

**REVISION OF
AGROSTOPHYLLUM SECTION APPENDICULOPSIS (ORCHIDACEAE),
WITH NOTES ON THE SYSTEMATICS OF AGROSTOPHYLLUM**

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(Drawings by the author)

SUMMARY

Section *Appendiculopsis* of the orchid genus *Agrostophyllum* is revised. Six taxa are recognized: *Agrostophyllum elongatum*, *A. laterale*, *A. stipulatum* subsp. *stipulatum* and subsp. *bicuspidatum*, *A. sumatranum* and *A. trifidum*. The status of a seventh taxon, *A. leyense*, is uncertain. No new species are described here. *Agrostophyllum celebicum* Schltr. is reduced to *A. stipulatum* subsp. *stipulatum*, *Poaephyllum hansenii* J. J. Wood is reduced to *A. laterale*. The latter appears to be a strict rheophyte. All species are described and illustrated, and their phylogeny and ecology are discussed. The infrageneric classification and the systematic position of *Agrostophyllum* are reviewed.

INTRODUCTION

The genus *Agrostophyllum* was established by Blume in 1825 with a single species, *A. javanicum*. Three species of *Appendicula* which Blume described at the same time were later transferred to *Agrostophyllum*.

Agrostophyllum has received little attention from botanists, even though some of its species are among the more commonly encountered orchids in their native habitats. The genus is usually said to contain about 60 species, and this seems to be a fair estimate. It is distributed from the Seychelles through tropical Asia east to Samoa, but appears to be absent in Australia. The greatest diversity is found in New Guinea, where at least half of all species occur, most of them endemic. Members of this genus are rarely seen in cultivation.

SYSTEMATIC POSITION OF AGROSTOPHYLLUM

Agrostophyllum has frequently been associated with the genus *Glomera*, e.g. by Schlechter (1914), Brieger (1975) and Kores (1989), probably because of the superficial resemblance in habit and the seemingly similar 'capitate' inflorescence. Dressler (1993) likewise includes *Agrostophyllum* in the Glomerinae, although earlier (1981) he referred it to the Podochilinae. There are actually very few grounds to include *Agrostophyllum* in the Glomerinae, and good arguments for inclusion in the Podochilinae.

The Podochilinae consist of at least the following genera: *Appendicula* (either or not with *Chilopogon* and *Cyphochilus* split off), *Poaephyllum* and *Podochilus*. Dressler (1993) also lists *Chitonochilus*, but that genus, as Kittredge has demonstrated, is based on a peloric species of *Agrostophyllum*.

Arguments for inclusion of *Agrostophyllum* in the Podochilinae as against the Glomerinae are the presence of elaters in the fruits (Hallé, 1986), as well as the clavate, pointed pollinia attached without caudicles to a well-defined, small viscidium.

Dressler (1993: fig. 11-3) suggests that there are two character states that would set *Agrostophyllum* apart from the Podochilinae: strictly terminal inflorescences and conical silica cells (stigmata). I would prefer to call the latter umbonate rather than conical (see figure 2-7 in Dressler, 1993). He was apparently unaware of the fact that all species of *Agrostophyllum* sect. *Appendiculopsis* are capable of producing lateral inflorescences; *A. laterale* normally produces lateral ones only. It is difficult to say whether or not the inflorescences usually seen in *Agrostophyllum*, namely those arranged in terminal fascicles, are all really terminal or actually upper lateral. The terminal racemes and panicles of *Agrostophyllum* sect. *Dolichodesme* are not sharply differentiated from the lower, leafy part of the stems; in fact, these inflorescences appear to be the continuation of the stem, with scales instead of leaves, carrying lateral inflorescences. In the Podochilinae terminal as well as lateral inflorescences often occur in the same species. This character state can therefore not be used to separate *Agrostophyllum* from the Podochilinae. The 'floral head' seen in *Glomera*, at first sight so similar to that of many species of *Agrostophyllum*, is not a cluster of many individual inflorescences as in the latter genus, but a strongly abbreviated, truly terminal raceme.

