

## POA L. (GRAMINEAE) IN MALESIA

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### SUMMARY

A revision of *Poa* L. (Gramineae) in Malesia is presented. There are 41 species and three varieties. Of these 38 are native, one is naturalized, two are casuals, ten are described as new, and four new combinations are proposed.

### INTRODUCTION

The last general survey of the Malesian representatives of *Poa* L. (Gramineae) was made by Jansen (1953) who recognized 20 indigenous taxa and three introduced ones, but only after this date did serious botanizing start in the mountains of Papua New Guinea, where most species occur. I made a preliminary survey (Veldkamp, 1979, most species depicted in detail!) for New Guinea and recorded 22 taxa. Now, several others have been added again. At present there are 38 indigenous species in Malesia and three introduced ones: one, *P. annua* L., is now widely naturalized, one, *P. pratensis* L., may possibly still be present in the area (Luzon, Mountain Prov., last collected in 1953, and perhaps on other islands), and one, *P. trivialis* L., has been found in Java (saddle of the Gedeh) but was last collected in 1932. The number of taxa makes this essentially temperate genus the largest of the herbaceous grasses in tropical Malesia! Of the whole family only the woody bamboo *Schizostachyum* Nees with more than 45 species is larger.

This revision is again preliminary but may serve to identify the more common and wide-spread taxa. For a better understanding of the phylogeny of the Malesian species it would have been very useful if the Australian and New Zealand ones could have been studied as carefully. Their number, however, and the absence of many in L has made this impractical and would have enlarged this study far beyond the scope with which it was set up. Time permitting a phylogenetic study will be undertaken in the future in which some selected non-Malesian taxa will have to be included.

As far as the characters used are concerned I had to limit myself to those that appeared useful in the delimitation of the taxa.

As the subalpine area (above c. 3000 m) is most extensive in Irian Jaya, more species may be expected from there. This area is still virtually unexplored. From the Vogelkop no collections have been made on the mountains probably high enough to support a subalpine flora, e.g. Peg. Arfak (2940 m) and G. Lina (2870 m). For the vast Central Range (Peg. Maoke) the only subalpine areas where significant collections have been made are the Carstensz [Kloss (1913), Wissel (1936), Hope (1971–

1972), Raynal (1973), and some casual visitors], Lake Habbema [Brass and Meijer Drees (1938)], and the Wilhelmina [Brass & Meijer Drees (1938), Mangen (1982, 1983, 1984)], and the Papua New Guinea part of the Star Mts [Leiden–Lae Expedition (1975)]. From the Doorman only *P. lamii* Jansen is known, from the Hubrecht *P. janseni* Veldk., certainly others occur there as well, e.g. the wide-spread *P. crassicaulis* Pilg., *P. papuana* Stapf, etc. For a survey of exploration see Van Royen (1980: e.g. 307–315).

Having taken part in the Star Mts Expedition I was struck by the occurrence of many species there previously only known from Irian Jaya, and I am convinced that there is a biogeographical boundary between the mountains of West and East at the Telefomin Gap, although an initial analysis could not prove this (H. Turner, L, unpublished).

As there are quite a few taxa known from one locality only, sometimes as a single collection, other instances are to be expected. A curious example is *P. borneensis* Jansen from Mt Kinabalu, which has been found six times by Ms. Clemens and once by Ms. Molesworth Allen, but not by any of the other numerous visitors to that mountain.

Even well-explored areas may harbour species as yet undescribed: Mt Wilhelm in Papua New Guinea turned up two: *P. jeremiadis* Veldk., only known from the type, and *P. muricata* Veldk. in six collections.

Striking is the occurrence of *P. papuana* over the whole range of the genus in Malesia, more remarkable even is that of *P. epileuca* (Stapf) Stapf which occurs in Sabah, Celebes, and then takes a far jump to Central and East Papua New Guinea. In the field this species is not likely to have been overlooked because of the peculiar greyish-glaucous hue of the leaves from which it derives its name.

Seram appears to be a stepping stone between New Guinea and Celebes for sub-alpine genera. Compare in the grasses the distributions of *Anthoxanthum horsfieldii* (Kunth ex Bennett) Mez (Y. Schouten & Veldkamp, 1985), *Brachypodium sylvaticum* (Huds.) Beauv. (Veldkamp & Van Scheindelen, 1989), and *Bromus* L. (Veldkamp et al., 1991). As yet there are no records for *Poa*. I expect several of the wide-spread species to be present, at least *P. epileuca* and *P. papuana*. Examples from other families are present as well, too numerous to cite. Other curious disjunctions are shown by *P. lamii* Jansen, *P. multinodis* Chase, and *P. pilata* Chase (q.v.).

No attempt has been made here to recognize sections. Previous classifications such as those of Hermann (1939), Tzvelev (1976), Hernández Cardona (1978), and Edmondson (1978, 1980) apply to the European (and Far East) taxa, and not to Malesia (nor to Australia). Hitchcock (1935, 1951) recognized 7 sections for North America, briefly reviewed by Kellogg (1985). Nicora (1978) distinguished 3 subgenera for Patagonia, which in line with the current use of infra-generic taxa in *Poa* might better be regarded as sections, also. In general the circumscriptions given are polythetic as was also pointed out by Bor (1952a: 788): “combinations of more or less variable (!) characters must be used.” Soreng (1990) commented that “character states used to unite groups ... mostly are continuous rather than discrete, and often are inconsistent.”

Keng (1959) distinguished 7 sections with 10 series for the Chinese species about which I can give no opinion, as the text is in Chinese (and the new taxa and combinations proposed there hence are all invalid).

Although I have checked repeatedly I have not found any Australian or New Zealand species that seemed particularly close to a Malesian one. Vickery (1970) made no attempt to distinguish groups for the Australian species at all, probably finding differences between the species strenuous enough. Edgar (1986) mentioned some groups and subgroups for the New Zealand taxa, without formally naming them. From the latter's diagnoses it again is clear how polythetic most groups are. It also becomes apparent how much more diverse the Australasian species are than suggested by Soreng (1990), who based his opinion on the only two taxa available to him, which were placed in the same subgroup by Edgar. T.B. Hair (1968) distinguished only three groups of New Zealand *Poa* based on caryotypes. Cytotypes of the largest and most widespread group were mostly indistinguishable from one another.

Because of its size no overall cladistic analysis has been attempted for *Poa*. Soreng (1990) made one for chloroplast DNA restriction sites of 46 taxa representing 19 sections or groups. Five groups could be identified and based on this he made an assessment of biogeographic events. The DNA tree suggested that *Poa* originated in Eurasia from where North America was independently colonized six times, two groups invaded South America, and from there one, (provisionally named '*Australopoa*'), closely related among itself (but see preceding paragraph!) and to the Andinae Nicora (as a subgenus), migrated to New Zealand and Australia. Unfortunately, no Malesian species could be taken into account.

The Andinae are circumscribed as being gynodioecious, the female flowers with large staminodia. The '*Punapoa*' group of Soreng is gynomonoeocious. *Poa labillardieri* Steud. and *P. sieberiana* Spreng. and most other Australasian and Malesian species are hermaphrodite (cf. Edgar, 1986: 427; Connor & Edgar, 1987). There are only 3 gynomonoeocious taxa and 3 dioecious ones out of 35 natives in New Zealand and none in Australia and Malesia.

If it turns out that Soreng was correct in assuming that at least the majority of the Australasian species are as closely related as is suggested by the DNA of the only two (related) species studied, and by Hair's (1968) and Connor & Edgar's (1987) cytological analyses of the New Zealand species, then it seems to me that only after migration gynomonoeocy, gynodioecy, and finally complete dioecy must have developed independently, as it surely did in the gynomonoeocious *P. annua* (and the related *P. infirma* H.B.K., *P. maroccana* Nannf., and *P. supina* Schrad.) of section *Ochlopoa* Aschers. & Gr. This seems an easier explanation than accepting a reversal to bisexuality. More likely is that invasion in Australasia has taken place at least twice to account for the many hermaphrodite species present now.

In view of the distribution of the genus in Malesia, this migratory route agrees with my intuitive feeling that the species have an Australian origin: 25 species in Papua New Guinea (excl. the Star Mts area), 20 in Irian Jaya (incl. the Star Mts area; but more to be expected), three in Celebes, and three in Sabah. None are known from Sumatra, Malaysia, Java, the Lesser Sunda Islands, or the Philippines (*P. luzoniensis* Merr. is *P. pratensis*, and seems introduced). Soreng's remark that the "species (from Southeast Asia) can be accommodated within sections found in the USSR," referred only to the continental ones, and not the Malesian (Soreng, in lit.).

Some directions in the evolution of morphological characters in the Malesian species seem apparent and will be mentioned in the next chapter.

## MORPHOLOGY

When checking characters it is advisable to check a few specimens to know the approximate range of variation.

In *Poa* shoots may be intra- or extra-vaginal. Intra-vaginal is the usual way of branching both at the base and at the higher nodes of the culm: the axillary shoot elongates and pushes the sheath away. In this case the prophylls are usually elongated. In some species, however, some of the basal shoots (at substrate level or just below) pierce the sheath, and the prophylls are less than 6 mm long. The first leaves of such an 'extra-vaginal' branch are reduced to cataphylls, modified sheaths lacking ligules and blades, more indurated than normal sheaths, with which they might otherwise be confused when the blades have withered away. The shoot protrudes at first horizontally, later geniculately so. It may be noted that extra-vaginal shoots may easily be lost when the tussock is too roughly torn from the substrate, as is the usual method of collecting grasses. In *P. pratensis* and *P. trivialis* stolons may be formed from extra-vaginal shoots, but I have not observed these in herbarium specimens, possibly due to this kind of collecting.

Extra-vaginal branching has been used as a character at the sectional level in Eurasia, but in Malesia it seems of little use.

Cushion-forming plants are not very common in New Guinea. In grasses this growth-form is present in at least

<i>Danthonia craigii</i> Veldk.	<i>Poa hentyi</i> Veldk. (sometimes)
<i>D. montis-wilhelmi</i> Veldk. & Fortuin	<i>P. inconspicua</i> Veldk.
<i>D. oreoboloides</i> (F. Muell.) Stapf	<i>P. lunata</i> Chase (perhaps sometimes)
<i>Poa callosa</i> Stapf	<i>P. papuana</i> Stapf (sometimes)
<i>P. crassicaulis</i> Pilg.	<i>P. pilata</i> Chase
<i>P. dozyi</i> Veldk.	<i>P. pulviniformis</i> (Veldk.) Veldk.

The ligules are scarious, the upper cauline usually the longest, except in *P. borneensis* where they are the shortest. The shape ranges from rim-like and truncate to triangular and acuminate, but it seems not possible to use shape and length to distinguish groups by, as is done in Eurasia, e.g. sect. *Oreinos* Aschers. & Gr. ex Nannf. with long cauline ligules, and the sections *Flaccidulae* Hernández (*Leptopoa* F. Hermann, nom. inval.) and *Macropoa* F. Hermann ex Tzvel. with collar-shaped ones.

The blades are usually involute probably as a defense against the harsh climate at high altitudes: UV-light and cold.

Most species have smooth blades, but some are more or less strongly scaberulous: *P. erectifolia* Hitchc., *P. muricata*, and *P. papuana*.

Two species have deciduous leaf blades, *P. hentyi* and *P. hypsinephes* Veldk., where the blade disarticulates with the sheath above the insertion of the ligule. The base of the plant then has a jagged outline because of the densely imbricate, distichous sheaths. In the other species the blades just rot away leaving the tougher vascular bundles as an inconspicuous network. Species with similar disarticulating blades are known from New Zealand (Edgar, 1986): *P. acicularifolia* J. Buchan., *P. astonii* Petrie, *P. colensoi* Hook. f., *P. hesperia* Edgar, and *P. maniototo* Petrie, but otherwise these seem to have little to do with the New Guinea ones.

The shape of the inflorescence has to be taken at or after anthesis, as immature ones are contracted to expand later or not, as the case may be.

Like Bor (1952a: 794), and unlike Vickery (1970), I have observed that the number of lowermost branches of the inflorescence is of diagnostic value, but I would hesitate to regard it as a character at the sectional level, however, as was done to distinguish sect. *Coenopoa* Hyl. from sect. *Flaccidulae*.

In *Poa*, as in many other genera, the longest lowermost inflorescence branch offers additional characters, usually neglected or imprecisely defined: length, number of spikelets, and 'nakedness', i.e. absence of spikelets in the lower part. The latter has roughly been measured from the attachment to the main axis to the glume of the lowermost spikelets.

The scabridity of the panicle branches has been used to distinguish sections, e.g. in sect. *Oreinos* they are smooth. In Malesia the condition is variously expressed, several species having both smooth and scaberulous branches.

Nine Malesian representatives are exceptional for having strictly 1-flowered spikelets, and another seven 1- or 2-flowered ones, whereby the first cannot be identified to genus with most keys and the second only with difficulty. Hence some have at one time been attributed to *Aulacolepis* Hack. (non Ettingsh.), a genus more related to *Agrostis* L., as *A. epileuca* (Stapf) Hitchc. The most extreme one is *P. inconspicua*, where the inflorescence is reduced to a single 1-flowered spikelet hidden among the foliage. *Poa pilata* sometimes has 1-spikeled, 2- or 3-flowered inflorescences, too.

There is a whole range of species with 3–5-flowered spikelets through some with either 1 or 2 florets to strictly uniflorous ones. It is tempting to see this reduction as an autapomorphy for the last group of species.

One- to four-flowered spikelets are also present in *P. takasagomontana* Ohwi from Taiwan. In other species 1-flowered spikelets exceptionally occur in depauperate individuals.

Cleistogamy was concluded to be present when well-developed fruits were found with the three stamens still entangled among the style branches. It occurs in several species, apparently exclusively so in *P. callosa* and *P. crassicaulis*. It was observed in the only specimen of *P. celebica* Ohwi ex Veldk. Both cleistogamy and chasmogamy occur in *P. aurigae* Veldk., *P. keysseri* Pilg. var. *brassii* (Hitchc.) Veldk. and var. *saruwagetica* (Pilg.) Veldk., *P. languidior*, *P. lunata*, and *P. nivicola* Ridley.

Apomixis and parthenogenesis is known for many species of *Poa*, contributing to the taxonomic problems in the genus. In Malesia it may be expected to occur in *P. pratensis*.

*Poa annua* (and relatives) are gynomonoeious, that is, with bisexual (lower) and female (upper) florets in the same spikelet, a rare condition in grasses.

Hybridization, such a powerful means of speciation and very common in *Poa*, has not been observed in Malesia. That is, no clear cases of intermediate collections have been observed. About karyology nothing can be said, as the chromosome number of only 4 native taxa is known:  $2n = 28$  for *P. crassicaulis*, *P. papuana*, and  $2n = 56$  for *P. keysseri* var. *keysseri* and var. *saruwagetica* (Borgmann, 1964).

The length of the first glume relative to the first lemma is measured in entire spikelets.

Measurements of the lemma have always been taken from the first, or lowermost one. This one is the largest, best-developed, and longest retained at maturity. Higher ones are smaller, may be less scaberulous and have less nerves. Their anthers tend to be shorter, too. Several types of hairs can be recognized on the lemma, which have been used in sectional division.

1. Crinkly hairs at the abaxial side of the callus of especially the first lemma and sometimes also along the lower part of the midrib, the so-called web. Where it occurs it is usually easy to see, but occasionally the web is reduced to a single hair, or even absent in the same inflorescence, e. g. in *P. keysseri* Pilg. var. *saruwagetica*, the form described as *P. archboldii* Hitchc., *P. languidior* Hitchc., *P. longiramea* Hitchc., *P. lunata* Chase, and *P. nivicola* (e. g. the form described as *P. egregia* Chase).

In the native species there is no other true indument, although the spicules present especially on the nerves may become elongated, 'ciliolate' (as in *P. crassicaulis*) or 'setosely scaberulous' (as in *P. nivicola*).

2. Crests of 'true' hairs adherent at the top becoming especially prominent when the lemma is moistened. This occurs in the introduced species only.

Likewise the keels of the palea may be smooth, scaberulous (at least in the upper half), ciliolate, or provided with crests of hairs, e. g. *P. annua*. The latter has been placed in the section *Ochlopoa* because of this, but in- and outside Malesia material with completely glabrous keels were regularly observed, which throws doubts on the value of this feature as a sectional character.

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## POA

*Poa* L., *Sp. Pl.* 1 (1753) 67; Veldk. in P. Royen, *Alp. Fl. New Guinea* 2 (1980) 1056. — Lectotype: *Poa pratensis* L.

Perennials (*P. annua* annual). Ligule membranous. Panicle lax to contracted; branches solitary to fascicled. Spikelets pedicelled, not in glomerules, 1–several-flowered, laterally compressed, elliptic to lanceolate. Glumes unequal, 1–3-nerved. Lower glume present. Lemmas herbaceous, 3–7(–11)-nerved, usually mucous, exceptionally shortly aristate, dorsally keeled. Rachilla glabrous to hairy-scaberulous. Lemma more or less imbricate with the next one, base more or less cuneate, glabrous or adaxially with 1–numerous crispy hairs ('web'), margins not broadly membranous, at most scabrid on the keels. Ovary glabrous. Stamens 3. Hilum punctiform, subbasal.  $x = 7$ , only 4 counts in Malesia, elsewhere with many aberrations from this.

Distribution – About 500 species, 41 in Malesia, 2 formerly introduced, perhaps still present, 1 naturalized. The Malesian species are clearly of a southern (Australasian) origin, mostly occurring in New Guinea, 3 in Celebes, 3 in Sabah.

Note – 16 species have 1-flowered spikelets, and in general cannot be identified with most generic keys!

## KEY TO THE TAXA

Note – When devising this key, it became necessary to omit exceptional cases, e.g. where spikelets usually were 2–3 mm long the observation of one of 3.25 mm was disregarded. In the descriptions such exceptions have been placed between brackets. It is recommended that several specimens or spikelets be checked.

