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NOTES ON MALAYSIAN GRASSES III[1]

BY

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DEYEUXIA Clar. ex Beauv.

1. **Deyeuxia pseudopoa** nov. spec.—Fig. 1.

Perennis, caespitosa. Culmi erecti, inferne 3—4 mm crassi, fistulosi, glabri laevesque, usque ad 120 cm alti, nodis 4—6 obscuris; internodium superius 30—45 cm longum. Vaginae teretes, glabrae laevesque, striatae, angustae, quam internodia breviores. Ligula membranacea, glabra, 5 mm longa, acuta, magis minusve lacerata. Foliorum laminae lineares, planae, tenuiter nervatae, glabrae, marginibus scabrae, inferiores elongatae, usque ad 40 cm longae, 5—8 mm latae, superiores breviores. Panicula oblonga, 15—25 cm longa, erecta vel subnutans; rami divaricati, capillares, laeves, subflexuosi, in verticillis distantibus dispositi, infimi 4—5-nati, 6—8 cm longi, inferne nudi, supra medium iterum ramosi; ramuli scaberrimi. Pedicelli spiculas subaequantes, scaberrimi, apice subincrassati. Spiculae virides, uniflorae, 4.5—5 mm longae, lanceolatae. Glumae inaequales, ambae acutissimae vel mucronatae vel brevissime aristatae, omnino scabrae, carina serrulato-scabrae; ima angusta, 2—3 mm longa, secunda subtrinervia, quam prima 1 mm longior. Callus pilis paucis brevissimis munitus vel glaber. Rhachilla in setam 1.5—2.5 mm longam manifeste producta. Lemma 4.5—5 mm longa, lanceolata, lateraliter valde compressa, indurata, puncticulato-scabra, indistincte 5-nervis, carina in aristam 0.5—2 mm longam desinente. Palea quam lemma subbrevior, nervis 2 approximatis. Antherae ca. 1 mm longae. Caryopsis matura ignota.

Distr. Sumatra, Gajolands: summit of Goh Lembuh, Van Steenis 9135 (type); Mt Losir, Van Steenis 8660.

Ecol. High-mountain grass; along shaded brooks in the moss-forests, from 3000—3500 m altitude.

Note. This remarkable species has the habit of a large *Poa* and belongs to the small group of *Deyeuxia* species with the lemma longer

[1] Part I in Reinwardtia 2 (1953) in the press; part II in Act. Bot. Neerl. 1 (1953) 468—483.

[2] Honorary collaborator Flora Malesiana Foundation.

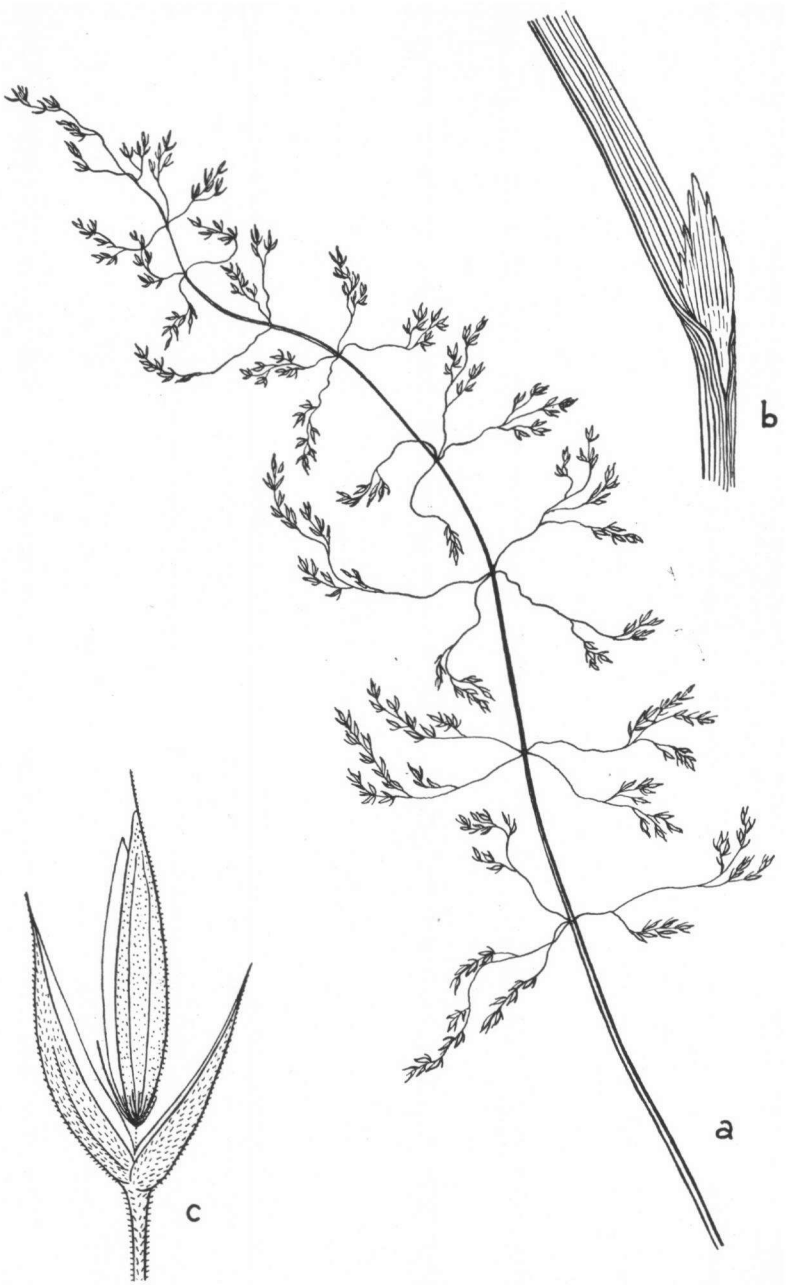

Fig. 1. Deyeuxia pseudopoa Jansen. *a*. Panicle, × ½, *b*. ligule, *c*. spikelet.

than the glumes, the callus very short-hairy and a bristle-like prolongation of the rhachilla, described by Miss J. W. VICKERY (1940). The shape and indurated texture of the lemma and the length of the awn is well within the generic range.

ERIANTHUS Michx.

1. **Erianthus velutinus** (Holttum) Jansen, nov. comb.

Spodiopogon velutinus Holttum in Gard. Bull. Sing. (1947) 297.

This species is nearly related to *E. beccarii* (Stapf) Jansen. It may be distinguished by the cuneate base of the blades, which are softly villous on the lower surface, by the hirsute sheaths, the whitish panicle and the perfect awn of the upper lemma.

FESTUCA L.

1. **Festuca nubigena** Jungh. — Fig. 2, 3.

This remarkable species was described by JUNGHUHN (1845). BUSE (1854) described it again after having studied Junghuhn's original specimens from Mts Lawu and Merbabu (Central Java). He stressed the typical habit: "Caespites ibi format insularum ad instar, vallibus 1—3 pedalibus segregatas". STEUDEL (1854) distinguished two species in Java: *F. nubigena* Jungh. and *F. nubila* Jungh. (in lit. ad Nees). Neither at Bogor nor at Leyden specimens of *F. nubila* are represented. According to ST. YVES (1928), who saw a specimen of *F. nubila* in the Berlin Herbarium, the type of *F. nubila* shows only trifling differences with *F. nubigena* and he considered them to be conspecific. CHASE (1943) mentioned *F. nubila* from New Guinea, and remarked: "This species is closely related to *F. nubigena* but has taller culms, much longer leaves, larger lax panicles and larger spikelets with hispidulous glumes and lemmas". She based her opinion on the specimens collected by Brass and Meijer Drees in New Guinea. By courtesy of Dr R. J. Swallen I could study these Brass specimens of the U. S. Nat. Herb. and compare them with a duplicate set of Brass & Meijer Drees in the Rijksherb. Leyden, in which Herbarium are also deposited numerous specimens of *F. nubigena* from the mountains of Java and Lombok.