The shape of the stigmata thus remains as the only character state that would argue against inclusion of *Agrostophyllum* in the Podochilinae. The Podochilinae should all have spherical stigmata, the Glomerinae umbonate ('conical') ones. And indeed, this difference seems to hold in Dressler's circumscription of the subtribes.

I have examined some material myself, and I found that *Appendicula reflexa* (voucher Lam 1132), *A. torta* (de Vogel 1079) and *Poaephyllum trilobum* (Docters van Leeuwen 10337) all have spherical stigmata. On the other hand, all the investigated species of *Agrostophyllum*, including *A. laterale* (Amjah 249), have umbonate stigmata. Nevertheless, the last mentioned species is in many ways so similar to a *Poaephyllum*, that it was recently described as a new species of that genus (*P. hansenii* J.J. Wood), and was considered to be closely related to *P. trilobum*. This seems to indicate that the shape of the stigmata is less fundamental than Dressler believes, at least in this alliance. Therefore I think the most parsimonious solution is to include *Agrostophyllum* in the Podochilinae. See note 1 under *Agrostophyllum laterale* for a discussion of the differences between *Poaephyllum* and *Agrostophyllum*.

The Glomerinae consist, in my opinion, of two genera: *Glomera* (including *Glossorhyncha*, *Giulianettia*, *Ischnocentrum* and *Sepalosiphon*) and *Aglossorhyncha*. There is no doubt that these two genera are closely related. *Ceratostylis*, *Epiblastus* and *Mediocalcar* have often been included in the Glomerinae, but I agree with Dressler (1981, 1993) that they belong in the Eriinae. *Earina*, considered a member of the Glomerinae by Dressler (1993), appears to be related to *Agrostophyllum*, and should, in my opinion, be included in the Podochilinae. The strange paniculate inflorescences of *Earina* resemble those seen in *Agrostophyllum* sect. *Dolichodesme*, but are quite unlike those of *Glomera*. Habitually too, with their deeply slit leaf-sheaths, sometimes with blackish margins, certain species of *Earina* rather closely resemble *Agrostophyllum*.

To summarize, I would differentiate the two subtribes as follows:

Glomerinae: Inflorescences terminal only; fruits without endocarpic elaters; pollinia 4, ovoid, flattened and sulcate on one side (always?), attached to flattened caudicles, with or without viscidium; rostellum a simple transverse rim. Stegmata umbonate. Genera: *Glomera*, *Aglossorhyncha*.

Podochilinae: Inflorescences terminal or lateral or both on the same plant; fruits with endocarpic elaters; pollinia 4, 6, or 8, pyriform to clavate, more or less flattened on both sides, not sulcate, caudicles absent (see note below), with small but distinct viscidium; rostellum more or less rostrate and bidentate, or oblong and entire. Stegmata spherical or umbonate. Genera: *Appendicula* (*Chilopogon*, *Cyphochilus*), *Podochilus*, *Poaephyllum*, *Agrostophyllum*, *Earina*. (Note: The 'caudicles' or 'stipes' often recorded in *Appendicula* are not true caudicles, i.e. appendages of the pollinia; they are modified, sterile pollinia).

INFRAGENERIC CLASSIFICATION OF AGROSTOPHYLLUM

The only attempt at a subgeneric division of *Agrostophyllum* was made by Schlechter in 1912. He distinguished four sections, which he characterized as follows:

- 1) *Dolichodesme*: inflorescence much elongated.
- 2) *Eu-Agrostophyllum* (= *Agrostophyllum*): plants with more or less elongated leaves and abbreviated, densely fasciculate inflorescences.
- 3) *Oliganthe*: Rhizome forming an elongated, pendulous sympodium; inflorescences as in sect. *Agrostophyllum*.
- 4) *Appendiculopsis*: Rhizome somewhat elongated, creeping. Inflorescences as in sect. *Agrostophyllum*. Leaves abruptly constricted between the blade and the sheath, small, at right angles to the stem.

