keel; upper glume boat-shaped, rather broad in profile, acutely acuminate, scaberulous on the keel upwards, sub-3-nerved, ciliate. Lower floret reduced to a narrow oblong subhyaline ciliate 2-nerved glume, 2 lin. long. Upper floret ♀: valve oblong, minutely 2-fid, ciliolate, back curved, awn about 3 lin. long, flexuous, bent at and twisted below the middle; valvule linear-oblong, hyaline, eciliate, over 1 lin. long. Pedicelled spikelet ♂, oblong to oblong-lanceolate, reddish or dull purplish, 2 lin. long; lower glume subchartaceous, scaberulous on the keels with 7-9 raised close nerves; upper thinner, very acute, 3-nerved, valves of both florets almost as long as the glumes, hyaline, ciliolate, of the lower 2-, of the upper 3-nerved; anthers almost 1 lin. long.

+ Upper Guinea. Northern Nigeria: Illah on the Niger, *Miss Macleod!*

39. *A. tectorum*, *Schumach. in Schumach. & Thonn. Beskr. Guin. Pl.* 49. Perennial (?), 8-20 ft. high. Culms much and repeatedly branched upwards, all the ultimate branchlets flowering; internodes terete, smooth, glabrous, more or less (usually shortly) exserted. Leaf-sheaths terete, tight, glabrous, produced into lanceolate erect auricles; ligules membranous, laterally adnate to the auricles of the sheath, truncate, up to over 1 lin. long, ciliolate or eciliolate; blades linear-lanceolate from a much attenuated base or the lower reduced at the base to the stout subterete midrib, long and finely acuminate, up to over 1½ ft. long and over 1 in. wide, thin, green, glabrous or puberulous at the tips, more or less rough all over, scabrid to spinulously ciliate along the margins, midrib quite rounded on the back and stout towards the base, primary lateral nerves up to 12, fine, distant. Inflorescence an often ample decompound spatheate panicle of up to 8 (or more?) primary mostly mixed 4-13-rayed tiers, the compound rays up to 2 ft. long bearing 2-4 secondary mostly simple few- to many-rayed tiers; spathes except the uppermost usually with well developed blades, glabrous, greenish; rays (simple) very slender, filiform, fastigate (within the tier),  $\frac{3}{4}$ -1½ in. long. Spatheoles thin herbaceous, membranous or scarious, pale dull green, sometimes suffused with purple, with short lanceolate to subulate dark green blades or bladeless, 1½-2½ in. long, finally more or less tightly inrolled; peduncles often forming a knee with the rays, ultimately usually exserted and straight. Racemes

2-nate, one sessile, the other with a short bare base, 1-1½ in. long, straight or somewhat flexuous, pale green and silkily-villous on both sides; joints linear, very slightly widened at the tips into a thin obscure cupule, about 1½ lin. long, somewhat transparent, densely ciliate on both sides, hairs upwards to 1½ lin. long, back glabrous; pedicels very similar. Sessile spikelet oblong, subtruncate, including the short obtuse bearded callus 2½ lin. long, glabrous, pale green; callus beard up to ¾ lin. long. Glumes subequal, membranous, the lower shallowly grooved on the back with 4-5 very fine and close nerves along each keel and 2 more distant and stouter inner nerves bordering the groove, keels very minutely scaberulous; upper glume boat-shaped, obliquely lanceolate-oblong, truncate, sometimes minutely mucronulate, 3-nerved, lateral nerves very faint, villously ciliate on the margins. Lower floret reduced to a hyaline oblong obtuse faintly 2-nerved ciliate valve, 1½ lin. long. Upper floret ♀; valve very narrow, linear-oblong, minutely 2-lobed, 1½ lin. long, lobes ciliate; awn fine, up to 1 in. long, kneed and twisted about the middle; valvule broad-oblong, truncate, 2-nerved, 1 lin. long. Anthers 1 lin. long; stigmas laterally exerted, orange. Pedicelled spikelets ♂, similar to the sessile; lower glume subherbaceous, flat on the back with minute close and fine nerves, and with a terminal bristle up to over ½ lin. long; upper glume oblong, obtuse, hyaline, 3-nerved, ciliate; valve of lower floret as in the sessile spikelet, of upper oblong, emarginate with a minute point in the notch; valvule 0; anthers as in the sessile spikelet.—Benth. in Hook. Niger Fl. 572; Hack. in DC. Monogr. Phan. vi. 471; Durand & Schinz, Consp. Fl. Afr. v. 729. *A. spectabilis*, K. Schum. in Engl. Jahrb. xxiv. 328.

**Upper Guinea.** Sierra Leone: Freetown, *Johnson*, 58! Port Lokko, *Thomas*, 5823! 6569! 6687! Kumrabai, *Thomas*, 6843! Komorobai, *Thomas*, 6921! and without precise locality, *Afzelius*! *Don*! *Barter*! *Smythe*, 209! *Scott Elliot*, 3970! French Guinea: Timbo, *Pobéguin*, 1784! 1809! Abudia, *Krause*! Togo: Bismarckburg, *Kling*, 223; *Büttner*, 301! Misahöhe, *Baumann*, 457 (467 at Kew)! Southern Nigeria: Western Lagos; *Rowland*! Ogurude, *Holland*, 278! 291! Obeyon, *Holland*, 285! Eruwa, *Dodd*, 382! Northern Nigeria: Yola, *Dalziel*, 296!

**North Central.** Oubangi Territory: basin of the upper Ombella, *Chevalier*, 5788!

One of the commonest grasses of Sierra Leone, covering sometimes many square miles (*Scott Elliot*, *Smythe*).

- ✓ 40. *A. auriculatus*, *Stapf*. Perennial. Culms up to 5 ft. high, terete, rather slender, glabrous, smooth, many-noded, producing flowering branches from the upper nodes. Leaf-sheaths glabrous, smooth, tight, those of the innovations much compressed and keeled, the others terete or slightly keeled upwards, produced at the mouth into linear-lanceolate acute straight or curved auricles, adnate to the ligule or at length breaking away from it; ligules firmly scarious, oblong-lanceolate, acute or subacute, 2 to over 5 lin. long; blades

*A. ticturus* v. *falsopictatus* A. Rehn  
Guinea (Nieder, Gambia - Felix 221<sup>60</sup>)



linear, the lower long and much attenuated at the base, tapering upwards to a long setaceous point, up to over 1 ft. long and 4 lin. wide, often tinged with purple or deep glaucous-purple all over, glabrous or pubescent below, margins scabrid, midrib slender or stout and laterally compressed in the lower part, lateral nerves very slender, 2-4 on each side. Inflorescence (imperfectly known) a scanty spatheate panicle of up to 5 mixed or upwards simple 2-3-rayed distant tiers, with all the rays erect, unequal, the compound ones from 1-1½ ft. long; or enriched by fascicles of barren (permanently?) and flowering branches; lower spathes resembling the preceding leaves with foliaceous blades. Spatheoles tumid at first, at length very narrow and tight, tapering to an acute or long setaceous point, 2½-4 in. long, glabrous, rather thin, often suffused with purple; peduncle filiform, slightly widened upwards, at length exerted (sometimes up to over ½ ft. long) and stiff, often forming a knee with the rays. Racemes 2-nate, one sessile, the other with a short bare base, erect, straight, more or less villous; joints stout, clavate-cuneate, 1½ lin. long, terminating with a denticulate very oblique cupule, ciliate on both sides and generally pubescent on the back, cilia up to 1 lin. long; pedicels similar, but shorter and very stout, tips laterally produced into 2 large teeth. Sessile spikelet linear-oblong, including the obtuse bearded callus 3-3½ lin. long, greenish or slightly tinged with brown. Glumes equal, lower minutely 2-denticulate, flat on the back with a longitudinal median groove, whitish and membranous in the groove, otherwise firmly chartaceous with numerous close nerves between the groove and the keels; slightly rough on the back at least upwards and usually with a line of very short stiff hairs in the lower half of the groove; keels scabrid upwards; upper glume subchartaceous, acute, 3-nerved, scaberulous on the keels, densely ciliate on the margins. Lower floret reduced to a 3-nerved hyaline linear-oblong ciliate valve, 2½ lin. long. Upper floret ♂: valve oblong, 2 lin. long, 2-fid to a quarter, lobes acute, subciliate; awn 6-7 lin. long, kneed at and twisted below the middle; valvule oblong, truncate, over 1 lin. long, nerveless. Anthers almost 1½ lin. long. Grain lanceolate-oblong, obtuse, triquetrous; scutellum not quite reaching the middle. Pedicelled spikelets ♂ or neuter, oblong, acute or subacute, about 2 lin. long; glumes equal, lower very many-nerved, terminating in a short fine bristle, usually slightly rough on the back; upper glume membranous, up to 7-nerved, acute or mucronulate; lower valve 3-nerved, upper 1-nerved, minutely emarginate, both hyaline and ciliate.

+ **Upper Guinea.** Senegambia: (without precise locality,) *Farmar*, 45! 157! Sierra Leone: Sherbro Island, (in dry sandy places close to the shore,) *Mrs. Hunter*, 8! Southern Nigeria: (banks of the Nun River,) *Mann*, 533! Cameroons: Batanga, (near the sandy beach,) *Bates*, 336!

A fragmentary specimen collected by Captain Boteler on the Gambia and mentioned by Bentham (in Hook. Niger Fl. 572) under *A. gayanus*, possibly belongs here.

41. *A. gabonensis*, Stapf in *Journ. de Bot.* 2<sup>me</sup> sér. ii. (1909) 207. Perennial, apparently very tall. Culms terete, stout, up to 3 lin. in diam., glabrous, smooth, many-noded. Leaf-sheaths tight, terete, glabrous or more or less softly hairy in the upper part, closely striate; ligules scarious, truncate, ciliolate, up to  $1\frac{1}{2}$  lin. long; blades linear, tapering to a subsetaceous point, the lower attenuated and almost reduced to the stout midrib towards the base, the following as broad as the sheath at the base and passing into it or slightly constricted, up to over 2 ft. long and up to 1 in. wide, firm, green or more or less reddish, glabrous, very scabrid to spinulose along the margins, midrib stout in the lower leaves, much projecting and rounded below, flat above, slender in the upper part, lateral nerves slender, 4-5 on each side. Inflorescence a contracted narrow elongated spatheate panicle up to over 3 ft. long, of up to 7 primary mixed or simple few- to 5-rayed tiers, the inner ray if compound often up to over 1 ft. long, and up to 4-noded with 2-1-rayed secondary tiers; spathes with usually well developed blades; rays filiform, somewhat stout, the simple ones of a tier often very unequal, the longest up to 3 in. long. Spatheoles subherbaceous to scarious, linear-lanceolate, 2-2 $\frac{1}{2}$  in. long, with short subulate or setaceous rudimentary blades or bladeless and acute, green, at length turning brown or reddish and tightly inrolled; peduncles at length terminally exerted (by up to over  $1\frac{1}{2}$  in.), erect, or slightly arching when flowering, then strict. Racemes 2-nate, very fragile,  $1\frac{1}{2}$ -2 in. long, one sessile, the other with a bare base up to 2 or 3 lin. long, both more or less erect, greenish, sparingly hairy; joints sublinear, slightly widened upwards in the lower part of the raceme, cuneate higher up, 1-1 $\frac{1}{2}$  lin. long, much rounded and shining on the back, shortly ciliate on one or on both sides, articulating subobliquely, with a short tooth on each side; pedicels similar but stouter upwards, with 2 larger tooth-shaped appendages. Sessile spikelet narrowly lanceolate, 2 $\frac{1}{2}$ -3 $\frac{1}{4}$  lin. long including the minutely bearded small obtuse callus, greenish. Glumes equal; lower chartaceous, acutely and shortly acuminate, or minutely 2-toothed, shallowly grooved on the flat back, glabrous, rarely with some short white hairs in the groove, very minutely puberulous upwards, rigidly ciliolate along the keels upwards, intracarpal nerves 2 along the groove; upper glume subchartaceous, boat-shaped, obliquely lanceolate in profile, very acute, 3-nerved, scabrid on the keel, ciliolate. Lower floret reduced to a lanceolate-oblong acute 2-nerved ciliate valve, almost as long as the glumes. Upper floret ♂: valve oblong, shorter than that of the lower, shortly 2-fid, glabrous, 1- or sub-3-nerved below; awn up to 6 lin. long, very slender, kneed at the middle; valvule oblong, truncate, about 1 lin. long, nerveless. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelet ♂, similar to the sessile, glabrous or very minutely puberulous; lower glume acute or mucronulate, 7-11-nerved, without a groove; upper glume 3-nerved, ciliate; valves hyaline, lower 3-nerved, reversedly ciliate, upper slightly





shorter, 1-nerved; anthers  $1-1\frac{1}{2}$  lin. long.—*A. gayanus*, Franch. Contr. Fl. Congo Franç. 18, not of Kunth.

**Lower Guinea.** French Gaboon: Cape Lopez, *Chevalier*, 4336! Gaboon River, *Mann*, 1027! between Loango and Brazzaville, *Dybowski*, 101! Mayomba, *Lecomte*! Niari, *Thollon*! Belgian Congo: Kisantu, *Gillet*, 146!

According to Dybowski this grass in places grows so densely as to become almost impassable.

**42. *A. gayanus*, Kunth, Rév. Gram. i. 163 (name only); Enum. Pl. i. 491.** Perennial, tufted. Culms from a few feet to 10 ft. high, terete, more or less stout, up to over 3 lin. in diam., glabrous, smooth, many-noded, producing flowering branches from the third node or above it. Leaves glabrous or softly pubescent, rarely villous or tomentose; sheaths tight, terete, striate, if wider than the base of the blade then forming more or less rounded shoulders or only very shortly produced into auricles adnate to the ligule; ligules short, rounded or truncate, glabrous or more or less hairy on the back, rarely exceeding 1 lin.; blades linear to lanceolate-linear, the lower usually from a much attenuated base, tapering to a fine point, over 1 ft. long, from a few to 8 lin. wide, rarely wider, moderately firm, glaucescent or at length reddish, margins scabrid, midrib stout, whitish in the larger leaves, flat above, much projecting and rounded below, often forming a terete petiole at the base, lateral nerves very slender. Inflorescence an often ample, on the whole contracted subdecompound panicle of up to 6 (or more?) primary downwards frequently mixed 2- to many-rayed tiers (9-18-rayed in var. *bisquamulatus*), the inner ray of the lower or lowest tiers often up to 1 ft. (sometimes up to 2 ft. long) with 2-4 secondary few-rayed tiers; spathes except the uppermost with usually well developed blades, glabrous; rays filiform, the simple of a tier subfastigiate, 2-3 in. long. Spatheoles herbaceous, membranous towards the edges, lanceolate-oblong with a short or often minute and subulate or setaceous blade or quite bladeless and acute,  $2\frac{1}{2}$ -3 in. long, pale green, at length more or less tightly in-rolled, rarely turning red; peduncles stoutly filiform, at length terminally exserted (sometimes by 2 in.), straight. Racemes 2-nate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, one sessile, the other with a bare base about 2 lin. long, both more or less erect and straight, more or less villous at least on one side; joints stout, cuneate-clavate, 2- $2\frac{1}{2}$  lin. long, terminating in an unequally dentate cupule, villously-ciliate on one or both sides, usually glabrous on the back; pedicels similar, with the tips produced on each side into a tooth. Sessile spikelet, including the obtuse callus which is bearded at the base and mostly glabrous above it,  $3\frac{1}{2}$ -4 (rarely  $4\frac{1}{2}$ ) lin. long, oblong, greenish or sometimes tinged with brown or red. Glumes equal; lower obtuse or subobtuse, entire or minutely 2-toothed, flat on the back with a longitudinal groove, corresponding to a projecting

ridge on the inside, whitish and thinly membranous in the groove, otherwise firmly chartaceous with numerous close nerves between the groove and the keels, smooth or variously scabrid on the back, spinulosly ciliolate on the keels; upper glume subchartaceous, boat-shaped, obliquely lanceolate in profile, acute or minutely mucronate, 3-nerved, spinulosly ciliolate on the keel, villously ciliate on the margins. Lower floret reduced to a hyaline linear-oblong or linear-lanceolate 2-3-nerved ciliate valve, somewhat shorter than the glumes. Upper floret ♂: valve oblong, about  $2\frac{1}{2}$  lin. long, more or less 2-fid, 3-nerved at the base, lobes acute and ciliate; awn  $\frac{3}{4}$  to over  $1\frac{1}{2}$  in. long, kneed and twisted well below the middle, column brown, bristle pale (or both pale), scaberulous; valvule half the length of the valve, oblong, truncate to subacute, 2-nerved or nerveless. Anthers  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. long. Stigmas laterally exerted, purplish-brown to dark purple, 1 lin. long. Grain oblong, planoconvex, over 1 lin. long; scutellum half the length of the grain. Pedicelled spikelets ♂, similar to the sessile, but usually broader and shorter, glabrous or variously hairy; lower glume herbaceous, acute, very many-nerved, flat, continued into a bristle as long as or almost as long as itself; upper glume membranous, 3-7-nerved, acute, mucronate or shortly aristulate; valves and valvule similar to those of the sessile spikelet, except that the upper valve is acute and awnless.—Steud. Syn. Pl. Glum. i. 372; Hack. in DC. Monogr. Phan. vi. 447; Durand & Schinz, Consp. Fl. Afr. v. 713; K. Schum. in Engl. Pf. Ost-Afr. C. 97. *A. guineensis*, Steud. l.c. 371. *A. tomentellus*, Steud. l.c. 371; Durand & Schinz, l.c. 729. *A. reconditus*, Steud. l.c. 386.

*Andropogon guineensis*, Schum. (Beskr. Guin. Pl. 51) is very likely this species, but having seen no authentic specimens, I hesitate to insist on its identity, the more so as this would involve the replacement of the name *gayanus* (1832) by *guineensis* (1827).

*A. gayanus*, as understood here, is a rather polymorphic species, the numerous forms of which may at present be classed under the following varieties. The occurrence of an often dense and coarse tomentum on the lower leaves, or more rarely on the spathes, seems to be unconnected with other distinctive characters and has been observed in each of the varieties.

Var. *genuinus*, Hack. l.c. 448. Joints and pedicels hairy on one side only, racemes therefore glabrous on the side exhibiting the lower glumes of the sessile spikelets or only hairy from the calli; sessile spikelet mostly  $3\frac{1}{4}$ - $3\frac{3}{4}$  lin. long; callus-beard scanty and usually confined to the sides, awn mostly  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; pedicelled spikelets glabrous.—*A. gayanus*, Benth. in Hook. Niger Fl. 572 (Vogel's specimens).

**Upper Guinea.** Cape Verd Islands: San Antaõ, *Lowe*! Fogo, *Newton*! San Nicolai, *Boile*! and without precise locality, *Hooker*, 88! Senegambia: without precise locality, *Roger*, 29! French Guinea: San, *Chevalier*, 2361! Tambukani, *Chevalier*, 2364! Dahomey: Cotonon, *Chevalier*, 4471! Southern Nigeria: Nun River, *Vogel*, 7! Ibu, *Vogel*, 32! Quorra, *Vogel*, 36! Aguku District, *Thomas*, 963! Northern Nigeria: Lokoja (leaves glabrous, spathes villous), *Macleod*, 29! Nupe, *Baikie*! *Barter*, 281! 1383! Yola, *Macleod*!





**North Central.** Eastern Shari: Senussi Country; N'delle, *Chevalier*, 8090! (inclining towards var. *squamulatus*).

**Nile Land.** Jur.; Ghattas' Seriba, *Schweinfurth*, 2362!

✓ Var. *squamulatus*, <sup>(H. St.)</sup> Stapf. Joints and pedicels ciliate on both margins; hence the racemes more or less villous on either side; sessile spikelets mostly  $3\frac{3}{4}$ –4 lin. long; callus-beard usually rather dense, frontal and lateral; awn usually  $\frac{3}{4}$ –1 $\frac{1}{4}$  in. long; pedicelled spikelets scaberulous to puberulous.—*A. gayanus*, Anderss. in Peters, Reise Mossamb. Bot. 563; Rendle in Cat. Afr. Pl. Welw. ii. 148, and in Journ. Linn. Soc. Bot. xl. 225; Eyles in Trans. Roy. Soc. S. Afr. v. 295. *A. gayanus*, var. *cordofanus*, Hack. in DC. Monogr. Phan. vi. 448 (partly); Chiov. in Ann. Istit. Bot. Roma, viii. 279. *A. squamulatus*, Hochst. in Flora, 1844, 244; Steud. l.c. 374; A. Rich. Tent. Fl. Abyss. ii. 454. *A. helophilus*, K. Schum. in Engl. Pf. Ost-Afr. C. 98. *A. hylophilus*, Engl. Glied. Veg. Usambara, 38.

**Upper Guinea.** Northern Nigeria: Katagum District, *Dalziel*, 275! Lo-koja, *Dalziel*, 288!

**North Central.** Bagirmi: Lower Shari; Koussouri, *Chevalier*, 10304! Dar-el-Hadjer, *Chevalier*, 9717! Lake Fittri, *Chevalier*, 9931!

**Nile Land.** Eritrea: Saraë; along the Mareb River, near Gundet, 5500 ft., *Pappi*, 358! Maragua; Adi Mabit, 5250 ft., *Pappi*, 958. Medri od Tesfa; Adi Ghebsus, *Pappi*, 6611. Gallabat: Matamma, *Schweinfurth*, 1030! Abyssinia: Shireh, *Dillon*; Ferrfera Valley, *Schimper*, 715! Sudan: Sobat River, at Nasser, *Brown*, 1731!

**Lower Guinea.** Gaboon: Sibange Farm, *Soyaux*, 410! Belgian Congo: between Boma and the mouth of the Congo, *Smith*! Angola: in grass-land between Anigena and Lucolla, *Gossweiler*, 900! Loanda, *Gossweiler*, 1613! Mainga del Rei, *Gossweiler*, 1542! Penedo, *Gossweiler*, 1571! Benguella; country of the Ganguellas and Amboellas, between Luasenha and Cutchi, *Gossweiler*, 3064! *Gossweiler*, 3918 (lower leaves coarsely villous)! Camondai, *Gossweiler*, 5555!

**Mozambique Distr.** German East Africa: Usambara; covering large areas, *Holst*, 2535! Portuguese East Africa: Querimba, *Peters*! near Senna, *Kirk*! Nyasaland: Shire Highlands, *Buchanan*, 75! and without precise locality, *Whyte*! Gazaland: Zinyumbo Hills, 1500 ft., *Swynnerton*, 1555! Chirinda, 3800 ft., *Swynnerton*, 967! Upper Buzi River, 3000–3500 ft., *Swynnerton*, 984! Rhodesia: Broken Hill, *Rogers*, 7700! Livingstone, *Rogers*, 7079! Victoria Falls, *Rogers*, 5673! Bulawayo, *Monro*, 991! Salisbury, *Mrs. Craster*, 37 (spathes sometimes villous)!

Var. *bisquamulatus*, Hack. l.c. 448. Joints and pedicels ciliate on one or both margins; sessile spikelets  $3\frac{1}{2}$ – $3\frac{3}{4}$  lin. long; callus beard rather dense, frontal and lateral; awn up to 1 in. long; pedicelled spikelets (all or sometimes only the upper) more or less hairy to villous, in typical cases the spikelets more or less hidden by the long silky hairs.—*A. gayanus*, Pobéguin, Éss. Fl. Guin. Franç. 217. *A. gayanus*, vars. *bisquamulatus*, *tridentatus*, and *cordofanus* (partly), Hack., l.c. 448, 449. *A. appendiculatus*, var. *polycladus*, Hack. in Bull. Herb. Boiss. iv. App. ii. 11. *A. bisquamulatus* and *A. cordofanus*, Hochst. in Flora, 1844, 245. *A. tridentatus*, Hochst. l.c. 246. *A. athiopicus*, Ruprecht ex Hack. in DC. Monogr. Phan. vi. 448. *A. gayanus*, var. *argyrophæus*, Stapf in Bull. Soc. Bot. France, Mém. viii. b. 102.

**Upper Guinea.** French Guinea: Kouroussa, *Pobéguin*, 540! Abudia, *Krause*! Southern Nigeria: without precise locality, *Dodd*, 385!

**North Central.** Bagirmi: Moito; Baro Aouni, *Chevalier*, 9844! Central Shari; swamp of Illi, *Chevalier*, 8581!

**Nile Land.** Sudan: Kordofan; Obeid, *Pfund*, 60! 80! *Kotschy*, 424! Arash Kol, *Kotschy*, 143! and without precise locality, *Kotschy*, 54! between Um Runbu and Eilafun, *Brown*, 907!

**Lower Guinea.** Damaraland, *Nels*, 76!

*A. gayanus*, var. *argyrophæus*, may be considered as an extreme state with plumosely villous pedicelled spikelets and whitish villous basal leaves.

- ✓ 43. *A. macrophyllus*, Stapf. Culms very tall, stout, up to  $\frac{1}{2}$  in. in diam., glabrous and smooth, branched upwards. Leaf-sheath terete, tight, villous along the edges, otherwise glabrous and smooth; ligules scarious, truncate, up to 2 lin. long, ciliate; blades linear, passing gradually into the sheath or long-attenuated below, tapering to a setaceous point, over 3 ft. long and up to  $1\frac{1}{2}$  in. wide, firm and somewhat rigid, glabrous, smooth except for the scabrid edges, midrib whitish, flat above, rounded on the back, primary lateral nerves 7-8 on each side, fine, slightly prominent. Inflorescence a narrow contracted spatheate panicle up to over  $3\frac{1}{2}$  ft. long, of up to 10 downwards mixed few-rayed tiers; spathes with well-developed blades; rays filiform, somewhat stout, very unequal. Spatheoles linear-oblongate passing into a short bristle, subherbaceous to scarious, greenish, slightly tinged with purple or red, glabrous,  $2\frac{1}{2}$ -4 in. long; peduncle short, laterally exerted from the spatheole (permanently?). Racemes 2-nate, pale green, erect; joints linear, 2-nate, rather stout, shortly cupular, with unequally toothed tips, hollow, about 2 lin. long, ciliate and pubescent on the back, cilia up to  $\frac{3}{4}$  lin. long; pedicels similar, but shorter, 2-toothed at the tips. Sessile spikelet oblong,  $2\frac{1}{2}$ -3 lin. long, including the shortly bearded callus. Glumes equal, the lower rather firmly chartaceous, scaberulous on the flat back with a narrow shallow longitudinal whitish groove, projecting as a rounded ridge on the other side, keels sharp, spinulously ciliate above, intracarpal nerves 4-5 on each side of the groove, equally distant, upper boat-shaped, submembranous, acute, puberulous, ciliate upwards, 3-nerved. Lower floret reduced to a broad oblong subacute ciliate 2-nerved valve  $2\frac{1}{2}$  lin. long. Upper floret ♂: valve oblong, 2-lobed to almost one-third, 1-nerved; lobes oblong, subacute, ciliate; awn 7-8 lin. long, kneed at and twisted below the middle; valvule oblong, faintly 2-nerved, broadly truncate; anthers 2- $2\frac{1}{2}$  lin. long. Pedicelled spikelets similar to the sessile, but the lower glume up to 15-nerved, grooveless and continued into a short bristle; valve of the upper floret entire and awnless and the valvule more or less reduced.

+ Upper Guinea. Southern Nigeria: Lagos; (without precise locality, MacGregor, 248! *MS type*)

*Imperfectly known species.*

44. *A. intumescens*, Pilger in *Engl. Jahrb.* xlv. 208. Culms 3- $4\frac{1}{2}$  ft. high, slender, very smooth, many-noded, simple. Leaf-sheaths shorter than the internodes; ligules membranous,  $1\frac{1}{2}$  lin. long; blades linear, the lower about 8 in. long, tapering to a long capillary point, scaberulous. Racemes at length more or less exerted, 2-nate, one sessile, the other bare at the base, dense, cylindrical, reddish-violet, 4-6 in. long; joints and pedicels 2 lin. long, stoutly clavate, convex on the sparingly hairy back, flat on the face, hollow,

*A. Chevalieri* A. Reznik  
Guinée fr.: Mali. [Chevalier] 34878. ①

*A. tenuiculmis* A. Reznik  
Guinée fr.: Mont Lourd. [Chevalier] 34879. ②

*A. infrasulcatus* A. Reznik  
Soudan fr. - Mossi: bords de la Volta blanche  
pres Linoré. 24590 [Chevalier] ④  
Nova prae grass. Burkund for thotah.

*A. gambiensis* A. Chev.  
Sénégal: bords de la Gambie à Ouassoulou  
-- Pres confluent de R. Nieniko [Chevalier] 34662.

46 = *Cyrtopogon prospichili* (K. Schum.) C.E. Hitchc.  
Kew Bull 1949: 175. 1949  
Kenya Colony similar to *C. floccosus*

margins rather setosely ciliate. Sessile spikelets laterally compressed,  $3\frac{1}{2}$  lin. long. Lower glume firm, ovate-lanceolate, sparingly hairy on the back, with 2 roughly ciliate nerves near the narrow inflexed margins; upper glume papery, boat-shaped, acute, with 6 faint lateral nerves and a roughly ciliate keel. Lower floret ♂: valve lanceolate, acute, hyaline,  $2\frac{3}{4}$  lin. long, almost nerveless; valvule of the same length. Upper floret ♀: valve 2-fid to about the middle, 3-nerved at the base, delicate; awn fine,  $4\frac{1}{2}$ –5 lin. long; valvule slightly shorter, faintly 2-nerved. Pedicelled spikelet reduced to a single lanceolate glume  $1\frac{1}{2}$  lin. long.

**Upper Guinea.** Cameroons: swamps by the Benue River at Garua, 1000 ft., Ledermann, 4577.

This is evidently a species of *Ischæmum*, very near to if not identical with *I. brachyatherum*, Fenzl.

**45. A. Matteodanum**, Chiov. *Ann. Istit. Bot. Roma*, viii. 279.

**Nile Land.** Eritrea: Oculè Cusai; Loggo Sarda, Deggahu, 8500 ft., Pappi, 1388.

The circumstantial description given by Chioventa reads so much like that of *Ischæmum brachyatherum*, Fenzl, that there can be little doubt of their identity.

**46. A. Pospischilii**, K. Schum. in *Engl. Jahrb.* xxiv. 328. Culms (base not known) slender, quite glabrous. Leaf-sheaths glabrous; ligules acute, glabrous; blades narrowly linear, acuminate, the upper about 9 in. by  $1\frac{1}{4}$  lin., glabrous, smooth except on the scabrid margins. Racemes 2-nate, one sessile, the other with a very short bare base, 10–15 lin. long, 6–8-noded; joints  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. long, villous, hairs up to  $1\frac{1}{2}$  lin. long, tips irregularly denticulate; pedicels slightly shorter. Sessile spikelet 3 lin. long, purplish. Lower glume grooved on the back, ciliate and sparingly hairy, upper ciliate-villous on the margin. Valve of upper floret awned; awn 9–10 lin. long, kneed and twisted below the middle. Pedicelled spikelet ♂, 3 lin. long, purplish.

**Mozambique Distr.** German East Africa: Muani, *Pospischil*.

According to K. Schumann this should be placed next to *A. tenuiberbis*, Hack.

## 42. CYMBOPOGON, Spreng. *Pl. Pungill.* 2: 14, 1815

Spikelets 2-nate, those of each pair differing in sex and more or less in shape—except those of the lowest pair of the lower or of both racemes which are homogamous (♂ or neuter)—one sessile, the other pedicelled on the articulate fragile rhachis of many-jointed paired racemes, terminating the culms and their branches; raceme-pairs supported by a spatheole, collected into often decompound or supra-decompound spatheate panicles; the fertile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels filiform or linear with frequently more or less cupular or auricled tips, those of the lowest pair (raceme-base) often conspicuously swollen, oblong or barrel-shaped and hard. Florets 2, lower reduced to an empty valve, upper ♀ in

the sessile spikelets of the heterogamous pairs, ♂, rarely neuter, in those of the homogamous pairs and in the pedicelled spikelets. Fertile spikelets dorsally, rarely laterally, compressed, awned (normally); callus very short, obtuse, shortly bearded. Glumes equal or subequal, more or less chartaceous, the lower almost flat or slightly depressed or narrowly grooved on the back with at least from the middle upwards sharply inflexed margins, 2-keeled, the upper more or less boat-shaped, keeled upwards, usually 1-nerved. Valves ciliate or ciliolate (sometimes obscurely), of the lower floret entire, hyaline, 2-nerved, of the upper 2-fid or 2-lobed, hyaline, rarely firmer and almost stipe-like below the insertion of the awn; column of awn, if any, smooth. Valvule 0. Lodicules 2, minute, glabrous. Stamens 3. Stigmas laterally exerted; styles terminal. Grain oblong in outline, subterete to plano-convex in cross-section; embryo about half the length of the grain. Pedicelled spikelets usually slightly different in shape and size from the sessile, but never depressed or grooved on the back. Glumes muticous, the lower chartaceous to subchartaceous, the upper thinner. Of the valves only that of the lower floret present (see *C. Schœnanthus*), hyaline, 2-nerved; upper floret usually represented by a naked ♂ flower, rarely suppressed.—Perennial densely tufted and usually aromatic grasses, with often very coarse leaves and frequently much compound and contracted spatheate panicles.

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

\*Tardily flowering perennials; innovations intravaginal; culms rising from dense bunches of firm persistent leaf-sheaths and innovations; blades hard, long, filiform to narrowly linear, if over 2 lin. wide, then long-attenuated at the base; the lower glume of the fertile spikelet shallowly concave to almost flat on the back, or if grooved then the bottom of the groove rounded.

†Fertile spikelets awned; awn differentiated into a twisted column and a bristle, or reduced to a straight bristle, about 3 lin. long.

‡Keels of the lower glume of the fertile spikelets acute, wingless upwards; panicle rarely decomposed (2, *C. senmarensis*).

Lower glume of fertile spikelet shallowly concave or almost flat; joints and pedicels villous on the back and the edges.

Blades (at least those of the basal leaves) minutely asperulous under the lens on all the nerves of the back; awn short, imperfectly kneed and twisted or bristlelike; base and adjacent pedicel of sessile raceme stout, tumid, hard, often barrel-shaped.

Blades filiform,  $\frac{1}{2}$  lin. in diam., semiterete, with narrow herbaceous margins; most or all of the rays simple, hence panicle comparatively scanty ... .. 1. *C. Schœnanthus*





Blades folded or flat, up to 1 lin. wide, midrib very slender; most of the tiers, except the peripheral, with compound and even decompound rays, hence panicle rich and more or less dense.

Panicle obovoid, formed of more or less dense balls borne on long ( $\frac{3}{4}$ -1½ ft.) branches; fertile spikelets 3-3½ lin. long, their lower glume with 4 intracarinale nerves ... ..

2. *C. sennarensis*.

Panicle narrow, long, much interrupted below; lower primary branches not much exceeding the adjacent internodes, their heads close to the culm; fertile spikelets 2½-3 lin. long, their lower glume with 2 short or no intracarinale nerves ... ..

3. *C. proximus*.

Blades smooth except on the upper margins; awn 5-8 lin. long, differentiated into a twisted column and a bristle spreading at a right angle; base and adjacent pedicel of sessile raceme not tumid ... ..

4. *C. plurinodis*.

Lower glume of fertile spikelet deeply grooved at least below the middle, often with a more or less distinct basal gibbosity between the downwards obtuse keels; joints and pedicels glabrous or pubescent on the back; awn always perfect.

Culms at least up to 4 ft. high, about 5-noded below the panicle; blades up to over 2 lin. wide, smooth; racemes suberect, in 4-5-rayed contracted tiers ... ..

5. *C. commutatus*.

Culms 1-2 ft. high, 1-2-noded below the panicle, very slender; blades under 1 lin. wide; racemes in few-rayed tiers.

Leaf-blades smooth below; racemes glaucous-green, hardly diverging ... ..

6. *C. floccosus*.

Leaf-blades minutely scaberulous on all the nerves on the back; racemes richly tinged with violet and brown, divaricate at right angles or deflexed ... ..

7. *C. divaricatus*.

††Keels of lower glume of fertile spikelets winged upwards; panicle decompound.

Panicle much interrupted or if more continuous, at least all its parts more or less loose; ultimate tiers few- to 10-rayed, corymboid, rays 6-4 lin. long; lower glume of fertile spikelet with 2-4 intracarinale nerves above the middle, of pedicelled spikelets 3-5-nerved; blades 1½-2 lin. wide ... ..

8. *C. Afronardus*.

Panicle much contracted; ultimate tiers 2-rayed, rays 1½-2 lin. long; lower glume of fertile spikelet with 2 percurrent intracarinale nerves, of pedicelled spikelet 7-9-nerved; blades 2½-4 lin. wide ... ..

9. *C. validus*.

††Fertile spikelets awnless; leaves in dense fascicles from a short annulate rhizome; basal sheaths wide below, cinnamon-coloured on the inner side;

- up to 1 ft. long, bearing blades up to 3 ft. by 3-9  
lin. ... .. 10. *C. citratus*.
- \*\*Perennials, sometimes flowering the first year (or some-  
times annuals ?); innovations mixed (extravaginal  
and intravaginal); old culms naked at the base  
or with the withered remains of the basal leaf-  
sheaths; blades flat, 3 lin. (rarely less, 13, *C.*  
*cæsius*) to over 1 in. wide, rounded to subcordate  
at the base, of a soft texture with smooth edges (at  
least below); the lower glume of the fertile spikelets  
flat on the back with a fine acute median groove.  
Lower glume of fertile spikelet 2-2½ lin. long, with the  
keels winged, awn distinctly differentiated into  
column and bristle, 3-8 lin. long.
- Panicle 3-6 in. long, rarely more, moderately com-  
pound; leaf-blades 3-6 lin. wide (see 13, *C.*  
*cæsius*).
- Base and adjacent pedicel of the sessile raceme  
not connate; fertile joints and adjacent pedi-  
cels very shortly ciliate throughout; lower  
glume of fertile spikelet with conspicuous  
long oil-streaks on both sides of the groove 11. *C. nervatus*.
- Base and adjacent pedicel of the sessile raceme  
connate; fertile joints and adjacent pedicels  
rather conspicuously ciliate, cilia rapidly in-  
creasing in length towards the tips, the upper-  
most 1 lin. long; lower glume of fertile spikelet  
with obscure and short or no oil-streaks.
- Culms simple below, rarely with a long branch  
from below; leaves dull green or sub-  
glaucous, blades 3-6 lin. wide; joints and  
pedicels shortly ciliate at the sides ... 12. *C. excavatus*. *ws*
- Culms frequently branched below, the branches  
often in fascicles from the knees of the  
culms, slender and wiry; leaves bluish-  
glaucous, blades 1-5 lin. wide; joints and  
pedicels densely villous-ciliate ... 13. *C. cæsius*.
- Panicle frequently over 1 ft. long, decompound;  
blades up to over 1 in. wide at the base; joints  
and pedicels densely ciliate; base and adjacent  
pedicel of sessile raceme connate; oil-streaks  
confined to the upper third or quarter of the  
lower glume of the sessile spikelets ... 14. *C. giganteus*.
- Lower glume of fertile spikelet 1½ lin. long, wingless;  
awn a fine bristle continuing the stipe-like valve  
and, including it, up to 2½ lin. long; panicle very  
dense and compact, ovoid to oblong or sub-  
globose, more rarely narrow and interrupted;  
blades ½-1 in. wide; joints and pedicels very  
shortly ciliate; base and adjacent pedicel of  
sessile raceme not tumid nor connate ... 15. *C. densiflorus*.

1. *C. Schœnanthus*, *Spreng. Pug.* ii. 15, *not of Schult.* Perennial,  
compactly cæspitose, with numerous intravaginal innovations,  
½-1½ ft. high. Culms erect, slender, few- to 4-noded and simple  
below the inflorescence, terete, glabrous, very rarely with a few small





hairs at the nodes. Leaf-sheaths very firm, smooth, glabrous, tight, those of the innovations and base of the culms widened at the base, very tough and long-persistent, straw-coloured, up to 5 in. long; ligules membranous to scarious, oblong, truncate, ciliate, up to  $1\frac{1}{2}$  lin. long; blades semiterete, filiform, wiry, flexuous, very fine and often circinate upwards, rounded on the back, channelled on the face, or those of the culms somewhat flatter and shorter, up to more than 9 in. long,  $\frac{1}{2}$  lin. in diam., glabrous, finely scaberulous on the nerves below, though often smooth to the touch, pale, glaucous, evenly 7-9-nerved, the midrib showing only above as a broad white band. Spatheate panicle narrow, 3-12 in. long, few- to 7-noded, lower internodes 2-3 in. long, upper rapidly decreasing in length, slender, glabrous; lowest primary branch rarely undivided at the base, 3-2-noded and up to 6 in. long, usually forming—like the following—up to 4-rayed simple or mixed tiers; lowest subtending sheaths with foliaceous blades; rays finely filiform, 1- $1\frac{1}{2}$  (rarely to over 2) in. long, glabrous; spathes narrowly lanceolate, subherbaceous, often tinged with pale purple, with a short blade or the upper bladeless and produced into a setaceous point,  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. long, glabrous. Spatheoles very narrow, acute or with a setaceous point  $\frac{1}{2}$ -1 in. long, pale or straw-coloured; peduncles finely filiform, widened upwards,  $1\frac{1}{2}$ -2 lin. long, tips truncate. Racemes 2-nate, more or less divaricate, at length epinastically deflexed,  $\frac{1}{2}$ -1 lin. long, white-villous, pale or tinged with purple, one subsessile, the other with a bare base,  $\frac{1}{2}$ -1 lin. long; bases puberulous to pubescent in the fork, ciliate-bearded upwards, with minutely cupular and denticulate tips, that of the subsessile raceme as well as the adjacent pedicel stout, elliptic to elliptic-oblong in outline and convex on the back, ultimately more or less glabrescent and glossy; fertile joints filiform, slightly widened towards the oblique subcupular auricled tips,  $1\frac{1}{4}$ - $1\frac{1}{2}$  lin. long, densely hairy to villous from the back and the angles (hairs increasing upwards to 2 lin. long); adjacent pedicels similar to the joints but more slender. Homogamous pair of spikelets 1 at the base of the sessile or of both racemes; the sessile spikelet of the lowest but one of the sessile raceme intermediate and imperfectly awned. Fertile spikelets linear-lanceolate, more or less acuminate, acute, including the callus  $2\frac{1}{2}$ -3 or even  $3\frac{1}{2}$  lin. long, glabrous, pale green below, reddish upwards; callus short, obtuse, shortly bearded. Glumes equal, chartaceous; lower nerveless and shallowly concave between the acute scaberulous keels, minutely 2-denticulate; upper lanceolate-oblong in profile, acute, slightly curved on the back, 1-nerved, margins broadly hyaline upwards, ciliate. Lower floret reduced to a linear-oblong nerveless hyaline ciliolate valve, slightly shorter than the glumes. Upper floret ♂: valve very narrow, shortly 2-fid, cuneate-linear and chartaceous below the insertion of the awn, under  $1\frac{1}{2}$  lin. long, lobes broadly lanceolate, ciliate; awn up to 5 lin. long, very fine, more or

less kneed at and slightly twisted below the middle; column smooth. Anthers 1 lin. long. Pedicelled spikelets ♂, linear-oblong, 2-3 lin. long, glabrous, more reddish than the sessile; glumes subchartaceous with 5-9 evenly distant intracardinal nerves, the upper thinner, 3-nerved; valve of lower floret linear-oblong, sub-2-nerved, ciliate, 2 lin. long; upper floret reduced to a ♂ flower, or its valve present as a microscopic scale.—Stapf in Kew Bulletin, 1906, 303-313, 352-353; Chiov. Gram. da Essenze, 15. *C. arabicus*, Nees ex Steud. Syn. Pl. Glum. i. 387. *C. Arriani*, Aitch. Cat. Punjab Pl. 174. *C. circinnatus*, Hochst. ex Hack. in DC. Monogr. Phan. vi. 599. *Andropogon Schœnanthus*, Linn. Sp. Pl. ed. i. 1046, ed. ii. 1481, not of Hack. and most other authors. *A. bicornis*, Forsk. Fl. Egypt.-Arab. 173, not of Linn. *A. laniger*, Desf. Fl. Atl. ii. 379 (*lanigerum*); Kunth, Enum. Pl. i. 493; Coss. & Dur. Expl. scient. Algérie, ii. 48; Ball in Journ. Linn. Soc. Bot. xvi. 734; Boiss. Fl. Or. v. 465; Batt. & Trab. Fl. Alger. (Monoc.) 126; Balfour, Bot. Socotra, 316; Hack. in DC. Monogr. Phan. vi. 598; Benth. in Hook. Ic. Pl. t. 1871; Schweinf. Plant. Util. Eritr. 22, and in Bull. Herb. Boiss. ii. App. ii. 93. *A. Olivieri*, Boiss. Diagn. Pl. Or. ser. i. fasc. v. 76. *A. circinnatus*, Hochst. ex Steud. Syn. Pl. Glum. i. 387; Franch. Sert. Somal. 69 (*circinnatus*). *A. Ariani*, Edgew. in Journ. Linn. Soc. vi. 208. *A. Iwarancusa*, subsp. *laniger*, Hook. f. Fl. Brit. Ind. vii. 203. *Gymnanthelia lanigera*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 306 (name only).

**Nile Land.** Eritrea: Barca; Mount Schegolgo-Mantai, *Schweinfurth*, 40; and without precise locality, *Schweinfurth*, 1020. Socotra: near Tamarida, *Schweinfurth*, 405! hills near Galonsir and Tamarida, *Balfour*, 275! 379! Somaliland: without precise locality, *Révoil*.

Throughout North Africa, from Morocco to Tunis, Arabia, and from Mesopotamia to the Punjab and Ladakh.

Once famous for its aromatic properties. Yields an aromatic oil (camel-grass oil).

**2. *C. sennarensis*, Chiov. Gram. da Essenze, 16.** Perennial. Culms tall, erect, terete, glabrous. Leaf-sheaths compressed, very narrow, the lowest up to 8 in. long, firm and tough, slightly rough, glabrous, subglaucous; ligules oblong, membranous, up to over 2 lin. long, ciliate; blades very narrow, linear, almost setaceous upwards, up to over 1 ft. by  $\frac{1}{2}$ -1 lin., folded or the upper flat, rigid, glabrous, the basal scaberulous on all the nerves, glaucous, very closely nerved, midrib slender. Spatheate panicle decompose, obovoid, 1-1 $\frac{1}{2}$  ft. by  $\frac{1}{2}$  ft., formed upwards of more or less dense balls of racemes and spathes; lower internodes up to 5 in. long, uppermost quite short; lower primary branches from 1 $\frac{1}{2}$  to  $\frac{3}{4}$  ft. long with usually 2 very long slender internodes below the first ramifications, those above the middle rapidly decreasing in length and forming 2-rayed tiers, each ray distichously divided up-





wards, resembling (before flowering) a laterally compressed ovate to ovate-lanceolate simple or compound spike 3-4 in. long with a succession of up to 10 spathes enclosing tiers of up to 3 rays; rays somewhat unequal, finely filiform, up to 4 lin. long; spathes narrowly lanceolate, rather firm, herbaceous with broader membranous to hyaline margins upwards, subglaucous, with a short herbaceous subulate to setaceous blade or bladeless, 2-2½ in. long. Spatheoles narrowly lanceolate, acute, thinly herbaceous, up to 9 lin. long, pale green; peduncle 2 lin. long, filiform, tips truncate. Racemes 2-nate, divaricate, at length epinastically deflexed, 5-7 lin. long, white-villous, one subsessile, the other with a bare base, under 1 lin. long; bases pubescent to villous, with truncate ciliate or ciliate tips, that of the subsessile raceme stout, ½ lin. long, the adjacent pedicel short, barrel-shaped and hard; fertile joints linear, not quite 1½ lin. long, densely hairy on the back and the angles, hairs increasing upwards to over 1½ lin., tips obscurely cupular; adjacent pedicels similar to the joints. Homogamous pair of spikelets 1 at the base of each raceme or only of the subsessile, sometimes the second also homogamous, but the sessile spikelet intermediate as to shape and awn. Fertile spikelets linear to lanceolate-linear, acuminate, including the callus 3-3½ lin. long, glabrous, pale green, darker or brownish upwards; callus short, obtuse, shortly bearded. Glumes equal, chartaceous; lower shallowly concave on the back below the middle, keels acute, almost winged, minutely scaberulous, intracarinal nerves 4 in the acumen, the inner 2 short, the outer decurrent close to the keels; upper glume narrowly lanceolate in profile, very acute, 1-nerved, keel narrowly winged upwards. Lower floret reduced to a linear-oblong nerveless hyaline ciliate valve, slightly shorter than the glumes. Upper floret ♂: valve very narrow, shortly 2-fid, sublinear and hyaline below the insertion of the awn, 1½ in. long, lobes ovate-lanceolate, acute, ciliate; awn a straight bristle up to 3 lin. long, not or shortly exerted from the spikelet. Anther 1¼ lin. long. Pedicelled spikelet ♂, linear-lanceolate, subacute, 3-3½ lin. long, glabrous, brownish or reddish; glumes unequal, lower chartaceous with very many close intracarinal nerves, upper shorter, membranous, 3-nerved; valve equal to the upper glume, linear-oblong, obtuse, 2-nerved, ciliate; anthers 1½ lin. long.—*Andropogon sennarensis*, Hochst. in Flora, 1844, 243. *A. Iwarancusa*, var. *sennarensis*, Hack. in DC. Monogr. Phan. vi. 600; Durand & Schinz, Consp. Fl. Afr. v. 716.

Nile Land. Sudan: Sennar; without precise locality, Kotschy, 187!

(~~Chicoo~~) (Hochst)

✓ 3. *C. proximus*, Stapf. Perennial, compactly caespitose, with intravaginal innovations, tightly coated with the persistent sheath-bases, 1½ to over 3 ft. high. Culms slender, erect, terete, glabrous, 3-4-noded and simple below the spatheate panicle, intermediate and

upper internodes exerted. Leaf-sheaths terete, firm, glabrous, slightly rough, those of the innovations and bases of the culms very tough, long-persistent, 2-3 in. long, widened downwards, of the culms rather tight and more or less herbaceous upwards; ligules membranous, ciliolate, truncate, up to slightly over 1 lin. long; blades narrow to very narrow, tapering to a long setaceous point, the inner of the innovation-shoots up to 1 ft. by  $\frac{1}{3}$ -1 lin., the outer and those of the culms shorter and up to over  $1\frac{1}{2}$  lin. broad, folded at first, then often quite flat, particularly the broader, rigid, or at least very hard, glabrous, finely scaberulous on all the nerves, glaucous often turning reddish, paler to whitish on the upper surface, very closely nerved, midrib very slender. Spatheate panicle linear-oblong in outline, narrow, interrupted below,  $\frac{1}{4}$  ft. to over 1 ft. long, up to 2 in. wide; lower internodes 3-6 in. long, upper much shorter to very short; lower primary branches not much exceeding the adjacent internodes, the upper decreasing in length in proportion to the internodes; lowest undivided at the base, the following usually forming 2-rayed tiers, each ray distichously divided, resembling (before flowering) a laterally compressed lanceolate to oblong spike, 1-2 in. long, with a distichous succession of 3-5 spathes enclosing tiers of up to 3 rays; or the false panicle so much reduced as to resemble when young a single lanceolate spike; rays somewhat unequal, finely filiform, up to over 2 lin. long; spathes lanceolate, rather firm, herbaceous with membranous to hyaline margins, subglaucous, usually bladeless, 1- $1\frac{1}{2}$  in. long. Spatheoles lanceolate, acute to subulate-acuminate, thinly herbaceous, 5-7 lin. long, pale green; peduncle up to  $1\frac{1}{2}$  lin. long, filiform, tips truncate. Racemes 2-nate, divaricate or more often only slightly diverging, at length deflexed, 4-7 lin. long, white-villous, one subsessile, the other, rarely both, with a bare base, under 1 lin. long; bases very villous, with cupular and denticulate tips, that of the subsessile raceme as well as the adjacent pedicel stout, short, somewhat swollen and hard; fertile joints linear, up to  $1\frac{1}{2}$  lin. long, densely hairy on the back and angles, hairs increasing upwards to 2 lin., tips slightly cupular; adjacent pedicels similar to the joints. Homogamous spikelets one at the base of each raceme or only of the sessile. Fertile spikelets linear to lanceolate-linear, acute to acuminate, including the callus  $2\frac{1}{2}$ -3 lin. long, glabrous, slightly darker or brownish upwards; callus short, obtuse, shortly bearded. Glumes equal, chartaceous; lower obscurely concave on the back below the middle; keels acute, wingless, minutely scaberulous, intracarpal nerves 0, or 2 short ones in the upper part; upper glume narrowly lanceolate in profile, acutely acuminate, 1-nerved, keel wingless. Lower floret reduced to an oblong 2-nerved or nerveless hyaline ciliate valve up to 2 lin. long. Upper floret ♂: valve very narrow, very shortly 2-fid, cuneate-linear and subhyaline below the insertion of the awn,  $1\frac{1}{4}$  lin. long, lobes broad, truncate or subtruncate,





ciliate; awn a fine straight bristle up to 3 lin. long, not or shortly exerted from the spikelet. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelets ♂, linear to linear-lanceolate, acute, 3 lin. long, glabrous, brownish or reddish; glumes unequal; lower chartaceous, with 9 or more intracardinal nerves; upper shorter, membranous, 3-nerved; valve almost equalling the upper glume, subobtusely, 2-nerved, ciliate; anthers  $1\frac{1}{2}$  lin. long.—*C. sennarensis*, var. *proximus*, Chiov. Gram. da Essenze, 16. *Andropogon proximus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 464; Penzig in Atti Congr. Bot. Genova, 1893, 364. *A. Iwarancusa*, var. *proximus*, Hack. in DC. Monogr. Phan. vi. 601; Durand & Schinz, Consp. Fl. Afr. v. 715; Chiov. in Ann. Istit. Bot. Roma, viii. 285. *A. Iwarancusa*, Schweinf. in Bull. Herb. Boiss. ii. App. ii. 13; not *A. Iwarancusa* of Jones. *A. laniger*, var. *genuinus*, Chiov. in Ann. Istit. Bot. Roma, viii. 25; not of Hack. *Gymnanthelia proxima*, Anders. in Schweinf. Beitr. Fl. Aethiop. 300.

**Upper Guinea.** French Guinea: Falama, *Chevalier*, 114! Northern Nigeria: Socoto, *Dalziel*, 486! Nupe; near Kavage, *Barter*, 1350!

**Nile Land.** Nubia: Sea coast, *Bent*! Soturba, *Schweinfurth*, 1041! Wadi O-Mareg, *Schweinfurth*, 561! Wadi Laemeb, in sand, *Schweinfurth*, 570! near Jokal, *Massey*! Sudan: without precise locality, *Broun*, 687! Cordofan; Mount Abu-Sunun, *Pfund*, 602! Eritrea: Assaorta, along the Alghedi torrent, *Pappi*, 5126. Amasen, between Sagalu and Aidereso, *Pappi*, 3282; Aala plain near Aidereso, *Pappi*, 3303; at the hot springs of Ailet, *Pappi*, 4744; *Schweinfurth*, 462! Bogos; Keren, 4600–4900 ft., everywhere among rocks, the principal constituent of the grass vegetation of the dry season, *Schweinfurth*, 754; *Pappi*, 2523, 7108; Moccada, *Pappi*, 2453; Ocule Cusai, by the Aini torrent, 5900 ft., *Pappi*, 1873; Acran, by the Mai Dharo torrent, *Pappi*, 3022; Medri od Tesfa, Adi Ghebsus, *Pappi*, 6571, 6589. Gallabat: Matamma, *Schweinfurth*, 1038! Abyssinia: Jelajeranne, *Schimper*, 1792!

Klatt (in *Jahrb. Hamb. Wiss. Anst.* ix. 122) indicates *Andropogon Iwarancusa* from Puguruni north of Quilimane (*Stuhlmann*) and from Zanzibar (*Stuhlmann*), but no specimens from these collectings have been seen by me.