- |  |    |
|--|----|
| 1a. Callus of first lemma adaxially with crinkly hairs ('web') ..... | 2  |
| b. Callus of first lemmas not webbed .....                           | 13 |
| 2a. Panicles erect .....   | 3  |
| b. Panicles secund and nodding .....                                 | 8  |

- 3a. Cauline ligules triangular, acute to rounded ..... 4  
 b. All ligules collar-shaped, truncate. — Tufted rhizomatous plants. First lemmas midrib and outer nerves with a crest of hairs ..... **31. *Poa pratensis***
- 4a. Basal ligules triangular, acute ..... 5  
 b. Basal ligules collar-shaped, truncate. — Culms loosely tufted to mat-forming, weak. Blades flaccid, flat to involute. Spikelets 3.5–5.7 mm long. First lemmas 2.9–3.5 mm long. First palea half as long as to distinctly shorter than the lemma, keels scaberulous ..... **20. *Poa languidior***
- 5a. Culms solitary or few together. Blades flaccid, flat. Spikelets 2.5–3.8 mm long. Rachilla process 0.4–1 mm long. First lemmas 2.1–3.2 mm long. First palea keels smooth ..... 6  
 b. Culms tufted. Blades stiff, involute. Spikelets 4.2–7.5 mm long. Rachilla process 1.25–3.25 mm long. First lemmas 3.7–5 mm long. First palea keels scaberulous ..... 7
- 6a. Culms weak, 13–25 cm long. Blades 1–1.5 mm wide. Panicles contracted, 3.5–4.5 cm long, branches appressed. Spikelets 1-flowered. Lower glumes 2.5–2.8 mm long, c. 0.7 times as long as the lemma. Upper glumes 2.9–3.5 mm long. First lemmas midrib without a crest of hairs. First palea subequal to the lemma. New Guinea ..... **21. *Poa leptalea***  
 b. Culms stiff, 35–60 cm long. Blades 1.75–4.5 mm wide. Panicles lax, 9–22 cm long, branches erecto-patent to patent. Spikelets 2- or 3-flowered. Lower glumes 1.35–1.8 mm long, 0.5–0.67 times as long as the lemma, upper glumes 1.8–2.6 mm long. First lemmas midrib with a crest of hairs. First palea distinctly shorter than the lemma. Java ..... **39. *Poa trivialis***
- 7a. Culms 17–38 cm long. Panicles contracted, branches appressed. Glumes scaberulous on the nerves. First lemmas midrib and nerves smooth to scaberulous ..... **23. *Poa lunata***  
 b. Culms 48–63 cm long. Panicles lax, branches erecto-patent to patent. Glumes and at least the first lemmas scaberulous all over ..... **33. *Poa quadrata***
- 8a. Cauline ligules triangular (the basal may be accolade- to collar-shaped!). Blades erect ..... 9  
 b. All ligules collar-shaped. Blades erecto-patent to patent ..... 11
- 9a. Basal ligules triangular, more than 2.75 mm long, acute to acuminate. First lemmas cuneate to apiculate ..... 10  
 b. Basal ligules accolade- or collar-shaped, up to 1.5 mm long, truncate, erose. First lemmas gradually acute. — Culms branching intra- and extra-vaginally at base. Blades loosely folded. Anthers 0.4–0.9 mm long.... **22. *Poa longiramea***
- 10a. Culms branching intra- and extra-vaginally at base. Basal ligules acute. Blades loosely folded or flat. Anthers 1–1.7 mm long ..... **27. *Poa nivicola***  
 b. Culms branching intra-vaginally at base. Basal ligules acuminate. Blades involute. Anthers 2.6–3 mm long ..... **37. *Poa telata***
- 11a. First lemmas 2.25–4 mm long. — Lowermost, longest panicle branches usually 22- to very many spikeled. Rachilla nodes usually scaberulous ... 12  
 b. First lemmas 4–5.5 mm long. — Lowermost, longest panicle branches 10–22-spikeled. Lower glumes 3–5.25 mm long, upper glumes 3.5–5.3 mm long. Rachilla nodes usually smooth ... **17b. *Poa keysseri* var. *keysseri***

- 12a. First lemmas 2.25–3 mm long. — Lowermost panicle branches 3–12 or more together. Lower glumes 1.7–3 mm long, upper glumes 2–3 mm long  
**17a. *Poa keysseri* var. *brassii***
- b. First lemmas 3–4 mm long. — Lowermost panicle branches 3–6 together. Lower glumes 2.4–3.5 mm long, upper glumes 2.75–3.8 mm long  
**17c. *Poa keysseri* var. *saruwagetica***
- 13a. Sheaths disarticulating with the blades. — Lowermost panicle branches solitary or paired, naked in the lower 0.7–1th ..... 14  
b. Sheaths not disarticulating with the blades ..... 15
- 14a. Plants greenish yellow. Lowermost longest branches naked in the lower 0.85–0.88th, 1- or 2-spikeled. — Leaf blades 0.5–0.85 mm wide. Basal ligules 0.4–0.9 mm long. Panicles with 3–13 spikelets ..... **12. *Poa hentyi***  
b. Plants more or less glaucous. Lowermost longest branches naked in the lower 0.7–0.8th, 3–5-spikeled. — Leaf blades 0.75–1.5 mm wide. Basal ligules 0.8–2 mm long. Panicles with 10–27 spikelets .. **13. *Poa hypsinephes***
- 15a. Blades rough, muricate (lens × 25!) ..... 16  
b. Blades smooth ..... 18
- 16a. Basal ligules triangular, acute. Spikelets usually 2-flowered. Glumes scaberulous all over (lens × 25!). First lemmas scaberulous at least on the midrib and nerves. First palea shorter to subequal to the lemma ..... 17  
b. Basal ligules collar-shaped, truncate, erose. Spikelets 1-flowered. Glumes and lemmas scaberulous on the midrib. Palea usually distinctly longer than the lemma ..... **28. *Poa papuana***
- 17a. Blades filiform, 8–18 cm long. Panicles rather lax, 4.5–8.5 by 1.5–5 cm. First lemmas 3–4.15 mm long, faintly 5-nerved. Anthers 1.1–2.25 mm long  
**10. *Poa erectifolia***  
b. Blades subulate, 2.7–8 cm long. Panicles compact, 2.5–4.5 by 0.4–1.1 cm long. First lemmas 2.4–2.8 mm long, faintly 3-nerved. Anthers 0.6–1 mm long. .... **26. *Poa muricata***
- 18a. Cauline ligules collar-shaped. .... 19  
b. Cauline ligules triangular ..... 24
- 19a. Culms stiff. Cauline ligules 0.15–0.7 mm long. Panicle branches appressed to erecto-patent ..... 20  
b. Culms weak. Cauline ligules 1–1.7 mm long. Panicle branches patent to reflexed. — Ligules subequal, truncate to acutish. Blades green  
**25. *Poa multinodis***
- 20a. Ligules truncate, erose, to acute, subequal. Blades green to glaucous. Panicles contracted. — Panicle branches usually appressed ..... 21  
b. Ligules acuminate, unequal, the upper cauline longest. Blades greyish-glaucous above. Panicles lax, branches erecto-patent. — Blades flattish to involute, 0.5–1.5 mm wide. Lower glumes faintly 3-nerved ..... **9. *Poa epileuca***
- 21a. Blades involute. Longest lowermost panicle branches 1- or 7–10-spikeled. Lower glumes faintly to distinctly 3–5-nerved. .... 22  
b. Blades loosely folded to flat. Longest lowermost panicle branches 2–6-spikeled. Lower glumes 1-nerved ..... 23

- 22a. Plants densely cushion-forming, culms 1–6 cm long. Blades erecto-patent to patent. Panicles 1.4–3.7 cm by 2–3 mm, 1–6-spikeled, the longest lowermost branches 1-spikeled. Spikelets 3–3.75 mm long . . . . . **30. *Poa pilata***
- b. Plants tufted, culms 17–40 cm long. Blades erect. Panicles 5.5–8 cm by 10–15 mm, many-spikeled, the longest lowermost branches 7–10-spikeled. Spikelets 5–5.5 mm long . . . . . **35. *Poa stellaris***
- 23a. Plants cushion-forming. Blades apically rounded. First lemmas acute, 5-nerved, midrib scaberulous, distally ciliolate . . . . . **7. *Poa crassicaulis***
- b. Culms solitary or few together, or tufted. Blades acute. First lemmas acuminate to mucronate, 3-nerved, midrib smooth to distally scaberulous
- 41. *Poa wisselii***
- 24a. Blades loosely folded to flat . . . . . 25
- b. Blades involute . . . . . 32
- 25a. Panicles erect. Upper glumes 1–3-nerved (sometimes 5-nerved at base) . . 26
- b. Panicles secund. Upper glumes 5-nerved. — Plants perennial. Spikelets 3.8–6.75 mm long. First palea keels scaberulous . . . . . **22. *Poa longiramea***
- 26a. Plants perennial. — Lemma and palea keels smooth to scaberulous, never with crests of hairs . . . . . 27
- b. Plants annual. — Panicle branches erecto-patent to reflexed in fruit. Spikelets 3.75–6 mm long, 3–5-flowered. Lower glumes 1–2.5 mm long. Lemma and palea keels glabrous or with crests of hairs on the nerves . . . . . **1. *Poa annua***
- 27a. Spikelets 3.1–7.6 mm long. Lower glumes 1.5–5.25 mm long, upper glumes 1.8–5.1 mm long. First palea keels scaberulous . . . . . 28
- b. Spikelets 2–3 mm long. Lower glumes 1–1.5 mm long, upper glumes 1.25–1.75 mm long. First palea keels smooth. — Panicle branches erecto-patent. Spikelets 1-flowered . . . . . **2. *Poa aurigae***
- 28a. Panicle branches appressed . . . . . 29
- b. Panicle branches patent to reflexed . . . . . 30
- 29a. Culms 2.5–8 cm long. Panicles contracted, 2.5–3.5 cm by 3–6 mm, the lowermost branches solitary. Spikelets usually 3-flowered. Lower glumes 4.15–5.25 mm long and 0.87–1 times as long as the lemma, the upper glumes 4.5–5.1 mm long. First lemmas 4.6–5.35 mm long
- 18. *Poa kuborensis***
- b. Culms 12–30 cm long. Panicles lax, 5.5–8 cm by 37–40 mm, lowermost branches 2–4 together. Spikelets 1- or 2-flowered. Lower glumes 2.25–2.5 mm long, c. 0.6 times as long as the lemma, upper glumes 2.65–2.9 mm long. First lemmas 3.5–4 mm long . . . . . **40. *Poa wilhelminae***
- 30a. Glumes smooth. First lemmas 2.6–3.5 mm long, midrib smooth to scaberulous . . . . . 31
- b. Glumes scaberulous on the nerves. First lemmas 3.6–4 mm long, midrib and nerves scaberulous. — Culms stiff. Basal ligules collar-shaped, 0.5–1.5 mm long, truncate. Blades stiff, flat to loosely folded. First lemmas nerves scaberulous . . . . . **15. *Poa jansenii***
- 31a. Culms weak. Basal ligules collar-shaped, truncate. Blades flaccid. Lower glumes 1.5–2.5 mm long. Palea half as long to distinctly shorter than the lemma. — Cauline ligules 1–4.5 mm long . . . . . **20. *Poa languidior***

- b. Culms stiff. Basal ligules triangular, acute. Blades stiff. Lower glumes 1–1.5 mm long. Palea slightly shorter to slightly longer than the lemma. — Culine ligules 3.5–7 mm long . . . . . **34. *Poa rigidula***
- 32a. First lemmas scaberulous all over (lens  $\times 25!$ ) . . . . . 33
- b. First lemmas midrib smooth to midrib and nerves scaberulous . . . . . 36
- 33a. Spikelets 2- or 3-flowered, 2.25–6.75 mm long. Lower glumes 1.35–4.85 mm long, upper glumes 1.75–5.25 mm long, 3–5-nerved . . . . . 34
- b. Spikelets 1-flowered, 1.8–2 mm long. Lower glumes 1–1.25 mm long. Upper glumes 1–1.3 mm long, 1-nerved. — Rachilla process c. 0.25 mm long. Lemma 1.6–1.75 mm long. Anthers c. 0.6 mm long . . . . . **11. *Poa helenae***
- 34a. Spikelets 2.25–4 mm long. Lowest rachilla joint 0.2–0.5 mm long . . . . . 35
- b. Spikelets 4–6.75 mm long. Lowest rachilla joint 0.5–1 mm long. — Lower glumes 2.7–4.85 mm long, upper glumes 2.75–5.25 mm long. Rachilla process 0.8–2.25 mm long. First lemmas 3.25–5 mm long. Anthers 1–2.9 mm long . . . . . **19. *Poa lamii***
- 35a. Spikelets 2.25–2.75 mm long, upper glumes 1.75–2.5 mm long. Lowest rachilla joint 0.2–0.35 mm long. First lemmas 2–2.4 mm long. Anthers 0.5–1.2 mm long . . . . . **24. *Poa minimiflora***
- b. Spikelets 2.8–4 mm long, upper glumes 2.6–3.5 mm long. Lowest rachilla joint 0.4–0.5 mm long. First lemmas 2.5–3.5 mm long. Anthers 1.3–1.6 mm long . . . . . **38. *Poa trinervis***
- 36a. Panicles lax, branches erecto-patent to patent . . . . . 37
- b. Panicles contracted, branches appressed to erecto-patent, or the inflorescences 1-flowered . . . . . 43
- 37a. Glumes smooth to scaberulous on the nerves. Rachilla smooth. Anthers 0.4–1 mm long . . . . . 38
- b. Glumes scaberulous all over. Rachilla scaberulous. Anthers 1.3–1.6 mm long. — Culms tufted. Ligules unequal, triangular, acute. Panicles 4–8.5 cm by 5–25 mm, the longest lowermost branches 15–32 mm long, 2–15-spikeled. Spikelets 2.8–4 mm long. First lemmas 3–7-nerved . . . . . **38. *Poa trinervis***
- 38a. Glumes smooth . . . . . 39
- b. Glumes scaberulous at least on the midrib . . . . . 40
- 39a. Culms loosely tufted. Panicles 3.5–4 cm by 15–20 mm, the longest lowermost branches 13–19 mm long, 4–6-spikeled. Spikelets 3.3–4 mm long. First lemmas 5-nerved . . . . . **16. *Poa jeremiadis***
- b. Plants densely cushion-forming. Panicles 0.5–1.3 cm by 2–5 mm, the longest lowermost branches 3.5–4 mm long, 1-spikeled. Spikelets 1.75–2.15 mm long. First lemmas faintly 3-nerved . . . . . **32. *Poa pulviniformis***
- 40a. Panicles 0.8–3.7 cm long. Spikelets 2.1–3.2 mm long. Upper glume 1.3–2 mm long. First lemma 1.4–2.5 mm long, midrib smooth to scaberulous . . 41
- b. Panicles 4.5–6 cm long. Spikelets 3.6–5.2 mm long. Upper glume 2.5–3.3 mm long. First lemma 3.5–4 mm long, midrib and nerves scaberulous. — Ligules unequal, the culmine longest, the basal collar-shaped to triangular, truncate to acute. Spikelets 1- or 2-flowered . . . . . **15. *Poa janseni***
- 41a. Ligules subequal, the basal triangular, acute. Spikelets usually 2- or 3-flowered . . . . . 42

- b. Ligules unequal, the upper cauline longest, the basal collar-shaped, truncate, erose. Spikelets 1-flowered. — Ligules 0.25–2.4 mm long. Blades 1.3–6 cm long. The longest lowermost panicle branches naked in the lower 0.3–0.6th. Celebes . . . . . **28. *Poa papuana***
- 42a. Ligules 0.85–1.6 mm long. Blades 2.5–3.2 cm long. The longest lowermost panicle branches naked in the lower 0.56–0.67th. — Celebes
- 5. *Poa celebica***
- b. Ligules c. 0.5 mm long. Blades 4.5–7 cm long. The longest lowermost panicle branches naked in the lower 0.3–0.4th. — New Guinea
- 36. *Poa suavis***
- 43a. Culms stiff. Panicle usually 2–many-spikeled. Lower glumes 1.1–4.1 mm long, 0.4–0.9 times as long as the lemma . . . . . 44
- b. Culms weak. Panicle reduced to 1 spikelet. Lower glumes 0.5–0.75 mm long, 0.2–0.25 times as long as the lemma. — Culms very densely cushion- or sward-forming, branching intra-vaginally at base. Cauline ligules 0.1–0.25 mm long. Panicles 1-flowered. Palea keels smooth . . . **14. *Poa inconspicua***
- 44a. Cauline ligules acute to acuminate . . . . . 45
- b. Cauline ligules obtuse to acutish. — Culms cushion-forming, branching intra-vaginally at base. Panicles 1–6-spikeled, 1.4–3.7 cm long. Spikelets usually 2-flowered. First palea keels ciliolately scaberulous . . . . . **30. *Poa pilata***
- 45a. Culms branching intra- and extra-vaginally at base . . . . . 46
- b. Culms branching intra-vaginally at base . . . . . 47
- 46a. Culms 2.5–4 cm long. Cauline ligules 0.5–0.7 mm long. Blades 1.4–1.8 cm long. Panicles 1–1.5 cm long, 4- or 5-spikeled, lowermost branches solitary, 4.5–7 mm long, 1-spikeled. Spikelets 1-flowered. Glumes smooth, lower glumes 1.2–1.6 mm long . . . . . **29. *Poa parva***
- b. Culms 12.5–35 cm long. Cauline ligules 2–3.2 mm long. Blades 4–15 cm long. Panicles 4–8.5 cm long, many-spikeled, the lowermost branches 2 or 3 together, the longest 15–32 mm long, 2–15-spikeled. Spikelets 2-flowered. Glumes scaberulous, lower glumes 2.1–3.1 mm long . . . **38. *Poa trinervis***
- 47a. Plants cushion-forming. — Panicles 2.5–6 mm wide. New Guinea . . . . . 48
- b. Plants tufted . . . . . 50
- 48a. The longest lowermost branches 2–4-spikeled . . . . . 49
- b. The longest lowermost branches 1-spikeled. — Blades 1.3–5 cm long. Ligules subequal to unequal. Panicles 1.4–3.7 cm long. Spikelets usually 2-flowered. First palea keels ciliolately scaberulous . . . . . **30. *Poa pilata***
- 49a. Blades 3.5–6.8 cm long. Ligules subequal. Panicles 2.7–6 cm long. Spikelets 3–5-flowered. First palea keels scaberulous . . . . . **4. *Poa callosa***
- b. Blades 1–3.5 cm long. Ligules unequal, the upper cauline longest. Panicles 1.5–2.5 cm long. Spikelets 2-flowered. First palea keels ciliate in the upper half . . . . . **8. *Poa dozyi***
- 50a. Ligules subequal to unequal, the upper cauline longest. — Palea keels usually scaberulous. New Guinea . . . . . 51
- b. Ligules unequal, the basal longest, 3–5.5 mm long, acuminate. — Blades 8–12 cm long. Panicles 3.7–6.5 cm by 5–10 mm. Spikelets usually 1-flowered, 2.6–3.5 mm long. Palea keels smooth. Sabah . . . . . **3. *Poa borneensis***

51a. Ligules 0.25–1.5 mm long. Blades 0.9–5 cm long. Panicles 1.2–3.2 cm by 0.75–3 mm. Spikelets usually 1-flowered, 2–3.75 mm long

**6. *Poa clavigera***

b. Ligules 1–6.7 mm long. Blades 5–15 cm long. Panicles 4.5–10 cm by 8–15 mm. Spikelets usually 2- or 3-flowered, 4.25–7.5 mm long . . **23. *Poa lunata***

**1. *Poa annua* L.**

*Poa annua* L., Sp. Pl. 1 (1753) 68; Warwick, Canad. J. Pl. Sc. 59 (1979) 1053. — Lectotype: ?*Hb. Linné 87.17*, right hand specimen (LINN holo).