The latter specimens possess the following characteristics:

a. *F. nubigena* is a densely caespitose perennial with numerous long-leaved, closely packed, intravaginal innovations, surrounded by the broadened old sheaths and building separate and distant tussocks.

b. The sheaths of the innovations are entire for the largest part (up to 2/3) and in the upper portion of the entire part they are very thin and implicately sulcate. In the opinion of St. Yves and De Litardière this is a character of major importance bringing the species in the group of *F. amethystina* L.

Fig. 2. Festuca nubigena Jungh. *a.* Type from Java, × ½, *b.* spikelet, *c.* lemma and palae.

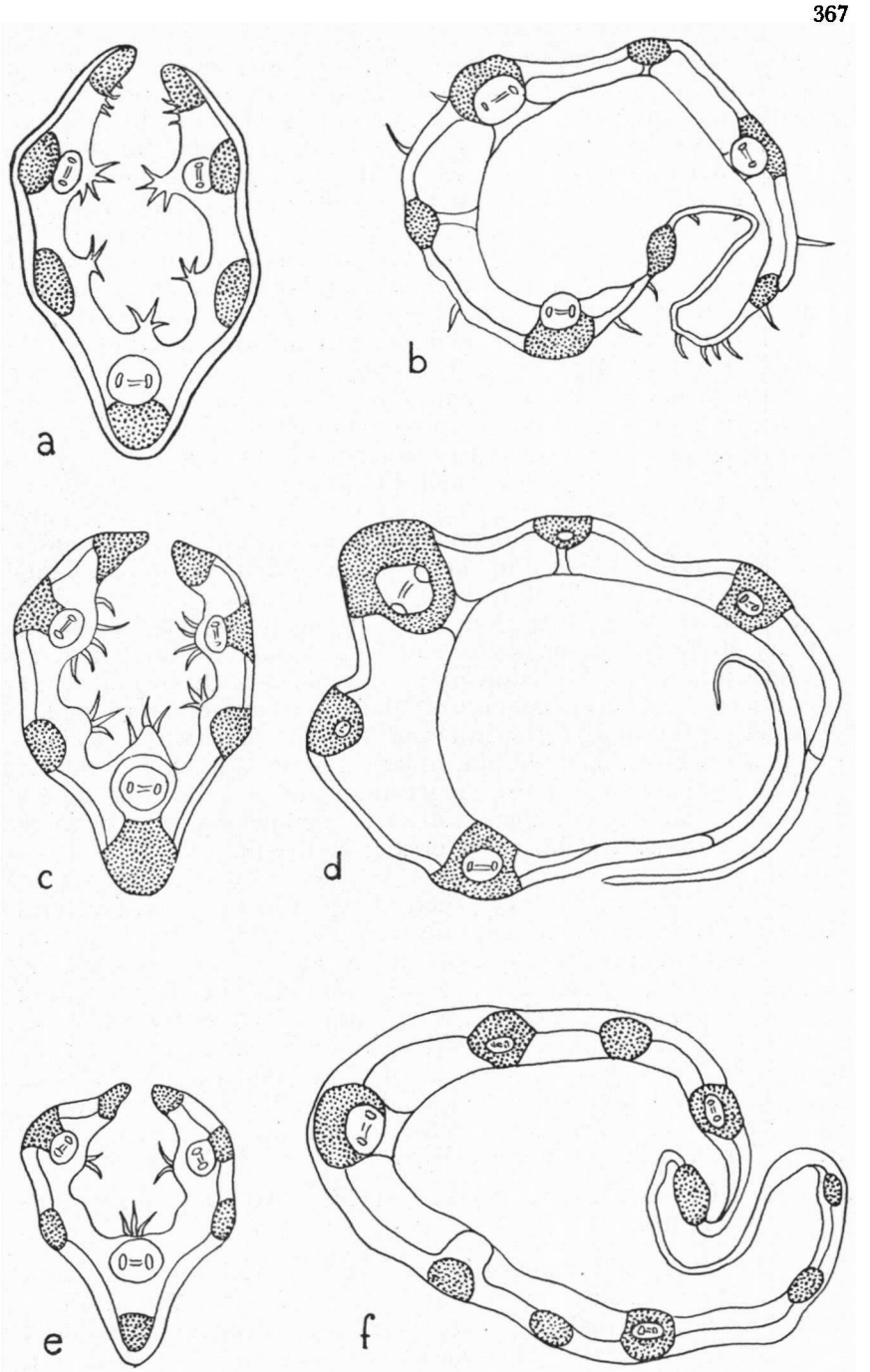

Fig. 3. Festuca nubigena Jungh. Transverse sections of blades and sheaths: *a/b*. Zollinger 3967 (Java), *c/d*. Junghuhn)Java), *e/f*. Elbert 2238 (Lombok).

c. The innovation-blades are setaceously involute, usually 20—40 cm long, glabrous and smooth at the outer side, with some minute hairs at the inner side, 0.6—0.7 mm in diameter, usually 3-, more rarely 5-nerved. In transverse section the vascular bundles are supported by sclerenchym only at the lower side of the bundles, with a small layer of sclerenchym at the apices of the margins. In this respect they differ from the figures given by ST. YVES (1927). They resemble most his f. 102. When we take the description of ST. YVES (1928) as a base, then the specimens from Java and the Lesser Sunda Islands might be separated as a distinct variety.

d. The culms are elegant, thin, glabrous and smooth below the panicle, up to 0.75 m high.

e. The panicle is 8—20 cm long, more or less contracted and often somewhat drooping, the 1—3-nate branches rather short with few spikelets. The axis of the panicle, the branches, branchlets and pedicels are antrorsely scabrid to hispid or more rarely setose.

f. The spikelets are 3—5—(7)-flowered, 7—10 mm long, with the upper floret male. The glumes are unequal, acuminate to minutely awned, the first 3.5—5 mm long and 1-nerved, the second 5—6 mm long and 3-nerved, both scaberulous towards the apex. The joints of the rhachilla are rather long, 1.5—2 mm, and finely but distinctly hairy (an important character of this species and the related ones). The lemmas are 6—7 mm long, lanceolate, with an entire tip, 5-nerved, usually granulate over the whole surface, more or less hispid on the margins and towards the tip. The awn is straight, rather solid and finely hispid, usually 4—5 mm long. The shortly bidentate palea is usually longer than or rarely as long as the lemma. The linear anthers are up to 4 mm long. The ovary is glabrous or with a few short bristles at the tip.

The New Guinean material, cited above, is a mixture of various species and forms. The collected tufts have been torn in fragments and these have been distributed, hence many herbarium specimens do not possess any innovation. Pressed and mounted on the sheets some of the shoots make the impression of being extravaginal, but stoloniferous culms are out of question. The old sheaths are often weathered. In general the specimens are more hairy and the variation of this indumentum is considerable. The blades are often shorter and wider and the culmsare lower. They have been collected between 3200 and 4050 m altitude in wet localities.

a. Brass 4204 (U. S. Nat. Herb. 1614466), Mt Alb. Edward at 3680 m altitude.

This specimen of *F. nubigena* is more or less similar to the Javan specimens. The old sheaths are wanting, probably weathered away. The innovation-sheaths are nearly entire, in the upper closed part deeply implicate-sulcate. The blades are long, narrow, 3-nerved, smooth and glabrous. The spikelets are more purplish than usual, the lemmas granulate to minutely scabrid.

b. Brass & Meijer Drees 9845 differs by the blades, which are clothed with rather long hairs on both surfaces, and by the very dark, quite purple spikelets with minutely hairy lemmas. Brass & Meijer Drees 9823 is a very loosely caespitose form. The old sheaths are wanting and the separate bundles of culms and innovations give the impression of extravaginal growth. Both numbers have been collected on Mt Wilhelmina, at 3560 m altitude.