Section *Eu-Agrostophyllum* contains the type species (*A. javanicum* Blume), and must consequently be called sect. *Agrostophyllum*. This section is by far the largest in the genus, and it is quite heterogeneous. To what extent the sections of *Agrostophyllum* represent natural groups remains to be seen. That question can only be answered when the whole genus is revised. When floral characters are also taken into consideration this may lead to a classification partly at odds with the above. For the time being, Schlechter's classification is at least a workable one, and it is followed here with slight emendations.

ACKNOWLEDGEMENTS

I thank the directors and curators of K, L and P for putting their herbarium material of *Agrostophyllum* sect. *Appendiculopsis* at my disposal. Collections from L included spirit material. Also studied were the living specimens at the Hortus Botanicus, Leiden, where all species of sect. *Appendiculopsis*, except for the dubious *A. leytense*, are presently in cultivation. I thank the Prefect of the Hortus for granting me access to these collections.

All taxa, with the exception of *A. stipulatum* subsp. *bicuspidatum* and *A. leytense*, could be observed by the author during field trips in Sarawak and Papua New Guinea; these trips were made possible through the sponsorship of Mrs. T. Mulder-Roelfsema and the late Dr. D. Mulder. A grant from Leiden University is also gratefully acknowledged.

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KEY TO THE SECTIONS OF AGROSTOPHYLLUM

- 1a. Leaves numerous, small (less than 3.5 cm long), abruptly contracted between the blade and the sheath Section **Appendiculopsis** Schltr.
- b. Leaves not at the same time small and abruptly contracted between the blade and the sheath 2
- 2a. Inflorescences lateral, rarely also terminal, very short Section **Appendiculopsis** Schltr. (*A. laterale*)
- b. Inflorescences exclusively terminal (or at least seemingly so), very short and condensed, or elongated 3
- 3a. Inflorescence a single elongated raceme or panicle (or at least seemingly so) Section **Dolichodesme** Schltr.
- b. Inflorescence a usually very dense cluster of 1- to few-flowered racemes, sometimes reduced to a single flower 4
- 4a. Rhizome forming a more or less dichotomously branched, pendulous sympodium, rooting at its base Section **Oliganthe** Schltr.
- b. Rhizome very short, rarely somewhat elongated and then creeping and rooting along its entire length Section **Agrostophyllum**

REVISION OF AGROSTOPHYLLUM SECTION APPENDICULOPSIS

Most members of sect. *Appendiculopsis* are easily recognized by the very slender stems with many small, distichous leaves spreading in one plane, the leaves being abruptly constricted between the blade and the sheath.

One aberrant species, *Agrostophyllum laterale*, deviates considerably from this description. In this species the leaves are linear-lanceolate, not constricted at the base, and not spreading in one plane. The inflorescences in *A. laterale* are normally lateral only, never fascicled at the top of the stem. It is included here in sect. *Appendiculopsis* on the following grounds:

- 1) All species of this section may produce lateral inflorescences well below the top of the leafy stem, even when the latter is not damaged; I have never observed this in any member of the other sections.
- 2) *Agrostophyllum laterale* has a creeping rhizome, like all members of the section. Creeping rhizomes are very exceptional in the other sections, being found only in a few apparently undescribed species from New Guinea that belong to sect. *Agrostophyllum*. These are very different in their floral characters from sect. *Appendiculopsis*.
- 3) The flowers of *A. laterale* are exceedingly similar to those of *A. elongatum*, an undisputed representative of sect. *Appendiculopsis*.
- 4) All species of sect. *Appendiculopsis* agree in having a column without any callosities, folds or sharply delimited grooves just below the stigma; in the other species of *Agrostophyllum* such characters appear to be universally present.

The deviating leaves of *A. laterale* may be an adaptation to its rheophytic habitat. This is further discussed in note 2 under this species. J. J. Smith, in his manuscript notes preserved at the Rijksherbarium, also referred *A. laterale* to sect. *Appendiculopsis*.