Tufted annuals, branching intra-vaginally at base. Culms weak to stiff, geniculate and rooting in the decumbent nodes to erect, 4–28(–40) cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, glabrous, the basal collar-shaped, 0.35–1.5 mm long, obtuse to truncate, entire to erose, to triangular and acute, the cauline trapezoid to triangular, 1–3.5 mm long, obtuse to acute, sometimes fimbriate. Blades flaccid to somewhat stiff, often transversely wrinkled when young, erecto-patent, usually flat, sometimes folded, 0.8–13.5 cm by 1–5 mm wide, acute, smooth. Panicles loosely contracted to lax, erect, (1–)2–7(–12) cm by (5–)8–55 mm; branches finally erecto-patent to reflexed, smooth, rarely sparsely scaberulous, the lowermost 1–3 together, the longest (5–)11–35(–50) mm long, naked in the lower 0.25–0.46th, (1- or) 2–15-spikeled. Spikelets 3–5-flowered, 3.75–6 mm long, chasmogamous. Glumes smooth; lower glumes lanceolate, (0.85–)1–2.5 mm long, 0.33–0.78 times as long as the lemma, 1-nerved; upper glumes lanceolate to diamond-shaped, (1.25–)1.6–3 mm long, 3-nerved, sometimes somewhat sulcately so. Rachilla smooth; lowest joint 0.5–1 mm long; process 0.25–0.75 mm long. First lemmas (2–)2.5–3.75 mm long, smooth, also on the nerves, 5-nerved, web absent, midrib and nerves glabrous or with crests of hairs in the lower half, apex broadly cuneate to acute, more or less scarious. Palea shorter than the lemma, keels glabrous or with a crest of hairs, smooth. Anthers 0.6–1.1 mm long.  $2n =$  usually 28.

Distribution – Thought to have originated in the Mediterranean, now cosmopolitan in temperate areas, one of the so-called ‘white man’s foot’ weeds: Malesia: Malay Peninsula (Perak: Maxwell’s Hill; Pahang: Fraser’s Hill, Cameron Highlands, Genting Highlands), Sumatra (Tapanuli, E Coast, Padang), Java (probably all over), Borneo (Sabah: Kinabalu), Philippines (Luzon: Mountain Prov.: Data, Pulog, Santo Tomas; Rizal Prov.: Makali; San Miguel Isl., at sea level, probably mislabeled), Lesser Sunda Islands (Bali: Penulisan), New Guinea: Irian Jaya (Enarotali); Papua New Guinea (Western: Karoma; Chimbu: Wilhelm; Enga: Wabag; Eastern Highlands: Marafunga; Morobe: Kaindi; Gulf Prov.: Yule; surely much more widely spread, but being a roadside grass not collected. I saw it as very common and even vegetation-forming in e.g. Wabag).

Habitat – On a wide range of soils, even pure masonry sand, pioneering and persistent in disturbed areas, along paths, borders, fields, near buildings, etc., locally abundant; 1140–3760 m alt.

Vernacular names – Annual meadow-grass, annual bluegrass (E.).

Uses – As it is resistant to trampling used for lawns in not too dry circumstances; very nutritious, but of low yield.

Collector's notes – Sheaths green to slightly purplish. Spikelets grey-green, or green with purple to purple. Anthers, styles white.

Notes – A summary of biological information is given by Warwick (1979).

The indument of the lemmas and paleas is very variable, ranging from completely absent to crests of hairs adherent at the top on the nerves and keels, which should not be confused with the web of long, crinkly hairs found on the callus in other species.

## 2. *Poa aurigae* Veldk., *spec. nov.*

*Poa multinodis* auct. non Chase.

Ab omnibus speciebus malesianis differt in habitu caespitoso, culmis basi intra- et extra-vaginaliter ramosis, ligulis inaequalibus superioribus longissimis, 1.75–4 mm longis, laminis plicatis ad planis, paniculae 1.8–3.5 cm longis 6–14 mm latis, ramis erecto-patentibus, spiculis 2–3 mm longis. — Typus: *Veldkamp 6574* (L. holo), Papua New Guinea, W Sepik Prov., Star Mts, Mt Auriga, c. 5° S, 141° 5' E, 3350 m, 27 April 1975.

Tufted perennials, branching intra- and extra-vaginally at base. Culms erect to geniculate, 7–17 cm long. Sheaths not articulating with the blades. Ligules unequal, triangular, the cauline longest, 1.75–4 mm long, acute, glabrous. Blades rather stiff, folded to flat, 3–7 cm by 0.5–2 mm, smooth, acute. Panicles contracted, lax in fruit, erect, 1.8–3.5 cm by 6–14 mm; branches erecto-patent, scaberulous, the lowermost 2–5 together, the longest 8–15 mm long, naked in the lower 0.12–0.2(–0.64)th, 3–7-spikeled. Spikelets 1-flowered, 2–3 mm long, chasmo- or cleistogamous. Glumes scaberulous on the midrib; lower glumes 1–1.5 mm long, 0.36–0.5 times as long as the lemma, 1-nerved; upper glumes 1.25–1.75 mm long, sulcately 3-nerved. Rachilla process 0.75–1.5 mm long. Lemmas 2.15–2.6 mm long, smooth, 3-nerved, web absent, apex acute. Palea slightly shorter to slightly longer than the lemma, keels smooth, slightly bidentate. Anthers 0.5–0.75 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz); Papua New Guinea: W Sepik (Star Mts), W Highlands (Kubor Range), S Highlands Prov. (Ambua).

Habitat – Open subalpine *Gleichenia* and low herb vegetation, margins of scrub, locally common, 3350–3600 m alt.

Collector's notes – Small tussocks or a few culms only. Leaves V-shaped, or setaceous on the sterile shoots, semigloss mid to dull dark green. Inflorescence green, brown, purple. Anthers purple (but white in *Pullen 5067*). Stigmas white.

Note – Named after Mt Auriga in the Star Mountains where I saw the species first.

## 3. *Poa borneensis* Jansen

*Poa borneensis* Jansen, *Reinwardtia* 2 (1953) 322, t. 15. — *Poa spec.*: Steenis, *Bull. Jard. Bot. Buitenzorg* III, 13 (1934) 216. — Type: *Clemens 51527* (L. holo; A, B, BM, K, NSW, UC, US).

*Poa epileuca* auct. non Stapf.

Tufted perennials, branching intra-vaginally at base. Culms somewhat stiff, 7–35 cm long. Sheaths not articulating with the blades. Ligules unequal, the basal longest, triangular, acuminate, entire, glabrous, 3–5.5 mm long. Blades stiffly erect, filiform, involute, 8–12(–17) cm by 0.5–0.75 mm, smooth, acute. Panicles erect, contracted, 3.7–6.5 cm by 5–10 mm; branches appressed, scaberulous, the lowermost 2 or 3 together, the longest 14–31 mm long, naked in the lower 0.26–0.43th, 3–11-spikeled. Spikelets 1- (or 2-)flowered, 2.6–3.5 mm long, chasmogamous. Glumes distally often with a scaberulous midrib, faintly nerved; lower glumes 1.5–2.65 mm long, 0.46–0.78 times as long as the lemma, 1- (or 2-)nerved; upper glumes 2.25–3.5 mm long, 3-nerved. Rachilla smooth; lowest joint 1 mm long; process 1.5–1.85 mm long, distinctly shorter than the upper glume. First lemmas 2.4–3.3 mm long, web absent, faintly 5-nerved, midrib distally scaberulous, apex acute to subapically mucronate, mucro up to 0.35 mm long. Palea as long as to slightly shorter than the lemma, keels smooth. Anthers 0.8–0.9 mm long.  $2n = ?$

Distribution – Sabah (Mt Kinabalu).

Habitat – Among wet rocks, 3960–4115 m alt.

Notes – Jansen (1953) remarked that two forms may be present, perhaps due to altitude. The size of the plants themselves, however, is not important, form 1 varying between 7 and 33 cm, form 2 between 14 and 27 cm. Insufficient material was available to sort this out, and recent collections are absent, as the species was mainly collected by Ms. Clemens (27787, 30314, 30315, ‘Upper Kinabalu’, 51527, ‘Gurulau Spur’, and 30273 p.p., ‘Low’s Peak’) and once by Ms. Molesworth Allen, without clear locality (3286, K). Ms. Clemens made several mixed collections, which does not necessarily mean that the two are growing together, as she had a habit of increasing her gatherings to get a sufficient number of duplicates for sale. An isotype of *Agrostis rigidula* Steud. var. *kinabaluensis* (Ohwi) Veldk. (Clemens 30273) in L contained a specimen of *P. borneensis*!

*Form 1*: Panicle rather open. Lower glumes 1.5–2 mm long, 1-nerved; upper glumes 2.25–2.5 mm long, faintly 3-nerved. Rachilla process 1.5–1.75 mm long. Lemmas 2.4–3.15 mm long.

*Form 2*: Panicle rather contracted. Lower glumes 2.4–2.65 mm long, 1- (or 2-)nerved; upper glumes 3.4–3.5 mm long, distinctly 3-nerved. Rachilla process 1.75–1.85 mm long. Lemmas 3.25–3.3 mm long.

#### 4. *Poa callosa* Stapf

*Poa callosa* Stapf, Kew Bull. (‘1899’, 1901) 116. — Type: *Giulianetti s.n.* (K holo).

*Festuca pusilla* auct. non Hook. f.

*Poa pilata* auct. non Chase.

*Poa spec. nov.*: Stevens & Veldk., Bot. Bull., Lae 10 (1980) ii, 15, 38.

Cushion-forming perennials, branching intra-vaginally at base. Culms stiff, 4–14(–30) cm long. Sheaths not articulating with the blades. Ligules glabrous, subequal, the basal collar-shaped to triangular, 0.5–0.75 mm long, obtuse to acutish, the cauline more triangular, 0.5–1 mm long, acute. Blades stiff, erect to patent, somewhat curved, involute, filiform, 3.5–6.8 cm by 0.5–1 mm, smooth, shiny, acute. Panicles contracted, erect, 2.7–6 cm by 3–6 mm; branches appressed, puberulous, the lowermost solitary, rarely geminate, the longest 22–27 mm long, naked in the

lower 0.54–0.72th, 2–4(–7)-spikeled. Spikelets 3–5- (or 6-)flowered, 4.3–6.5 mm long, cleistogamous. Glumes upward scaberulous on the midrib, otherwise smooth; lower glumes 2–2.8(–3.15) mm long, (0.56–)0.63–0.78(–0.83) times as long as the lemma, 1–3-nerved; upper glumes 2.15–3.1(–3.55) mm long, 3–5-nerved. Rachilla usually smooth (see note); lowest joint 0.6–0.9 mm long; process 1–1.75 mm long. First lemmas 3–3.85(–4.15) mm long, web absent, midrib scaberulous upward, otherwise smooth, apex acute, distinctly 3- to faintly 7-nerved. Palea slightly shorter than the lemma, keels scaberulous. Anthers 0.6–0.75 mm long.  $2n = ?$

Distribution – Papua New Guinea: Central (Albert Edward, Scratchley, Knutsford, Victoria), Northern (English Peaks), Milne Bay Prov. (Suckling).

Habitat – Open, subalpine, moist to dry short-grasslands, locally vegetation-forming, forest glades on shallow soil, 3375–3750 m alt.

Note – Specimens from Mt Suckling have ciliolate rachilla joints but are otherwise similar.

### 5. *Poa celebica* Ohwi ex Veldk., *spec. nov.*

*Poa epileuca* auct. non Stapf.

Ab omnibus speciebus malesianis differt in culmis basi intra- et extra-vaginaliter ramosis 4–9 cm longis, ligulis subaequalibus triangularibus 0.85–1.6 mm longis, laminis 2.5–3.2 cm longis, c. 0.5 mm latis, paniculis laxis, 1.6–2 cm longis, ramis erecto-patentibus. — Typus: *Eyma 869-a* (BO holotype; L), Celebes, Latimojong Mts, G. Rantemario, 3550 m, 20 June 1939.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 4–9 cm long. Sheaths not articulating with the blades. Ligules subequal, triangular, 0.85–1.6 mm long, acute, glabrous. Blades rather soft, erect, involute, 2.5–3.2 cm by c. 0.5 mm, smooth, acute. Panicles lax, erect, 1.6–2 cm by 5–8 mm; branches erecto-patent, scaberulous, the lowermost paired, the longest 8–10 mm long, naked in the lower 0.56–0.67th, 2-spikeled. Spikelets (1- or) 2-flowered, 2.1–2.85 mm long, cleistogamous. Glumes smooth, midrib scaberulous; lower glumes 1.1–1.75 mm long, 0.58–0.7 times as long as the lemma, 1-nerved; upper glumes 1.5–2 mm long, 3-nerved. Rachilla smooth; lowest joint 0.2–0.25 mm long; process 0.3–0.65 mm long. First lemmas 1.85–2.4 mm long, web absent, smooth or distally minutely scaberulous on the midrib, apex acute, faintly 3(–5)-nerved. Palea subequal to distinctly longer than the lemma, especially in the second floret, keels distally hardly scaberulous. Anthers 0.5–0.6 mm long.  $2n = ?$

Distribution – Celebes, Latimojong Mts, G. Rantemario.

Habitat – Presumably in subalpine short-grassland, as the only collection known was mixed with *Danthonia oreoboloides* (F. Muell.) Stapf; said to be not very common; 3550 m alt.

Collector's notes – Fine, subular, green blades.

### 6. *Poa clavigera* Veldk.

*Poa clavigera* Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1094, f. 355. — Type: *Veldkamp 6589* (L. holotype; LAE).

*Poa callosa* auct. non Stapf.

*Poa pilata* auct. non Chase.

Densely, sometimes loosely tufted perennials, branching intra-vaginally at base. Culms stiff, 3–20 cm long. Sheaths not articulating with the blades. Ligules subequal, 0.25–1.5 mm long, triangular, acuminate, rarely collar-shaped, truncate, or auriculate, outside slightly to densely retrorsely scaberulous. Blades stiff, erect, involute, filiform, 0.9–5 cm by 0.1–0.85 mm, smooth, acute. Panicles contracted, erect, 1.2–3.2 cm by 0.75–3 mm, 2–14-spikeled; branches appressed, scaberulous to scaberulously ciliolate, the lowermost solitary or paired, the longest 7–17 mm long, naked in the lower 0.6–0.7(–1)th, 1–3-spikeled. Spikelets 1- (or 2-, see note) flowered, 2–3.75(–4.5) mm long, chasmogamous or cleistogamous. Glumes smooth or midrib distally slightly scaberulous, 1–3-nerved; lower glumes 1.15–2.65 mm long, 0.4–0.82 times as long as the lemma; upper glumes 1.5–3 mm long, 1–3-nerved. Rachilla joint (when present) smooth, 0.35–0.75(–1.25) mm long, process usually exerted, 1.35–2.6 mm long. First lemmas 1.8–3.25(–4.25) mm long, web absent, smooth, midrib distally sometimes slightly scaberulous, acute to minutely apiculate, faintly 3- or 5-nerved. Palea distinctly to slightly shorter than the lemma, keels smooth to scaberulous in the upper half. Anthers 0.6–1.25 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz, Wilhelmina); Papua New Guinea: W Sepik Prov. (Star Mts: Capella, Scorpion).

Habitat – Subalpine short-grassland, in soliflux areas, between boulders, 3400–4210 m alt.

Notes – I am not quite satisfied with the circumscription of this species. Several specimens on which the description is based had very poorly collected spikelets and their distinction from e.g. *P. dozyi* and *P. pilata* was not always clear-cut. The latter two differ by having distally ciliate palea keels.

*Mangen* 473, 490, and 924 from the Wilhelmina and *Veldkamp* 6594 from the Star Mts had few to many 2-flowered spikelets.

## 7. *Poa crassicaulis* Pilg.

*Poa crassicaulis* Pilg., Bot. Jahrb. 62 (1929) 458. — Type: *Keysser* 4 (B † holo). Neotype: *Keysser s.n.* (BM holo).

Cushion-forming perennials, branching intra-vaginally at base. Culms stiff, 5–12 (–30) cm long. Sheaths distichous, not articulating with the blades. Ligules subequal, collar-shaped, 0.35–0.55 mm long, truncate, erose, glabrous. Blades stiff, erecto-patent to patent, flat to V-shaped, 0.5–4(–13.5) cm by 1.2–4.5 mm wide, smooth, margins scaberulous, distally ciliolate, apex rounded. Panicles contracted at anthesis, erect, 0.6–2.7(–8.2) cm by 4–8(–20) mm; branches sometimes secund, appressed to erecto-patent, scaberulous to puberulous, the lowermost (1 or) 2(–4) together, the longest 4.5–11.2(–24.5) mm long, naked in the lower (0.33–)0.4–0.67(–0.8)th, (1–)2–3(–7-)spikeled. Spikelets (1- or) 2(–4-)flowered, (1.8–)2–2.7(–4) mm long, cleistogamous. Glumes smooth, midrib distally scaberulous; lower glumes 0.9–1.7(–2) mm long, 0.42–0.63(–0.7) times as long as the lemma, 1-nerved; upper glumes 1.1–1.8(–2.3) mm long, 3-nerved. Rachilla smooth; lowest joint 0.3–0.6 mm long; process 0.7–1.3 mm long. First lemmas 1.5–2.4(–2.7) mm

long, web absent, smooth, midrib distally scaberulous to ciliolate, apex acute, 5-nerved. Palea slightly shorter than the lemma, keels ciliate. Anthers (0.4–)0.5–0.6 (–0.7) mm long.  $2n = 28$ .

Distribution – New Guinea: from the Carstensz to the Suckling.

Habitat – Subalpine short-grasslands, on rocks, in crevices, locally common, 2750–4570 m alt.

Collector's notes – Forming small tussocks or dense, tight mats. Leaves stiff, distichous, pale green, dull green, to glaucous. Panicles flattened. Spikelets pale to purplish green. Anthers white or purplish. Stigmas white.

Notes – Conspicuous in the field for its glaucous-coloured cushions up to 30 cm diameter or more.

Some collections have been made between the Carstensz and the Star Mts (the only form seen there) and on the Sugarloaf of large, more tussocky specimens with long blades and many-spikeled inflorescences. Otherwise these seem conspecific.

### 8. *Poa dozyi* Veldk.

*Poa dozyi* Veldk., *Blumea* 30 (1984) 71, t. 1. — Type: ANU 10967 (Hope) (L holo; BO, CANB). *Monostachya oreoboloides* auct. non Hitchc.

*Poa callosa* auct. non Stapf.

Cushion-forming perennials, branching intra-vaginally at base. Culms stiff, 38 cm long. Sheaths not articulating with the blades. Ligules unequal, the upper cauline longest, outside scaberulous; the basal collar-shaped, 0.75–1.5 mm long, truncate, the cauline triangular, 0.75–2.5 mm long, acute. Blades stiff, erect, involute, 1–3.5 cm by 0.7–1 mm, smooth, acute. Panicles contracted, erect, 1.5–2.5 cm by 2.5–4 mm; branches appressed, scaberulously ciliolate, the lowermost paired, rarely solitary, the longest 9–12 mm long, naked in the lower 0.5–0.64(–1)th, (1- or) 2- (or 3-) spikeled. Spikelets 2-flowered, 3–5 mm long, chasmogamous. Glumes smooth, midrib distally scaberulous; lower glumes 1.8–3 mm long, 0.7–0.8 times as long as the lemma, faintly 1–3-nerved; upper glumes 2–3.2 mm long, faintly 3-nerved. Rachilla smooth; lowest joint 0.75–1 mm long; process 1.25–2 mm long. First lemmas 2.25–3.6 mm long, web absent, smooth, midrib distally scaberulous, apex acute, faintly 3- (or 5-)nerved. Palea slightly shorter than the lemma, keels ciliate in the upper half. Anthers 0.8–1 mm long.  $2n = ?$

Distribution – New Guinea: Mt Carstensz.