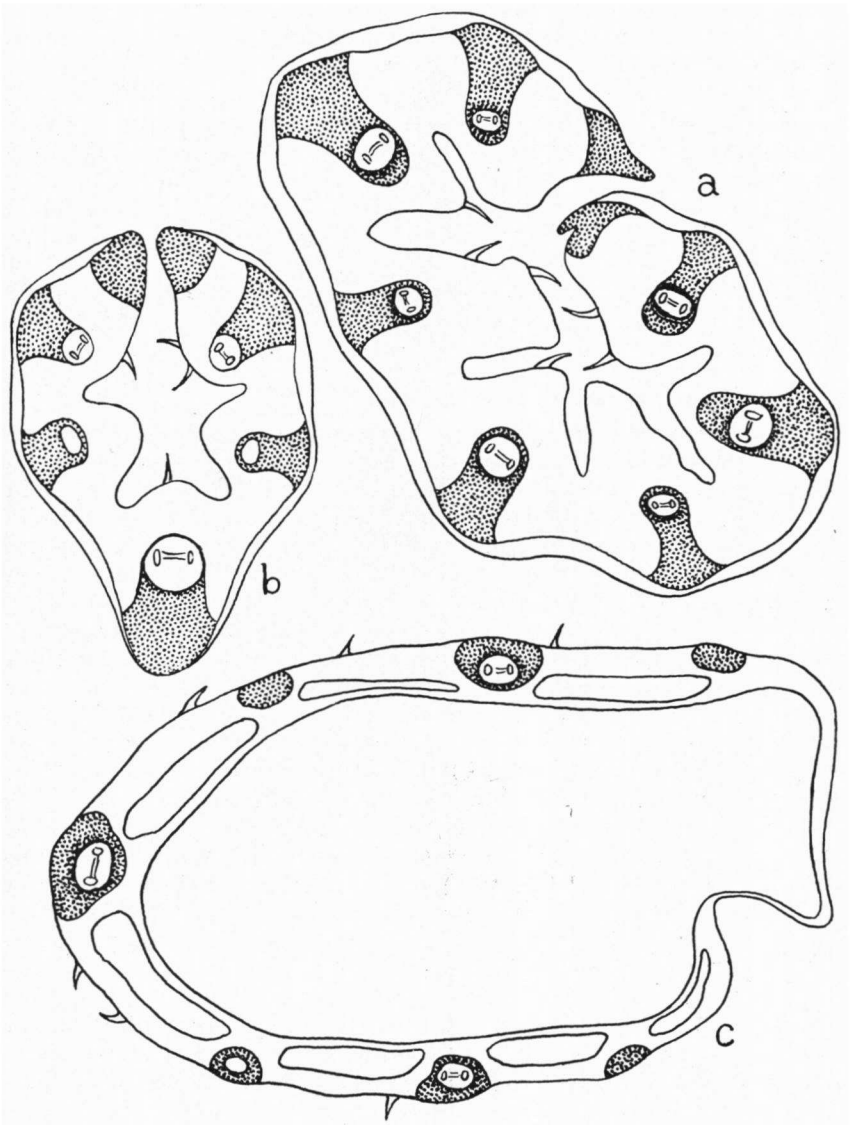

Fig. 4. Festuca nubigena Jungh. ssp. novoguineensis Jansen. Transverse sections of blades: *a.* Brass 9976, *b.* Brass 10066; *c.* transverse section of sheath, Brass 10066.

c. The other specimens of *F. nubigena* from New Guinea differ by the wider 5—7-nerved and usually shorter and more stiff blades, the firmer culms, woolly hairy below the panicle, the spike-like panicle, the adpressed short and few-spikeled branches, and the usually densely pubescent lemmas. I propose to call them

ssp. **novoguineensis** nov. ssp. — Fig. 4.

Laminae modice latiores quam in var. *nubigena*, 5—7-nerviae. Culmi firmiores, infra paniculam lanati. Panicula spiciformis, ramis brevibus, adpressis, spiculas paucas gerentibus.

Distr. Mt Wilhelmina, at 3660 m altitude, alpine grassland, covering marshy hollows, Brass & Meijer Drees 9976, type in U. S. Nat. Herb. 1761722; Lake Habbema at 3225 m altitude, sandy banks of a small stream, Brass 9325 in U. S. Nat. Herb.

The following specimens differ from those cited above by the much shorter, more stiff blades, less than 20 cm long and the still more contracted and shorter panicle:

Lake Habbema at 3225 m altitude, scattered over a wet peaty flat, Brass 9547.

Mt Wilhelmina at 3400 m altitude in a rather wet grassy valley, Brass & Meijer Drees 9747.

Mt Wilhelmina at 4050 m altitude, on shallow wet soil of old screes, Brass & Meijer Drees 10066.

The height of the culms decreases with the altitude.

2. **Festuca parvipaleata** nov. sp. — Fig. 5, 6.

Gramen perenne, dense caespitosum, innovationibus intravaginalibus, plerumque vaginis vetustis basi latioribus inclusum. Culmi erecti, glabri vel subglabri, 40—70 cm alti. Innovationum vaginae in parte quarta inferiori integrae, in parte superiore fissae et apertae, modice latae. Ligula membranacea, 3/4 mm longa, breviter auriculata. Laminae lineares, involutae vel setaceae, apice acuto, 25—40 cm longae, 0.7—1 mm in diam., 5-nerviae, utrimque pubescentes vel demum inferne glabrescentes; laminae foliorum caulinorum valde breviores et paullo latiores. Sectio transversa foliorum innovationum demonstrat fasciculos fibrovasculares utroque cum superficiebus per fasciculos sclerenchymaticos connectos, etiam marginibus foliorum fasciculos sclerenchymaticos continentibus. Panicula 8—12 cm longa, axi, ramis et pedicellis scabris vel minute pilosis. Rami inferiores 1—3-nati, fere patentes, 3—5 cm longi, superiores solitarii vel binati, breviores. Spiculae 8—10 cm longae, plerumque 5-florae, virides vel purpureae, supra pedicello variabilis longitudine positae. Glumae inaequales, apicem versus scabrae. Gluma prima acuta, 3—4 mm longa, 1-nervia; gluma secunda latior, 6—7 mm longa, 3-nervia, acuta vel subulata. Internodia rhachidis 1—1.2 mm longa, dense minute pilosa. Lemma lanceolatum, valde 5-nervium, un aristam 2—3 mm longam scabridam rectam attenuatum, lemma flosculorum inferiorum 8—9 mm longum, superiorum gradatim brevius, glabrum vel nervis magis minusve pubescens. Palea quam lemma valde brevior. Antherae 2—2.5 mm longae. Apex ovarii glaber vel pilis paucis brevibus praeditus.

Distr. New Guinea: northern slopes of Mt Wilhelmina at 4050 m altitude, common in grass cover of old screes, Brass & Meijer Drees 10061, type in U. S. Nat

Fig. 5. Festuca parvipaleata Jansen. *a.* Type from New Guinea (Brass 10061) × ½, *b.* spikelet, *c.* lemma and palea.

Herb. 1761726. From the same locality: Brass & Meijer Drees 10070 & 10071, slightly differing in the blades being very hairy on the outer surface.

This species has more or less the same habit as *F. nubigena* but differs in a character of paramount importance: its sheaths are only entire up to 1/4 of their length, then split and open, while in *F. nubigena* the sheaths are nearly entire to the tip and in their upper part deeply and implicately sulcate. A second remarkable character is furnished by the short palea, about 2/3 as long as its lemma, while in *F. nubigena* the palea is as long as or longer than its lemma.