Two of the three species of *Agrostophyllum* that Blume described in *Appendicula* (*Appendicula callosa* and *A. hasseltii*) are now included in sect. *Appendiculopsis*. Unfortunately, by the time J. J. Smith noticed their proper affinities, the specific epithets of these two species had already been used for different species of *Agrostophyllum*. This has caused some nomenclatural problems, as will be seen below.

PHYLOGENY

Agrostophyllum sect. *Appendiculopsis* is probably monophyletic. The following characters, already discussed in the preceding paragraph, are considered to be synapomorphies of this section:

- 1) The capability of producing lateral inflorescences on an undamaged leafy stem.
- 2) The simple column.
- 3) The creeping rhizome (which probably evolved independently in some New Guinea species of sect. *Agrostophyllum*).

It seems unlikely that sect. *Appendiculopsis* is primitive within the genus; the tendency to produce lateral inflorescences is generally believed to be a derived character state in the Orchidaceae. The creeping rhizome too, which only sporadically occurs in other genera of the Podochilinae, is unlikely to be a plesiomorphic character state.

Which species in *Agrostophyllum* are the nearest relatives of *Appendiculopsis* is at present difficult to say. It seems most parsimonious to assume that the sister group is found in sect. *Agrostophyllum*, considering that both sect. *Dolichodesme* and sect. *Oliganthe* deviate to a greater extent from *Appendiculopsis* than do most species of sect. *Agrostophyllum*. An outgroup consisting of *A. javanicum* Blume and *A. glumaceum* Hook. f. was chosen from among the more widespread members of sect. *Agrostophyllum*. These are two very different, probably not closely related species. It is hoped that in this way bias is prevented.

The characters and their states used in the analysis below are the following:

- | | |
|---|--|
| <p>1 Inflorescences:
 0: exclusively terminal
 1: at least occasionally lateral</p> <p>2 Column:
 0: with callosities below the stigma
 1: without callosities below the stigma</p> <p>3 Rhizome:
 0: strongly abbreviated
 1: creeping (except in young specimens)</p> <p>4 Leaf:
 0: not constricted between sheath and blade
 1: constricted between sheath and blade</p> <p>5 Rostellum:
 0: short, bidentate
 1: elongated, entire</p> <p>6 Lip:
 0: concave at base
 1: saccate at base</p> | <p>7 Leaf-sheaths:
 0: without vertical appendages
 1: with vertical appendages</p> <p>8 Callus:
 0: no callus between the lobes of the hypochilium
 1: between the lobes of the hypochilium present</p> <p>9 Callus extending to:
 0: well below the top of the epichilium
 1: the top of the epichilium (this character is conditional on state 8.1)</p> <p>10 Individual inflorescences:
 0: 2- or 3-flowered
 1: 1-flowered</p> <p>11 Inflorescences:
 0: predominantly fascicled at the top of the stem
 1: predominantly lateral on the stem</p> |
|---|--|

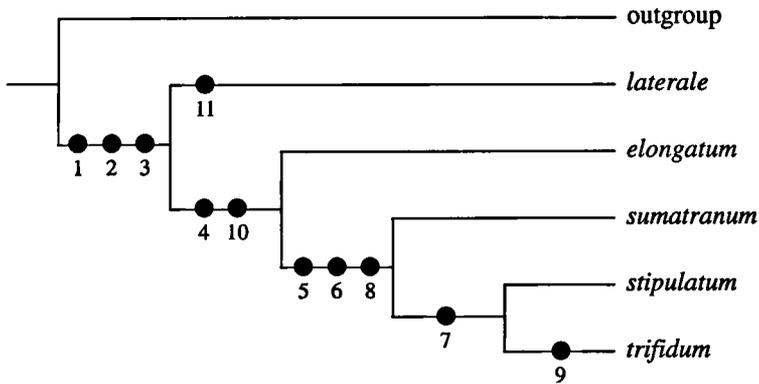
Excluded from the analysis is *A. leytense* Ames, of which I have not seen any material; according to the description this species seems to have a petaloid lip, and may very well be a peloric form. This means that some of its character-states are probably reversals rather than plesiomorphies.