Habitat – On moraine in sheltered, poorly drained hollows in alpine tundra, 4000–4700 m high.

### 9. *Poa epileuca* (Stapf) Stapf

*Deyeuxia epileuca* Stapf, *Trans. Linn. Soc., London* II, 4 (1894) 247, t. 20c, f. 10. — *Poa epileuca* Stapf in Hook. f., *Icon. Pl.* (1899) t. 2607, in obs.; t. 2608. — *Aulacolepis epileuca* Hitchc., *Brittonia* 2 (1936) 117. — *Aniselytron epileuca* Soják, *Casopsis* 148 (1980) 202 ('*epileucum*').

— Type: *Haviland 1401* (K holo).

*Festuca pusilla* auct. non Hook. f.

Tufted perennials, usually branching intra- and extra-vaginally at base. Culms stiff, 3.5–12 cm long. Sheaths not articulating with the blades. Ligules unequal, accolade-shaped, glabrous; the basal from 0.25 mm up, acuminate, the cauline up to 0.6 mm long. Blades stiff, erect, flattened to involute, 1.5–6 cm by 0.5–1.5 mm wide, smooth, acute, margins usually retrorsely scaberulous, upper surface, when exposed, with a peculiar greyish-glaucous colour. Panicles rather lax, erect, 1–1.7 cm by 3–6 mm; branches erecto-patent, densely white-puberulous, the lowermost paired, the longest 5.75–7 mm long, naked in the lower 0.46–0.6th, 1- or 2- (or 3-)spikeled. Spikelets 1- (or 2-)flowered, (2.3–)2.75–3 mm long, chasmogamous. Glumes smooth but for some spicules on the midrib, 3-nerved at least at base; lower glumes 1.25–1.8 mm long, 0.5–0.65 times as long as the lemma; upper glumes 1.35–2 mm long. Rachilla smooth; process (1.1–)1.4–1.75 mm long, subequal to or protruding beyond the upper glume. First lemmas (2.1–)2.35–2.75 mm long, web absent, smooth, apex acute, faintly 3(–5)-nerved. Palea subequal to or longer than the lemma, keels smooth. Anthers 0.75–1 mm long.  $2n = ?$

Distribution – Sabah (Kinabalu), Celebes (Rantemario), New Guinea: E Highlands (Piora), Central (Albert Edward, Victoria), Northern Prov. (English Peaks).

Habitat – Short-grassland, edges of subalpine scrub, in depressions of rocky substrate; 3200–4115 m alt.

Collector's notes – Small, tufted grass. Leaves glaucous, especially below.

Notes – The distribution is most remarkable in view of the far 'jump' from Borneo and Celebes to Eastern New Guinea. Especially because of the conspicuous greyish-glaucous foliage I can hardly believe that this species has been undercollected. I have never found it myself. It would not be surprising if eventually collections from other New Guinea mountains would be brought in, of course, but I would expect it more from the virtually unknown ranges in Irian Jaya than from Papua New Guinea.

The three islands bear populations which differ slightly in the sizes of the spikelets, but insufficiently so to warrant the recognition of infra-specific taxa.

	Mt Kinabalu	G. Rantemario	New Guinea
Spikelet	2.75–3 mm	2.5–2.8 mm	2.3–2.5 mm
Lower glumes	1.4–1.8 mm	1.25–1.6 mm	1.2–1.45 mm
Upper glumes	1.6–2 mm	1.3–1.6 mm	1.3–1.75 mm
Rachilla process	1.1–1.75 mm	1.4–1.8 mm	1–1.1 mm
Lemmas	2.2–2.75 mm	2.35–2.65 mm	2.1–2.35 mm

## 10. *Poa erectifolia* Hitchc.

*Poa erectifolia* Hitchc., Brittonia 2 (1936) 111. — Type: *Brass* 4326 (NY holo; A, BM, K, US).

Tufted perennials, branching intra-vaginally at base. Culms stiff, (12.5–)20–45 cm long. Sheaths not articulating with the blades. Ligules unequal, triangular, acute, the basal from 0.75 mm up, scaberulous, the cauline up to 4.75 mm long, smooth. Blades stiff, erect, involute, filiform, 8–18 cm by 0.4–0.7 mm, muricate (lens  $\times 25!$ ), acute. Panicles at first rather compact, later usually lax, erect, 4.5–8.5 cm by 15–50 mm;

branches at first appressed, later (erecto-)patent to even reflexed, scaberulous, the lowermost 1–4 together, the longest 20–35 mm long, naked in the lower 0.25–0.4th, 4–12-spikeled. Spikelets (1- or) 2- (or 3-)flowered, 3.1–4.5 mm long, chasmogamous. Glumes slightly scaberulous; lower glumes 2.25–3.5 mm long, 0.68–0.84 times as long as the lemma, 1–3-nerved; upper glumes 2.5–3.8 mm long, 3-nerved. Rachilla smooth; lowest joint 0.3–0.75 mm long; process 0.75–1.5 mm long. First lemmas 3–4.15 mm long, web absent, scaberulous, apex gradually acute, faintly 5-nerved. First palea slightly shorter than the lemma, the uppermost often protruding, keels scaberulous in the upper part. Anthers 1.1–2.25 mm long.  $2n = ?$

Distribution – Papua New Guinea: Central Prov. (Neon Basin, Albert Edward, Scratchley, Knutsford, Victoria).

Habitat – Open subalpine short-grasslands, swampy plains, locally common, 3350–3800 m alt.

Collector's note – Panicle purple.

### 11. *Poa helenae* Veldk., *spec. nov.*

Ab omnibus speciebus malesianis differt in culmis basi intra- et extra-vaginaliter ramosis, ligulis triangularibus acutis inaequalibus summis longissimis 0.75–1.75 mm longis, laminis involutis, paniculae ramis infimis longissimis 9–11 mm longis, spiculis 1-floris, glumarum nervis scaberulis. — Typus: *Hopkins 871* (L. holo; UPNG), Papua New Guinea, Northern (Oro) Prov., English Peaks, Lake Omba, 8° 45' S, 147° 29' E, 3640 m alt., 3 Feb. 1988.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 12–17 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, 0.75–1.75 mm long, acute, glabrous to retrorsely scaberulous. Blades rather stiff, erect, involute, filiform, 4–6.5 cm by 0.4–1 mm, smooth, acute. Panicles lax, erect, 1.8–3.5 cm by 5–10 mm; branches erecto-patent, scaberulous, the lowermost paired, the longest 9–11 mm long, naked in the lower 0.23–0.3th, 3–7-spikeled. Spikelets 1-flowered, 1.8–2 mm long, chasmogamous. Glumes scaberulous on the nerves, otherwise smooth; lower glumes 1–1.25 mm long, 0.57–0.71 times as long as the lemma, 1-nerved; upper glumes 1–1.3 mm long, 1(–3)-nerved. Rachilla process smooth, c. 0.25 mm long. Lemmas 1.6–1.75 mm long, minutely scaberulous (lens  $\times 25!$ ), 3-nerved, web absent, apex acute. Palea longer than the lemma, keels scaberulous. Anthers c. 0.6 mm long.  $2n = ?$

Distribution – Papua New Guinea: Northern Prov., English Peaks.

Habitat – Subalpine grassland, locally common, 3640 m.

Note – The species is named after Dr. Helen Fortune Hopkins, who was the first to find it.

### 12. *Poa hentyi* Veldk.

*Poa hentyi* Veldk. in P. Royen, *Alp. Fl. New Guinea* 2 (1979) 1091. — Type: *Veldkamp & Vinas 7539* (L. holo; LAE).

*Poa callosa* auct. non Stapf.

*Poa minimiflora* auct. non Stapf.

*Poa spec.*: Wade & McVean, *Mt Wilhelm Studies* 1 (1969) pro *ANU 7438*, p. 140, 145, 146.

Tufted to cushion-forming, greenish-yellow perennials, branching intra-vaginally at base. Culms stiff, 1.7–7(–9) cm long. Sheaths articulating with the blades. Ligules subequal, triangular, 0.4–0.9 mm long, scaberulous. Blades stiff, erect to curved out, folded, terete to flattened, (1–)2–3(–5) cm by 0.5–0.85(–1) mm, smooth, acute. Panicles contracted, erect, (1–)2.2–3.3(–3.7) cm by 3–4 mm, 3–13-spikeled; branches appressed, scaberulous, the lowermost solitary or paired, the longest (8–) 12–23(–27) mm long, naked in the lower (0.75–)0.85–1th, 1- or 2(–5)-spikeled. Spikelets (1- or 2- or 3- (or 4)-flowered, (2–)2.5–3.5(–4) mm long, chasmogamous. Glumes smooth, midrib distally sometimes slightly scaberulous; lower glumes 1.3–1.75 mm long, 0.56–0.81 times as long as the lemma, 1–3-nerved at base; upper glumes (1.4–)1.5–1.85(–2.2) mm long, 3-nerved at least at base. Rachilla smooth; lowest joint 0.3–0.6 mm long; process (1.25–)1.45–1.6(–2) mm long. First lemmas 1.95–2.6 mm long, web absent, smooth, midrib distally slightly scaberulous, apex acute, faintly 3-nerved. Palea shorter than the lemma, keels scaberulous. Anthers 0.5–0.65(–0.75) mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Wilhelmina), Papua New Guinea (W Sepik: Star Mts; W Highlands: Kubor Range; S Highlands: Giluwe, Kegum; Chimbu: Wilhelm, Kerigomna; E Highlands: Piora, Michael; Morobe Prov.: Naitambi Range, Saruwaged, Samanzing, Bangeta, Rawlinson Range).

Habitat – Short-grass and herb communities, pockets between stones or higher plants on various soils, along tracks and other disturbed places; (?2750–)3500–4120 m alt., on the Wilhelm and Giluwe apparently not above 3920 m.

Collector's notes – Small, bluish green, glaucous, pale to mid green tussocks. Blades firm. Spikelets green to purple. Anthers purple.

Notes – The specimens from the Saruwaged differ slightly from those found elsewhere:

Saruwaged: Panicle 4–13-spikeled. Spikelets (1- or 2- (or 3)-flowered, 2.5–3.1 mm long, 2750(?)–4120 m alt.

'Elsewhere': Panicle (2- or 3–5(–8)-spikeled. Spikelets (2- or 3- (or 4)-flowered, (2–)3–3.5(–4) mm long, 3300–3920 m alt.

In part of its area (Giluwe, Wilhelm) the species is replaced at higher altitudes by the related *P. hypsinephes*. In the Kubor Range it grows together with *P. kuborensis* between 2570–3860 m alt.

### 13. *Poa hypsinephes* Veldk.

*Poa hypsinephes* Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1093 ('*hypsenephes*'). — Type: ANU 5163 (Walker) (L. holo; A, B, CANB, K, LAE).

*Poa callosa* auct. non Stapf.

Tufted glaucous perennials, branching intra-vaginally at base. Culms stiff, 2–12 cm long. Sheaths articulating with the blades. Ligules subequal, triangular, 0.8–2 mm long, acute, scaberulous. Blades stiff, erect to slightly curved out, rather flat, (0.8–) 2.2–4.5(–5.5) cm by 0.75–1.5(–1.8) mm wide, smooth, acute. Panicles contracted, erect, (0.8–)2.1–4.1 cm by 3–8 mm, 10–27-spikeled; branches appressed, scaber-

ulous, the lowermost solitary or paired, the longest 4–29 mm long, naked in the lower (0.6–)0.7–0.8(–1)th, (1–)3–5(–8)-spikeled. Spikelets 2–4-flowered, (2–)2.35–3.7 mm long, chasmogamous. Glumes smooth, midrib distally scaberulous; lower glumes 1.2–1.6(–2.25) mm long, 0.42–0.79 times as long as the lemma, 1(–3)-nerved; upper glumes 1.5–2(–2.7) mm long, 3-nerved at base. Rachilla smooth; lowest joint 0.3–0.7 mm long; process 0.6–1.5(–1.9) mm long. First lemmas 1.7–2.25(–3) mm long, web absent, smooth, midrib distally slightly scaberulous, apex acute, faintly 3-nerved. Palea shorter than the lemma, keels scaberulous. Anthers 0.5–0.75 mm long.  $2n = ?$

Distribution – Papua New Guinea: S Highlands (Giluwe), Chimbu Prov. (Wilhelm).

Habitat – Subalpine short-grasslands with small herbs, locally very common, 3800–4500 m alt.

Collector's notes – Small tufted, stiff-leaved grass. Panicle purplish to green.

Note – In unfavourable places, e.g. mountain summits, exposed places, dwarf forms may occur with much-reduced leaves and panicles, which then resemble *P. hentyi*, but the leaves remain wider and the panicles more-flowered. They differ otherwise by the peculiar green colour of the foliage and stems when dried and the higher altitudinal distribution.

#### 14. *Poa inconspicua* Veldk.

*Poa inconspicua* Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1062, t. 3444. — Type: *Veldkamp 6494* (L. holo; LAE).

*Poa* spec.: Veldk. in Hope et al., Equatorial Glac. New Guinea (1976) 158.

Very densely cushion- or sward-forming perennials, up to 40 cm diam., branching intra-vaginally at base. Culms weak, 1–10 cm long. Sheaths not articulating with the blades. Ligules subequal, glabrous, collar-shaped to more or less triangular, 0.1–0.25 mm long. Blades stiff, ascending to patent, loosely involute, filiform, 0.6–2 cm by 0.3–0.6 mm, acute, margins and midrib sparsely scaberulous. Panicles hidden among the foliage, reduced to 1 spikelet, erect. Spikelets 1-flowered, 2.5–3 mm long, chasmogamous. Glumes smooth, faintly 3-nerved; lower glumes 0.5–0.75 mm long, 0.2–0.25 times as long as the lemma; upper glumes 0.85–1.25 mm long. Rachilla smooth; process 1.15–1.35 mm long. First lemmas 2.5–2.6 mm long, web absent, smooth, apex acute, not or faintly 1–3-nerved. Palea slightly shorter than the lemma, keels faint, smooth. Anthers 0.6–0.9 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz, Wilhelmina); Papua New Guinea (W Sepik Prov.: Star Mts; Capella, Scorpion).

Habitat – Subalpine short-grasslands, in hard-hummock bogs, and forest edges, apparently resistant to trampling, 3300–3850 m alt.

Collector's notes – Cushion- and sward-forming.

Note – Possibly more common than it would seem because of its resemblance to *Danthonia oreoboloides* and *Centrolepis* Labill. In the field it can immediately be recognized by its paler colour and finer foliage which is soft to the hand and not as pungent as in these species.

**15. *Poa janseni* Veldk.**

*Poa janseni* Veldk. in P. Royen, *Alp. Fl. New Guinea* 2 (1979) 1077, t. 350. — *Poa spec.*: Chase, *J. Arnold Arbor.* 24 (1943) 83, p.p. — *Poa turfosa* Jansen, *Reinwardtia* 2 (1953) 329, t. 17; non Litw. (1917). — Type: *Brass & Meijer Drees 9929* (L. holo; A, BM, BO, K, LAE, US).  
*Poa multinodis* auct. non Chase.

Tufted perennials, branching extra- and intra-vaginally at base. Culms stiff, 10–50 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, glabrous to slightly scaberulous, entire to fimbriate, the basal collar-shaped to triangular, 0.5–1.85 mm long, truncate to acute, the cauline triangular, 1.5–3.75 mm long, acute. Blades stiff, more or less erect, flat to involute, 2.3–7 cm by 0.6–3 mm wide, smooth, the cauline sometimes scaberulous, acute, slightly falcate. Panicles lax, erect, 4.5–6 cm by (10–)25–45 mm; branches at first erecto-patent, later patent to reflexed, smooth to scaberulous, the lowermost 2 or 3 together, the longest 14–36 mm long, naked in the lower 0.33–0.67th, 3–6-spikeled. Spikelets 1- or 2-flowered, 3.6–5.25 mm long, chasmogamous. Glumes scaberulous on the nerves; lower glumes 1.75–3.1 mm long, 0.44–0.7 times as long as the lemma, 1-nerved; upper glumes 2.5–3.35 mm long, 3-nerved. Rachilla smooth; lowest joint 0.75–1.1 mm long; process 0.95–2.5 mm long. First lemmas 3.5–4 mm long, web absent, mainly scaberulous on the 5(–7) nerves, sometimes distally in between, apex acute. Palea slightly shorter than the lemma, keels scaberulous in the upper half. Anthers 1–1.5 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz, Wilhelmina, Hubrecht).

Habitat – In swamps or on bare peaty ground on edges of dying forest, *Cyatheal* tussock grassland, 3100–3720 m alt.

Note – Both the otherwise good drawing and the partially incorrect description given by Jansen do not agree with any specimen annotated by him and seen by me.

**16. *Poa jeremiadis* Veldk., *spec. nov.***

Ab omnibus speciebus malesianis differt in culmibus basi intra- et extra-vaginaliter ramosis 9–23 cm longis, ligulis triangularibus 0.75–1.4 mm longis acutis, laminis involutis 4.5–7.5 cm longis 0.6–0.8 mm latis, paniculis laxis 15–20 mm latis, glumis laevibus, inferioribus lemmate 0.53–0.63-plo longioribus. — Typus: *ANU 15438 (J.M.B. Smith)* (L. holo; CANB, LAE), Papua New Guinea, Chimbu Prov., Mt Wilhelm, Observatory Peak, 4085 m alt., 1 June 1972.

Loosely tufted perennials, branching intra- and extra-vaginally at base. Culms geniculate, more or less stiff, 9–23(–30) cm long. Sheaths not articulating with the blades. Ligules subequal, the cauline somewhat longer, 0.75–1.4 mm long, triangular, acute, smooth. Blades stiff, erect, involute, filiform, 4.5–7.5 cm by 0.6–0.8 mm, smooth, acute to slightly falcate. Panicles lax, erect, 3.5–4 cm by 15–20 mm; branches erecto-patent to nearly reflexed, smooth to sparsely scaberulous, the lowermost solitary or paired, the longest 13–19 mm long, naked in the lower 0.4–0.46th, 4–6-spikeled. Spikelets 1- or 2-flowered, 3.3–4 mm long, chasmogamous. Glumes smooth, acute; lower glumes 1.85–2.15 mm long, 0.53–0.63 times as long as the lemma, 1-nerved; upper glumes 2.25–2.5 mm long, 3(–5)-nerved. Rachilla joint

(when present) smooth, 0.75–1.35 mm long, process often exerted, 1.1–1.5 mm long. First lemmas 2.9–3.15 mm long, web absent, smooth, acuminate to falcate, 5(–7)-nerved. First palea distinctly shorter than the lemma, keels smooth. Anthers c. 0.6 mm long.  $2n = ?$

Distribution – Papua New Guinea: Chimbu Prov. (Wilhelm, Observatory Peak).

Habitat – Shaded place beneath rock in gully, 4085 m alt.

Note – Named for the collector, Jeremy Smith, and for the fact that any study of the genus is bound to be a jeremiad.

### 17. *Poa keysseri* Pilg.

For literature see under the varieties.