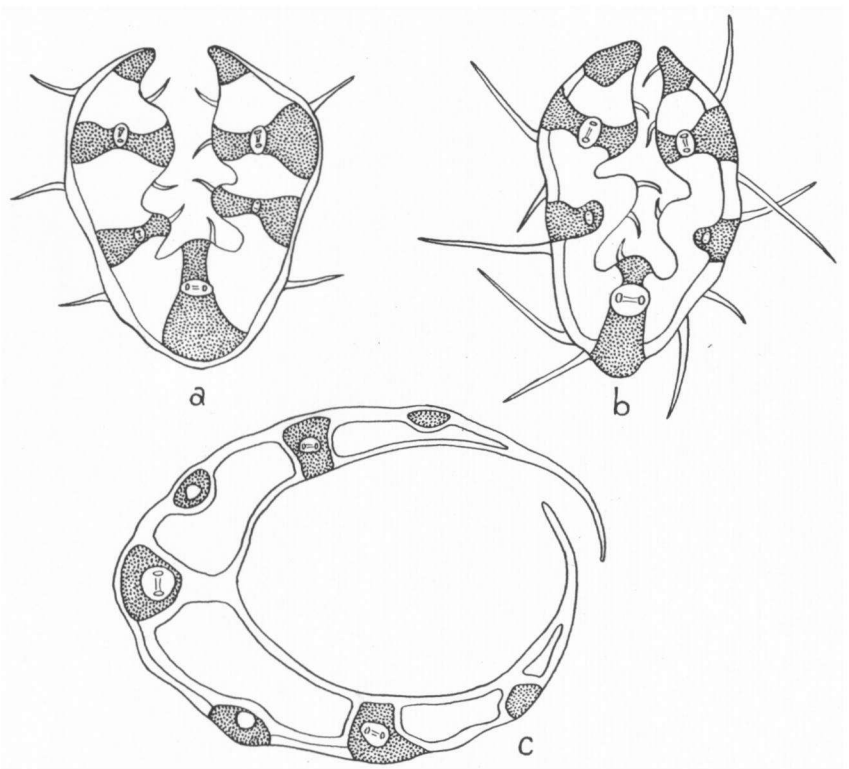

Fig. 6. Festuca parvipaleata Jansen. Transverse section of blades: *a*. Brass 10061, *b*. Brass 10071; *c*. transverse section of sheath, Brass 10071.

3. Brass & Meijer Drees 9128, 9715 & 9824, from New Guinea, certainly represent a new species. The sheets bear a number of different forms. The culm-blades are 9-nerved; the culms are slightly pilose; the panicle is large with long spreading branches; the spikelets are large, up to 1 cm long; the lemmas are densely and hispidly hairy all over; the palea is as long as the lemma; the joints of the rhachilla are finely hairy. As the innovations are wanting I refrain from naming it.

4. **Festuca papuana** Stapf in Kew Bull. (1899) 117. — Fig. 7.

This species is characterized by its erect, setaceously convolute,

rigid and pungent blades, in transverse section tricostate, the vascular bundles not supported by sclerenchym, the short contracted panicle, the purplish to black spikelets, the subequal glumes and the prominently 5-nerved lemmas tapering into a short awn.

Stapf (l.c.) supposed that the "*Festuca ovina*" mentioned by F. v. MUELLER (1889) also belonged to *F. papuana*. In Herb. Melbourne I saw the specimens collected by MacGregor on Mt Knutsford and the Owen Stanley Range. They certainly represent *F. papuana*.

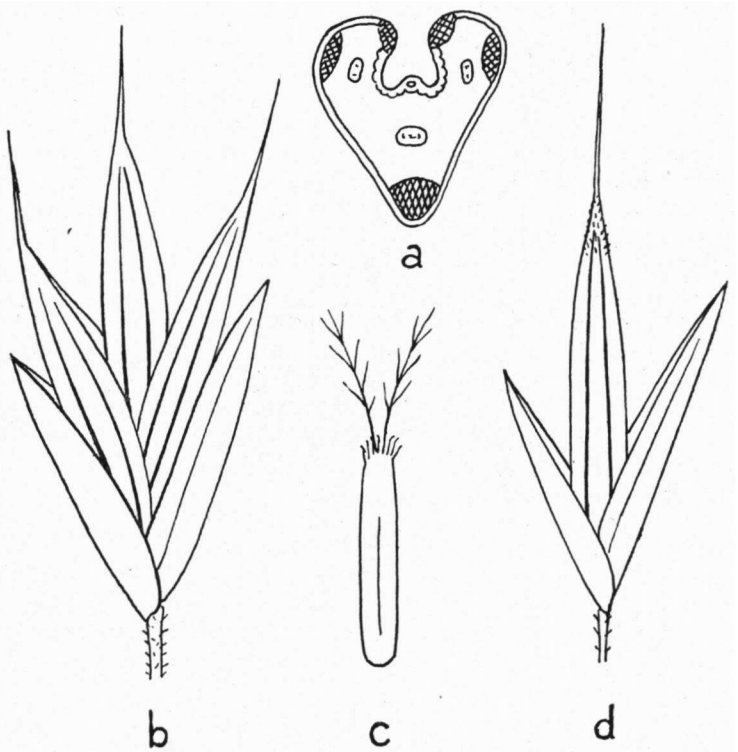

Fig. 7. Festuca papuana Stapf. *a*. Transverse section of blade, *b*. spikelet, *c*. ovary, *d*. spikelet of var. monantha (Stapf) Jansen.

STAPF (1899) described also *Festuca monantha* from Mt Scratchley. I saw the type in Herb. Kew. Stapf separated it from *F. papuana* by the sheathed shorter culms, the 1-flowered spikelets, and the apex of the ovary bearing some short hairs. Using a strong lens I found that the apex of the ovary in *F. papuana* also bears some short bristles. As the other differences are trifling it seems advisable to consider it a 1-flowered variety of *F. papuana*: **F. papuana** Stapf var. **monantha** (Stapf) Jansen, nov. comb.

5. **Festuca sumatrana** Jansen, nov. sp. — Fig. 8.

Gramen perenne, dense caespitosum, innovationibus intravaginalibus. Culmi erecti, 20—30 cm alti, teretes, glabri laevesque.

Innovationum vaginae fere ad basin usque fissae et apertae, apice breviter auriculatae. Ligula brevissima, truncata. Foliorum lamina linearis, modice rigida, 7—9-nervis, convoluta vel secundum margines tantum involuta, 6—10 cm longa, 3—3.5 mm lata (explanata), abruptiuscule argute acutata, glabra; sectione transversa stratum angustum interruptum sclerenchymae subepidermalis exhibens, basi 7—9 fasciculis vascularibus auctum, apice fasciculis sclerenchymatosis parvis munitum. Paniculae 6—8 cm longae; rhachis angulosa, minute scabrida, magis minusve flexuosa. Rami solitarii vel gemini, divaricati; infimi 3—4 cm longi, superiores gradatim breviores. Pedicelli crassiusculi, minute scabri, 4—6 mm longi. Spiculae virides, glabrae, 4—5-florae, ± 9 mm longae (aristis haud computatis). Glumae valde inaequales; infima ± 3 mm longa, uninervis; secunda 6—7 mm longa, quam prima latior, 3-nervis; ambae rigidae, acutissimae. Rhachillae internodia ± ½ mm longa, glabra. Lemmae glabrae, laeves, inconspicue nervatae, attenuatae in aristam 3—6 mm longam, rectam vel subflexuosam. Antherae ½ mm longae et fere aeque latae. Ovarii apex glaber.

Distr. Sumatra, Atjeh, East slope of Mt. Kemiri, in small dense tufts among rocks at 3300 m altitude, Van Steenis 9629. Type in Rijksherb. Leyden 952—64—404.

This species is characterized by its dense small tufts, the rather wide, not setaceously but slightly inrolled 7—9-nerved blades, the short culms, the wavy panicle-axis, the thick and rather long pedicels, the very unequal stiff glumes, the short glabrous joints of the rhachilla, the indistinctly nerved smooth lemmas, the short nearly square anthers and the glabrous tip of the ovary.