Data matrix for *Agrostophyllum* sect. *Appendiculopsis*.

	1	2	3	4	5	6	7	8	9	10	11
<i>javanicum</i>	0	0	0	0	0	0	0	0	?	0	0
<i>glumaceum</i>	0	0	0	0	0	0	0	0	?	0	0
<i>elongatum</i>	1	1	1	1	0	0	0	0	?	1	0
<i>laterale</i>	1	1	1	0	0	0	0	0	?	0	1
<i>stipulatum</i>	1	1	1	1	1	1	1	1	0	1	0
<i>sumatranum</i>	1	1	1	1	1	1	0	1	0	1	0
<i>trifidum</i>	1	1	1	1	1	1	1	1	1	1	0

The cladogram (next page) is easily seen to be most parsimonious, as there are no homoplasies. It presents no unusual features.

It is possible that the character state 4.0 in *A. laterale* is not primitive, but a reversal, derived from an *A. elongatum*-like ancestor, reflecting the specialized habitat of this rheophytic species. That would not alter the topology of the cladogram, however.



Cladogram of *Agrostophyllum* sect. *Appendiculopsis*.

Agrostophyllum* section *Appendiculopsis

Agrostophyllum Blume sect. *Appendiculopsis* Schltr. ('*Apendiculopsis*'), in Fedde, Rep., Beih. 1 (1912) 257; Brieger in Schltr., Die Orchideen ed. 3, 1 (1975) 378; Seidenf., Opera Bot. 89 (1986) 124. — Type species: *Agrostophyllum stipulatum* (Griff.) Schltr.

Note — *Agrostophyllum laterale* deviates in several respects from the other members of this section. Where this is the case, the character states for *A. laterale* are put between brackets.

Sympodial herbs. *Roots* along the entire rhizome, rather thin, glabrous. Rhizome creeping, short to conspicuously elongated. *Stems* elongated, slender, erect to pendulous, either or not branching, not or slightly fleshy, many-leaved. *Leaves* articulate, papyraceous to thinly coriaceous, small, the lower ones becoming progressively smaller towards the base of the stem, oblong to linear-oblong (linear-lanceolate), twisted at the base (not twisted at the base), lying in one plane with the stem axis (not so), mostly at right angles to the stem (slightly spreading), often marked by the impressions of adjacent leaves (not so), base truncate, strongly contracted between the sheath and the blade (base only slightly narrowed, not contracted at the base), margins entire, apex conspicuously bilobed with rounded lobules (less distinctly so), mucronate; sheaths enveloping the stem, tubular, glabrous, either or not with two acicular to filiform appendages, entire or more frequently deeply longitudinally slit opposite the blade and then with blackish margins along the slit (entire, with an obtuse triangular tooth opposite the blade). *Inflorescences* 1-flowered (up to 3-flowered), usually (not in *A. laterale*) fascicled at the top of the stem into a capitulum, the base of the fascicle with several persistent, distichous, short-lived bracts which eventually dissolve into fibres; occasionally individual inflorescences arise laterally from the stems (in *A. laterale* normally only lateral ones are produced). *Peduncle* very short, enveloped by 2 or 3 membranous, subacute, tubular bracts. Pedicel and ovary with scattered brownish scale-hairs, 6-ribbed, terete, with a membranous, narrowly ovate bract. *Flowers* small, not resupinate, rather fleshy, especially the lip; sepals outside with scattered brownish scale-hairs, epichilium of lip more or less distinctly papillose, otherwise flower glabrous. *Median*