#### 4. *C. plurinodis*, <sup>(Stapf)</sup> *Stapf* ex *Burt-Davy* in *Ann. Transvaal Mus.* iii.

121. Perennial, 1–3 ft. high, compactly cæspitose, with intravaginal innovations, shortly coated with the persistent sheath-bases. Culms slender, erect, terete, simple and 3–6-noded below the panicle, glabrous, smooth, longest internode 5–10 in. long. Leaf-sheaths firm, tight, terete, glabrous, shorter than the internodes, except the lowermost which are up to 3 in. (rarely 4, or on the culms up to 6 in.) long and fugaciously hairy to tomentose at the base; ligules very short, truncate, scarious, firm, minutely ciliolate; blades very narrow, linear, setaceous or filiform upwards, 4–8 or sometimes up to 12 in. by  $\frac{1}{2}$ – $1\frac{1}{2}$  lin. (rarely to  $2\frac{1}{2}$  lin.) wide, flat or partly folded, rather rigid below, flexuous above, glaucous, glabrous or with very fine spreading hairs downwards, gathered sometimes into a loose beard at the mouth or behind the ligule, smooth to the touch, margins smooth below, scabrid upwards, midrib and nerves fine, inconspicuous above, slightly raised below, the narrow white band on the upper side corresponding to a zone of spongy tissue. Spatheate panicle narrow, 3–6 in. long, mostly loose; internodes 3–5, rarely more, lowest 3–4 in. long,

the following much shorter, gradually decreasing; usually all the primary branches forming scanty, up to 3-rayed, tiers, the lowest of which are frequently mixed; spathes, except the lowest, with much reduced blades, herbaceous, subglaucous, lanceolate, acuminate to subulate-acuminate,  $1\frac{1}{2}$ –1 in. long; rays finely filiform, glabrous,  $1-1\frac{1}{2}$  in. long. Spatheoles at length very narrow, acute to acuminate,  $1\frac{1}{4}-\frac{3}{4}$  in. long, scarious, reddish; peduncle filiform, 3–5 lin. long, glabrous. Racemes 2-nate, laterally exerted, ultimately divaricate or epinastically deflexed, dense,  $\frac{2}{3}$  to 1 in. long, green, variously and usually slightly tinged with purple or red, moderately villous, one subsessile, the other with a linear bare base,  $\frac{3}{4}$  lin. long; bases villosulous in the fork, ciliate upwards, glabrous on the back, tips distinctly denticulate-cupular, neither the base of the subsessile raceme nor its short adjacent pedicel swollen; fertile joints filiform, up to  $1\frac{1}{2}$  lin. long, glabrous on the back or with a line of hairs upwards, densely ciliate on both sides, cilia about  $\frac{1}{2}$  lin. long below, to over 2 lin. near the tips, these denticulate, auriculate-cupular; adjacent pedicels very similar, very slightly longer. Homogamous pair of spikelets 1 at the base of the subsessile raceme. Fertile spikelets linear to linear-lanceolate, usually acuminate, about 3 lin. long, greenish, glabrous; callus short, obtuse, shortly bearded. Glumes subequal, thinly chartaceous, lower 2-toothed, grooved or depressed on the back up to or beyond the middle, then flat, keels rounded and often thickened and shining below, acute and scabrid above, sometimes a slight callous gibbosity at the base between the keels; intracarinal nerves usually 2 or 3 (sometimes 1 or 4) evanescent downwards, green; upper glume boat-shaped, acute, acutely keeled, 1-nerved, hyaline margins narrow, ciliate. Lower floret reduced to a narrow linear-oblong hyaline sub-2-nerved sparingly ciliolate valve. Upper floret ♀: valve very narrow, 2 lin. long, 2-fid almost to the middle, almost subchartaceous below the insertion of the awn, segments subulate, ciliolate; awn very fine, about 5–8 lin. long, bent at and twisted below the middle, bristle spreading more or less at right angles. Anthers about  $1\frac{1}{2}-1\frac{3}{4}$  lin. long. Pedicelled spikelets ♂, linear to lanceolate-oblong, acute,  $3-3\frac{1}{2}$  lin. long, glabrous, sometimes purplish; glumes subequal, subchartaceous, lower with acute keels and 9–11 very close intracarinal nerves; upper 5-nerved, ciliolate, side-nerves close to each other; valve lanceolate, acute, 2-nerved, sparingly ciliolate, as long as the glumes; anthers as in the fertile floret.—*Andropogon plurinodis*, Stapf in Dyer, Fl. Cap. vii. 353.

**Lower Guinea.** Hereroland: Awas Mountains; pass between Haris and Aub, *Pearson*, 9664! 9666! 9667! 9668! between Nauchas and Areb, *Pearson*, 9020! Haris, *Fleck*, 557!

**Mozambique Distr.** Rhodesia: Salisbury, *Nobbs*, 634! Bulawayo, *Rogers*, 5897! 5918! Bechuanaland: Roehudi, *Rogers*, 6572!

All over South Africa, with the exception of the south-west and the littoral in the east.

*Andropogon plurinodis* (Stapf) v. *Trochtha* 42;  
Dyer, 1875.





5. *C. commutatus*, Stapf in *Kew Bulletin*, 1907, 211 (excluding the specimens). Perennial, up to 4 ft. high, with intravaginal innovations. Culms erect, terete, simple and about 5-noded below the panicle, finely pubescent below the nodes, otherwise glabrous. Leaf-sheaths firm, terete, tight, glabrous, smooth or slightly rough on the back, the basal up to 4 in. long, more or less persistent; ligules membranous, truncate, up to 1 lin. long, ciliolate; blades linear, tapering to a setaceous point, the inner of the innovations very narrow, the outer and those of the culm-leaves over  $\frac{3}{4}$  (probably over 1) ft. long, up to over 2 lin. broad, rigid, flat, dull green turning russet, glabrous, almost smooth, at least below, more or less rough along the margins, midrib very slender, primary lateral nerves 3-4, prominent above, obscure below. Spatheate panicle very narrow, interrupted below, up to 1 ft. long; internodes 5-6, lowest up to over 6 in. long, upper rapidly decreasing in length; lower leaves of the panicle more or less like those lower down on the culm, blade-bearing, upper more and more reduced, spathe-like, bladeless; primary branches usually forming up to 6-rayed fastigiate tiers; lower tiers mixed, rays very finely filiform, slightly unequal, even the compound frequently shorter than the supporting spathe or sheath; spathes very narrow, linear, acute, glabrous, those of the shortest compound rays often permanently enclosed and thin, of the longer exerted, scarious to subherbaceous, up to  $1\frac{1}{2}$  in. long, hardly over 1 lin. wide in profile. Spatheoles very narrow, acute, scarious to submembranous, reddish,  $1\frac{1}{2}$ - $\frac{3}{4}$  in. long; peduncles 6-3 lin. long, finely filiform, pubescent upwards. Racemes 2-nate, hardly diverging, erect,  $\frac{2}{3}$  to 1 in. long, moderately villous, reddish-brown, one subsessile, the other with a distinct bare base; bases rather stout upwards, or that of the upper raceme linear and up to 1 lin. long, minutely pubescent, their tips cupular and denticulate, the adjacent pedicel of the subsessile raceme more or less swollen and hard, 1 lin. long, glabrous on the back; fertile joints linear,  $1\frac{3}{4}$  lin. long, pubescent on the back, very shortly ciliate below, long-ciliate towards the cupular tips (cilia up to  $1\frac{1}{2}$  lin. long), cupule rather conspicuous, membranous, dentate; adjacent pedicels very similar. Homogamous or imperfect sessile spikelet 1 at the base of the sessile raceme, intermediate as to shape. Fertile spikelets linear in front view, more or less acuminate,  $2\frac{3}{4}$ - $3\frac{1}{2}$  lin. long, greenish, turning straw-colour or reddish, glabrous; callus short, obtuse, shortly bearded. Glumes unequal, chartaceous; lower obscurely 2-dentate, deeply grooved below the middle with a callous gibbosity at the base, shallowly concave to flat upwards, keels acute, scabrid, intracarinal nerves 0, inflexed margins narrow; upper glume shorter, linear-lanceolate in profile, acute, hardly curved on the back, 1-nerved, ciliate. Lower floret reduced to a narrow oblong hyaline almost nerveless ciliate valve, slightly shorter than the upper glume. Upper floret ♀: valve narrow, linear, 2-fid to over one-third, 2 lin. long, subchartaceous

below, lobes sublinear, ciliolate, awn slender, 5-6 lin. long, distinctly differentiated into a dark brown twisted column and a yellowish bristle. Pedicelled spikelets ♂, linear-lanceolate, acute,  $3\frac{1}{2}$  lin. long, brownish, glabrous; glumes subequal, lower chartaceous, with scabrid keels and 7-9 very close intravaginal nerves, upper membranous, acute, 3-nerved, keeled; valve linear-oblong, almost as long as the upper glume, hyaline, ciliate, faintly 2-nerved; anthers over 1 lin. long.—*Andropogon commutatus*, Hack. in DC. Monogr. Phan. vi. 612; Durand & Schinz, Consp. Fl. Afr. v. 708; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 93; Chiov. in Ann. Istit. Bot. Roma, vii. 61 and viii. 286 (partly?). *A. flavicundus*, Hochst. ex Chiov. ll.cc. *Gymnanthelia commutata*, Aschers. & Schweinf. in Schweinf. Beitr. Fl. Aethiop. 306.

**Nile Land.** Eritrea: Barka, by the Shegolgol-Mantai, 2950 ft., *Schweinfurth*, 46; by the Messiam, below Mai-Mafales, very common in open bush, 4600 ft., *Schweinfurth*, 45! Amasen; Harara, near Ghinda, *Pappi*, 4492! Lesa Mountains, *Pappi*, 4705 bis; Mat-Allat, *Pappi*, 4799. Sarae; along the Mareb, Debarroa, 6000 ft., *Pappi*, 473. Ocule Cusai; Deae-Mere, 6550 ft., *Pappi*, 1704! Scimenzana; plateau of Ghebbba, 8100 ft., *Pappi*, 894. Abyssinia: Jelajeranne, *Schimper*, 685; and without precise locality, *Schimper*, 1801! British Somaliland: Ogaden, *Riva*, 315.

Chioventa distinguishes two colour varieties, (a) *flavicundus*, with pale yellowish panicles, corresponding to Schimper's specimens which constitute the type, and (b) *violaceus* with intensely violet spikelets. All of Pappi's specimens with the exception of no. 1812, are referred to this form. The determination of Riva's plant from the Ogaden is, according to the same author, doubtful.

(*Schweinf.*)

**6. C. floccosus**, *Stapf*. Perennial, 1-1½ ft. high, densely caespitose, with numerous intravaginal innovations from an oblique rhizome and a coat of short old weathered sheaths. Culms very slender, erect, subgeniculate or terete, simple and 2-noded below the panicle, glabrous, smooth. Leaf-sheaths firm, terete, glabrous, smooth, the basal about 1½ in. long, tough and long-persistent, slightly widened downwards, the cauline very tight and shorter than the internodes; ligules very short, truncate, membranous, subciliolate; blades very narrow-linear, setaceous and flexuous or circinnate upwards, up to 6 in. by  $\frac{1}{2}$ - $\frac{3}{4}$  lin., convolute in bud, soon flat, firm and more or less rigid, glaucous particularly above, glabrous except for scanty long extremely fine spreading hairs, smooth below the more or less scaberulous setaceous points, midrib and nerves fine, the latter slightly raised above. Spatheate panicle scanty, loose, narrow, 3-6 in. long; internodes 2-4, lowest 2-4 in. long, upper gradually decreasing; primary branches forming up to 4-rayed tiers; rays finely filiform,  $1\frac{1}{2}$ - $\frac{3}{4}$  in. long, at length subequal, glabrous; spathes herbaceous, glabrous, very narrow, acuminate,  $1\frac{1}{2}$ -1 in. long, the lower with a short herbaceous blade, the upper terminating with a flexuous bristle. Spatheoles very narrow, acute, subherbaceous to scarious, pale,  $\frac{4}{5}$  to  $1\frac{1}{4}$  in. long; peduncles finely filiform, mostly 4-6 lin.





long, enclosed in or laterally exerted from the spatheole, rarely those of the lowest tiers longer and terminally exerted, glabrous, tips disarticulating, minutely cupular. Racemes 2-nate, obliquely erect, hardly diverging, 7-10 lin. long, moderately villous, glaucous-green, sparingly tinged with purple or brown, one sessile, the other with a filiform to linear slender bare base, up to over 1 lin. long, both bases pubescent to villous, rarely subglabrous with cupular tips, that of the sessile raceme stout and short, the adjacent pedicel swollen, oblong, hard, glabrescent on the back and  $1\frac{1}{2}$  lin. long; fertile joints linear,  $1\frac{1}{2}$  lin. long, minutely and rigidly pubescent on the back, shortly ciliate below, cilia increasing upwards to  $1\frac{1}{2}$  lin., cupule oblique, auriciform; adjacent pedicels very similar. Homogamous or imperfect spikelet 1 at the base of the sessile raceme, very similar in shape to the fertile spikelets. Fertile spikelets tightly wedged in between joint and pedicel, linear in front view, long-acuminate,  $2\frac{3}{4}$ -3 lin. long, greenish, sometimes purplish or violet at the tips and in the groove, glabrous; callus short, obtuse, shortly bearded. Glumes unequal, chartaceous; lower obscurely 2-dentate, deeply and narrowly grooved up to the long flat acumen, with a callous gibbosity at the base, the keels obtuse and stout below the middle, acute and scaberulous in the acumen, intracarpal nerves 0, or 2 short ones in the acumen close to the keels, inflexed margins narrow; upper glume slightly shorter, lanceolate-oblong in profile, acute or mucronulate, slightly curved on the back, 1-nerved, ciliate. Lower floret reduced to a narrow oblong hyaline almost nerveless ciliate valve, 2 lin. long. Upper floret ♀: valve narrow, linear, 2-fid to a quarter or almost the middle, not quite 2 lin. long, chartaceous below, lobes linear, ciliate; awn slender, about 5-7 lin. long, distinctly differentiated into a dark brown twisted column and a yellowish bristle, usually bent at a right angle. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelet ♂, linear-lanceolate, acute, up to almost 3 lin. long, dull green or tinged with purple, glabrous; glumes unequal, lower chartaceous with scabrid keels and 7-9 very close intracarpal nerves; upper shorter, membranous, 3-nerved, hardly keeled; valve linear-oblong, almost as long as the upper glume, hyaline, ciliate, sub-2-nerved; anthers  $1\frac{1}{2}$  lin. long.—*Andropogon floccosus*, Schweinf. in Bull. Herb. Boiss. ii. App. ii. 14. *A. commutatus*, Stapf in Kew Bulletin, 1907, 211 (the specimens).

Nile Land. Eritrea: Amasen; Ginda, 3900-4000 ft., Schweinfurth, 162, 156, 183, 412, 484. Somaliland: Golis range, Drake-Brockman, 121! 126! 252! near Upper Sheikh and towards Burao, rare, Appleton!

Very similar to *C. commutatus*, but a smaller and much more slender grass, and perhaps only its desert modification. The waxy (?) secretion described by Schweinfurth as occurring among the short hairs on the back of the joints (and pedicels) and in the groove of the spikelets is also present in some of Drake-Brockman's specimens. The lobes of the awned valve have always been found to be ciliate although sometimes sparingly so, and not glabrous as Schweinfurth says of his specimens. Drake-Brockman says (in litt.) that it is also found in the Haud.

- ✓ **7. *C. divaricatus*, Stapf.** Perennial, 1½–2 ft. high, densely caespitose, with intravaginal innovations, coated with persistent sheaths; root-fibres few, coarse. Culms slender, erect, terete, simple and 1-noded below the panicle (the node at about the middle), glabrous, smooth. Leaf-sheaths very firm, terete, glabrous, slightly rough, or the upper almost smooth, the basal 1½–3 in. long, tough and long-persistent, somewhat widened downwards, the cauline rather tight and shorter than the internodes; ligules subhyaline, truncate, ciliate, 1½ lin. long; blades very narrow, linear, setaceous and curled or flexuous upwards, to over 6 in. by ½ lin., folded or channelled in the bud, then broader, finally flat, hard, glaucous, glabrous, finely rough on the back, smooth and whitish on the face, margins smooth or almost smooth below, scaberulous upwards, midrib and nerves fine, inconspicuous above, slightly raised below, the white band of the upper side corresponding to a zone of spongy tissue. Spatheate panicle loose, narrow, from a few in. to almost 1 ft. long; internodes up to 4, rarely 5, the lower up to 3 in. long, rarely longer, upper gradually decreasing; primary branches forming about 3-rayed tiers, rays finely filiform, 2–1 in. long, at length subequal, glabrous, very slightly scaberulous near the tips; spathes herbaceous, glaucous or tinged with purple, narrowly lanceolate, acuminate, 2–1½ in. long, the lower with a herbaceous filiform and setaceous blade. Spatheoles very narrow, acute, 1½–1 in. long, scarious, straw-coloured or pale-purple; peduncles 3–8 lin. long, scaberulous upwards, tips truncate, subcupular. Racemes 2-nate, divaricate, often at right angles or epinastically deflexed, ¾–1 in. long, more or less villous, tinged with rich violet, one subsessile, the other with a short linear bare base, almost up to 1 lin. long, both bases scaberulous, that of the subsessile raceme short and stout, the adjacent pedicel swollen, oblong or barrel-shaped, hard, glabrescent and often glossy; fertile joints 1½ lin. long, glabrous on the back or nearly so or pubescent upwards, densely ciliate on both sides, cilia up to 1 lin. long, or some of the uppermost almost 2 lin. long, snow-white, tips cupular, oblique, auriculiform, denticulate; adjacent pedicels very similar. Homogamous or imperfect spikelet 1 at the base of the sessile raceme more like the fertile spikelets than the pedicelled. Fertile spikelets tightly wedged in between joint and pedicel, linear to lanceolate-linear in front view, long-acuminate, almost 3½ lin. long, greenish to violet-purple, glabrous, callus short, obtuse, shortly bearded. Glumes subequal, chartaceous, lower minutely 2-dentate, concave on the back below the flat acumen, keels obtuse, stout and smooth below the middle, with or without a small gibbosity between them at the usually yellowish base, acute and finely scaberulous in the acumen, intracarpal nerves 2 in the upper part, short and faint, inflexed margins less than half the width of the back; upper glume narrowly lanceolate in profile, acutely acuminate, gently curved on the back, 3-nerved, ciliate. Lower floret reduced to a linear-oblong hyaline





almost nerveless ciliate valve  $2\frac{1}{2}$  lin. long, and purplish below. Upper floret ♂: valve linear-oblong, 2-fid to one-third or beyond, over 2 lin. long, subchartaceous and often purple, the lobes linear-oblong, subacute, ciliate; awn fine, 6-8 lin. long, gently bent near and twisted below the middle, column smooth. Anthers 1 lin. long. Stigmas deep orange. Pedicelled spikelets ♂, linear-lanceolate, acute or subacute, purple, glabrous; glumes unequal, lower subchartaceous, with scaberulous keels and 5-7 or more intracarinal nerves, upper 3-nerved, rounded on the back; valve linear-oblong, obtuse, subhyaline, ciliate, 2-nerved,  $2-\frac{1}{2}$  lin. long; anthers almost 2 lin. long.

+ Nile Land. British Somaliland: (without precise locality, *Drake-Brockman*, 410! 411!

✓ **8. C. Afronardus, Stapf.** Perennial, tall, compactly cæspitose, the intravaginal innovations and culm-bases coated with long tough slender sheaths or their bases. Culms erect, terete, stout, up to  $2\frac{1}{2}$  lin. thick, 3-4-noded and simple below the panicle, glabrous, smooth; lower internodes over 1 ft. long. Leaf-sheaths terete, firm, prominently striate, the basal over 6 in. long, narrow upwards, widened and the outer of them hirsute towards the base, otherwise glabrous and quite smooth; ligules scarious, of the innovations up to over 6 lin. long, of the culm-leaves much shorter (rarely over 2 lin.), rounded or truncate, ciliolate; blades narrow from a long-attenuated base or almost reduced there to the stout midrib and much narrower than the mouth of the sheath, tapering upwards to a fine point, the basal up to over  $1\frac{1}{2}$  (probably 2) ft. by  $1\frac{1}{2}$ -2 lin., the cauline also very long (over 1 ft.), up to 3 lin. wide, very firm, green, rigid or flexuous upwards, the lower quite glabrous, smooth except on the scabrid margins, the uppermost rough all over, midrib semiterete downwards, whitish above, lateral nerves moderately prominent on both sides. Spatheate panicle decomposed, oblong to linear, usually more or less secund,  $\frac{1}{2}$  to over 1 ft. long, mostly interrupted below, internodes about 4-5, lowest 6-10 in. long, rarely much shorter, upper rapidly decreasing in length; lowest subtending leaves with herbaceous sheaths 2-4 in. long and short normal blades, upper spathaceous; lower and intermediate primary branches, or all but the uppermost, forming mixed tiers, the longest of their rays often considerably exceeding the supporting sheath, up to 4- and even 5-noded, and bearing secondary and sometimes tertiary tiers; ultimate tiers few- to 10-rayed, corymboid; rays finely filiform, of the peripheral tiers 6-4 lin. long, glabrous or sparingly hairy towards the tips; spathes lanceolate, acute or subulate-acuminate,  $\frac{3}{4}$ -1 in. long, subherbaceous with scarious reddish margins. Spatheoles narrow, linear-lanceolate to lanceolate, acute or subacute, scarious, pale reddish to brown, 6-8 lin. long; peduncles filiform, 2-4 lin. long, glabrous. Racemes 2-nate, ultimately more or less divaricate and

rather loose, 4-5 (or sometimes 6) lin. long, pale green, slightly tinged with red or dull purple to dark dull violet, loosely villous, one subsessile, the other with a hairy base,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long, the base of the subsessile raceme very much shorter and stouter, the adjacent pedicel short, linear, not swollen; fertile joints slender, filiform,  $\frac{3}{4}$ -1 lin. long, hairy on the back and sides, cilia up to 1 lin. long, spreading, tips cupular, cupule unequally 2-auriculate; adjacent pedicels very similar, but longer (over 1 lin.). Homogamous pair of spikelets 1 at the base of the sessile raceme. Fertile spikelets oblong to oblanceolate-oblong, 2-2 $\frac{1}{2}$  lin. long, pale or more or less tinged with dull purple, glabrous; callus short, obtuse, shortly bearded. Glumes subequal, thinly chartaceous; lower minutely 2-toothed, usually more or less depressed downwards, often with 1 or 2 faint transverse ridges across the depression, keels narrowly winged, wings white or reddish, intracarinal nerves 2-4 above the middle, like the keel-nerves green or violet; upper glume boat-shaped, acute, acutely keeled, 1-nerved, margin broadly hyaline, ciliate upwards. Lower floret reduced to a linear or lanceolate-oblong hyaline nerveless ciliate valve, almost 2 lin. long. Upper floret ♂: valve very narrow, linear, 2-fid almost or quite to the middle, hyaline and strongly 1-nerved below, segments subulate, linear, ciliate, awn very fine, 2 $\frac{1}{2}$ -3 lin. long, bent at and twisted below the middle, column smooth, bristle spreading at a right angle or deflexed. Anthers almost 1 lin. long. Pedicelled spikelets ♂, oblong, subobtuse, 2-2 $\frac{1}{2}$  lin. long, glabrous, darker coloured than the sessile. Glumes equal, thinly chartaceous; lower with acute keels and 3-5 intracarinal nerves, upper 3-nerved, ciliate; valve linear-oblong, obtuse, almost equalling the glumes, sub-2-nerved, ciliate; anthers 1 lin. long.

+ Nile Land. Uganda: Kipayo, (in grassland, *Dummer*, 445! Kavirondo, (very common, 4000-5000 ft.,) *Scott Elliot*, 7021! Buddu; common in sandy soil,) *Scott Elliot*, 7080! Ruwenzori; Kivata, (6000 ft.,) *Scott Elliot*, 7581! British East Africa: Aberdare Mountains, *James*! (and without precise locality) *Powell*, 21!

Here belongs probably the *Andropogon Nardus*, var. *marginatus* of Pilger (in *Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr. Exped.* ii. 44) from Bukoba District, between Ituri and Buddu Forest, *Mildbraed*, 100. *Andropogon Nardus*, var. *marginatus*, Hack. (= *Cymbopogon marginatus*, Stapf) is a much smaller plant with less compound panicles and broader winged keels.

9. *C. validus*, *Stapf ex Burt-Davy in Ann. Transvaal Mus.* iii. 121, 129. Perennial, 4-7 ft. high, compactly caespitose, the intravaginal innovations more or less coated with long slender gradually breaking up sheaths. Culms erect, terete, stout, up to over 2 $\frac{1}{2}$  lin. thick, 4-5-noded and simple below the panicle, glabrous, rarely pubescent towards the nodes, smooth; lower internodes up to over 1 ft. long. Leaf-sheaths terete, firm, finely striate, the basal up to 1 ft. long, more or less widened below, the outer of them shortly hairy to sub-tomentose at the base, usually soon glabrescent, the others mostly





quite glabrous; ligules scarious, 2-3 lin. long, rounded or truncate, glabrous; blades narrow from a long-attenuated base (innovations and lower culm-leaves) or only very slightly so (most culm-leaves), tapering upwards to a long setaceous point, up to 2 ft. by  $2\frac{1}{2}$ -4 lin., green, very firm, rigid or flexuous upwards, quite glabrous, smooth except on the scabrid margins, midrib slender throughout or widened downwards and crescent-shaped in cross section, whitish on the upper surface, lateral nerves numerous, slender. Spatheate panicle decomposed, narrow, densely contracted,  $\frac{1}{2}$ -1 ft. long, more or less interrupted downwards; internodes 3-6, lowest to over 1 ft. long, upper rapidly decreasing in length, lowest 1 or 2, rarely 3, subtending leaves with herbaceous sheaths 2-4 in. long and normal often long blades; primary branches all but the uppermost forming mixed tiers, the longest of their rays often long-exserted from the supporting sheath, 4-7-noded and bearing secondary tiers which before flowering imitate distichous ovate-oblong or oblong false spikes, axes often pubescent; ultimate tiers usually 2-rayed, rays mostly  $1\frac{1}{2}$ -2 lin. long, finely filiform, glabrous; spathes lanceolate-acute,  $\frac{2}{3}$  to  $\frac{3}{4}$  lin. long, firmly subherbaceous with scarious reddish margins. Spatheoles very narrow, linear-lanceolate, finely acuminate, 6-8 lin. long, scarious, reddish or brownish-red; peduncles filiform,  $1\frac{1}{2}$ -3 lin. long, glabrous. Racemes 2-nate, laterally exserted, ultimately often more or less divaricate, dense, 4-5 (or sometimes 6) lin. long, pale green, more or less tinged with red or brown, hardly villous at all, one sessile, the other with a hairy bare base,  $\frac{1}{2}$  lin. long, the base of the sessile raceme very short and somewhat stout, the adjacent pedicel very short, linear, not swollen; fertile joints slender, filiform,  $\frac{3}{4}$  lin. long, hairy on the back and sides, cilia up to  $\frac{1}{2}$  lin. long, tips cupular, minutely and unequally 2-auriculate; adjacent pedicels very similar to the joints,  $\frac{3}{4}$ -1 lin. long. Homogamous pair of spikelets 1 at the base of the sessile raceme. Fertile spikelets oblong or oblanceolate-oblong,  $2\frac{1}{2}$ -3 lin. long, pale, reddish upwards, glabrous; callus very short, obtuse, shortly bearded. Glumes subequal, thinly chartaceous, lower 2-toothed, flat on the back or very slightly depressed towards the base or with a faint shallow median groove; keels distinctly winged above the middle, wings pale or reddish, intracardinal nerves usually 2, percurrent from the base to near the tips, green like the keel-nerves; upper glume boat-shaped, acute, acutely keeled and often narrowly winged, 1-nerved, hyaline margin narrow, ciliolate. Lower floret reduced to a lanceolate-oblong hyaline nerveless ciliate valve up to over 2 lin. long. Upper floret ♀: valve very narrow, subchartaceous and almost stipe-like below the insertion of the awn, 2-fid to one-third, segments finely subulate-ciliolate; awn very fine, about 5 lin. long, bent at and twisted below the middle; bristle spreading at right angles or almost so. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelets ♂, oblong, acute,  $2\frac{1}{2}$ -3

lin. long, glabrous, somewhat darker than the sessile; glumes subequal, thinly chartaceous; lower with acute keels and 7-9 very close intracardinal nerves; upper 3-nerved, eciliolate; valve lanceolate-oblong, subacute, 2 lin. long, 2-nerved, ciliolate; anthers as in the fertile spikelet.—*Andropogon Nardus*, var. *validus*, Stapf in Dyer, Fl. Cap. vii. 352; Eyles in Trans. Roy. Soc. S. Afr. v. 296.

**Mozambique Distr.** Rhodesia: Salisbury, *Mundy*! Transvaal: Limvubu River, *Nelson*, 8!

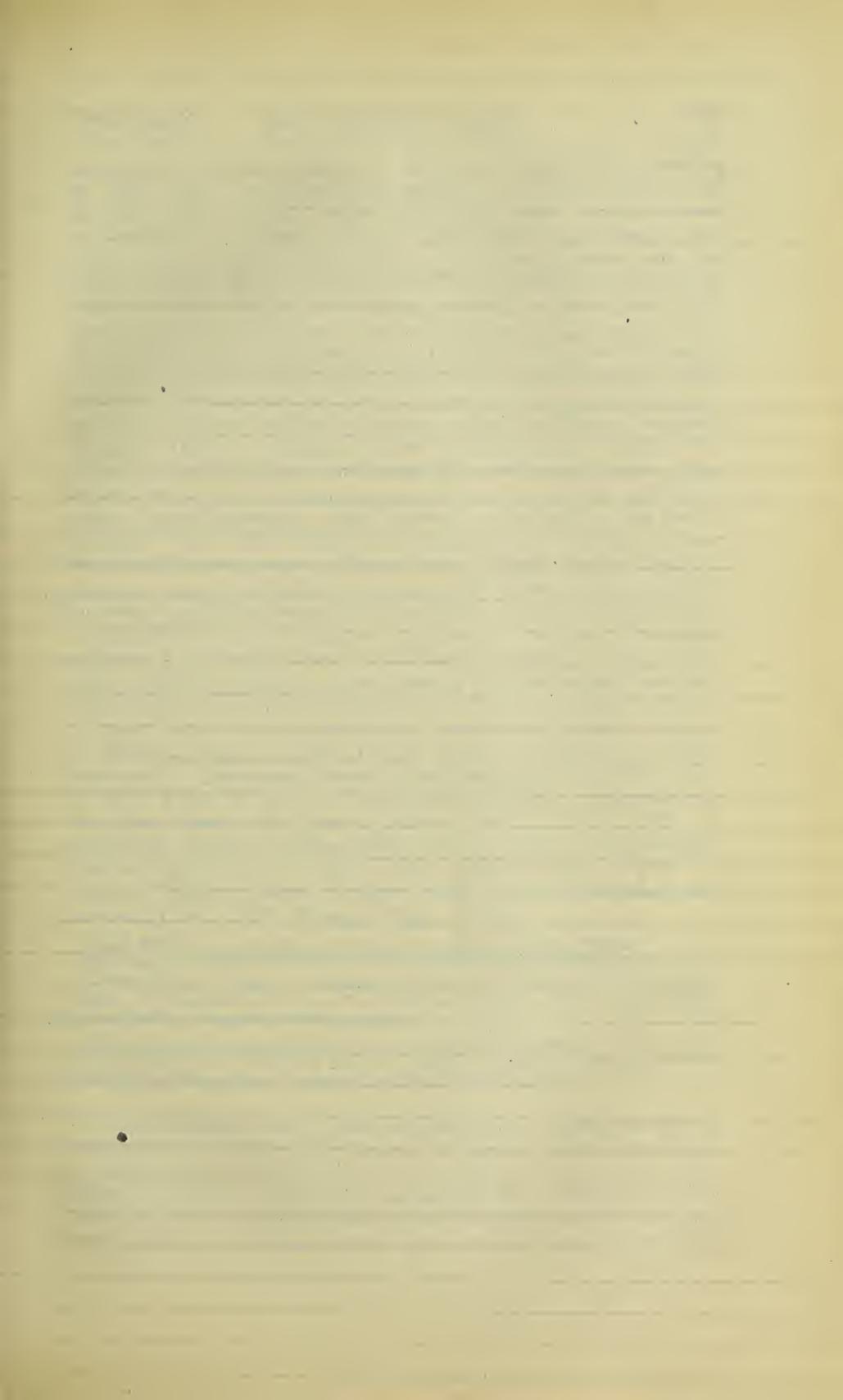
Also throughout Natal.

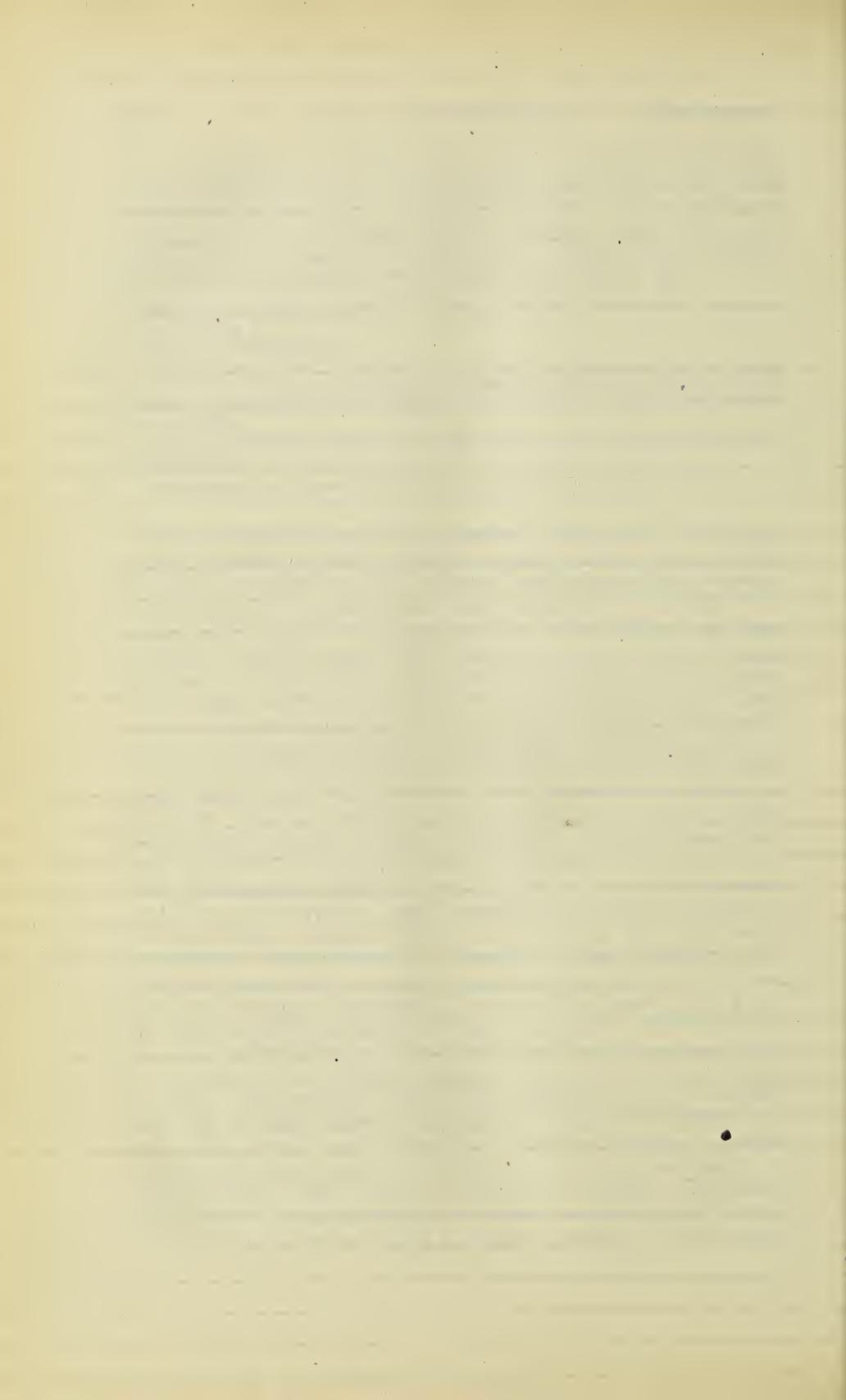
✓ Var. *lysocladius*, Stapf. Panicle over 2 ft. long, loose owing to the lengthening of all the axes; racemes pale green, pleasantly contrasting with the reddish spathes.—*Andropogon connatus*, Eyles in Trans. Roy. Soc. S. Afr. v. 295, partly; not of Hochst.

† **Mozambique Distr.** Rhodesia: Victoria Falls, on the south bank of the river, *Rogers*, 5672!

Perhaps only an edaphic modification of the common contracted form.

**10. C. citratus**, Stapf in *Kew Bulletin*, 1906, 357. A tall perennial, throwing up dense fascicles of leaves from a short oblique annulate sparingly branched rhizome, usually barren but occasionally giving rise to a stout erect culm up to over 6 ft. high, 7-8-noded and simple below the panicle, up to 4 lin. thick at the base, glabrous, smooth, longest lower internodes up to over 1 ft. long, pruinose below the nodes. Leaf-sheaths terete, those of the barren shoots much widened at the base, and tightly clasping each other, narrow and separating upwards, with rounded shoulders at the mouth, 4 in. to 1 ft. long, subcoriaceous, quite glabrous and smooth, more or less cinnamon coloured or russet on the inside; sheaths of the culms tight, shorter than the internodes, finely pubescent or velvety at the nodes; ligules very short, scarious, rounded or truncate; blades linear, long-attenuated towards the base and tapering upwards to a long setaceous point, up to over 3 ft. long by 3-9 lin. wide, very firm, glaucous-green, glabrous, smooth or more or less rough upwards and along the margins; midrib somewhat stout below, whitish on the upper side; primary lateral nerves 4-6 on each side, raised particularly above with 2-4 secondary nerves between them. Spatheate panicle decompose to supradecompose, loose, 1 to over 2 ft. long, nodding; internodes 4 to over 6, the longest up to 8 or 9 in. long, rapidly decreasing in length upwards; lowest primary branches undivided at the base, up to over 1½ ft. long, and up to 5- or 6-noded, the following forming mixed tiers of very unequal variously compound and simple rays, ultimate tiers up to 4-rayed; rays 1-½ in. long, filiform and glabrous; lower subtending leaves with tight sheaths and normal but abbreviated blades; spathes narrow-lanceolate, acute or acuminate, 2-1 in. long, herbaceous or subherbaceous, with narrow membranous margins. Spatheoles very narrow, linear-lanceolate to almost subulate when inrolled, 7-9 lin. long, acute or finely acuminate, reddish to rich russet;





peduncles 3-5 lin. long, glabrous. Racemes 2-nate, finally spreading at right angles or epinastically deflexed, moderately dense, 7-12 lin. long, pale, variously tinged with dull purple, loosely villous, one subsessile, the other with a slender filiform bare base, almost 1 lin. long and hairy, the pedicel of the homogamous pair also slender, though short; fertile joints filiform, slender, 1-1½ lin. long, ciliate on both sides, cilia increasing upwards to more than 1 lin., tips obliquely auriculate and cupular; adjacent pedicels very similar. Homogamous pair of spikelets 1 at the base of the sessile raceme, its sessile member usually slightly differing in shape from the fertile spikelets. Fertile spikelets linear or linear-lanceolate, acutely acuminate, 2½-3 lin. long, reddish, glabrous; callus short, obtuse, minutely bearded. Glumes subequal; lower subchartaceous, slightly depressed towards the base, otherwise flat on the back, keels acute, scaberulous above; intracarpal nerves 0 or 1, short or indistinct; upper glume boat-shaped, slightly curved on the back, acute, keeled upwards. Lower floret reduced to a hyaline linear-oblong or almost linear sub-2-nerved valve, ciliate above, slightly shorter than the glumes. Upper floret ♀: valve narrowly linear, acute, about 2 lin. long, usually entire and awnless, rarely more or less 2-fid with a small bristle from the sinus. Anthers 1 lin. long. Pedicelled spikelets ♂ or neuter, linear to subulate-lanceolate, as long as the sessile, reddish, glabrous; lower glume 5-9-nerved, upper 3-nerved; valve shorter to much shorter than the glumes, hyaline, ciliate, of upper floret very narrowly linear, nerveless if present at all.—*C. Nardus*, Rendle in Cat. Afr. Pl. Welw. ii. 155 (as to Welw. specimens). *Andropogon Schœnanthus*, Linn. Syst. ed. x. 1304; not of Sp. Pl.; Roxb. Fl. Ind. ed. Carey & Wall. i. 278. *A. citratus*, DC. Cat. Hort. Monsp. 78; Nees in Allgem. Garten. Zeit. iii. 267. *A. citriodorum*, Desf. in Tableau École Bot. ed. ii. 15. *A. Roxburghii*, Nees in Wight, Cat. no. 1699; Steud. Syn. Pl. Glum. i. 395. *A. ceriferus*, Hack. in Mart. Fl. Bras. ii. iii. 281. *A. Nardus*, var. *ceriferus*, Hack. in DC. Monogr. Phan. vi. 605.

**Upper Guinea.** Ivory Coast: Taboa, cultivated, *Chevalier*, 20058!

**Nile Land.** Uganda: without precise locality, *Imperial Institute*!

**Lower Guinea.** Angola: Loanda, cultivated, *Welwitsch*, 7288! Mossamedes; in plantations by the River Bairo, *Welwitsch*, 2284! and without precise locality, *Imperial Institute*, 45088!

Only known in the cultivated state, very probably of Indian origin; grown for the extraction of lemon oil and as a potherb. Barren specimens received from Uganda through the Imperial Institute also belong here.

**11. C. nervatus**, *Chiov. Gram. da Essenze*, 10. Annual (always?). Culms erect or somewhat geniculate at the base, up to 3 ft. high, simple (or with an occasional branch) and 5-7-noded below the panicle, terete, glabrous, smooth. Leaf-sheaths moderately firm or thin, terete, the lowest up to over 6 in. long, glaucous, early slipping from the stem, the upper tighter, herbaceous, shorter than the internodes, all perfectly

glabrous and smooth, prominently striate; ligules membranous, truncate, glabrous, under  $\frac{1}{2}$  lin. long; blades linear from a rounded or slightly attenuated base, tapering to an acute point, to over 1 ft. by 3-5 lin., glaucous-green, flaccid, thin, glabrous, smooth, except on the upwards scaberulous margins, midrib whitish, slender; primary lateral nerves up to 6 on each side, very slender, somewhat raised. Spatheate panicle narrow, more or less dense, 4 to over 6 in. long; lower primary branches undivided at the base (or with an arrested ray), terminally exerted from the supporting sheath, forming a false spike about 2 in. long, 5-7-noded, the upper forming mixed or simple tiers; ultimate tiers with 2 rays, 3-4 lin. long, filiform, glabrous; subtending sheaths with normal but shortened blades; spathes narrowly lanceolate, long and finely acuminate, subherbaceous, subglaucous, glabrous. Spatheoles very narrow, at length subulate-lanceolate, 6-8 lin. long; peduncles very finely filiform, 2-4 lin. long. Racemes 2-nate, more or less spreading at length, somewhat dense, olive-green, 6-8 lin. long, one sessile, the other with a bare base, not quite 1 lin. long, base of sessile raceme and adjacent pedicel stout but not fused,  $\frac{2}{3}$  lin. long; fertile joints filiform, slightly over 1 lin. long, very shortly ciliate below (a few cilia near the tips,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long), tips broadly auriculate and cupular; adjacent pedicels very similar. Homogamous pair of spikelets 1 at the base of the sessile raceme. Fertile spikelets lanceolate-oblong, subobtuse,  $2\frac{1}{4}$ - $2\frac{1}{2}$  lin. long, glabrous; callus very small, obtuse, glabrous. Glumes equal, almost membranous, lower minutely truncate, flat on the back, with a fine median groove, bordered by a green intracarpal nerve and a broad brown oil-mark on each side; keels winged upwards, wings whitish, transparent; upper glume narrowly boat-shaped, narrowly winged on the keel, sub-3-nerved. Lower floret reduced to an oblong delicately hyaline nerveless sparingly ciliate valve almost 2 lin. long. Upper floret ♂: valve linear, about 1 lin. long, subhyaline, 2-fid to almost the middle, segments very narrowly linear, subciliate; awn 4-8 lin. long, fine, bent at and twisted below the middle. Anthers over 1 lin. long. Pedicelled spikelets ♂, oblong, subobtuse, as long as the sessile, and of the same colour if not darker; lower glume about 7-nerved, keels obscurely winged; upper glume membranous, shorter, 3-nerved; valve oblong,  $1\frac{1}{2}$  lin. long, hyaline, 2-nerved, ciliolate; anthers as in the fertile spikelet.—*Andropogon nervatus*, Hochst in Flora, 1844, 243; Steud. Syn. Pl. Glum. i. 387. *A. Schœnanthus*, var. *nervatus*, Hack. in DC. Monogr. Phan. vi. 611; Durand & Schinz, Consp. Fl. Afr. v. 722; and var. *genuinus*, Chiov. in Ann. Istit. Bot. Roma, viii. 286. *Gymnanthelia nervata*, Aschers. & Schweinf. in Schweinf. Beitr. Fl. Aethiop. 306.

**Nile Land.** Sudan: Cordofan; in savannas on Mount Arash-Kul, *Kotschy*, 374! near the sources of the "River Blo" and in the region of the White River (specimen cultivated in Cairo), *Figari*!

Chiovenda (*Gram. da Essenze*, 11) describes a variety "*erythræum*" from





Eritrea characterised by somewhat longer and more spreading cilia on the joints and pedicels. The localities given are the same as those quoted by him under *A. Schœnanthus*, var. *genuinus*, in *Ann. Istit. Bot. Roma*, viii. 286, namely, Mai Giahah (*Pappi*, 6626) in Dembelas, and Carajai (*Pappi*, 6304) and Mansura (*Pappi*, 7207), both in Beni Amir.

- (Hochst.)  
 ✓ 12. *C. excavatus*, Stapf. Perennial, with extravaginal and frequently also scanty intravaginal shoots from a short rhizome, 2-4 ft. high. Culms fascicled, erect or shortly ascending, slender to moderately stout, often wiry, 4-7-noded and usually simple (rarely with a long branch from one of the lower nodes) below the panicle, terete, glabrous, smooth, often waxy-pruinose below the nodes. Leaf-sheaths firm, tight, the lower at length slipping off the internodes and inrolling, persistent, glabrous, smooth, 2-4 in. long, the upper shorter than the internodes; ligules very short, rounded, scarious, rarely over 1 lin. long; blades linear to linear-lanceolate, of the innovation-leaves from a more or less attenuated base, of the culm-leaves from a broader rounded or subcordate but not clasping base, tapering to a long setaceous point, up to over 6 in. (sometimes 1 ft.) by 3-6 lin., flat, dull green or subglaucous, glabrous, smooth or the margins scabrid, midrib slender, primary lateral nerves 4-6, fine, prominent above. Spathaceous panicle narrow, mostly 3-6 in., rarely up to 1 ft. long or very much reduced, more or less interrupted below, sparingly divided and rather loose, or if much divided then contracted and dense; internodes 3-6, rarely more, the lowest often equalling half the panicle or more, the upper rapidly decreasing; lowest primary branch usually long-exserted from its sheath and undivided below, the following forming mixed tiers, rays of ultimate tiers mostly 3, finely filiform, 3-6 lin. long, glabrous or ciliate upwards; lowest subtending sheaths with shortened foliaceous or sometimes setaceous blades; spathes lanceolate, finely acuminate, about 1 in. long, subherbaceous, pale green or tinged with purple, turning reddish. Spatheoles very narrow, lanceolate-linear to linear, 1-½ in. long, subherbaceous to scarious, soon turning reddish or russet; peduncles filiform, 3-6 lin. long, glabrous. Racemes 2-nate, more or less divaricate and finally epinastically deflexed, 4-9 lin. long, greenish variously tinged with red or dull purple, slightly villous, one subsessile, the other with a short bare base, hairy on the inner side, linear or swollen and oblong, hard and shining upwards, base of the subsessile raceme swollen, hard, fused with the equally swollen and hard adjacent pedicel; fertile joints slender, filiform, about 1 lin. long, glabrous on the back, shortly ciliate on the sides, cilia rapidly increasing in length near the tips, a few up to 1 lin. long, tips cupular with a thin denticulate rather large auricle; adjacent pedicels very similar. Homogamous pair 1 at the base of the sessile raceme. Fertile spikelets lanceolate-oblong, with the greatest width at the middle, rarely suboblanceolate with the greatest diameter just above the middle, subobtusate, 2-2½ lin.

long, green often variegated with purple, glabrous; callus very small, obtuse, minutely bearded. Glumes equal, subchartaceous; lower minutely truncate, brownish near the tips, flat on the back with a fine median groove (corresponding to a keel on the inner side) almost all along or only in the lower half, keels narrowly winged from the middle upwards, thinning out above, intracarpal nerves 0 or 2 along the groove; upper glume narrow in profile, acute, acutely keeled upwards, 1-3-nerved. Lower floret reduced to a delicate linear-oblong indistinctly nerved ciliate valve. Upper floret ♂: valve almost stipitiform, not quite  $1\frac{1}{2}$  lin. long, 2-fid to the middle, segments capillary, almost eciliate, awn very fine, 5-8 lin. long, bent at and twisted below the middle. Anthers slightly over 1 lin. long. Pedicelled spikelets ♂, oblong, acute, 2-2½ lin. long, dark green or reddish or dull purple, glabrous; lower glume rather convex on the back, chartaceous, closely 9-11-nerved, upper subhyaline, 3-nerved, valve of lower floret linear-oblong, subacute, sub-2-nerved, up to 2 lin. long; upper floret reduced to a ♂ flower.—*C. connatus*, Chiov. Gram. da Essenze, 13. *Andropogon excavatus*, Hochst. in Flora, 1846, 116. *A. nardooides*,  $\beta$  *minor*, Nees, Fl. Afr. Austr. 116. *A. connatus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 464; Eyles in Trans. Roy. Soc. S. Afr. v. 295 (partly); Hack. in Bull. Herb. Boiss. iv. App. iii. 12 (partly). *A. Schœnanthus*, K. Schum. in Engl. Pf. Ost-Afr. C. 98. *A. Schœnanthus*, var. *versicolor*, Hack. in DC. Monogr. Phan. vi. 610; Durand & Schinz, Consp. Fl. Afr. v. 722; Stapf in Dyer, Fl. Cap. vii. 354; Chiov. in Ann. Istit. Bot. Roma, viii. 286; Eyles in Trans. Roy. Soc. S. Afr. v. 297. *A. giganteus*, Eyles, l.c. 296; not of Chiov. *Gymnanthelia connata*, Aschers. & Schweinf. in Schweinf. Beitr. Fl. Aethiop. 299.

**Nile Land.** Eritrea: Amasen; Lesa Mountains, *Pappi*, 4708, 4895! Sarae; Adi Ugri, 6200 ft., *Pappi*, 29; along the Mareb River near Debarroa, 6200 ft., *Pappi*, 451; Maragus; Adi Mabit, 5250 ft., *Pappi*, 950. Abyssinia: Mount Scholoda, *Schimper*, 411! Tigre or Begemedet, *Schimper*, 491! Sudan: without precise locality, *Brown*, 687! Uganda: Kavirondo, *Linton*, 92! British East Africa: Nairobi, *Dowson*, 227! *Linton*, 14! 123! Schimba Mountains, *Kaessner*, 381! Tanaland, *Linton*, 208!

**Lower Guinea.** Hereroland: without precise locality, *Fleck*, 77!

**Mozambique Distr.** German East Africa: Usambara; Mascheua, *Holst*, 8740! Rhodesia: near Mumbwa, *Macaulay*, 19! 67! 76! Salisbury, *Mrs. Craster*, 73! Bulawayo, *Rogers*, 5866! Charter District, *Rhodesian Col. Herb.* 2112! Insiza district, *Mundy*! North Melsetter, 4000-6000 ft., *Swynnerton*, 1689; Nyahodi River, 4000 ft., *Swynnerton*, 1676! Gazaland: near Chirinda, 3500 ft., *Swynnerton*, 1636! 1641! Upper Buzi valley, 3000-3500 ft., *Swynnerton*, 994!

Also in South Africa, extending southwards to Griqualand (West and East) and the mountains of Natal.

The references to "*A. Schœnanthus*" and "*A. Schœnanthus*, var. *genuinus*" by Engler in his *Pflanzenwelt Ost-Afrikas* C. 98 and *Vegetations-Verhältnisse von Usambara*, 35, 38, 58, by Schweinfurth in *Bull. Herb. Boiss.* ii. App. ii. 14, 93, and by Chiovenda in *Ann. Istit. Bot. Roma*, viii. 286, are very probably to be connected with *C. excavatus*. None of them extend the area of the species as defined above.

*C. excavatus* is very closely allied to the Indian *C. polymyuros*, Stapf, but in





this the base and pedicel of the sessile raceme are not fused and are hardly ever tumid, whilst the spikelets are broader upwards, chiefly owing to the widening of the keel wings.

**13. C. cæsius**, Stapf in *Kew Bulletin*, 1906, 341. Perennial, tufted, up to 3 ft. high, with intra- and extravaginal innovation-shoots from a short rhizome. Culms erect or geniculate-ascending, slender, more or less wiry, frequently branched below, the branches often in fascicles from the knees, often many-noded (particularly when ascending and branched again), terete, glabrous, smooth. Leaf-sheaths rather firm, tight, the lowest mostly short, those placed at branching nodes at length thrown aside, inrolling or deciduous, glabrous, smooth, usually much shorter than the internodes; ligules very short, rounded, scarious; blades linear from a scarcely narrowed rarely slightly rounded base, tapering to a long setaceous point, those of the culms up to over 6 (sometimes almost 12) in. long, 1-3 (sometimes 5) lin. broad, of the innovations usually much shorter, flat, bluish-glaucous, glabrous, smooth, midrib slender, primary lateral nerves very fine, 3-4 on each side. Spathaceous panicle narrow, mostly 3-6 in. long, rarely much longer, sometimes reduced and small, dense or interrupted; internodes usually 4-6, the lowest rarely exceeding a third of the panicle, the following gradually decreasing; lowest primary branch shortly exerted from its sheath, undivided at the base, or like the following forming mixed or (upwards) uniformly simple-rayed tiers; rays of ultimate tiers 5-3, finely filiform, 3-4 lin. long, glabrous; lowest subtending sheaths with foliaceous blades; spathes lanceolate, acuminate, 1- $\frac{3}{4}$  in. long, subherbaceous, glaucous, sometimes turning reddish. Spatheoles narrowly lanceolate, acuminate, 7-8 lin. long, subherbaceous to scarious, turning dirty straw-colour or slightly reddish; peduncles filiform, 2 $\frac{1}{2}$ -3 lin. long, glabrous. Racemes 2-nate, obliquely erect, of some pairs at length divaricate and finally epinastically deflexed, 6-7 lin. long, greenish, more or less white-villous, one subsessile, the other with a bare base, over 1 lin. long, finely pubescent on the inner side, ciliate and thickened upwards, base of the subsessile raceme swollen, hard, fused with the equally swollen and hard adjacent pedicel; fertile joints filiform, about 1 lin. long, glabrous on the back, densely ciliate on the sides, cilia increasing in length upwards up to 1 $\frac{1}{2}$  lin. long, snow-white, tips often cupular with a crenulate margin or auricle; adjacent pedicels very similar. Homogamous pair 1 at the base of the sessile raceme. Fertile spikelets oblong, slightly wider above the middle, subobtuse, 2 lin. long, greenish, glabrous; callus very small, obtuse, minutely bearded. Glumes equal, subchartaceous; lower minutely truncate, flat on the back with a fine median groove in the lower half, keels narrowly winged from the middle upwards, intracarinal nerves 1 on each side towards the keels, very fine; upper glume narrow in profile, very acute, very narrowly winged above the middle, with 1 delicate

nerve on each side near the margin. Lower floret reduced to a delicate oblong minutely truncate ciliate nerveless valve. Upper floret ♀; valve substipitiform, almost  $1\frac{1}{2}$  lin. long, 2-fid to the middle, segments subulate, ciliate; awn very fine, 5-7 lin. long, bent at and twisted below the middle. Anthers almost 1 lin. long. Pedicelled spikelets ♂, linear to lanceolate-oblong, subobtuse, 2 lin. long, green, glabrous; lower glume slightly convex on the back, subherbaceous, about 10-nerved, the inner 6 nerves prominent; upper subhyaline, 3-nerved; valve oblong, truncate, sub-2-nerved, almost 2 lin. long.—*Andropogon cæsius*, Nees in Wight, Cat. (1833) no. 1700*b* (name only) and in Hook. & Arn. Bot. Beech. Voy. 244 (description) partly. *A. Schœnanthus*, var. *cæsius*, Hack. in DC. Monogr. Phan. vi. 610; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 14; Hook. f. Fl. Brit. Ind. vii. 205, excl. most syn.

**Nile Land.** Somaliland: Golis range, *Drake-Brockman*, 463!

Also in Arabia and Southern India.

**14. C. giganteus**, *Chiov. Gram. da Essenze*, 12. Perennial, with extravaginal innovations from a short rhizome, up to 8 ft. high. Culms somewhat robust, up to 3 lin. in diam., many-noded and simple below the panicle, glabrous, smooth, intermediate and upper internodes exerted. Leaf-sheaths terete, moderately firm or the lower rather thin and decaying leaving the culm-bases bare, glabrous, smooth, green or glaucous and waxy at the nodes; ligules almost reduced to a rim or up to  $1\frac{1}{2}$  lin. long, scarious, glabrous; blades linear from a rounded broader base, long-tapering to a fine point, up to over 1 ft. long and (at the base) to 1 in. or more wide, rigid, glaucous, glabrous, smooth except on the rough margins; midrib slender, primary lateral nerves numerous, slightly raised on both sides. Spatheate panicle narrow-linear to oblong in outline, more or less decompound, frequently over 1 ft. long, interrupted or rather dense throughout, internodes numerous, lowest 4-6 in. long, upper rapidly decreasing; lower primary branches usually undivided below with the first internode exerted from the supporting sheath, then many-noded, often very long and repeatedly divided, upper gradually shorter, forming oblong mixed tiers; ultimate tiers of usually 2 rays 4-5 lin. long, glabrous; lower subtending leaves with well-developed though shorter blades; spathes lanceolate, subherbaceous,  $1-\frac{1}{2}$  in. long, acutely acuminate, glaucous. Spatheoles very narrow, acuminate or acute, 7-9 lin. long, greenish turning straw-coloured or reddish; peduncles  $2\frac{1}{2}$ -3 lin. long, obscurely puberulous below the subcupular tips or glabrous. Racemes 2-nate, more or less diverging and at length epinastically deflexed, one sessile, the other with a short pubescent or ciliate bare base,  $\frac{1}{2}-\frac{3}{4}$  lin. long; base of the sessile raceme and adjacent pedicel short, hard, swollen and fused; fertile joints linear,  $1\frac{1}{4}$ - $1\frac{1}{2}$  lin. long, glabrous on the back and densely ciliate, cilia up to over 1 lin. long; adjacent pedicels very similar.