Tufted perennials, usually branching intra-vaginally at base. Culms stiff, (15–)50–150 cm long. Sheaths not articulating with the blades. Ligules collar-shaped, unequal, the cauline longest, 0.5–2.5(–4) mm long, truncate, finely erose, glabrous to scaberulous. Blades stiff, erecto-patent, usually involute, (6–)10–40 cm by 1–5.5 mm, smooth, the uppermost sometimes scaberulous, acute. Panicles lax, more or less secund, 9–32 cm by 20–120(–300) mm; branches erecto-patent to reflexed, scaberulous, the lowermost 2–12(–more) together, the longest 60–140 mm long, naked in the lower (0.2–)0.4–0.6th, 9–many-spikeled. Spikelets 2–5- (or 6-)flowered, 2.75–9.2(–10.25) mm long, chasmogamous or cleistogamous. Glumes scaberulous, especially on the nerves; lower glumes 1.7–5.25 mm long, 0.67–0.9 times as long as the lemma, 1–3-nerved; upper glumes 2–5.3 mm long, 3(–5)-nerved. Rachilla smooth to scaberulous; lowest joint 0.3–1.7 mm long; process 1–1.75 mm long. First lemmas 2.25–5 mm long, webbed at base and often also along the lower part of the midrib, scaberulous, especially on the nerves, apex cuneate to truncate, entire to erose or emarginate, or shortly mucronate, 5–7(–11)-nerved. First palea shorter than the lemma, keels scaberulous. Anthers 0.75–2.7 mm long.

Note – Formerly, I have distinguished three subspecies in this polymorphic species. In view of the differences between them, which are only slight, a varietal status seems more apt.

#### a. var. *brassii* (Hitchc.) Veldk., *comb. nov.*

*Poa brassii* Hitchc., Brittonia 2 (1936) 110. — *Poa keysseri* subsp. *brassii* Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1067. — Type: *Brass* 4874 (NY holo; A, BM).

Lowermost branches of the panicle (2 or) 3–12 (or more) together, then densely fastigiate, the longest (9–)33–c. 120-spikeled. Spikelets 2.75–5.5 mm long, cleistogamous or chasmogamous. Lower glumes 1.7–3 mm long, the upper 2–3 mm long. Rachilla joints usually scaberulous. First lemmas 2.25–3(–3.2) mm long. Anthers 0.75–1.5 mm long.  $2n = ?$

Distribution – Papua New Guinea: Enga (Yobobos grasslands), W Highlands (Hagen, Tomba), Chimbu (Wilhelm), E Highlands (Goroka), Madang (Abilala), Morobe (Cromwell Mts, Samanzing), Central (Tafa), Milne Bay Prov. (Nawandowan R.).

Habitat – Disturbed areas along river banks, roads, and in forest clearings, 1525–2820 m alt. (see note).

Note – *Gillison 49* is said to have been collected at 1500 ft (c. 460 m) in Kwapse- nek (Morobe Prov.), which seems much too low.

**b. var. keysseri, comb. nov.**

*Poa keysseri* Pilg., Bot. Jahrb. 62 (1929) 460. — *Poa keysseri* subsp. *keysseri*: Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1067, t. 345 A–N. — Type: *Keysser s.n.* (B † holo; BM).

*Poa cruttwellii* C.E. Hubb., Kew Bull. 4 (1949) 474. — Type: *Cruttwell 61* (K holo; L).

*Poa gymnohypsos* Gilli in Feddes Repert. 92 (1981) 293, 297, tab. 12, nom. nud. — Voucher: *Gilli 340* (W).

*Poa egregia* auct. non Chase.

*Poa nivicola* auct. non Ridley.

*Poa saruwagetica* auct. non Pilg.

Lowermost branches of the panicle 2–6 (or 7) together, the longest 10–22(–more)-spikeled. Spikelets (5.25–)6–9.2(–10.25) mm long, chasmogamous. Lower glumes 3–5.25 mm long; upper glumes 3.5–5.3 mm long. Rachilla joints usually smooth. First lemmas (3.75–)4–5.5 mm long. Anthers 1.9–2.7 mm long.  $2n = 56$ .

Distribution – New Guinea: probably on all high mountains, apparently much more common East of Telefomin.

Habitat – Subalpine open to shrubby or tussocky (*Deschampsia klossii*) grasslands, also on well-drained, peaty to sandy soil, resistant to trampling, digging by pigs, fire, then sometimes becoming a pioneer and dominant, at (1750–)2700–4300 m altitude.

Collector's notes – Tussock-forming. Sheaths reddish, copper, purplish green. Leaves mid to dark green, soft. Panicles secund, pale green to purplish. Margins of chaffs silvery. Anthers white to yellowish cream. Stigmas white.

**c. var. saruwagetica (Pilg.) Veldk., comb. nov.**

*Poa saruwagetica* Pilg., Bot. Jahrb. 62 (1929) 459. — *Poa keysseri* subsp. *saruwagetica* Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1068, t. 345 O–Q. — Type: *Keysser s.n.* (B † holo; BM).

*Poa archboldii* Hitchc., Brittonia 2 (1936) 109. — Type: *Brass 4480* (NY holo; L, US).

*Poa brassii* auct. non Hitchc.

*Poa cruttwellii* auct. non C.E. Hubb.

*Poa longiramea* auct. non Hitchc.

*Poa luzoniensis* auct. non Merr.

*Poa nivicola* auct. non Ridley.

*Poa spec. 2*: Johns & Stevens, Bot. Bull., Lae 6 (1971) 12.

Lowermost branches of the panicle (2 or) 3–6 (or 7) together, the lowermost longest (9–)15–50(–85)-spikeled. Spikelets (4.25–)4.5–6.75(–7) mm long, chasmogamous or cleistogamous. Lower glumes (2–)2.4–3.5(–4.1) mm long, upper glumes (2.5–)2.75–3.8(–4) mm long. Rachilla joints usually scaberulous. First lemmas (2.7–)3–4(–4.3) mm long. Anthers 0.85–1.1 mm long (cleistogamous florets) or 1.2–2.2 mm long (chasmogamous florets).  $2n = 56$ .

Distribution – New Guinea: Irian Jaya (Snow Mts: Carstensch, Bele River, Wilhelmiana); Papua New Guinea: W Sepik (Star Mts), Enga (Margarima, Kepilam), W Highlands (Sirunki, Kum, Upper Kaugel Valley), S Highlands (Yombi, Kagoba, Mt Hagen), Chimbu (Sinasina, Michael, Daulo Pass, Otto, Obura), Madang (Lake Naho, Abilala), Morobe (Wantoat, Enggom, Samanzing, Bolan, Saruwaged, Gawin Wain), Central (Albert Edward), Northern (Isuani Basin, Victoria), Milne Bay Prov. (Suckling).

Habitat – Disturbed areas along paths, in forest margins, *Cyathea* grasslands, *Gleichenia* heaths, peaty subalpine grasslands, (1525–)1900–4150 m alt.

Uses – Perhaps planted as a decoration near a grave in Tenggor village near Margarima, Enga Prov. (*Pullen 2848*).

Collector's notes – Tufted to straggling. Blades pale to mid green. Peduncles pale reddish. Panicles secund to suberect, pale green to purple. Lemmas with silvery margins. Anthers, stigmas white.

Note – *Poa archboldii* is included here. It is a form with a much reduced to absent web, thus approaching *P. longiramea* (q. v.).

### 18. *Poa kuborensis* Veldk., *spec. nov.*

*Poa lunata* auct. non Chase.

Ab omnibus speciebus malesianis differt in culmis plusminusve solitariis ad paucis confertis basi intra- et extra-vaginaliter ramosis 2.5–8 cm longis, ligulis inaequalibus basalibus plus quam 1.25 mm longis summo caulinis 2–3.5 mm longis, laminis laxe plicatis laevibus, paniculis contractis, ramis infimis longissimis in parte inferiore 0.6–1 nudis 1- vel 2-spiculatis. — Typus: *Vink 16184* (L holo; CANB, LAE), Papua New Guinea, W Highlands Prov., Kubor Range, Mt Kantz, 3860 m, 26 July 1963.

Small-tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 2.5–8 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, acute, glabrous to scaberulous; the basal 1.25–2 mm long; the cauline 2–3.5 mm long. Blades stiff, erect, flatly folded, keeled, 1.3–4.5 cm by c. 1.25 mm, smooth, acute. Panicles contracted, erect, 2.5–3.5 cm by 3–6 mm; branches appressed, smooth, distally scaberulous, the lowermost solitary, 20–25 mm long, naked in the lower 0.6–1th, 1- or 2-spikeled. Spikelets (2- or 3- (or 4-) flowered, 6–7.6 mm long, chasmogamous. Glumes smooth, 3-nerved, at base faintly 5-nerved; lower glumes 4.15–5.25 mm long, 0.87–1 times as long as the lemma; upper glumes 4.5–5.1 mm long. Rachilla smooth; lowest joint 0.5–1 mm long; process 0.6–2.75 mm long. First lemmas 4.6–5.35 mm long, web absent, smooth, apex acute to minutely mucronate, 5–7(–9)-nerved. Palea shorter than the lemma, keels scaberulous in the upper half. Anthers c. 0.8 mm long.  $2n = ?$

Distribution – Papua New Guinea, W Highlands Prov., Kubor Range (Mt Kantz, Mt Kinkain: *Pullen 5096-A*).

Habitat – Subalpine grasslands, wet peaty places, together with *P. hentyi*, 3565–3860 m alt.

Collector's notes – Culms solitary or in small tufts. Panicle purple.

**19. *Poa lamii* Jansen**

*Poa lamii* Jansen, Reinwardtia 2 (1953) 326, t. 16. — Type: *Lam 1664* (L. holo).

*Poa erectifolia* Hitchc. var. *scabriflora* Jansen, Reinwardtia 2 (1953) 326. — Type: *McGregor s. n.* (L. holo; MEL, US).

*Poa erectifolia* auct. non Hitchc.

*Poa languidior* auct. non Hitchc.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 17–73 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, 0.5–4 mm long, smooth, the basal collar-shaped and truncate to triangular and acuminate, the cauline triangular, acute to caudate. Blades stiff, erect, involute, 8–25 cm by 0.4–1.7 mm wide, smooth, acute. Panicles contracted to lax, erect, secund, 3.5–12 cm by 10–90 mm; branches appressed to patent, subsmooth to scaberulous, the lowermost (1 or) 2 or 3(–5) together, the longest 14–50(–65) mm long, naked in the lower 0.5–0.75th, 3–13-spikeled. Spikelets (1- or) 2- or 3- (or 4-)flowered, (3.75–)4–6.75 mm long, chasmogamous. Glumes acute, scaberulous at least on the nerves; lower glumes 2.7–4.85 mm long, 0.7–1 times as long as the lemma, 1–3-nerved; upper glumes 2.75–5.25 mm long, 3–5-nerved. Rachilla smooth to setulose (to shortly villose); lower joint 0.5–1(–1.2) mm long; process (0.2–)0.8–2.25 mm long. First lemmas (3.1–)3.25–5 mm long, scaberulous all over, 3- or 5- (or 7-) nerved, web absent, apex cuneate to acute, rarely minutely mucronate. Palea slightly shorter to slightly longer than the lemma, keels scaberulous. Anthers 1–2.9 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Snow Mts: Carstensz, Doorman, Wilhelmina); Papua New Guinea (Central: Albert Edward; Northern: Knutsford, Victoria; Milne Bay: Strong, Suckling, Ganaina).

Habitat – Subalpine shrubby grasslands, flat, peaty, badly drained areas, also in rather shaded places in coppices, 2830–3960 m. Sometimes dominant and vegetation-forming.

Collector's notes – Culms erect, purple at base or nearly all over. Blades pungent, green, slightly glaucous, purple. Panicles glaucous, variegated, purple.

Notes – A very variable species with a curious disjunction. Because of the few collections available the local variability is difficult to ascertain, but it seems that nearly each population differs slightly from the others. In the Western part the ligules are always triangular and the peduncles smooth. Those from the Carstensz (2 collections seen) show no distinctive trait, those from the Doorman (2) have only 2 or 3 spikelets on the lowest, longest branch of the panicle, the glumes are scaberulous on the nerves only, the lower 0.8–1 times as long as the first lemma, the rachilla joint setulose. The specimens from the Wilhelmina (4) have exceptionally wide panicles (5–9 cm), those from the Star Mts (1) have short spikelets (3.75–4 mm long) with 2.25–2.6 mm long lower glumes and 2.75–3 mm long upper ones.

In the East the specimens from the Knutsford (1, but many specimens) have a setulose rachilla, and the apex of the first lemmas is acute to minutely mucronate. In the Murray Pass (1) and on the Strong (2) the basal ligules are collar-shaped and truncate. In the first area the spikelets are (3.75–)4–4.75 mm long, the lower glumes

2.75–3.25 mm, the upper 3.25–3.6 mm, the first lemmas 3.6–3.85 mm. On the Strong (2) the upper glumes are 5-nerved, one specimen had shortly villose rachilla joints. On the Suckling (4) and Ganaina (1) the peduncles are scaberulous and the lemmas often 3-nerved.

## 20. *Poa languidior* Hitchc.

*Poa languidior* Hitchc., Brittonia 2 (1936) 111. — Type: Brass 4238 (NY holo; K neg. 5634, L, US).

*Poa keysseri* auct. non Pilg.

Loosely tufted or mat-forming perennials, branching intra- and extra-vaginally at the base. Culms weak, sometimes trailing, rooting in the decumbent nodes, 10–50 (–85) cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, glabrous; the basal collar-shaped, from 0.4 mm up, truncate, the cauline triangular, 1–4.5 mm long, acute to rounded. Blades flaccid, more or less erect, flat to folded (apparently when exposed), 5–13.5 cm by 0.5–3 mm wide, smooth beneath, above scaberulous to puberulous, acute. Panicles lax, erect, the larger somewhat nodding, 3.5–15 cm by 20–90 mm; branches patent to reflexed, sometimes wavy, smooth to scaberulous, the lowermost (1 or) 2 (or 3) together, the longest (17–)35–58 mm long, naked in the lower (0.3–)0.5–0.67th, 2–12-spikeled. Spikelets 1- or 2- (or 3-)flowered, 3.5–5.7 mm long, chasmo- or cleistogamous. Glumes smooth to finely scaberulous on the nerves; lower glumes (1.3–)1.5–2.5(–3.15) mm long, 0.4–0.6(–0.75) times as long as the lemma, 1-nerved; upper glumes 1.8–3(–3.65) mm long, 3-nerved. Rachilla smooth; lowest joint 0.4–1 mm long; process 0.25–2 mm long. First lemmas 2.9–3.5(–4.6) mm long, web usually scanty to nearly absent (upper lemmas often without any), smooth to finely scaberulous on the nerves, apex gradually acute to acuminate, 3–5-nerved. Palea half as long to distinctly shorter than the lemma, keels scaberulous in the upper half. Anthers 0.5–0.9(–1.5) mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz, Wilhelmina); Papua New Guinea: W Sepik (Capella), Western (Karoma), Enga (Ambua), W Highlands (Burgers), S Highlands (Ialibu, Kegum), Chimbu (Wilhelm, Kerigomna), E Highlands (Michael, Otto, Piora), Madang (Abilala), Morobe (Saruwaged, Samanzing), Central (Strong, Kenive, Yule, Albert Edward, Scratchley, Victoria), Milne Bay Prov. (Suckling). Probably wide-spread, but easily overlooked.

Habitat – Usually hidden in moss cushions and so sometimes epiphytic, and moist, shaded crevices, (2485–)3000–3800 m alt.

Collector's notes – Tufted to loosely mat-forming. Culms sprawling to erect, pale to dark green, or purplish. Panicles erect to secund, branches patent to reflected. Spikelets pale green to purple. Anthers white or purple with white suture. Stigmas white.

Notes – *Poa takasagomontana* Ohwi [Feddes Repert. 36 (1934) 41] from Taiwan is very similar, but differs by the sparsely pilose basal sheaths (no Malesian species ever has this!), the relatively longer lower glume, 0.6–0.7 times as long as the first lemma, the longer upper glume, 3.5–4.2 mm long, and first lemma, 3.75–4.6 mm long with a quite copious web (Ohwi's remark that it would be absent seems erroneous).

*Poa languidior* is inconspicuous in the field, because of its fine culms, blades, and inflorescences, growing in shaded places with other herbs. When one knows where to look for it the species is more common than apparent from the herbarium.

## 21. *Poa leptalea* Veldk., *spec. nov.*

*Poa languidior* auct. non Hitchc.

Ab omnibus speciebus malesianis differt in habitu perennanti, culmis infirmis plusminusve solitariis ad paucis confertis, ligulis 1.4–3.5 mm longis, laminis flaccidis planis, paniculis contractis. — Typus: *Brass 4774-a* (US holo; NY), Papua New Guinea, Central Prov., Murray Pass, 2840 m, 8 Aug. 1933.

Perennials. Culms solitary or few together, branching intra- and extra-vaginally at base, weak, 13–25 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, 1.4–3.5 mm long, acute. Blades flaccid, erect to slightly patent, flat, 8.7–12.5 cm by 1–1.5 mm wide, smooth, acute. Panicles contracted, erect, secund, 3.5–4.5 cm by 7–15 mm; branches appressed, scaberulous, the lowermost paired, the longest 12–17 mm long, naked in the lower 0.5–0.6th, 4–7-spikeled. Spikelets 1- (or 2-)flowered, 3.4–3.8(–4.25) mm long, chasmogamous. Glumes scaberulous on the midrib; lower glumes 2.5–2.8 mm long, c. 0.7 times as long as the lemma, 1-nerved; upper glumes 2.9–3.5 mm long, 3-nerved. Rachilla subsmooth to slightly scaberulous; lowest joint (when present) c. 0.7 mm long; process 0.4–1 mm long. First lemmas 3.1–3.25 mm long, web copious, subsmooth, 5-nerved, apex acute. Palea subequal to the lemma, keels smooth. Anthers c. 1 mm long.  $2n = ?$

Distribution – Papua New Guinea: Central Prov., Murray Pass.

Habitat – Epiphytic on bole of tree-fern in grassland, 2840 m alt.

Collector's notes – Delicate grass.

Notes – These may be depauperate specimens of a usually more robust species, even so the usually 1-flowered spikelets and the distinct web set it apart.

The type material was tentatively cited as a paratype of *P. languidior* by Hitchcock, but that species differs by the tufted culms, basal ligules collar-shaped, truncate, erose, panicles lax, 20–90 mm wide, branches patent to reflexed, glumes smooth, first palea shorter than the lemma to half as long, keels scaberulous.

Named for its slender habit.

## 22. *Poa longiramea* Hitchc.

*Poa longiramea* Hitchc., *Brittonia* 2 (1936) 112. — Type: *Brass 4393* (NY holo; A, BM, BO, K, L, US).