sepal broadly ovate to ovate-oblong, narrower than the lateral sepals, concave. *Lateral sepals* broadly obliquely triangular-ovate, forming an obtuse mentum, connate in the basal part on the adaxial side of the mentum, keeled outside along the midvein. *Petals* linear to lanceolate. *Lip* immobile; hypochilium concave, with the lateral margins free from the column-foot, or saccate, with the lateral margins adnate to the column-foot, which then appears to be absent; containing nectar, sulcate below, more or less conspicuously bilobed in front, the rim connecting the lobes of the hypochilium often with a more or less conspicuous callus; epichilium broadly ovate to transversely elliptic, convex, minutely papillose, median with a longitudinal concavity. *Column* short, semiterete, either or not with two obtuse stelia at the top, without callosities or folds below the stigma; foot short. *Clinandrium* entire, dorsally with a broadly triangular filament. *Anther* subcordate, c. 1 by 1 mm. *Pollinia* 8, c. 1 mm long, clavate, pointed at the base, somewhat flattened, yellow, attached without caudicles to a common, rather small, elliptic, brown viscidium. *Stigma* concave; rostellum either short, bidentate or triangular, or oblong and entire and then overtopping the clinandrium. *Fruit* ellipsoid, small, containing elaters.

Distribution — Southern Burma (1 species + 0 subspecies), Thailand (1 + 0), Malay Peninsula (2 + 0), Sumatra (4 + 1), Java (2 + 0), Borneo (5 + 0), Philippines (2 or 3 + 0), Sulawesi (2 + 1), Moluccas (1 + 0), New Guinea (1 + 0), Palau Islands (1 + 0), Solomon Islands (1 + 0), Vanuatu (1 + 0). The only endemic species are found in the Philippines (*A. leytense* Ames, status uncertain) and Borneo (*A. laterale*).

Habitat & Ecology — Epiphytes in everwet primary lowland and montane forest, also in swamp and heath forest; on trunks and large branches, often along streams, usually in shaded positions, sometimes lithophytic on mossy rocks. *Agrostophyllum laterale* is almost certainly a rheophyte. All species, except perhaps *A. sumatranum*, can be very common locally. None of them are at present to be considered endangered. Pollination biology is unknown. Individual flowers last about a week, inflorescences may arise from the same stem at rather long intervals for several years. Flowering with irregular intervals throughout the year, possibly more seasonal in *A. laterale*. Altitude 0–1500 m.

Notes — 1. In the description of the species, the terminal fascicle of 1-flowered inflorescences is for brevity's sake called a capitulum.

2. Descriptions and measurements of flowers are based on spirit material only, as dried flowers are usually much shrivelled and distorted. Even when rehydrated, the fleshy lip, for example, usually remains some 25% smaller than it was in the living state. The vegetative parts do not change much when dried, except that the stems often appear more strongly flattened than in living plants. Only measurements of full-grown leaves from near the top of the stems are given; much smaller leaves are usually present at the base of the stems.

3. Data on distribution are only based on specimens seen by the author.

KEY TO THE SPECIES OF SECTION APPENDICULOPSIS

(Not included is *Agrostophyllum leytense* Ames; see under insufficiently known species)

- 1a. Leaves only slightly narrowed to the base, linear-lanceolate, not turned in one plane (although seemingly so in some herbarium specimens) 2. **A. laterale**
- b. Leaves abruptly contracted at the base between the blade and the sheath, oblong, turned in one plane 2

- 2a. Leaf-sheaths on either side of the stem with a vertical (i.e. more or less parallel to the stem-axis) acicular to filiform appendage (easily broken off and then seemingly absent in herbarium material: inspect the entire specimen) 3
- b. Leaf-sheaths without such appendages, at most on either side with a small tooth pointing horizontally away from the stem 4
- 3a. Callus on the lip extending to the top of the epichilium or beyond 5. **A. trifidum**
- b. Callus on the lip at most extending to about the middle of the epichilium 3. **A. stipulatum**
- 4a. Lip saccate at the base, with the lateral margins adnate to the column foot, hypochilium with a small tongue-shaped callus at the apex between the lobes; rostellum triangular-oblong, entire 4. **A. sumatranum**
- b. Lip concave at the base, with the lateral margins free from the column foot, hypochilium with a longitudinal ridge in the basal half; rostellum bidentate . 1. **A. elongatum**