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lowermost joint and pedicel of sessile raceme short, hard, swollen and fused. Homogamous pair of spikelets 1 at the base of the sessile raceme. Fertile spikelets oblong, obtuse,  $2\frac{1}{2}$  lin. long, glabrous, greenish, brown upwards; callus very short, obtuse, minutely bearded. Glumes equal, chartaceous, lower subtruncate, flat on the back with a narrow deep groove corresponding to a keel on the inner side from the middle or from above it downwards; keels winged, wings thin, whitish; intracarinal nerves 2, one on each side of the groove, oil-streaks brown in the upper third or quarter, joining across the tip; upper glume narrowly boat-shaped, acute, 1- to sub-3-nerved, keeled, keel ciliate. Lower floret reduced to a very narrow hyaline linear-oblong obtuse nerveless subciliate valve under 2 lin. long. Upper floret ♀: valve very narrowly linear, almost stipitate,  $1\frac{1}{2}$  lin. long, 2-fid to one-third, subchartaceous below, segments subulate, ciliate; awn very fine, 3-7 lin. long, bent at or below the middle, column twisted. Anthers  $\frac{3}{4}$  lin. long. Grain oblong, semiterete at the middle, 1 lin. long; scutellum about as long. Pedicelled spikelets ♂, lanceolate-oblong, acute or subacute,  $2\frac{1}{2}$  lin. long; glumes subchartaceous, lower olive-green to brown, obscurely winged, with about 7 strong intracarinal nerves, upper shorter, whitish, 3-nerved; valve as in the ♀ spikelet; anthers under 1 lin. long—*Andropogon giganteus*, Hochst. in Flora, 1844, 242. *A. Schœnanthus*, Hack. in Bolet. Soc. Brot. iii. 139; not of Linn. *A. Schœnanthus*, subspec. *genuinus*, Hack. in DC. Monogr. Phan. vi. 609, partly; Durand & Schinz, Consp. Fl. Afr. v. 722, partly. *Gynnanthelia Martini*, Aschers. & Schweinf. in Schweinf. Beitr. Fl. Aethiop. 306.

**Upper Guinea.** Senegal: *Rogers*! M'Bidjem, *Thierry*, 93! Portuguese Guinea: Bolama, *Carvalho*! Sierra Leone: without precise locality, *Vogel*! Gold Coast: Accra Plains, *Johnson*, 756! Togo: near Lome, *Warnecke*, 402! Southern Nigeria: Lagos; without precise locality, *MacGregor*, 164! Northern Nigeria: Socoto, *Dalziel*, 485! Kontagora, *Dalziel*, 239! Cameroons: Yaunde, *Zenker & Staudt*, 560! 569!

**North Central.** Darbanda: Balidja country, *Chevalier*, 6680! Ndellé, *Chevalier*, 6832! Shari Territory; Bouso, *Chevalier*, 10467!

**Nile Land.** Jur: Ghazal River; Abu Gurun's Seriba, *Schweinfurth*, 4270! Hellet Kaka, *Schweinfurth*, 1069! Sudan: without precise locality, *Brown*! Cordofan; Mount Kohn, *Kotschy*, 250! Megenas, *Pfund*, 242! 469!

**Mozambique Distr.** Portuguese East Africa: Morambala Mountain, *Scott*! Senna and below Mazzaro, *Kirk*! Nyasaland: between Kondowe and Karonga, 2000-6000 ft., *Whyte*! Rhodesia: without precise locality, *Mundy*!

(*Staud.*)

- ✓ 15. *C. densiflorus*, *Stapf*. Perennial (always?). Culms erect, stout, up to 4 lin. in diam. below, up to 8- (and probably more) noded, simple below the false panicle, terete, smooth, sometimes waxy below the nodes, glabrous. Leaf-sheaths terete, tight, glabrous, smooth, the lowest moderately firm; ligules very short, truncate, glabrous; blades linear to linear-lanceolate from a usually wider







and Études Fl. Bas- et Moyen-Congo, ii. 9. Th. & Hél. Durand, Syll. Fl. Congol. 626; Eyles in Trans. Roy. Soc. S. Afr. v. 297.

**Lower Guinea.** Gaboon: Munda; Sibange, *Soyaux*, 422! banks of the Gaboon River, *Jardin, Griffon du Bellay*. French Congo: N'Gove, *Dybowski*, 83, and without precise locality, *Brazza & Thollon*. Belgian Congo: Lower Congo, *Cabra*; Malela, in the Boma district, *Laurent*; Lutete, *Hens*, 243! in dry savannas near Stanley Pool, *Demeuse, Dewèvre*; Kisantu, *Gillet*, 312. Angola: Golungo Alto; Sange, *Welwitsch*, 2952! 3006! 7238! Pungo Andongo; banks of the River Cuanza, *Welwitsch*, 2725! thickets between Candumba and Mangue, *Welwitsch*, 7428! Malange, *Gossweiler*, 808! Tumbo Campole, *Mechow*, 551. Benguella; country of the Ganguellas and Penguellas, *Gossweiler*, 2574! 3119! Mossamedes; Huilla, very common in meadows and thickets throughout the country, *Welwitsch*, 1321! 7526! *Dekindt*.

**South Central.** Belgian Congo: Stanleyville, *Pynaert*. Eastern Province; Kavala Islands in Lake Tanganyika, *Carson*, 2! Katanga; Tschinsenda, *Rogers*, 10785!

**Mozambique Distr.** German East Africa: without precise locality, *Busse*, 738! Nyasaland: without precise locality, *Whyte*!

Leaves and rhizome pleasantly aromatic; according to Welwitsch, smelling almost like citron, used as a tonic and styptic by the natives.

43. **HYPARRHENIA**, Anderss. (name only), in Nov. Act. Soc. Scient. Upsal. ser. 3, ii. 254.

Spikelets 2-nate, those of each pair differing in sex and more or less in shape, or those of the lowest pair or pairs homogamous (♂ or neuter), one sessile, the other pedicelled, on the articulate fragile rachis of few- to many-jointed paired racemes, terminating the culms and their branches; raceme-pairs supported by a spatheole, collected into scanty or compound to decompound spatheate panicles; the fertile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicel finely filiform with more or less obliquely truncate sometimes obscurely auricled tips, in racemes with homogamous spikelets the joint or joints below the lowest fertile spikelet entering into the formation of the raceme-base, shorter to very short, ciliate and tardily disarticulating. Florets 2, lower reduced to an empty valve, upper ♀ in the sessile spikelets of the heterogamous pairs, ♂ or neuter (rarely quite suppressed) in those of the homogamous pairs and in the pedicelled spikelets. Fertile spikelets more or less flattened dorsally, but with rounded sides, awned, very rarely awnless (6, *H. ezarmata*); callus short and obtuse or more often acute to pungent, shortly bearded. Glumes equal, more or less chartaceous, mostly thin, the lower narrowly truncate or 2-dentate, sometimes with a very shallow longitudinal depression, with very narrow involute margins up to two-thirds or more, then equally narrowly inflexed from the very fine short or obscure keels, the upper narrowly and shallowly boat-shaped, rounded on the back below, finely keeled towards the tips only, 3-nerved. Valves ciliate

or ciliolate or that of the upper floret glabrous, of lower floret hyaline, 2-nerved (often very faintly), rarely quite nerveless, of upper stipitiform with a very fine delicate base, above it gradually hardened with narrow hyaline margins which usually run out into minute teeth, passing between the teeth into the mostly distinctly kneed more or less hirtellous or subplumose awn. Valvule 0, rarely a small hyaline scale. Lodicules 2, minute, glabrous. Stamens 3. Stigmas laterally exerted; styles terminal. Grain oblong in outline, subterete to plano-convex in cross section; embryo about half the length of the grain. Pedicelled spikelets acute, often mucronate or aristulate from the lower glume, usually somewhat longer than the fertile and more distinctly 2-keeled (often from below the middle). Valves of both florets developed, even in neuter spikelets, rarely the upper or both suppressed.—Perennial or annual mostly coarse grasses with often large loose rarely much contracted panicles, never aromatic.—*Andropogon*, Benth. & Hook. f. Gen. Pl. iii. 1133, partly.

Species over 60, almost confined to tropical Africa (including the islands) and subtropical South Africa, 3 of them extending to tropical America, 1 to Asia and Australia, and 1 to the Mediterranean countries and temperate South Africa.

It has been found impracticable in the elaboration of the key to use the presence or absence of homogamous pairs of spikelets and their number as a leading character throughout. Whilst stable in certain groups, these conditions are not so in others, particularly in the section *Eu-Hyparrhenia*. Moreover, the sexual character of the sessile spikelet is not readily established if the awn be absent, as the latter frequently becomes detached in handling the specimen during collection or preparation. In this case the spikelet must be dissected or young racemes still enclosed in their spatheole examined. The readiness with which the awns fall out of the spikelets also renders the determination of the number of awned (fertile) spikelets contained in a raceme somewhat uncertain. This difficulty can be overcome if the total number of awns of a raceme-pair just emerging from the spatheole be counted. For this reason the expression "racemes . . . *n*-awned *per pair*" has been introduced into the key and the descriptions, it being understood that the number of awned (fertile) spikelets *per single raceme* is  $\frac{n}{2}$  in the case of even, and  $\frac{n}{2} + \frac{1}{2}$  or  $\frac{n}{2} - \frac{1}{2}$  in the case of odd numbers. The dimensions given in the key and the descriptions are, unless mentioned otherwise, meant to cover values of greatest frequency rather than of average, and therefore exclude extreme cases, especially those due to the partial arrest of development not uncommonly observed in the latest members of more compound inflorescences.

#### KEY TO THE SECTIONS.

\*Lower glume of fertile spikelets unpitted. *Small*

†Raceme-bases unequal to very unequal, that of the lower raceme usually very short (the raceme therefore subsessile or sessile), the upper 1-5 lin. long, filiform, slender, glabrous or pubescent, rarely with long fine soft hairs, except in 5, *H. altissima*, where it is scantily bearded with stiff tubercle-based hairs.





Raceme-bases not produced into a long bract-like appendage at the insertion of the lowest fertile spikelet (§ *Eu-Hyparrhena*).

Upper raceme with or without 1 pair of homogamous awnless ♂ or neuter spikelets.

Hairs of the racemes fulvous or rufous throughout, or at least above the callus-beards and lower cilia of the joints and pedicels which may be white; raceme-bases not epinastic in most species (epinastic in 5, *H. altissima*) ... ..

I. RUFÆ.

Hairs of the racemes white throughout.

Upper glume of fertile spikelets mucicous; callus  $\frac{1}{2}$ - $\frac{3}{4}$  (rarely 1) lin. long, subacute to acute; awns dark brown; raceme-bases epinastic or not, upper usually much under 2 lin. long; peduncles very slender, often much arched or flexuous, up to 2 or 2½ (rarely 3) in. long

II. HIRTÆ.

Upper glume of fertile spikelets aristulate, bristle up to 3 lin. long; callus up to 2 lin. long, pungent; awns (in the African species) almost white; raceme-bases never epinastic, upper 3-5 lin. long; peduncles stoutly filiform, stiff or more or less arched in the uppermost part only, up to 4½ in. long ... ..

III. GRALLATÆ.

Upper raceme with 2 pairs of homogamous awnless ♂ or neuter spikelets persistent on the tardily disarticulating raceme-bases; racemes not epinastic ... ..

IV. FILIPENDULÆ.

Raceme-bases produced into a long scarios bract-like appendage at the insertion of the lowest fertile spikelet, the appendage appressed to the latter; racemes not epinastic (§ *Ruprechtia*)

V. RUPRECHTIÆ.

†† Raceme-bases subequal or more or less unequal, short and somewhat stout, dorsally flattened, rarely the upper elongated and subfiliform upwards.

Raceme-bases both or at least the upper bearded with spreading or suberect stiff tubercle-based hairs; peduncles similarly bearded near the tips; racemes at length epinastically deflexed (§ *Pogonopodia*: but see also 5, *H. altissima*, and 54, *H. multiplex*).

Raceme-bases not produced at the insertion of the lowest fertile spikelet into a scarios denticulate appendage or only slightly auricled ...

VI. CYMBARIÆ.

Raceme-bases produced at the insertion of the lowest fertile spikelet into a scarios usually denticulate appendage... ..

VII. BRACTEATÆ.

Raceme-bases not bearded (except in 54, *H. multiplex*), although usually finely pubescent or villous, at least in the fork (§ *Apogonia*).

Raceme-bases without a large cornucopiæ-like appendage.

Racemes spreading, at length epinastically deflexed; glumes rather firm: perennial ...

VIII. DIPLANDRÆ.



2 *Ruprechtia*

Racemes neither spreading nor epinastically deflexed, the inner faces of their bases permanently contiguous or parallel: annual

IX. INVOLUCRATÆ.

Raceme-bases produced into a large obovoid-cuneate cornucopiæ-like appendage, 4-5 lin. long, embracing the base of the succeeding spikelets ... .. X. CORNUCOPIÆ.

\*Lower glume of fertile spikelets with a pair of deep circular or subcircular pits; a small annual grass (§ *Dibarathria*) ... .. XI. PUSILLÆ.

I. RUFÆ.

\*Tall coarse grasses, often as high as a man or higher, with stout culms, long leaf-blades and usually large decom- pound panicles.

†Racemes dense, never long and densely villous when mature not epinastically deflexed; spikelets small (fertile  $1\frac{3}{4}$ - $2\frac{1}{2}$  lin., pedicelled  $2$ - $2\frac{1}{2}$  lin. long, but see 1, *H. finitima*); spatheoles rarely over 25 lin. long.

Mature peduncles 6-12 lin. long, enclosed in the narrow loosely inrolled spatheoles which usually much exceed them on maturity; racemes 5-8 lin. long, the pair with 3-5 fertile awned spikelets; glumes pale with reddish tips, mostly sparingly hairy, hairs short, whitish or fulvous; cilia white; pedicelled spikelets ♂ or neuter.

Fertile spikelets 4-5 per raceme-pair, 3 lin. long; callus very acute,  $\frac{3}{4}$  lin. long; awn 17-22 lin. long ... .. 1. *H. finitima*.

Fertile spikelets 3-4 per raceme-pair, up to  $2\frac{1}{2}$  lin. long; callus subacute, under  $\frac{1}{2}$  lin. long; awn 10-12 lin. long ... .. 2. *H. gazensis*.

Mature peduncles over 10 lin. long, almost as long as or longer than the spatheoles; racemes 7-12 lin. long, the pair with 6-13 fertile awned or (6, *H. exarmata*) awnless spikelets.

Fertile spikelets awned: perennial.

Peduncles 12-18 lin. long, almost to quite as long as the narrow loosely inrolled spatheoles; glumes of fertile spikelets usually greenish or pale with reddish or purple tips, rather dim, their hairs pale fulvous; callus bearded and lower cilia white; pedicelled spikelets neuter, usually with a single small scale-like ciliate valve ... .. 3. *H. dichroa*.

Peduncles 20-30 (occasionally to over 40) lin. long, exerted from the tightly inrolled spatheoles; fertile spikelets usually rufous or purplish; pedicelled spikelets mostly ♂ with well-developed valves, less often neuter with more or less reduced valves.

Raceme-bases not epinastic, the longer pubescent, not bearded with stiff hairs; spikelets mostly rufous and slightly glossy, with short hairs ... .. 4. *H. rufa*.

5 cm  
12-24 mm  
2 cm  
1.4-2.4 cm  
2.4-3.6 cm  
4-6 cm





Raceme-bases at length epinastically deflexed, the longer scantily bearded with stiff tubercle-based hairs; spikelets tinged with purple or violet, hairs and cilia pale fulvous or those of the callus white ...

5. *H. altissima.*

Fertile spikelets awnless: annual ... ..

6. *H. exarmata.*

†† Racemes loose, mostly densely villous with soft fulvous or rufous hairs; at length often epinastically deflexed; spikelets rather large (fertile  $2\frac{1}{4}$ -3 lin., pedicelled  $3-3\frac{1}{2}$  lin. long); spatheoles 25-40 lin. long.

Raceme-pairs 7-11-awned, golden- or greyish-fulvous: perennial.

Mature peduncles exceeding the spatheoles; upper raceme with 2 homogamous ( $\delta$ ) pairs of spikelets at the base ... ..

7. *H. pœcilotricha.*

Mature peduncles shorter than the spatheoles; upper raceme with, or more often without, 1 homogamous pair at the base ... ..

8. *H. vulpina.*

Raceme pairs 11-13-awned, densely rufously villous; upper raceme without a homogamous pair at the base; mature peduncles equalling or exceeding the spatheoles: annual ... ..

9. *H. chrysargy-*  
[*rea.*]

\*\* Short, compactly cæspitose grasses, rarely more than 2 ft. high, with slender 2-3-noded culms and narrow leaf-blades, scanty panicles and dense rufously villous racemes.

Leaf-blades under  $1\frac{1}{2}$  lin. wide; spatheoles 20-30 lin. long (or over); peduncles at length 25-50 lin. long, and long-exserted; racemes slender, 10-15 lin. long, at length spreading or epinastically deflexed; joints and pedicels very obliquely truncate ... ..

10. *H. Nyassæ.*

Leaf-blades  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. wide; spatheoles 18-25 lin. long; peduncles at length 25-33 lin. long; racemes somewhat stout, 7-10 lin. long, almost contiguous, rarely one of a pair at length spreading or deflexed ... ..

11. *H. smithiana.*

II. HIRTÆ.

Perennial, densely tufted; leaf-blades usually glaucous,  $\frac{3}{4}$ - (rarely)  $1\frac{1}{2}$  lin. wide; raceme-bases not epinastic or very rarely the lower only; fertile spikelets  $2\frac{1}{4}$ - $2\frac{1}{2}$  lin., pedicelled  $2\frac{1}{2}$ -3 lin. long; awns 9-12 lin. long

12. *H. hirta.*

Annual: leaf-blades not glaucous, 2-4 lin. wide; raceme-bases conspicuously epinastic; spikelets and awns longer.

Spatheoles and peduncles  $2-2\frac{3}{4}$  in. or the latter to  $3\frac{3}{4}$  in. long; awns 7-11 per raceme-pair; fertile spikelets  $2\frac{3}{4}$ -3 lin. long, their awns  $1\frac{1}{2}$ -2 in. long; pedicelled and homogamous spikelets  $3\frac{3}{4}$ -4 lin. long ... ..

13. *H. soluta.*

Spatheoles and peduncles  $3-3\frac{1}{2}$  in. or the latter to 5 in. long; awns 6-8 per raceme-pair; fertile spikelets  $3-3\frac{1}{2}$  lin. long, their awns  $2-2\frac{1}{2}$  in. long; pedicelled and homogamous spikelets  $3\frac{1}{2}$ - $4\frac{1}{2}$  lin. or the latter to  $5\frac{1}{2}$  lin. long ... ..

14. *H. bagirmica.*

III. GRALLATÆ.

Only Tropical African species ... ..

15. *H. grallata.*

## IV. FILIPENDULÆ.

Panicles contracted, often compound, with frequently fan-shaped fastigiate tiers upwards; awned spikelets  $2\frac{1}{2}$  lin. long, glabrous or hairy.

Annual: spikelets glabrous, awns 2 per raceme-pair, subplumose, their hairs up to 2 lin. long ... .. 16. *H. Barteri*.

Perennial: awns shortly hirtellous.

Awns 2, rarely 3 per raceme-pair; spikelets glabrous or very sparingly hairy ... .. 17. *H. filipendula*.

Awns 3-4 per raceme-pair; spikelets villous ... .. 17. *H. filipendula*,  
[var. *pilosa*.]

Panicles very loose; awns 3-5 per raceme-pair,  $3-3\frac{1}{2}$  lin. long, glabrous ... .. 18. *H. familiaris*.

## V. RUPRECHTIÆ.

Perennial: fertile spikelets  $3\frac{1}{2}$  lin. long excluding the callus; awn about 3 in. long ... .. 19. *H. Ruprechtii*.

Annual: fertile spikelets 4-5 lin. long excluding the callus; awn up to 5 in. long ... .. 20. *H. macrolepis*.

## VI. CYMBARIÆ.

\*Mature peduncles much shorter than the cymbiform spatheoles which after flowering retain their shape; ratio of spatheole and peduncle on maturity 2 : 3, rarely below 2; see 25, *H. Tamba* and 27, *H. spectabilis*.

Awns 15-30 lin. long; racemes 4-7 lin. long, contracted; sessile spikelet of the homogamous pair up to 5 lin. long; annual.

Panicle decomposed, showy; spatheoles broad, often vividly coloured, 10-12 lin. long, shortly tapering ... .. 21. *H. pseudocym-*  
[*baria*.]

Panicle reduced to 2 or 3 few-rayed tiers; spatheoles 10-25 lin. long, narrowed to a long slender acumen ... .. 22. *H. anthistiri-*  
[*oides*.]

Awns 3-15 lin. long; perennial.

Spatheoles 4-10 lin. long, broad; peduncles 2-4 lin. long; panicle mostly decomposed to supra-decomposed, often large, nodding and vividly coloured.

Spatheoles 4-9 lin. long; peduncles 2-3 lin. long; sessile spikelet of the homogamous pair rarely over 3 lin. long; awns 3-6 lin. long ... .. 23. *H. cymbaria*.

Spatheoles 7-10 lin. long; peduncles mostly over 3 lin. long; sessile spikelet of the homogamous pair  $3\frac{1}{2}-4\frac{1}{2}$  lin. long; awns 10-15 lin. long ... .. 24. *H. variabilis*.

Spatheoles 10-15 lin. long; peduncles 3-10 lin. long.

Racemes villous with long hairs.

Culms stout, unbranched below the panicle; racemes  $4\frac{1}{2}-7\frac{1}{2}$  lin. long with about 5 awned (fertile) spikelets per pair; spikelets somewhat plump ... .. 25. *H. Tamba*.

Culms slender, branched below the panicle; racemes  $7\frac{1}{2}-9$  lin. long with 7-8 awned (fertile) spikelets per pair; spikelets slender ... .. 26. *H. collina*.

Racemes shortly and sparingly pubescent to almost glabrous (except for the cilia of the joints and pedicels).





Awned (fertile) spikelets 4-5 per raceme-pair, panicle large, compound; peduncle 6-7 lin. long; awns 10-15 lin. long ... .. 27. *H. spectabilis*.

Awned (fertile) spikelets usually 6-12 per raceme-pair.

Racemes short, contracted, about 6 lin. long; awns 3½-6 lin. long ... .. 28. *H. formosa*.

Racemes elongated, 7-15 lin. long; awns 10-15 lin. long.

Spatheoles 12-15 lin. long; peduncles 6-10 lin. long; racemes 7-8 (rarely 10) lin. long ... .. 29. *H. Schimperii*.

Spatheoles 15-24 lin. long; peduncles 10-20 (rarely 25) lin. long; racemes 10-15 lin. long ... .. 30. *H. elongata*.

\*\*Mature peduncles equalling (or almost so) or exceeding the spatheoles, which after flowering are more or less inrolled from the margin; ratio of spatheole and peduncle on maturity 1:0·8.

Panicle large, loose; spatheoles broad, 12-15 (rarely more) lin. long; racemes greyish-villous, awns 5-7 per pair; awned (fertile) spikelets 5-6 lin. long; a very robust grass with blades 3-9 lin. wide ... 31. *H. rudis*.

Panicle narrow, often scanty (but see 36, *H. cyanescens*); spatheoles narrower and longer than in 31, *H. rudis*; racemes less villous to subglabrous, awns 8-15 per pair; awned (fertile) spikelets 4-5 lin. long; leaf-blades mostly narrow.

Panicle long and narrow or very scanty with usually dense racemes.

Panicles long and narrow, borne on stiff erect culms; leaf-blades long, narrow, rigid, narrowed towards the base and there often reduced to the stout semicylindric midrib; racemes dark purplish, almost glabrous (except for the cilia of the joints and pedicels) ... 32. *H. phyllopoda*.

Panicle rather scanty to very scanty; culms slender; leaf-blades soft.

Mature peduncles equalling or more usually exceeding the narrowly inrolled spatheoles (ratio 1:0·8); spikelets reddish, loosely villous ... .. 33. *H. papillipes*.

Mature peduncles equalling or rather slightly shorter than the spatheoles; spikelets very sparingly hairy or glabrous.

Both racemes with 1 or the lower frequently with 2 large homogamous pairs at the base, glabrous; spatheoles and mature peduncles 18-22 lin. long ... .. 34. *H. arrhenobasis*.

The lower raceme only with 1 homogamous pair at the base, loosely hairy; spatheoles and mature peduncles 22-35 lin. long ... 35. *H. Lintonii*.

Panicle large, effuse; spatheoles up to 25 lin. long; peduncles very slender, variously curved to cirrose upwards and subterminally exerted; racemes slender, glabrous or very sparingly and minutely pubescent (except for the cilia) ... 36. *H. cyanescens*.

## VII. BRACTEATÆ.

- Annual: panicles usually foliate, loose and more or less flaccid; awns 2 or more often 3 in. long.
- Awns 2 per raceme-pair; spikelets large, fertile  $3\frac{1}{2}$ -6 lin. long, pedicelled 5-7 lin. long.
- Mature peduncles about equalling the spatheoles or only slightly shorter; fertile spikelets  $3\frac{1}{2}$ -4 $\frac{1}{4}$  lin., pedicelled 5-6 lin. long; nodes not bearded.
- Sheath-auricles very long; blade-base petioid ... 37. *H. petiolata*.
- Sheath-auricles short; blade-base not petioid ... 38. *H. confinis*.
- Mature peduncles very much shorter than the spatheoles; fertile spikelets 6 lin., pedicelled 7 lin. long; nodes with a spreading beard ... 39. *H. macrarrhena*.
- Awns 3-6 per raceme-pair; fertile spikelets 3-3 $\frac{1}{2}$  lin., pedicelled 3-5 lin. long.
- Nodes with stiff yellow beards; spatheoles up to 1 $\frac{1}{2}$  in. long; awns 3-4 per raceme-pair ... 40. *H. Welwitschii*.
- Nodes not bearded.
- Awns 3 per raceme-pair; spatheoles 1 $\frac{1}{2}$  to almost 2 in. long; pedicelled spikelets 3-3 $\frac{1}{2}$  lin. long... 41. *H. gracilescens*.
- Awns 5-6 per raceme-pair; spatheoles over 2 in. long; pedicelled spikelets 5 lin. long ... 42. *H. comosa*.
- Perennial: panicle usually stiff and narrow, not foliate; awns 2-4 per raceme-pair, 1-2 in. long.
- More or less coarse grasses with blades 1-2 ft. long; mature peduncles about as long as the spatheoles or much shorter.
- Fertile spikelets 2-3 lin. long, their awns 8-18 lin. long.
- Spatheoles and mature peduncles 9-12 lin. long; all the spikelets 2-2 $\frac{1}{2}$  (rarely 3) lin. long, awns 8-10 lin. long; panicles often decompound, much contracted and dense, very stiff ... 43. *H. bracteata*.
- Spatheoles and mature peduncles 12-20 lin. long; fertile spikelets 3 lin. long, awns 15-18 lin. long; panicles usually much less compound and looser at the periphery than in 43, *H. bracteata* ... 44. *H. Lecomtei*.
- Fertile spikelets 4 lin. long, their awns 18-25 lin. long; pedicelled spikelets 4 $\frac{1}{2}$ -5 lin. long.
- Leaves more or less hairy, up to 1 ft. by 1-1 $\frac{1}{2}$  lin.; mature peduncles about as long as the spatheoles; awns 1 $\frac{3}{4}$ -2 in. long; panicle narrow, but very loose at the periphery, often scanty ... 45. *H. Newtonii*.
- Leaves quite glabrous and smooth, up to 2 ft. by  $\frac{1}{2}$ -1 lin.; peduncles up to half as long as the spatheoles, awns 1 $\frac{1}{2}$  in. long; a stiff grass with few and distant raceme-pairs close to the main axis ... 46. *H. Stolzii*.
- A small grass with blades 4-5 in. long and  $\frac{3}{4}$ -1 lin. wide, very lax; secund panicles at length long-exserted with more or less cirrose, very fine peduncles and spikelets as in 45, *H. Newtonii*, but smaller (3 lin. long) ... 47. *H. cirrosula*.





## VIII. DIPLANDRÆ.

Raceme-bases very short; each raceme with 2 homogamous pairs of spikelets at the base which form an imperfect involucre.

Racemes 8-9 lin. long; awns more or less subplumose,  $2\frac{1}{2}$ -3 in. long, their hairs up to  $\frac{1}{2}$  lin. long; panicles loose with distant tiers ... 48. *H. subplumosa*.

Racemes 5-8 lin. long; awns hirtellous,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long. Panicles with up to over 10 tiers, distant below, approximate upwards; spatheoles lanceolate, 12-15 lin. by  $1\frac{1}{2}$  lin.; racemes 5-8 lin. long; fertile spikelets linear-oblong ... 49. *H. diplandra*.

Panicles with 4-5 distant tiers; spatheoles broad-lanceolate, 18-30 lin. by up to over 2 lin., often intensely coloured; racemes 7-8 lin. long, plump; fertile spikelets oblong ... 50. *H. pachysta*-<sup>[chya.</sup>

Raceme-bases linear-filiform, dorsally flattened; each raceme or the lower only with 1 homogamous pair.

Culms about 4-noded and simple below the panicle; peduncles much shorter than the spatheoles; each raceme with 1 homogamous pair of spikelets at the unappendaged base; fertile spikelets 4- $4\frac{1}{2}$  lin. long.

Spatheoles 20-33 lin. long; peduncles 8-10 lin. long; raceme-pairs 6-9-awned, awns 15-22 lin. long ... 51. *H. Gossweileri*.

Spatheoles 12-18 lin. long; peduncles 6-8 lin. long; raceme-pairs about 4-awned; awns 9-10 lin. long 52. *H. glabriuscula*.

Culms many-noded, branched all along, branches gathered upwards in bunches; spatheoles about 16-18 lin. long, equalled at length by the peduncles; raceme-bases with a short scarios appendage; fertile spikelets  $3\frac{1}{2}$  lin. long ... 53. *H. andongensis*.

## IX. INVOLUCRATÆ.

Panicle reduced to 1-2 pairs of much contracted racemes, 5-6 lin. long; lower glume of fertile spikelets hispidulous, turning dark brown ... 54. *H. multiplex*.

Panicle very lax, of mixed 3-6-rayed tiers; racemes 9-12 lin. long.

Racemes 9 lin. long; fertile spikelets glabrous ... 55. *H. involucrata*.

Racemes 12 lin. long; fertile spikelets whitish-tomentose ... 56. *H. notolasia*.

## X. CORNUCOPIÆ.

Only species ... 57. *H. Cornucopia*æ.

## XI. PUSILLÆ.

Only species ... 58. *H. pusilla*.

✓ 1. *H. finitima*, Stapf. Perennial, with short extravaginal innovations, their cataphylls glabrous. Culms branched from the base or simple for a short distance, then with barren or mixed

branches, passing into a spatheate panicle above the fourth or fifth node, erect, firm, slender or somewhat stout (to 2 lin. in diam.), glabrous and smooth. Leaf-sheaths terete, or bluntly keeled upwards, rather firm, more or less hirsute, with tubercle-based hairs in the upper part, or quite glabrous; ligules firmly scarious, rounded,  $1\frac{1}{2}$  lin. long; blades linear from a slightly and very gradually narrowed base, tapering to a long fine point, up to almost 2 ft. by  $2\frac{1}{2}$ –4 lin., firm and somewhat rigid, dull green or reddish, glabrous or coarsely hirsute towards the base on the upper side, rough above and scabrid to spinulously ciliolate on the margins; midrib somewhat stout towards the base, conspicuous and whitish above, primary lateral nerves 3–4 on each side, slender, prominent. Spatheate panicle narrow, compound, subfoliate, interrupted and rather lax below, contracted above; primary internodes 6–10, the lowest 4–7 in. long, the upper rapidly decreasing; tiers 4–6-rayed, the lower mixed, with few and mostly compound rays, bearing secondary and sometimes a few tertiary tiers, ultimate (simple) rays  $1\frac{1}{4}$ – $\frac{3}{4}$ , rarely  $\frac{1}{2}$  in. long, very slender; lower and intermediate subtending leaves like the preceding leaves, with blades gradually decreasing upwards, higher up spathaceous, with very narrow blades, reaching to the top of the panicle. Spatheoles narrowly lanceolate, long-acuminate,  $1\frac{1}{4}$ – $1\frac{3}{4}$  in. long, thinly scarious, sparingly and softly hairy or glabrous, at length loosely inrolled from the margins; peduncles filiform, up to 1 in. or more long, permanently shorter than the spatheole, with some long fine white hairs in the upper part. Racemes laterally exerted, parallel or the lower spreading, somewhat loose, greenish or reddish, 7–8 lin. long, 4–5-awned per pair, the lower raceme subsessile, the other with a slender filiform obliquely truncate and minutely auricled base, up to  $1\frac{1}{2}$  lin. long and beset with some long fine spreading white hairs; joints slender, filiform,  $1\frac{1}{4}$  lin. long, obliquely truncate and produced into a minute scarious auricle, ciliate, cilia white, up to 1 lin. long; pedicels similar if not slightly longer. Homogamous pair of spikelets 1 at the base of the lower raceme (rarely of both). Fertile spikelets linear-oblong, including the callus 3 lin. long, pale below, reddish upwards or purplish-brown all over; callus very acute,  $\frac{3}{4}$  lin. long, densely and shortly bearded. Glumes equal, chartaceous, the lower narrowly truncate, slightly flattened and sometimes longitudinally depressed on the back, rounded on the sides, glabrous or more or less, but mostly loosely, hairy, 9-nerved, nerves very slender, the inner ones slightly prominent, at least in the upper part, margins narrowly involute, inflexed only in the tips, keels scabrid, upper glume deltoid-subtruncate, glabrous, 3-nerved, ciliate upwards. Lower floret reduced to a linear-oblong obtuse erect-ciliate hyaline valve 2 lin. long. Upper floret ♀: valve stipitiform with narrow hyaline margins and short ciliolate or obscure teeth; awns slender, about  $1\frac{3}{4}$  in. long, column shortly fulvously hirtellous. Valvule 0. Anthers over 1 lin. long. Pedicelled





spikelets ♂ or neuter, with rudimentary anthers, lanceolate to linear-lanceolate, glabrous or loosely hairy; lower glume produced into a bristle up to 2 lin. long, closely 11-13-nerved, keels rigidly ciliolate above; upper glume acute, 3-nerved, erect-ciliate; valves hyaline, 1-nerved, erect-ciliate, lower linear-oblong, over  $2\frac{1}{2}$  lin. long, upper slightly shorter and very narrow. Spikelets of the homogamous pair like the pedicelled but muticous.—*Andropogon finitimus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 465; Steud. Syn. Pl. Glum. i. 385; Hack. in DC. Monogr. Phan. vi. 637; Durand & Schinz, Conspect. Fl. Afr. v. 712, and Études Fl. Congo, 316; Chiov. in Ann. Istit. Bot. Roma, viii. 289; Th. & Hel. Durand, Syll. Fl. Congol. 625. *Cymbopogon finitimus*, Rendle in Cat. Afr. Pl. Welw. ii. 157.

**Nile Land.** Eritrea: Amasen; Mount Deksana, 5250 ft., *Pappi*, 5502. Saraé; Adi Gana, 6250 ft., *Pappi*, 251. Gallabat: Matamma; Chor Utrub, *Schweinfurth*, 1039! Abyssinia: Jelajeranne, *Schimper*, 1797! Uganda: Kipayo, 4000 ft., *Dummer*, 527! 768!

**Lower Guinea** Belgian Congo: without precise locality, *Demeuse*. Angola: Pungo Andongo; common in secondary jungle near Caghug, *Welwitsch*, 2838!

The Mascarene specimens referred to this species by Hackel are *H. rufa*, whilst the Indian also quoted by Hackel, l.c. (*Griffith*, 6766), is clearly a distinct species of *Hyparrhenia*.

(Rendle)

✓ **2. *H. gazensis*, Stapf.** Perennial, tall. Culms ascending, rooting from the lower nodes, terete, stout, glabrous, smooth. Leaf-sheaths terete, glabrous or hirsute upwards and along the margins, the upper much shorter than the internodes; ligules scarious, truncate, up to 1 lin. long, glabrous or pubescent; blades linear, slightly constricted at the base, long attenuated to a fine point, up to 1 ft. by over 4 lin., green, glabrous or sparingly hairy, scabrid along the margins, otherwise smooth or slightly rough; midrib comparatively slender, whitish above, prominent below, primary lateral nerves 3-4 on each side. Spatheate panicle very lax, leafy, up to almost 2 ft. long, sometimes overtopped by the uppermost blades; primary internodes up to 10, the lowest 6-4 in. long, the upper rapidly decreasing; lowest tiers of 1 or 2 compound rays,  $\frac{3}{4}$ -1 ft. long and 2-3-noded, the following up to 6-rayed, mixed or simple; simple rays 1-1½ in. long, finely filiform; subtending leaves developed almost throughout as normal leaves with shortened sheaths and long blades. Spatheoles obliquely erect or spreading, lanceolate, acutely acuminate, 1-1½ in. long, 1-1½ lin. wide, thinly scarious, reddish or brownish, glabrous, the margins at length slightly involute; peduncles filiform, 7-9 lin. long, straight and enclosed in the spatheoles, very slender, filiform, pubescent below with some longer delicate white hairs. Racemes subparallel or only slightly spreading or finally the lower somewhat deflexed, 6-7 lin. long, laterally exerted from the spatheoles, greenish or reddish, sparingly silky, 4-awned per pair, the lower sessile, the other with a very slender base, up to over 1½ lin. long, both bases more or less hairy, with oblique shortly

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auricled tips; joints usually 2, slender, filiform, obliquely truncate, up to  $\frac{3}{4}$  lin. long, very shortly white ciliate; pedicels very similar. Homogamous pair of spikelets 1 at the base of the lower raceme. Fertile spikelets lanceolate-oblong, including the callus  $2\frac{1}{4}$  lin. long, greenish or tinged with brown or purple, scantily pubescent; callus less than  $\frac{1}{2}$  lin. long, subacute, densely shortly bearded. Glumes equal, subchartaceous, the lower minutely truncate, flat on the back, loosely pubescent, 9-nerved, nerves evanescent below, margins involute for two-thirds, then inflexed forming slender scaberulous keels; upper glume obliquely truncate, 3-nerved, spreadingly ciliate. Lower floret reduced to a linear-oblong delicately 2-nerved ciliate hyaline valve  $1\frac{3}{4}$  lin. long. Upper floret ♂: valve stipitiform, 2-toothed, teeth less than  $\frac{1}{2}$  lin. long, lanceolate, ciliolate; awn slender, 10–12 lin. long, pale brown, fulvously hispidulous. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelets ♂, or frequently neuter, linear-lanceolate, often subaristulate,  $2\frac{1}{2}$  lin. long, reddish, glabrous or sparingly pubescent; lower glume 9–11-nerved; keels spinulously ciliolate upwards, terminal bristle if present up to almost 1 lin. long; lower glume thinner, shorter, 3-nerved, reversedly ciliate; valves hyaline, the lower linear-oblong, 2 lin. long, 1-nerved, reversedly ciliate or like the upper more or less reduced, often represented by a hyaline ciliate scale. Lower homogamous spikelet up to  $3\frac{1}{2}$  lin. long, not aristulate.—*Cymbopogon gazense*, Rendle in Journ. Linn. Soc., Bot., xl. 226. *Andropogon gazensis*, Eyles in Trans. Roy. Soc. S. Afr. v. 295.

Mozambique Distr. Nyasaland: Shire Highlands, *Buchanan*, 38! Gazaland: Chiringa, 3500–3700 ft., common, *Swynnerton*, 1637!

(*Steud.*)

✓ 3. *H. dichroa*, Stapf. Perennial, apparently very tall, with extravaginal innovations, their cataphylls firm, glabrous or sparingly hairy. Culms stout, to over 3 lin. in diam., terete or subterete, solid, glabrous, smooth, somewhat pruinose below, 4–5 (or more?)-noded with vegetative (from the lower nodes) or mixed branches below the panicle. Leaf-sheaths of lower branches somewhat compressed and keeled, prominently nerved, of the culms terete, firm, all quite glabrous and very smooth, the basal decaying and breaking away; ligules very short, scarious, rounded or truncate, glabrous; blades linear from an equally broad or slightly attenuated almost rounded base, tapering to a long fine point much over 1 ft. long, up to 5 and even 7 lin. wide, those of the culms firm and rigid below, of the vegetative branches thinner and softer, all flat, quite glabrous, rarely with some stiff tubercle-based hairs above the ligule, slightly rough above or smooth all over with the exception of the scabrid or spinulose margins; midrib up to 1 lin. wide and whitish on the upper surface, very prominent below, primary lateral nerves up to 5 or more on each side in the widest leaves, prominent above. Spatheate panicle very large, up to over 2 ft. long, decomposed to the third





degree; primary internodes numerous, probably up to 10 or more, the lowest up to over 9 in. long, the following gradually decreasing; lowest branches undivided at the base, very long and several-noded or forming few-rayed tiers, with all the rays compound, the intermediate broken up into mixed, up to 8- (or over) rayed tiers; simple rays very slender, filiform,  $\frac{3}{4}$ - $\frac{1}{2}$  in. long; subtending leaves with well-developed upwards decreasing blades, the lowest resembling the preceding leaves, quite glabrous, smooth. Spatheoles lanceolate, finely acuminate, 1-1 $\frac{1}{2}$  in. long and 1-1 $\frac{1}{2}$  lin. wide, thinly scarious, more or less tinged with purple, glabrous, at length narrowly inrolled peduncles finely filiform, more or less recurved upwards and at length laterally very shortly exerted from the spatheole, always shorter than this, pubescent upwards with some longer hairs, glabrous at the tips. Racemes almost contiguous (always?), somewhat dense,  $\frac{2}{3}$ - $\frac{3}{4}$  in. long, 7-10-awned per pair, sparingly silky, yellowish-green, the lower subsessile, the other with a slender filiform base under 1 lin. long, more or less hairy in the fork; joints 3-5, finely filiform, obliquely truncate, about 1 $\frac{1}{4}$  lin. long, very shortly ciliate, cilia whitish or pale fulvous; pedicels very similar. Homogamous pair of spikelets 1, neuter, at the base of the lower raceme. Fertile spikelets linear-oblong, 2 $\frac{1}{2}$  lin. long, pale; callus very short, obtuse, shortly white bearded. Glumes equal; lower very thinly chartaceous, minutely truncate, dorsally flat, more or less fulvously hairy, particularly along the median line, margins involute, inflexed near the tips forming short scabrid keels, nerves 9; upper glume membranous, truncate or submarginate, often minutely mucronulate, glabrous, ciliate upwards. Lower floret reduced to an oblong hyaline truncate delicately 2-nerved reversedly ciliate valve, under 2 lin. long. Upper floret ♂: valve stipitiform, minutely 2-toothed, awn up to 1 $\frac{1}{2}$  in. long, column slender, fulvous, pubescent. Anthers up to  $\frac{3}{4}$  lin. long. Pedicelled spikelets neuter, narrowly linear-lanceolate, up to 2 $\frac{1}{2}$  lin. long, resembling the sessile in colour and hairiness; lower glume chartaceous, acute, very frequently mucronulate to subaristulate, 9-11-nerved; upper shorter, membranous, acute, 3-nerved; valves usually one, reduced to a hyaline broadly obovate scale long-ciliate from the top.—*Andropogon bicolor*, Nees, Fl. Afr. Austr. 113; not of Kunth nor Roxb. *A. dichroos*, Steud. Syn. Pl. Glum. i. 389; Hack. in DC. Monogr. Phan. vi. 622; Durand & Schinz, Consp. Fl. Afr. v. 710; Stapf in Dyer, Fl. Cap. vii. 360. *Cymbopogon Schimperi*, Rendle in Journ. Linn. Soc., Bot., xl. 227. *A. hirtus*, Phillips ex Eyles in Trans. Roy. Soc. S. Afr. v. 296 (partly).

**Mozambique Distr.** Portuguese East Africa: Shupanga, Kirk! Nyasaland: Shire Highlands, Buchanan, 39! Adamson, 197! Rhodesia: near Mumbwa (15° S., 28° E.), Mrs. Macaulay! Victoria Falls, Rogers, 13278! Gazaland: Northern Melsetter, 4000-6000 ft., Swynnerton, 951! Upper Buzi River, 3000-4000 ft., Swynnerton, 993d! 994a!

Also in Natal.

(Nees)

✓ 4. *H. rufa*, Stapf. Perennial, up to over 8 ft. high, tufted, with extra- and intra-vaginal innovations, with firm glabrous cataphylls. Culms erect or geniculately ascending, often stout (up to 3 lin. in diam.), terete, solid, glabrous and smooth, simple and 5-7-noded below the panicle or sometimes here and there with a branch from one of the lower nodes. Leaf-sheaths terete, glabrous, rarely hairy upwards, shorter than the internodes except the lowest, the basal short and more or less persistent; ligules scarious, rounded, up to 1 lin. long, often with hairs from behind; blades linear, narrow and equally broad downwards, long-tapering to a fine point, 1-2½ ft. by 1-4 (rarely 6) lin., or those of the innovations very much shorter, rigid, erect, flat, glabrous, rarely more or less hirsute, scabrid along the margins; midrib stout, white above, lateral nerves about 3-4 on each side, slender. Spatheate panicle often large, elongated, lax or contracted, 1-1½ (sometimes 2) ft. long, in tall specimens compound to the third degree, in meagre specimens much reduced; primary internodes 8-10, the lowest 6-9 in. long, or in very robust specimens considerably longer, the following gradually decreasing; tiers up to 8- or 13-rayed, mixed, or the lowest branches undivided at the base, up to 4-noded, and up to 1 ft. long; simple rays very slender, filiform, 1-2 in. long; subtending leaves like the preceding leaves, decreasing upwards but usually with well-developed blades. Spatheoles very narrowly linear-lanceolate, acuminate, subherbaceous or scarious, at length reddish, 1½-2 (exceptionally 3) in. long, ultimately tightly inrolled; peduncles finely filiform, 1-2 in. long, often nodding and laterally exserted from the spatheole when in flower, exceeding the spatheole (at length up to 3 in. or occasionally 4 in. long), and almost straight, glabrous (rarely) or pubescent above, or with few to many spreading white tubercle-based hairs towards the tips. Racemes not or very slightly spreading, often nodding, slender, ¾-1 in. long, 7-13-awned per pair, fulvous to rufous, the lower subsessile, the other with a slender filiform base up to 1½ lin. long, pubescent, very rarely epinastic; joints filiform, obliquely truncate, up to 1 lin. long, shortly and densely ciliate, lower cilia often white or at least pale, upper fulvous or rufous; pedicels very similar, but slightly shorter. Homogamous pair of spikelets 1, ♂ or neuter, at the base of the lower raceme or occasionally of both. Fertile spikelets linear-oblong, 1¾-2¼ lin. long, pale or sometimes dark greenish or more often reddish and slightly glossy; callus short, obtuse, shortly bearded. Glumes equal; lower subchartaceous, minutely truncate, dorsally flattened, margins narrowly involute up to two-thirds, then inflexed from the narrow short rigidly ciliate keels, more or less hairy to almost villous with short rather rigid fulvous or rufous hairs, rarely glabrous on the back, nerves about 7-9, evanescent below; upper glume membranous, subobtuse, 3-nerved, reversedly ciliate upwards. Lower floret reduced to an oblong obtuse reversedly ciliate faintly 2-nerved valve. Upper





floret ♂: valve substipitate, minutely 2-lobed, lobes rounded, ciliate; awn 10–15 lin. long, shortly fulvously or rufously hirsute below the bend. Anthers 1 lin. long. Pedicelled spikelets ♂ or neuter, lanceolate-linear,  $2\frac{1}{4}$ – $2\frac{1}{2}$  lin. long, like the sessile in colour and hairiness; glumes equal, the lower subherbaceous, acute, 7–11-nerved; upper membranous, 3-nerved, ciliate; valves shorter than the glumes, oblong to linear, 3–1-nerved, ciliate or more or less reduced or the upper quite suppressed. Homogamous spikelets  $2\frac{1}{2}$ –3 lin. long.—*H. fulvicoma*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 306. *Trachypogon rufus*, Nees, Agrost. Bras. 345. *Andropogon xantholepharis*, Trin. in Mém. Acad. St. Pétersb. 6me sér. ii. 281; Sp. Gram. Icon. t. 330; Hack. in DC. Monogr. Phan. vi. 637; Durand & Schinz, Consp. Fl. Afr. v. 727. *A. rufus*, Kunth, Enum. i. 492; Hack. in Mart. Fl. Bras. ii. iii. 282, and in Bolet. Soc. Brot. vi. 142, and in DC. l.c. 621 (var. *genuinus*); Durand & Schinz, l.c. 721 (var. *genuinus*); K. Schum. in Engl. Pfl. Ost-Afr. C. 98; Stapf in Dyer, Fl. Cap. vii. 358 (partly); Warb. in Baum, Kunene-Samb. Exped. 174, 475, 480; Pobéguin, Ess. Fl. Guin. Franç. 216; Chiov. in Ann. Istit. Bot. Roma, viii. 287 (var. *genuinus*); Cheval. Sudania, 106; Pilger in Mildbr. Deutsch. Zentr.-Afr. Exped. ii. 44; Eyles in Trans. Roy. Soc. S. Afr. v. 296. *A. rufus*, var. *fulvicomus*, Hack. in Bolet. Soc. Brot. v. 213, and in DC. l.c. (partly), Pilger, l.c. (?); Rendle ex Eyles, l.c. 297. *A. rufus*, var. *glabrescens*, Chiov. l.c. 288. *A. fulvicomus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 463 (partly); Steud. Syn. Pl. Glum. i. 384 (partly). *A. hirtus*, Baker, Fl. Maurit. 446; not of Linn. *A. bouangensis*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 333 (reprint 25). *Cymbopogon rufus*, Rendle in Cat. Afr. Pl. Welw. ii. 155 (incl. var. *fulvicomus*), and in Journ. Linn. Soc., Bot., xl. 226 (incl. var.).

**Upper Guinea.** French Guinea: Baffing River Valley, Pobéguin, 1816! Kouroussa, Pobéguin, 491! Northern Nigeria: Sokoto Province, Dalziel, 487! Abinsi, Dalziel, 903! Katagum District, Dalziel, 266! Kontagora, common in damp places, Dalziel, 247! Lokoja District, Richardson, 4! Southern Nigeria: Ogurude, Holland, 276! Cameroons: Yaunde, Zenker & Staudt, 461! and without precise locality, Unwin, 9098!

**North Central.** Bagirmi: Logone River, Macleod, 1518! Upper Shari region; banks of the Gribingui River, between Fort Archambault and Fort Crampel, Chevalier, 10406! between Bouso and Fort Archambault, Chevalier, 10488! Ndelle, Chevalier, 6829! 7671!

**Nile Land.** Abyssinia: Adowa, Schimper, 914! 1113! and without precise locality, Schimper, 935! Jur: Nyángaru, Murie! Ghattas' Great Seriba, Schweinfurth, 2427! Bongo: Culango; Tondy flats, Schweinfurth, 2579! Uganda: Lado; banks of the Nile, Speke & Grant! Banda, hilltops, 4000 ft., Dummer, 435! Kavirondo, Linton, 94! 98! British East Africa: Nairobi, Dowson, 193!

**Lower Guinea.** St. Thomas Island; on the coast, Moller, 152! French Congo: Niari District; Bouanga, Thollon, 1078! Belgian Congo: Lower Congo, Smith! Burton! Stanley Pool District; Kisantu, Gillet, 143! Angola: Loanda, Gossweiler, 402! Golungo Alto; common in reedy places, Welwitsch, 2954! Guanga River, Welwitsch, 7224! Sange, Welwitsch, 7246! 7264! and without precise locality, Welwitsch, 2948! Icolo e Bengo; banks of River

Bengo, *Welwitsch*, 7195! 7196! Pungo Andongo; Islands of Calembu River, *Welwitsch*, 7409! Malanje District; between Umziga and Luculla, *Gossweiler*, 902 (partly)! Benguela; country of the Ganguellas and Ambuellas, near Princeza Amelia, *Gossweiler*, 3927! Cazengo; Camondai, *Gossweiler*, 5559! Chitandu River, between Goudkopje and Kalele, 4000 ft., *Baum*, 198! Huilla; Lopollo, *Welwitsch*, 7511!

South Central. Belgian Congo: Katanga District; Tschinsenda, *Rogers*, 10205!

Mozambique Distr. Zanzibar, *Hildebrandt*, 1075! *Lyne*, 89! German East Africa: Bukoba; Itara, *Mildbraed*, 102, 104. Kilimanjaro; Kwa Ngowe, 5250 ft., *Volkens*, 353! 5000 ft., *Johnston*! Usambara; Mascheua, *Holst*, 8817! Hosigu, *Holst*, 2534! Coast, *Kirk*, 95! Seliman Mamba, *Busse*, 2757! and without precise locality, *Busse*, 107! Portuguese East Africa: Zambesi Delta, *Kirk*! Misonque; banks of Zambesi, *Scott*! Banks of Macussi, *Carvalho*. Nyasaland: Milanji Mountains, *Whyte*! Shire Highlands, *Adamson*, 105! Rhodesia: near Mumbwa, *Mrs. Macaulay*, 64! 70! Salisbury, *Allen*, 741! *Nobbs*, 619! Victoria Falls, *Rogers*, 13140! Bulawayo, *Rand*, 411! Umtali, *Sawer*, 25! Gazaland; Melsetter, 4000-6000 ft., *Swynnerton*, 1606! 1712! Luzito River, 3500 ft., *Swynnerton*, 1655! Upper Buzi River, 3000-5000 ft., *Swynnerton*, 993a! 993c! 995!

Also in the Mascarene Isles and in Brazil. Commonly used for grass-fencing in Nigeria, and for thatching in Angola. "Yamma" (Sokoto), "Mossequé" or "Mosoque" (Angola).

Var. *major*, <sup>Rendle</sup> Stapf. Panicle loose; racemes looser than in the type, each with 1 homogamous pair of ♂ spikelets at the base; fertile spikelets  $2\frac{1}{2}$  lin. long, pedicelled  $2\frac{1}{2}$ -3 lin. long, ♂.—*Cymbopogon rufus*, var. *major*, Rendle in Cat. Afr. Pl. Welw. ii. 155.

Lower Guinea. Angola: Pungo Andongo; island of Calemba, common in sandy wooded places, *Welwitsch*, 7409! Camondai-Cazengo, *Gossweiler*, 4984!

South Central. Belgian Congo: Katanga; Tschinsenda, *Rogers*, 10395!

Chiovenda (*l.c.*), under *Andropogon rufus*, var. *fulvicomus*, also quotes a specimen collected by Tellini (no. 473, 1-6, xii. 1902) between the Anseba river and Az Taclesan (Amasen) which he says is noteworthy on account of its very villous absolutely white-haired racemes. This character suggests very strongly that the plant in question is *Hypparrhenia hirta*, which species is actually recorded as having been collected by Tellini in the same place (no. 465; 1-6, xii. 1902). The same applies probably to Gioli's white-haired specimen from the Atbara (no. 1), first referred by Chiovenda (*l.c.* 26) to *Andropogon Schimper* and then (p. 288) to *A. rufus*. Besides these the following specimens are quoted by Chiovenda (*l.c.* 287-288) under *A. rufus*: (α) *genuinus*, Hack.—Eritrea: Saraë; Adi Gana, *Pappi*, 253; (β) *fulvicomus*, Hack.—Eritrea: Saraë; Adi Gana, *Pappi*, 326, and Gaza Gobo, *Pappi*, 215, 216; subvar. *approximatus*—Eritrea: Margus (South Saraë); Adi Mabit, *Pappi*, 942-943; (γ) *glabrescens*, Chiov.—Eritrea: Amasen; Mai Hinzi, *Pappi*, 3340, and Ocule Cusai; Soyra Mountains, 9200-9850 ft., *Pappi*, 1242. The last variety is said to have shortly hairy (♀) to glabrous (♂) spikelets. None of these specimens has been seen by me, and it is an open question whether those referred to β *fulvicomus* represent *H. rufa* or, as is more likely, *H. altissima*.