*Poa spec.* 3: Coode & Stevens, *Proc. New Guinea Sc. Soc.* 23 (1972) 24, pro *LAE 51403, 46251* p.p.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 30–80 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, glabrous; the basal collar-shaped, truncate or accolade-shaped, from 0.2 mm up, the cauline triangular, up to 1.5 mm long, acute, entire to erose. Blades stiff, erect, loosely

folded, 8–28 cm by 0.5–3 mm, smooth, acute. Panicles lax, secund, nodding, (7.5–)8.5–16.5 cm by 20–110 mm; branches erecto-patent to patent, finally somewhat wavy, scaberulous upward, the lowermost 1–4 together, the longest 38–100 mm long, naked in the lower 0.33–0.67th, 6–23-spikeled. Spikelets 3- or 4- (or 5-) flowered, 3.8–6.75(–7) mm long, chasmogamous. Glumes scaberulous on the nerves and sometimes in between; lower glumes 2.5–4(–4.9) mm long, 0.71–0.92 times as long as the lemma, 3-nerved; upper glumes 2.6–4.3(–5.5) mm long, (3–)5-nerved. Rachilla smooth to minutely scaberulous; lowest joint 0.35–0.4 mm long; process 0.8–2.25 mm long. First lemmas 3–4.35(–5.75) mm long, web usually absent (see note), scaberulous on the nerves and sometimes in between, apex gradually acute, 5–7-nerved. Palea shorter than the lemma, keels scaberulous. Anthers 0.4–0.9 mm long.  $2n = ?$

Distribution – New Guinea: Central (Strong, Neon Basin, Albert Edward, Fala), Northern Prov. (Murray Pass).

Habitat – Open, subalpine grasslands, boggy areas, along paths in forest, 2800–3600 m alt.

Collector's notes – Plant pale green, soft textured. Blades pale to red green. Peduncle secund, purplish. Spikelets purplish. Anthers purple.

Note – *Brass 4195* has a very scanty web but otherwise seems identical. Very similar to the form of *P. keysseri* var. *saruwagetica*, described as *P. archboldii*.

— Cauline ligules collar-shaped, truncate, arose, subequal. Blades erecto-patent to patent, involute. First lemmas apex cuneate. — Anthers said to be white

*Poa keysseri* Pilg. var. *saruwagetica*

— Cauline ligules triangular, acute, unequal, the upper cauline longest. Blades erect, loosely folded. First lemmas apex gradually acute. — Anthers said to be purple

*Poa longiramea*

### 23. *Poa lunata* Chase

*Poa lunata* Chase, J. Arnold Arbor. 24 (1943) 81, f. 2. — Type: *Brass & Meijer Drees 10067* (A holo; BM, BO, K neg. 5626, L, US).

*Poa callosa* auct. non Stapf.

*Poa lamii* auct. non Jansen.

Tufted perennials, possibly sometimes cushion-forming, branching intra-vaginally at base. Culms stiff, (6–)17–38 cm long. Sheaths not articulating with the blades. Ligules triangular, acute, unequal, the cauline longest, glabrous to slightly scaberulous; the basal 1–2.75 mm long, the cauline 1.5–6.7 mm long. Blades stiff, erect, involute, (2.5–)5–15 cm by 0.25–1.3 mm, smooth, acute. Panicles contracted, erect, (3.5–)4.5–10 cm by (4–)8–15 mm; branches appressed, setulose scaberulous, the lowermost solitary or paired, the longest 23–53 mm long, naked in the lower 0.25–0.7th, 3–25-spikeled. Spikelets (1- or 2- or 3-) flowered, (3.5–)4.25–7.5 mm long, chasmogamous or cleistogamous. Glumes scaberulous on the nerves; lower glumes 2.25–4.1 mm long, 0.6–0.85 times as long as the lemma, 1–3-nerved; upper glumes 2.85–4.35 mm long, 3-nerved. Rachilla smooth or scaberulous at base; lowest joint 0.5–1.5 mm long; process 1.75–3.25 mm long. First lemmas 3–5 mm long, web absent or developed at base and sometimes on the basal part of the midrib; midrib

and nerves smooth to scaberulous, apex acute to minutely mucronate, (3–)5-nerved. Palea shorter than to subequal to the lemma, keels scaberulous at least in the upper part. Anthers 0.65–1.4 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz, Wilhelmina); Papua New Guinea: W Sepik Prov. (Star Mts).

Habitat – Subalpine grassland, old screes, 3400–4100 m alt.

Collector's notes – Small tussocks. Culms stiff. Panicles contracted to slightly spreading. Spikelets appressed, green to purple.

Note – A rather heterogeneous species. Some collections are mixtures of two extremes, a large-spikeled and a small-spikeled one. The type-collection in A is an example of this and Ms. Chase's description is based partly on the one, partly on the other form. Other collections appear to be intermediary.

#### 24. *Poa minimiflora* Stapf

*Poa minimiflora* Stapf in Hook. f., Icon. Pl. IV, 7 (June 1899) t. 2608, p. 1; Kew Bull. (July/Aug. 1899) 116. — Type: *Giulianetti s.n.* (K holo; L, MEL) (see note).

*Poa callosa* auct. non Stapf.

*Poa epileuca* auct. non Stapf.

*Poa* spec.: Wade & McVean, Mt Wilhelm Studies 1 (1969) 91, 92, 119, 175, 187, 188, 193, 195, 212.

*Poa* spec. 4: Johns & Stevens, Bot. Bull., Lae 6 (1971) 12.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 4.5–30 cm long. Sheaths not articulating with the blades. Ligules unequal, triangular, acute, smooth; the basal from 1.5 mm up, the cauline up to 4.5 mm long. Blades erect, stiff, involute, filiform, 2–8 cm by 0.3–0.6 mm, smooth, acute. Panicles contracted to lax, erect, 3–5.5 cm by 5–14 mm; branches appressed to patent, scaberulous to minutely setulose, the lowermost (1–)3 together, the longest 10–26 mm long, naked in the lower 0.3–0.6th, 2–8-spikeled. Spikelets (1- or) 2- (or 3-)flowered, (1.75–) 2.25–2.75(–3.25) mm long, chasmogamous. Glumes minutely scaberulous (lens  $\times 25!$ ); lower glumes (1–)1.35–2.2(–2.5) mm long, 0.6–0.9 times as long as the lemma, 1-nerved; upper glumes (1.25–)1.75–2.5(–2.75) mm long, 3-nerved. Rachilla smooth to ciliate; lowest joints 0.2–0.35 mm long; process (0.2–)0.4–0.65 mm long. First lemmas (1.1–)2–2.4 mm long, web absent, minutely scaberulous (lens  $\times 25!$ ), apex acute, faintly 3(–5)-nerved. First palea subequal to the lemma, the second usually protruding, keels scaberulous. Anthers 0.5–1.2 mm long.  $2n = ?$

Distribution – Papua New Guinea: W Highlands (Sigul Mugal), S Highlands (Giluwe), Chimbu (Wilhelm), E Highlands (Michael), Morobe (Amungwiwa, Saruwaged, Bangeta), Central Prov. (Albert Edward, Scratchley).

Habitat – Subalpine tussock-grasslands, herb-fields on wet, peaty, overgrown screes, etc., locally common, 3200–4000 m alt.

Collector's notes – Small tussocks. Leaves yellowish to dull mid green, glaucous. Panicles purple.

Notes – The type collection is somewhat aberrant: the spikelets are 1- or 2-flowered, 1.75–2.5 mm long, lower glumes 1–1.35 mm long, upper 1.25–1.5 mm, first

lemmas 1.6–1.75 mm long. Such small, partly 1-flowered spikelets occur only very rarely (e.g. *van Royen 11140*, Amungwiwa), but it seems unlikely that two taxa are involved considering the overall similarity otherwise. One collection (*Dept. Forests, 23-7-1954, K*) has some 3-flowered spikelets.

Wade (*ANU 7433*) stated that on Mt Wilhelm this species would be common above 3690 m, and this number is repeatedly cited as a voucher by Wade & McVean. From this well-collected area very few specimens have been brought in, however, and the species is probably much more rare than suggested. It would seem that a mismatch with one or more other species is involved, but I do not know which.

## 25. *Poa multinodis* Chase

*Poa multinodis* Chase, *J. Arnold Arbor.* 24 (1943) 81, t. 3. — Type: *Brass 9584* (A holo; K neg. 5623; US; cited as '*Brass 9854*' by Jansen, 1953).  
*Aulacolepis epileuca* auct. non Hitchc.

Loosely tufted perennials with runners, branching intra- and extra-vaginally at base. Culms erect to trailing, geniculate, sometimes rooting in the decumbent nodes, 10–80 cm long. Sheaths not articulating with the blades. Ligules smooth, unequal, the cauline longest, the basal accolade- to collar-shaped, 0.4–1 mm long, truncate, erose, the cauline 1–1.7 mm long, acutish. Blades erect, rather stiff, folded to flattish, 1.3–6.5 cm by 0.5–1.5 mm, smooth, acute, upper surface sometimes minutely retrorsely puberulous, margin at base smooth or retrorsely scaberulous. Panicles contracted, lax in fruit, erect, 2–8 cm by 12–40 mm; branches finally patent to reflexed, subglabrous to finely or pusticular scaberulous, the lowermost solitary or paired, the longest 6–25 mm long, naked in the lower 0.37–0.54th, 6–20-spikeled. Spikelets (1- or) 2-flowered, 2.25–3.75 mm long, chasmogamous. Glumes scaberulous on the midrib; lower glumes 1–1.8 mm long, 0.5–0.62 times as long as the lemma, 1-nerved; upper glumes 1.25–2.15 mm long, sulcately 3-nerved. Rachilla smooth; lowest joint (0.35–)0.5–0.75 mm long; process 0.65–1.25 mm long. First lemmas 2–2.7 mm long, midrib scaberulous, otherwise smooth, 5-nerved, web absent, apex acute. Palea distinctly to slightly shorter than the lemma, keels smooth. Anthers 0.5–0.75 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Lake Habbema); Papua New Guinea: W Sepik (Star Mts), Morobe (Saruwaged, see note), Central Prov. (Albert Edward).

Habitat – Wet forest glades, dry spots in subalpine grasslands, as a pioneer in burnt places, locally frequent, 2960–3350 m alt.

Collector's notes – Small, very soft tussocks. Leaves pale to bright green. Panicles often with zig-zag axes. Spikelets often pointing down, mid green, purple-brown at apex. Stigmas white.

Notes – Note the great disjunction in distribution. A similar one seems to be present in *P. pilata*.

The record for the Saruwaged is based on a scrappy specimen with a single immature panicle, *Clemens 6102+* (US ex A), found mixed with *Clemens 6102* (*P. minimiflora*). It differs slightly from the description given above by the subequal, triangular ligules, only c. 0.5 mm long. The inflorescence is contracted, which may be due to the fact that it is still young; the longest lowermost branch is 5-spikeled.

**26. *Poa muricata* Veldk., spec. nov.***Poa callosa* auct. non Stapf.

Ab omnibus speciebus malesianis differt in ligulis inaequalibus superioribus longissimis acutis 2.3–3.5 mm longis, laminis subulatis involutis muricatis (lens  $\times 25!$ ), paniculis contractis, ramis appressis, glumis tote scaberulis, lemmatibus primis 2.4–2.8 mm longis, antheris 0.6–1 mm longis. — Typus: ANU 15496 (*J.M.B. Smith*) (L. holo; CANB, LAE), Papua New Guinea, Chimbu Prov., Mt Wilhelm, Upper Pindaunde Valley, 4175 m alt., 15 Aug. 1972.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, (4–)7–23 cm long. Sheaths not articulating with the blades. Ligules triangular, acute, unequal, the cauline longest, the basal 0.5–2 mm long, scaberulous, the cauline 2.3–3.5 mm long, more or less smooth. Blades subulate, erect to curving out, involute, (1.2–)2.7–8 cm by 0.6–1.3 mm, muricate (lens  $\times 25!$ ), acute. Panicles erect, densely contracted, (1.4–)2.5–4.5 cm by 4–11 mm, many-spikeled; branches appressed, scabrous, the lowermost (1 or) 2 or 3 together, the longest 9–20 mm long, naked in the lower (0.16–)0.2–0.35th, 5–16-spikeled. Spikelets (1- or) 2-flowered, (2–) 2.85–3.25 mm long, chasmogamous. Glumes scabrous, especially on the nerves; lower glumes (1.5–)2.25–2.75 mm long, 0.75–0.96 times as long as the lemma, faintly 1–3-nerved; upper glumes (1.5–)2.25–3 mm long, faintly 3-nerved. Rachilla smooth; lowest joint 0.3–0.5(–0.75) mm long; process 0.5–0.8 mm long. First lemmas (1.4–)2.4–2.8 mm long, web absent, midrib scabrous, otherwise sub-smooth to sparsely scaberulous, apex acute, faintly 3-nerved. First palea slightly shorter than the lemma, keels scabrous. Anthers 0.6–1 mm long.  $2n = ?$

Distribution – Papua New Guinea: Chimbu Prov. (Wilhelm).

Habitat – Subalpine short-grass (often mixed with *Poa hypsinephes*), and *Deschampsia*-tussock grasslands, locally common, 3960–4510 m alt.

Collector's notes – Tufted. Culms stiffly erect. Leaves glaucous. Panicles purplish.

Notes – Very similar to *P. minimiflora* by the description, but differing especially by muricate blades.

*Poa papuana* is also similar, but differs by the collar-shaped, truncate, erose, basal ligules, the lax panicles, the 1-flowered spikelets, the scaberulous nerves of the glumes, the scaberulous midrib of the first lemma, and the first palea longer than the lemma.

ANU 7293 (*McVean*) (CANB) represents a small plant with exceptionally small spikelets, most of the bracketed low values in the description have been derived from this. These reductions may be due to the fact that it came from near the summit of Mt Wilhelm (4510 m alt.), although dimensions of spikelets generally appear not to be influenced by edaphic factors.

**27. *Poa nivicola* Ridley**

*Poa nivicola* Ridley, Trans. Linn. Soc., London, Bot. II, 9 (1916) 251. — Lectotype: *Kloss s.n.* (BM, holo).

*Poa egregia* Chase, J. Arnold Arbor. 24 (1943) 79, t. 1. — Type: *Brass & Meijer Drees 10206* (A holo; BM, BO, L, LAE, US).

*Poa cf. cruttwellii*: Walker, J. Ecol. 56 (1968) 451, pro ANU 5164 (*Walker*).

*Poa languidior* auct. non Hitchc.

*Poa* spec.: Chase, J. Arnold Arbor. 24 (1943) 83, pro *Brass & Meijer Drees 10347*.

*Poa* spec. 3: Johns & Stevens, Bot. Bull., Lae 6 (1971) 12, pro *ANU 5164 (Walker)*.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, up to 40 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, acute, 2.75–9.25 mm long, glabrous. Blades stiff to flaccid, more or less erect, flat to loosely folded, 4–13 cm by 1–3.5 mm wide, smooth or upper surface slightly scaberulous, acute. Panicles lax, somewhat secund and nodding, 4–11 cm by 15–50 mm; branches erecto-patent to patent, scaberulous, the lowermost solitary or paired, the longest 25–70 mm long, naked in the lower 0.5–0.67th, 4–16-spikel- ed. Spikelets 24-flowered, 3.6–7 mm long, chasmo- or cleistogamous. Glumes smooth to setosely scaberulous, acute to mucronate; lower glumes 3–5.75 mm long, 0.75–1 times as long as the lemma, 3-nerved; upper glumes 3.25–6.75 mm long, 3–5-nerved. Rachilla smooth, rarely scaberulous; lowest joint 0.5–0.85 mm long; process 1.25–2.5 mm long. First lemmas 3.5–6(–6.75) mm long, web usually present to copious; smooth to setosely scaberulous, apex usually broadly cuneate, erose, mucronate to 3-dentate, 3–7-nerved. Palea shorter than the lemma, scaberulous on and between the keels. Anthers 1–1.7 mm long.  $2n = ?$

Distribution – New Guinea: Carstensz, Wilhelmina, W Sepik (Capella), Chimbu Prov. (Wilhelm).

Habitat – Alpine grasslands, on broken scree, rock outcrops in pockets of moist clay, pioneering at high altitudes and possibly replacing *P. keysseri* there, e.g. on Mt Wilhelm, sometimes locally common; 3680–4330 m alt.

Collector's notes – Tufted. Nodes laterally flattened. Blades flat, soft, dull mid green, keeled towards tip, margins finely serrate. Panicles secund, bluish to purplish green, purple. Anthers pale violet to pinkish. Stigmas white.

Notes – The species has here perhaps been taken in a too broad circumscription as various forms seem to be represented, one of which has been described separately as *P. telata* here. As, however, so few collections were available, it may well be that these are only variants of a rather polymorphic species.

- a) (Incl. type) chaffs, rachilla joints smooth, lemmas webbed, mucronate (Carstensz, Wilhelmina).
- b) (Incl. type of *P. egregia*) chaffs setosely scaberulous, rachilla joints smooth, lemmas webbed, mucronate (Wilhelmina, Capella).

These two forms seem rather distinct in their spikelets, but intermediaries occur:

- c) Chaffs only slightly scaberulous, rachilla joints smooth, lemmas acute, non-mucronate, web scanty or absent (Capella).
- d) Chaffs, rachilla joints very scabrous, lemmas not webbed, apex erose to slightly apiculate (Wilhelm).

## 28. *Poa papuana* Stapf

*Poa papuana* Stapf in Hook. f., Icon. Pl. IV, 7 (June 1899) t. 2607, p. 1; Kew Bull. 1899 (July/Aug. 1899) 116. — *Poa papuana* subsp. *papuana*: Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1105, f. 358, pl. 106. — Type: *Giulianetti s.n.* (K holo = *Hb. McGregor s.n.* in MEL?, W).

*Aulacolepis epileuca* auct. non Hitchc.

*Festuca pusilla* auct. non Hook. f.

*Poa epileuca* auct. non Stapf.

*Poa kerguelensis* auct. non Steud.

*Poa spec.*: Wade & McVean, Mt Wilhelm Studies 1 (1969), quoad ANU 7633.

*Poa spec.* 1: Johns & Stevens, Bot. Bull., Lae 6 (1971) 12, quoad ANU 7627, 7633.

Densely tufted to cushion-forming perennials, branching intra-vaginally at base. Culms stiff, (2-)5-30 cm long. Sheaths not articulating with the blades. Ligules unequal, usually glabrous; the basal collar-shaped, 0.25-1.25 mm long, truncate, erose; the cauline triangular to trapezoid, 1-2.4(-2.6) mm long, obtuse to acute. Blades stiff, erect, involute, (0.5-)1.3-6(-7) cm by 0.25-0.5(-1) mm, acute, usually rough and densely muricate (lens  $\times 25!$ ; see also note). Panicles laxly contracted, erect, (0.8-)1.1-3(-3.7) cm by 3-12 mm, 5-many-flowered; branches more or less erecto-patent, scaberulous, the lowermost (1 or) 2(-4) together, the longest 5-13 mm long, naked in the lower 0.3-0.6th, (1-)3-6(-12)-spikeled. Spikelets 1-flowered, 2.15-2.85(-3.25) mm long, chasmogamous. Glumes scaberulous on the midrib; lower glumes 1.25-2 mm long, (0.55-)0.65-0.8(-0.85) times as long as the lemma, 1(-3)-nerved; upper glumes 1.35-2 mm long, (1-)3-nerved. Rachilla smooth; process (0.25-)0.6-0.85 mm long. First lemmas 1.9-2.5(-2.75) mm long, web absent, smooth but for the midrib, apex acute, faintly 3(-5)-nerved. Palea usually distinctly longer than the lemma, keels smooth to scaberulous upward. Anthers 0.75-1 mm long.  $2n = 28$ .