1. *Agrostophyllum elongatum* (Ridley) Schuit. — Fig. 1, 2; Plate 1a, b

Agrostophyllum elongatum (Ridley) Schuit., Blumea 35 (1990) 165; Lewis & Cribb, Orch. Solomon Isl. & Bougainville (1991) 128; Seidenf. & J.J. Wood, Orch. Penins. Malaya and Singapore (1992) 321; J.J. Wood & Cribb, Checkl. Orch. Borneo (1994) 143; O'Byrne, Lowl. Orch. Papua New Guinea (1994) 116. — *Appendicula elongata* Ridley, Trans. Linn. Soc. London, Bot. II, 3 (1893) 375; J. Linn. Soc. 32 (1896) 389. — Type: *Ridley s.n.* (SING holo, n.v.; K iso).

Appendicula hasseltii Blume, Bijdr. (1825) 304. — *Podochilus hasseltii* (Blume) Schltr., Mém. Herb. Boiss. 21 (1900) 61. — *Agrostophyllum hasseltii* (Blume) J.J. Smith, Ic. Bogor. 2 (1903) 55; Fl. Buitenzorg 6 (1905) 288; Fig.-Atlas (1910) fig. 220; Mitt. Inst. Allg. Bot. Hamburg 7 (1927) 45; in Fedde, Rep. 32 (1933) 208; Ridley, Fl. Mal. Penins. 4 (1924) 108; Holttum, Rev. Fl. Malaya, Orch., ed. 3 (1964) 488; Backer & Bakh. f., Fl. Java 3 (1968) 309; Valmayor, Orch. Philipp. 1 (1984) 88; Comber, Orch. Java (1990) 190 (as '*Agrostophyllum hasseltii* (Blume) Rchb. f.', see note 3 below). — Type: *Blume s.n.* (L holo; P iso).

?*Appendicula graminifolia* Teijsm. & Binnend., Nat. Tijdschr. Ned. Ind. 24 (1862) 322. — Type: *Bogor cult. s.n.* (?BO, n.v.; see note 4).

Agrostophyllum costatum J.J. Smith, Bull. Dép. Agr. Ind. Néerl. 19 (1908) 1; Nova Guinea 8 (1909) 39, t. 13, fig. 43; Schltr. in Fedde, Rep., Beih. 1 (1912) 279; *ibid.* 21 (1923) t. 102, fig. 381; Lewis & Cribb, Orch. Vanuatu (1989) 81. — Type: *Djibdja 205*, cult. in Hort. Bogor. (BO, n.v.).

Agrostophyllum costatum J.J. Smith var. *concovum* Schltr. in Fedde, Rep., Beih. 1 (1912) 279; *ibid.* 21 (1923) t. 102, fig. 382. — Type: *Schlechter 20092* (B, lost).

Agrostophyllum palawense Schltr., Bot. Jahrb. 56 (1921) 476. — Type: *Ledermann 14468* (B, lost).

Agrostophyllum spec., J.J. Smith, Bull. Jard. Bot. Buitenzorg III, 10 (1928) 135.

non *Agrostophyllum hasseltii* Rchb. f., Walp. Ann. 6 (1864) 909; Seidenf., Opera Bot. 89 (1986) 130 (in syn.). — *Appendicula hasseltii* auct. non Blume: Wight, Ic. Pl. Ind. Orient. (1852) t. 1748 (see note 3).

non *Agrostophyllum graminifolium* Schltr. in Fedde, Rep., Beih. 1 (1912) 266.