*H. rufa* is very generally distributed throughout tropical Africa with the exclusion of the driest parts where in the north and south-west it is replaced by *H. hirta*. As might be expected from a grass of so wide a distribution, it varies greatly. Some of the variations are evidently edaphic, whilst others suggest the presence of more or less fixed races. To segregate these from the herbarium material available seems to be impossible. Rendle's variety *major* has been retained, as it represents an extreme of deviation in the looseness and size of the spikelets, but these characters may after all indicate no more than the limits of fluctuation. Hackel's var. *fulvicomus* rests on the specimens distributed by Hochstetter as *Andropogon fulvicomus* (*Schimper*, 928, 935, 1114, 1118), and (with the exception of *Schimper*, 935) quoted by A. Richard when he





described that species. Of these numbers 935 and 1118 are in my opinion genuine *H. rufa*. They were meant by Hochstetter (1842) to represent typical *A. fulvicomus*. At that time *Andropogon rufus* had not been recorded from Africa and the only species which suggested themselves for comparison to Hochstetter were *A. pubescens*, Vis., and *A. podotrichus*, Hochst., forms of *H. hirta*, and it was in order to emphasize the contrast of the white pubescence of the spikelets of *A. pubescens* and *A. podotrichus* with the fulvous pubescence of *A. fulvicomus* that he selected the latter name. Schimper 928 and 1114 were issued by Hochstetter (also in 1842) as *A. fulvicomus* var. *approximatus* with the synonym *A. altissimus*, Hochst. in litt., a name which the year before had been taken up and published by A. Braun (in *Flora*, 1841, 277), together with a brief description. This *A. altissimus* is clearly distinct from *H. rufa* and is described below as *H. altissima*. Another synonym which requires explanation is *A. xanthoblepharis*, Trin. This was based on a specimen from the Congo, no doubt collected by Christian Smith in 1816. The figure quoted above might almost be called a faithful portrait of Smith's example in the Kew Herbarium. It is true the awn is represented in the figure as glabrous, but as the hairs are so appressed in Smith's specimen as to be easily overlooked, they probably escaped the attention of the draughtsman and possibly also of Trinius, who in the original description passed over the character of glabrousness and only introduced it subsequently in the text which accompanies the figure of his *A. xanthoblepharis*.

(Hochst.)

✓ 5. *H. altissima*, <sup>(Hochst.)</sup> Stapf. Perennial, up to 7 ft. high, with intra- (and extra-?) vaginal innovations. Culms erect or geniculately ascending, slender to somewhat stout, up to 1½ lin. in diam., terete, solid, glabrous and smooth, simple and 5-6-noded below the panicle. Leaf-sheaths terete, glabrous, shorter than the internodes except the lowest, which themselves are short and more or less persistent or decay down to their fibrous bases; ligules scarious, rounded, up to 1½ lin. long, glabrous or appressedly hairy on the back; blades linear, narrow and equally broad downwards, long-tapering to a fine point, 6-9 in. (in cultivated specimens much longer) by 1-1½ lin., rather firm, flexuous or more or less rigid, flat, glabrous, rough along the margins and upwards on the upper face, otherwise rather smooth, midrib slender on the back, wider and whitish towards the base on the face, lateral nerves about 2-3 on each side, slender. Spatheate panicle very lax, somewhat scanty, to over 1 ft. long; primary internodes 3-4 in the wild, up to 7 in the cultivated specimens, the lowest up to 10 in. long, the following gradually decreasing; primary tiers few- to 8-rayed, the lower usually mixed or reduced to 1 or 2 long but few-noded compound rays; ultimate rays very slender, filiform, 2-2½ in. long; subtending leaves soon becoming spatheiform upwards with much reduced blades or quite spatheoloid (in cultivated specimens the blades much more developed). Spatheoles very narrow, linear-lanceolate, acuminate, subherbaceous or scarious, at length reddish, 2-3 in. long, ultimately tightly inrolled; peduncles finely filiform, at length 3-4 in. long, more or less curved and bearded towards the tips, beards of long spreading whitish tubercle-based hairs. Racemes slender, somewhat loose and flexuous, ¾-1½ in. long, fulvous to greyish or brownish, very slightly spreading, finally epinastically reflexed, 7-13-awned per pair; bases unequal, the lower

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very short, the upper filiform, widened below, up to 2 lin. long, both densely pubescent or villous in the fork, the upper pubescent upwards with a usually scanty beard of long whitish more or less stiff and sometimes minutely tubercle-based hairs; joints filiform, obliquely truncate, up to over 1 lin. long, shortly and densely ciliate, lower cilia white or pale, upper fulvous; pedicels very similar but slightly longer. Homogamous pair of spikelets 1 at the base of the lower raceme, rarely of both. Fertile spikelets linear-oblong, 2-2½ lin. long, greenish, sometimes tinged with purple; callus short, obtuse, shortly bearded. Glumes equal, subchartaceous; lower narrowly truncate, dorsally flattened, margin narrowly involute to over two-thirds, then reflexed from the fine rigidly ciliolate keels, more or less fulvously pubescent, finely 9-nerved; upper glume subobtuse, 3-nerved, spreadingly ciliate upwards. Lower floret reduced to a linear-oblong truncate reversedly ciliate hyaline 2-nerved valve. Upper floret ♂: valve stipitiform, 2-dentate (teeth ciliate and up to ½ lin. long), awn ¾-1 in. long, rarely longer, brown, fulvously hirtellous; valvule a minute hyaline scale, ½ lin. long, or 0. Anthers up to almost 1 lin. long. Pedicelled spikelets usually ♂, linear-lanceolate, acute, 2-3 lin. long, like the sessile in colour and hairiness, if not darker; glumes equal, the lower subherbaceous, 9-nerved, upper membranous, 3-nerved, ciliate; valves shorter than the glumes, reversedly ciliate; the lower oblong, finely 3-nerved, the upper cuneate-linear, emarginate, 1-nerved. Homogamous spikelets similar to the pedicelled, up to 3½ lin. long. — *Andropogon altissimus*, Hochst. ex A. Braun in Flora, 1841, 277. *A. fulvicomus*, var. *approximatus*, Hochst. in sched. (Schimp. It. Abyss. sect. ii. 928). *A. rufus*, var. *fulvicomus*, Hack. in DC. Monogr. Phan. vi. 621 (partly).

Nile Land. Abyssinia: Tigre; Adowa, Schimper, 1114! Amogai, Schimper, 1043! Gondar, Massey, 13! and without precise locality, Schimper, 928!

Plants raised by A. Braun from seed communicated by Schimper (Herb. Kew.) grew up to 7 ft. high and were more robust than the wild specimens. Their panicles are lengthened out to over 2 ft., but still are scanty. The racemes are also enlarged, and frequently grouped in a tribotryum, the additional raceme being shorter and intercalated between the two long ones. There is a homogamous pair of spikelets at the base of each raceme, and the pedicelled spikelets of the lower raceme-pairs (particularly of the lowest raceme) are often replaced by a trio of spikelets, consisting of a ♂ sessile and 2 ♂ pedicelled spikelets. It seems not improbable that *H. altissima* is a cross of *H. rufa* and *H. papillipes*, specimens of both of which were collected by Schimper in the neighbourhood of Adowa within a few days (*H. altissima* and *H. rufa* on Nov. 8, 1838, and *H. papillipes* on Nov. 13, 1838).

- ✓ 6. *H. exarmata*, (Stapf) Stapf. Annual, about 3 ft. high. Culms stout, erect or suberect, terete, glabrous, about 7-noded and simple below the spatheate panicle. Leaf-sheaths terete, tight, firm, glabrous; ligules scarious, rounded, 1-1½ lin. long; blades linear from an equally wide base, long-attenuated upwards, up to almost 1½ ft. by 1½-2½ lin., firm, glabrous, scabrid along the margins, otherwise smooth, pale green or at length reddish; midrib rather





stout, white and broad on the upper side; primary lateral nerves 3-4 on each side. Spatheate panicle narrow, about 1 ft. long, of about 5 frequently 5- or more-rayed distant tiers; rays of lower tiers mostly compound 2-1-noded, erect or suberect, much overlapping the adjacent internode, filiform, shortly bearded at the nodes, upper simple rays very slender, about 1 in. long; spathes with narrow more or less herbaceous upwards abbreviated blades. Spatheoles narrowly lanceolate,  $1\frac{1}{4}$ - $1\frac{3}{4}$  in. long, acuminate, soon tightly inrolled, bearded at the nodes, otherwise glabrous, pale reddish. Peduncles finely filiform, erect, at length equalling or exceeding (by up to 1 in.) the spatheoles, minutely pubescent upwards with longer delicate hairs. Racemes suberect, rarely nodding, subcontiguous, up to 1 in. long, 12-19-awned per pair, olive- or reddish-green, sparingly hairy, the lower sessile, the other with a filiform base, up to  $1\frac{1}{2}$  lin. long; both bases pubescent in the fork; joints filiform, subobliquely truncate, up to 1 lin. long, very shortly white-ciliate; pedicels very similar. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, very minutely truncate, including the very short and obtuse shortly bearded callus 2 lin. long. Glumes equal, lower thinly chartaceous, pale, faintly tinged with red, flat on the back, glabrous or sparingly hairy (hairs whitish), margins very narrowly involute below and inflexed towards the tips, forming there fine scaberulous keels, nerves about 9, of which 3-4 are intracarinar; upper glume obscurely emarginate, 3-nerved, glabrous, reversedly ciliate. Lower floret reduced to an oblong truncate 2-nerved reversedly ciliate hyaline valve. Upper floret: valve hyaline, oblong, rounded or obscurely emarginate at the top, delicately 3-nerved, reversedly ciliate, over  $1\frac{1}{2}$  lin. long, awnless; valvule 0. Pedicelled spikelets ♂, narrowly lanceolate, acute, over 2 lin. long, sparingly hairy; lower glume about 7-nerved; upper glume and valves as in the sessile spikelets; anthers  $\frac{3}{4}$ -1 lin. long.—*Cymbopogon exarmatus*, Stapf in Journ. de Bot. 2me sér. ii. 210. *Andropogon rufus*, var. *exarmatus*, Stapf in Cheval. Sudania, i. 180.

North Central. Shari Territory: on the lower Bahr Salamat, Chevalier, 10509!

(Hackel.)

- ✓ 7. *H. pœcilotricha*, Stapf. Perennial,  $1\frac{1}{2}$  ft. high, with intravaginal innovations. Culms rather stout, subterete, glabrous and smooth, producing vegetative branches from one or several of the lower nodes. Leaf-sheaths tight, quite glabrous, those of the innovations much compressed and acutely keeled; ligules scarious, ciliolate, glabrous, very short; blades linear from an equally wide or slightly attenuated rounded base, long tapering to a fine point, rigid, over  $\frac{1}{2}$  ft. by 3 lin., flat, smooth and glabrous except on the scabrid margins or sometimes (Hackel) with some tubercle-based hairs at the junction with the sheath; midrib rather slender, primary

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lateral nerves 3-5 on each side, slightly raised. Spatheate panicle scanty, about 8 in. long, of few- to 6-rayed tiers, all the rays simple; spathes bladeless, narrow, tapering to a long fine point, up to over 4 in. long, subherbaceous, subglaucous, glabrous or very sparingly hairy; rays filiform, about 2 in. long. Spatheoles subulate-lanceolate, glabrous, otherwise resembling the spathe, at length tightly inrolled; peduncles finely filiform, recurved upwards, more or less exerted from the spatheoles, pubescent upwards with some long fine spreading hairs. Racemes slightly spreading, very loose, pale, fulvously silky, 1 in. long, 7-8-awned per pair; raceme bases very slender, filiform, the lower 1 lin., the upper up to 4 lin., pubescent below; joints filiform, obliquely truncate, about 2 lin. long, shortly ciliate, cilia whitish below, more or less fulvous upwards; pedicels very similar, with a small subulate auricle. Homogamous pair of spikelets 1 at the base of each raceme or 2 at that of the upper. Fertile spikelets linear-oblong, including the callus  $2\frac{3}{4}$  lin. long, pale (except for the hairs); callus slender, acute,  $\frac{3}{4}$  lin. long, black on the back, shortly bearded. Glumes equal; lower thinly chartaceous, minutely truncate, dorsally flat, fulvously hairy all over, margins narrowly involute, keels obscure, nerves 7-9; upper glume membranous, obtuse, sometimes mucronulate, 3-nerved, hairy upwards, reversedly ciliate. Lower floret reduced to a linear-oblong obtuse hyaline reversedly ciliate valve. Upper floret ♀: valve stipitiform, acutely 2-toothed, awn  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. long, column brown, fulvously pubescent. Anthers 1 lin. long. Pedicelled spikelets ♂, linear-lanceolate, 2 lin. long, resembling the sessile in colour and tomentum; glumes subequal, very acute; lower closely 11-nerved; upper 3-nerved; valves decreasingly shorter, ciliate, lower oblong, upper linear.—*Andropogon pæcilotrichus*, Hack. in Bolet. Soc. Brot. iii. 138, t. 2, fig. 3, and in DC. Monogr. Phan. vi. 638; Durand & Schinz, Consp. Fl. Afr. v. 720.

Lower Guinea. Angola: Humpata; in flooded fields along the River Nene, *Newton!*

The only specimen seen is the type in the Coimbra Herbarium. It is rather imperfect, the middle portion of the culm being missing, and the "panicle" described by Hackel and again here is very likely only a compound ray of a much longer panicle.

✓ **8. *H. vulpina*, Stapf.** Perennial, up to over 5 ft. high, densely caespitose (*Gossweiten*) with extravaginal innovations. Culms erect, stout (up to  $2\frac{1}{2}$  lin. in diam.), terete, solid, glabrous and smooth, simple and 3-5-noded below the panicle. Leaf-sheaths very firm, terete, hairy particularly upwards, the lowest more or less woolly at the base or perfectly glabrous, the basal often up to 9 in. long; ligules scarious, truncate, about 1 lin. long, mostly with hairs from behind; blades narrowly linear from an equally wide or more or less attenuated base, long-tapering to a fine point, rigid, over





1½ ft. long, up to over 3 lin. wide, erect, flat or frequently with revolute scabrid margins, rough on the upper side or almost smooth, more or less hirsute and bearded at the mouth or glabrous above the latter or altogether; midrib moderately to very stout in the lower leaves, slender in the upper, whitish on the upper side; primary lateral nerves about 4 on each side, prominent above. Spatheate panicle large, in tall specimens compound to the third degree, elongated, rather lax, to over 3 ft. long; primary internodes 6-9, the lowest 3 very long (the lowest 6-11 in.), the upper rapidly decreasing; tiers few- to 6-rayed, mixed or the lowest branches undivided at the base and up to 4-noded; simple rays slender, filiform, 2-2½ in. long; subtending leaves with well developed upwards decreasing blades, the lowest resembling the preceding leaves. Spatheoles narrowly subulate, lanceolate, 2-2¼ in. long, very long- and finely acuminate, scarious, purple or reddish-brown, glabrous, ultimately narrowly inrolled; peduncles finely filiform, recurved upwards, laterally exerted from the spatheoles, always shorter than these, pubescent upwards with long spreading tubercle-based hairs from the curvature. Racemes loose, more or less spreading, nodding, at length usually epinastically reflexed, 1-1¼ in. long, 8-12-awned per pair, loosely silky, fulvous or greyish-fulvous; bases slender, filiform, the lower subsessile, the other up to 2 lin. long, pubescent in the fork; joints finely filiform, very obliquely truncate or subauricled, up to over 2 lin. long, shortly ciliate, cilia white to dark fulvous, ½-1 lin. long; pedicels very similar, slightly longer, with a small subulate auricle. Homogamous pair of spikelets 1 (normally) at the base of the lower raceme only. Fertile spikelets linear-lanceolate, 3 lin. long, pale or olive green (apart from the hairs); callus slender, acute, up to ¾ lin. long, very shortly bearded. Glumes equal, lower subchartaceous, minutely truncate, dorsally flat, fulvous- or greyish-hairy all over, margins very narrowly involute, slightly inflexed near the tips, keels very short, scaberulous, nerves about 11; upper glume membranous, obscurely emarginate, slightly hairy upwards on the back and ciliate on the margin. Lower floret reduced to an oblong truncate hyaline delicately 2-nerved reversedly ciliate valve. Upper floret ♀: valve stipitiform, very obscurely 2-toothed; awn 1½-2 in. long, column brown, fulvously pubescent. Anthers 1 lin. long. Grain oblong, 1½ lin. long, dorsally much compressed; embryo less than half the length of the grain. Pedicelled spikelets ♂ or neuter, narrowly linear-lanceolate, over 3 lin. long, resembling the sessile in colour and tomentum; glumes subequal, lower firmly subherbaceous, acute, 11-nerved, upper sometimes mucronulate, 3-nerved; valves slightly shorter than the glumes, hyaline, reversedly ciliate, lower oblong, 3-nerved, upper linear-spathulate from a very narrow base, or both more reduced.

+ Lower Guinea. Angola: Benguella; close to native villages, near Munongue, growing gregariously, (Gossweiler, 3068) abundant at N'Jaia, near Munongue,

*Gossweiler*, 3120 ! gravelly slopes south of Munongue, *Gossweiler*, 4152 ! sources of the River Kuariri, in open woods, *Gossweiler*, 2630 !

Mozambique Distr. Rhodesia : near Mumbwa, *Mrs. Macaulay*, 48 ! Salisbury, on granite soil, *Nobbs*, 669 !

*Gossweiler*'s numbers 4152 and 2630 might be treated as a form *glabrescens*, differing from the other specimens quoted in the completely or almost completely glabrous leaves. This form *glabrescens* includes several comparatively weak samples with narrower and softer blades. The structure of the panicle and spikelets, however, is the same in all the specimens.

(Stapf)

9. *H. chrysargyrea*, *Stapf*. Annual, up to over 5 ft. high. Culms erect, stout, terete, glabrous and smooth. Leaf-sheaths terete, tight, firm, the lower villous-hirsute along the margins or all over in the upper part ; ligules scarious, rounded, up to  $1\frac{1}{2}$  lin. long ; blades linear from a long-attenuated base (in the lowest leaves almost reduced to the stout whitish midrib) tapering to a fine point, up to over  $2\frac{1}{2}$  ft. long and 5 lin. wide, rigid, subglaucous or reddish, rough above, very scabrid on the more or less revolute margins, loosely or sparingly hirsute on both sides, often coarsely bearded above the ligules ; primary lateral nerves about 4 on each side, prominent above. Spatheate panicle elongated, lax, up to over 3 ft. long : primary internodes up to 8, the lowest 3 very long (the lowest up to 1 ft.), the upper rapidly decreasing ; tiers few- to 11-rayed mixed or simple, the lowest compound rays up to 2 ft. long and 4-5-noded, the simple  $2-2\frac{1}{2}$  in. long ; subtending leaves (except the uppermost) with well-developed blades, resembling the preceding leaves. Spatheoles narrowly lanceolate, acuminate, 2-3 in. long, glaucous-reddish, glabrous, scarious, at length tightly in-rolled ; peduncles filiform, enclosed in the spatheole or laterally exerted and strongly recurved during flowering, at length more or less straightened and terminally exerted (by up to 1 in.), pubescent upwards, with long spreading tubercle-based hairs from the curvature. Racemes not or only slightly spreading, at length epinastically deflexed (always ?), rather dense, about  $1-1\frac{1}{4}$  in. long, 11-13-awned per pair, silky, fulvous or almost rufous, the lower sessile, the upper with a filiform base,  $1\frac{1}{2}$  lin. long, both bases dark, glabrous or hairy in the fork, shortly auricled ; joints filiform, to over  $1\frac{1}{2}$  lin. long, obliquely truncate, densely and very shortly ciliate, lower cilia white, upper fulvous, or almost all fulvous ; pedicels very similar but slightly longer and produced into a short linear or subulate auricle. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong,  $2\frac{1}{4}-3$  lin. long, pale (apart from the hairs) ; callus very short, obtuse, minutely bearded. Glumes equal, lower subchartaceous, minutely truncate and fulvously hairy on the back, margins very narrowly involute below, inflexed above with rigidly ciliolate keels, nerves 10-12, intracarpinal 4-6, fainter downwards ; upper glume lanceolate-oblong, acute, 3-nerved, hairy above, ciliate upwards. Lower floret reduced to a linear-





oblong hyaline obtuse reversedly ciliate valve of the same length as the glumes. Upper floret ♀: valve stipitiform, minutely 2-toothed; awn  $1\frac{1}{2}$  in. long, column fulvously pubescent. Anthers  $1\frac{1}{2}$ –2 lin. long. Pedicelled spikelets ♂, oblong-lanceolate,  $2\frac{3}{4}$ – $3\frac{1}{2}$  lin. long, resembling the sessile spikelets in colour and hairiness; lower glume acute, 11-nerved; upper as in the sessile spikelets; valves hyaline, ciliate,  $2\frac{1}{2}$ – $2\frac{3}{4}$  lin. long, the lower linear-oblong, 3-nerved, the upper spatulate to linear-lanceolate from a very narrow base.

+ — *Cymbopogon chrysargyreus*, Stapf in Journ. de Bot. 2me sér. ii.  
 ✓ 213. *Andropogon chrysargyreus*, Cheval. Sudania, 77. not in card bot

Upper Guinea. Northern Nigeria: Lokoja, Dalziel, 293! MS  
 North Central. French Congo: junction of the Ubangi and Kemo Rivers,  
 Chevalier, 5366! Stapf in Cymbopogon

(Rendle)  
 ✓ 10. *H. Nyassæ*, Stapf. Perennial, up to over 2 ft. high, very densely tufted, with numerous intravaginal innovations. Culms erect, slender, terete, glabrous and smooth, simple and about 3-noded below the panicle. Leaf-sheaths terete or those of the innovations more or less keeled, firm, the basal packed inside with wool, long persistent, the upper sparingly hairy or glabrous; ligule short, truncate, scarious; blades of the innovation-leaves very narrowly linear, 9 in. by less than  $1\frac{1}{2}$  lin., flat, firm, subglaucous, at length reddish, usually bearded at the mouth and often hairy above it, those of the culm-leaves shorter and relatively broader, mostly glabrous or sparingly bearded at the base; midrib slender, lateral nerves about 3, very slender. Spatheate panicle  $\frac{1}{2}$ –1 ft. long, of 3–4 distant 1–3-rayed simple tiers; rays slender, filiform, 4–5 in. long; subtending leaves spathaceous upwards with rapidly decreasing blades or quite spatheoid. Spatheoles narrowly lanceolate, long-acuminate, 2–3 in. long, glabrous, scarious, reddish or purplish and often subglaucous, at length narrowly inrolled; peduncles narrowly filiform, at first laterally, then terminally or subterminally and often very long-exserted from the spatheoles, curved below the tips with long spreading tubercle-based hairs from the curvature. Racemes somewhat slender, nodding, ultimately spreading or epinastically reflexed,  $\frac{2}{3}$ –1 in. long, 7–13-awned per pair, fulvously silky, the lower subsessile, the other with a slender filiform base,  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. long, pubescent in the fork, otherwise glabrous; joints very slender, filiform, very obliquely truncate to subauriculate, about  $1\frac{1}{2}$  lin. long, shortly and densely ciliate, cilia fulvous; pedicels very similar but rather longer and more slender, and produced into a small linear auricle. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, subacute,  $2\frac{1}{2}$ – $2\frac{3}{4}$  lin. long, pale or purplish except the hairs; callus short, subacute, very shortly bearded. Glumes equal, lower subchartaceous, minutely truncate, dorsally flattened, margins very narrowly involute or inflexed below the tips and there forming

short scaberulous keels, sparingly to copiously hairy all over the back; nerves 9, the 3 inner rather distant, the others very fine and rather close; upper glume submembranous, obtuse or emarginate, 3-nerved, ciliate above. Lower floret reduced to an oblong obtuse obscurely 2-nerved and reversedly ciliate valve. Upper floret ♀: valve substipitiform, minutely 2-toothed; awn  $\frac{3}{4}$  to almost  $1\frac{1}{2}$  in. long, rich brown, column shortly hirsute. Anthers 1– $1\frac{1}{4}$  lin. long. Grain obovate, flat on the back, very concave in front above the middle; embryo half the length of the grain. Pedicelled spikelets ♂, linear-lanceolate or linear-oblong,  $2\frac{1}{2}$ –3 lin. long, like the sessile spikelets in colour and hairiness; glumes acute, firm, the upper 7-nerved, the lower 3-nerved; valves hyaline, oblanceolate to (the upper) oblanceolate-linear, reversedly ciliate, 3–1-nerved or nerveless.—  
 + *Andropogon Nyassæ*, Rendle in Journ. Bot. 1893, 358. *A. sp.* (§ *Gymnandropogon*), T. Thoms. in Speke & Grant, Nile Journ. Append. 652.

**Nile Land.** British East Africa: Kiu (panicles only), *Linton*, 151!

**Mozambique Distr.** German East Africa: Usambara; Kwa Mshuza, *Holst*, 9156a! Ikungu; Tura, in moist places, 3600 ft., *Speke & Grant*! Nyasaland: Zomba, *Cameron*, 87! between Kondowe and Karonga, *Whyte*! and without precise locality, *Buchanan*, 1423! Rhodesia: Salisbury, *Sawer*, 21! Victoria, *Monro*, 862! Salisbury District, *Mundy*! Charter District, *Mundy*! Umtali, *Sawer*, 5! Ingesi, *Nobbs*, 671! 677.! Gazaland; Chirinda, 3900 ft., *Swynnerton*, 1639! Nyabodi River, 4000 ft., *Swynnerton*, 1659!

*Andropogon rufus*, var. *auricoma*, Pilger in Engl. Jahrb. xxx. 268, from the Ukinga Mountains in German Nyasaland (*Goetze*, 901), evidently belongs here. It has the same woolly tomentum at the base of the lowest sheaths and shaggy beards at the junction of sheath and blade, but it is a taller plant with the lower culm-leaves up to 15 in. long and  $2\frac{1}{2}$  lin. broad, and traversed by a stout midrib. The cilia are white at the callus and the bases of the joints and pedicels, and fulvous upwards, much as in *H. rufa*, but are rather longer.

(Hook. f.)

11. *H. smithiana*, <sup>(Hook. f.)</sup> *Stapf*. Perennial, about 2 ft. high, tufted; innovations intravaginal. Culms erect, moderately slender, glabrous and smooth, simple and 2–3-noded below the panicle. Leaf-sheaths terete or slightly keeled upwards, the lowermost more or less persistent, hairy all along, the next hairy upwards only or glabrous, hairs often scanty; ligules scarious, truncate or rounded, up to over 1 lin. long, often hairy from behind; blades linear from a gradually attenuated base, tapering to an acute point, 6–10 in. by  $1\frac{1}{2}$ – $2\frac{1}{2}$  lin., somewhat rigid, suberect, flat, pale green, glabrous, rough along the margins; midrib stout in the lower, slender in the upper leaves, primary lateral nerves about 3 on each side, slender. Spatheate panicle elongated, scanty or moderately compound, lax, about 1 ft. long, of up to 4 distant few- to 5-rayed tiers, the lowest tiers often mixed, consisting of a simple and a compound 2–3-noded ray or all the tiers reduced to a single ray; simple rays slender,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long; subtending leaves with generally well





developed blades, their sheaths usually more or less (occasionally densely) hairy, herbaceous to subherbaceous. Spatheoles narrowly linear-lanceolate, long-acuminate,  $1\frac{1}{4}$ –2 in. long, acute, subherbaceous to scarious, glabrous, at length very narrow; peduncles filiform; laterally exerted from the spatheoles, at length exceeding them by a few lin. to  $\frac{1}{2}$  in., usually curved upwards with long tubercle-based spreading hairs above the curvature, otherwise finely pubescent. Racemes dense, somewhat stout, usually only slightly spreading, often nodding, the lower rarely epinastic, 8–12 lin. long, 7–13-awned per pair, silky, rich, rufously fulvous, the lower sessile, the upper with a filiform subglabrous or pubescent base; joints 4–6, filiform, subobliquely truncate,  $1\frac{1}{4}$ – $1\frac{1}{2}$  lin. long, very densely ciliate, cilia almost rufous, from  $\frac{1}{2}$  lin. (the uppermost) to 1 lin. long; pedicels very similar. Homogamous pairs of spikelets 1 at the base of the lower or of both racemes, ♂ or neuter. Fertile spikelets lanceolate-oblong, up to almost 3 lin. long, pale to olive-brown (except the hairs); callus very short, obtuse, fulvously bearded. Glumes equal, lower subchartaceous, more or less (upwards often densely) silky, minutely truncate, dorsally flattened, 9-nerved, margins very narrowly involute all along, keels hardly any, hairs fulvous to rufous, denser upwards and often exceeding the glume by  $\frac{3}{4}$ –1 lin.; upper glume thinner, pale, subobtuse, 3-nerved, hairy below the tip, ciliate upwards. Lower floret reduced to an oblong obtuse reversedly ciliate hyaline valve. Upper floret ♀: valve substipitiform, minutely 2-lobed, lobes subacute, ciliolate; awn  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, rich brown, bent at or below the middle, column shortly hirsute. Anthers 1 lin. long. Pedicelled spikelets ♂ or neuter, lanceolate, acute, about  $2\frac{1}{2}$  lin. long, densely silky; glumes equal, the lower 7–9-nerved, the upper 3-nerved; valves shorter than the glumes, oblong, ciliate, 3–1-nerved, the upper if present emarginate or both more or less reduced.—*Andropogon smithianus*, Hook. f. in Journ. Linn. Soc. Bot. vii. 232; Hack. in DC. Monogr. Phan. vi. 622; Durand & Schinz, Consp. Fl. Afr. v. 723.

Upper Guinea. Cameroons: Cameroon mountain, 7000 ft., Mann, 1342! 2079!

(L.)

12. *H. hirta*, Stapf. Perennial, up to over 3 ft. high, densely tufted from an oblique or sometimes creeping rhizome, innovations intra- and extra-vaginal, cataphylls firm, glabrous. Culms erect, slender, wiry and solid below, glabrous, smooth, passing above the third or fourth internode into a spatheate panicle, very frequently with barren or mixed branches from the lower nodes. Leaf-sheaths of the innovations compressed and keeled otherwise terete, glabrous and smooth or the lower sometimes loosely hairy, the upper shorter, the basal longer than the internodes, firm and long persistent; ligules scarious or membranous, truncate, up to 2 lin. long, ciliate-

denticulate; blades very narrowly linear, tapering to a fine point, from a few to over 12 in. long,  $\frac{3}{4}$  to (rarely)  $1\frac{1}{2}$  lin. wide, firm, usually flexuous, glaucous, glabrous or with some scattered hairs downwards, finely scaberulous, rough along the margins, midrib relatively stout, flat and whitish on the upper face, lateral nerves few, close, fine. Spatheate panicle elongated, often scanty, loose, from a few to over 12 in. long, of 1-4 distant 2-3- (rarely 4- or 5-) rayed mostly simple tiers; simple rays subfastigate when more than 2, very slender, filiform, 4-6 in. long, often more or less kneed at the nodes; spathes upwards with rapidly reduced subulate or subsetaceous blades, glaucous, glabrous. Spatheoles very narrow, linear-lanceolate, long-tapering to an acute point, about 2 in. long, glabrous, rarely softly hairy, turning pale reddish, at length more or less tightly inrolled; peduncles 2-3 in. long, subterminally or terminally exerted, at length equalling or more or less exceeding the spatheole, usually slightly arched, finely puberulous towards the tips, sometimes with additional soft obliquely spreading hairs up to 1 or  $1\frac{1}{2}$  lin. long. Racemes subcontiguous or slightly diverging, straight or flexuous, erect or more or less nodding, but not epinastically reflexed, 1 to over  $1\frac{1}{2}$  in. long, 10-14-awned per pair; more or less whitish or greyish silkily villous; the lower sessile or subsessile, the other with a slender filiform glabrous or shortly hairy truncate base, up to over 2 lin. long; joints and pedicels filiform, slender,  $1\frac{1}{2}$  lin. long, subobliquely truncate, ciliate, cilia equal,  $\frac{1}{2}$  lin. long. Homogamous pairs of spikelets 1 at the base of the lower or both racemes, ♂. Fertile spikelets linear-oblong,  $2\frac{1}{4}$ - $2\frac{1}{2}$  lin. long, reddish upwards; callus linear-cuneate, grooved, subacute, like the beard up to  $\frac{1}{2}$  lin. long. Glumes equal; lower thinly chartaceous or downwards almost membranous, truncate, flat on the back, 9-11-nerved, with the nerves faint below, more distinct and raised upwards, more or less loosely villous, margins involute to three-quarters, then more sharply inflexed, forming subterminal scaberulous keels, upper glume thinner, submembranous, obliquely truncate in profile, mucronulate, 3-nerved, glabrous, ciliate. Lower floret reduced to a linear-oblong obtuse hyaline 2-nerved ciliate valve, almost as long as the glumes. Upper floret ♀: valve narrowly linear to almost stipitiform, almost 2 lin. long, with two short sparingly ciliate subacute lobes; awn slender,  $\frac{3}{4}$  to over 1 in. long, with the column minutely fulvo-hirsute. Valvule 0 or an almost microscopic scale. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelets ♂, narrowly linear-oblong, acute,  $2\frac{1}{2}$ -3 lin. long, more or less loosely villous, reddish; glumes equal, lower subherbaceous, acute to mucronulate, 9-11-nerved, upper thinner, 3-nerved; valves linear-oblong, hyaline, ciliate, the lower 3-nerved, the upper 1-nerved, much narrower, attenuated downwards or more or less reduced.—*H. podotricha*, Anderss. in Aschers. & Schweinf. Beitr. Fl. Aethiop. 306. *Andropogon hirtus*, Linn. Sp. Pl. ed. i. 1046; Thunb. Prodr. 20; Fl. Cap.





ed. Schult. 108; Desf. Fl. Atl. ii: 378; Kunth, Enum. ii. 492; Reichb. Ic. Fl. Germ. i. fig. 1498; Nees Fl. Afr. Austr. 110; A. Rich. Tent. Fl. Abyss. ii. 459 (partly); Steud. Syn. Pl. Glum. i. 384; Coss. & Durieu, Expl. Scient. Alger. ii. 47; Batt. & Trabut, Fl. Alg. (Monoc.) 126; Hack. in DC. Monogr. Phan. vi. 618 (vars.  $\alpha$  &  $\beta$ , the latter partly), and in Bull. Herb. Boiss. iv. App. iii. 11; Durand & Schinz, Consp. Fl. Afr. v. 714; Balf. f. Bot. Socotr. 316; Martelli, Fl. Bogos. 93; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 15 (vars.  $\alpha$  and  $\beta$ ), 94; Rendle in Trans. Linn. Soc. ser. ii. Bot. iv. 58; K. Schum. in Engl. Pfl. Ost-Afr. C. 98; Stapf in Dyer, Fl. Cap. vii. 355, incl. var. *podotricha*; Pilg. in Engl. Jahrb. xxx. 268, and in Mildbr. Deutsch. Zentr.-Afr. Exped. ii. 44; Chiov. in Ann. Istit. Bot. Roma, viii. 26, 287 (vars.  $\alpha$  &  $\beta$ ); Nash in North Amer. Flora, xvii. 122; Eyles in Trans. Roy. Soc. S. Afr. v. 296. *A. pubescens*, Vis. in Flora, 1829, i. Erg. Bl. 3; Fl. Dalm. t. ii. fig. 2; Nees Fl. Afr. Austr. 111. *Trachypogon hirtus*, Nees, Agrost. Bras. 346. *Heteropogon hirtus* and *H. pubescens*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 310 (accord. to Hackel). *Sorgum hirtum*, O. Kuntze, Rev. Gen. Pl. ii. 792. *Cymbopogon hirtus*, Stapf in Kew Bulletin, 1907, 212, and in Ann. Transv. Museum, iii. 3, 129.

**Upper Guinea.** Cape Verd Islands: Nicolai; Mount Gardo, 5000 ft., *Bolle*! St. Vicente, *Moseley*! Mount Verde, *Bolle*! *Vogel*, 108! St. Antonio, *Ansell*! *Vogel*, 636\*! Valley of St. Domingo, *Hooker*, 100\*!

**Nile Land.** Nubia: Jebel Uaratab near Suakin, *Schweinfurth*, 1035! Wadi Arab, between Suakin and Berber, *Schweinfurth*, 497! Erkowit, near Khor Ashal, *Brown*, 1237! and without precise locality, *Figari*! Eritrea: Mensa; Geleb, 6450-6550 ft., *Schweinfurth*, 1201, 1229, 1387. Amasen; near Asmara, 7900 ft., *Schweinfurth*, 554; Matcallat, *Pappi*, 4807! slopes of Mount Bizen, 4600 ft., *Schweinfurth*, 2014! 2016! Saganeiti, 7200 ft., *Schweinfurth*, 808! 1195, 1733; Haschello-Kokob near Acrur, *Schweinfurth*, 1022! 1087! 1089! 5250! Maragus; plateau of Kohaito, *Schweinfurth*. Abyssinia: Tigre; Adowa, *Schimper*, 922! 936! 1053! Mettaro, 8300 ft., *Schimper*, 1036! Gajeh Merki, *Schimper*, 1037! Mount Zladscha, 9300 ft., *Schimper*, 1040! Berrechowa, 5200 ft., *Schimper*, 1048! Mettgalo, *Schimper*, 1050! Jelajeranne, *Schimper*, 714! 1795! and without precise locality, *Schimper*, 1056! Samen; Jaja, 6000 ft., *Schimper*, 294! Mount Bachit, *Schimper*, 641! Agrina, 6000 ft., *Schimper*, 907! Boran Country; Lake Harimiya, *Drake-Brockman*, 50! British Somaliland: Golis Range, *Drake-Brockman*, 186! 471! Waggar Mts.; Godais, 5600 ft., *Lort-Phillips*! and without precise locality, *Drake-Brockman*, 34! Socotra: Keregnigiti, *Schweinfurth*, 482! *Balfour*, 386! British East Africa: Lake Naivasha, 6000 ft., *Scott Elliot*, 6536!

**Lower Guinea.** Damaraland: between Nauchas and Areb, in beds of streams, *Pearson*, 9029! and without precise locality, *Nels*, 75!

The upper end of the peduncles sometimes bears long soft silky usually obliquely spreading hairs. Such forms occur throughout the area of the species, and are not otherwise separable. They are frequently enumerated as *Andropogon hirtus*, var. *podotrichus*. Of the specimens quoted above, those marked with an asterisk are referable to this form, so far as I have seen them.

Common throughout the Mediterranean region, and in South Africa. Chiovenda (*l.c.*) enumerates very numerous specimens under *Andropogon hirtus* (incl. var. *podotrichus*) from all parts of Eritrea where the plant is evidently very common

*H. pubescens* Hackel. Uganda, Senegal, West

None of them has been seen by me, except *Pappi*, no. 4807, which is quoted above.

✓ 13. *H. soluta*, (Stapf) Annual (?), 4-5 ft. high. Culms in scanty fascicles, erect, stout, glabrous, simple and 3-noded below the panicle, sparingly rooting from the lower nodes. Leaf-sheaths terete or upwards keeled, tight, firm, glabrous and smooth; ligules scarious, oblong,  $1\frac{1}{2}$  lin. long; blades linear from a hardly attenuated base, very long and finely tapering upwards, up to over 1 ft. by 4 lin., firm, glabrous, scabrid along the margins, otherwise smooth, midrib wide and whitish or pinkish on the upper side, primary lateral nerves 3 on each side. Spatheate panicle large, subeffuse, up to 2 ft. by over  $\frac{1}{2}$  ft., of 6 or 7 distant, upwards up to 8- (or more-) rayed mostly mixed tiers; compound rays few with each tier (the lowest tier 2-rayed), 3- or 2-noded, up to  $\frac{3}{4}$  ft. long, slender, glabrous, simple rays filiform, more or less compressed and angular, 1-2 in. long; lower and intermediate subtending leaves resembling the preceding leaves, but with much narrower and upwards shorter blades. Spatheoles very narrow, at length inrolled, tapering to a fine point, up to over  $2-2\frac{1}{2}$  in. long, glabrous, reddish; peduncle filiform, equalling or more usually exceeding the spatheoles and exerted from them subterminally, arching or recurved in a semi-circle upwards, but straightened out after the shedding of the racemes, minutely pubescent with long fine white tubercle-based hairs from the curvature. Racemes parallel, nodding, at length epinastically reflexed, slender,  $\frac{4}{5}-1$  in. long, 8-11-awned per pair, pale, loosely and finely greyish-villous, lower with a short, upper with a long ( $1-1\frac{1}{2}$  lin.) base, both slender except for the swollen epinastic cushions, pubescent in the fork, otherwise glabrous or with a few short or long hairs, very obliquely truncate and narrowly auricled; joints 5-6, filiform, subobliquely truncate,  $1\frac{1}{2}$  lin. long, shortly ciliate, cilia white,  $\frac{1}{2}$  lin. long; pedicels similar, slightly longer. Homogamous pair of spikelets 1 at the base of the lower raceme only, or 0. Fertile spikelets linear-oblong, including the callus about  $1\frac{1}{2}$  lin. long, pale or slightly tinged with pink; callus slender, subacute,  $\frac{1}{2}-\frac{3}{4}$  lin. long. Glumes equal, chartaceous; lower minutely truncate, thin, almost membranous, more or less finely hairy (hairs white), dorsally flattened, margins narrowly involute and upwards inflexed, keels short, fine, scaberulous, nerves 9-11, of which 5 are intracarpinal, evanescent below; upper glume membranous, 3-nerved, sparingly hairy above. Lower floret reduced to a broad-oblong truncate hyaline reversedly ciliate valve,  $1\frac{3}{4}$  lin. long. Upper floret ♀: valve stipitiform, minutely 2-dentate, ciliate; awn 2 in. long, column dark-brown, fulvous-puberulous, bristle pale; valvule 0. Anthers 1 lin. long. Grain oblong, dorsally slightly compressed,  $1\frac{3}{4}$  lin. long. Pedicelled spikelets ♂, lanceolate, acute, up to  $3\frac{1}{2}$  lin. long, sparingly hairy or almost glabrous; lower glume 11-nerved with scabrid keels, upper as in the sessile spikelets; valves hyaline, upper narrowly cuneate, 1 lin. long, nerveless.—





+ *Cymbopogon solutus*, Stapf in Journ. de Bot. 2me sér. ii. 211, and in Cheval. Sudania, 180.

North Central. Shari territory: between Bouso and Fort Archambault, *Chevalier*, 10490 bis! 10507! Upper Oubangui River, *Chevalier*, 5406!

✓ Var. *violascens*, Stapf. Spikelets slightly longer than in the type, strongly tinged with violet, minutely and usually scantily pubescent, the pedicelled and homogamous  $3\frac{1}{2}$ -4 lin. long. — us

+ Upper Guinea. Northern Nigeria: Katagum District, *Dalziel*, 263!

(Stapf)

✓ 14. *H. bagirmica*, Stapf. Annual. Culms solitary or in scanty fascicles, erect, terete, glabrous, smooth, up to 3 ft. high, simple, 3-noded below the panicle. Leaf-sheaths terete, the lowest usually very short, more or less loosely hairy or the upper glabrous; ligules rounded, scarious,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long; blades linear from an equally wide often slightly constricted base, tapering to a slender point, over  $\frac{1}{2}$  ft. by 2-4 lin., somewhat flaccid, with long loose scattered hairs in the lower part; midrib slender, lateral primary nerves about 3 on each side, very slender. Spatheate panicle lax, scanty, of 4-5 distant few-rayed tiers; rays all or nearly all simple, the lowest almost 3 in., the uppermost  $1\frac{1}{2}$  in. long, slender, filiform; lower subtending leaves with well-developed blades, the following becoming rapidly spatheoloid. Spatheoles narrowly lanceolate, produced into a very long slender acumen, 3 in. by  $1\frac{1}{2}$  lin., scarious, reddish, glabrous or here and there with a long fine hair, very soon inrolled, and at length tightly clasping the peduncle; peduncle slender, filiform, at length exceeding the sheath (sometimes by more than 1 in.), more or less recurved at the tips with numerous stiff spreading yellowish tubercle-based hairs, 2-3 lin. long, from the curvature. Racemes subcontiguous, rather loose, at length more or less epinastically reflexed, 1- $1\frac{1}{4}$  in. long, 6-8-awned per pair, greyish-pubescent; bases more or less unequal, one very short, the other up to 1 lin. long, pubescent in the fork, otherwise glabrous, or with a few stiff yellowish hairs, both very obliquely truncate and produced into a subulate or lanceolate auricle; joints and pedicels finely filiform, obliquely truncate,  $1\frac{1}{4}$ - $1\frac{1}{2}$  lin. long, shortly white-ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-lanceolate, 3- $3\frac{1}{2}$  lin. long, greyish-pubescent; callus very slender and acute,  $\frac{3}{4}$ -1 lin. long, densely and shortly bearded. Glumes equal, chartaceous, the lower minutely truncate, pale greyish or silvery pubescent all over, up to 9-nerved, nerves very faint, margins narrowly involute; upper glume deltoid-acute, thinner, 3-nerved, ciliate. Lower floret reduced to a linear-oblong truncate sub-2-nerved ciliate hyaline valve, 2- $2\frac{1}{4}$  lin. long. Upper floret ♂: stipitiform, minutely 2-dentate, awn 1- $1\frac{1}{2}$  in. long, column fulvo-pubescent. Valvule 0. Pedicelled spikelets ♂, narrowly lanceolate, very acute, pale reddish,  $3\frac{1}{2}$ - $4\frac{1}{2}$  lin. long; lower glume subherbaceous, 7-9-nerved, sometimes shortly aristulate, more or less

pubescent; upper glume membranous, acute, 3-nerved, ciliate; valves hyaline, oblong-linear, ciliate, the lower  $3\frac{1}{2}$ –4 lin. long, 2–3-nerved, the upper slightly shorter, 1-nerved; anthers up to 2 lin. long.—*Cymbopogon bagirmicus*, Stapf in Journ. de Bot. 2me sér. ii. 214. *Andropogon bagirmicus*, Cheval. Sudania, 166. *Andropogon brachypodus*, Stapf ex Cheval. Sudania, 167 (name only).

North Central. Bagirmi: Moito, Baro, and Aoumi, *Chevalier*, 9849! 9795! 9850! Between Fort Lamy and Mandjofa, *Chevalier*, 10290!

✓ 15. *H. grallata*, Stapf. Perennial, over 4 ft. high, densely tufted with intravaginal innovations. Culms stiffly erect, comparatively slender, up to 2 lin. in diam., terete or very slightly compressed below, almost wiry, glabrous and smooth, simple and 5–6-noded below the panicle. Leaf-sheaths terete or the lowermost compressed upwards, firm, striate, glabrous and smooth or the lower more or less hirsute upwards, the lower slipping off the stem, the upper tight; ligules very short, truncate, scarious, glabrous or hairy from behind, ciliate; blades linear from an equally wide or very slightly attenuated base, long-tapering to a fine point, up to 6 or even 10 in. by 2–2½ lin., hard, rigid or flexuous in the upper part, flat, more or less greyish-villous when young, at length more or less glabrescent, scaberulous on the nerves on the upper side, margins almost smooth except towards the tips; midrib very slender, lateral nerves numerous, very close, slightly prominent above, about 4 primary ones with 3 secondary between. Inflorescence 1½–2 ft. long, of 4–5 very distant few-rayed mixed or more often simple tiers, or the lowest branch undivided and few-noded; subtending leaves with blades rapidly decreasing upwards, the lower resembling the preceding leaves; simple rays 3–4 in. long, filiform, glabrous or more or less hairy. Spatheoles very narrow, sublinear to linear-lanceolate, acuminate, very early tightly inrolled, 3–4½ in. long, subscarious, dull green or reddish, more or less softly hairy to almost villous; peduncles stoutly filiform, equalling the spatheoles or slightly exceeding them, slightly curved upwards or almost straight, pubescent with some fine longer hairs in the upper part. Racemes slender, somewhat loose, at length more or less spreading, but not epinastically reflexed, up to over 2 in. long, about 12-awned per pair, loosely greyish-villous; bases stiff, slender, filiform, one very short, the other 3–4 lin. long, more or less hairy or almost glabrous; joints about 6, finely filiform, very obliquely truncate, 2 lin. long, densely white-villous on the back and ciliate; pedicels similar, up to over 3 lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets sublinear, up to 5 lin. long (including the callus), pale brown, loosely greyish-villous; callus very slender, pungent, 1½ lin. long, white-villous all over. Glumes equal, both hairy; lower chartaceous, somewhat rounded on the back, truncate, margins involute all along, nerves about 7 with 2

WS

*H. grallata* Stapf. *Rhodocoma* Engelm. 1850





shorter ones between the first and second lateral nerves; upper glume lanceolate, subchartaceous, produced into a bristle up to 3 lin. long, 3-nerved, reversedly ciliate from the hyaline margin. Lower floret reduced to a linear-oblong obscurely 2-nerved reversedly ciliate valve, 3 lin. long. Upper floret ♂, substipitiform, deeply 2-lobed; lobes over 1 lin. long, ciliate; awn fine, whitish, bent and pubescent below, the middle; valvule 0. Anthers  $1\frac{3}{4}$  lin. long. Pedicelled spikelets ♂, narrowly linear-lanceolate, resembling the sessile in colour and tomentum, passing gradually into the pedicel below; glumes subequal, acute, chartaceous, the upper about 11-, the lower 6-8-nerved; valves hyaline, reversedly ciliate, lower linear-oblong, 3 lin. long, 3-nerved, upper shorter, linear, 1-nerved; anthers up to 2 lin. long.

+ **Lower Guinea.** Angola: Benguella; (country of the Ganguellas and Ambuelas,) *Gossweiler*, 1842! (common in open woods at the sources of the River Sobi, Kuito River, *Gossweiler*, 4040! (very common in open woods at) Muene Equeha, Quiriri River, *Gossweiler*, 2781! *Ms.*)

(Hack.)

✓ **16. H. Barteri, Stapf.** Annual, up to 6 or even 8 ft. high. Culms erect, solitary or fascicled, slender, simple and 3-5-noded below the panicle. Leaf-sheaths terete, or the lower keeled upwards, glabrous and smooth; ligules very short, truncate, ciliate, glabrous; blades narrowly linear from an equally wide or slightly attenuated base, up to 1 ft. by  $1\frac{1}{2}$ -2 lin., long-tapering to a fine point, somewhat flaccid, glabrous or hairy behind the ligule, more or less rough all over the upper surface and scaberulous along the margins, midrib slender, lateral nerves close and fine, slightly prominent above. Spatheate panicle decompound, rather dense, of about 7 upwards approximate tiers, most of the rays of the primary tiers (except of the uppermost) compound, some of the lowest up to 4-noded and up to over  $\frac{1}{2}$  ft. long, with secondary and occasionally tertiary tiers, the majority 1-noded, bearing a fan-shaped frequently many- (15- or more-) rayed secondary tier, these fan-shaped tiers more or less imbricate, ultimate rays about  $\frac{1}{2}$  in. long, very slender; lower subtending leaves similar to the preceding ones, the following spatheaceous with narrow reduced blades, or the uppermost spatheoloid and up to over 3 in. long. Spatheoles very narrow, linear, long-tapering to a fine point,  $1\frac{1}{2}$ - $1\frac{3}{4}$ , rarely 2, in. long, scarious, reddish, at length inrolled and almost subulate; peduncles very finely filiform, slightly flexuous or quite straight, finely scaberulous upwards, sometimes with a few very fine white hairs, permanently shorter ( $1$ - $1\frac{1}{4}$  in. long) than the spatheole. Racemes subparallel or the lower more or less spreading, never epinastically reflexed, rather loose, 4-5 lin. long, 2-awned per pair, greenish, one sessile, the other with a very finely filiform base,  $2\frac{1}{2}$ - $4\frac{1}{2}$  lin. long and glabrous, or very minutely puberulous above the homogamous spikelets, bases disarticulating very obliquely, and tips subsubulate; terminal pedicels

finely filiform, shortly ciliolate, up to  $1\frac{1}{2}$  lin. long, those of the homogamous pairs shorter, finely puberulous to almost glabrous. Homogamous pair of spikelets 1 at the base of each raceme. Fertile spikelet linear-oblong, subacuminate, dorsally flattened and rounded at the sides, including the callus  $2\frac{1}{2}$  lin. long, glabrous, pale with reddish tips; callus 1 lin. long, bearded with white hairs, the uppermost of its own length. Glumes equal, thinly chartaceous, lower minutely truncate or 2-denticulate, reddish upwards, 9-nerved, the inner 3 or 5 nerves more or less raised on the back particularly towards the tips; margins very narrowly involute, inflexed in the upper quarter, keels fine, scabrid; upper glume oblong, very shortly deltoid-acute to subtruncate, 3-nerved, ciliolate upwards. Lower floret reduced to a linear-oblong obtuse spreadingly ciliate nerveless hyaline valve. Upper floret ♂; valve stipitiform with 2 small hyaline teeth, awn  $1\frac{1}{4}$  to over  $1\frac{3}{4}$  in. long, slender, column fulvously hairy, the hairs varying up to  $1\frac{1}{2}$  lin.; anthers  $\frac{3}{4}$  lin. long. Pedicelled spikelets ♂ (or neuter?), linear-lanceolate, 2– $2\frac{1}{2}$  lin. long, glabrous; lower glume very acute, mucronulate to subaristulate, 11-nerved, upper acute, 3-nerved, ciliate; valves hyaline, oblong, obtuse, reversedly ciliate, the lower sub-3-nerved, 2 lin. long, the upper shorter and narrower, 1 lin. long; anthers  $1\frac{1}{4}$  lin. long. Homogamous spikelets like the pedicelled but muticous.—*Andropogon Barteri*, Hack. in Flora, 1885, 124, and in DC. Monogr. Phan. vi. 635; Durand & Schinz, Consp. Fl. Afr. v. 707; Cheval. Sudania, 88.

**Upper Guinea.** Northern Nigeria: confluence of the Niger and Benue Rivers, *Barter*! Lokoja, *Dalziel*, 295! Southern Nigeria: Awka District; Agolo, Obu, *Thomas*! Cameroons: Benue Basin; Bogalo River, *MacLeod*!

**North Central.** Upper Oubangui: basin of the Umbella, Kaga Do near Damba, *Chevalier*, 5948! 5925!

Chevalier's no. 5925 collected along with 5948 consists of specimens only  $\frac{1}{2}$ –1 ft. high, with spatheoles and peduncles somewhat longer than usual, but in other respects identical with the ordinary form.

✓ **Var. *calvescens***, <sup>(Hack.)</sup> Stapf. More robust than the type, up to 10 ft. high. Culms up to  $2\frac{1}{2}$  lin. in diam.; ligules up to  $1\frac{1}{2}$  lin. long; blades up to 1 ft. by  $1\frac{1}{2}$ – $2\frac{1}{2}$  lin., glaucous, smooth except upwards and along the margins, midrib sometimes stout towards the base, 2–3 of the lateral nerves more prominent than the others; peduncles at length more or less equalling the spatheole; the upper raceme with 2 homogamous pairs. Fertile spikelets more acuminate; awns up to over 2 in. long, their hairs not exceeding 1 lin. Pedicelled spikelets 3 lin. long.—*Andropogon filipendulus*, var. *β calvescens*, Hack. in DC. Monogr. Phan. vi. 635 (Schweinfurth's specimens).

**Nile Land.** Jur: Ghattas' Great Seriba, *Schweinfurth*, 2332! 2421! Bahr el Jebel: Mongulla Province; Giggig, *Brown*, 1447! Uganda: Nile Province, *Dawe*, 947!

This may perhaps be a distinct species and it inhabits a distinct geographical area, but the general aspect and the structure of the spikelets are so like those of typical *H. Barteri* that I hesitate to separate it specifically.