Distribution - Sabah (Kinabalu), Celebes (Latimojong Mts), New Guinea: probably wide-spread in all subalpine areas from the Carstenz to the Suckling.

Habitat - Granite crevices, subalpine short-grassland, dry, exposed, lichenous areas to moist shaded gullies, boggy, peaty marshes, treefern grassland; 3100-4500 m alt.

Collector's notes - Small tufts to large cushions. Blades fine, subulate, rough, laterally compressed, yellowish, pale, dull (mid), bluish green. Peduncle reddish. Panicles grey green, (dull) purple, branches appressed, later erecto-patent. Glumes with pink margins. Anthers, stigmas white.

Notes - In the field various forms differing in size, colour, etc. seem to be present, but in the herbarium no clearly distinguishable entities can be distinguished. Some possible forms are:

- a) Specimens from the Owen Stanley Range tend to be more robust, while those from the Kinabalu and the Saruwaged tend to be small, with somewhat smaller panicles with less spikelets.
- b) The few specimens seen from Celebes all have smooth blades, also under magnification, but are otherwise similar.

These two forms seem rather distinct in their spikelets, but intermediaries occur:

- c) Inflorescences exceptionally elongated, branches divergent, the basal about as long as the subsequent node of the axis with 9-12 spikelets (Mt Strong).
- d) Blades exceptionally long, inflorescences contracted (Knutsford, Suckling).

Jansen [Reinwardtia 2 (1953) 325] mentioned a viviparous form from the Owen Stanley's (Mt Victoria). This is *Deyouxia uncinioides* (S.T. Blake) Veldk.

### 29. *Poa parva* Veldk., *spec. nov.*

Ab omnibus speciebus malesianis differt in habitu laxe caespitoso, culmis basi intra- et extra-vaginaliter ramosis 2.5–4 cm longis, ligulis subaequalibus acutis 0.5–0.75 mm longis, laminis 1.4–1.8 cm longis apice rotundato, paniculis 1–2 mm latis, ramis laevibus. — Type: *Mangen 1002* (L. holo; LUX), New Guinea, Irian Jaya, Mt Wilhelmina, terraces West of Trikora Pass, 3780 m alt.

Loosely tussocky perennials, branching intra- and extra-vaginally at base. Culms stiff, 2.5–4 cm long. Sheaths not articulating with the blades. Ligules subequal, 0.5–0.75 mm long, triangular, acute, smooth. Blades stiff, erect to slightly curved, involute, filiform, 1.4–1.8 cm by 0.4–0.75 mm, rounded, smooth. Panicles contracted, erect, 1–1.5 cm by 1–2 mm, 4- or 5-spikeled; the branches appressed to erecto-patent, smooth, the lowermost solitary, 4.5–7 mm long, 1-spikeled. Spikelets 1-flowered, 2.5–2.75 mm long, chasmogamous, purple. Glumes smooth, inconspicuously nerved, lower glumes 1.25–1.6 mm long, 0.5–0.58 times as long as the lemma, 1-nerved; upper glumes 1.75–2.1 mm long, 3-nerved. Rachilla process enclosed, 0.35–0.5 mm long. First lemmas 2.4–2.65 mm long, web absent, smooth, acute, faintly 5-nerved. Palea slightly shorter than to subequal to the lemma, keels smooth. Anthers c. 0.75 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Wilhelmina).

Habitat – Subalpine short-grassland and heaths, 3780–4100 m alt.

Notes – *Poa clavigera* differs by branching intra-vaginally at base, basal ligules acuminate, blades acute, panicle branches scaberulous, the longest lowermost 7–17 mm long, rachilla process 1.6–2.6 mm long, first lemmas 3-nerved, often apiculate.

*Poa pilata* differs by being cushion-forming, branching intra-vaginally at base, blades erecto-patent to patent, acute, branches scaberulous to puberulous, spikelets 2- or 3-flowered, 3–3.75 mm long, lower glumes 1.6–2 mm long, 3-nerved, upper glumes 5-nerved, rachilla process 1–2.25 mm long.

### 30. *Poa pilata* Chase

*Poa pilata* Chase, *J. Arnold Arbor.* 24 (1943) 82. — Type: *Brass & Meijer Drees 10153* (A holo; K neg. 5624, BO, US).

Densely sward- or cushion-forming perennials, branching intra-vaginally at base. Culms stiff, 1–6 cm long. Leaves very distichous. Sheaths not articulating with the blades. Ligules subequal to unequal, rim-like to triangular, 0.15–0.75 mm long, truncate to acutish, glabrous. Blades subulate, involute, erecto-patent to patent, 1.3–5 cm by 0.4–1 mm, smooth, acute. Panicles contracted, erect, 1.4–3.7 cm by 2–3 mm, 1–6-spikeled; branches appressed, scaberulous to ciliolate, the lowermost solitary, rarely paired, 5–15 mm long, 1-spikeled. Spikelets 2- (or 3-)flowered, 3–3.75 mm long, chasmogamous. Glumes smooth or midrib sparsely scaberulous, acute; lower glumes (1.35–)1.6–2(–2.35) mm long, (0.5–)0.6–0.75 times as long as the lemma, faintly 3-nerved; upper glumes 1.75–2.25(–2.5) mm long, faintly 3- or 5-nerved at least at base. Rachilla smooth; lowest joint 0.5–1 mm long; process 1–2.25 mm long. First lemmas 2.3–2.6(–3.35) mm long, web absent, smooth or midrib sparsely scaberulous, apex acute, 3- or faintly 5-nerved. First palea shorter than the lemma, the upper sometimes longer, keels ciliolately scaberulous. Anthers 0.6–0.9 mm long.  $2n = ?$

Distribution – New Guinea: Carstenz, Wilhelmina, Lake Habbema, Central Prov. (Albert Edward, Scratchley).

Habitat – Sward- or cushion-forming in flat, peaty bogs and on tracks, abundant to dominant, 3225–4100 m alt.

Collector's notes – Sward- or cushion-forming. Leaves grey-green.

Notes – Note the disjunct distribution.

The BO and L specimens of *Brass & Meijer Drees 9942* doubtfully included by Ms. Chase represent *Danthonia oreoboloides*.

*LAE 54504-B (Stevens & Coode)*, mixed with *P. callosa* in L, differs slightly by the longer blades, the longer and more-spikeled inflorescences, the longer glumes, and the lemmas.

### 31. *Poa pratensis* L.

*Poa pratensis* L., Sp. Pl. 1 (1753) 67; Holub, Fol. Geobot. & Phytotax. 18 (1983) 327. — *Poa viridis* Gilib., Exerc. Phyt. 2 (1792) 530, nom. inval., superfl. — *Poa angustifolia* L. var. *pratensis* Simonk., Enum. Fl. Transsilv. (1887) 580. — *Paneion pratense* Lunell, Am. Midl. Nat. 4 (1915) 222, comb. incorr. — Lectotype: Not resolved.

*Poa luzoniensis* Merr., Philipp. J. Sc. 1 (1906) Suppl.: 180. — Type: *Merrill 5712* ('4712') (PNH † holotype; K, L fragm., W).

Tufted, rhizomatous perennials, branching intra- and extra-vaginally at base. Culms geniculate, stiff, 17–70 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, collar-shaped, truncate, glabrous; the basal 0.15–0.5 mm long; the cauline 0.6–1.25 mm long. Blades flaccid to stiff, erect to reflexed, folded to flat, 6–37 cm by 0.4–4.5 mm, smooth, acute. Panicles laxly contracted to lax, erect, 5.5–11 cm by 10–55 mm; branches erecto-patent to patent (in fruit), smooth to scaberulous, the lowermost 3–5 together, the longest 14–40 mm long, naked in the lower 0.45–0.75th, 3–10-spikeled. Spikelets 3- or 4-flowered, 3.75–4.5 mm long, chasmogamous. Glumes smooth to scaberulous on the nerves; lower glumes 1.8–2.6 mm long, 0.62–0.75 times as long as the lemma, 1-nerved; upper glumes 2.3–3.25 mm long, 3-nerved. Rachilla smooth; lowest joint 0.3–0.5 mm long; process 0.6–1 mm long. First lemmas 2.6–3.35 mm long, copiously webbed, midrib and outer nerves with a crest of hairs in the lower half, smooth to finely scaberulous, apex acute, 5-nerved. First palea distinctly shorter than the lemma, keels smooth to finely scaberulous. Anthers 0.85–1.75 mm long.  $2n = 28, 42, 50-78, 91, 98$ .

Distribution – Temperate regions of the Old World; introduced elsewhere, e.g. in Malesia: E Java by Buysman [Teysmannia 23 (1912) 768], but apparently not persistent, and Papua New Guinea [Wilhelm, c. 3490 m, fide Smith, Science New Guinea 16 (1990) 13], but no specimens on record; Philippines: Luzon (Pauai, St. Tomas), already found in 1905.

Habitat – Meadows, banks of streams, 2075–2400(–3490?) m alt.

Uses – Excellent grazing, producing good hay.

Vernacular names – Kentucky bluegrass, smooth meadow-grass (E.).

Notes – Very variable, mainly apomictic, although apparently chasmogamous. The various forms usually remain unnamed.

In Europe an entity '*angustifolia*' is distinguished as an infraspecific form or as a distinct species. The collections from Luzon are intermediary between the two, throwing doubt on its distinctiveness.

### 32. *Poa pulviniformis* (Veldk.) Veldk., *comb. nov.*

[*Poa papuana* Stapf var. *pulviniformis* Veldk. in Stevens & Veldk., Bot. Bull., Lae 10 (1980) 31, nomen.] — *Poa papuana* subsp. *pulviniformis* Veldk. in P. Royen, Alp. Fl. New Guinea 2 (1979) 1105, t. 359. — Type: LAE 54225 (*Veldkamp & Stevens*) (L holo; A, BISH, BO, BRI, K, LAE, NSW, SING).

*Aulacolepis epileuca* auct. non Hitchc.

*Poa epileuca* auct. non Stapf.

*Festuca pusilla* auct. non Hook. f.

*Poa* spec. 2: Coode & Stevens, Proc. P.N.G. Sc. Soc. 23 (1972) 24.

Densely cushion-forming perennials, branching intra-vaginally at base. Culms stiff, 2–6(–9) cm long. Sheaths not articulating with the blades. Ligules subequal, triangular, 0.25–0.75 mm long, acute, glabrous. Blades stiff, erect, involute, 4–14 cm by c. 0.3 mm, smooth, acute. Panicles lax, erect, 0.5–1.3 cm by 2–5 mm; branches erecto-patent, smooth to scaberulous, the lowermost solitary or paired, the longest 3.5–4 mm long, 1-spikeled. Spikelets 1-flowered, 1.75–2.15(–2.25) mm long, chas-mogamous. Glumes smooth; lower glumes 0.9–1.6 mm long, 0.55–0.75 (–0.8) times as long as the lemma, 1-nerved; upper glumes 0.95–1.75 mm long, 3-nerved at base. Rachilla smooth; process 0.3–0.6 mm long. First lemmas 1.4–1.9 mm long, web absent, smooth, midrib scaberulous upward, apex acute, faintly 3-nerved. Palea longer than the lemma, keels smooth. Anthers 0.75–0.85 mm long.  $2n = ?$

Distribution – Papua New Guinea: Morobe (Strong), Central (Albert Edward, Scratchley, Victoria), Milne Bay Prov. (Suckling).

Habitat – Moist, sometimes boggy, often sloping, very short-grasslands on shallow soil, 2800–3800 m alt.

Collector's notes – Cushion-forming. Leaves pale, mid, dull dark green. Panicle green, purplish.

Note – Although I described this originally as a subspecies of *P. papuana*, further study has convinced me that a distinct species is involved.

### 33. *Poa quadrata* Veldk., *spec. nov.*

Ab omnibus speciebus malesianis differt in culmis 48–63 cm longis, ligulis inaequalibus triangularibus acutis, basalibus 1–2 mm longis, caulinis 2.75–3.25 mm longis, laminis involutis, paniculis 40–55 mm latis, spiculis 4.5–5.25 mm longis, glumis toto scaberulis, inferioribus 2.25–2.5 mm longis, lemmatibus primis basi exigue telatis. — Typus: LAE 68028 (*Croft & Hope*) (L holo; A, BRI, CANB, LAE), Papua New Guinea, W Sepik Prov., Star Mts, S slope Mt Scorpion, 3400 m alt., 25 May 1975.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 48–63 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, acute, the basal 1–2 mm long, the cauline 2.75–3.25 mm long, scaberulous. Blades stiff, erect, involute, 5.2–14 cm by 0.5–1 mm wide, smooth, acute.

Panicles lax, erect, 3.5–7 cm by 40–55 mm; branches erecto-patent to patent, at rather straight angles, sparsely scaberulous, the lowermost paired, the longest 24–32 mm long, naked in the lower 0.5–0.6th, 4–6-spikeled. Spikelets 2-flowered, 4.5–5.25 mm long, chasmogamous. Glumes scaberulous especially on the nerves, acuminate; lower glumes 2.25–2.5 mm long, 0.53–0.62 times as long as the lemma, 1-nerved; upper glumes 2.8–2.9 mm long, 3-nerved. Rachilla setulosely scaberulous; lowest joint 0.6–0.8 mm long; process 1.25–2.25 mm long. First lemmas 3.8–4.25 mm long (incl. mucro), web scanty; scaberulous, apex acuminate, mucronate, 5-nerved, mucro especially well-developed on the second lemma, slightly patent-erect, 0.25–0.6 mm long. First palea shorter than the lemma, scaberulous on and between the keels, second palea slightly longer than the body of the lemma. Anthers not seen.  $2n = ?$

Distribution – Papua New Guinea: W Sepik Prov., Star Mts (Scorpion).

Habitat – Subalpine grasslands, 3400 m alt.

Collector's notes – Leaves dull mid green. Panicles green with purple.

Notes – Most similar to *P. lunata*, but this differs by the 6–38 cm long culms, the contracted, 5–15 mm wide panicles with appressed branches, the scaberulous nerves of the glumes, and the first lemmas with midrib and nerves smooth to scaberulous.

Conspicuous for the divaricately branched panicle and the mucronate lemmas.

### 34. *Poa rigidula* Veldk., *spec. nov.*

*Poa multinodis* auct. non Chase.

Ab omnibus speciebus malesianis differt in habitu perennanti (laxe) caespitose, culmis strictis, ligulis triangularibus acutis inaequalibus superioribus longissimis caulinis 3.5–7 mm longis, laminis plicatis ad planis erectis, paniculis 20–47 mm latis, ramis laevibus, spiculis 1-floris, glumis laevibus, lemmatis primi costa leviter scaberula. — Typus: *Raynal 17391* (L. holo; BR, P), New Guinea, Irian Jaya, Carstensz, Carstensz Meadow, 3400 m alt., 29 April 1973.

(Loosely) tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, erect to geniculate, 12–50 cm long. Sheaths not articulating with the blades. Ligules triangular, acute, glabrous, unequal, the cauline longest, the basal 1.25–4 mm long, the cauline 3.5–7 mm long. Blades rather stiff, folded to flattish, 2–12 cm by 0.5–2 mm, smooth, rarely slightly scaberulous, apex slightly falcate. Panicles erect, contracted, becoming lax in fruit, then 3.5–8.5 cm by 20–47 mm; branches finally patent to reflexed, smooth, the lowermost 2 or 3 together, the longest 15–33 mm long, naked in the lower (0.33–)0.4–0.55th, 5–16-spikeled. Spikelets 1-flowered, (2.9–)3.1–3.75 mm long, chasmogamous. Glumes smooth; lower glumes 1–1.5 mm long, 0.32–0.48 times as long as the lemma, 1-nerved; upper glumes 1.4–2 (–2.2) mm long, sulcately 3(–5)-nerved. Rachilla process 1–1.75 mm long, smooth. Lemmas 2.6–3.5 mm long, 3-nerved, midrib slightly scaberulous, otherwise smooth, web absent, apex acute. Palea slightly shorter to longer than the lemma, keels slightly scaberulous, apex acuminate, deeply bidentate. Anthers 0.6–1.6 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya (Carstensz, Wilhelmina).

Habitat – Steep slope, gaps in subalpine shrubbery and forest, rocky meadows, 2650–3940 m alt.

Notes – Superficially similar to *P. multinodis* in its habit, foliage, and rigidly patent panicle branches when in fruit. Differing, however, by the stiff culms, the triangular ligules, the uppermost 3.5–7 mm long, the usually quite smooth panicle branches, strictly 1-flowered spikelets, the smooth glumes, the lower 0.32–0.48 times as long as the lemma, the 3-nerved first lemmas with the lateral nerves close to the margins, none in the middle, and the acuminate bidentate palea usually slightly longer than the lemma (as in some *P. epileuca*) with scaberulous keels.

*Poa languidior* differs by the weak culms, the collar-shaped, truncate, erose basal ligules, the flaccid blades, and the smooth midrib of the first lemmas.

### 35. *Poa stellaris* Veldk., *spec. nov.*

Ab omnibus speciebus malesianis differt in ligulis subaequalibus collariformibus 0.3–0.65 mm longis truncatis, laminis involutis erectis, paniculis 5.5–8 cm longis 10–15 mm latis, ramis appressis, spiculis 5–5.5 mm longis. — Typus: *Veldkamp 6221* (L holo), Papua New Guinea, W Sepik Prov., Star Mts, Tel Basin, c. 5° S, 141° 5' E, 2960 m, 1 April 1975.

Tufted perennials, branching intra-vaginally at base. Culms stiff, 17–40 cm long. Sheaths not articulating with the blades. Ligules subequal, collar-shaped, 0.3–0.65 mm long, truncate, glabrous. Blades stiff, erect, involute, 4–8 cm by 0.5–1 mm, smooth, acute. Panicles contracted at anthesis, erect, 5.5–8 cm by 10–15 mm; branches appressed, scaberulous, the lowermost paired, the longest 30–40 mm long, naked in the lower 0.4–0.5th, 7–10-spikeled. Spikelets (2- or) 3-flowered, 5–5.5 mm long, chasmogamous. Glumes scaberulous on the 3 nerves; lower glumes 2.1–2.5 mm long, 0.57–0.67 times as long as the lemma; upper glumes 2.5–2.75 mm long. Rachilla slightly scaberulous; lowest joint c. 0.75 mm long; process 2.25–2.5 mm long. First lemmas 3.25–3.6 mm long, web absent, scaberulous on the conspicuous nerves, otherwise smooth, apex broadly cuneate, 5-nerved. Palea subequal to the lemma, keels scaberulous from base. Anthers 0.45–0.5 mm long.  $2n = ?$

Distribution – Papua New Guinea: W Sepik Prov., Star Mts.

Habitat – Shaded, moist, grassy, muddy gully subjected to periodical floodings, locally frequent, c. 2960 m alt.

Collector's notes – Loose tussocks. Leaves folded, mid green. Panicle contracted, green. Lemmas occasionally with purple veins, margins white-scarious. Anthers white or with purplish margins.

Note – Most similar to *P. lunata*, differing by the collar-shaped, 0.3–0.65 mm long, truncate, erose ligules, the 2.5–2.75 mm long upper glumes, the cuneate apex of the first lemma, and the 0.45–0.5 mm long anthers. *Poa lunata* seems to grow in more open areas at higher altitudes.