KEY TO THE MALAYSIAN SPECIES OF FESTUCA

1. Blades 7—8 mm wide, flat and soft with an obtuse or rounded base. Awn of the lemma 10—11 mm long, tender and flexuous. . . . . **F. leptopogon** Stapf
1. Blades much narrower, 0.6—3 mm wide, inrolled to setaceous. Awn of the lemma less than 6 mm long, straight.
   2. Joints of the rhachilla glabrous and less than 1 mm long. Blades stiff, very acute, usually shorter than 10 cm. Panicle 6—8 cm long, the axis and branches glabrous, smooth or slightly scabrous.
      3. Blades 0.6—0.7 mm in diameter, setaceous. Panicle-branches adpressed to the axis. Spikelets purple to black. Glumes subequal, 4 and 5 mm long. Tip of the ovary minutely hispid. . . . . **F. papuana** Stapf
      3. Blades about 3 mm wide when flattened out, slightly inrolled. Panicle-branches spreading. Spikelets green. Glumes very unequal, 3 and 6—7 mm long. Tip of the ovary glabrous. . . . . **F. sumatrana** Jansen
   2. Joints of the rhachilla finely hairy and much longer. Blades up to 40 cm long, softer. Panicle 10—20 cm long, often somewhat nodding; the axis, branches branchlets and pedicles scabrous to hispid or setose.

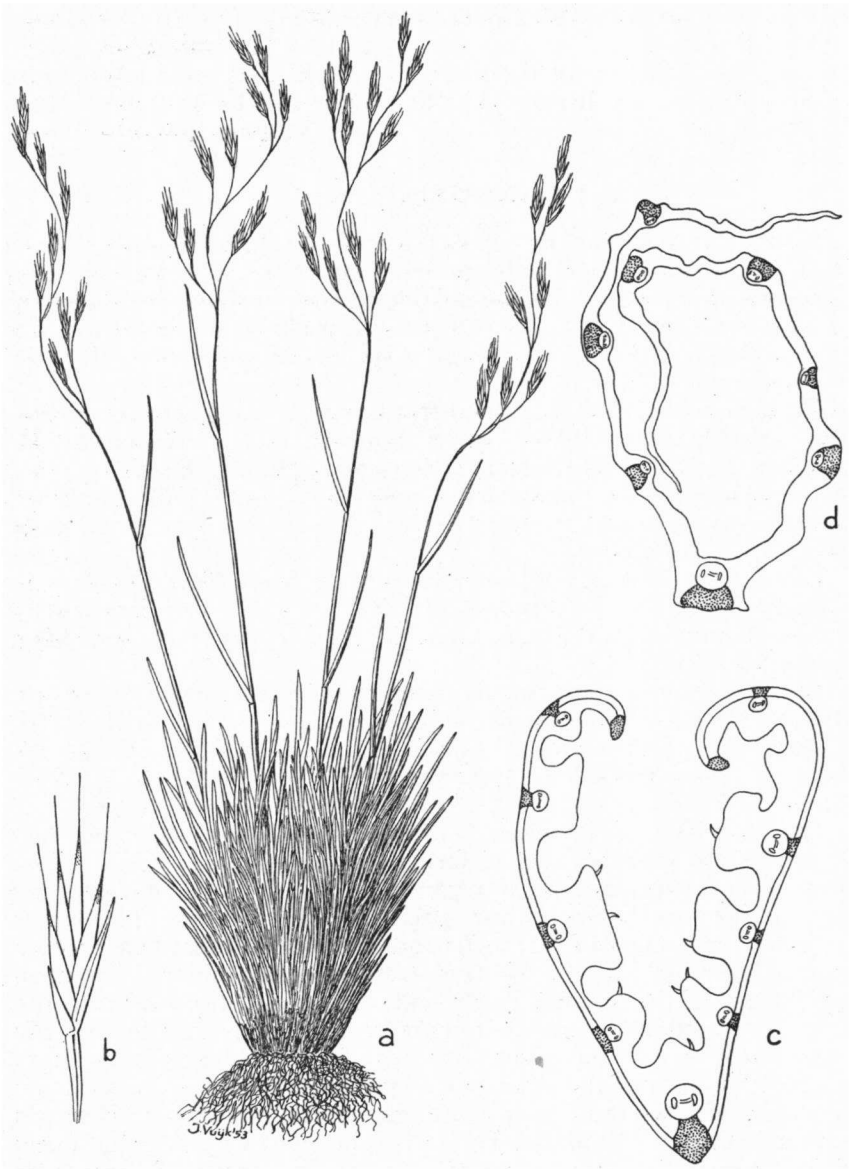

Fig. 8. Festuca sumatrana Jansen. *a.* Type, × ½, *b.* spikelet, *c.* transverse section of blade, *d.* transverse section of sheath.

4. Sheaths of the innovations entire for the largest part, in the upper portion of the entire part deeply implicate-sulcate. Palea longer than or rarely as long as the lemma.
F. nubigena Jungh.

4. Sheaths of the innovations split and open, only entire in the lower 1/4. Palea $^1/_2$—$^2/_3$ as long as the lemma.
F. parvipaleata Jansen

GARNOTIA Brongn.

In DUPERREY (1830) Brongniart described this genus with *Garnotia stricta* from Tahiti as the only species. Neither the type nor any other authentic specimen has been available to later authors. In Malaysian literature *G. stricta* Brongn. was misinterpreted and the name was commonly used for all the *Garnotia* specimens collected within the Archipelago.

Even BACKER (1928) still used this name for the Javan specimens, although MERRILL (1906) already doubted the determination. He stated, that the Philippine form of *Garnotia* might be a distinct species, characterized by the long-awned lemma. KNEUCKER (1909) published *G. stricta* var. *longiseta*, accredited to Hackel and based on the manuscript name *G. longiseta* Merr.

Later some new species were published from New Guinea: *G. ledermannii* Pilger in Bot. Jahrb. 52 (1914) 171, *G. mezii* Janovsky in Fedde, Repert. 17 (1921) 86, and *G. papuana* Ohwi in Bot. Mag. Tokyo 56 (1942) 1.

Recently J. V. Santos started monographic research of the genus. He published *G. mindanaensis* in J. Wash. Ac. Sc. 33 (1943) 135, *G. caespitosa* in J. Arn. Arb. 25 (1944) 89, and *G. philippinensis*, l.c. 94. Finally Ohwi described *G. spadicea* in Bull. Tokyo Sc. Mus. 18 (1947) 9 from Sumatra.

The "Revision of the genus Garnotia" by SANTOS (1950) includes 73 species, 46 varieties and 24 forms, among which 11 species from Malaysia. The distinctions are very fine, many of the microspecies and varieties are based on one specimen only. For example Santos has seen 6 specimens of *G. fragilis* and everyone of them belongs to a separately named variety. He lays stress on many minor differences, e.g. the tip of the lemma, being quite entire and tapering into the awn, or awned between the minute teeth of a bidentate tip. His interpretations may be right, but such a character is difficult to observe: the apex of the lemma is very thin and fine, and often tears in drying, with the result that in a single panicle both kinds of lemmas may be present. A similar difficulty is connected with the characters of the glumes, being emarginate or not. The notch, if present, is often so minute or variable, that it hardly seems to be a reliable character fit to separate species. The key, including all his species, varieties and forms has become so very intricate, that the author was obliged to place the same species (*G. ledermannii*) into 2 different series of the subsection *Longiaristatae*.