✓ **17. *H. filipendula***, <sup>(Hochst.)</sup> Stapf. Perennial, 3–5 (rarely 7) ft. high, tufted from an oblique often much-branched rhizome, covered with





short firm cataphylls or their fibrous remains; innovations mostly extravagant. Culms erect, slender, glabrous, 4-5-noded below the panicle, branched from the lower nodes, very rarely simple, the lowest branches barren, the following mixed. Leaf-sheaths tight, terete, or the lower keeled upwards, glabrous and smooth, very rarely sparingly hairy; ligules up to  $\frac{1}{2}$  lin. long, truncate, scarious; blades narrowly linear from an equally wide base, tapering upwards to a long fine point, up to over 1 ft. by  $\frac{3}{4}$ -2 (rarely 3) lin., rather firm, flat, or with revolute margins, glabrous and smooth except upwards and along the scaberulous margins, or slightly bearded at the very base, or more or less hairy to hirsute. Spatheate panicle very narrow, contracted, 1-3 ft. long, of 4-6 or in very robust specimens up to over 8 distant or upwards approximate tiers; primary tiers few-rayed, mostly mixed, or the uppermost sometimes up to 8-rayed and then more or less fan-shaped; compound rays often very long and up to 5-noded, bearing secondary and occasionally tertiary tiers, ultimate rays  $\frac{3}{4}$ -1 in. long, finely filiform; lower subtending leaves like the preceding ones, the following spathaceous with reduced narrow blades, the upper spatheoid, up to 3 in. long. Spatheoles very narrowly linear, tapering to a setaceous point up to over 2 in. long, scarious, reddish, glabrous, finally tightly inrolled; peduncles very finely filiform, slightly scaberulous upwards, usually with very fine white hairs up to 2 lin. long, at length straight and slightly shorter than or equalling or exceeding the spatheoles by  $1\frac{1}{4}$ -1 in., in extreme cases up to  $3\frac{1}{2}$  in. long. Racemes subparallel, 5-7 lin. long, 2-awned per pair, greenish or tinged with dark purple, the lower sessile, the upper with a very finely filiform base  $2\frac{1}{2}$ -4 lin. long, glabrous or minutely puberulous above the homogamous spikelets, bases disarticulating very obliquely and their tips subsubulate. Terminal pedicels finely filiform, shortly ciliolate, not much over 1 lin. long, those of the homogamous pair shorter, sparingly hairy or glabrous. Homogamous pairs of spikelets 1 at the base of the lower, 2, somewhat distant, at the base of the upper raceme. Fertile spikelets linear-oblong, dorsally flattened and rounded on the sides, including the callus 3-4 lin. long, glabrous or sparingly hairy, pale with reddish tips; callus slender, acute, up to 1 lin. long, bearded with white hairs. Glumes equal, thinly chartaceous, lower 2-denticulate, 9-nerved, the inner nerves more or less raised on the back, particularly towards the tips, margins very narrowly involute, inflexed in the upper quarter, keels very fine, scaberulous; upper glume oblong, deltoid-acute, 3-nerved, ciliolate upwards. Lower floret reduced to a linear-oblong obtuse reversedly ciliate hyaline valve. Upper floret ♂: valve stipitiform, with 2 small hyaline teeth, awn about 2 in. long, slender, column fulvously hairy, hairs up to 1 lin. long; valvule 0. Pedicelled spikelets ♂, linear-lanceolate, 3 (rarely  $3\frac{1}{2}$ ) lin. long, glabrous or sparingly hairy; lower glume produced into

a bristle up to 3 lin. long, very closely 11-nerved, upper acute, 3-nerved, ciliate; valves hyaline, linear-oblong, reversedly ciliate, the lower obtuse, 1- to sub-3-nerved, the upper emarginate, 1-nerved; anthers 1 lin. long Homogamous spikelets like the pedicelled but muticous, or only shortly aristulate.—*Andropogon filipendulus*, Hochst. in Flora, 1846, 115; Steud. Syn. Pl. Glum. i. 389 (*filipendulinus*); Stapf in Dyer, Fl. Cap. vii. 362; Eyles in Trans. Roy. Soc. S. Afr. v. 295. *A. f.*, var. *calvescens* (partly), Hack. in DC. Monogr. Phan. vi. 635; Durand & Schinz, Consp. Fl. Afr. v. 712 (partly). *Cymbopogon filipendulus*, Rendle in Cat. Afr. Pl. Welw. ii. 157 (incl. var. *angolensis*), and in Journ. Linn. Soc., Bot., xl. 227.

**Nile Land.** Uganda: Kipayo, 4000 ft., *Dummer*, 526! Kisumu, 3650 ft., *Dummer*, 698! 1781! Fumbua, 4000 ft., *Dummer*, 3097! Kavirondo, common, *Scott Elliot*, 7109! *Linton*, 91! 1 degree north, covering low ground, *Speke & Grant*, 525! and without precise locality, *Maitland*, 66! 75! British East Africa: foothills of Leikipia, *Gregory*! Mombasa, *Turnbull*, 6! and without precise locality, *Powell*, 19! 139!

**Lower Guinea.** Belgian Congo: Banana District; Moanda, *Vanderyst*! Stanley Pool District; Mokaba, *Vanderyst*! Angola: Pungo Andongo; Sansamanda, in meadows, *Welwitsch*, 2773! Malanje; between Umziga and Luculla, *Gossweiler*, 902 partly! N'Jaia, near Munongue, *Gossweiler*, 3119! inundated banks of the Quiriri River near Kassuango, *Gossweiler*, 3719! Huilla; thickets of Morro de Monino, *Welwitsch*, 2948b! 7524!

**Mozambique Distr.** German East Africa: Usambara; Kwa Mshuza, in forest, *Holst*, 8954! in old cultivated land at Muoa, *Holst*, 3118! Portuguese East Africa: east coast of Lake Nyasa, *Johnson*, 34! Nyasaland: Shire Highlands, *Adamson*, 102! 197! between Kondowe and Karonga, 2000–6000 ft., *Whyte*! Rhodesia: Mumbwa, *Mrs. Macaulay*, 32! 60! M'rawa, in open veldt, *Appleton*, 13! Broken Hill, *Rogers*, 7701! Choma, 3500 ft., *Rogers*, 8093! Bulawayo, *Rogers*, 5898, 13508, 5869! *Jeffries*, 69. Salisbury, *Mrs. Craster*, 1! 74! *Flanagan*, 3003! Umtali, *Sawer*, 3! *Engler*. Charter District, *Mundy*! North Mazoe District, *Mundy*! Gazaland: North Melsetter, 4000–6000 ft., *Swynnerton*, 1687! Chirinda, *Swynnerton*, 1640! Upper Busi River, 3000–3500 ft., *Swynnerton*, 985! 988! 990! Nyahodi River, 4000 ft., *Swynnerton*, 1660 A!

**South Central.** Belgian Congo: Eastern Province; Albertville, *Descamps*!

Var. *pilosa* (Hack. & S.) Stapf. Heterogamous pairs of spikelets usually 2 (or rarely 3) in each raceme, or at least in the upper. Spikelets very hairy, racemes therefore silvery or greyish-villous, their indumentum contrasting with the fulvous awns.—*Andropogon filipendulus*, Hochst. l.c. (partly); *A. f.*, var. *pilosus*, Hack. l.c.; Durand & Schinz, l.c. *A. finitimus*, var. *rectirameus*, Hack. in Bolet. Soc. Brot. iii. 137 (name only).

**Nile Land.** British East Africa: Eastern Kenya, 4500 ft., *Battiscombe*, 851! Makindu, *Linton*, 105! Nairobi, *Dowson*, 241!

**Lower Guinea.** Angola: Benguella; sunny gravelly slopes at Munongue, *Gossweiler*, 4150! 4151! Mossamedes; near Huilla, *Pearson*, 2718! between Chibia and Quihita, *Pearson*, 2725! Serra de Chella, at Lobango, *Newton*, 32!

**Mozambique Distr.** German East Africa: Kilimanjaro; below Majame, 3300 ft., *Volkens*, 1576! Muka, *Kaessner*, 899! Portuguese East Africa: Beira, *Rogers*, 5945! Rhodesia: Mumbwa, *Mrs. Macaulay*, 60! Salisbury, *Nobbs*, 630! 637! 669! 670! *Eyles*, 641! Sykinga, *Nobbs*, 647!

The form described as var. *pilosa* hardly deserves the status of a variety. According to *Gossweiler* it grows with the ordinary form at Munongue; it has also been collected along with it in Rhodesia and Natal. The species in its typical form has been found in Ceylon (*Andropogon filipendulus*, var. *Thwaitesii*,





Hack.), and in the Philippines. *Andropogon lachnatherus*, Benth. (*A. filipendulus*, var. *lachnatherus*, Hack.), from Australia, is also conspecific. Its spikelets are much less hairy than those of the Angolan and British East African plants referred here to the variety *pilosa*. The Khasia plant quoted under *Andropogon filipendulus* in Hook. f. Fl. Brit. India, vii. 210, is a perfectly distinct species of *Hyparrhenia*. *H. filipendula* is often found on abandoned plantations, and its occurrence in India, Malaya and Australia may possibly be due to casual introduction.

(Stand.)

- ✓ 18. *H. familiaris*, Stapf. Perennial, caespitose, 2 to over 6 ft. high. Culms rather slender to moderately stout, terete, smooth, glabrous, simple and few-noded below the panicle. Leaf-sheaths glabrous, terete and tight except the lowest which are compressed and inclined to slip off the culm; ligules scarious, truncate, reddish, ciliolate; blades linear from a gradually attenuated or almost equally wide base, long-tapering to a fine point, up to 1 ft. by 1-3 lin., dull green, flexuous or rigid, glabrous, rough upwards, margins scabrid, midrib slender, primary nerves 3-4 on each side, slender. Spatheate panicle leafy, narrow, lax, up to 2 ft. long; primary internodes 4-7, the lowest up to over 6 in. long, the following very gradually decreasing, the uppermost much shorter; lower tiers of 2 or 3 compound 2-3-noded rays, up to  $\frac{3}{4}$  ft. long, bearing secondary tiers only, the following mixed, 3-5-rayed, the uppermost of up to 6 simple very slender rays, 3-2 in. long and scantily bearded at the insertion of the spatheole—or the whole inflorescence very much reduced with only 2 or 3 tiers of simple rays; lower subtending leaves resembling the preceding leaves, the following with inflated sheaths and narrow blades, which often overtop the panicle, the uppermost spatheoloid. Spatheoles linear-lanceolate, 2-3 in. by 1-1½ lin., scarious, reddish-brown, glabrous, at length inrolled and very narrow; peduncles slender, filiform, with a beard of white or yellowish spreading hairs below the tips, usually permanently enclosed in and always shorter than the spatheole, straight when mature. Racemes subparallel or more or less spreading, loose, up to 1 in. long, 3-5-awned per pair, olive-green tinged with purple or brownish, the lower subsessile, the other with a slender filiform glabrous or subglabrous base, 2-2½ lin. long; joints filiform, ciliate, over 1 lin. long, very obliquely truncate and subauriculate; pedicels filiform, ciliate, 2 lin. long. Homogamous pairs of spikelets 1 at the base of the lower, 2 (normally) at that of the upper raceme. Fertile spikelets linear-oblong, flattened on the back upwards, rounded on the sides, including the callus 3-3½ lin. long, reddish upwards, glabrous; callus slender, very acute, up to over 1 lin. long. Glumes equal, chartaceous, the lower narrowly truncate, finely 9-nerved, nerves rather distinct towards the hyaline teeth, margins involute, inflexed in the tips, keels very short, scaberulous; upper glume deltoid-truncate, narrowly oblong-boat-shaped, 3-nerved, spreadingly ciliate upwards. Lower floret reduced to an oblong very obtuse faintly 2-nerved reversedly ciliate hyaline valve.

Upper floret ♂: valve stipitiform, shortly 2-toothed, awn slender, 2-2½ in. long, column fulvously hairy. Valve 0. Anthers over 1 lin. long. Pedicelled spikelets ♂, linear-lanceolate, reddish, glabrous, 3½-4 lin. long; lower glume produced into a bristle up to 2 lin. long, closely 11-nerved, tiers scabrid upwards; upper glume acute, 3-nerved, reversedly ciliate; valves hyaline, reversedly ciliate, the lower 3-nerved, up to almost 3 lin. long, the upper cuneate, emarginate, 1-nerved, shorter; anthers over 1½ lin. long. Homogamous spikelets like the pedicelled, but mucous and usually slightly longer.—*Andropogon familiaris*, Steud. Syn. Pl. Glum. i. 385; Hack. in DC. Monogr. Phan. vi. 636; Durand & Schinz, Consp. Fl. Afr. v. 711, and Études Fl. Congo. 316; Franch. in Bull. Soc. Hist. Nat. Autun, 1895, 24; De Wild. & Durand, Pl. Thonner. 3; Th. & Hél. Durand, Syll. Fl. Congol, 625.

Nile Land. Uganda: Entebbe, *Fuffe*!

Lower Guinea. Gaboon: Loango (quoted by Hackel, l.c.) and without precise locality, *Jardin! Griffon du Bellay!* Portuguese Congo: sea-shore at Cabinda, *Gossweiler*, 6446! Belgian Congo: Stanley Pool District; Kisanu, *Gillet*, 908! Kunzulu, Tua, Wombali, Mokaba and elsewhere, *Vanderyst*, 3780! 3785! 3833! 3855! 4086! 4517! 4858! 5211! Cataract District; Lutete, *Hens*, A. 225 partly! Kwango District; Bandundu, *Vanderyst*, 5164!

South Central. Belgian Congo: Aruwimi District; Molanga, near Dabo, *Thonner*.

*Hens*, A. 225, in the Kew and Paris collections, represents a mixture of *H. familiaris* and *H. diplandra* (?). Most of the pieces so numbered are evidently diseased (apparently affected by an *Epichloe*). In these the peduncles are glabrous and, compared with the spatheole, relatively shorter, whilst the spikelets are frequently enlarged (up to 6 lin. long), with irregularly developed florets, so that those which normally should be ♂ are either purely ♂ or ♂ with a rudimentary pistil, or neuter, whilst those which ought to be ♂ (particularly of the homogamous pairs) are neuter.

19. *H. Ruprechtii*, *Fourn. Mex. Pl. Gram.* 67. Perennial, forming dense caespitose clumps from a few to 10 ft. high, with intravaginal innovations. Culms rather stout, terete, glabrous, smooth, sometimes waxy-pruinose, simple and 3-4-noded below the panicle. Leaf-sheaths terete, or those of the innovations compressed and keeled, glabrous, smooth, very rarely hirsute, the lowest more or less persistent, those of the culm-leaves produced at the mouth into a triangular or lanceolate auricle up to 1½ lin. long; ligules scarious, broadly ovate, rounded, glabrous, up to over 12 lin. long, laterally adnate to the auricles of the sheath; blades linear from an equally wide or long-attenuated base, tapering to a fine point, up to over 1 ft. by 2 lin., rarely wider, somewhat rigid, with the margins frequently recurved, dull or glaucous green, rough on both sides, scabrid on the margins, glabrous or with some scattered spreading hairs towards the base, very rarely hairy all along on the under side; midrib somewhat stout downwards, broad and whitish on the upper side. Spatheate panicle erect, somewhat stiff, narrow and interrupted; primary internodes 4-6, rarely 7 or more, the lowest about ½ ft. long, the following very gradually, the upper-

19 = *A. dissoluta* (Nees) Hubert  
*Anthistiria dissoluta* Nees  
"Afr. aequinoctialis" Herb. Lindley.  
Hubbard says type is in Cambridge Herb. coll.  
Sierra Leone by St. Barry. — Kew Bull 1936:  
295. 1936.



most rapidly decreasing; lower tiers consisting of few mostly compound rays, the longest almost up to 1 ft. long, few-noded, bearing secondary tiers only, upper of 4-6, rarely more, mostly simple tiers, ultimate rays  $1-\frac{2}{3}$  in. long, slender, filiform; lowest subtending leaves like the preceding ones, the following spathaceous with upwards rapidly decreasing very narrow blades. Spatheoles narrowly lanceolate, long-acuminate, mostly from 2-3 in. by  $1-1\frac{1}{2}$  lin., scarious, dull purple or reddish, glabrous, rarely more or less softly hairy, at length loosely inrolled from the margins and rather narrow; peduncles filiform, from less than 1 in. to  $1\frac{1}{2}$  rarely 2 in. long, very slightly curved or almost straight and hardly exerted from the spatheole, finely hairy towards the tips, hairs soft, not spreading. Racemes subcontiguous, laterally exerted from the spatheole, suberect and rarely nodding, never recurved or epinastically reflexed, up to over 1 in. long, 2-awned per pair, the lower sessile, the upper with a filiform glabrous or subglabrous base up to  $1\frac{1}{2}$  lin. long, both bases produced into a thin scarious oblanceolate or linear upwards denticulate whitish appendage  $2\frac{1}{2}$ -4 lin. long; pedicels slender, filiform, 2 lin. long, very shortly ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, excluding the callus  $3\frac{1}{2}$  lin. long, almost terete in cross section, greenish, glabrous; callus very slender and acute, up to  $2\frac{1}{2}$  lin. long, shortly bearded. Glumes subcoriaceous, lower 2-dentate or 2-mucronate, slightly flattened on the back with a narrow very pronounced groove projecting as a slender ridge on the inner side, 10-nerved, the 2 innermost nerves very close, lining the groove, like the others only visible by transmitted light, keels very short, like the tips scaberulous; upper glume oblong, shortly 2-lobed with or without a micro or bristle (up to over 1 lin. long) from the sinus. Lower floret reduced to a narrow linear-oblong 2-nerved ciliate hyaline valve,  $2\frac{1}{2}$  to almost 3 lin. long. Upper floret ♂: valve stipitiform, minutely 2-dentate, ciliate, awn mostly 3 in. (rarely only 2, or up to over  $3\frac{1}{2}$  in.) long, very shortly fulvously hirtellous. Valvule 0. Pedicelled spikelets ♂, subulate-lanceolate to linear-lanceolate, 6 lin. long, glabrous, pale green or faintly tinged with red or purple; lower glume subherbaceous, with or without a terminal bristle (up to 3 lin. long), 11-nerved, keels rigidly ciliolate upwards; upper membranous, very acute, 3-nerved, spreadingly ciliate; valves hyaline, narrowly linear-oblong, ciliate, 5 lin. long, the lower 3-, the upper 1-nerved; anthers  $2\frac{1}{2}$  lin. long. Homogamous spikelets similar to the pedicelled, but muticous.—*Andropogon arundinaceus*, Benth. in Hook. Niger Fl. 572, not of Willd. *A. antheasterioides*, Rupr. ex Martens & Galeotti in Bull. Acad. Brux. ix. 245 (name only), not of Hochst. *A. Ruprechtii*, Hack. in DC. Monogr. Phan. vi. 645; Stapf in Dyer, Fl. Cap. vii. 365; Cheval. Sudania, 163; Eyles in Trans. Roy. Soc. S. Afr. v. 297. *A. macrolepis*, Hack. in Flora, 1885,

125, and l.c. 646 (partly); and in Bull. Herb. Boiss. iv. App. iii. 11; Durand & Schinz, *Consp. Fl. Afr.* v. 717 (partly); K. Schum. in Engl. Pfl. Ost-Afr. C. 99; Pilger in Baum, Kunene-Samb. Exped. 174, 472; and in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr. Exped. ii. 44? *Cymbopogon Ruprechtii*, Rendle in Cat. Afr. Pl. Welw. ii. 160; and in Journ. Linn. Soc., Bot., xl. 227.

**Upper Guinea.** Ivory Coast: Adioukrou Country; Dabou, *Chevalier*, 17150! Dahomey: Zumbodje, *Newton*. Southern Nigeria: Lagos, *Macgregor*, 320! Awovo, *Dawodu*, 52! Quorra, *Vogel*, 102! *Barter*, 102! Northern Nigeria: Jeba, *Barter*, 281! Lokoja; the prevalent grass, *Richardson*! Katagum District, *Dalziel*, 265!

**North Central.** Bagirmi: *Massenia*, *Chevalier*, 9631!

**Nile Land.** Soudan: Shambe, *Brown*, 943! Uganda: Madi, *Speke & Grant*! Namayenza, 4000 ft., *Dummer*, 3081! Nandi Country; Sibum, *James*! and without precise locality, *Scott Elliot*!

**Lower Guinea.** Gaboon: Loango; Chinechoxo, forming savanas, *Soyaux*, 11! Portuguese Congo: Cabinda, *Gossweiler*, 6443! Belgian Congo: Banana District; Moanda, *Vanderyst*, partly! Stanley Pool District; Kisantu, *Gillet*, 672! Kimayala, *Van Houtte*! Kunzulu, *Vanderyst*, 5205! Wombali, *Vanderyst*, 4249! Kwango District; Baya, *Vanderyst*, 2620! Lutschima, *Vanderyst*, 2860! and without precise locality, *Butaye*, 2227! Angola: Pungo Andongo; Calunda, *Welwitsch*, 2712; Malange District, *Gossweiler*, 900! Benguella; gregarious along the Tiengo stream, Kuito River, *Gossweiler*, 2761! 3660! between the Kutue and Sobi streams, Kuito River, *Baum*, 777! Huilla; in wooded meadows near Monino, *Welwitsch*, 7523!

**South Central.** Kalahari: Gudon, *Schinz*, 655!

**Mozambique Distr.** German East Africa: Tanga, *Holst*, 2099! Portuguese East Africa: banks of the River Luabo, *Kirk*, 33! Shupanga, *Kirk*! Nyasaland: Tanganyika Plateau at Fort Hill, 3500-4000 ft., *Whyte*! Rhodesia: Salisbury District, *Mundy*! Matabeleland, *Jeffries*, 4, 22. Gazaland: North Melsetter, 4000-5000 ft., *Swynnerton*, 1605! 1686! Nyahodi River, 4000 ft., *Swynnerton*, 1659 A! Upper Buzi River, 3000-3500 ft., *Swynnerton*, 991!

Used for thatching in N. Nigeria.

Also in South Africa, Madagascar, and tropical America.

20. **H. macrolepis**, <sup>(Hack.)</sup> Stapf. Annual, 5-8 ft. high. Culms rather slender, simple below for about 6 very long internodes, then passing into the panicle. Leaf-sheaths tight or the lower somewhat loose, generally shorter than the internodes, glabrous and smooth, produced at the mouth into triangular-ovate auricles; ligules firmly scarious, broadly ovate, rounded, glabrous, about 2 lin. long, laterally adnate to the auricles of the sheath; blades linear from a slightly narrowed base, tapering to a long fine point, up to 1 ft. by 1½ to almost 3 lin., somewhat rigid, with the margins frequently recurved, dull green, glabrous, smooth on both faces except the scabrid tips and margins; midrib slender or somewhat stout downwards, whitish on the upper side. Spatheate panicle erect, narrow, of up to 6 more or less distant 3-6-rayed tiers; rays mostly simple or one or the other of the lowest tiers compound, up to 3-noded and up to over ½ ft. long; rays filiform, of the lowest tiers up to 3 in., of the upper very much shorter; lowest subtending leaves like the preceding ones, but with distinctly inflated sheaths, the following spathaceous, the upper with upwards decreasing very narrow blades. Spatheoles lanceolate,





long-acuminate, mostly 3 in. by  $1\frac{1}{2}$ –2 lin., scarious, purplish or reddish and more or less glaucescent, quite glabrous, at length inrolled from the margins and very narrow; peduncles filiform,  $1\frac{1}{2}$  in. long, enclosed in the spatheoles, finely hairy about 3 lin. below the tips, hairs soft, not spreading. Racemes subcontiguous, up to  $1\frac{1}{4}$  in. long, 2-awned per pair, laterally exerted from the spatheole, suberect, never recurved nor epinastically reflexed, the lower sessile, the upper with a filiform glabrous base up to 2 lin. long, both bases produced into a scarious linear upwards denticulate reddish appendage  $3\frac{1}{2}$ –5 lin. long; pedicels slender, filiform, 3 lin. long, very shortly ciliate up to near the tips. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, excluding the callus almost 4–5 lin. long, almost terete in cross section, greenish or yellowish, glabrous; callus very slender and acute, 2–3 lin. long, densely bearded, hairs of the beard up to  $1\frac{1}{2}$  lin. long. Glumes coriaceous, equal, lower 2-mucronate (mucros up to 1 lin. long), slightly flattened on the back with a narrow very pronounced groove projecting as a slender ridge on the inner side, 11-nerved, the slender middle nerve in the groove, which is flanked by the 2 stout innermost lateral nerves, all the nerves only visible by transmitted light, keels very short, like the tips and mucros scaberulous; upper glume oblong, shortly 2-lobed with a mucro or bristle (up to  $2\frac{1}{2}$  lin. long) from the sinus. Lower floret reduced to a linear-oblong 2-nerved ciliate hyaline valve  $3\frac{1}{2}$  lin. long. Upper floret ♂: valve stipitiform, minutely 2-dentate; awns stout, yellowish, up to 5 in. long, shortly fulvously hirtellous. Valve 0. Anthers 2 lin. long. Pedicelled spikelets ♂, linear to subulate-lanceolate,  $6\frac{1}{2}$ –8 lin. long, glabrous, olive-green or slightly reddish; the lowest glume subherbaceous, with or without a terminal bristle, up to 3 lin. long, very closely many-nerved, keels rigidly ciliate upwards; upper membranous, very acute, 3-nerved, spreadingly ciliate; valves hyaline, narrowly linear, ciliate,  $6\frac{1}{2}$  lin. long, the lower 3-, the upper 1-nerved; anthers  $2\frac{1}{2}$  lin. long. Homogamous spikelets similar to the pedicelled but mucicous or only shortly mucronate.—*Andropogon macrolepis*, Hack. in Flora, 1885, 125, and in DC. Monogr. Phan. vi. 646, (Schweinfurth's specimen only); Durand & Schinz, Consp. Fl. Afr. v. 717 (partly); Stapf in Dyer, Fl. Cap. vii. 366 (in note).

Nile Land. Jur: Ghattas' Great Seriba, Schweinfurth, 2361! 2411!

(Steud.)

✓ 21. *H. pseudocymbaria*, Stapf. Annual, up to over 3 ft. high. Culms erect or geniculately ascending, with powerful root-fibres, sometimes producing stilt-roots from the lower nodes, glabrous and smooth, rather slender, rarely up to 2 lin. thick, simple and 3- or 4-noded below the panicle, or with mixed branches from the lower nodes. Leaf-sheaths terete, moderately firm, most or at least the middle and upper ones shorter to much shorter than the

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1856

but given

*Hyparrhenia* not described there

internodes; ligules very short, rounded or truncate, glabrous; blades linear from a slightly or hardly narrowed base, long-tapering to a fine point from a few to over 12 in. by 2-6 lin., somewhat flaccid, flat, green, glabrous or very sparingly beset with fine spreading white hairs, slightly rough upwards and scaberulous along the margins, otherwise smooth; midrib slender; primary lateral nerves up to 4 on each side. Spatheate panicle interrupted, somewhat decomposed, up to  $1\frac{1}{2}$  ft. long; tiers about 6, remote below, approximate upwards, the lower of 2-4 compound rays, the upper mixed and like the terminal secondary tiers up to 10-rayed, often forming balls of spatheoles and racemes; compound rays up to 6-noded with the upper internodes much shortened, slender to finely filiform, often flexuous or nodding; ultimate simple rays  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, subcapillary if very numerous, laterally exerted from the spathe together with their linear-subulate prophylls; lower and intermediate spathes with distinct often coloured blades, usually much shorter than the panicle; secondary spathes much reduced, mostly scarious, often brightly coloured, with short blades, upwards rapidly assuming the shape of the spatheoles. Spatheoles permanently boat-shaped, usually more or less horizontal on the arched rays, broad-lanceolate in profile, acutely acuminate, about 1 in. long,  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. wide, thinly scarious, greenish or often brilliantly red or orange coloured, glabrous; peduncles finely filiform, 2-5 lin. long, with a spreading or deflexed beard below the tips and on the outer side, hairs white, 2-3 lin. long. Racemes subcontiguous, laterally and vertically exerted from the spatheoles, or epinastically reflexed, 4-5 lin. long, dense, 3-4- (rarely 5-) awned per pair, with very short densely bearded bases; joints 1-3, filiform,  $\frac{1}{2}$  lin. long, obliquely truncate, white-ciliate, cilia up to 1 lin. long; pedicels similar but more slender and 1 lin. long without the cilia. Homogamous pair of spikelets 1 at the base of the lower raceme only, neuter, larger than the heterogamous. Fertile spikelets sublinear,  $2\frac{1}{2}$  lin. long, pale; callus  $\frac{1}{2}$  lin. long, acute or subacute, shortly bearded. Glumes equal; the lower very minutely truncate or subacute, thinly chartaceous, flat on the back or somewhat rounded when mature, margins narrowly involute below and inflexed towards the tips, forming short fine scabrid keels, sparingly and shortly hairy, delicately 9-nerved; upper lanceolate-oblong, obliquely truncate, keeled upwards, 3-nerved, ciliate or almost so. Lower floret reduced to a delicate hyaline almost ciliate or subciliate valve over  $1\frac{1}{2}$  lin. long. Upper floret ♂, stipitiform, with an obscure hyaline margin, edentate; awn slender, 2- $2\frac{1}{2}$  in. long, column brown, fulvously hispidulous; valvule 0. Anthers  $\frac{3}{4}$ -1 lin. long. Grain linear-oblong, subterete, slightly compressed on the back,  $1\frac{1}{4}$  lin. long. Pedicelled spikelets (of the heterogamous pairs) neuter, linear-lanceolate, acute,  $2\frac{1}{2}$ -3 lin. long, aristulate, glabrous; lower glume minutely 2-dentate, produced into a fine bristle 2 lin. long, submembranous, subinvolute





along one margin, spinulously ciliolate along the other, nerves 7-8; upper glume thinner, mucronate, 3-nerved, erect, ciliolate; valves hyaline, linear-oblong to linear, erect-ciliolate, lower 2 lin. long, subobtuse, 1-nerved, upper slightly shorter, notched, almost nerveless. Spikelets of the homogamous pair similar to the pedicelled, but with a fine hyaline acumen and no bristle, the sessile much larger, about 4-5 lin. long,  $1\frac{1}{2}$  lin. wide, the other subsessile.—*H. quinqueplex*, Aschers. & Schweinf. Beitr. Fl. Aethiop. 306. *Andropogon cymbarius*, A. Rich. Tent. Fl. Abyss. ii. 466; Hack. in DC. Monogr. Phan. vi. 629; Durand & Schinz, Consp. Fl. Afr. v. 710 (partly); Schweinfurth in Bull. Herb. Boiss. ii. App. ii. 94 (?); Chiov. in Ann. Istit. Bot. Roma, viii. 288 (?). *Anthistiria pseudocymbaria*, Steud. Syn. Pl. Glum. i. 399. *A. quinqueplex*, Steud. l.c. 400.

**Nile Land.** Eritrea: Keren; Zad Amba, *Steudner*, 1094! Saraë; near Debarroa, along the River Mareb, *Pappi*, 409! Abyssinia: Mountains near Adowa, *Schimper*, 1098! Gennia, *Schimper*, 923! Jaja, 6000 ft., *Schimper*, 311! Tigre; Mai Zengettem, Antizo, 6000 ft., *Schimper*, 503! Gondar, *Massecy*, 14! and without precise locality, *Sabatier*! Soudan: Roseires, on the Blue Nile, *Brown*, 37! 38! and without precise locality, *Penton*!

If Schweinfurth's and Chioventa's specimens enumerated under *Andropogon cymbarius* be referable to this species, as is practically certain, the following localities will have to be added:—Eritrea: Amasen: Asmara, 5900 ft., *Schweinfurth*, 656; *Tellini*, 364. Barka; Messeam River, 4600 ft., *Schweinfurth*, 33, 34. Bogos; Keren, *Tellini*, 1291. Dembelas; along the Mai Ciagharit, *Pappi*, 6039. Mai Giahah, 5250 ft., *Pappi*, 6624. Mai Mappelles, *Schweinfurth*. Mensa, 5900-7900, *Terracciano & Pappi*, 559, 1186, 1522, 1829. Saraë; various places between 5900-6950 ft., *Pappi*, 56, 192, 590. Ocule Cusaï, *Pappi*, 6550-8500, *Pappi*, 1402, 1707. Marabus; Kohait, *Pappi*, 1002. Beni Amer, *Pappi*, 6322. Medri Od Tesfa, *Pappi*, 6576, 612, 6727.

(Hochst)  
**22. H. anthistirioides**, *Anderss.* in *Schweinf. Beitr. Fl. Aethiop.* 306. Annual. Culms very slender, erect, up to 1 ft. high, subterete, glabrous, smooth, simple and 4- or 5-noded below the inflorescence. Leaf-sheaths glabrous, smooth, the lower more or less compressed and keeled, the upper terete, produced at the mouth into a short triangular auricle; ligules scarious, very short, truncate, adnate to the auricles of the sheath; blades linear from an almost equally wide base, acutely acuminate, up to over 3 in. by  $1-1\frac{1}{2}$  lin., green, somewhat soft, very slightly rough all over including the margin. Inflorescence very scanty, of 3-2 very few-rayed tiers, rays simple, filiform,  $\frac{1}{2}-1$  in. long, arched or flexuous, glabrous. Spatheoles lanceolate, very long and finely acuminate, 1 to over  $1\frac{1}{2}$  in. long, scarious, pale or tinged with olive-brown or lurid purple, glabrous, boat-shaped during flowering, then loosely inrolled upwards; peduncles 4-6 lin. long, filiform, erect and enclosed in or arched and exserted from the spatheole, below the tips with a beard of yellowish tubercle-based spreading hairs up to  $2\frac{1}{2}$  lin. long. Racemes subcontiguous, laterally exserted, finally sharply epinastically deflexed, about 5 lin. long, 2-5-awned per pair, pale reddish or olive-

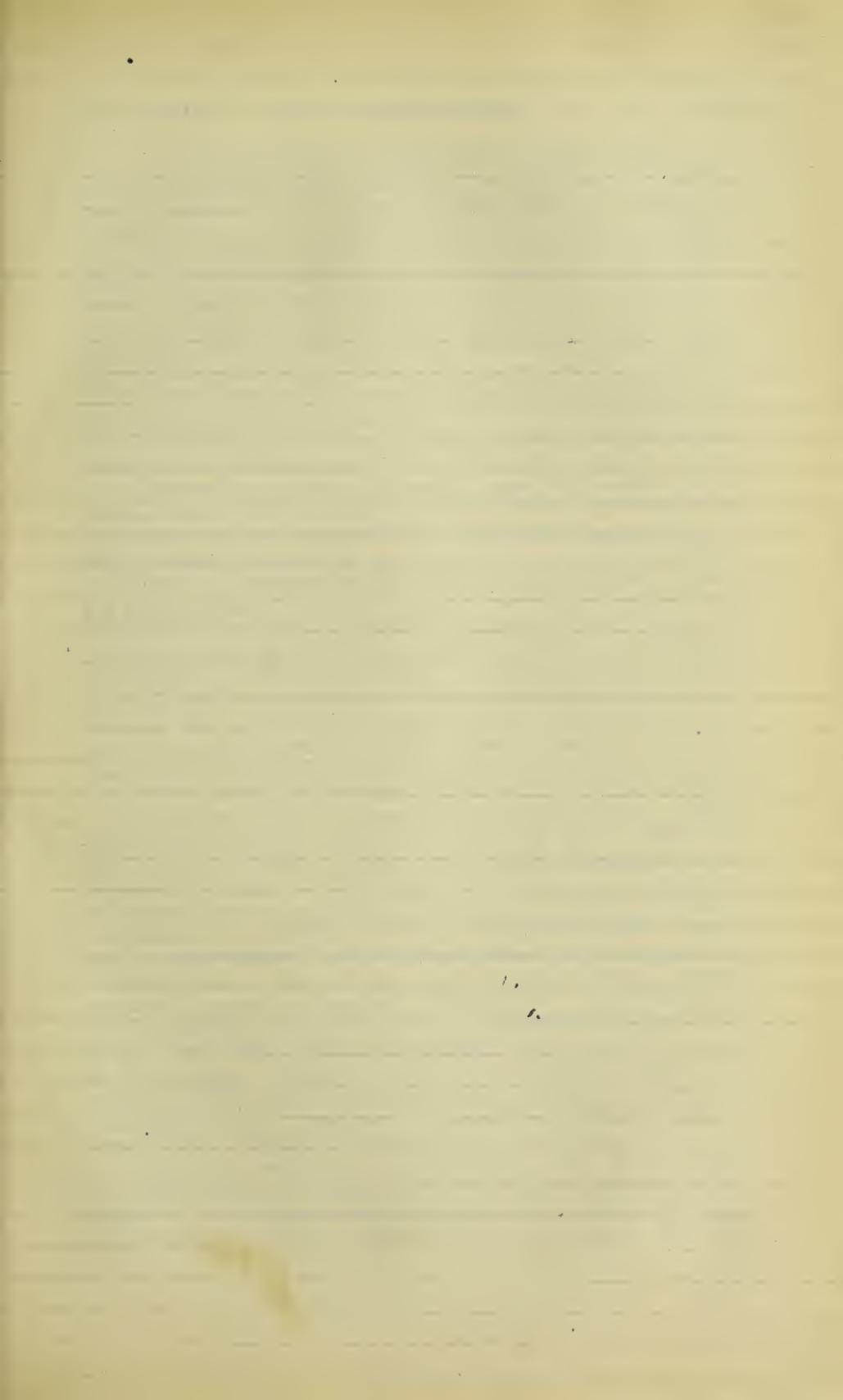
green, bases very short, subequal, pubescent and densely bearded with hairs like those of the peduncle, obliquely truncate and produced into an ovate to oblong firm auricle up to 1 lin. long; joints linear, about 1 lin. long, obliquely truncate, very densely and shortly ciliate; pedicels similar but more slender. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, rounded on the back to subterete, 3 lin. long including the callus, pale brownish upwards; callus subacute,  $\frac{1}{2}$  lin. long, densely bearded on the back. Glumes equal, lower firmly chartaceous, minutely 2-dentate, glabrous and smooth or sparingly pubescent or hispidulous to scaberulous, 7-9-nerved, nerves very obscure below the tips, except the middle nerve which becomes at length prominent between 2 fine longitudinal grooves, margins involute, keels very short and indistinct, scaberulous; upper glume obliquely truncate, mucronulate, 3-nerved, ciliolate upwards, grooved along the broad round keel. Lower floret reduced to an oblong obtuse faintly 2-nerved ciliolate hyaline valve. Upper floret ♂: valves stipitiform, edentate or minutely 2-toothed, awn stout, 2 in. long, column dark, fulvously hispid, bristle somewhat paler; valvule 0. Anthers  $\frac{3}{4}$  lin. long. Pedicelled spikelets neuter, reduced to the glumes, linear-lanceolate or flattened out broad lanceolate, 3-4 lin. long; lower glume thin, with a mucro or bristle up to 3 lin. long, keels rigidly ciliolate; upper glume shorter, very thin, 3-nerved. Homogamous spikelets similar to the pedicelled, up to 5 lin. long, always muticous.—*Andropogon anthistirioides*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 463; Steud. Syn. Pl. Glum. i. 386; Hiern in Trans. Linn. Soc. 2nd ser., Bot., ii. 33 (?); Hack. in DC. Monogr. Phan. vi. 630 (*anthistirioides*); Durand & Schinz, Consp. Fl. Afr. v. 706; K. Schum. in Engl. Pfl. Ost-Afr. C. 98; Chiov. in Ann. Istit. Bot. Roma, viii. 27.

Nile Land. Eritrea: Mensa; Sella Mogasas, Mount Ira, 7870 ft., *Terracciano & Pappi*, 865. Abyssinia: Shire Plateau, *Schimper*, 1822! 1832! Debra Sina, *Quartin-Dillon & Petit*, 68.

The specimen referred here by Hiern, *l.c.*, was collected by Serpa Pinto, 53, by the Ninda River (Angola, 21° E. long., 15° S. lat.).

(L.)

✓ 23. *H. cymbaria*, Stapf. Perennial, 6-20 ft. high (*Schweinfurth*), with a creeping branched slender rhizome closely covered with small glabrous hard cataphylls. Culms erect or ascending from a sometimes prostrate base, often rooting from the lower nodes, glabrous and smooth, slender or, in tall specimens, up to  $2\frac{1}{2}$  lin. thick, many-noded with vegetative branches from all or some of the lower nodes. Leaf-sheaths terete, glabrous, often ciliate along the margins, rarely hirsute with tubercle-based hairs or villous at the nodes, the lowest withering away, the middle and upper usually shorter than the internodes; ligules scarious, very short, up to  $\frac{1}{2}$  lin. long, rounded or truncate; blades linear from an often rounded and slightly con-





stricted base, long-tapering to a fine point,  $\frac{1}{2}$  to over  $1\frac{1}{2}$  ft. by 3-8 lin., rarely narrower, rigid to subflaccid, flat, dull green, sometimes slightly glaucous or suffused with purple, glabrous or delicately hirsute at the base with tubercle-based hairs, scabrid to spinulose along the margins, otherwise smooth or slightly rough, midrib slender, primary lateral nerves up to 5 (rarely 7) on each side, slender. Spatheate panicle often very large and dense, interrupted or lobed, decomposed, leafy,  $\frac{1}{2}$  to over 2 ft. long, in weak specimens, however, much reduced; tiers distant below, often approximate upwards, up to 10, few- to 5-rayed, usually mixed with numerous compound rays; compound rays 5- or more-noded with at least the upper internodes much shortened; ultimate (simple) rays finely filiform,  $\frac{1}{3}$ -1 in. long; primary spathes developed almost throughout as normal leaves with short sheaths and long blades which frequently overtop the panicle, secondary spathes much reduced, mostly scarious, reddish, with small blades, upwards rapidly assuming the shape of the spatheoles. Spatheoles permanently boat-shaped, usually more or less horizontal on the arched rays, broad-lanceolate or ovate-lanceolate in profile, acutely acuminate, mostly  $\frac{1}{2}$ - $\frac{3}{4}$  in. long (rarely 4 or 5 lin.),  $1\frac{1}{2}$ -2 lin. wide, thinly scarious, often brilliantly red or purple, glabrous; peduncles filiform, about 2-4 (rarely 5) lin. long, their tips densely bearded, hairs white or yellowish, up to 3 lin. long. Racemes sessile, laterally and usually vertically exerted from the spatheoles, at length epinastically more or less deflexed, dense, subcontiguous,  $2\frac{1}{2}$ -4 lin. long, 2-6- (mostly 4-5-) awned per pair, bases very short, densely bearded; joints like the pedicels slender filiform, truncate,  $\frac{1}{2}$ - $\frac{3}{4}$  lin., or the pedicels up to 1 lin. long, shortly white ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only, ♂ or neuter. Fertile spikelets linear-oblong, usually  $1\frac{3}{4}$ -2 lin. long, pale; callus very short, obtuse, bearded. Glumes equal, thinly chartaceous, lower minutely truncate, dorsally flattened, glabrous or pubescent, 7-9-nerved, nerves very faint below the tips; margins narrowly involute up to two-thirds, then inflexed, forming fine rigidly ciliate keels; upper minutely and obliquely truncate, 3-nerved, sparingly ciliate upwards. Lower floret reduced to a linear-oblong truncate obscurely 2-nerved or nerveless ciliate valve. Upper floret ♀: valve stipitiform, minutely 2-toothed; awn fine, 3-8 (rarely under 3) lin. long, column brown, hispidulous; valvule 0. Anthers up to 1 lin. long. Pedicelled spikelets ♂ or neuter, lanceolate to oblong, 2-2 $\frac{1}{2}$  lin. long, pale to deep reddish, glabrous or pubescent; lower glume acutely acuminate, 7-9-nerved, keels rigidly ciliate; upper acute, 3-nerved; valves hyaline, lower oblong obtuse, up to  $1\frac{1}{2}$  lin. long, faintly 1- to sub-3-nerved; upper shorter, linear to cuneate-linear or reduced or 0.—*Andropogon cymbarius*, Linn. Mant. Alt. 303; Spreng. in Mém. Acad. Pétersb. ii. 305 (1810); Stapf in Dyer, Fl. Cap. vii. 360; Pilger in Mildbr. Wiss. Ergebn. Deutsch.

Zentr.-Afr. Exped. ii. 44; Eyles in Trans. Roy. Soc. S. Afr. v. 295; not of Hack. *A. lepidus*, Hack. in DC. Monogr. Phan. vi. 625, partly; K. Schum. in Engl. Pf. Ost-Afr. C. 98; Chiov. in Istit. Bot. Roma, viii. 26, 288 (partly ?); var. *Tamba*, Schweinf. in Bull. Herb. Boiss. ii. App. ii. 15, 94. *Cymbopogon elegans*, Spreng., Pug. Pl. Nov. ii. 14; Roem. & Schult. Syst. Veg. ii. 833; Rendle in Cat. Afr. Pl. Welw. ii. 157, and in Journ. Linn. Soc., Bot., xl. 227. *C. cymbarius*, T. Thoms. in Speke, Nile, App. 652 (name); Rendle in Journ. Linn. Soc., Bot., xxxviii. 241. *Anthisteria cymbaria*, Trin. Androp. in Mém. Acad. Pétersb., 6me sér. ii. (1833), 323; Steud. Syn. Pl. Glum. i. 399; not of Roxb. *Anthistiria latifolia*, Anderss. in Peters, Reise Mossamb. Bot. ii. 562.

**Upper Guinea.** Cameroons: Bambuto range, 5000 ft., *Unwin*, 221!

**Nile Land.** Eritrea: Amasen; Mount Saviour, 3300-5900 ft., *Pappi*, 79! 5404, 5605! Mount Faghenat, 6550-8200 ft., *Pappi*, 5324. Mensa; Adinalai-Maldi, 6200 ft., *Terracciano & Pappi*, 1506; Dada, 4600 ft., *Terracciano & Pappi*, 2060, 2067. Mount Bizen, 6550 ft., *Schweinfurth & Riva*, 2027! Niamniam: by the Atasilli brook near Rikkete's, *Schweinfurth*, 3058. Uganda: Gani; south of Lado, very common, *Speke & Grant*! Ruwenzori, 5300 ft., *Scott Elliot*, 7607! 7613! 7000 ft., *Wollaston*! Entebbe, 3900 ft., *Brown*, 1! *Fyffe*, 3! Mabira Forest, *Ussher*, 39! Kipayo, 4000 ft., *Dummer*, 2410! Banda, on grassy hill tops, 4000 ft., *Dummer*, 436! Kinerema, 4000 ft., *Dummer*, 92! Nyanza Basin, 3000-4000 ft., *Battiscombe*, 492! *Mailand*, 131! Nandi; Sibü, *James*! Mau, 7000 ft., *Scott Elliot*, 6898! British East Africa: Nairobi, *Dowson*, 318!

**Lower Guinea.** Angola: Golungo Alto; woods of Monte de Queta, *Welwitsch*, 7300! near Ndele and Cacarambola, *Welwitsch*, 2974! Benguella; covering large tracts of moist ground along the River Songue, *Gossweiler*, 1714!

**Mozambique Distr.** German East Africa: Usambara; Heboma, *Holst*, 2551. Kilimanjaro, 6000 ft., *Johnson*, 111! Marangu, 4600-6500 ft., *Volkens*, 644! *Taylor*! Kwangowe, 4750 ft., *Volkens*, 341! 350! plains of Arusha Jini and Kahe, 3000 ft., *Taylor*! Portuguese East Africa: Mbame, 4000 ft., *Kirk*! Nyasaland: Shire Highlands, *Buchanan*, 37! Namasi, *Cameron*, 18! Mwanemba Mountain, 5000 ft., *McClounie*, 22! Kondowe to Karonga, 2000-6000 ft., *Whyte*! and without precise locality, *Deschamps*! *Buchanan*. 680! 1434! Rhodesia: Victoria, *Monro*, 1991! Gazaland: near Nyahodi River, 4000 ft., *Swynnerton*, 1675!

Also in the Comoro Islands and in Madagascar.

The specimen in Rottler's Herbarium written up as *Andropogon cymbarium* evidently a co-type, was probably collected in the Comoro Islands.

- ✓ 24. *H. variabilis*, Stapf. Perennial, 2½-7 ft. high, with extra-vaginal innovations, their cataphylls firm, white-tomentose. Culms erect, rather slender to stout, 5-6- (or more-?) noded, and with or without mixed branches below the panicle. Leaf-sheaths glabrous, or the lower hirsute and bearded at the mouth, the lowest longer than the internodes, at length inrolled and slipping from the culm; ligules firm, scarious, rounded, up to 1 lin. long; blades linear, gradually narrowed downwards, almost semi-amplexicaul or at least suddenly constricted at the base, long-tapering to a fine point, over 1 ft. by up to 6 lin., rather firm, flat, pale green, glabrous,





rarely more or less hirsute towards the ligule, scabrid to spinulose along the margin, somewhat rough on the upper, smooth on the lower side; midrib relatively slender (except in very large leaves), prominent below, primary lateral nerves distant, 4-6 on each side, slender. Primary spatheate panicle decomposed, leafy, linear-oblong, over 1 ft. long (apart from the additional mixed flowering branches below it), usually dense, somewhat flexuous and subsecund; primary internodes up to more than 8, the lowest  $4\frac{1}{2}$ -3 in. long, the following gradually decreasing; tiers up to 5-noded, mostly mixed, the compound rays up to 7-noded and the longest much exceeding the adjacent internode, bearing apparently secondary tiers only; ultimate (simple) rays very finely filiform,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, rarely (the lowest) longer; subtending leaves of the primary axis resembling the preceding leaves except for the upwards gradually wider sheaths and the shorter blades, the latter falling short of the panicle; subtending leaves of the compound rays spatheoloid except sometimes the lowest. Spatheoles permanently boat-shaped, usually more or less horizontal on the arched rays, lanceolate to ovate-lanceolate in profile, acutely acuminate,  $\frac{2}{3}$ -1 in. long, rarely slightly longer, thinly scarios, glabrous, greenish or tawny to bright brick-red; peduncles finely filiform, at length  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, their tips bearded, hairs white, fine, stiff, up to 2 lin. long. Racemes subsessile, laterally and usually vertically exerted from the spatheoles, at length more or less epinastically reflexed, 5-6 lin. long, dense, subcontiguous, 3-6-awned per pair; bases very short, somewhat stout, more or less bearded like the peduncle, their tips shortly auricled; joints filiform, obliquely truncate,  $\frac{3}{4}$  lin. long, shortly white-ciliate; pedicels similar, more slender and up to 1 lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear- to lanceolate-oblong, 2-2 $\frac{1}{2}$  lin. long, pale; callus very short, obtuse, shortly bearded. Glumes equal, thinly chartaceous, lower narrowly truncate, dorsally flattened, sparingly hairy at least downwards, faintly 9-11-nerved, margins narrowly involute up to two-thirds, then inflexed from the fine rigidly ciliate keels; upper deltoid-truncate, 3-nerved, sparingly ciliate upwards. Lower floret reduced to an oblong truncate obscurely 2-nerved ciliate valve. Upper floret ♂: valve stipitiform, shortly 2-toothed, glabrous; awn slender, about 1 in. long, column brown, fulvously hirtellous; valvule 0. Anthers almost 1 lin. long. Pedicelled spikelets ♂ or more often neuter, lanceolate, 2 $\frac{1}{2}$ -4 lin. long, or occasionally smaller, pale, glabrous or pubescent; lower glume thin, acuminate, aristulate (bristle up to 2 lin. long), about 9-nerved, with rigidly ciliate keels (cilia often very short), in neuter spikelets often involute on one side; upper glume acute, 3-nerved; valves hyaline, lower oblong, subacute or truncate, up to 2 or 3 lin. long, 1-nerved, ciliate upwards or only at the tips, upper narrowly linear, slightly shorter, usually 2-dentate or 2-fid, or both valves

reduced or 0; anthers if fully developed up to  $1\frac{1}{4}$  lin. long, usually much reduced or 0.

+ Mozambique Distr. Nyasaland: Zomba, *Sharpe*, 131! Urungu: Fwambo, 5250 ft., *Nutt*! Rhodesia: Mumbwa ( $28^{\circ}$  E.,  $15^{\circ}$  S.), *Mrs. Macaulay*, 62! Salisbury, *Mrs. Craster*, 72!

A specimen received from Mr. Buijsman who grew it in his garden at Lawang, Java, is evidently this species. It is noteworthy on account of its long prostrate-ascending base comprising 11 internodes and varying in length from 1 in. to 6 in. The lowest internodes are wiry and only  $\frac{1}{2}$  lin. in diameter, whilst the uppermost measure  $2\frac{1}{2}$  lin. across where the stem becomes upright. All the nodes emit roots, those from the ascending upper portions being very stout and strong and acting as stilt-roots. The lower and intermediate nodes produce at the same time extra-vaginal innovations with more or less white-villous or hirsute cataphylls or more rarely—like the upper nodes—intravaginal shoots.

(Hochst)  
 25. *H. Tamba*, *Anderss. in Schweinf. Beitr. Fl. Aethiop.* 306. W.B.  
 Perennial, up to 4–5 ft. high, cæspitose with few intravaginal innovations. Culms erect or ascending, rarely up to 2 lin. thick, 5–7-noded and simple below the panicle. Leaf-sheaths terete, quite glabrous, very rarely hirsute with short tubercle-based hairs, the basal firmer and more or less persistent; ligules scarious, 1–2 lin. long, rounded; blades linear from a slightly narrower or equally broad and somewhat constricted base, long-tapering to a fine point, to over 1 ft. long and 2–4 lin. wide, firm but hardly rigid, green or reddish or subglaucous, glabrous, scabrid to spinulose along the margins, otherwise slightly rough or almost smooth; midrib somewhat slender and prominent below, whitish and often rather broad above; primary lateral nerves 3–4 on each side, slightly raised. Spatheate panicle narrow, more or less lax,  $\frac{1}{2}$ – $1\frac{1}{2}$  ft. long, of 6–8 up to 5-rayed mostly mixed tiers, the internodes gradually decreasing in length upwards; lower subtending leaves resembling the preceding ones, their blades usually shorter than the panicle; upper much reduced, often reddish with small blades; compound rays rarely more than 3-noded, ultimate simple rays filiform,  $\frac{1}{2}$ – $1\frac{1}{4}$  in. long. Spatheoles permanently boat-shaped, lanceolate, acutely acuminate,  $\frac{2}{3}$ – $1\frac{1}{2}$  in. long,  $1\frac{1}{4}$ – $1\frac{3}{4}$  lin. wide, thinly scarious, glabrous (very rarely hirsute); peduncles filiform, 8–9 lin. long, their tips together with the very short raceme-bases densely bearded, hairs up to 2 lin. long, white or yellowish. Racemes sessile or subsessile, subcontiguous, at length epinastically reflexed and exerted laterally from the spatheole together with the strongly arching peduncles, 5–7 lin. long, about 5-awned per pair; joints filiform, obliquely truncate, up to almost 1 lin. long, shortly white-ciliate, uppermost cilia up to 1 lin. long; pedicels very similar. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, 2– $2\frac{1}{2}$  lin. long, pale, sometimes reddish upwards or brown on the back, very sparingly or densely hairy; callus hardly 1 lin. long, subacute, shortly bearded. Glumes equal,





thinly chartaceous; lower minutely truncate, dorsally flattened, more or less hairy, 7-9-nerved, nerves very faint below the tips, margins narrowly involute and inflexed near the tips, with scabrid short keels; upper minutely and obliquely truncate, mucronulate, 3-nerved, more or less hairy on the back, erect, ciliate upwards. Lower floret reduced to a linear-oblong truncate obscurely 2-nerved or nerveless ciliate hyaline valve. Upper floret ♀: valve stipitiform, minutely 2-toothed; awn fine, 10-16 lin. long, column brown, finely hispidulous. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelets ♂ or neuter, lanceolate to linear-lanceolate, up to 3 lin. long, reddish, glabrous or more or less hairy; lower glume acutely acuminate or minutely aristulate, about 11-nerved, keels rigidly ciliate, upper very acute, 3-nerved, erect-ciliate; valves hyaline, erect-ciliate, up to  $2\frac{1}{2}$  lin. long, narrowly 1-nerved, lower linear-oblong, upper notched, linear-cuneate, or both more or less reduced. Spikelets of homogamous pair very slightly longer than the pedicelled, neuter (always?) long persistent on the peduncles.—*H. umbrosa*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 316. *Andropogon lepidus*, Nees, Fl. Afr. Austr. 113; Steud. Syn. Pl. Glum. i. 389; Hack. in DC. Monogr. Phan. vi. 625 (incl. vars.); Durand & Schinz, Consp. Fl. Afr. v. 716; Schweinf. in Bull. Herb. Boiss. ii. App. ii. 94. *A. intonsus*, Nees, l.c. 114. *A. cymbarius*, var. *lepidus*, Stapf in Dyer, Fl. Cap. vii. 361. *A. umbrosus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 467; Steud. l.c., 386. *A. Tamba*, Hochst. ex Steud. l.c. 385; Eyles in Trans. Roy. Soc. S. Afr. v. 297. *Cympobogon Tamba*, Rendle in Journ. Linn. Soc., xl. 227 (the Abyssinian plant).

Nile Land. Eritrea: Amasen; Ambelaco, near Maldi, 6500 ft., Schweinfurth, 35! Abyssinia: Mount Sholoda, near Adowa, Schimper, 937! 1098! (mixed with *H. pseudocymbaria*) 1116! near Gennia, Schimper, 584! 911! Mount Semayata, near Adowa, 7300 ft., Schimper, 1009! Gondar, Massey, 12!