### 36. *Poa suavis* Veldk., *spec. nov.*

Ab omnibus speciebus malesianis differt in habitu caespitoso, ligulis subaequalibus plus minusve triangularibus c. 0.5 mm longis acutis, laminis 4.5–7 cm longis 0.5–0.6 mm latis, paniculis laxis 1.7–3.4 cm longis 8–15 mm latis, ramis erecto-patentibus. — Typus: *Hoogland & Schodde 7400* (L holo; A, BM, CANB, K, LAE, NSW, US), Papua New Guinea, W Highland Prov., Lagaip Valley, near Kपालim, exposed limestone rock, 2250 m alt., 10 Aug. 1960.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 9–30 cm long. Sheaths not disarticulating with the blades. Ligules subequal, more or less triangular, c. 0.5 mm long, acute, minutely scaberulous. Blades stiff, involute, filiform, 4.5–7 cm by 0.5–0.6 mm, smooth, acute, throat minutely puberulous. Panicles lax, erect, 1.7–3.4 cm by 8–15 mm, green; branches erecto-patent, scaberulous to minutely setulose, the lowermost 1–3 together, the longest 7–13 mm long, naked in the lower 0.3–0.4th, 2–9-spikeled. Spikelets 2- or 3-flowered, 2.5–3.25 mm long, chasmogamous. Glumes midrib scaberulous; lower glumes 1.1–1.5 mm long, 0.62–0.73 times as long as the lemma, 1–3-nerved; upper glumes 1.35–1.6 mm long, 3-nerved. Rachilla smooth; lowest joint 0.4–0.5 mm long; process 1–1.5 mm long. First lemmas 1.4–2.25 mm long, web absent, midrib scaberulous, apex acute, faintly 3–5-nerved. First palea shorter than the lemma, keels scaberulous. Anthers c. 0.4 mm long, violet.  $2n = ?$

Distribution – Papua New Guinea: Enga Prov., Lagaip Valley, near Kepilam.

Habitat – Exposed limestone rock, 2250 m alt.

Notes – *Poa minimiflora* appears most similar, but differs by: ligules unequal, the upper cauline longest, 1.5–4.5 mm long, glumes scaberulous all over, lowest rachilla joint 0.2–0.35 mm long, process 0.2–0.65 mm long, first lemmas scaberulous all over, first palea subequal to the lemma, anthers 0.5–1.2 mm long, yellowish.

This species was found at an exceptionally low altitude for a native *Poa*; only *P. keysseri* is found lower.

Named for its gracious habit: tussocks of fine, filiform leaves, and a handsome, small, green panicle.

### 37. *Poa telata* Veldk., *spec. nov.*

Ab omnibus speciebus malesianis differt in culmis basi intra-vaginaliter ramosis, ligulis inaequalibus superioribus longissimis acuminatis, basalibus 2–3 mm longis, paniculis secundis, glumis superioribus 5.3–6.2 mm longis, lemmatibus primis sparse telatis. — Typus: *McGregor s.n.* (MEL holo; no. MEL 69412), Papua New Guinea, Central Prov., Mt Knutsford, A° 1889.

Tufted perennials, branching intra-vaginally at base. Culms stiff, 17–30 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, acuminate, glabrous, the basal 2–3 mm long, the cauline 3.5–4.15 mm long. Blades stiff, erect, involute, 5.5–11 cm by 0.75–1.25 mm wide, smooth, acute. Panicles lax, secund, 6–10 cm by 10–20 mm; branches patent, scaberulous, the lowermost solitary or paired, the longest 45–50 mm long, naked in the lower 0.5th, 7–10-spikeled. Spikelets 2-flowered, 5.75–6.75 mm long, chasmogamous. Glumes scaberulous all over, 3-nerved; lower glumes 4.4–5.5 mm long, 0.73–1 times as long as the lemma, upper glumes 5.3–6.2 mm long. Rachilla smooth, lower joint 0.75–1 mm long; process 1.5–2 mm long. First lemmas 5–5.6 mm long, scaberulous, 5-nerved, web scanty, apex cuneate to acute and mucronulate. First palea slightly shorter than to subequal to lemma, second palea slightly longer, scaberulous all over. Anthers 2.6–3 mm long.  $2n = ?$

Distribution – Papua New Guinea: Central Prov. (Knutsford).

Habitat – Not noted, probably subalpine grasslands.

Notes – Represented by several collections made for McGregor and never found again. Apparently close to *P. lamii*, which is a very variable species, differing by the 2.75–5.25 mm long upper glumes and the absence of webbed lemmas.

*Poa nivicola*, as accepted here, is rather variable; *Poa telata* may be an outlying form of it. At present it seems to differ significantly by the way of basal branching, the involute blades, and the longer anthers.

### 38. *Poa trinervis* (Hack.) Monod de Froideville

*Poa trinervis* (Hack.) Monod de Froideville in P. Royen, Alp. Fl. New Guinea 2 (1979) 1109. — *Festuca trinervis* Hack., Oesterr. Bot. Zeitschr. 63 (1903) 34. — Type: *Armit s.n.* (W holo; L, MEL).

*Poa erectifolia* auct. non Hitchc.

Tufted perennials, branching intra- and extra-vaginally at base. Culms stiff, 12.5–35 cm long. Sheaths not articulating with the blades. Ligules unequal, the cauline longest, triangular, acute, scaberulous; the basal 0.5–1 mm up, the cauline 2–3.25 mm long. Blades stiff, erect, involute, 4–15 cm by 0.5–0.7 mm, smooth, acute. Panicles loosely contracted to lax, erect, 4–8.5 cm by 5–25 mm, branches erecto-patent to patent, scaberulous, the lowermost 2 or 3 together, the longest 15–32 mm long, naked in the lower 0.4–0.6th, 2–15-spikeled. Spikelets 2-flowered, 2.8–4 mm long, chasmogamous. Glumes acute, scaberulous; lower glumes 2.1–3.1 mm long, 0.8–0.9 times as long as the lemma, 1–3-nerved; upper glumes 2.6–3.5 mm long, 3-nerved. Rachilla scaberulous; lowest joint 0.4–0.5 mm long; process 0.5–1 mm long. First lemmas 2.5–3.5 mm long, web absent, more or less scaberulous, 3- to faintly 7-nerved. Palea shorter than to subequal to the lemma, keels scaberulous. Anthers 1.3–1.6 mm long.  $2n = ?$

Distribution – New Guinea: Milne Bay Prov. (Suckling, Dayman).

Habitat – Subalpine short-grasslands, locally common, 2750–3385 m alt.

Collector's notes – Tufted. Leaves mid green, sometimes rather purplish. Panicles purple.

### 39. *Poa trivialis* L.

*Poa trivialis* L., Sp. Pl. 1 (1753) 67. — Type: not resolved.

*Aira semineutra* Waldst. & Kit. in Schult., Oestr. Fl. 1 (1794) 199. — *Poa semineutra* Trin., Fund. Agrost. (1820) 139. — *Poa trivialis* L. var. *semineutra* Griseb. in Ledeb., Fl. Ross. 4 (1853) 380. — Type: *Waldstein & Kitaibel s.n.* (BP holo).

Description based on Java material.

Perennials, branching intra- and extra-vaginally at base. Culms solitary, or few together, geniculate, rooting at the nodes, stiff, 35–60 cm long. Sheaths not articulating with the blades, usually smooth (!). Ligules triangular, ochrea-shaped, acutish, often torn, unequal, the cauline longest, glabrous; the basal 2.5–4 mm long; the cauline 2.5–7 mm long. Blades flaccid, patent to reflexed, flat, 7.5–23.5 cm by 1.75–4.5 mm, smooth, acute. Panicles lax, erect, 9–22 cm by 20–75 mm; branches erecto-patent to patent (in fruit), scaberulous, the lowermost 2–6 together, the longest 18–60 mm long, naked in the lower 0.37–0.5th, 9–27-spikeled. Spikelets 2- or 3-

flowered, 2.5–3.75 mm long, chasmogamous. Glumes scaberulous on the nerves; lower glumes 1.35–1.8 mm long, 0.5–0.67 times as long as the lemma, 1-nerved; upper glumes 1.8–2.6 mm long, 3-nerved. Rachilla smooth; lowest joint 0.3–0.5 mm long; process 0.4–0.6 mm long. First lemmas 2.1–3.1 mm long, copiously webbed, midrib with a crest of hairs in the lower half, nerves smooth to finely scaberulous, apex acute, 5-nerved. First palea distinctly shorter than the lemma, keels smooth. Anthers 0.9–1.6 mm long.  $2n = 14$ .

Distribution – Temperate Eurasia, introduced elsewhere, e.g. in Malesia: Java (Gedeh-Pangerango-complex, in the saddle).

Habitat – Forest trail, around hut, 2300–2400 m alt.

Vernacular names – Rough meadowgrass, rough bluegrass (E.).

Collector's notes – Culms geniculate. Leaves somewhat bluish green.

Uses – Very palatable to stock, useful for hay; included in mixtures for coarse lawns.

#### 40. *Poa wilhelminae* Veldk.

*Poa wilhelminae* Veldk. in P. Royen, *Alp. Fl. New Guinea* 2 (1979) 1081. — Type: *Brass & Meijer Drees 10347-bis* (A holo; L, US).

Tufted perennials, branching intra- and extra-vaginally at base, sometimes with runners. Culms stiff, 12–30 cm long. Sheaths not articulating with the blades. Ligules subequal, triangular, 2–3.5 mm long, rounded to acute, glabrous. Blades stiff, erect, flat to loosely folded, 2.3–9 cm by 1.6–3.5 mm wide, smooth, acute. Panicles lax, erect, 5.5–8 cm by 37–40 mm; branches appressed, scaberulous, the lowermost 2–4 together, the longest 25–38 mm long, naked in the lower 0.5–0.6th, 3–7-spikeled. Spikelets 1- or 2-flowered, 3.75–5.25 mm long, chasmogamous. Glumes smooth but for the midrib; lower glumes 2.25–2.5 mm long, c. 0.6 times as long as the lemma, 1–3-nerved; upper glumes 2.65–2.9 mm long, 3-nerved. Rachilla smooth; lower joint 0.5–1.1 mm long; process 1.5–2.25 mm long. First lemmas 3.5–4 mm long, web present, not very copious, smooth but for the midrib, apex gradually acute, faintly 5-nerved. Palea subequal to the lemma, keels scaberulous in the upper half. Anthers 1–1.1 mm long.  $2n = ?$

Distribution – New Guinea: Wilhelmina.

Habitat – Moist places near waterfall on limestone, c. 3850 m alt.

Note – Most similar to *P. lamii*, which differs by the unequal ligules, the upper cauline longest, blades involute, the lower glumes 2.7–4.85 mm long, 0.7–1 times as long as the lemma, and the first lemmas scaberulous all over.

#### 41. *Poa wisselii* Jansen

*Poa wisselii* Jansen, *Reinwardtia* 2 (1953) 330. — Type: *Wissel 25-A* (BO holo).

*Aulacolepis epileuca* auct. non Hitchc.

*Poa epileuca* auct. non Stapf.

*Poa minimiflora* auct. non Stapf.

Perennials. Culms tufted or nearly solitary, branching intra- and extra-vaginally at base, stiff, 5–18(–30) cm long. Sheaths not articulating with the blades. Ligules

subequal, collar-shaped, rarely somewhat triangular, 0.15–1.25 mm long, erose, glabrous. Blades stiff, erect to ascending, flat to folded, (2–)2.5–9.5 cm by 0.5–2.6 mm wide, acute to slightly falcate, upper surface and margins scaberulous, lower surface smooth. Panicles contracted to somewhat lax, erect, (1.5–)2–4.5 cm by 4–16 mm; branches appressed to erecto-patent, scaberulous, the lowermost 1–4 together, the longest (8–)11–20 mm long, naked in the lower 0.3–0.5th, 3–8(–10)-spikeled. Spikelets 1-flowered, 2.25–3.25 mm long, chasmogamous. Glumes smooth but for the midrib; lower glumes (1–)1.25–1.75 mm long, 0.36–0.55(–0.63) times as long as the lemma, 1-nerved; upper glumes 1.35–2.1 mm long, 3-nerved. Rachilla process (0.85–)1.1–1.6 mm long. Lemmas (2.2–)2.5–2.85 mm long, web absent, midrib distally sparsely scaberulous to smooth, apex acuminate to mucronate, sometimes uncinata, thickened; 3-nerved. Palea slightly longer to subequal to the lemma, keels distally sparsely scaberulous. Anthers 0.5–0.85 mm long.  $2n = ?$

Distribution – New Guinea: Irian Jaya: Carstensz, Wilhelmina; Papua New Guinea: W Sepik (Star Mts, Wamtakin), W Highlands Prov. (Kinkain).

Habitat – Moist, sheltered areas in subalpine short-grasslands, boggy places, in limestone areas, locally common, 3200–4350 m alt.

Collector's notes – Culms in dense tufts to nearly solitary. Leaves distichous. Panicles erect. Spikelets green to purple. Anthers yellow with purple margins, or purple. Stigmas white.

Note – Very similar is *P. aurigae*, which differs in habit, by the triangular, 1.75–4 mm long ligules, the lax panicle with erecto-patent branches, the lowermost longest 8–15 mm long, and the usually shorter 2.15–2.6 mm long lemmas with a scaberulous midrib and acute apex.

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About 750 numbered and/or dated collections have been studied.

During several expeditions and trips to various mountain summits in Papua New Guinea a number of species could be studied in the field, which very much enhanced an understanding of their ecology and variability. My various companions, Messrs. Paul Kores, Max Kuduk, Simeon Obedi, Peter Stevens, Andries Touw, Artis Vinas, and Joe Wiakabu are much thanked for their assistance, teaching, and forbearance. Funds were provided by the Rijksherbarium, the Netherlands Foundation for the Advancement of Tropical Research (WOTRO, grant W 85-61), the Royal Dutch Academy of Sciences and its Melchior Treub Fund, the Rumphius Fund of the Gresshoff Foundation of the Royal Institute for the Tropics, the Company for Scientific Research in the Tropics ('Treub Maatschappij'), and the Department of Botany, B.P. Bishop Museum.

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## IDENTIFICATION LIST

Specimens cited but not seen have their presumed identity between brackets. (T) = type of a name (sometimes of a synonym!).

ann = 1. <i>Poa annua</i> L.	lan = 20. <i>P. languidior</i> Hitchc.
aur = 2. <i>P. aurigae</i> Veldk.	lep = 21. <i>P. leptalea</i> Veldk.
bor = 3. <i>P. borneensis</i> Jansen	lon = 22. <i>P. longiramea</i> Hitchc.
cal = 4. <i>P. callosa</i> Stapf	lun = 23. <i>P. lunata</i> Chase
cel = 5. <i>P. celebica</i> Ohwi ex Veldk.	min = 24. <i>P. minimiflora</i> Stapf
cla = 6. <i>P. clavigera</i> Veldk.	mul = 25. <i>P. multinodis</i> Chase
cra = 7. <i>P. crassicaulis</i> Pilg.	mur = 26. <i>P. muricata</i> Veldk.
doz = 8. <i>P. dozyi</i> Veldk.	niv = 27. <i>P. nivicola</i> Ridl.
epi = 9. <i>P. epileuca</i> (Stapf) Stapf	pap = 28. <i>P. papuana</i> Stapf
ere = 10. <i>P. erectifolia</i> Hitchc.	par = 29. <i>P. parva</i> Veldk.
hel = 11. <i>P. helenae</i> Veldk.	pil = 30. <i>P. pilata</i> Chase
hen = 12. <i>P. hentyi</i> Veldk.	pra = 31. <i>P. pratensis</i> L.
hyp = 13. <i>P. hypsinephes</i> Veldk.	pul = 32. <i>P. pulviniformis</i> (Veldk.) Veldk.
inc = 14. <i>P. inconspicua</i> Veldk.	qua = 33. <i>P. quadrata</i> Veldk.
jan = 15. <i>P. janseni</i> Veldk.	rig = 34. <i>P. rigidula</i> Veldk.
jer = 16. <i>P. jeremiadis</i> Veldk.	ste = 35. <i>P. stellaris</i> Veldk.
17. <i>P. keysseri</i> Pilg.	sua = 36. <i>P. suavis</i> Veldk.
kbr = 17a. var. <i>brassii</i> (Hitchc.) Veldk.	tel = 37. <i>P. telata</i> Veldk.
kke = 17b. var. <i>keysseri</i>	trn = 38. <i>P. trinervis</i> (Hack.) Monod de
ksa = 17c. var. <i>saruwagetica</i> (Pilg.) Veldk.	trv = 39. <i>P. trivialis</i> L. [Froideville
kub = 18. <i>P. kuborensis</i> Veldk.	wil = 40. <i>P. wilhelminae</i> Veldk.
lam = 19. <i>P. lamii</i> Jansen	wis = 41. <i>P. wisselii</i> Jansen

Alston 15095: ann — Anderson 306: ann — ANU 904 (Walker): ksa; 2415 (Flenley): cra; 5003 (Walker): kke; 5075 (id.): cra; 5103 (id.): hen; 5155 (id.): pap; 5162 (id.): cra; 5163 (id.): hyp (T); 5164 (id.): niv; 5251 (id.): hyp; 7060 (McVean & Wade): kke/ksa; 7088 (id.): lan; 7111 (id.): cra; 7117 (id.): hen; 7204 (id.): hyp/mur; 7246 (id.): kke; 7293 (McVean): hyp/mur; 7433 (Wade): min; 7438 (id.): hen; 7452 (id.): kke; 7627 (id.): pap; 7633 (id.): pap; 10775 (Hope): kke; 10805 (id.): pap; 10809 (id.): min; 10950 (id.): kke; 10955 (id.): lun; 10957 (id.): cra; 10962 (id.): aur/jan/pap; 10963 (id.): inc; 10964 (id.): niv; 10966 (id.): niv; 10967 (id.): doz (T); 10969 (id.): lam; 10970 (id.): wis; 10973 (id.): pil; 10978 (id.): lun/wis; 10979 (id.): rig; 11306 (Hnatiuk): hyp; 11310 (id.): kke; 11311 (id.): pap; 11312 (id.): kke; 11316 (id.): kke; 11361 (id.): kke; 11362 (id.): ksa; 11363 (id.): kke; 11364 (id.): kke; 11365 (id.): kke; 11366 (id.): kke; 11367 (id.): ksa; 13057 (Wace): kke/ksa; 15062 (J.M.B. Smith): kke; 15079 (id.): ann; 15084 (id.): cra; 15089 (id.): kke; 15108 (id.): hyp; 15120 (id.): kke; 15126 (id.): kke; 15130 (id.): hyp; 15138 (id.): hen; 15155 (id.): pap; 15245 (id.): kbr; 15375 (id.): lan; 15431 (id.): kke; 15438 (id.): jer (T); 15451 (id.): pap; 15458 (id.): mur; 15496 (id.): mur (T); 15510 (id.): kke; 15559 (id.): hen; 15591 (id.): min; 16441 (Deveson): ksa.

Backer 12-6-1928: ann; 5693: ann; 5717: ann; 8337: ann; 12500: ann; 13547: ann; 13576: trv; 13576-bis: ann; 15808: ann; 16191: ann; 21481: ann; 21733: ann; 21926: ann; 22281: ann;

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