KEY TO THE MALAYSIAN SPECIES OF GARNOTIA

1. Spikelets 6—7 mm long, brown. Panicle short, stiff, spike-like. Blades rigid and thick . . . . . 1. **G. spadicea**
1. Spikelets 3—4.5 mm long, green. Panicle loose and usually much longer. Blades soft, flat or involute.
   2. Lemmas quite awnless. Glumes awnless to very minutely mucronate. Branches of the panicle less than 5 cm long. Spikelets 4—4.5 mm long. . . . . 2. **G. philippinensis**
   2. Lemmas distinctly and usually long-awned.
      3. Awn of the lemma perfect, geniculate with a twisted column and a flexuous subule.
         4. Culms simple, 30—60 cm high, erect with pubescent nodes. Blades lanceolate, up to 12 mm wide, flat, papillose-pilose. Both glumes emarginate at the tip. (Lemma awned between the minute teeth of the bidentate tip) . . . . . 3. **G. fragilis**
         4. Culms tender, about 20 cm high, freely branching at base. Blades linear-lanceolate, 2—4 mm wide, subinvolute, glabrous to minutely and sparsely pilose. First glume entire, second emarginate at the tip. (Lemma awned from the entire tip). 4. **G. pahangensis**
      3. Awn of the lemma straight, flexuous or tortuous, neither geniculate nor twisted.
         5. Awn of the lemma strongly attenuate towards the tip, flexuous and tortuous. Basal hairs inconspicuous or wanting.
            6. Spikelets 4—4.5 mm long. Basal hairs inconspicuous. Nodes of the culm pubescent. Branches of the panicle loosely adpressed. (Lemma awned from the entire tip) . . 5. **G. mindanaensis**
            6. Spikelets 2.5—3.8 mm long. Basal hairs wanting. Branches of the panicle more spreading. (Lemma awned between the teeth of the minutely bidentate tip).
               7. Culms rather robust, up to 80 cm high. Panicle up to 40 cm long, the branches in whorls and bearing many spikelets. Blades sparsely puberulent from the middle of the tip. Glumes subequal, about as long as the spikelet . . . . . 6. **G. mezii**
               7. Culms slender, decumbent and rooting at the lower nodes. Panicle less than 10 cm long, the few 1-nate distant branches with few spikelets. Blades sprinkled with long tubercle-based hairs. Glumes very unequal. 7. **G. ledermannii**

5. Awn of the lemma moderately attenuate towards the tip, straight or subflexuous. Basal hairs more or less copious, 0.5—0.7 mm long. Spikelets 3—3.5 mm long.
    8. Ligule very short, less than 0.5 mm long. Blades flat to convolute when dry, up to 30 cm long, usually pubescent on both surfaces. Nodes of the culm pubescent. Spikelets narrow, about 0.5 mm wide. Culms strongly branching at the base, building dense tufts. 8. **G. acutigluma**
    8. Ligule 1—1.7 mm long. Blades involute, suberect, 7—10 cm long, glabrous. Nodes of the culm glabrous. Culms simple. Spikelets lanceolate, 0.7 mm wide. 9. **G. erecta**

1. **Garnotia spadicea** Ohwi in Bull. Tokyo Sc. Mus. 18 (1947) 9. — Fig. 9.

This rigid mountain species differs from all other Malaysian ones by the 6—7 mm long brown spikelets, the narrow short strict panicle, and the rigid, thick, 3—9 cm long, loosely convolute blades.

Distr. N. Sumatra, Gajo Lands, Mt Losir, 2200—2800 m altitude, Van Steenis 8479 & 8539.

2. **Garnotia philippinensis** Santos in J. Arn. Arb. 25 (1944) 94.

Characterized by its awnless lemmas and awnless to very minutely mucronate glumes, the short panicle-branches, and the 4—4.5 mm long spikelets.

Distr. Santos only mentions a single specimen from the Philippines (Ramos, B. S. 42963). I also saw specimens from Celebes (Kjellberg 3042) in Herb. Bogor and from New Guinea (Zippel a. 1828) in the Rijksherb. Leyden. In the specimens from Celebes the nodes of the culms are nearly glabrous, the blades are narrower and loosely involute towards the tip, and the spikelets are nearly nude at the base.

3. **Garnotia fragilis** Santos in J. Arn. Arb. 25 (1944) 89.

This is one of the few species with a perfect, geniculate awn, the column twisted and the subule flexuous. Spikelets 4—4.5 mm long. Blades of the basal leaves short (3—4 cm), those of the culm-leaves 6—10 cm by 7—9 mm, lanceolate, flat, sprinkled with tubercle-based hairs.

Distr. India to Malaysia.

SANTOS (1950) cited six specimens, every one of them bearing a separate varietal name. I only examined the Malaysian varieties:

var. *parcitorta* Santos l.c. 132.

The specimen in Herb. Kew. (Malay Peninsula, Haniff 638) differs only slightly from the description and figure of the type variety in having the column of the awn somewhat less twisted.

var. *brevifolia* (Ohwi) Santos l.c. 132, based on *Garnotia brevifolia* Ohwi in Bull. Tokyo Sc. Mus. 18 (1947) 9.

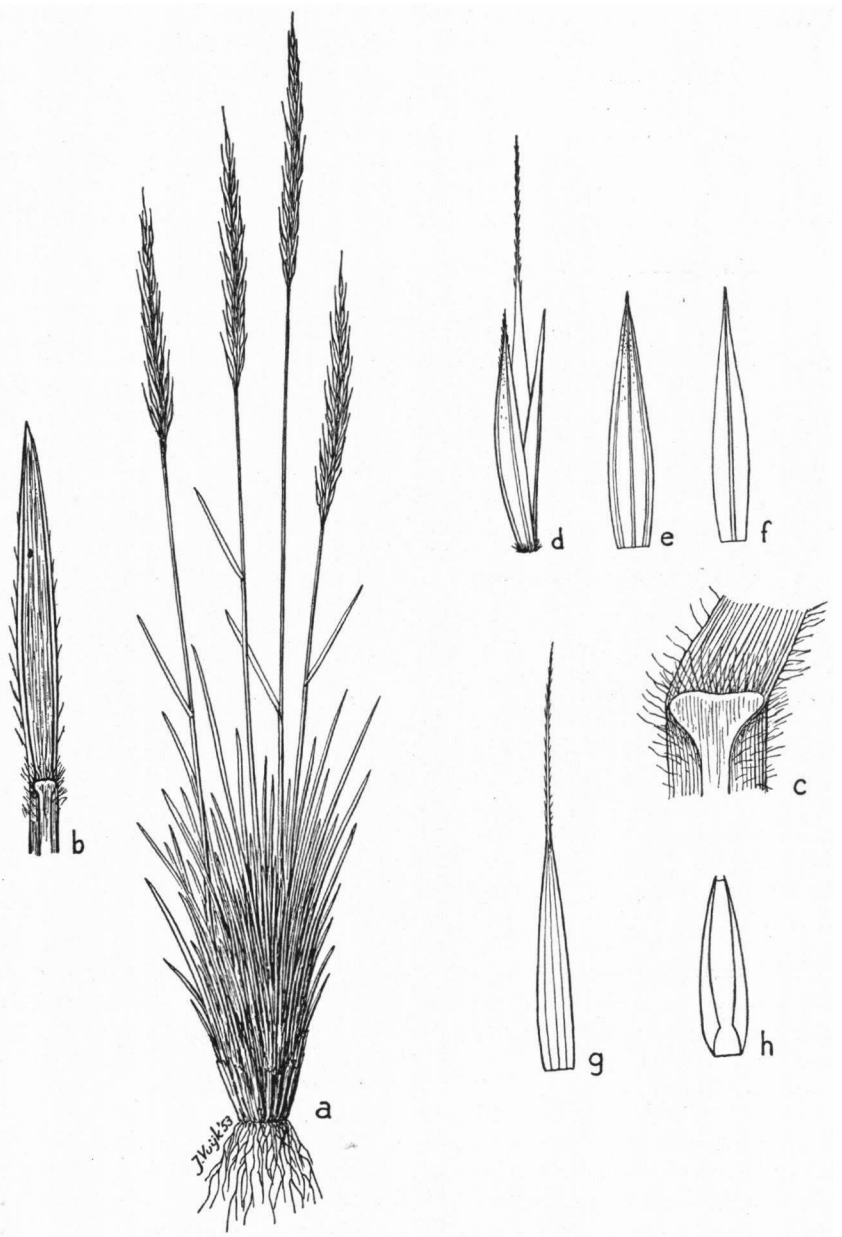

Fig. 9. Garnotia spadicea Ohwi. *a*. Type, × ½, *b*. culm-blade, *c*. ligule, *d*. spikelet, *e*. first glume, *f*. second glume, *g*. lemma, *h*. palea.

Santos studied an isotype (Java, Bakhuizen van den Brink 4687). I saw the type-specimens in Herb. Bogor.; they differ slightly mutually. One of them has the culm strictly erect like in *G. fragilis var. fragilis*, the other specimen on the same sheet has the culm slightly decumbent at the base. In both specimens the glumes are entire or minutely emarginate in a single panicle. In the youngest specimen the branches of the panicle are less spreading than in the other one.