- ✓ 26. *H. collina*, <sup>(Pilger)</sup> Stapf. Perennial,  $1\frac{1}{2}$  to over 2 ft. high, from a short oblique rhizome; innovations extra- and intra-vaginal with firm glabrous bud-scales. Culms erect or ascending, wiry and solid below, slender, glabrous and smooth, simple and about 5-noded below the panicle or with mixed or barren branches from the lower nodes. Leaf-sheaths terete, glabrous and smooth, tight, the lower withering away except for the firm persistent bases, or pushed aside by the branches; ligules very short, or up to 1 lin. long, truncate, glabrous, rather firm; blades linear (or the lower from a somewhat attenuated base), long-tapering to a fine point, up to over 6 in. by 2 lin., flat, rather firm, dull green, turning reddish, glabrous or with a few tubercle-based hairs upwards, smooth below, scaberulous above and on the margins; midrib slender below, broader and whitish above, lateral nerves very fine, close and distinctly raised above. Inflorescence elongated, usually scanty and lax, from less than  $\frac{1}{2}$  to 1 ft. long, of 4 or 5, rarely more, upwards approximate

downwards rather distant about 3-rayed simple or (below) mixed tiers; subtending leaves with usually well-developed blades, glabrous, green. Spatheoles linear-lanceolate, acutely acuminate, 1-1½ in. long, glabrous or more or less hairy, early turning red; rays subfastigiate, very slender, filiform, over 2 in. long; peduncles laterally shortly exerted from the middle of the spatheole, permanently shorter than the same (up to ½ in. long, rarely longer), straight or more or less recurved, pubescent upwards and also beset with long tubercle-based white hairs for about 3 lin. below the tips. Racemes somewhat diverging, at length epinastically deflexed, silkily greyish-villous, 7-10 lin. long, 6-8-awned per pair, bases very short, pubescent in the fork, upwards with a hirsute beard, tips oblique; joints and pedicels filiform, slender, up to 1½ lin. long with obliquely truncate tips, densely ciliate, cilia almost equally long throughout, ½ lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblanceolate-oblong, up to 2½ lin. long, greenish with a slight tinge of purple, callus short, subobtusate, ½ lin. long, beard hardly longer. Glumes equal, upper subchartaceous, truncate, flat on the back, 7-9-nerved, pubescent at the base, then villous upwards with spreading tubercle-based hairs up to 1½ lin. long, margins narrowly involute, subterminal keels obscure; upper glume submembranous, obliquely truncate in side view, 3-nerved, shortly hairy on the back. Lower floret reduced to a linear-oblong obtuse hyaline 2-nerved ciliate valve. Upper floret ♂: valve narrowly stipitate, passing into the awn which is about 10-12 lin. long, kneed and often flexuous, column densely and finely fulvo-pubescent; valvule a minute oblong scale hardly equalling the lodicules. Anthers ¾ lin. long. Pedicelled spikelets lanceolate, about 3 lin. long, dull purplish; glumes equal, lower subchartaceous, loosely villous all over, passing into a bristle 1-1½ lin. long, closely 11-13-nerved, upper membranous, very acute, 3-nerved, ciliolate with a few hairs on the back; valves slightly shorter than the glumes, hyaline, ciliolate, linear-oblong, the lower 3-nerved, the upper 1-nerved and very narrow; anthers 1 lin. long. —*Andropogon collinus*, Pilger in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr. Exped. ii. 43.

**Nile Land.** British East Africa: Nairobi, *Dowson*, 238! and without precise locality, *Powell*, 24!

**Mozambique Distr.** German East Africa: Kilimanjaro; Kwa Ngome, 5250 ft., *Volkens*, 352! East Ruanda; mountain steppes at Bushara, *Mildbraed*, 375.

A young, rather stout specimen collected by Hutchins (no. 377) on Mount Kenia, 5000-10,000 ft., and designated by him "Elephant grass," evidently belongs here.

✓ **27. *H. spectabilis*, Stapf.** Perennial, 4-8 ft. high, densely caespitose, with extravaginal innovations from an oblique rhizome. Culms stout at the base, up to 3 or 4 lin. thick, erect or ascending





and rooting from the lower nodes (*Welwitsch*), simple at the base for a few internodes, then producing long mixed branches and passing above into a large compound panicle. Leaf-sheaths very firm, terete, tight, smooth and glabrous or sparingly hirsute in the upper part, produced into short triangular auricles at the mouth, the basal long-persistent; ligules very short, scarious, truncate, glabrous, ciliolate, laterally adnate to the auricles of the sheaths; blades linear from an equally wide or slightly constricted base, long-tapering to a very slender point, up to over 1 ft. by 5 lin., very firm, flat, reddish or purplish, faintly glaucescent on the under side, glabrous or frequently with some long scattered tubercle-based hairs at the base, slightly rough above, smooth below, scabrid along the margins. Spatheate panicle leafy, about  $1\frac{1}{2}$  ft. by  $2\frac{1}{2}$ – $3\frac{1}{2}$  in., loose or more or less contracted, internodes 7–8, the lowest 3–5 in. long, the following gradually decreasing; lowest primary branches undivided at the base or forming, like the following, scanty tiers of compound rays (up to over  $\frac{1}{2}$  ft. long and up to 5-rayed); upper nodes with mostly mixed up to 6-rayed tiers; ultimate rays finely filiform, straight or recurved or curled and frequently exerted from the supporting spathe,  $\frac{3}{4}$ – $\frac{1}{2}$  in. long; lower and intermediate subtending leaves like the preceding ones, but with shorter sheaths, the upper more spathaceous, all with well-developed blades equalling or exceeding the panicle. Spatheoles often at a right angle to the ray, cymbiform, lanceolate, finely acuminate, 10–15 lin. by over 1 lin., scarious, reddish or reddish-brown, glabrous, at length very loosely or hardly involute from the margin; peduncles finely filiform, 6–7 lin. long, permanently shorter than the spatheoles with a scanty beard of fine white hairs towards the tips, up to 3 lin. long and not tubercle-based. Racemes pale reddish-brown, subcontiguous or slightly spreading, 5–6 lin. long, 5–6-awned per pair; bases very short, densely bearded from the fork and the inner sides, tips obliquely truncate, obscurely auricled; joints very slender, filiform,  $\frac{4}{5}$  lin. long, subobliquely truncate, shortly ciliate, cilia white; pedicels very similar, rather longer. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear- to lanceolate-oblong, 2– $2\frac{1}{2}$  lin. long, pale with reddish tips; callus very short, obtuse, shortly bearded. Glumes equal; lower narrowly truncate, subchartaceous, more or less hairy, sometimes only minutely and sparingly pubescent, faintly 7–9-nerved, margins narrowly involute to over two-thirds, then inflexed from the fine ciliolate keels; upper submembranous, truncate, obscurely mucronate, 3-nerved, ciliolate upwards. Lower floret reduced to a hyaline linear-oblong truncate finely 2-nerved sparingly ciliolate valve. Upper floret ♀: valve stipitiform, 2-dentate, teeth narrow, glabrous; awn slender, 1 in. long, minutely hirtellous; valvule 0. Pedicelled spikelets neuter, linear-lanceolate, 2– $2\frac{1}{2}$  lin. long, reddish; lower glume subherbaceous, 9-nerved, shortly aristulate, glabrous or hairy, rigidly and minutely

ciliolate along the keels, one side often more or less involute, upper shorter, very acute, 3-nerved, ciliate upwards; valves reduced to small ciliolate scales.—*Cymbopogon Schimperii*, Rendle in Cat. Afr. Pl. Welw. ii. 155.

† Lower Guinea. Angola: Cazengo; (in damp reed-grown places near Dalandando) *Welwitsch*, 2947! Golungo Alto; (in reedy places throughout the district, *Welwitsch*, 2953! Sange; Cacarambola, *Welwitsch*, 7219! Cambondo, *Welwitsch*, 7247!

According to *Welwitsch* this grass grows socially and is very variable in habit. The culms are "first erect, then ascending and rooting," and up to 3 or 4 lin. thick at the base.

Some panicles collected by Buchanan at Umpumulo, Natal (no. 229) and referred by me to *Andropogon cymbarius*, var. *lepidus*, in Dyer, Fl. Cap. vii. 361, agree in every respect with those of the Angolan plant described above.

✓ 28. *H. formosa*, *Stapf*. Perennial, 8–10 ft. high. Culms (base not seen) somewhat slender, terete, glabrous, smooth, with some mixed branches below the panicle or almost simple. Leaf-sheaths terete, glabrous or softly hirsute towards the mouth; ligules scarious, rounded, up to  $1\frac{1}{2}$  lin. long; blades linear, gradually narrowed downwards or almost equally wide and constricted at the base, long-tapering to a fine point, to over  $1\frac{1}{2}$  ft. by up to 6 (or even 7) lin., somewhat firm and rigid, or slightly flaccid and drooping, pale green, glabrous or with some long fine spreading hairs near the base, rough to spinulously scabrid along the margins, more or less rough on the upper, less so to smooth on the lower surface, midrib relatively slender, primary lateral nerves up to 7 on each side, slender. Spathulate panicle oblong, leafy, up to over 1 ft. long, rather dense; primary internodes up to 8 or more, lowest 2– $2\frac{1}{2}$  in. long, the following gradually shorter; primary tiers up to 6- (or more-?) rayed, the lower and intermediate mixed, their compound rays up to 4- or 5-noded and up to 4–5 lin. long, bearing secondary tiers only; ultimate rays finely filiform, flexuous or arching,  $\frac{1}{2}$ –1 in. long; subtending leaves like the preceding ones except for the shorter and wider sheaths, their blades well-developed, flexuous, overtopping the panicle. Spatheoles permanently cymbiform, broad-lanceolate, acutely acuminate, 10–15 lin. by  $1\frac{1}{4}$ – $1\frac{3}{4}$  lin., scarious, turning purplish-red, glabrous; peduncles finely filiform, in the flowering state 4–7 lin. long, with a beard of spreading fine white tubercle-based hairs up to  $2\frac{1}{2}$  lin. long towards the tips. Racemes pale greenish-brown, subcontiguous or slightly spreading, about 6 lin. long, 6-awned per pair; bases very short, densely bearded, beard like that of the peduncle but upright, tips obliquely truncate, obscurely auricled; joints very slender, filiform, almost 1 lin. long, subobliquely truncate, shortly ciliate, cilia white; pedicels very similar, rather longer. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, 2– $2\frac{1}{4}$  lin. long, pale greenish or brownish at the tips; callus very short, obtuse, shortly





bearded. Glumes equal, subchartaceous, lower narrowly truncate, flattened on the back and slightly depressed along the middle nerve, rounded on the sides with involute margins to beyond two-thirds, then finely keeled with the keels rigidly ciliate, very faintly 9-nerved, more or less pubescent with white hairs; upper deltoid-truncate or obscurely mucronulate, 3-nerved, ciliate upwards. Lower floret reduced to a hyaline linear-oblong truncate finely 2-nerved sparingly ciliate valve. Upper floret ♀: valve stipitiform, 2-dentate, teeth almost subulate, glabrous; awn slender, 4-5 lin. long, column dark brown, minutely fulvous hirtellous; valvule 0. Anthers almost 1 lin. long. Pedicelled spikelets neuter, linear-lanceolate,  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long, reddish; lower glume thin, subherbaceous, 9-11-nerved, acute, usually mucronate or shortly aristulate, hairy like the fertile spikelets, rigidly ciliate along the keels, one side sometimes slightly involute; upper equalling the lower, very acute, 3-nerved, ciliate upwards; lower valve oblong, subobtus, slightly shorter than the glumes, 1-nerved, ciliate; upper very narrow, usually much shorter and nerveless. Homogamous spikelets very similar to the pedicelled member of the heterogamous pairs, but rather larger, broader and flatter.—*Andropogon formosus*, Hort. (partly ?). "

Nile Land. Abyssinia: Tigre; without precise locality, Schimper, 1009!

Hackel attributes the name *Andropogon formosus* to "Klotsch in h. berol," and adds "et in hort. mult." According to Jaeger (J) in *Gartenfl.* xi. 241, a grass named *Andropogon formosus* had, at the date of his writing (1862), been for a long time in cultivation in the Botanic Garden at Berlin, and he himself received it from there in 1856. Pynaert (in *Fl. Serr. 2me sér.*, iv., 1859, 56) gives a figure of it and some cultural notes, taken from Neubert, *Deutsch. Mag. f. Garten- u. Blumenkunde* about 1858. It became more generally known after 1860 and is mentioned repeatedly in horticultural literature; but it was never described, whilst the figure reproduced by Pynaert and others allows of no identification. It is possible that the name came in time to cover more than one species. However, specimens grown at Kew from 1878-1882 agree with Schimper's plant quoted above, and it is very probable that the species was raised at Berlin, like many others, from seed communicated by Schimper, though not from no. 1009, which belongs to the set distributed in the sixties as "Plantæ Abyssinicae ex Tigre v. Begemder. Collegit Schimper, a. 1863-8." But all the numbers of that set below 1100, so far as I have been able to check them from the original tickets, were actually collected in Tigre in 1862.

29. H. Schimper, *Anderss. in Schweinf. Beitr. Fl. Aethiop.* 306. Perennial, up to over 6 ft. high, with extravaginal innovations, their cataphylls short, ovate, glabrous. Culms geniculately ascending, terete, glabrous, smooth, slender and wiry, up to  $2\frac{1}{2}$  lin. thick in strong specimens, 7-8-noded below the panicle, with mixed branches from some or most of the nodes. Leaf-sheaths terete, glabrous, the lowest withering away, the middle and upper usually much shorter than the internodes; ligules scarious, rounded or truncate, about 1 lin. long; blades linear from an almost equally wide or more or less attenuated base, long-tapering to a fine point, up to over  $1\frac{1}{2}$  ft. long by  $2\frac{1}{2}$ - $4\frac{1}{2}$  lin. wide, flaccid, pale green, sometimes tinged with

red, glabrous or with few long tubercle-based hairs on the lower part, scabrid to spinulose along the margins, otherwise smooth or slightly rough, midrib rather slender on the back, wider and whitish above, prominent below, primary lateral nerves about 4 on each side. Spatheate panicle often large, leafy, decomposed (to the third degree), up to over 2 ft. long, sometimes overtopped by the uppermost blades; tiers up to over 10, distant below (lowest internodes up to 7 in. long in robust plants), upwards gradually approaching each other, 6- to over 10-rayed, usually mixed; lower subtending leaves developed almost throughout as normal leaves with shortened sheaths and long blades, upper spathes rapidly reduced upwards assuming the shape of the spatheoles, compound rays up to over 1 ft. long, and up to 5-noded, ultimate simple rays finely filiform, 1-1½ in. long. Spatheoles permanently boat-shaped, obliquely erect or horizontal on the arched rays, lanceolate, acutely acuminate, about 1 in. long by 1½ lin., thinly scarious, reddish or tinged with purple, glabrous. Peduncles at length filiform, 6-10 lin. long, long-bearded upwards, hairs white, about 2 lin. long, fine, tubercle-based. Racemes slightly spreading, laterally exerted from the spatheoles, soon more or less epinastically deflexed and somewhat lax, 7-9 lin. long, 5-8-awned per pair, obscurely or distinctly hairy; bases very short, long-bearded; joints like the pedicels, finely filiform, truncate, 1 lin. long, shortly white-ciliate, cilia up to ½ lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, 2¼ lin. long, pale, glabrous or hairy, callus very short, subacute, densely and shortly bearded. Glumes equal, subchartaceous, minutely truncate, lower flat on the back, slightly grooved between the innermost nerves, 9-nerved, nerves very faint below, margins very narrowly involute, inflexed towards the tips, forming short scaberulous keels; upper glume 3-nerved, erect-ciliolate upwards. Lower floret reduced to a linear-oblong obtuse obscurely 2-nerved sparingly ciliate hyaline valve, 1¾ lin. long. Upper floret ♂: valve stipitiform, minutely 2-toothed, awn slender, 10-15 lin. long, column fulvous, finely hispidulous; valvule 0. Anthers 1 lin. long. Pedicelled spikelets ♂ or neuter, linear-lanceolate, 2½-3 (rarely 3½) lin. long, glabrous or hairy; lower glume chartaceous, produced into a bristle 1-2 lin. long, 9-nerved, rigidly ciliolate on the keels; upper membranous, acute, often mucronulate, 3-nerved, ciliolate; valves hyaline, linear-oblong, ciliolate, 1-nerved, upper to 2½, lower 2 lin. long, often minutely notched; anthers up to almost 1½ lin. long, rudimentary. Spikelets of the homogamous pair very similar to the pedicelled, but up to 4 or 4½ lin. long, one of them slightly broader and longer with longer cilia.—*Andropogon Schimperii*, Hochst. in Flora, 1841, Intell. i. 20 (name only), and ex A. Rich. Tent. Fl. Abyss. ii. 466; Steud. Syn. Pl. Glum. i. 384; Hack. in DC. Monogr. Phan. vi. 623 (partly); Durand & Schinz, Consp. Fl. Afr. v. 721 (partly); Schweinf. in





Bull. Herb. Boiss. ii. App. ii. 94; Chiov. in Ann. Istit. Bot. Roma, viii. 288.

**Nile Land.** Eritrea: Dembelas; by the Messellem torrent (Upper Leito River), near Adi-Tschodog, 7200 ft., *Schweinfurth*, 32. Saræ; along the River Mareb, near Debaroa, 6200 ft., *Pappi*, 512. Abyssinia: Arba Fensa, near Gennia, *Schimper*, 921! Mount Sholoda, near Adowa, *Schimper*, 408! near Adowa, 1052 (a. 1838)! Uganda: Ruwenzori; Kasamaga, common at 5300 ft., *Scott Elliot*, 7613!

**Mozambique Distr.** German East Africa: Kilimanjaro; Marangu, 4300 ft., *Volkens*, 534!

The specimens referred by me to *Andropogon Schimperii* in *Dyer, Fl. Cap.* vii. 357, do not belong to this species.

✓ **30. H. elongata, Stapf.** Perennial, 2-4 ft. high. Culms rising from a short oblique rhizome, often closely fasciated or accompanied by intravaginal innovations whose inner sheaths are covered with white hairs at the very base, terete, usually stout, glabrous, smooth, erect or geniculately ascending, usually stiff, simple for 3-5 internodes below the panicle. Leaf-sheaths terete, glabrous, pruinose below the nodes, rarely subhirsute upwards, smooth, firm, the lowest longer than the internodes, often slipping off the culm and then gradually breaking up, those of the innovations compressed and keeled upwards; ligules scarious, firm, rounded, 1-2 lin. long; blades linear from a more or less narrowed or almost equally wide base, which may be narrower than the sheath or pass quite gradually into it, long-tapering upwards to a fine point, up to over 1 ft. by up to 3 (rarely 4) lin., firm, rigid, pale or glaucous-green, glabrous or very sparingly hairy on the back or with some long stiff hairs above the ligule, smooth below, rough on the face upwards, margins scabrid, at least upwards, midrib comparatively slender, broader and whitish above, primary lateral nerves 3-5 on each side, slender. Spatheate panicle narrow, very lax, up to over 1 ft. long; primary axis rather stiff, its 6-8 internodes gradually decreasing upwards (the lowest up to over  $\frac{1}{2}$  ft. long); tiers few-rayed, the lower and intermediate mostly mixed, their compound rays up to 4-noded, up to over  $\frac{1}{2}$  ft. long and very slender; secondary tiers usually reduced to a single ray; ultimate rays 2-1 in. long, very slender, often finely filiform and arching upwards; subtending leaves resembling the preceding ones, the upper with much reduced stiff blades or spatheoloid. Spatheoles cymbiform, long-lanceolate, finely acuminate,  $1\frac{1}{4}$ -2 in. long, standing out more or less horizontally or nodding, scarious, reddish or purplish and slightly glaucous, glabrous, at length sometimes loosely inrolled from the margins; peduncles filiform, at length 1-2 in. long, long-bearded upwards, hairs whitish, about 2 lin. long, very fine, obscurely tubercle-based. Racemes rather dense, usually more or less villous with white hairs, rarely glabrous except for the cilia of joints and pedicels, subcontiguous or slightly diverging, 6-12-awned per pair; bases very short, obliquely

48  
is this distinct from H. Schimperii

truncate, more or less (often densely) bearded like the peduncle; joints finely filiform, shortly ciliate, up to over  $1\frac{1}{4}$  lin. long; pedicels very similar, slightly longer and finer. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelet linear-oblong,  $2\frac{1}{4}$ –3 lin. long, pale with a tinge of violet or dark purple along the shallow median depression of the lower glume or dark purple almost all over; callus cuneate, subacute, variegated with a white band across the junction with the free part of the glume, shortly bearded. Glumes equal, subchartaceous; lower truncate, flat on the back with a shallow median depression, rounded on the sides, more or less hairy to villous, rarely glabrous, 7–9-nerved, margins narrowly involute, inflexed towards the tips, the fine keels rigidly ciliate; upper glume thinner, obtuse or deltoid-truncate, 3-nerved, spreadingly ciliate upwards. Lower valve reduced to an oblong obtuse loosely ciliate faintly 2-nerved hyaline valve. Upper floret ♂: valve stipitiform, with two minute glabrous teeth, sparingly ciliate below them; awn 10–15 lin. long, fulvous, rarely the hirtellous column darker; valvule 0. Anthers  $\frac{1}{2}$  lin. long. Pedicelled spikelets ♂ or neuter, linear-lanceolate,  $2\frac{1}{2}$ – $3\frac{1}{2}$  lin. long, glabrous or hairy; lower glume acute to mucronulate, 9-nerved, rigidly ciliate along the keels; upper acute, 3-nerved, ciliate; valves hyaline, linear-oblong (the lower) to spatheolate-linear (the upper), 1-nerved, ciliate, the upper if with a ♂ flower up to  $2\frac{1}{2}$  lin. long. Homogamous spikelets similar to the pedicelled member of the heterogamous pairs, but slightly larger, up to 4 lin. long.

† **Nile Land.** Abyssinia: Tigre; (without precise locality) *Schimper*, 466! 1006! 1052 (a. 1862, not a. 1838)! Samen! Agrima, 6000 ft., *Schimper*, 133! 897! Bellaka, 7000 ft., *Schimper*, 469! Arwassa, 6000–7000 ft., *Schimper*, 749! (and without precise locality) *Schimper*, 1011! us

A specimen collected by Schweinfurth & Riva (no. 2010), on Mount Bizen, in Amasen, Eritrea, very probably belongs here. It has shed all its racemes, except a few still enclosed in their spatheoles and apparently arrested in their development. The specimen is otherwise noteworthy on account of its very long (up to over 9 in.) and unusually firm persistent basal sheaths.

✓ **31. H. rudis, Stapf.** Perennial, from 8–15 ft. high, cæspitose, with extravaginal innovations covered in bud with glabrous or upwards sparingly hairy cataphylls. Culms erect, rooting (stilt-roots) from the lowest nodes, terete, stout, towards the base up to 5 lin. thick (“finger-thick,” *Gossweiler*), glabrous, waxy-pruinose below the nodes or the lower internodes almost all along, simple, with 8–11 internodes below the panicle or emitting mixed branches from the intermediate and upper, rarely from almost all, internodes. Leaf-sheaths terete, very firm, tight, glabrous, smooth, their scarious margin often produced into an auricle of varying size and shape; ligules scarious, truncate or rounded, laterally adnate to the auricles of the sheath, up to 3 lin. long; blades linear from a more or less narrowed base, tapering upwards to a long fine point, us





up to over 2 ft. by up to 9 lin., firm, pale green, often slightly tinged with purple or brown, glabrous, hirsute just above the ligule, more or less rough on the upper side, scaberulous to scabrid along the margins, midrib stout downwards and rounded on the back, rather wide, white or pinkish on the upper side, primary lateral nerves 4-7 on each side, slender. Spatheate panicle (except the secondary panicles of the mixed branches below it) leafy, narrowly oblong, loose or somewhat contracted, often decompound, up to over  $2\frac{1}{2}$  ft. by 3-4 in.; primary internodes 7-11, the lowest about 6 in. long, the following gradually, the uppermost more rapidly decreasing in length; tiers mixed, except the uppermost, the lowest consisting of one or two 6-5-noded compound rays with, in the lower part, 2-1-rayed tertiary tiers, the intermediate and upper 4-5- (rarely 6-) rayed, with 2-4-rayed secondary tiers, ultimate (simple) rays about  $\frac{3}{4}$ - $\frac{1}{2}$  in. long, arching; subtending leaves like the preceding leaves—except the uppermost which become rapidly spatheaceous or spatheoloid—with well-developed blades which, however, do not reach to the top of the panicle. Spatheoles lanceolate, acutely acuminate, 1- $1\frac{3}{4}$  in., rarely only 8-10 lin. long,  $1\frac{1}{2}$ - $1\frac{3}{4}$  lin. wide in profile, scarios, glabrous or sometimes finely and sparingly hairy upwards, reddish-brown to brownish-purple, more or less horizontal or slightly nodding, at length loosely inrolled from the margins; peduncle filiform, strongly arching or recurved, at length shorter than the spatheole by about a quarter or less or just equalling it, bearded upwards, hairs of beard greyish or pale fulvous, stiff, minutely tubercle-based, up to 3 lin. long. Racemes laterally exerted, more or less vertical during flowering, subcontiguous or slightly diverging, at length epinastically deflexed, 5-9 lin. long, greyish-villous, dense, 5-7-awned per pair; bases very short, densely pubescent in the fork and bearded upwards, tips obliquely truncate, obscurely or shortly auricled; joints filiform, 1 lin. long, shortly white-ciliate; pedicels similar, somewhat longer. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong,  $2\frac{1}{2}$ -3 lin. long, pale or slightly reddish, their colour mostly hidden by the abundant hairs; callus up to  $\frac{1}{2}$  lin. long, sub-obtuse, shortly bearded. Glumes equal, subchartaceous; lower narrowly truncate, somewhat flattened on the back with rounded sides, 9-nerved (nerves very faint downwards), hairy all over, hairs whitish, straight, up to 1 lin. long, margins very narrowly involute up to over two-thirds, then inflexed from the fine keels whose cilia are merged in the general tomentum; upper glume obtuse to deltoid-truncate, 3-nerved, reversedly ciliate upwards. Lower floret reduced to a narrowly oblong-obtuse finely 2-nerved upwards ciliate hyaline valve. Upper floret ♂: valve stipitiform, 2-dentate, teeth ciliate; awn 10-20, (mostly about 12-18) lin. long, slender, fulvous, hirtellous, the hairs almost equalling the diameter of the awn; valvule an ovate hyaline scale,  $\frac{1}{2}$  lin. long, or 0. Anthers  $\frac{3}{4}$  lin. long. Pedicelled

spikelets ♂, linear-lanceolate, acuminate, 3–3½ lin. long, with the tomentum of the fertile, reddish; lower glume membranous, very closely many-nerved, aristulate, bristle up to 3 lin. long; upper acutely acuminate, 3-nerved, hairy and ciliate upwards; valves hyaline, reversedly ciliate, lower oblong, narrowly truncate, 3-nerved, slightly shorter than the glumes, upper linear to linear-cuneate, somewhat shorter, 1-nerved. Homogamous spikelets similar to the pedicelled member of the heterogamous pair, but not aristulate, usually larger (up to 4½ lin. long) and less hairy.

† Lower Guinea. Angola: Benguella; (country of the Ganguellas and Ambuellas, at the abandoned village N'Jaia, *Gossweiler*, 3121! (rocky situations at Princeza Amelia, near the River Kubango), *Gossweiler*, 3919! (gregarious and plentiful on gravelly or clayey slopes near Munongue), *Gossweiler*, 3129! 4151!

✓ 32. *H. phyllopoda*, Stapf. Perennial, up to 5 ft. high, with intravaginal innovations. Culms erect, somewhat stout, firm, terete, glabrous and smooth, simple and 4–5-noded below the panicle; lower internodes swollen at the base, with the conspicuous culm-nodes 3 lin. from the base. Leaf-sheaths firm, terete, quite glabrous, the basal more or less persistent; ligules scarious, oblong, glabrous, 2 lin. long; blades narrowly linear from an equally wide or more often long-attenuated base, often almost reduced to the stout dorsally rounded midrib, long-tapering upwards to a fine point, over 1 ft. by 1½ lin., very rigid (at least below), glabrous, slightly rough above and scabrid along the margins, midrib white above, primary lateral nerves about 3 on each side, with about 3 very fine secondary nerves between them. Spatheate panicle elongated, narrow, somewhat contracted, up to 1½ ft. long, of 5–6 mostly mixed up to 5-rayed tiers; subtending leaves with well developed upwards rapidly decreasing blades, the lowest resembling the preceding leaves, glabrous, the lowest compound rays up to 1 ft. long and 3-noded; simple rays slender, filiform, ¾–1 in. long. Spatheoles narrowly lanceolate, finely acuminate, 1¼–1½ in. long, scarious, reddish-brown, glabrous, permanently boat-shaped, 1 lin. wide in profile; peduncles filiform, 8–15 lin. long, recurved, laterally exerted from the spatheoles, always shorter than these, pubescent upwards, and with long spreading tubercle-based hairs from the curvature. Racemes at length epinastically reflexed, somewhat dense, ¾ to almost 1 in. long, about 8–12-awned per pair, glabrous or nearly so except on the joints and pedicels, dark purplish or olive-brown; bases rarely over ½ lin. long, dark-pubescent on the inside, often with long rigid hairs near the tips, the longer produced into a dark short ovate auricle; joints filiform, obliquely truncate, a little over 1 lin. long, shortly ciliate, cilia pale, up to ½ lin. long; pedicels similar, slightly longer, with a minute auricle. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, including the callus up to 2–2¼ lin. long, olive-green with reddish tips or dark





purple; callus very short, obtuse, minutely bearded. Glumes equal, lower subchartaceous, minutely truncate, dorsally flat, glabrous or with a few scattered hairs, margins very narrowly involute, slightly inflexed towards the tips, keels short, scabrid, nerves 9; upper glume membranous, obtuse, glabrous, ciliate upwards, 3-nerved. Lower floret reduced to a linear-oblong hyaline obtuse almost nerveless reversedly ciliate valve. Upper floret ♂: valve stipitiform, minutely 2-lobed, lobes  $\frac{1}{2}$  lin. long, eciliate; awn 5-7 lin. long, fine, column pale brown, shortly pubescent; valvule reduced to a broad oblong hyaline glabrous scale,  $\frac{1}{2}$  lin. long. Anthers not quite 1 lin. long. Pedicelled spikelets ♂, linear-lanceolate, acute, up to  $2\frac{1}{2}$  lin. long, usually dark; glumes equal, lower firmly chartaceous, sometimes mucronulate, 9-nerved, upper 3-nerved; valves hyaline, reversedly ciliate, lower up to 2 lin. long, 3-nerved, upper linear, spatheolate, emarginate, 1-nerved.

+ Nile Land. Abyssinia: Mukafilo, *Drake-Brockman*, 151! 152!

Some of the racemes were infested with the pupæ of a small insect of the family *Chalcididae* which caused an enlargement of the sessile spikelets, their lower glume attaining a length of 5-9 lin. and becoming quite coriaceous and smooth in the lower part, the perfect insects escaping through a hole in the back of the glume.

(Hochet)

33. *H. papillipes*, *Anderss. in Schweinf. Beitr. Fl. Aethiop.* 306. Perennial, up to over 3 ft. high, tufted from a short oblique rhizome; innovations intra- and extra-vaginal, with firm glabrous cataphylls. Culms erect, sometimes from an arching base, wiry or woody and solid below, glabrous and smooth, simple below for 4-6 nodes below the panicle, with mixed or barren erect branches from some of the lower nodes. Leaf-sheaths of the innovations compressed and keeled, otherwise terete, glabrous and smooth, tight, the lower usually longer than the internodes, at length slipping off or decaying with the exception of the long-persistent dark bases; ligules scarios, truncate, up to over 1 lin. long, ciliolate or glabrous; blades linear from a more or less narrowed base, long-tapering to a fine point, up to 6 or 8 in. by 1-3 lin., slightly flaccid or rigid, flat, glaucous, glabrous or with a few long fine spreading hairs near the base, smooth, or rough upwards, margins scabrid, midrib slender on the back, whitish and wider on the upper side, lateral nerves indistinctly raised. Spatheate panicle elongated, usually scanty, lax,  $\frac{1}{2}$  ft. to  $1\frac{1}{2}$  (rarely 2) ft. long, of 1-7 distant 2-4- (rarely 5- or 6-) rayed tiers or with the lowest branch undivided at the base and 2-3-noded; simple rays subfastigate, very slender, filiform,  $1\frac{1}{2}$  to over 4 in. long, often more or less kneed at the nodes; subtending leaves with usually well developed blades, herbaceous to subherbaceous, glabrous, greenish. Spatheoles linear-lanceolate, tapering to an acute point,  $1\frac{1}{4}$ - $2\frac{1}{4}$  in. long, usually glabrous or more or less hairy, early turning reddish or red, at length loosely inrolled; peduncles at length  $1\frac{3}{4}$  to almost 3 in. long, subterminally long-exserted and

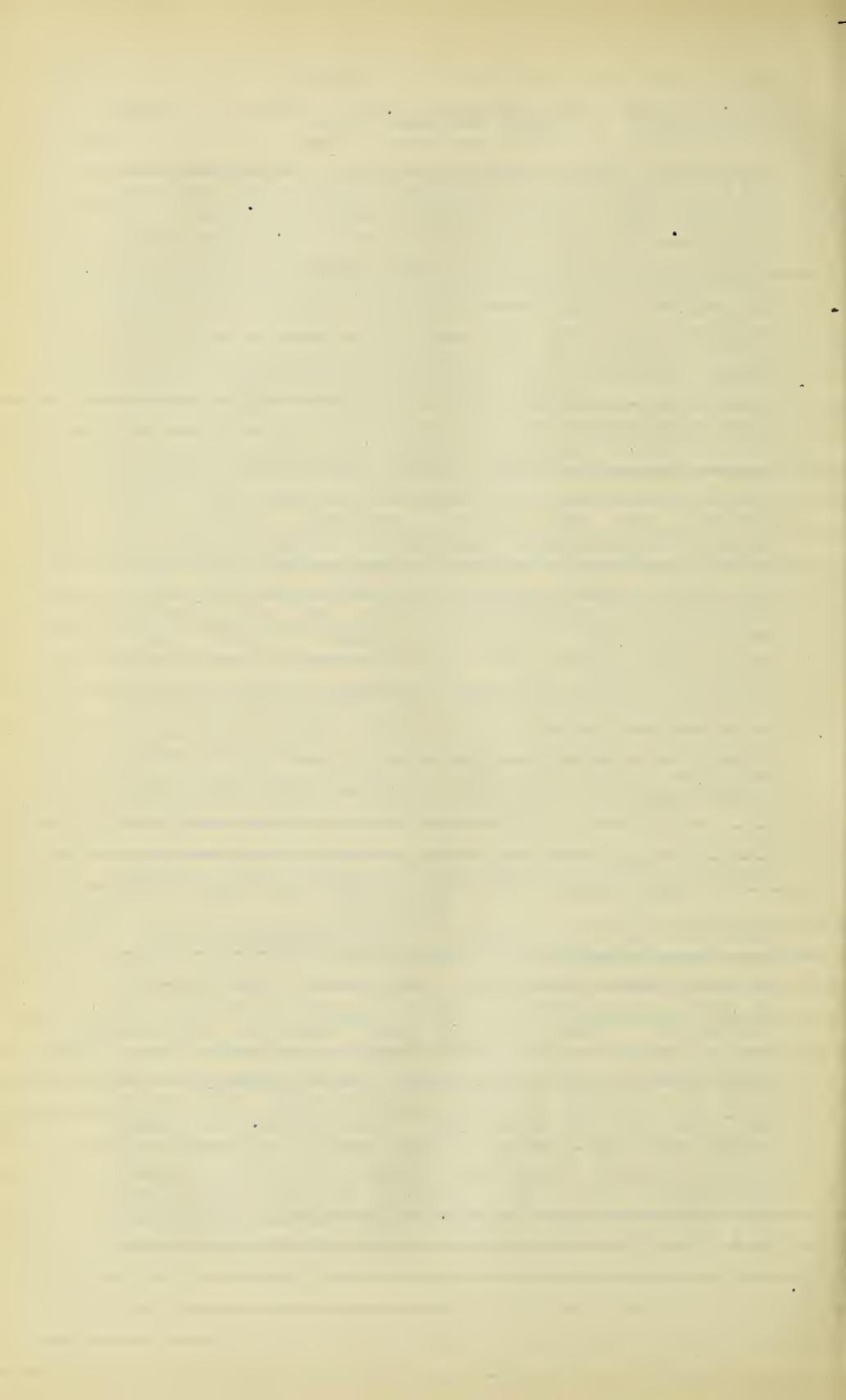
mostly recurved in a semicircle, pubescent upwards, the curvature beset with stiff spreading tubercle-based whitish hairs up to 3 lin. long. Racemes somewhat diverging, rarely at right angles, at length epinastically reflexed, more or less silky villous, 8-14 lin. long, 7-15-awned per pair; bases very short, pubescent in the fork, upwards hirsute, tips with a minute dark auricle; joints and pedicels filiform, slender, almost  $1\frac{1}{2}$  lin. long, with obliquely truncate tips, densely ciliate, cilia up to 1 lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong to linear-lanceolate,  $2\frac{1}{2}$ - $2\frac{3}{4}$  lin. long, pale below, reddish upwards; callus very short, subobtuse to almost acute, beard dense, white,  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long. Glumes equal, lower subchartaceous, minutely truncate, flat on the back, thinner downwards, 7-9-nerved, loosely to densely whitish-villous upwards, margins subinflexed upwards, rigidly ciliate along the subterminal keels; upper glume thinner, submembranous, subtruncate, 3-nerved, hairy along the keel. Lower floret reduced to a linear-oblong subobtuse hyaline 2-nerved ciliolate valve, almost as long as the glumes. Upper floret ♀: valve stipitate,  $1\frac{1}{2}$  lin. long, with two short glabrous subacute lobes; awn slender, 8-12 lin. long, with the column fulvously or rufously hirtellous; valvule 0. Anthers over  $\frac{3}{4}$  lin. long. Grain elliptic-oblong, dorsally much compressed,  $1\frac{1}{4}$  lin. long; embryo half as long. Pedicelled spikelets lanceolate-oblong, acute, muticous,  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long; glumes equal, hairy, the lower about 9-nerved, upper 3-nerved; valves slightly shorter than the glumes, membranous to hyaline, linear-oblong to linear, ciliolate, the lower 3-, the upper, which is very narrow, 1-nerved; anthers  $1\frac{1}{2}$  lin. long.—*Andropogon papillipes*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 460, partly; Hack. in DC. Monogr. Phan. vi. 620; Durand & Schinz, Consp. Fl. Afr. v. 719.

Nile Land. Eritrea: Amasen; north of Acgur, *Schweinfurth & Riva*, 1089! Abyssinia: Tigre; Shire plateau, *Schimper*, 1804! Mount Sinai near Adowa, *Schimper*, 1055! Mount Semeyata, east of Adowa, *Schimper*, 469!

(Hochst.)

34. *H. arrhenobasis*, Stapf. Perennial, up to over 3 ft. high, densely tufted with extravaginal innovations, shoots close to the flowering culms. Culms erect or geniculately ascending, simple and 4-5-noded below the panicle, moderately stout, terete or somewhat compressed below, glabrous, smooth. Leaf-sheaths terete or the lowest slightly compressed and keeled, glabrous or rarely sparingly hirsute upwards, those of the innovation shoots 1-2 in. long; ligules scarious, rounded or truncate, very short, glabrous or sparingly hairy; blades linear from an equally wide base, tapering to an acute point, the cauline  $\frac{1}{2}$ - $1\frac{1}{2}$  ft. long, 2-4 lin. wide, of the innovations usually much shorter, somewhat firm but hardly rigid, pale green, glabrous or with a few tubercle-based hairs towards the base, scabrid along the margins, otherwise almost smooth. Inflorescence a narrow scanty panicle rarely over 1 ft.





long, of 4-5 distant few-rayed tiers or simple branches; subtending leaves or spathes resembling the preceding leaves, with mostly well-developed blades or the upper spatheoloid; rays simple or (in strong specimens) one of the lowest tiers compound, 2-3-noded, filiform, 2-3½ in. long. Spatheoles lanceolate, acuminate, 2-2½ in. by 2-2½ lin., scarious, green, tinged with red or reddish, glabrous, permanently boat-shaped with ultimately inrolled margins, rarely altogether inrolled. Peduncles at length up to 1-1¼ in. long, arched upwards, with a long beard of stiff tubercle-based white or yellowish hairs from the curvature, the bearded tips laterally or subterminally exerted from the spatheoles. Racemes subcontiguous, usually nodding, at length epinastically reflexed (?), ¾-1 in. long, 7-12-awned per pair, rather stout, yellowish or brownish green; bases short, from less than ½ to 1 lin. long, with long stiff spreading tubercle-based hairs; joints slender, filiform, 1 lin. long, obliquely truncate, shortly ciliate; pedicels similar, up to 1½ lin. long. Homogamous pair of spikelets 1 or 2 at the base of each raceme, supporting them like an involucre. Fertile spikelets linear-oblong, 3 lin. long including the callus, yellowish-green to brownish or purplish-brown; callus short, up to ¾ lin. long, subacute, bearded. Glumes equal, chartaceous to subchartaceous, lower flat on the back, sparingly and minutely pubescent, 9-nerved, intracarpinal nerves somewhat raised all along; margins narrowly involute, inflexed towards the tips, the short keels rigidly ciliate; upper glume obliquely truncate, mucronulate, 3-nerved, more or less grooved between the nerves, with a broad rounded keel, margins erect, ciliate upwards. Lower floret reduced to an oblong or oblong-cuneate faintly 2-nerved hyaline valve 2¼ lin. long, sparingly ciliate upwards. Upper floret ♀: valve stipitiform, 2-dentate, teeth almost ½ lin. long, ciliate; awn 1-1½ in. long, fulvous, column hirtellous; valvule an elliptic-oblong glabrous hyaline scale, ¼ lin. long. Anthers over 1 lin. long. Pedicelled spikelets ♂, narrowly lanceolate-acuminate, up to 4 lin. long, glabrous; lower glume chartaceous, produced into a mucro or very short bristle, spinulously ciliate along the keels, up to 13-nerved; upper glume membranous, very acute to mucronulate, 3-nerved, sparingly ciliate, cilia erect; valves hyaline, oblong, the lower 3 lin. long, sub-3-nerved, ciliate, cilia erect, short; upper valve oblanceolate-cuneate, emarginate, 1-nerved, otherwise like the lower; anthers 1¾ lin. long.—*Heteropogon arrhenobasis*, Anderss. in Schweinf. Beitr. Fl. Aethiop. 310. *Andropogon arrhenobasis*, Hochst. ex Steud. Syn. Pl. Glum. i. 385; Hack. in DC. Monogr. Phan. vi. 626; Durand & Schinz, Consp. Fl. Afr. v. 706; Chiov. in Ann. Istit. Bot. Roma, viii, 288.

Nile Land. Eritrea: Amasen, Mount Zien, 8200 ft., *Pappi*, 5296. Addi Baro, by the River Mareb, *Pappi*, 2381. Abyssinia: Shire Plateau, *Schimper*, 1821! Adowa, *Schimper*, 1054 partly! Debra Eski, 9300 ft., *Schimper*, 1011! Tigre; Mettaro, 8300 ft., *Schimper*, 1010! Ankober, *Roth*!

A specimen collected by Drake-Brockman at Ger Abbas in South Abyssinia

(no. 235) is evidently referable to this species with which it shares the general facies, but the racemes are divided, producing from the lower nodes secondary racemes with 3, 2, or 1 heterogamous pairs of spikelets. These compound racemes have each 2 pairs of homogamous spikelets at the base, which, like the following, are continued into secondary racemes. It is evidently a morbid condition due to insect action.

✓ **35. H. Lintonii, Stapf.** Perennial, up to over 2 ft. high. Culms (base unknown) very slender, wiry, with vegetative or mixed (?) branches from below the panicle, terete, glabrous, smooth, intermediate internodes 5-3 in. long. Leaf-sheaths terete, glabrous, smooth, tight or those with branches in their axils slipping off the culm, shorter to much shorter than the internode; ligules thinly scarious, very short, truncate, glabrous; blades linear from an equally wide, more or less constricted and rounded base, tapering upwards to a very fine point, up to 4 in. by  $1\frac{1}{2}$ -2 lin., glabrous, smooth except upwards on the face and the margins, tinged with purple or dull red, midrib very slender, primary lateral nerves 2-3 on each side, fine below, lost among the numerous close secondary nerves above. Spatheate panicle very scanty and loose, up to over 1 ft. long; primary internodes about 3 or sometimes only 2, the lowest 4-5 in. long; tiers few-rayed, the lower or sometimes all reduced to a single ray; lowest rays compound, 1-2-noded, their secondary tiers 1-rayed; ultimate (simple) rays filiform, erect, 3-2 or the uppermost  $1\frac{1}{2}$  in. long; subtending leaves like the preceding ones, the lower with relatively long blades, the uppermost spatheoloid. Spatheoles lanceolate, long and finely acuminate, 2 to almost 3 in. long, subherbaceous, glabrous, smooth, at length reddish and narrowly inrolled; peduncles filiform, curved upwards, bearded below the tips (hairs stiff, yellowish, tubercle-based, up to over  $2\frac{1}{2}$  lin. long), at length often straightened out and as long as the spatheole or permanently slightly shorter than it. Racemes dense, slightly diverging, at length epinastically deflexed, about 1 in. long, 10-15-awned per pair, greyish-villous; bases very short, pubescent in the fork and bearded like the peduncle, but beard upright, tips with a more or less distinct scarious dark auricle; joints and pedicels filiform, up to over 1 lin. long, shortly white-ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong to lanceolate-oblong,  $2\frac{1}{2}$ -3 lin. long, pale, usually tinged with purple downwards, tips mostly reddish; callus cuneate, subacute, almost  $\frac{1}{2}$  lin. long, shortly bearded. Glumes equal, subchartaceous; lower narrowly truncate, flattened on the back with rounded sides, sparingly hairy to villous (hairs very fine, white), faintly 7-nerved, margins narrowly involute, then inflexed near the tips, keels very fine, ciliolate; upper glume truncate, minutely mucronulate, 3-nerved, reversedly ciliate. Lower floret reduced to a linear-oblong obtuse nerveless reversedly ciliate hyaline valve. Upper floret ♂: valve stipitiform, minutely 2-dentate, awn slender,





1-1½ in. long, column brown, minutely hirtellous; valvule 0. Pedicelled spikelets ♂, narrowly lanceolate, acutely acuminate, 3-4½ lin. long, reddish, indumentum as in the fertile spikelets; lower glume subherbaceous, about 11-nerved, more or less mucronate or mucous, finely ciliate upwards; upper very acute, subchartaceous with broad hyaline ciliate margins, 3-nerved; valves lanceolate-oblong, hyaline, ciliate, the lower broader, almost as long as the glumes, 3-nerved, the upper slightly shorter, 1-nerved; anthers 2 lin. long.

+ Nile Land. British East Africa: Nairobi, *Linton*, 124! (*Dowson*, 240!)

✓ 36. *H. cyanescens*, <sup>(Stapf)</sup> *Stapf*. Perennial (*Pobéquin*); up to over 6 ft. high, only known from the upper part. Culms terete, smooth, solid, pruinose below the nodes, with barren branches from the lower nodes. Leaf-sheaths tight, terete, glabrous, shorter than the internodes, produced at the mouth into firm oblong auricles over 1 lin. long; ligules scarious, truncate, glabrous, laterally adnate to the auricles; blades linear from a very long-attenuated narrow base, tapering to a fine point, up to over 1½ ft. by 3½ lin., firm, glaucous, glabrous, scabrid at the margins; midrib stout, of the lower leaves semiterete at the base, whitish and over ½ lin. wide on the upper side; primary lateral nerves very slender, 3-4 on each side. Spatheate panicle obovate-oblong, ample, up to almost 2 ft. long, of 8-10 downwards distant, upwards more approximate mostly 3-4-rayed often mixed tiers; compound rays often 2 in one tier, up to 5-noded with 2-3-rayed secondary tiers, the lowest up to 1 ft. long; simple rays 1-1½ in. long; subtending leaves with usually well developed upwards rapidly decreasing blades, glabrous, glaucous. Spatheoles narrowly linear to linear-lanceolate, acutely acuminate, up to over 2 in. long, turning dull reddish, at length more or less loosely inrolled; peduncles finely filiform, up to 2 in. long, subterminally exerted, arched or recurved in a semicircle, beset with long spreading tubercle-based silky hairs for about 3-4 lin. below the tips. Racemes more or less diverging, at length epinastically deflexed, somewhat loose, ½-1 in. long, up to 11-awned per pair, the lower sessile, the upper with a narrowly linear base up to ¾ lin. long, both bases pubescent in the fork, hirsute upwards, with the hairs up to 2 and even 2½ lin. long, their tips oblique, sometimes minutely auriculate; joints and pedicels filiform, slender, 1½ lin. long, subobliquely truncate, densely and equally ciliate, cilia ½ lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, 2-2½ (rarely 2¾) lin. long, whitish or bluish downwards, reddish towards the tips; callus short, subobtusate, dark on the back below a white cross bar, with a dense white beard of the same length. Glumes equal, lower chartaceous, minutely truncate, flat on the back, smooth or more or less lineate-scabrous upwards and towards the sides or laterally pubescent,

about 9-nerved, the 5 inner nerves raised, margins involute, sub-terminal keels faint, asperulous; upper glume membranous, acute or subtruncate, 3-nerved, ciliate upwards. Lower floret reduced to an oblong truncate hyaline 2-nerved ciliate valve. Upper floret ♂: valve stipitiform from a very narrow base, minutely 2-dentate, sparingly ciliate, awn slender,  $1-1\frac{1}{4}$  in. long, kneed, column fulvo-pubescent; valvule a subquadrate scale,  $\frac{3}{8}$  lin. long. Grain oblong, subterete,  $1\frac{3}{8}$  lin. long. Pedicelled spikelets narrowly lanceolate, acute, up to over 3 lin. long, glabrous, bright reddish; glumes equal, lower subherbaceous, passing into a bristle, up to  $1\frac{1}{2}$  lin. long, finely 11-nerved, upper acute, membranous, 3-nerved; valves oblong, hyaline, ciliate, 1-nerved, upper much narrower; anthers 1 lin. long.—*Cymbopogon cyanescens*, Stapf in Journ. de Bot. 2me ser. ii. 209. *Andropogon cyanescens*, Cheval. Sudania, 35. *Andropogon hirtus* (including var. *podotrichus*), Pobéguin, Ess. Fl. Guin. Franç, 216; not of Linn.

Upper Guinea. French Guinea: Kouroussa, Pobéguin, 508! 514! Middle Niger; between Nyamina and Koulikoro, *Chevalier*, 2359! Cameroons: Upper Benue Basin; Bogalo, *Macleod*, 93!

✓ 37. *H. petiolata*, Stapf. Annual, about 3 ft. high. Culms erect, slender, terete, glabrous, simple and 4-noded below the panicle. Leaf-sheaths terete, smooth, glabrous, somewhat loose; ligules linear-lanceolate, up to 8 lin. long, scarious, glabrous; blades linear, reduced towards the base to the subterete midrib (for  $1\frac{1}{2}-1$  in.), flat and subflaccid above it, tapering to a fine point, up to 1 ft. by 4-5 lin., glabrous, subglaucous, slightly rough on both sides, scabrid along the margins, midrib slender above the petioloid portion, primary lateral nerves 2-4 on each side, very slender. Spatheate panicle narrow, flaccid, somewhat contracted, foliate, over 1 ft. long, of 5 or 6 mostly mixed upwards approaching 3-4-rayed tiers; compound rays up to 3- or 4-noded, the lowest up to over 6 in. long bearing secondary tiers only; ultimate (simple) rays very slender, about  $1\frac{1}{2}$  in. long; lower subtending leaves resembling the preceding leaves with blades equalling the panicle. Spatheoles lanceolate, acutely acuminate, cymbiform, up to 2 in. long, scarious, glabrous, pale, glaucous, faintly tinged with red or purple, at length more or less inrolled from the margins; peduncles very slender, flexuous or recurved upwards, beset with fine spreading tubercle-based pale hairs up to over 3 lin. long, at length slightly exceeding the spatheole. Racemes subcontiguous, at length more or less epinastically reflexed, about 7 lin. long, dull purplish, nodding, 2-awned per pair, each with 1 heterogamous pair of spikelets, bases subequal, not over  $\frac{1}{2}$  lin. long, pubescent in the fork, with or without a few spreading long hairs, the upper produced into a scarious purplish linear-oblong denticulate appendage,  $2-2\frac{1}{2}$  lin. long; pedicels filiform,





2 lin. long, shortly and fulvously ciliate. Fertile spikelets linear-oblong, flattened on the back but rounded on the sides, including the callus  $3\frac{1}{2}$ –4 lin. long, pale greenish, glabrous; callus slender, very acute, 1 lin. long, very densely bearded, hairs fulvous to ferruginous, the upper exceeding the callus by its own length. Glumes equal, thinly chartaceous; lower 2-dentate or 2-mucronulate, rough upwards, 9-nerved, nerves faint downwards, margins narrowly involute, keels fine, short, scaberulous; upper glume suddenly contracted into a fine mucro,  $\frac{1}{2}$  lin. long, 3-nerved, ciliate upwards. Lower floret reduced to a narrow linear-oblong nerveless reversedly ciliate hyaline valve. Upper floret ♀: valve stipitiform, shortly 2-dentate; awn to over 2 in. long, moderately stout, fulvously hirtellous; valvule 0. Pedicelled spikelets ♂ (?), linear-lanceolate, up to 5 lin. long, glabrous, purplish; lower glume produced between two fine teeth or mucros into a fine bristle, up to 4 lin. long, thinly chartaceous, 9-nerved, keels scaberulous upwards; upper glume membranous, acute, 3-nerved, ciliate; valves hyaline, 1-nerved, reversedly ciliate, lower oblong, 4 lin. long, upper very narrow, cuneate-subulate. Homogamous spikelets similar to the pedicelled, but not aristulate.

+ Nile Land. Abyssinia; Atsegua, 5000–6000 ft., Schimper, 748!

38. *H. confinis*, <sup>(Hochst)</sup> Anderss.

*in Schweinf. Beitr. Fl. Aethiop.* 306. Annual, 3 or more ft. high. Culms erect, slender to stout, terete, glabrous, simple and 3–5-noded below the panicle. Leaf-sheaths terete, smooth, glabrous, produced at the mouth into triangular-ovate acute auricles; ligules ovate, obtuse, scarious, glabrous, laterally adnate to the auricles of the sheath, up to over 3 lin. long; blades linear from a more or less narrowed but not petioid base, tapering to a long fine point, up to 2 ft. by 5 lin., somewhat flaccid, glabrous, smooth except on the scabrid to spinulously ciliate margins; midrib slender or in large leaves stout downwards, primary lateral nerves 3–6 on each side, very fine. Spatheate panicle somewhat flaccid, leafy, of 6–8 mostly mixed distant or upwards approximate 4- (rarely up to 7-) rayed tiers; lower compound rays to over 1 ft. long and up to 6-noded, bearing secondary tiers only; ultimate (simple) rays very slender, 1–1½ in. or in the lowest tiers up to 4 in. long; subtending leaves and spathes with well-developed blades often equalling the panicle. Spatheoles cymbiform-lanceolate, long and finely acuminate, 1½–2 in. by 1½ lin., scarious, glabrous, pale reddish, at length inrolled from the margins and quite narrow; peduncles slender, filiform, flexuous or recurved, upwards beset with fine spreading tubercle-based hairs up to over 3 lin. long, at length often straightened and equalling or only slightly shorter than the spatheoles. Racemes subcontiguous, more or less nodding, at length epinastically reflexed, up to 10 lin. long, pale reddish or brownish, 2-awned per pair; bases subequal, not over ½ lin. long, pubescent in the fork, setosely bearded like the peduncle, produced

into an oblong denticulate scarious appendage  $\frac{1}{2}$  lin. to over  $1\frac{1}{2}$  lin. long; pedicels filiform, shortly ciliate, up to  $2\frac{1}{2}$  lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, flattened on the back or very slightly depressed along the middle, broadly rounded on the sides, including the callus 4– $4\frac{1}{2}$  lin. long, pale greenish, reddish towards the tips, pubescent; callus slender, very acute,  $1\frac{1}{4}$  lin. long, densely bearded, hairs whitish, the upper exceeding the callus by its own length. Glumes equal, chartaceous; lower narrowly truncate, about 9-nerved, nerves faint downwards, margins involute, keels fine, short, minutely and rigidly ciliate; upper glume deltoid-acute, deeply grooved along the broad keel, ciliate upwards. Lower floret reduced to an oblong acute 2-nerved hyaline reversedly ciliate valve, over  $2\frac{1}{2}$  lin. long. Upper floret ♀: valve stipitiform, with a hyaline margin and 2 small teeth; awn rather stout, to over 3 in. long, fulvously hirtellous; valvule 0. Anthers up to 2 lin. long. Pedicelled spikelets linear-lanceolate, very acute, 5–6 lin. long, glabrous, greenish or pale reddish; lower glume with or without a terminal bristle, up to 6 lin. long, very closely and finely many-nerved, keels rigidly ciliate; upper glume membranous, acute, 3-nerved, reversedly ciliate; valves hyaline, linear-oblong, acute, up to 4 lin. long, lower 3-nerved, upper 1-nerved; anthers 3– $3\frac{1}{2}$  lin. long.—*Andropogon confinis*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 461; Steud. Syn. Pl. Glum. i. 386; Hack. in DC. Monogr. Phan. vi. 640 (var. *a genuinus*); Durand & Schinz, Consp. Fl. Afr. v. 708; K. Schum. in Engl. Pfl. Ost-Afr. C. 99; Cheval. Sudania, 76. *A. niariensis*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 330 (reprint 22). *A. Viancini*, Franch. l.c. 331 (reprint 23). *Cymbopogon Welwitschii*, var. *minor*, Rendle in Cat. Afr. Pl. Welw. ii. 159.

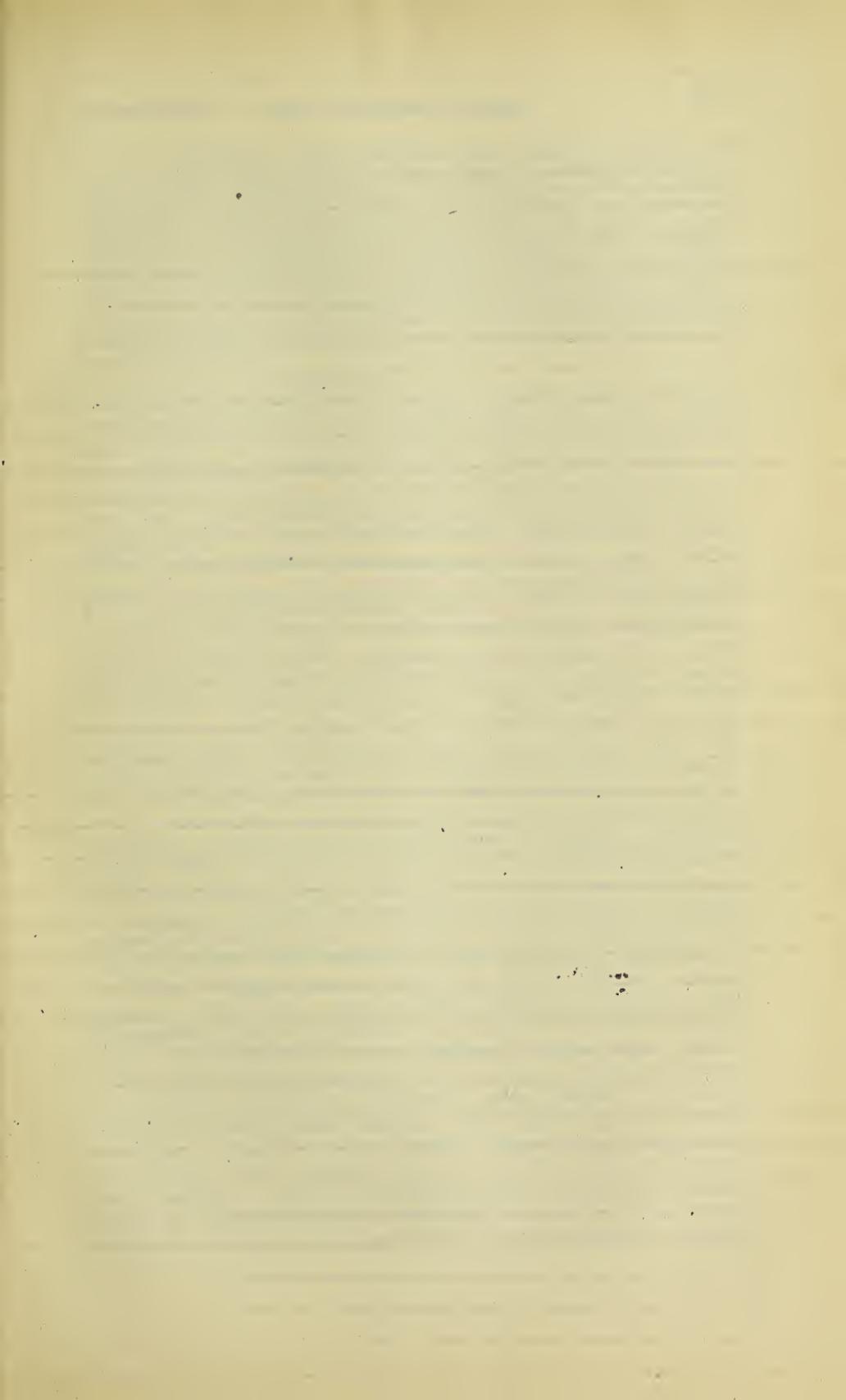
**North Central.** Oubangui Territory: Upper Oubangui, *Viancin*! Kredje, *Chevalier*, 5743! Middle Oubangui; near Fort de Possel, *Chevalier*, 5313!  
**Nile Land.** Abyssinia: Gallabat; Matamma, *Schweinfurth*, 1043! and without precise locality, *Schimper*, 1456! US

**Lower Guinea.** French Congo: Niari District, *Thollon*, 1037! and without precise locality, *Viancin*! Belgian Congo: without precise locality, or collector's name, 906! Angola: Pungo Andongo; mountains of Pedrede Cabondo, plentiful, *Welwitsch*, 2820! between Pungo Andongo and Catete, *Welwitsch*, 7420

✓ Var. ? *pellita* (Hornem.) Stapf. Leaves more rigid and narrower than in the type, the lower almost reduced to the midrib at the base. Fertile spikelets covered with long silvery silky hairs.—*Andropogon confinis*, var. *pellitus*, Hack. l.c. 642.

+ **Nile Land.** Abyssinia: Gallabat; Matamma, up to 10 ft. high, growing in small groups, *Schweinfurth*, 1034! US

*Schweinfurth's* specimen quoted under var. *pellita* may be a distinct species, the peduncles are much shorter than the spatheoles, and this in combination with the long silvery hairs of the fertile spikelets gives it a peculiar appearance, but the specimens seen are young plants, and it is quite possible that the peduncles ultimately grow out as much as in the typical form; all other characters agree very well with *H. confinis*. The length of the appendage of the raceme-bases differs in the specimen referred here to typical *H. confinis*, the extremes being 1 lin. (in the specimen from the Belgian Congo), or less than  $\frac{1}{2}$  lin. (in some of those from the Oubangui Territory).





Hackel distinguishes a variety *nudiglumis* which is said to differ from the type by its more rigid and glaucous leaves, longer exerted peduncles, and glabrous spikelets; he bases it on a plant collected by Schweinfurth at Matamma and distributed under no. 1043, adding that other specimens issued under the same number are intermediate between it and the type; the specimen of this number at Kew has distinctly pubescent fertile spikelets which are slightly smaller than those of the sample of *H. confinis* enumerated above, but the plant, which in all other respects recalls typical *H. confinis*, is very young and most of the racemes are still enclosed in their spatheoles. On the other hand, a sample of the same number in the British Museum collections is fully developed and is typical *H. confinis*. Schweinfurth says of it that it grows gregariously, and attains a height of 10 ft.

(Hackel.)

- ✓ 39. *H. macrarrhena*, Stapf. Annual, about 3 ft. high, with a few weak flowering branches from the base of the main culm. Culms erect, moderately stout, terete, glabrous except for a spreading beard up to  $1\frac{1}{2}$  lin. long from below the insertion of the leaves, simple and 2-noded below the panicle. Leaf-sheaths terete, smooth, glabrous, at length their upper part slipping from the culm and inrolled, produced at the mouth into narrow lanceolate auricles; ligules oblong, obtuse, adnate to the auricles of the sheaths, up to 3 lin. long; blades linear from a more or less narrowed but not petioid base, up to 9 in. by 4 lin., somewhat flaccid, glaucous, glabrous, very slightly rough with scabrid margins; midrib slender, primary lateral nerves about 3 on each side, fine. Spatheate panicle leafy, of 6-8 mostly mixed distant or upwards approximate up to 4- (rarely 5-6-) rayed tiers; lower compound rays up to  $\frac{1}{2}$  ft. long, few-noded, bearing secondary tiers only, ultimate rays very slender, about 1 in. long; subtending leaves and spathes except the uppermost with well-developed blades equalling or almost equalling the panicle. Spatheoles cymbiform, lanceolate-acute or shortly acuminate, up to  $1\frac{1}{2}$  in. by  $1\frac{1}{2}$  to almost 2 lin., scarious, glabrous, purple or violet with a glaucous bloom, at length slightly inrolled from the margins; peduncles slender, filiform, straight or arching, 8-9 lin. long, beset upwards with fine spreading tubercle-based hairs, up to 3 lin. long. Racemes subcontiguous, laterally exerted from the spatheoles, at length epinastically reflexed, loose, up to over 10 lin. long, purplish, 2-awned per pair; bases subequal, hardly  $\frac{1}{2}$  lin. long, pubescent in the fork, the upper produced into an obscure auricle, densely bearded on the back; pedicels filiform, ciliate, up to  $2\frac{1}{2}$  lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, flattened on the back, with a rather broad median groove, up to 6 lin. long including the callus, pale greenish throughout, pubescent; callus slender, very acute, up to 2 lin. long, densely bearded, hairs whitish, uppermost hairs exceeding it almost by its own length. Glumes equal, very firmly chartaceous; lower narrowly truncate, grooved, with its groove corresponding to a broad blunt ridge on the inner side, pubescent mainly in the groove and on the sides, 7-nerved with 1 nerve on each side of the groove and 2 nerves submarginally, nerves somewhat

UB

prominent in the tip, keels fine, minutely and rigidly ciliate; upper glume broadly transversely truncate, deeply grooved along the broad keel, ciliate upwards. Lower floret reduced to an oblong truncate or obtuse sub-2-nerved hyaline reversedly ciliate valve almost 3 lin. long. Upper floret ♀: valve stipitiform with a very fine hyaline margin and 2 small teeth; awn stout, about 3 in. long, minutely and appressedly hirtellous; valvule 0. Anthers 2 lin. long. Pedicelled spikelets linear-lanceolate, very acute, up to 7 lin. long, reddish-brown, purplish, glabrous; upper glume with or without a terminal bristle, up to 6 lin. long, very closely and finely many-nerved, keels scaberulous; lower glume membranous, acute, 3-nerved, reversedly ciliate; valves hyaline, linear-oblong, subacute, 1-nerved, up to 5 lin. long; anthers  $3\frac{1}{2}$  lin. long.—*Andropogon confinis*, var. *macrarrhenus*, Hack. in DC. Monogr. Phan. vi. 642.

Nile Land. Bongo: Sabbi, Schweinfurth, 2618!

(Rendle)

✓ 40. **H. Welwitschii**, *Stapf*. Annual (?), tall, up to 9 ft. high (*Pobéquin*). Base unknown. Culms moderately stout, with dense yellowish beards  $1\frac{1}{2}$  lin. long from just below the insertion of the leaf-sheath, otherwise perfectly glabrous and smooth. Leaves quite glabrous, only those of the panicle known; sheaths firm, terete, tight, strongly striate upwards, glabrous, smooth, produced at the mouth into lanceolate auricles, up to 3 lin. long; ligules scarious, otherwise glabrous, as long as and adnate to the auricles of the sheath; blades linear from a slightly narrowed base, tapering to a fine point, up to  $1\frac{1}{2}$  ft. by 5 lin., dull green, slightly glaucescent, quite glabrous, almost smooth except upwards and along the scabrid margins, primary lateral nerves about 5 on each side, very slender. Spatheate panicle large, loose, leafy, up to over 2 ft. long, bearded at all the nodes, of about 7-8 mostly mixed distant or upwards approximate 2-5- (rarely 6-) rayed tiers; lowest and strongest compound rays up to over 9 in. long and up to 5-noded, bearing secondary tiers; ultimate rays slender, filiform,  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long; lower subtending leaves like the preceding, the intermediate with more or less reduced blades, shorter than the panicle, the uppermost spatheoloid. Spatheoles cymbiform, lanceolate, narrow, tapering to a fine point, about  $1\frac{1}{2}$  in. (rarely 2 in.) by  $1\frac{1}{4}$ - $1\frac{1}{2}$  lin., scarious, reddish or brownish-purple, glabrous, at length inrolled from the margins and very narrow; peduncles very slender, filiform, slightly arched or recurved upwards with a beard of fine stiff tubercle-based yellow hairs from the curvature, laterally exerted, at length exceeded by the spatheole by a few to 6 lin., rarely equalling it. Racemes subcontiguous, nodding, at length epinastically deflexed, rather loose, 6-8 lin. long, brownish, 2-4-awned per pair; bases subequal, not much over  $\frac{1}{2}$  lin. long, dorsally compressed, pubescent in the fork and bearded upwards, beards like those of the peduncles, the upper produced into a scarious oblong denticulate purplish





appendage, up to 1 lin. long, lowest joint of the lower raceme obsolete, produced into an appendage like that of the lower base, upper joints, if present, and pedicels slender, filiform,  $1\frac{1}{2}$  lin. long, shortly white ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets lanceolate-oblong, subacuminate, flattened on the back and rounded on the sides, including the callus  $3-3\frac{1}{4}$  lin. long, ashy-grey with reddish tips; callus acute, up to  $\frac{3}{4}$  lin. long, densely white-bearded, uppermost hairs exceeding the callus by almost its own length. Glumes equal, chartaceous, the lower very narrowly truncate, greyish-pubescent, the short hairs dense below and arranged in lines between the nerves, more or less reduced to asperities towards the tips, or glabrescent except on the sides, nerves 9, very slender, margins narrowly involute, keels very faint, fine, short, scaberulous; upper glume deltoid-acute to subtruncate, 3-nerved, ciliate upwards. Lower floret reduced to a linear-oblong sub-2-nerved reversedly ciliate hyaline valve. Upper floret ♂: valves stipitiform, very minutely 2-dentate, awn up to  $2\frac{1}{2}$  in. long, fulvously pubescent; valvule 0. Anthers over 1 lin. long. Pedicelled spikelets ♂ or neuter, linear-lanceolate, acuminate, glabrous, reddish-brown; lower glume produced into a fine bristle about 3 lin. long, 11-nerved, rigidly ciliate along the keels: upper glume very acute, membranous, 3-nerved, reversedly ciliate; valves if fully developed hyaline, linear-oblong, reversedly ciliate, 1-nerved, 4 lin. long; anthers 2 lin. long. Homogamous spikelets similar to the pedicelled, but not aristulate.—*Cymbopogon Welwitschii*, Rendle in Cat. Afr. Pl. Welw. ii. 157. *Andropogon Chrysopogon*, Welw. ex Rendle l.c.

**Upper Guinea.** French Guinea: Timbo, very common in rich deep soil, *Pobéguin*, 1796! 1797! Cameroons: Yaunde, 2600 ft., *Zenker & Staudt*, 98!

**Lower Guinea.** Angola: Golungo Alto; near Undele and Candombo, *Welwitsch*, 2955! near Sange, *Welwitsch*, 2956! Cataracts of the Cuango, *Welwitsch*, 3000! thickets near the Ambaca Road, *Welwitsch*, 7190! thickets near the base of the Queta Mountains, *Welwitsch*, 7248!

- ✓ 41. *H. gracilescens*, Stapf. Annual, up to over 4 ft. high, with stilt-roots from the lowest nodes. Culms slender, terete, smooth, compressible, simple and 4-5-noded below the panicle. Leaf-sheaths terete, glabrous, the lower inrolled upwards and slipping off the culm, not produced into auricles; ligules firmly scarious, truncate, glabrous, 1 lin. long; blades linear from a long somewhat attenuated or equally wide base, over 1 ft. by 2-3 lin., rather thin, glaucous, glabrous or more or less scattered with short fine hairs below; margins scabrid, nerves somewhat rough on the upper side; midrib slender, primary lateral nerves about 4 on each side, slender. Spatheate panicle interrupted below, narrowly oblong, lax, over 1 ft. long, of about 6-8 downwards distant (lowest internode up to over 6 in. long), upwards rapidly approaching 3-8-rayed tiers; compound

rays often 2 in the lower tiers, the longest up to 6 in. long, carrying several secondary tiers; simple rays very finely filiform,  $1-\frac{2}{3}$  in. (or of the lowest tiers to  $1\frac{1}{2}$  in.) long; lower subtending leaves resembling the preceding leaves, their blades almost reaching to the top of the panicle, the upper becoming rapidly spatheoloid. Spatheoles linear-lanceolate, finely acuminate,  $1\frac{1}{2}-1\frac{3}{4}$  in. long, scarious, glabrous or with a few scattered hairs, pale reddish, soon narrowly inrolled; peduncles filiform, arching or strongly recurved upwards, with long (3 lin.) stiff yellow tubercle-based spreading hairs from the curvature, exerted subterminally from the spatheole, at length equalling the latter and straightening out. Racemes subparallel, finally sharply epinastically reflexed, loose, about  $\frac{1}{2}$  in. long, inconspicuously hairy, straw-coloured or pale olive-green, 2-3-awned per pair; bases subequal, very short, dark pubescent in the fork, with a beard of long rigid yellowish hairs from the tips which often bear short ovate purplish auricles up to over  $\frac{1}{2}$  lin. long; joints (if any) and pedicels finely filiform, subobliquely truncate, shortly ciliate, the former about  $1-1\frac{1}{2}$  lin., the latter up to 2 lin. long. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-oblong, subacuminate,  $3-3\frac{1}{2}$  lin. long including the callus, pale or slate-colour about the middle with reddish tips; callus slender, acute, up to  $\frac{3}{4}$  lin. long, shortly bearded. Glumes equal, thinly chartaceous; lower minutely truncate, flat or slightly rounded on the back, sometimes more or less depressed along the middle nerve, scabrid all over or shortly pubescent at least downwards, faintly 7-9-nerved, margins involute, inflexed at the tips, keels obscure, scaberulous; upper glume obtuse or obliquely truncate, 3-nerved, sparingly ciliate upwards. Lower floret reduced to an oblong obtuse hyaline 2-nerved ciliate valve. Upper floret ♂: valves stipitiform, obscurely 2-dentate; awn stout, 2-3 in. long, column fulvous or dark brown, hirtellous, bristle slightly paler; valvule 0. Pedicelled spikelets neuter, sublinear, very narrow,  $3-3\frac{1}{2}$  lin. long; lower glume up to 11-nerved, scaberulous on the intracardinal nerves and scabrid on the keels, produced into a very fine bristle up to  $3\frac{1}{2}$  lin. long; upper acute, membranous, 3-nerved; valve 1, reduced to a small ciliate hyaline scale or 0. Homogamous spikelets slightly stouter than the pedicelled, muticous, their valve less reduced.

+ **Upper Guinea.** French Guinea: Fouta Jallon (between Dalaba and Sougueta), *Chevalier*, 2019! Northern Nigeria: Lokoja, *Dalziel*, 292! *US*

**42. *H. comosa*** <sup>(Hochst)</sup> *Anderss. in Schweinf. Beitr. Fl. Aethiop.* 306. Annual, over 3 ft. high. Culms erect from a subgeniculate base, throwing out stilt-roots, slender to somewhat stout, terete, glabrous, branched or simple below the panicle. Leaf-sheaths loose, the lowest slipping off the culm, not very firm, glabrous or more or less hirsute, particularly upwards, with spreading tubercle-based hairs;





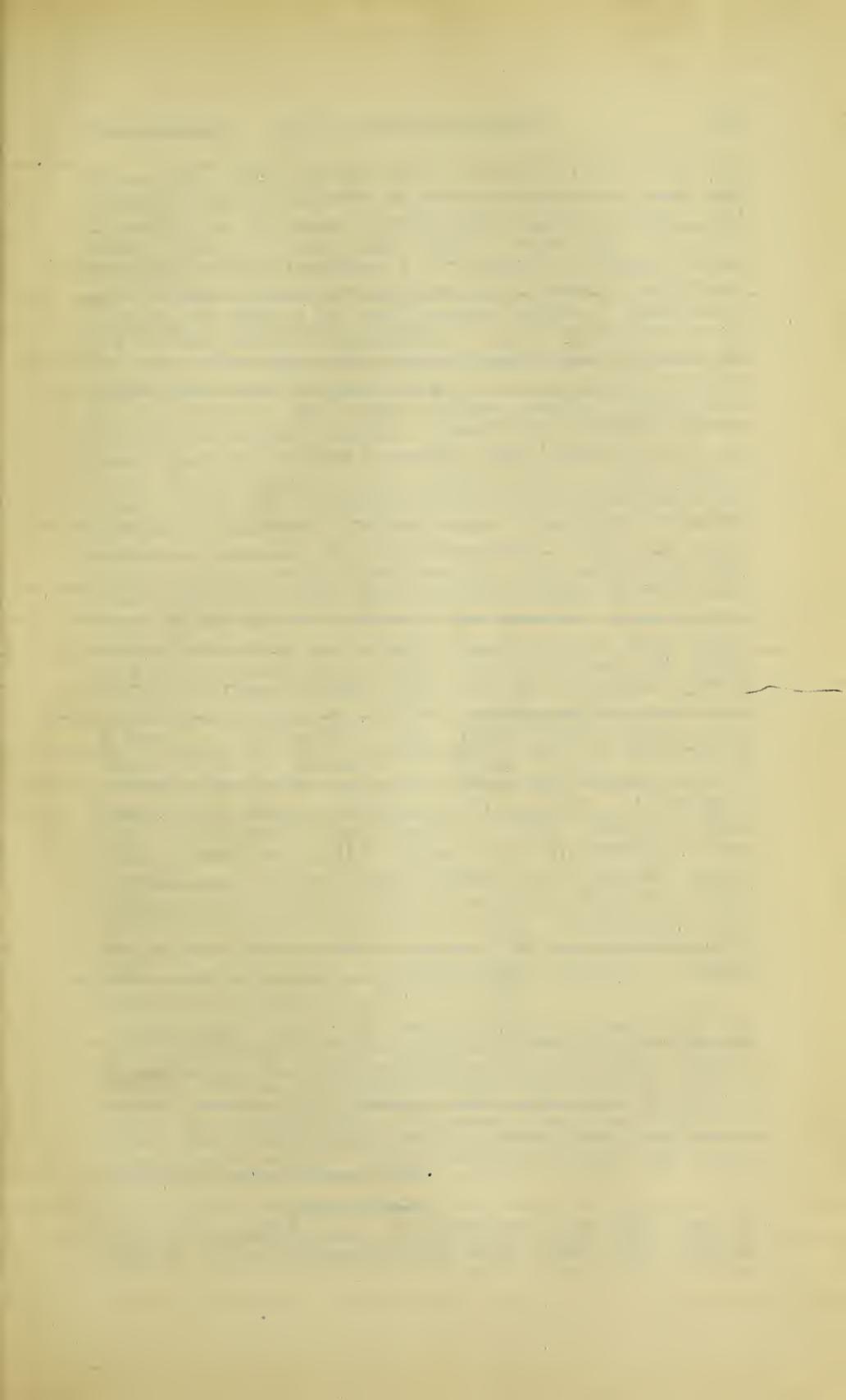
ligules broad, rounded, glabrous, scarious, up to 3 lin. long; blades linear from an equally wide or more often long-narrowed but not petiolid base, tapering to an acute point, up to over 1 ft. by  $2\frac{1}{2}$ –8 lin., flaccid, green, glabrous or with some long spreading tubercle-based hairs towards the base, more or less rough particularly on the upper side and along the margins; midrib slender, or in the largest leaves somewhat stout downwards; primary lateral nerves 3–5 on each side, distant, very slender. Spatheate panicle narrow, flaccid, loose and foliate (sometimes augmented by 1 or 2 flowering branches,  $1\frac{1}{2}$ –1 ft. long and resembling it), of 5 or 6 downwards mixed few- to 4- or 5-rayed tiers; lowest compound rays few-noded, up to over 6 in. long, bearing secondary tiers only; ultimate (simple) rays very slender, up to  $1\frac{1}{2}$  in. long; subtending leaves and spathes with well-developed blades equalling or overtopping the panicle, glabrous or pubescent at the nodes. Spatheoles narrowly cymbiform, lanceolate, long-acuminate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, scarious, pale or slightly purplish, glabrous, at length more or less inrolled from the margins; peduncles very slender, recurved upwards, beset with fine spreading tubercle-based pale hairs up to over 3 lin. long, laterally exerted and at length only slightly (by 4 or 5 lin.) shorter than the spatheole. Racemes subcontiguous, nodding, at length epinastically reflexed, about  $\frac{3}{4}$ –1 in. long, straw-coloured, tinged with pale purple, mostly 6-awned per pair; bases subequal, short, not over  $1\frac{1}{2}$  lin. long, pubescent in the fork, upwards with some spreading long hairs like those of the peduncles, produced into a linear-oblong pale denticulate scarious appendage, 1 lin. long; joints like the pedicels, slender, filiform, to over  $1\frac{1}{2}$  lin. long, shortly whitish-ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear to lanceolate-oblong, including the callus  $3\frac{1}{2}$  lin. long, pale, shortly villous, flattened on the back but rounded on the sides, callus slender, acute,  $\frac{3}{4}$ –1 lin. long, very densely bearded, hairs whitish, the upper exceeding the callus almost by its own length. Glumes equal, thinly chartaceous, lower narrowly truncate, softly villous up to three-quarters of its length, then glabrous, 9-nerved, nerves rather distinct upwards, margins involute, inflexed towards the tips only, forming three scaberulous keels; upper glume deltoid-truncate, loosely hairy, 3-nerved, reversedly ciliate. Lower floret reduced to a narrow linear sub-2-nerved reversedly ciliate hyaline valve. Upper floret ♂: valve stipitiform, minutely 2-dentate; awn 2–3 in. long, fulvous to dark brown, hirtellous; valvule 0. Pedicelled spikelets neuter, linear-lanceolate, up to 5 lin. long, pubescent to villous or glabrous, pale; lower glume produced into a fine bristle 3–4 lin. long, subherbaceous, 11-nerved, keels scabrid upwards; upper glume membranous, very acute, usually more or less hairy upwards, 3-nerved, ciliate; valves hyaline, linear, reversedly ciliate, 1-nerved, the lower about 4 lin. long, the upper slightly shorter. Homogamous spikelets

similar to the pedicelled but muticous.—*H. coleotricha*, Schweinf. & Aschers. in Schweinf. l.c. *Andropogon comosus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 461; not of Spreng. *Andropogon coleotrichus*, Steud. Syn. Pl. Glum. i. 386; Hack. in DC. Monogr. Phan. vi. 642; Durand & Schinz, Consp. Fl. Afr. v. 708. *A. anthistirioides*, var. *procera*, Chiov. in Ann. Istit. Bot. Roma, viii. 289.

**Nile Land.** Eritrea: Dembelas; near Ferfer, *Pappi*, 6130! Ocule Cusai; along the Tserina and Belasa Torrents, 5200 ft., *Pappi*, 1814; on Mount Metaten, 8000 ft., *Pappi*, 1506; and by the Aini Torrent, 6000 ft., *Pappi*, 1869. Abyssinia: without precise locality, *Schimper*, 1458!

(Humb. & Bonpl.)

✓ **43. *H. bracteata*, Stapf.** Perennial, densely tufted, up to over 6 ft. high, with intra- and extravaginal innovations. Culms rather stout below, to over  $2\frac{1}{2}$  lin. in diam., terete, glabrous or the lower internodes glabrous to villous in the upper part, simple and 4-6-noded below the panicle. Leaf-sheaths firm, terete or keeled upwards, the lower at length slipping off the culm, and then more or less folded or involute, hirsute or villous all over or at least in the upper part; ligules scarious, truncate, not much over  $\frac{1}{2}$  lin. long, reddish; blades linear from a gradually attenuated base, tapering to a fine point, 2 ft. by 1-2 lin., very rigid, glaucescent, ultimately often reddish or brown with frequently recurved margins, more or less villous on the underside and bearded behind the ligule, otherwise glabrous, rough above in the upper part, very scabrid on and along the margins, midrib rather slender and prominent below or somewhat stout basewards, much broader and whitish on the upper side, lateral nerves numerous, slender and close, prominent above. Spatheate panicle decomposed, narrow, rather dense, up to over  $1\frac{1}{2}$  ft. high, consisting of 1-2 long flowering branches undivided at the base and 6-8 mostly mixed and upwards approximate tiers; lowest branches and compound rays up to over 1 ft. long, with very long basal internodes, 3-4-noded, bearing secondary and tertiary tiers, tiers rarely more than 4-rayed, crowded together, ultimate rays about  $\frac{1}{2}$  in. long; lower subtending leaves resembling the preceding ones, the upper more spathaceous with rapidly shortening blades, their sheath-portions hirsute to villous. Spatheoles linear-lanceolate, acutely acuminate,  $\frac{3}{4}$ -1 in. by  $\frac{1}{2}$ - $\frac{3}{4}$  lin., scarious, reddish or brown, loosely to rather densely and appressedly hirsute, at length loosely convolute below; peduncles very slender, filiform, arching or recurved above, at length often more or less straightened out and equalling or almost equalling the spatheoles, with fine spreading whitish or yellowish tubercle-based hairs about  $1\frac{1}{2}$  lin. long from the upper part. Racemes subcontiguous or more or less spreading and finally epinastically reflexed, reddish to dark brown, 4-6 lin. long, 2-4-awned per pair; bases short, densely bearded with hairs like those of the peduncle, produced into a broad-oblong 2-dentate purple scarious appendage, up to almost 1 lin. long; joints





between the fertile spikelets filiform, truncate, 1 lin. long, very densely ciliate on one side all along, much less so and only downwards on the other; pedicels finely filiform, equally and shortly ciliate on both sides, slightly longer than the joints. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets narrowly linear-oblong, obscurely acuminate, including the callus  $2\frac{1}{2}$  lin. long, fuscous, glabrous; callus acute,  $\frac{3}{8}$ – $\frac{2}{3}$  lin. long, shortly white-bearded. Glumes equal, chartaceous; the lower 2-denticulate with broadly rounded sides, 7-nerved, the middle nerve raised between 2 fine grooves, margins involute below the tips, keels very fine, rigidly ciliate or scabrid; upper glume minutely mucronulate, 3-nerved. Lower floret reduced to a narrow linear-oblong sub-2-nerved reversedly ciliate hyaline valve,  $1\frac{1}{2}$  lin. long. Upper floret ♀: valve stipitiform, with 2 small subulate hyaline teeth; awn very slender, 8–10 lin. long, column finely fulvo-pubescent; valvule 0. Anthers almost 1 lin. long. Pedicelled spikelets ♂ or neuter (?), linear-lanceolate, 2–3 lin. long, acute, mostly mucronate or very shortly aristulate, dark purple or blackish-brown, glabrous; lower glume 9-nerved, scabrid on the keels; upper slightly shorter, 3-nerved, ciliate upwards; valves hyaline, reversedly ciliate, up to over  $1\frac{1}{2}$  lin. long, lower acute, upper 2-lobed with subulate acute lobes; anthers about 1 lin. long.—*H. foliosa*, Anderss. ex Fourn. Pl. Mex. Gram. 67. *H. sp.*, Anderss. in Nov. Act. R. Soc. Sc. Upsal. ser. 3, ii 254. *Andropogon bracteatus*, Humb. & Bonpl. ex Willd. Sp. Pl. iv. 914; Hack. in Mart. & Eichler, Fl. Bras. ii. iii. 279, t. 64, and in DC. Monogr. Phan. vi. 643; Durand & Schinz, Études Fl. Congo, 315; Th. & Hël. Durand, Syll. Fl. Congol. 624; Nash in North Amer. Fl. xvii. 123. *A. trachypus*, Trin. in Mém. Acad. Pétersb. 6me sér. ii. 280. *Cymbopogon Humboldtii*, Spreng. Pug. ii. 15; Rendle in Cat. Afr. Pl. Welw. ii. 159. *C. reflexus* and *C. foliosus*, Roem. & Schult. Syst. ii. 834, 835. *Anthis-tiria reflexa* and *A. foliosa*, H.B. & K. Nov. Gen. et Sp. i. 191; Kunth, Enum. i. 482; Steud. Syn. Pl. Glum. i. 402. *A. Humboldtii*, Nees, Agrost. Bras. 369. *A. pilosa*, Presl in C. B. Presl, Rel. Haenck. i. 348; Steud. l.c., 402. *A. andropogonoides*, Steud. l.c. *Sorgum bracteatum*, O. Kuntze, Rev. Gen. Pl. ii. 791.

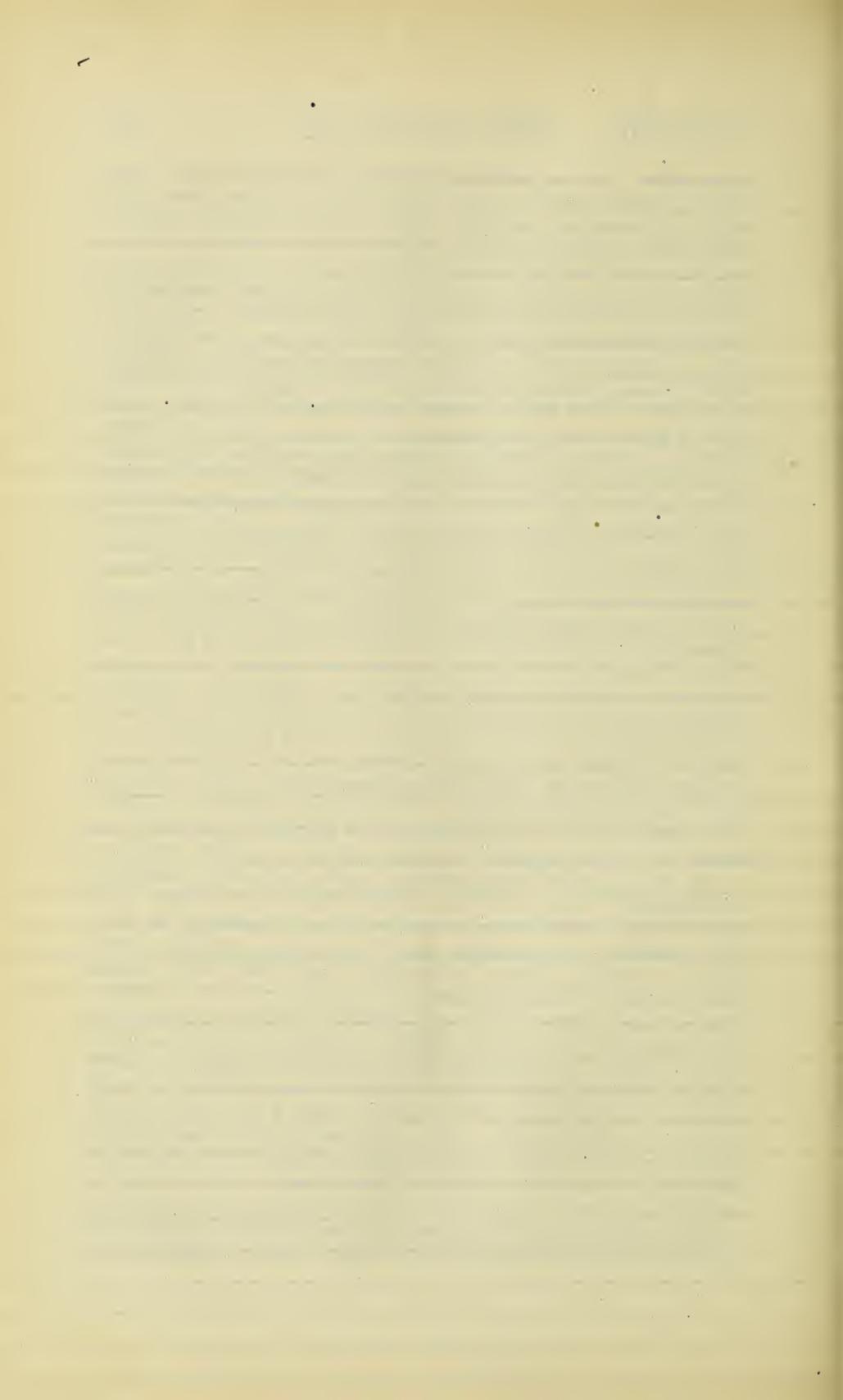
**Lower Guinea.** Belgian Congo: Stanley Pool district; Kisantu, *Gillet*, 913! Angola: Pango Andongo; Candumba, *Welwitsch*, 1758! Benguella; Country of Ganguellas and Ambuellas, rare, along the marshes of the River Cambamhe, *Gossweiler*, 2598! in a marsh near Munongue, *Gossweiler*, 3124! Cuito, in marshes, *Gossweiler*, 2577! Kubango; moist meadows near Fort Princeza Amelia, *Gossweiler*, 3924! 3925! Mossamedes; Huilla, Lake Ivantala, in wooded places, *Welwitsch*, 7513! Monino, *Welwitsch*, 7514! damp meadows between Monino and Lake Ivantala, common, *Welwitsch*, 7512! between Lopollo and Monino, *Welwitsch*, 2657!

(Franché)

✓ 44. **H. Lecomtei**, *Stapf*. Perennial, over 4 ft. high (base not known). Culms moderately stout, erect, terete, quite glabrous,

simple and 5- (or more-?) noded below the panicle. Leaf-sheaths firm, terete, the lowest with a blunt keel and very sparingly hairy upwards, otherwise like the upper, glabrous and smooth; ligules scarious, firm, very short, rounded or truncate, reddish; blades linear from a narrowed or the upper from a rounded and somewhat constricted base, tapering to a fine point, up to  $1\frac{1}{3}$  ft. by 3-4 lin., purplish-brown, firm, somewhat rigid, densely hirsute behind the ligule and sparingly to very sparingly so higher up, glabrous and smooth below, rough on and above the margins and all over in the uppermost part; midrib stout towards the base, slender upwards, primary lateral nerves about 4 on each side, slender, raised above. Spatheate panicle very narrow, more or less interrupted, up to over  $1\frac{1}{2}$  ft. long, consisting of 1-2 flowering branches undivided at the base and 4-5 mostly mixed tiers somewhat distant below and approximate upwards; lowest branches and compound rays up to  $\frac{3}{4}$  ft. long, rarely more than 2-noded, with long basal internodes and simple secondary tiers; tiers up to 6- or more-rayed, ultimate rays about  $\frac{1}{2}$ -1 in. long; lower subtending leaves like the preceding leaves, the upper more spathaceous with rapidly shortening blades, their sheath-portions glabrous or very sparingly hairy. Spatheoles linear-lanceolate, acutely acuminate,  $1-1\frac{3}{4}$  in. long by 1 lin., scarious, reddish, glabrous or sparingly and very finely hairy downwards or loosely hirsute, at length loosely convolute; peduncles very slender, filiform, arching or recurved upwards, at length often more or less straightened out, and equalling or exceeding ( $1-1\frac{3}{4}$  in.) the spatheoles, with fine spreading tubercle-based hairs  $1\frac{1}{2}$ -2 lin. long from the upper part. Racemes subcontiguous or more or less spreading and finally epinastically reflexed, reddish or brownish-yellow, 5-6 lin. long, 2-awned per pair; bases unequal, densely bearded with hairs like those of the pedicels, with a narrow oblong unequally 2-dentate scarious purple or brown appendage up to  $1\frac{1}{2}$  lin. long; pedicels finely filiform, up to  $1\frac{1}{2}$  lin. long, equally and shortly ciliate on both sides. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets narrowly linear, subacuminate, including the callus 3 lin. long, pale, fuscous upwards, glabrous; callus slender,  $\frac{1}{2}$  lin. long, acute, short white-bearded. Glumes equal, chartaceous, the lower 2-dentate or 2-mucronate, with broadly rounded sides, 7-nerved, the middle nerve raised between 2 fine grooves, margins involute below the tips, keels fine, scabrid; upper glume obliquely truncate, minutely mucronulate, 3-nerved. Lower floret reduced to a narrow linear-oblong sub-2-nerved reversedly ciliate hyaline valve over 2 lin. long. Upper floret ♂: valves stipitiform, with 2 small subulate hyaline teeth, awn very slender,  $1\frac{1}{4}$ - $1\frac{1}{2}$  in. long; column finely pubescent; valvule 0. Pedicelled spikelets neuter or ♂, linear-lanceolate, reddish or brownish, glabrous; lower glume 7-9-nerved, acute, mucronate or very shortly aristulate, scabrid along the keels; upper very acute, 3-nerved, ciliate upwards;





valves hyaline, reversedly ciliate, up to over  $2\frac{1}{2}$  lin. long, lower linear-oblong, 3-nerved, the upper narrowly linear-cuneate, minutely emarginate.—*Andropogon Lecomtei*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 329 (reprint 21); Th. & Hél. Durand, Syll. Fl. Congol. 625; Eyles in Trans. Roy. Soc. S. Afr. v. 296 (?). *Cymbopogon Lecomtei*, Rendle in Journ. Linn. Soc., Bot. xl. 227.

**Upper Guinea.** Cameroons: without precise locality, *Unwin*, 9149!

**Lower Guinea.** French Congo: Kitabi, *Lecomte*, A 9! Belgian Congo: Cataracts Division; Lukungu, *Hens*, A 188! Stanley Pool Division; N' Lemfu, *Butaye*! Kisantu, *Gillet*, 876! Oriental Province; Kavala Islands in Lake Tanganyika, *Carson*!

**Mozambique Distr.** Nyasaland: Shire Highlands, *Buchanan*, 33! Gazaland: Nyahodi River, 4000 ft., *Swynnerton*, 1660! Upper Buzi River, 3000–3500 ft., *Swynnerton*, 995 a!

Franchet quotes, probably by mistake, *Hens* 186, not 188, for the specimen from Lukungu.

Also in North Madagascar (*Baron*, 5205!).

(Hack.)

✓ 45. **H. Newtonii**, <sup>(Hack.)</sup> *Stapf*. Perennial, densely caespitose, up to over 3 ft. high with numerous mostly intravaginal innovations, cataphylls of extravaginal innovation-buds glabrous. Culms erect, terete or slightly compressed below, rather slender, simple and about 3–4-noded below the panicle. Leaf-sheaths terete or the lowest and those of the innovations compressed and keeled, very firm, glabrous or hairy, those of the culms produced at the mouth into short triangular auricles; ligules from very short to 1 lin. long, scarious, truncate, adnate to the auricles of the sheath; blades linear from a slightly and often long-attenuated base, long-tapering to a fine point, very firm and rigid or slightly flexuous, up to 1 ft. by  $1-1\frac{1}{2}$  lin., flat, pale green or turning reddish, softly hirsute to almost villous on both sides, scabrid along the margins, midrib slender and prominent below, wider and whitish towards the base above, lateral nerves numerous, very slender and close on the upper side, obscure on the lower. Spatheate panicle slender, loose, interrupted, up to  $1\frac{1}{2}$  ft. long, of 5–6 distant tiers, 2–4-rayed, mixed downwards or the lowest branch undivided, lowest compound rays up to over  $\frac{1}{2}$  ft. long, few-noded; simple rays 1–2 in. long, those of each tier subequal; lower subtending leaves like the preceding ones, upper with much reduced blades, spatheoloid. Spatheoles narrowly lanceolate, long and finely acuminate, about 2 in. by  $1-1\frac{1}{4}$  lin., scarious, pale purplish or reddish, glabrous or hairy at the base, at length inrolled from the margins and quite narrow; peduncles arched or strongly recurved upwards and subterminally exerted, at length more or less equalling the spatheole, with fine spreading yellowish hairs (up to 3 lin. long) from the curvature, hairs minutely or obscurely tubercle-based. Racemes slightly spreading, at length epinastically reflexed, about  $\frac{3}{4}$  in. long, usually purplish, 2-awned per pair; bases unequal, the longer up to 2 lin. long, both densely bearded with stiff yellowish

tubercle-based hairs up to over 4 lin. long, each with a linear entire or 2-dentate dark purple scarious appendage; pedicels very slender filiform, up to 2 lin. long, shortly ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets narrowly linear, subacuminate, excluding the callus 4 lin. long, pale, glabrous or pubescent near the tips; callus slender, acute, up to  $1\frac{1}{2}$  lin. long, shortly bearded along the sides. Glumes subequal, subcoriaceous, lower 2-mucronate, 9-nerved, middle nerve prominent between 2 fine grooves, margins broadly involute, inflexed in the acumen, keels fine, scabrid; upper glume obliquely truncate, acute, 3-nerved, sparingly ciliate upwards. Lower floret reduced to an oblong sub-3-nerved ciliate hyaline valve. Upper floret ♂: valves stipitiform, 2-dentate, with distinct narrow hyaline margins, teeth linear, subulate,  $1\frac{1}{2}$  lin. long, ciliate; awn somewhat stout,  $1\frac{3}{4}$ –2 in. long, column fulvously villous, bent at or above the middle, somewhat longer than the bristle; valvule 0. Pedicelled spikelets ♂ or sometimes neuter, linear-lanceolate, long and acutely acuminate, up to 5 lin. long, dark purple or violet, glabrous; lower glume chartaceous, mucronate to shortly aristulate, 9–11-nerved, keels rigidly ciliate upwards; upper glume slightly shorter, sublinear, very acute, 3-nerved; valves hyaline, ciliate, lower oblong, 3-nerved, up to 4 lin. long, upper very narrow, 1-nerved, or both valves more or less reduced; anthers 2 lin. long. Spikelets of the homogamous pairs like the pedicelled, but muticous.—*Andropogon Newtonii*, Hack. in Bolet. Soc. Brot. iii. 137, t. 2, fig. 4, and in DC. Monogr. Phan. vi. 644; Durand & Schinz, Consp. Fl. Afr. v. 719.

**Lower Guinea.** Angola: Mossamedes; Humpata, *Newton!* and without precise locality, *Pearson!*

✓ **Var. *macra*, Stapf.** Leaf-blades often more or less revolute along the margins, finely pubescent, or at length glabrescent or hirsute at the base only. Inflorescence frequently more scanty than in the type, with narrow spatheoles and very narrow almost subulate barren pedicelled spikelets reduced to a 7–9-nerved lower glume, and a very small 3-nerved upper glume; awns of the fertile spikelets slightly more slender, with short to very short fulvous hairs.

+ **Lower Guinea.** Angola: (Benguella; country of the Ambuellas and Ganguellas, Munongue, in sandy sunny places and inundated meadows,) *Gossweiler*, 2456! 2460! (sources of the River Kuariri, in thickets,) *Gossweiler*, 2632! (and without number, *Gossweiler!* Mossaca-Kuelai, in woods, *Gossweiler*, 3125!

**Mozambique Distr.** Rhodesia: Mumbwa (28° E. Lon., 15° S. Lat.), *Mrs. Macaulay*, 61! Salisbury, *Mrs. Craster*, 59!

✓ **46. H. *Stolzii*, Stapf.** Perennial, densely caespitose, up to 3 ft. high, with intravaginal innovations. Culms slender, simple for about 4 internodes below the panicle; lower internodes (except sometimes the lowest which may be short, more or less compressed, and hairy) up to 9 or 10 in. long, terete or compressed downwards, glabrous and smooth; sheaths rather firm, narrow and produced into minute auricles at the mouth, the lower at length slipping off the culm and convolute, the upper tight, terete or slightly keeled upwards; ligules truncate, very short, less than  $\frac{1}{2}$  lin. long, laterally adnate to





the sheath-auricles; blades very narrowly linear from an equally wide or gradually attenuated base, tapering to a setaceous point, up to 2 ft. by 1 lin., firm, more or less rigid, glaucous or pale green, with the margins often revolute, glabrous, smooth except along the scabrid margins. Spatheate panicle very narrow, interrupted and scanty, over 1 ft. long; internodes about 3, gradually decreasing upwards; primary branches forming 3-1 upwards very scanty tiers, some of the lowest rays compound, 1-2-noded, all the others simple, up to 2 in. long, subtending leaves like the preceding but upwards with more or less widened sheaths and reduced blades. Spatheoles narrowly linear-lanceolate, long-acuminate, up to  $1\frac{3}{4}$  in. long, scarious, reddish or purplish upwards, glabrous; peduncles filiform, apparently never much above  $\frac{1}{2}$  in. long, beset almost all along with white somewhat stiff minutely tubercle-based hairs up to 3 lin. long. Racemes subcontiguous, laterally exserted from the spatheoles, about 8 lin. long, greenish, 2-, rarely 3-, awned per pair; bases unequal, pubescent in the fork, with a dense beard of yellowish hairs about 3 lin. long, the lower very short, the upper about  $1\frac{1}{2}$  lin. long, both with a linear-oblong unequally dentate scarious whitish appendage; fertile joints (if present) like the pedicels, slender, filiform, up to 2 lin. long, shortish white-ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets linear-lanceolate, acuminate, somewhat flattened on the back with a longitudinal groove and broadly rounded sides, 4 lin. long including the callus, greenish, glabrous; callus slender, acute, white-bearded, hairs  $\frac{1}{2}$ - $\frac{3}{4}$  lin. long. Glumes equal, chartaceous; lower 2-denticulate, with very narrow tips, 9-nerved, middle nerve raised in the groove, the other nerves obscure except in transmitted light, margins involute below the acumen, then inflexed, keels fine, scabrid; upper glume truncate, mucronate, 3-nerved, reversedly ciliate. Lower floret reduced to a linear-oblong faintly 2-nerved reversedly ciliate hyaline valve. Upper floret ♀: valves stipitiform, 2-dentate (teeth  $\frac{1}{2}$  lin. long), ciliate; awn  $1\frac{1}{2}$  in. long, column fulvous, shortly hirtellous. Anthers over 1 lin. long. Pedicelled spikelets ♂, linear-lanceolate, about  $4\frac{1}{2}$  lin. long; lower glume thinly subherbaceous, shortly aristulate, 9-nerved, keels spinulously ciliate upwards; upper glume very acute or mucronulate, 3-nerved, reversedly ciliate; valves hyaline, reversedly ciliate, the lower narrowly oblong, faintly 3-nerved,  $3\frac{1}{2}$  lin. long, the upper oblanceolate, emarginate, 1-nerved, slightly shorter; anthers up to  $1\frac{1}{2}$  lin. long.

+ **Mozambique Distr.** German East Africa: Kyimbila; Utengule, 4600 ft., *Stolz*, 2629!

✓ 47. *H. cirrosula*, *Stapf*. A perennial apparently short grass throwing out filiform stolons bearing bunches of leaves and branches. Culms compressed below, glabrous. Leaf-sheaths very smooth glabrous, rarely with some very fine spreading hairs, pale but bright

green, at length turning reddish, the lower much compressed and keeled, the upper terete, all very narrow; ligules scarious, truncate, glabrous, up to  $\frac{3}{4}$  lin. long; blades very narrow, linear from a slightly attenuated base, tapering to a fine point, 4–5 in. by  $\frac{3}{4}$  to almost 1 lin., green turning reddish or brownish, quite glabrous or with some very fine spreading hairs up to over 2 lin. long, particularly near the base, rough above and along the margins, smooth below. Spatheate panicle lax, secund, loose, 9 in. long, consisting of a basal branch, undivided below, up to 6 in. long and bearing 3 or 4 secondary tiers, and of about 5 upwards approximate 3–4-rayed mixed or upwards simple tiers; simple rays very fine,  $1\frac{1}{2}$ –1 in. long or the uppermost still shorter; lower subtending leaves resembling the preceding ones, the following with much reduced blades or the uppermost spatheoloid. Spatheoles linear, acutely acuminate,  $1\frac{1}{4}$  in. by  $\frac{1}{2}$  lin., subherbaceous and green in the lower part, scarious and reddish upwards, glabrous or more often very loosely hairy, particularly towards the base; peduncles extremely slender, at length  $1\frac{1}{2}$ –2 in. long, recurved or curled, sometimes finally straightened out, with fine spreading tubercle-based white hairs 2– $2\frac{1}{2}$  lin. long towards the tips. Racemes slightly spreading, finally epinastically deflexed,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long, greenish, 2-awned per pair; bases bearded, with the hairs like those of the peduncle, that of the upper raceme up to 1 lin. long, both produced into a linear 2-lobed purplish or brown scarious appendage about  $1\frac{1}{4}$  in. long; pedicels very finely filiform, up to 2 lin. long, shortly ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets narrowly linear-lanceolate, acuminate, including the callus 3 lin. long, pale green or slightly tinged with brown or purple; callus slender, acute,  $\frac{3}{4}$  lin. long, shortly bearded. Glumes equal, chartaceous; the lower 2-mucronate with broadly rounded sides, 7-nerved, the middle nerve raised between 2 fine grooves, margins involute below the acumen, keels fine, scaberulous; upper glume mucronulate, 3-nerved. Lower floret reduced to a narrow linear-oblong faintly 2-nerved reversedly ciliate hyaline valve 2 lin. long. Upper floret ♂: valve stipitiform with 2 subulate hyaline teeth  $\frac{1}{2}$  lin. long and ciliate, awn slender, about  $1-1\frac{1}{4}$  in. long, column finely fulvously pubescent; valvule 0. Pedicelled spikelets neuter, subulate, glabrous, 3 lin. long excluding the bristle of the lower glume (2 lin. long), and 9-nerved, keels scabrid, upper glume much shorter, 3-nerved; florets suppressed or represented by a small very narrow ciliate hyaline valve.

+ South Central. Belgian Congo: Katanga; Tschinsenda, *Rogers*, 10399!

✓ 48. *H. subplumosa*, *Stapf*. Perennial, up to over 10 ft. high, with extra- and intravaginal innovations, their cataphylls glabrous. Culms robust, up to over 2 lin. in diam., simple and about 4-noded below the panicle, terete, glabrous. Leaf-sheaths terete, tight, firm, pale green or glaucous, the lowest up to  $\frac{1}{2}$  ft. long, glabrous and





smooth, very rarely those of young innovation-shoots softly hairy; ligules scarious, truncate, up to  $1\frac{1}{2}$  lin. long, glabrous, ciliolate; blades linear from an equally broad or slightly attenuated base, tapering to a long fine point, up to over 2 ft. long by 2-4 lin., firm, pale green or glaucous and sometimes tinged with purple, quite glabrous or more or less hirsute behind and above the ligule, rarely higher up and then the hairs much shorter, smooth except at the very scabrid margins and tips. Spatheate panicle large, usually very loose, up to over 2 ft. long, with glabrous or shortly bearded nodes, bearing up to 6-9 tiers; tiers rather distant throughout, few- to 5- (rarely 6-) rayed, mostly mixed; lower compound rays up to over 1 ft. long and about 3-noded, strictly erect; simple rays very slender, filiform, 1 to over 2 in. long, frequently strongly arched or recurved; lower and intermediate subtending leaves resembling the preceding ones with long somewhat flexuous blades, the uppermost spatheoloid. Spatheoles narrowly lanceolate, long- and finely acuminate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, up to  $1\frac{1}{2}$  lin. wide, scarious to subherbaceous, glaucous, usually tinged with purple or red or brownish, glabrous, boat-shaped, finally inrolled from the margins, at least in the upper part but never tightly so; peduncles filiform, about 1 in. long, erect or curved and then their tips laterally exerted from the spatheoles, glabrous, rarely with a few fine hairs near the tips. Racemes subcontiguous, often nodding and very sharply epinastically reflexed, 8-9 lin. long, dense, glabrous except for the cilia of the joints and pedicels, 4-6-awned per pair; bases short, dorsally compressed, pubescent on the inner side, the longer up to 1 lin. long, exappendiculate: joints linear with obliquely truncate tips, villously ciliate, hairs up to 1 lin. long; pedicels similar, up to  $1\frac{3}{4}$  lin. long, cilia shorter than in the joints. Homogamous pairs of spikelets 2 at the base of each raceme, forming an imperfect involucre, similar to the pedicelled spikelets of the heterogamous pairs but larger, green or at length more or less vividly coloured, frequently covered with a waxy bloom. Fertile spikelets linear-oblong or lanceolate, 3- $3\frac{1}{2}$  lin. long including the callus, yellowish-green or tinged with purple or brown, glabrous; callus slender, acute, up to over  $\frac{3}{4}$  lin. long, grooved on the back, with a beard up to over 1 lin. long. Glumes equal, firmly chartaceous, minutely truncate; lower somewhat rounded on the back downwards, 9-nerved, nerves obscure or delicately raised, sometimes with 2 very fine and shallow grooves along the middle nerve, margins narrow, involute, inflexed at the very tips, forming short scabrid keels; upper glume 3-nerved, spreadingly ciliate upwards. Lower floret reduced to a linear-oblong subacute ciliate sub-2-nerved hyaline valve. Upper floret ♀: valve stipitiform, minutely 2-toothed, awn  $2\frac{1}{2}$ -3 in. long, column hirsute, hairs white or fulvous, up to  $\frac{1}{2}$  lin. long, rarely short; valvule 0. Anthers over 1 lin. long. Pedicelled spikelets ♂, linear-lanceolate,  $3\frac{1}{2}$ -4 lin. long, glabrous, often turning red or purple; lower

glume chartaceous, closely and finely up to 13-nerved, keels sparingly scaberulous, one of them usually running out into a fine bristle 1 to over 7 lin. long; upper glume acute, 3-nerved, spreadingly, or reversedly ciliate; valves hyaline, ciliate, lower linear-lanceolate, acute, 3-nerved, up to 3 lin. long, upper much shorter, spatheolate, oblong, 1-3-nerved; anthers almost 2 lin. long.

+ **Upper Guinea.** Sierra Leone: Samaia, *Thomas*, 227! (and without precise locality,) *Scott Elliot*, 5931! French Guinea: Fouta Jallon; (between Dalaba and Sougueta,) *Chevalier*, 20185! Timbo, *Pobéguin*, 1799! Baffing Valley, (common,) *Pobéguin*, 1812! Abudia, *Krause*! Togo: Misahöhe, *Baumann*, 328! Northern Nigeria: Abinsi, *Dalziel*, 889! 901! Lokoja, *Dalziel*, 298!