These differences seem too trifling to split up the species into varieties.

4. **Garnotia pahangensis** Santos in Nat. & Appl. Sc. Bull. 10 (1950) 133.

This is also a species with a perfect, geniculate awn. Santos cited one specimen from Pahang (Seimund 435). I saw it in Herb. Kew. It resembles a reduced form of *G. fragilis* with tender short culms, but the blades are much narrower and subinvolute. According to Santos the first glume is entire, the second emarginate at the tip, while in *G. fragilis* both glumes are described as emarginate. It is very difficult to verify this character, as the specimen is glued to the sheet.

5. **Garnotia mindanaensis** Santos in J. Wash. Acad. Sc. 33 (1943) 135; in J. Arn. Arb. 25 (1944) 93.

This certainly is a good species, restricted to the Philippines and known from many localities. It is easily distinguished by the long, wide and flat blades, the long, narrow, interrupted panicle, and by the long awn of the lemma, straight to about the middle, then becoming strongly attenuate, capillary and tortuous towards the tip (the tortuous part sometimes drooping or caducous at maturity).

Santos in his Revision p. 98 proposes the combination *G. mindanaensis* var. *longiseta* (Hack.) Santos for specimens with smaller spikelets, only 3—3.75 mm long. The varietal epithet, though inappropriate, was used by Hackel in 1909 to separate these specimens from the awnless *G. stricta*.

6. **Garnotia mezii** Janovsky in Fedde, Repert. 17 (1921) 86.

This species is only known from New Guinea and seems rather variable. In general the culms are rather robust, the panicle is up to 40 cm long, with distant fascicles of branches, variable in length. The basal hairs of the spikelets are wanting or extremely short. The glumes are subequal, both distinctly 3-nerved; veins scabrous, intervenium smooth. Lemma is as long as the spikelet. Awn straight in the lower part, thin and flexuous in the upper part.

The specimens I saw are very variable as to the length of the spikelets. The type-specimen (Schlechter 19542) has spikelets 2.5—2.8 mm long, in Clemens 4878 they are 4.7—5 mm long. The spikelets of the other specimens examined are intermediate in length.

SANTOS (1950, p. 92—93) distinguishes 4 varieties which I cannot accept. On the whole it appears to me that a final conclusion on

specific delimitation in this genus has to be postponed until additional material will be available. The attempt by Santos appears to be premature and unsatisfactory and to be mainly based on artificial distinction by measuring details.

7. **Garnotia ledermannii** Pilger in Bot. Jahrb. 52 (1914) 171; Santos in Nat. & Appl. Sc. Bull. 10 (1950) 99.

This species is only known from New Guinea: Kaiserin Augusta River, at 1400-1500 m altitude, forming a growth on high, steep, wet rock walls. The type was destroyed during the war. We are dependent on Pilger's description. The species seems to be related to *G. mezii*, but it is much more slender, decumbent and rooting at the lower nodes. Panicle less than 10 cm long with few, solitary, distant branches. Glumes unequal, 2.5 and 3.5 mm long. Awn strongly attenuated towards the tip and rather flexuous.

8. **Garnotia acutigluma** (Steud.) Ohwi in Bot. Mag. Tokyo 55 (1941) 393.—*Urachne acutigluma* Steud. Syn. 1 (1854) 121.—*Streptachne indica* Buse in De Vriese, Pl. Ind. Bat. Or. (1856) 99.—*Garnotia stricta* (non Brongn.) Merr. in Philip. J. Sc. 15 (1919); En. Born. Pl. (1921) 50; En. Philip. Pl. 1 (1923) 81; Backer, Handb. Fl. Java 2 (1928) 207.—*Garnotia papuana* Ohwi, in Bot. Mag. Tokyo 56 (1942).—*Garnotia caespitosa* Santos in J. Arn. Arb. 25 (1944) 92.

This is the species that has been repeatedly reported in the Malaysian literature as *G. stricta* Brongn. SANTOS (1944), guided by the original description and the plate of Brongniart, came to the conclusion, that the only specimens which might be recognized as illustrative were those of P. Nelson 359 & 480. Afterwards, in his Revision (1950, p. 53, 54) he refers the Nelson specimens to *G. stricta* var. *marianarum* Santos. For the Philippine specimens he proposed the name *G. caespitosa* Santos and for those from Java etc. he followed Ohwi, calling them *G. acutigluma* (Steud.) Ohwi.

After having studied numerous Malaysian specimens, I cannot agree with him. On comparing his key with his descriptions, I found that the varieties he distinguished merge into each other and often even overlap as to their characteristics. I cannot find a single reliable differential character. For instance in the key he states:

Spikelets 3—3.5 mm long . . . . . **G. caespitosa**
Spikelets 3.75—4 mm long . . . . . **G. acutigluma**

but in the former species he describes a var. *longiuscula* having spikelets of a length of 3.7—4 mm.

In his descriptions he states:

Lemma awned from the entire tip . . . . . **G. caespitosa**
Lemma awned between the teeth of the shortly bidentate tip **G. acutigluma**

but in the latter species he describes a var. *aberrans* with the lemma awned from the entire tip, &c.

It seems better to consider *G. caespitosa* a synonym of *G. acutigluma*.

Another microspecies is *G. longiaristata* SANTOS (1950, p. 70) from Borneo and the Philippines. The only difference with *G. acutigluma* consists in the longer awned glumes. This character is rather variable and not sufficient to delimit a new species.

I propose to name it: *G. acutigluma* var. *longiaristata* (Santos) Jansen, nov. comb.

9. **Garnotia erecta** Santos in Nat. & Appl. Sc. Bull. 10 (1950) 73.

This species differs from the preceding in the glabrous nodes, the glabrous blades with a ligule longer than 1 mm, and the lanceolate, slightly gaping spikelets. I only saw the type specimen in Herb. Kew. (S. F. 13854 from Pahang). Some other specimens are mentioned from Malaya and Indo-China. It may be a good species.

HYPARRHENIA Anderss.

1. **Hyparrhenia filipendula** (Hochst.) Stapf, Fl. Trop. Afr. 9 (1919) 322.

The Malaysian specimens belong to
var. **lachnathera** (Benth.) Jansen, nov. comb.—*Andropogon lachnatherus* Benth. Fl. Austr. 7 (1878) 534.—*Andropogon filipendulus* Hochst. var. *lachnatherus* (Benth.) Hack. Monogr. Androp. (1889) 635; Merr. En. Philip. Pl. 1 (1923) 44.

Peduncle of the racemes at length longer than the spathes. Spikelets long and densely whitish villous. Racemes with one pair of homogamous and usually one pair of heterogamous spikelets.

Distr. Malaysia: Philippines, Celebes.

The number of heterogamous pairs of spikelets in the racemes is not constant, even in the same panicle. The form described as f. *bispiculata* Hackel in Philip. J. Sc. 1 (1906) Suppl. 267 hardly deserves distinction and may better be neglected.

ISCHAEMUM L.

1. **Ischaemum aristatum** L. Sp. Pl. (1753) 1049; Fischer in Kew Bull. (1935) 144.—Ischaemum ciliare Retz. Observ. 6 (1791) 36.
var. **scrobiculatum** (Wight & Arn.) Jansen, nov. comb.—*Ischaemum scrobiculatum* Wight & Arn. ex Steud. Syn. 1 (1854) 373.

Lower half of the first glume flatter than in the type and slightly wrinkled, the wings in the upper part less developed. Pedicelled spikelets shortly awned to awnless.

Distr. Malay Peninsula: Kedah, S. F. 25882 (Herb. Singapore).

ISEILEMA Anderss.

1. **Iseilema minutiflorum** spec. nov. — Fig. 10.