✓ 49. **H. diplandra**, *Stapf.* <sup>(Haeck.)</sup> Perennial, up to over <sup>12</sup> 12 ft. high, densely tufted from a short descending rhizome with mostly intravaginal innovations. Culms robust, up to over 3 lin. in diam., simple and 3-9-noded below the panicle, terete, glabrous. Leaf-sheaths terete, tight, firm, the lower often up to 1 ft. long, glabrous and smooth; ligules very firmly scarious, truncate, hardly up to 1 lin. long, ciliolate; blades linear from an equally broad or somewhat attenuated base, tapering to a long very fine point up to over 2 ft. long by 3-5 lin., very firm, more or less rigid, pale green or faintly tinged with red, usually densely hirsute behind the ligules and just above them, otherwise generally glabrous, smooth except at the very scabrid margins and tips. Spatheate panicle large, narrow, loose, often over 2 ft. long, with pubescent or shortly bearded nodes, bearing up to over 10 tiers; tiers distant below, approaching each other above, few- to 8-rayed, mostly mixed, lower compound rays often over 6 in. long and up to 5-noded; simple rays of the ultimate tiers  $\frac{1}{2}$ -1 in. long, of the lower tiers much longer, up to over 2 in.; lower and intermediate subtending leaves resembling the preceding ones, the following with rapidly decreasing blades. Spatheoles lanceolate, finely acuminate, 1-1 $\frac{1}{4}$  in. long, 1 $\frac{1}{2}$  lin. wide, scarious, reddish, purplish or brownish-yellow, glabrous, for a short time boat-shaped during flowering, then inrolled from the margins, but never tightly; peduncles filiform, 3-4 lin. long (rarely up to 5), hairy upwards, hairs silky, up to 1 lin. long. Racemes subcontiguous, laterally exerted from the spatheoles, at length epinatically reflexed, mostly 5-8 lin. long, dense, glabrous or almost so, except for the cilia of the joints and pedicels, 6- (rarely 4- or up to 8-) awned per pair, bases dorsally compressed, pubescent on the inner side, truncate, without an auricle, the longer (upper) up to 1 lin. long; joints linear, slightly widened with obliquely truncate tips 1 lin. long, shortly ciliate; pedicels finely filiform, up to 1 $\frac{3}{4}$  lin. long, cilia as in the joints. Homogamous pairs of spikelets 2 with each raceme, very close, forming an imperfect involucre to the raceme, similar to the pedicelled spikelets of the heterogamous pairs, if not slightly larger, and always muticous. Fertile spikelets linear-oblong, 2 $\frac{1}{2}$ -3 lin. long, including the callus, yellowish or pale green often tinged with brown upwards, glabrous or very scantily and minutely pubescent,





callus slender, subacute, up to  $\frac{1}{2}$  lin. long, shortly bearded, glabrous and grooved on the back. Glumes equal, firmly chartaceous, minutely truncate; lower somewhat rounded on the back downwards, 9-nerved, nerves obscure except in transmitted light, or delicately raised downwards, sometimes with 2 very fine and shallow grooves along the middle nerve, margins narrowly involute, inflexed towards the tips, forming short scabrid keels; upper glume 3-nerved, spreadingly ciliate upwards. Lower floret reduced to a linear-oblong obtuse ciliate hyaline valve. Upper floret ♂: valve stipitiform, minutely 2-toothed, awn 1 to over  $1\frac{1}{2}$  in. long, column and bristle pale, fulvously hispidulous; valvule 0. Anthers almost 1 lin. long. Pedicelled spikelets ♂, linear-lanceolate to linear-oblong,  $2\frac{1}{2}$ –3 lin. long, glabrous, generally darker, often reddish or brown; lower glume firmly chartaceous, dorsally compressed and sharply 2-keeled, frequently mucronulate or shortly aristulate, up to 13-nerved, keels rigidly ciliolate; upper glume 3-nerved, reversedly ciliate; valves hyaline, oblong, spreadingly ciliate, lower faintly 1-nerved, upper considerably shorter, nerveless; anthers over 1 lin. long. Homogamous spikelets 3–4 lin. long.—*Andropogon diplandrus*, Hack. in Flora, 1885, 123, and in DC. Monogr. Phan. vi. 627; Durand & Schinz, Consp. Fl. Afr. v. 710, and Études Fl. Congo, i. 315; De Wild. & Durand, Contr. Fl. Congo, ii. 75; Cheval. Sudania, 83; Pilg. in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr. Exped. ii. 44 (*diplander*); Th. & Hél. Durand, Syll. Fl. Congol. 625. *A. osikensis*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 332 (reprint 24). *A. obscurus*, K. Schum. in Engl. Jahrb. xxiv. 330. *Cymbopogon Phoenix*, Rendle in Cat. Afr. Pl. Welw. ii. 156.

**Upper Guinea.** French Guinea: Baffing Valley; in swampy places, *Pobé-guin*, 1803! Ivory Coast: between Bingerville and Potou Lagoon, *Chevalier*, 20091! Southern Nigeria: Abaja, *Kidston*! Cameroons: Yaunde, gregarious in savanas, *Zenker*, 544!

**North Central.** Shari Territory: Krebédje, *Chevalier*, 5695!

**Nile Land.** Jur: Ghattas' Great Scriba, *Schweinfurth*, 2602! Bongo: west of Tondy River, *Schweinfurth*, 2694! Uganda: Kipayo, 4000 ft., *Dummer*, 525! Namanyazi, 4000 ft., *Dummer*, 3082!

**Lower Guinea.** French Congo: Batéké Country; Oseka, *Brazza*, 233! Belgian Congo: Stanley Pool, in marshes, *Hens*, B. 25! Kisantu, *Gillet*, 147! 877! 969! N' Lemfu, *Butaye*, 1187! north bank of the Kasai River, *Luja*. Bangala district; Yambingu, *Demeuse*; and without precise locality, *Tilman*, 11! Angola: Malange District, *Gossweiler*, 901! between Camundai and N'dalalonde, *Gossweiler*, 5728! near Camondai, *Gossweiler*, 5731!

**Mozambique Distr.** Nyasaland: between Kondowe and Karonga, 2000–6000 ft., *Whyte*! and without precise locality, *Whyte*

A specimen collected by Gossweiler (no. 3917) in Benguella, has the margins of some of the sheaths ciliate and the blades not only packed with long coarse hairs above the ligules but hirsute over the greater part of both surfaces. Apart from this and the darker colouring of the spikelets it agrees with the usual form. *Andropogon pachyneurus*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 233 (reprint 25), from Ogowe, French Congo, *Thollon*, 177! differs from *H. diplandra* as described above in having longer spatheoles (up to 2 in.) and longer peduncles (up to 1 in.). The specimen quoted, however,

has a very weak inflorescence as if grown in the shade or under some other unfavourable conditions which may have caused the elongation of those organs. A similar modification has also been observed in a fragmentary specimen collected by Chevalier in S. Thome, no. 13785. It is therefore almost certain that *Andropogon pachyneurus* represents only a growth form of *H. diplandra*. All the West African specimens from the Ivory Coast East southwards have a slightly different facies from those collected in the Soudan region, the spikelets being darker, their racemes on the whole slightly less stout and the hairs of the awns somewhat longer.

Another, apparently anomalous, condition is represented by a specimen collected by Fyffe at Entebbe in Uganda. In this all the sessile spikelets are awnless, the valve of the upper floret being narrowly oblong, acute, 3-nerved up to three-quarters where the lateral nerves join the middle nerve which runs out into a minute fine point. It is accompanied by a hyaline nerveless valvule about  $\frac{3}{4}$  lin. long; the ♂ flower is apparently normal with the anthers 1-1 $\frac{1}{2}$  lin. long.

✓ 50. *H. pachystachya*, Stapf. Perennial (?). Culms (base not known) terete, stout, 2 lin. in diam., simple below, lowest internodes not seen,  $\frac{1}{2}$  ft. long, glabrous, smooth. Leaf-sheaths terete, tight, glabrous and smooth, rarely slightly villosulous at the nodes; ligules firmly scarious, truncate, 1 $\frac{1}{2}$  lin. long, ciliolate; blades linear from an equally wide base, long-tapering to a slender point up to 2 ft. (or possibly more) long, up to over 3 lin. wide, very firm, flat, green or dull purple above, pale green below, glabrous, very scabrid along the margins and on the submarginal nerves, otherwise smooth on both sides; midrib rather slender, whitish above, lateral nerves numerous, close, 3 or 4 on each side, more raised. Spatheate panicle narrow, interrupted, up to 1 $\frac{1}{2}$  ft. long, of about 4-5 distant tiers; lowest tier or tiers mixed, 4-6-rayed, rays very unequally long (the compound up to over 6 in. long, rarely more than 2-noded); the following of 4-6 usually simple rays, the latter 2 $\frac{1}{2}$ -3 in. long, or in the uppermost tiers still shorter, glabrous or more or less hairy towards the tips and bearded at the insertion of the spatheole; lower and intermediate spathes resembling the preceding leaves with gradually decreasing blades. Spatheoles broadly lanceolate, long-acuminate, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, up to over 2 lin. wide in profile, at first almost boat-shaped, finally inrolled from the margins in the upper part, scarious, reddish to copper-red, glabrous or sometimes hairy along the margins; peduncles filiform, 4-8 lin. long, slightly arching, sparingly and shortly hairy towards the tips. Racemes at first subcontiguous, then more or less spreading and ultimately epinastically reflexed, dense, somewhat stout, 7-9 lin. long, almost subglabrous except for the cilia of the joints and pedicels, often richly coloured, 2-3-awned per pair; bases short, stout, the longer up to 1 lin. long, pubescent in the fork without an appendage; joints linear, obliquely truncate, over 1 $\frac{1}{2}$  lin. long, silkily ciliate, hairs increasing upwards to 1 $\frac{1}{2}$  lin.; pedicels similar, up to 2 lin. long with slightly shorter cilia. Homogamous pairs of spikelets 2 at the base of each raceme, very close, forming an imperfect involucre. Fertile spikelets oblong,





subacuminate, often black-purple, paler downwards, including the callus  $3\frac{1}{2}$ –4 lin. long; callus  $\frac{3}{4}$ –1 lin. long, acute, very shortly bearded. Glumes equal, firmly chartaceous, minutely truncate; the lower somewhat rounded on the back, sometimes with a very shallow longitudinal depression, loosely whitish-pubescent towards the base, very faintly 9-nerved, margins involute for more than two-thirds, then inflexed forming distinct rigidly ciliolate keels; upper glume 3-nerved, reversedly ciliate. Lower floret reduced to an oblong obtuse faintly 2-nerved reversedly ciliate hyaline valve. Upper floret ♀: valve stipitiform, 2-dentate, teeth linear, up to  $\frac{1}{2}$  lin. long, glabrous, awn rather stout,  $1\frac{3}{4}$ – $2\frac{1}{4}$  in. long, brown, column fulvously hirtellous; valvule 0. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelets linear-lanceolate, acute,  $3\frac{1}{2}$ –4 lin. long, glabrous, olive-green to dark purple or slate-colour; lower glume chartaceous, produced into a short bristle or mucro, about 11-nerved, nerves indistinct except in transmitted light, keels rigidly ciliolate from the middle upwards; upper glume acute, 3-nerved, reversedly ciliate; valves hyaline, ciliate, the lower oblong-obtuse, about 3 lin. long, faintly 2-nerved, the upper spatulate, oblong, shorter, 1-nerved; anthers 2 lin. long. Homogamous spikelets ♂, up to 5 lin. long, often slightly curved and subsymmetric with the lower glume rather firm and 7–9-nerved, otherwise like the pedicelled member of the heterogamous pairs.—*Cymbopogon rufus*, Rendle in Journ. Linn. Soc., Bot., xl. 226 (partly), not elsewhere.

+ **Mozambique Distr.** Northern Rhodesia: Mumbwa, *Mrs. Macaulay*! Gaza-land: Upper Buzi River, 3000–3500 ft., *Swynnerton*, 993!

✓ **51. H. Gossweileri, Stapf.** Perennial, densely or compactly caespitose, up to over 4 ft. high, with intravaginal innovations. Culms firm and somewhat stout, terete, glabrous and smooth, simple and 4-noded below the panicle. Leaf-sheaths terete with broad rounded shoulders, very tight, glabrous or the lowest shortly and appressedly hairy, the basal up to  $\frac{1}{2}$  ft. long, inrolled, long-persistent; ligules very short, scarious, ciliolate; blades linear from a somewhat narrowed or slightly constricted base, tapering to a long point, up to 1 ft. long,  $1\frac{1}{2}$ –3 lin. wide, flat or the upper tightly convolute when dry and then almost filiform, firm, rigid, glabrous, smooth except at the scabrid margins; midrib slender, hardly prominent below, whitish above, lateral nerves numerous and prominent above, obscure below. Spatheate panicle very narrow, lax, up to over 2 ft. long, of about 4–5 very distant tiers (the lowest internode almost 1 ft. long); the lowest 1 or 2 tiers reduced to 1 or 2 compound 1–2-noded rays up to over 1 ft. long, the following of 5–7 simple rays; lower subtending leaves resembling the preceding ones, with filiform convolute blades. Spatheoles very narrowly lanceolate, long-acuminate, 2–3 in. long,  $1\frac{1}{2}$  lin. wide, scarious, reddish, glabrous, at length loosely inrolled

from the margins; peduncles filiform, erect and more or less straight, sparingly and shortly hairy towards the tips, 8–10 lin. long. Racemes laterally exerted from the spatheoles, at length diverging, sharply epinastically reflexed, somewhat loose, about 1 in. long, 6–8-awned per pair, greenish, variously tinged with purple or brown, glabrous except for the silky cilia of the joints and pedicels; bases linear-filiform, the lower  $\frac{1}{2}$  lin., the upper up to  $1\frac{1}{2}$  lin. long, pubescent in the fork, tips truncate, shortly bearded, without an appendage; joints filiform, very obliquely truncate, up to almost 2 lin. long, shortly silkily ciliate; pedicels similar, more slender and slightly shorter. Homogamous pairs of spikelets 1 at the base of each raceme. Fertile spikelets linear-lanceolate to linear-oblong, 4 lin. long including the callus, glabrous; callus slender, acute, 1 lin. long, grooved on the back, very shortly bearded. Glumes equal, chartaceous; the lower minutely truncate and 2-denticulate, very smooth and somewhat glossy on the back, finely 11–13-nerved, with the nerves very obscure except in transmitted light, margins narrowly involute, keels very fine and obscurely scaberulous towards the tips; upper glume obliquely truncate, sometimes mucronulate, 3-nerved, sparingly ciliate. Lower floret reduced to an oblong obtuse 2-nerved spreadingly ciliate hyaline valve as long as the glumes. Upper floret ♀: valve substipitiform, 2-dentate, teeth  $\frac{1}{2}$  lin. long, sparingly ciliate; awn  $1\frac{1}{4}$ – $1\frac{3}{4}$  in. long, slender; column brown, puberulous, bristle pale; valvule 0. Pedicelled spikelets lanceolate, acute,  $3\frac{1}{2}$ –4 lin. long, glabrous; lower glume chartaceous, 9-nerved, intracardinal nerves about 5, keels always smooth, upper acute, 3-nerved, spreadingly or reversedly ciliate; valves oblong, hyaline, ciliate, lower acute, sub-3-nerved, upper emarginate or 2-lobed, 1-nerved; anthers over 2 lin. long.

+ Lower Guinea. Angola: Benguella; in open thickets near Munongue, *Gossweiler*, 3085!

(Hochst.)

✓  
comb.  
add by  
Hochst.  
not publ.

52. *H. glabriuscula*, Stapf. Perennial, about  $1\frac{1}{2}$  ft. high, with intra- and extravaginal innovations, their cataphylls glabrous, firm. Culms very slender, erect, simple and 4–5-noded below the panicle, terete, glabrous, smooth. Leaf-sheaths terete, glabrous, smooth; ligules very short, truncate, glabrous; blades narrowly linear from an equally wide base, tapering to a fine point, up to over 6 in. by  $1$ – $1\frac{1}{2}$  lin., dull green, glabrous or very finely and sparingly hairy, smooth except towards and on the margins: midrib slender, primary lateral nerves 2–3 on each side, slender. Spatheate panicle 3–4 in. long, contracted, of 6–2 raceme-pairs; the lowest tiers 2-rayed or like the others 1-rayed, all the rays simple, filiform,  $1$ – $\frac{1}{2}$  in. long; subtending leaves with more or less inflated herbaceous sheaths and the lower with well developed blades which equal or exceed the panicle. Spatheoles linear-lanceolate, acuminate, about  $1$ – $1\frac{1}{4}$  in.





long, scarious, glabrous, smooth, dark reddish; peduncles filiform, glabrous, about half as long as the spatheoles. Racemes dense, soon spreading, at length epinastically reflexed, glabrous, reddish-green, about  $\frac{2}{3}$  in. long, 3-5-awned per pair; bases unequal, the lower very short, the upper linear-filiform, dorsally flattened, up to 1 lin. long, both pubescent in the fork, otherwise glabrous; joints filiform, up to  $1\frac{1}{2}$  lin. long, white-ciliate, cilia short; pedicels very similar. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, acuminate, 3-3 $\frac{1}{2}$  lin. long, glabrous, dark green; callus very short, obtuse, shortly bearded. Glumes equal, chartaceous; the lower rather firm, 2-denticulate, flattened on the back, rounded on the sides, margins very narrowly involute to beyond the middle, then rather sharply inflexed, keels very fine, scaberulous, nerves 9-11, somewhat stout and raised; upper glume deltoid-truncate, 3-nerved, sparingly ciliate. Lower floret reduced to a linear-oblong obscurely 2-nerved minutely and sparingly ciliate hyaline valve. Upper floret ♀: valve stipitiform, 2-dentate, eciliate, awn 9-10 lin. long, slender, column scabrid; valvule 0. Pedicelled spikelets ♂ linear-lanceolate, glabrous, dark dull red; lower glume subcoriaceous, about 9-nerved, very acute; upper slightly shorter, acutely acuminate, chartaceous, 3-nerved; valves narrowly oblong or lanceolate, hyaline, very obscurely ciliate, the lower 3-1-, the upper 1-nerved. Homogamous spikelets like the pedicelled member of the heterogamous pair.—*Andropogon glabriusculus*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 468; Hack. in DC. Monogr. Phan. vi. 616; Durand & Schinz, Consp. Fl. Afr. v. 713.

Nile Land. Abyssinia: Tigre; Shire Plateau, *Schimper*, 1805!

(*Remde*)

✓ 53. *H. andongensis*, *Stapf*. Perennial, about  $2\frac{1}{2}$  ft. high, with a creeping branched rhizome and extravaginal innovations, their cataphylls very short, firm, glabrous. Culms slender, wiry, many-noded, branched all along, branches gathered upwards in fascicles, internodes terete or somewhat compressed upwards, glabrous and smooth. Leaf-sheaths rather loose, mostly longer than the internodes, often slipping off the culms and exposing the nodes, terete, loosely hirsute with the hairs tubercle-based and spreading, the lowest finally decaying leaving the culm-leaves more or less bare; ligules scarious, oblong, glabrous, up to  $1\frac{1}{2}$  lin. long; blades narrowly linear from an equally wide or downwards narrowed base, tapering to a setaceous point up to 9 in. by 1-2 (rarely  $2\frac{1}{2}$ ) lin., flat, flexuous, more or less revolute along the margins when drying up, minutely puberulous and more or less rough above or beset with spreading tubercle-based hairs towards the base, glabrous below, midrib slender below, much broader and whitish below towards the base. Spatheate panicle up to over 1 ft. long, narrow, interrupted, very lax; internodes 5-6, very gradually decreasing upwards, 3-2 in. long; primary branches

forming 2-3-rayed tiers or the lowest undivided at the base, 2-noded and up to  $1\frac{1}{2}$  ft. long, compound rays if present 2-1-noded; simple rays 3 (the lowest)- $1\frac{1}{2}$  in. long; subtending leaves like the preceding ones, the uppermost with only slightly inflated spathes and with distinct though very narrow blades reaching to the top of the panicle. Spatheoles very narrowly linear, acuminate,  $1\frac{1}{3}$ - $1\frac{1}{2}$  in. by  $\frac{3}{4}$  lin., scarious, glabrous, dull reddish, at length involute from the margins; peduncles finely filiform, flexuous, glabrous, at length as long as or nearly as long as the spatheole. Racemes slightly diverging, slender, rather loose, about 1 in. long, 4-5-awned per pair, brownish-reddish; bases linear-filiform, glabrous, the lower 1, the upper 2- $2\frac{1}{2}$  lin. long, produced into a reddish oblong 2-denticulate or subentire scarious appendage  $\frac{1}{2}$  lin. long, joints and pedicels very slender, filiform, about 2 lin. long, very shortly ciliate. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets lanceolate-oblong, acuminate,  $3\frac{1}{2}$  lin. long including the callus, glabrous, reddish at least upwards, callus  $\frac{1}{4}$ - $\frac{1}{3}$  lin. long, obtuse, blackish with a short white beard. Glumes equal, chartaceous; the lower rather rigid, 2-denticulate, somewhat flattened on the back, rounded on the sides, slightly longitudinally grooved, with the middle nerve in the groove and the inner lateral nerves prominently raised, hence markedly ribbed, altogether 9-nerved, margins involute, keels short, scaberulous; upper glume truncate and minutely apiculate, 3-nerved, obscurely ciliate. Lower floret reduced to a lanceolate-oblong minutely truncate 2-nerved reversedly ciliate valve over  $2\frac{1}{2}$  lin. long. Upper floret ♂: valve oblanceolate, cuneate,  $2\frac{1}{4}$  lin. long, 2-fid, very slender, hyaline and faintly 3-nerved up to the middle, then cartilaginous with a hyaline margin which widens upwards and passes into the lanceolate-oblong lobes  $\frac{1}{2}$  lin. long; awn slender, 9-10 lin. long, bent at and twisted below the middle, column brown, minutely hirtellous, bristle pale; valve an elliptic-oblong obtuse hyaline scale up to  $\frac{1}{2}$  lin. long. Anthers  $1\frac{1}{4}$  lin. long. Pedicelled spikelets ♂, narrowly linear-lanceolate, up to  $4\frac{1}{2}$  lin. long, reddish, glabrous; lower glume drawn out into a fine point, 11-nerved, the innermost side-nerves somewhat distant from the next outer, keels scaberulous; upper glume somewhat shorter, very acute, 3-nerved, sparingly ciliate; valves hyaline, reversedly ciliate, the lower cuneate-oblong, acute, 3-nerved, up to  $3\frac{1}{2}$  lin. long, the upper narrowly oblanceolate, shorter, 1-nerved; anthers  $1\frac{1}{2}$  lin. long. Homogamous spikelets like the pedicelled.—

+ *Cymbopogon andongensis*, Rendle in Cat. Afr. Pl. Welw. ii. 159.

**Lower Guinea.** Angola: Pungo Andongo; Caghuy, *Welwitsch*, 2728! on rocks near Mopopo, *Welwitsch*, 7396!

7  
54. **H. multiplex**, <sup>Recht</sup> *Anderss. in Schweinf. Beitr. Fl. Aethiop.* 306. Annual. Culms very slender, erect, up to 1 ft. high, terete, glabrous, smooth, few-noded and simple below the panicle. Leaf-sheaths





glabrous, smooth, strongly striate, terete, produced at the mouth into a short triangular auricle; ligules scarious, truncate, adnate to the auricles of the sheath; blades linear from an almost equally wide base, acutely acuminate, 2-6 in. by  $\frac{3}{4}$ -1 lin., green, soft, rough above and on the margins, much less so underneath; midrib and lateral nerves slender. Inflorescence reduced to a terminal pair of racemes or a terminal 2-rayed tier, uppermost internode or rays slender, filiform,  $1\frac{1}{2}$ -3 in. long, erect, subflexuous, glabrous. Spatheoles lanceolate, long and finely acuminate, about 3 in. long, scarious to thinly subherbaceous, pale-greenish or straw-coloured, glabrous, soon loosely inrolled from the margins; peduncles  $1\frac{3}{4}$  to over 2 in. long, hairy towards the tips, hairs fine, hardly tubercle-based, yellowish, under 2 lin. long. Racemes subcontiguous, laterally exerted from the spatheole and more or less recurved and nodding but not epinastically deflexed, 5-6 lin. long, pale green, 4-7-awned per pair; bases short, somewhat stout, pubescent, hirsute on the inner side, indistinctly articulate; joints linear, about 1 lin. long, obliquely truncate, very densely ciliate, cilia on one side up to 1 lin. long, on the other side shorter; pedicels similar, somewhat longer and more slender. Homogamous pairs of spikelets 1 or 2 at the base of each raceme, forming an imperfect involucre. Fertile spikelets sublinear, 4 lin. long including the callus, rounded on the sides and slightly flattened and turning brown along the middle of the back; callus acute, 2 lin. long, shortly and densely bearded. Glumes equal, firmly chartaceous; lower mucronate, hispidulous all over, 9-nerved, middle nerve much shorter than the nearest 2 inner nerves which join the outer just below the mucro, margins involute, keels obscure; upper glume obliquely truncate, mucronulate, hispidulous upwards, turning dark brown below the middle. Lower floret reduced to a narrow oblong faintly 2-nerved sparingly ciliate hyaline valve. Upper floret ♀: valve stipitiform, firm, edentate; awn robust, stout,  $2\frac{1}{2}$ -3 in. long, column dark brown, fulvously hirtellous, bristle slightly paler. Pedicelled spikelets neuter, narrowly lanceolate, 3-3 $\frac{1}{2}$  lin. long; lower glume thin, produced into a short mucro, 9-11-nerved, nerves slender, slightly prominent, keels spinulously ciliate; upper glume slightly shorter, mucronulate, 3-nerved, ciliate; valves if present hyaline, linear-oblong, lower up to 3 lin. long, 1-nerved or like the upper more or less reduced. Homogamous spikelets similar to the pedicelled, up to 5 lin. long, neuter or ♂; anthers  $1\frac{1}{4}$  lin. long.—*Anthistiria multiplex*, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 449; Steud. Syn. Pl. Glum. i. 400. *Andropogon multiplex*, Hack. in DC. Monogr. Phan. vi. 631.

Nile Land. Abyssinia: Sana; mountains of the Bahara district, *Schimper*, 1637! Samen; Debra Eski, towards Woina, 8000 ft., *Schimper*, 804!

✓ Var. *leiopoda*, Stapf. Peduncles minutely pubescent or glabrous; raceme-bases glabrous or at least never hirsute, each raceme with only 1 or 2 heterogamous pairs of spikelets

+ Nile Land. Abyssinia: Tigre; Mount Arba Tensesa, 8000 ft., *Schimper*, 349!

This has the appearance of a starved shade form.

✓ 55. *H. involucrata*, *Stapf*. Annual (?); base and culm-leaves unknown, but see description of subtending leaves. Spatheate panicle foliate, lax, secund, somewhat nodding, up to over 2½ ft. long, lowest internodes about 10 in. long, the following 2 or 3 between 5 and 6 in. long; primary branches forming 3- or upwards 4-5-rayed tiers; lowest tier of very unequal compound rays, the lowest up to over 1 ft. long and 2-noded, the following mixed or the uppermost of simple rays only; simple rays very unequal, from 4 to less than 1 in. long, glabrous; lowest subtending leaves resembling normal leaves, their spathes slightly inflated, glabrous and smooth; ligules scarious, truncate, ciliolate, up to ¾ lin. long; blades linear, narrowed downwards to a rounded almost clasping base, tapering to a slender point, over ½ ft. by 2½ lin., flaccid, pale green, glabrous or shortly and sparingly pubescent below, very rough all over; midrib slender, upper subtending leaves with spathaceous sheaths and rapidly reduced blades. Spatheoles cymbiform-lanceolate, setaceous long acuminate, 2-2½ in. by 2 lin., very thinly scarious, pale tinged with livid purple, glabrous, at length loosely inrolled and narrow; peduncles slender, at length ¾-1 in. long, quite glabrous, flexuous or slightly arched upwards or almost straight. Racemes permanently contiguous or subcontiguous, laterally exerted from the spatheole, up to 9 lin. long, greenish or brownish, glabrous, 4-awned per pair; raceme-bases very short, stout, dorsally compressed, pubescent in the fork, tardily disarticulating between the homogamous pairs, obliquely truncate; joints linear, filiform, up to over 1 lin. long, densely and shortly white-ciliate, tips truncate, not auricled; pedicels very similar, slightly longer. Homogamous pairs of spikelets 2 at the base of each raceme, forming an involucre. Fertile spikelets linear-lanceolate, subacuminate, including the callus 4½ lin. long, pale green, flattened on the back, rounded on the sides; callus very slender and acute, 1½ lin. long, shortly and densely bearded. Glumes equal, firmly chartaceous, lower 2-mucronulate, quite smooth except the short scaberulous subterminal keels, 11-nerved, nerves subequal, the inner 5 ending below the hyaline tips, margins involute up to the acumen; upper glume deltoid-acute, 3-nerved, reversedly ciliate upwards. Lower floret reduced to a hyaline oblong 2-nerved reversedly ciliate valve. Upper floret ♂: valve stipitiform, over 2½ lin. long with a narrow hyaline margin adnate all along, awn from over 2-4 in. long, fulvous, column fulvously hairy, hairs up to 1 lin. long; valvule 0. Anthers 1¼ lin. long. Pedicelled spikelets ♂ or neuter, linear-lanceolate, acutely acuminate, 4½ lin. long; lower glume thin, produced from between 2 minute teeth into a fine bristle (up to 10 lin. long), about 11-nerved, keels upwards scaberulous;





upper glume shorter to much shorter, acute, 3-nerved, ciliate; valve of lower floret if fully developed linear-oblong, up to 4 lin. long, sub-3-nerved, reversedly ciliate, of the upper very much shorter or both greatly reduced; anthers  $2\frac{1}{4}$  lin. long. Spikelets of the homogamous pairs similar to the pedicelled, but mucicous, from 5–6 $\frac{1}{2}$  lin. long.—*Androscepia Barteri*, Anderss., and *Anthistiria Barteri*, Munro mss. ex Oliver in Trans. Linn. Soc. xxix. 176.

† Upper Guinea. Northern Nigeria: Nupe?, *Barter*, 957!

✓ 56. *H. notolasia*, Stapf. Annual, 8–10 ft. high. Culms robust, up to 2 lin. in diam., simple and about 4-noded below the panicle, terete, glabrous. Leaf-sheaths terete, tight, at length slipping off the culms altogether (lowest), or upwards only and inrolled from the margins, smooth, glabrous; ligules scarious, short, truncate, ciliolate, blades linear from an equally broad or gradually narrowed base, tapering to a long point, up to over 1 ft. by 3 lin., pale green, flaccid, more or less rough on both sides and scabrid along the margins, slender or somewhat stout downwards, whitish below; primary lateral nerves 3–4 on each side, slightly raised. Spatheate panicle narrow, very lax, up to 2 ft. (or more?) long, of over 4 distant mixed or upwards simple tiers; lower tiers few- to 6-rayed with the compound rays up to over 6 in. long and 2–3-noded; simple rays very slender, filiform, 1 to over 2 in. long, frequently strongly arched or recurved; lower spathes resembling the preceding leaves with long blades. Spatheoles narrowly lanceolate, long and finely acuminate,  $2\frac{1}{2}$ – $3\frac{1}{2}$  in. long, up to  $1\frac{1}{2}$  lin. wide, scarious, pale tinged with purple, finally inrolled from the margins but never tightly; peduncles filiform, up to 1 in. long, flexuous or recurved and exerted from the spatheole, glabrous. Racemes nodding, subcontiguous or slightly spreading, up to 1 in. long, contracted, greenish, 2–3-awned per pair; raceme-bases rather stout, up to 1 lin. long, dorsally compressed, densely pubescent in the fork, exappendiculate; joints if any, slender, filiform, with obliquely truncate tips shortly silky-ciliate, 1 lin. long; pedicels similar, up to 2 lin. long. Homogamous pairs of spikelets 1 at the base of the upper, 2 at that of the lower raceme, the latter forming a persistent imperfect involucre. Fertile spikelets oblong, 4 lin. long including the callus, pale green, tomentose; callus slender, acute, 1 lin. long, finely grooved on the back, shortly silvery bearded. Glumes equal, firmly chartaceous, minutely truncate; lower rounded on the back, shortly villous almost all over, faintly 9-nerved, very finely grooved along the middle nerve at the base; upper glume 3-nerved, ciliolate on the rounded keel, and reversedly so on the margin. Lower floret reduced to a linear-oblong obtuse ciliate 2-nerved hyaline valve. Upper floret ♂: valve stipitiform, minutely 2-toothed; awn  $2\frac{1}{2}$  to over 3 in. long, column brown, subplumose, hairs white,  $\frac{1}{2}$ – $\frac{3}{4}$  lin. long, bristle pale; valvule 0. Anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelets ♂ or neuter,

linear-lanceolate to almost linear, 4-5 lin. long, acute, glabrous or minutely pubescent, pale green; lower glume thinly chartaceous, usually aristulate with a bristle (from 1-6 lin. long) arising from between 2 minute teeth, or mucicous, intracarinal nerves about 5, faint, keels rigidly and minutely ciliolate or scaberulous; upper glume sublinear, acute, 3- to sub-5-nerved, reversedly ciliate; lower valve if present narrowly linear, hyaline, faintly 3-nerved, ciliate, up to  $3\frac{1}{2}$  lin. long, or more or less reduced; upper suppressed; anthers up to 2 lin. long.

+ **Upper Guinea.** Northern Nigeria: Lokoja, *Dalziel*, 299.

+ **North Central.** Oubangi territory: Mbouras; Tuburi Marsh, *Macleod*!

(Newsp.)

- ✓ 57. **H. Cornucopiæ**, *Stapf*. Annual? Base unknown. Culms simple below the panicle, terete, glabrous and smooth. Leaf-sheaths terete, glabrous, smooth; ligules scarious, rounded, 1-2 lin. long, glabrous; blades linear from a narrower base, tapering to an acute point, up to over  $1\frac{1}{2}$  ft. by 3-5 lin., somewhat flaccid, or at least flexuous, green to purplish or reddish, scaberulous upwards, scabrid on the margins; midrib slender, primary lateral nerves 3-4 on each side. Spatheate panicle foliate, loose, more or less flaccid, up to 1 ft. long, of 4-5 distant or approximate 3-6-rayed mixed or upwards simple tiers, compound rays comparatively short and few-noded, simple rays filiform, flexuous, the lowest up to 4 in. long, the uppermost not much over 1 in. long; subtending leaves and spathes with long blades mostly overtopping the panicle. Spatheoles narrowly lanceolate, very long and finely acuminate, up to 3 in. by  $1-2\frac{1}{2}$  lin., subherbaceous, glabrous, at length inrolled from the margins; peduncles very slender, filiform,  $1-1\frac{1}{2}$  in. long, arching or recurved, shortly bearded, about 3 lin. below the tips. Racemes contiguous, at length epinastically reflexed, stout, dull purplish or reddish, up to over 1 in. long, 2-awned per pair; bases somewhat unequal, one very short, the other up to over 1 lin. long, pubescent to villous in the fork, otherwise glabrous, produced into a large obovoid-cuneate entire or crenulate scarious glabrous nerved appendage, 4-5 lin. long, and embracing the base of the succeeding trio of spikelets like a cornucopia; pedicels filiform, 2 lin. long, ciliate or villous all over. Homogamous pair of spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong, almost terete in cross section, up to 5 lin. long excluding the callus, pubescent; callus very slender and acute,  $2\frac{1}{2}$  lin. long, densely villously bearded on the back and sides. Glumes equal, coriaceous; the lower thickened, brown and more or less constricted from the back below the hyaline 2-mucronate tip, puberulous all over with a deep groove corresponding to a slender ridge on the inner side from the constriction to the base, 6-nerved, with an additional middle nerve in the tip, the 2 innermost nerves close to the groove, the others rather distant; upper glume broad-oblong, with a hyaline deltoid subacute





tip, produced into a bristle, up to over 3 lin. long, 3-nerved, ciliate, more or less puberulous on the back. Lower floret reduced to a linear-oblong obtuse 2-nerved ciliate hyaline valve almost as long as the glumes. Upper floret ♀: valve stipitiform, with 2 short hyaline teeth, awn very stout, up to over 5 in. long, fulvous; column shortly hirtellous; anthers  $1\frac{1}{2}$  lin. long. Pedicelled spikelets ♂ or neuter, more or less involute or almost folded, flattened out, broadly lanceolate, long-acuminate,  $\frac{3}{4}$ -1 in. long, glabrous, reddish; lower glume produced into a bristle up to 3 lin. long, very closely many-nerved, keels rigidly ciliate; upper glume subulate-lanceolate, setaceously acuminate, 5-nerved, the submarginal nerves very firm, ciliate, lower 3-nerved, upper 1-nerved, almost as long as the glumes or more or less reduced. Homogamous spikelets broad-lanceolate, 6-7 lin. long, muticous, otherwise like the pedicelled, if not the glumes more scarious.—*Andropogon Cornucopiæ*, Hack. in Flora, 1885, 126, and in DC. Monogr. Phan. vi. 646; Durand & Schinz, Consp. Fl. Afr. v. 710.

Nile Land. Jur : Ghattas' Great Seriba, *Schweinfurth*, 2331!

- ✓ 58. H. (?) <sup>(Horsbr. f.)</sup>pusilla, Stapf. Annual, up to  $\frac{1}{2}$  ft. high. Culms slender, erect or ascending, 6- or more-noded, simple or tufted at the base, flowering from the upper 2 or 3 nodes, glabrous, compressed, smooth, lower internodes short to very short, upper elongated and more or less exserted. Leaf-sheaths loose, keeled, more or less hirsute (at least upwards) with tubercle-based hairs, lower often purple; ligules very short, truncate, fimbriate; blades linear from a slightly rounded base, acutely acuminate,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. long, up to  $1\frac{1}{2}$  lin. wide, green hirsute, midrib slender, lateral primary nerves 2-3 on each side, very fine; inflorescence reduced to 2 or 3 distant raceme-pairs, borne on filiform rays, 1-2 in. long, subtending leaves with more or less spatheaceous sheaths and small blades or the uppermost spatheoloid. Spatheoles narrowly lanceolate, acuminate,  $1\frac{1}{4}$ - $1\frac{3}{4}$  in. long, sometimes with a rudimentary blade, glabrous, suffused with purple, at length slightly inrolled; peduncles finely filiform,  $\frac{3}{4}$ - $1\frac{1}{4}$  in. long, glabrous. Racemes subcontiguous, laterally exserted from and at a right angle to the spatheole, at length epinastically reflexed, about  $\frac{3}{4}$  in. long, 4-7-awned per pair, greenish, glabrous except for the joints and pedicels, the lower usually subsessile, the upper with a slender short more or less hairy base; joints slender filiform, with a transparent median line, shortly and densely ciliate,  $1\frac{1}{2}$  lin. long, tips truncate; pedicels very similar but slightly shorter. Homogamous pair of neuter spikelets 1 at the base of the lower raceme only. Fertile spikelets oblong to oblanceolate-oblong, including the callus  $2\frac{1}{2}$ -3 lin. long, greenish or tinged with purple; callus subobtusely, densely bearded, beard up to 1 lin. long. Glumes subequal; lower 2-denticulate, thinly herbaceous, chartaceous, somewhat rounded on the back, glabrous and very smooth, usually with a shallow

median groove and a large pit on each side of it at the upper third quarter, keels finely scaberulous, nerves 2-3 on each side of the groove; upper glume thinner, oval-oblong, finely 3-nerved, minutely notched, with a fine bristle up to 3 lin. long from the notch. Lower floret reduced to a linear-oblong 2-nerved glabrous hyaline valve. Upper floret ♂: valve 2-fid to one-third, lobes linear-lanceolate, glabrous, awn robust, about  $1\frac{1}{2}$  in. long, bent at and twisted below the middle, column dark brown, scabrid, bristle pale; valvule 0. Grain oblong, dorsally subcompressed,  $1\frac{1}{4}$  lin. long; embryo half as long. Pedicelled spikelets lanceolate, neuter,  $3\frac{1}{2}$ -4 lin. long, greenish, with or without pits, often more or less involute from the sides; lower glume minutely 2-dentate, with a bristle 3-4 lin. long from the notch, upper shorter, hyaline, 3-nerved; valves if present linear, often very small. — *Andropogon pusillus*, Hook. f. in Journ. Linn. Soc., Bot., vii. 233; Hack. in DC. Monogr. Phan. vi. 628; Durand & Schinz, Consp. Fl. Afr. v. 721.

**Upper Guinea.** Cameroons: Cameroon Peak, 7000 ft., *Mann*, 2097!

A very aberrant type of uncertain position. The large pits of the lower glume of the fertile spikelets are unique in the genus.

*Imperfectly known species.*

**59. *Andropogon mobukensis*, Chiov. in Ann. di Bot. Roma, vi. 147.** Perennial. Culms very elongated, branched, slender. Leaf-blades short, quite glabrous, linear, contracted at the base into a short petiole; ligules minute. Panicle? Peduncle longer or shorter than the spatheole, hardly scaberulous upwards. Racemes greenish, 9-12 lin. long, 4-5-jointed, one sessile, the other with a distinct bare base; joints densely white-ciliate, half as long as the fertile spikelets; pedicels three-quarters as long as the latter. Fertile spikelet lanceolate, quite glabrous; callus very obtuse. Lower glume depressed on the back, 9-nerved, nerves visible all along, scabrid; upper with a very short terminal bristle, quite glabrous. Lower floret reduced to an obtuse ciliate hyaline valve. Upper floret ♂: valve 2-fid to one-quarter, awn "equalling one-third of the lower glume." Pedicelled spikelets ♂, lanceolate-linear, acuminate, mucous, quite glabrous; lower glume not dorsally depressed; valve 1 only.

**Nile Land.** Uganda: Ruwenzori; Mobuku Valley, between Nabitava and Bihunga, *Expedition of the Duke of Abruzzi*.

The author places this species next to *A. hirtus*, L. (*Hyparrhenia hirta*). The description of the awn suggests some printer's error; its length would work out at about 1 lin. Can this be one of the *Diplandrae* series near *Hyparrhenia andongensis* or *H. glabriuscula*?

**60. *Andropogon monatherus*, A. Rich. Tent. Fl. Abyss. ii. 462.** Perennial, caespitose. Culms erect, 2 ft. high, glabrous, glaucous.





Leaf-sheaths loose, glabrous; ligules 6-8 lin. long, truncate, subdenticulate, glabrous, membranous; blades linear, flat or often narrow with involute margins, very acute, scabrid. Inflorescence consisting of 2-4 very distant raceme-pairs, borne on very long glabrous somewhat stout rays. Spatheoles very long, convolute, acute, glabrous; peduncle exceeding the spatheoles, scabrid. Racemes yellowish-villous, one sessile, the other with a long base, each consisting of 1 fertile awned spikelet and 5 ♂ spikelets of which the lowest 3 are subsessile whilst the 2 others are pedicelled; pedicels densely ciliate. Fertile spikelet surrounded by yellowish silky hairs at the base (callus?). Lower glume truncate, 2-dentate, nerved, fulvously silky; awn very long, fulvously silky. Pedicelled spikelets ♂, glabrous; lower glume aristulate, upper acute. Homogamous spikelets muticous.—Hack. in DC. Monogr. Phan. vi. 633; Durand & Schinz, Consp. Fl. Afr. v. 718.

**Nile Land.** Abyssinia: Shire, *Quartin Dillon*.

This species ought to be easily recognized by its unusually long ligule. This it has in common with *Hyparrhenia petiolata*: but the much reduced inflorescence, the scabrid but not bearded peduncles, and the very unequal raceme-bases, one of which is described as "long," and finally its perennial duration, exclude it from that species. The statement that there are 5 ♂ spikelets is probably erroneous. If there are 2 terminal pedicelled spikelets they would, together with the solitary fertile spikelet, form the usual terminal trio, below which one might expect 1 or 2 pairs of homogamous ♂ spikelets, bringing up the number of ♂ spikelets to 4 or 6. If there be 6, the affinity of the species would evidently lie with the *Filipendula* series.

**61. Andropogon setifer**, *Pilg. in Wiss. Ergebn. Deutsch. Zentr.-Afr. Exped.* 1907-8, ii. 44 (1910). Perennial. Culms about 3 ft. high, erect, stout, coated at the base with long imbricate sheaths, 4-noded below the panicle. Leaf-sheaths (upper?) shorter than the internodes, hirsute upwards, setose at the mouth; blades very long, rigid, narrowly linear,  $2\frac{1}{2}$ -3 lin. wide, "involute, hairy on the upper side," scabrid along the margins, "midrib stout, impressed on the lower side." Panicle over 2 ft. long, narrow, very scanty and loose, almost interrupted, with more or less erect branches. Spatheoles narrow, cymbiform, rufescent; peduncle two-thirds as long as the spatheoles, densely bearded upwards with long yellowish stiff hairs. Racemes 4-awned per pair, at length epinastically reflexed, one sessile, the other with a base 1 lin. long; bases bearded like the peduncle, their tips produced into a broad 2-fid or -dentate bract-like appendage, 1 lin. long; joints and pedicels slender,  $1\frac{1}{2}$  lin. long, white-ciliate. Homogamous pair of spikelets 1 with the lower raceme. Fertile spikelets narrow, ovate-lanceolate, slightly over 3 lin. long; callus short, acute. Glumes: lower rigid, 2-dentate, flat on the back, the innermost 3 nerves prominent, the outer obscure; upper ovate-oval, obtuse, shortly cuspidate, hairy towards the margin. Lower floret reduced to a very delicate valve with inflexed margins. Upper floret ♂: valve 2-fid, ciliate; awn

more or less kneed or flexuous, hairy downwards. Pedicelled spikelets neuter, as long as the fertile; lower glume aristulate, distinctly nerved, very scabrid; upper glume and valve small.

**Mozambique Distr.** German East Africa: Bukoba District; Itara, in high-grass savannahs, *Mildbraed*, 98.

The author places this near *Andropogon confinis*, Hochst. The description points unmistakably to *Hyparrhenia Lecomtei* and its immediate allies. The passages above put between inverted commas should probably read "revolute, hairy on the lower side" and "midrib stout, impressed on the upper side."

#### 43A. **DYBOWSKIA**, Stapf.

Spikelets 2-nate, or the terminal ternate, inserted on the short more or less fragile rachis of paired racemes, terminating the culms and branches, those of the terminal trio differing in sex and shape, one of them sessile, the others pedicelled, those of the pairs below it homogamous and subsessile, surrounding it like an involucre; raceme-pairs supported by a spatheole and collected in 1 or 2 terminal or subterminal tiers; the fertile spikelet on maturity falling with the contiguous pedicels; the homogamous pairs tardily separating afterwards, their adjacent joints entering into the formation of the raceme-base, very short, stout, ciliate, obliquely truncate and tardily disarticulating; pedicels of the trio slender, filiform, ciliate, obliquely truncate, of the homogamous pair similar to the joints if not slightly longer, not disarticulating. Florets 2, lower reduced to an empty valve, upper ♀ in the terminal sessile spikelet, ♂ in those of the homogamous pairs and in the pedicelled spikelets. Fertile spikelets slightly flattened dorsally with broad rounded sides, awned; callus long and pungent, bearded. Glumes equal, the lower coriaceous with a very short broad slightly depressed beak, margins involute almost up to the beak, then inflexed from the very short keels, the upper rounded on the back to near the obscurely keeled tip, 3-nerved. Valves ciliate, of the lower floret hyaline, 2-nerved, of the upper very short, stipitiform, passing between two obtuse small hyaline teeth into a coarse kneed hirtellous awn. Valvule small, hyaline, nerveless. Lodicules 2, small, glabrous. Stamens 3. Stigmas laterally exerted; styles terminal. Ovary oblong, glabrous. Grain unknown. Pedicelled spikelets (of the terminal trio) very acute, involute, very finely keeled upwards. Valves of both florets developed, much shorter than the glumes. Homogamous spikelets very large, equalling or slightly exceeding the fertile, similar to the terminal pedicelled but dorsally more compressed and flattened.—Annual. Spatheoles very large, boat-shaped, the short peduncle and the base of the stout short contiguous raceme-pairs permanently enclosed in them.

Species 1, endemic.

The affinity of *Dybowskia* is with the *Involucratae* series of *Hyparrhenia*; but the excessive development of most parts of the inflorescence and the very





small valve of the ♂ floret with its enormous awn mark it off sufficiently to recommend its recognition as a new genus.

(See Wild)

✓ 1. *D. Seretii*, Stapf. Annual, about 3 (or more ?) ft. high. Culms in scanty fascicles, erect, glabrous, smooth, intermediate inter nodes up to over 1 ft. long, long-exserted. Leaf-sheaths terete, smooth and glabrous, except on the ciliate margins, or the lowest (?) villous at the base; ligules scarious, rounded, ciliolate, glabrous, up to 2 lin. long; blades linear from a slightly attenuated or equally wide base, long-tapering to an acute point, up to  $1\frac{1}{2}$  ft. (or more ?) by 3-6 lin., green, glabrous, or sparingly hirsute, slightly rough on the upper side, smooth below, margins spinulosly scabrid. Inflorescence of 1 terminal about 7-rayed umbelliform tier or two 3-4 rayed tiers, the lowest about  $1\frac{1}{2}$  in. long; subtending leaves with more or less spathaceous sheaths and reduced blades, often overtopping the inflorescence. Spatheoles permanently cymbiform, lanceolate, long and acutely or subacutely acuminate, 2-3 in. long,  $3\frac{1}{2}$  lin. wide in profile, brownish-green, glabrous, smooth except for the scabrid keel of the acumen; peduncle filiform, with a discoid tip, up to 7 lin. long, glabrous or with some hairs upwards, permanently enclosed in the spatheole. Racemes laterally incompletely exserted from the spathe, permanently contiguous, about 10-12 lin. long; bases very short, with an annular thickening at the nodes, sparingly hairy upwards, intermediate disarticulation-face oblique, wide, terminal disarticulation very oblique, tip auriculiform; pedicels of the trio adnate at the base to the side of the lower glume of the fertile spikelet, free part  $3\frac{1}{2}$  lin. long, very densely and shortly silky-ciliate. Homogamous pairs of spikelets 2. Fertile spikelet linear-oblong, 2-mucronulate, including the callus 9-11 lin. long, straw-coloured; callus  $2\frac{1}{2}$ - $3\frac{1}{2}$  lin. long, very pungent, very densely bearded, hairs white, silky, the uppermost over 1 lin. long. Glumes equal, coriaceous; lower with a fine longitudinal groove at the base and there densely villous, loosely and shortly hairy upwards, at least on the sides and below the acumen, about 13-nerved, nerves very obscure, acumen  $\frac{2}{3}$  lin. long, turning brown, mucros and keels rather firm; upper glume subcoriaceous, deltoid-truncate, very minutely pubescent upwards, middle nerve prominent towards the tip, margins reversedly ciliolate. Lower floret: valve linear-oblong, obtuse, about 5 lin. long. Upper floret ♂: valve 1 lin. long, glabrous, awn up to 5 in. long, golden-fulvous, appressedly silky-pubescent, slightly bent at the middle and again somewhat below it; valvule linear-oblong, about  $1\frac{1}{2}$  lin. long, ciliate at the tip. Anthers  $2\frac{1}{2}$  lin. long. Pedicelled spikelets (the trio) linear-lanceolate, 6-8 lin. long, glabrous; lower glume subcoriaceous, passing into a mucro or very short bristle, obscurely many-nerved; upper shorter, very acute, 3-nerved, reversedly ciliate; lower valve oblong-obtuse, up to 4 lin. long, 3-nerved, upper very minute, obovate, ciliate; anthers 4 lin. long. Homogamous spikelets linear-lanceolate, up to 10 lin.

long, those of the lower pair over 1 lin. wide, acute, glabrous; valves usually more developed than in the pedicelled spikelets; the upper similar to the lower but shorter and 1-nerved.—*Andropogon Dybowskii*, Franch. in Bull. Soc. Hist. Nat. Autun, viii. 334 (reprint 26). *A. Sereti*, De Wild. Études Fl. Bas- et Moyen Congo, iii. 152, t. xl. *Cymbopogon princeps*, Stapf in Mém. Soc. Bot. France, viii. 104.

**North Central.** French Congo: Langouani Country; Balao Camp, 60-95 miles from the River Oubangi, *Dybowski*, 585! Upper Oubangui; Tomi valley, *Chevalier*, 3570!

**South Central.** Belgian Congo: Welle District; between Missa and Gongo, on arid, rocky plateau, *Seret*, 308.

44. **EXOTHECA**, Anderss. in Nov. Act. R. Soc. Sc. Upsal. ser. 3, ii. 253, t. 3.

Spikelets 2-nate, those of the uppermost pair differing in sex and very conspicuously in shape (forming with the terminal pedicelled spikelets a trio), those of the lower pairs homogamous (♂ and alike in shape), one sessile, the other pedicelled on the rhachis of paired racemes; the homogamous pairs approximate, forming an involucre below the heterogamous trio, the axis disarticulating tardily between and readily above them; raceme-pairs solitary, terminating the culms and their scanty usually undivided branches, rarely the latter forming few-rayed tiers; the fertile spikelet falling with the adjacent pedicels; joints and pedicels of the involucre very short, stoutly filiform, glabrous or almost so; pedicels of the trio slender, filiform-linear, with truncate minutely auricled tips. Florets 2, lower reduced to an empty valve, upper ♀ in the sessile spikelet of the terminal trio, ♂ in those of the homogamous pairs and all the pedicelled spikelets. Fertile spikelets dorsally convex and laterally rounded when in flower, terete in fruit, awned; callus long, slender, pungent, shortly bearded. Glumes subequal, subcoriaceous, the lower with a herbaceous 2-dentate and 2-keeled beak and involute margins below it, the upper thinner, rounded on the back with a large membranous finely keeled tip, 3-nerved. Valves ciliate; of lower floret hyaline, 2-nerved or nerveless, of upper floret stipitiform, passing into a long stout awn from between 2 short hyaline lobes. Valvule small, hyaline, nerveless. Lodicules 2, glabrous. Stigmas laterally exserted; styles terminal. Stamens 3. Grain clavate-oblong, subterete. Pedicelled spikelets of all pairs linear-to lanceolate-oblong, acute or mucronate or aristulate from the lower dorsally much compressed and flat or subinvolute glume, longer than the fertile. Valves of both florets developed.—Perennial, densely cæspitose, with narrow blades and very scanty inflorescences; spikelets large.

Species 1, endemic.

1. **E. abyssinica**, Anderss. *l.c.* Densely cæspitose with intravaginal innovations, up to 3 ft. high. Culms erect, rather slender,











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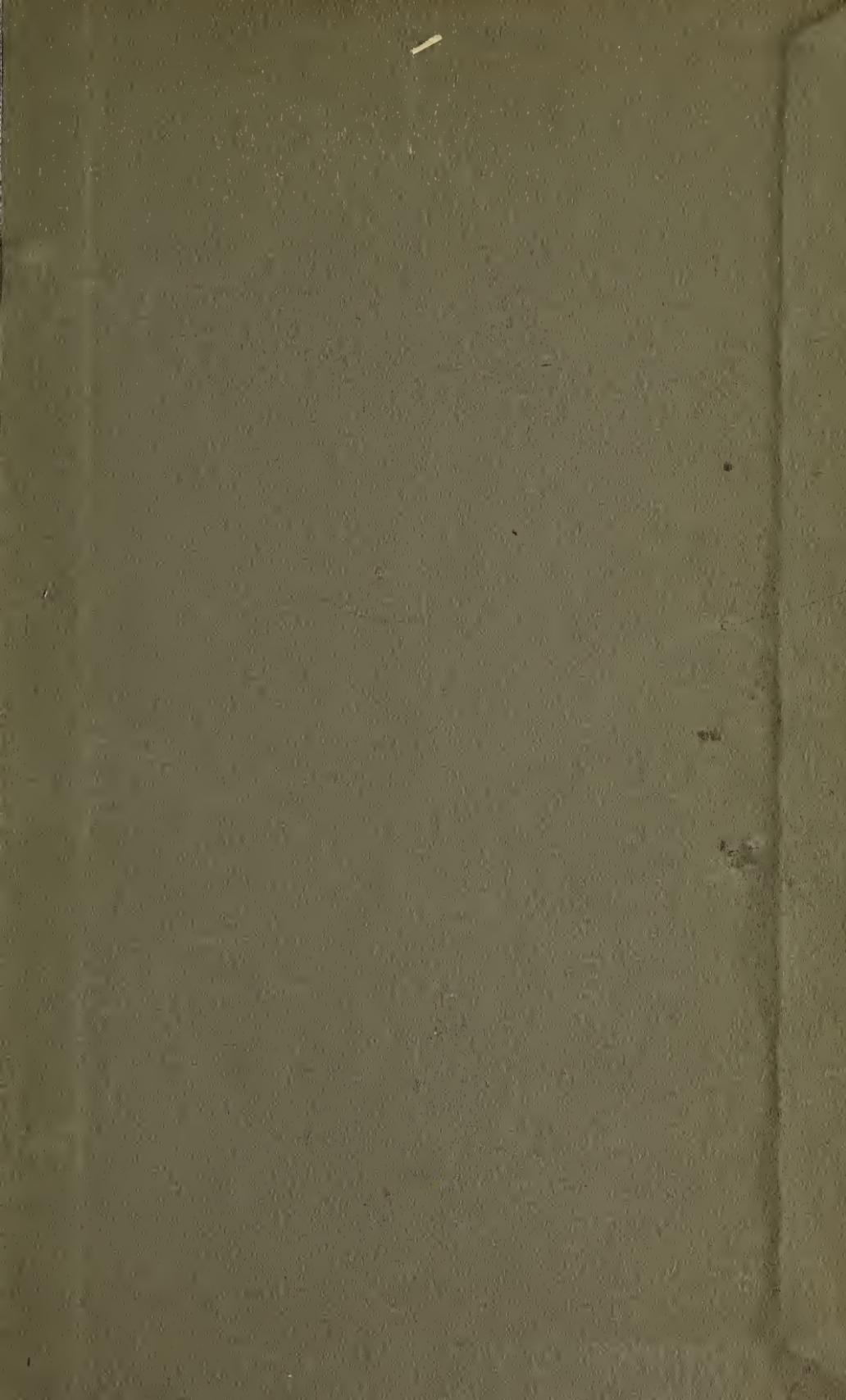
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