Gramen annuum. Culmi erecti, graciles, teretes, glabri, 2—3 dm

Fig. 10. Iseilema minutiflorum Jansen. *a.* Type, × $\frac{2}{3}$, *b.* culm-blade, *c.* spathe, *d.* raceme with involucral spikelets, *e.* sessile spikelet, front view, *f.* sessile spikelet, back view, *g.* pedicelled spikelet.

alti. Vaginae saepe ad basin culmi aggregatae, compressae et carinatae, carina glanduloso-punctata scabrida. Ligula brevis, truncata, ciliata. Laminae lineares, acutae, planae vel conduplicatae, ceterum glaberrimae, usque ad 12 cm longae, si explanatae 2—2.5 mm latae, eae foliorum culmorum marginibus basin versus pilis gracilis mox deciduis ad basin tuberculatis praeditae. Inflorescentia foliacea, angusta, elongata, 15—20 cm longa, 4—5-nodis; internodium inferius usque ad 6 cm longum, superiora gradatim breviora, glaberrima et laevia; vaginae eae 8—12 mm longae, herbaceae, striatae, carina parce glandulifera. Spathae lanceolatae, acutae, tenuiter nervosae, marginibus late hyalinis, 6—8 mm longae, carinatae, carina glandulis paucis minutis sessilibus praedita. Racemi tandem lateraliter exserti, 4 mm longi, a pedunculis disarticulantes. Spiculae masculae involucratae, lineari-oblongae, 4 mm longae, dorso compressae, pallide virides; pedicelli breves, compressi, ad basin connati, pilis sericeis albis ad 2 mm longis dense barbati. Gluma inferior obtusa, membranacea, marginibus inflexis, 5-nervia, carinis dimidio superiore pilis 1—1.5 mm longis dense ciliatis. Spicula fertilis lanceolata, 3.5 mm longa; gluma inferior coriacea, superne bicarinata, glandulis paucis sessilibus praedita; lemma superius lineare, integrum, arista geniculata, 10 mm longa; columna contorta, minute scabra, 4 mm longa. Spiculae neutrae pedicellatae, lanceolatae, subacutae, 2.7 mm longae; pedicelli 2.5 mm longi, scabridi, apicem versus pilis longis ad basin tuberculatis obtecti; gluma inferior elliptica, 5-nervia, carinis parce glanduliferis.

Distr. Lesser Sunda Islands: Sumba Island, Milolo, Monod de Froideville 2012 (type, in Herb. Bogor.).

Ecol. In groups among the grass-vegetation on the shallow soil of a limestone plateau at 50 m altitude, a range for livestock and subjected to annual burning.

Note. This species is most closely related to the Australian *Iseilema ciliatum* C. E. Hubbard in Hook. Ic. Pl. (1935) 3286, up till now the only species described with ciliate hairs along the keels and tips of the involucral spikelets. Moreover the Sumbanese species has the tubercle-based hairs along the margins of the culm-blades, mentioned by S. T. Blake (1938). The species differ in the shape of the inflorescence: narrow and elongate in *I. minutiflorum*, dense and contracted in *I. ciliatum*. They particularly differ in the size of the spikelets:

	I. ciliatum	*I. minutiflorum*
pedicels of involucral spikelets	1.5 mm	0.5 mm
involucral spikelets	5—5.5 mm	4 mm
sessile spikelet	7 mm	3.5 mm
pedicels of pedicelled spikelets	3.5 mm	2.5 mm
pedicelled spikelets	3—3.5 mm	2.7 mm

POA L.

1. **Poa luzoniensis** Merr. in Philip. J. Sc. 1 (1906) Suppl. 180. Luzon (Merrill 4712).

This is *Poa pratensis*, probably escaped from cultivation as is the case in Java.

RIDLEY (1916) mentioned a specimen of *Poa luzoniensis* from New Guinea, leg. Boden Kloss, Utakwa Expedition. I saw this specimen in the British Museum Herbarium. On the label is written: "identical with a plant from the Java mountains, labelled *Poa annua* by Koorders (Tosari)". There are specimens of *Poa annua* L. from Tosari, they are, however, not identical with Kloss' specimen but true *Poa annua.*

RIDLEY (1916) wrote: "I have seen no Philippine specimens but the description by Merrill suits this plant". This is not exact. Merrill described a not tufted, erect perennial, with long creeping and branching rhizomes. His description manifestly points to *Poa pratensis* L. to which Hackel already hints. The specimen collected by Boden Kloss, however, is a tufted perennial without rhizomes. Most of the florets have fallen out, no perfect spikelet is present. It most probably is a mature specimen of *Poa brassii* Hitchc. in Brittonia 2 (1936) 110.

PSEUDORAPHIS Griff.

After Hitchcock accepted *Pseudoraphis* Griff. Not. Pl. Asiat. 3 (1851) 29 as distinct from *Chamaeraphis,* Miss A. Chase published the combination *Pseudoraphis squarrosa* (L. f.) Chase in J. Arn. Arb. 20 (1939) 313.

Miss VICKERY (1950) holds the view, that *Pseudoraphis spinescens* (R. Br) Vick. is the correct name for this species. She has doubts about the genuineness of the Linnean specimen and in her opinion R. Brown has "deliberately referred to the Linnean specimen but left out a reference to the description of Linnaeus f.". She also finds this description wrong in certain characters. The latter point is, to a certain extent, irrelevant for nomenclature, as typification is, in the presence of specimens, based on the identity of the latter only.

However, there seems to be no doubt whatever as to the genuineness of the Linnean specimen. R. BROWN (1810) referred *Andropogon squarrosum* L. f. to his *Panicum abortivum.* STAPF (1906) equally admits that the Linnean specimen is correctly identified by R. BROWN. HITCHCOCK saw the plant in the Linnean Herbarium. Miss A. Chase kindly sent me a copy of his note: "*Andropogon squarrosus* L. f. Specimen in Linn. herb. is labelled "*Andropogon scabrum*" with short description in Latin by Koenig. Label is pinned to sheet. Sheet has at left lower corner "Koenig", at middle "*Andr. scabrum*" (*scabrum* with 2 pencil marks through it). At right in pencil "*squarrosum*" J. E. S." (mith). The specimen consists of 4 upper parts of culms with 1—3 leaves and panicles 3—4 in. long. This is *Chamaeraphis squarrosus* (L. f.) Chase. Munro in Proc. Linn. Soc. Bot. 6 (1862) 53 says this Koenig specimen is *Chamaeraphis hordacea* R. Br. which it is not." A. S. H. 1930.

Finally SAVAGE (1945) definitely states that the Linnean specimen was examined by J. E. Smith and that the original label of Koenig as collector, as quoted by Linneaus f. is attached to this sheet. Therefore there seems to be no doubt, that Miss Chase rightly accepted *Andropogon squarrosum* L. f. Suppl. (1781) 433 as the basonym of her combination.

VETIVERIA Bory.

The genus *Vetiveria* differs only slightly from *Chrysopogon*, the first genus having several-jointed racemes, the latter only 1-jointed racemes, consisting of a triplet of spikelets at the end of an usually long branch. This differential character holds only to a certain degree, as there are species with the lower racemes several-jointed, whereas the upper or the secundary branches bear 1-jointed racemes. Consequently there is much difference of opinion in the literature about the generic disposition of some species.

The Australian *Chrysopogon elongatus* (R. Br.) Benth. var. *filipes* Benth. Fl. Austral. 7 (1878) 539 extends to Malaysia. The only specimens recorded up to now, are the Brass specimens 8460 from New Guinea.

REEDER (1948) described them as *Chrysopogon filipes* (Benth.) Reeder var. *arundinaceus* Reeder.

They differ from typical specimens in being much taller (100—150 cm) and more robust with longer panicle-branches, fewer-jointed racemes, the glumes of the sessile spikelets yellow below (rather than evenly purple throughout) and the second glume not mucronate but with an awn as much as 6 mm long.

I agree with S. T. BLAKE (1944) that *Chrysopogon elongatus* (R. Br.) Benth. var. *filipes* must be referred to *Vetiveria.*

Reeder's variety, therefore, should be called:
Vetiveria filipes (Benth.) C. E. Hubbard var. **arundinacea** (Reeder) Jansen, nov. comb.

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