Rhizome elongated, occasionally rather short. *Stems* either or (more frequently) not branching, 0.5–7 cm apart, slightly compressed, suberect to pendulous, (20–)30–120 cm long, 3.5–6 mm wide across the sheaths. *Leaves* broadly oblong to linear-oblong, (0.8–) 1–2.3(–3.5) cm by 4–11 mm, slightly narrowing towards the top; distance between successive leaves on the same side of the stem 5–13 mm, sheaths entire to deeply slit, without appendages, rarely with two short triangular teeth pointing horizontally away from the stem-axis. *Capitulum* few- to many-flowered. Pedicel and ovary 3.5–5.2 mm long. *Dorsal sepal* broadly ovate, c. 3.5 by 2.2 mm, subacute. *Lateral sepals* obliquely broadly ovate, c. 3.3 by 3.0 mm, abruptly acuminate. *Petals* obtuse to subacute, c. 3 by 1–1.3 mm. *Lip* concave

at the base, with the lateral margins not adnate to the column foot, 3–3.5 mm long; hypochilium 1.7–2.0 mm long, 1.5–1.7 mm wide in the centre (not flattened), lobes triangular-ovate, 0.6–0.8 mm long, with a median keel in basal half, no callus between the lobes; epichilium suborbicular to transversely elliptic, 1.4–1.7 by 1.6–1.8 mm (not flattened), broadly rounded, mucronate, more or less conspicuously papillose. *Column* 1.5–1.7 mm long, foot 0.4–0.8 mm long, stelia truncate, rostellum bidentate. *Fruit* ellipsoid, obscurely triangular in cross section, c. 7 by 2.5 mm.

Colours — Sepals cream colour to light ochre yellow. Petals and lip white or yellowish cream colour. Column pale green or cream colour. Margin of stigma and stelia dark purple. Anther cream colour.

Distribution — Peninsular Malaysia (Kedah, Perak, Pahang, Johor), 5 collections (K, L). Sumatra (Sumatera Barat, Jambi), 2 coll. (K, L). Java (Jawa Barat), 7 coll. (K, L, P). Borneo: Sabah (Bahagian Tawau, Pantai Barat); Sarawak (no herbarium material seen, but living specimens which had been collected in Sarawak were observed in cultivation at Semengoh Nature Study Centre); Brunei (Belait Dist., Tutong Dist.); Kalimantan (Kalimantan Tengah, Selatan, Timur), 9 coll. (K, L). Sulawesi (Sulawesi Tengah), 1 coll. (L). Moluccas: Seram, 2 coll. (L). Philippines (Bohol, Cagayan, Leyte), 3 coll. (K, L). Palau Islands, 5 coll. (K, L, P). New Guinea: Irian Jaya (Kab. Cenderawasih, Sorong); Papua New Guinea (Madang, East Sepik, Morobe, Southern Highlands, Gulf, Central, Northern, and Milne Bay Prov.), 17 coll. (K, L). Solomon Islands, 6 coll. (K). Vanuatu, 3 coll. (K, P).

Habitat & Ecology — Epiphyte on tree trunks in swamp forest, riverine forest, mixed Dipterocarp forest, disturbed *Castanopsis*-dominated forest and lower montane forest. Often, but by no means exclusively, along streams. Altitude 0–1500 m. Fl. throughout the year; cultivated specimens flower once or twice a year.

Notes — 1. *Agrostophyllum elongatum* has flowers similar to those of *A. laterale*, but that species is vegetatively very different, having linear-lanceolate leaves. From the other species in sect. *Appendiculopsis* it is distinguished by the not saccate but concave lip, which lacks a callus between the lateral lobes, by the frequently entire leaf-sheaths without appendages (the latter character state also found in *A. sumatranum*), by the larger size of the vegetative parts (overlapping the range in *A. sumatranum*), the usually more elongated rhizome, and the relatively short bidentate rostellum.

2. Whether or not it is possible to distinguish more than one taxon among the material here referred to *A. elongatum* is a difficult problem. There is considerable diversity, especially in the vegetative parts. Living specimens of *A. elongatum* from Borneo and New Guinea have been in cultivation in the Leiden Hortus Botanicus for several years. They are kept under the same conditions in the same greenhouse and they look quite different. The specimens from Borneo have entire leaf-sheaths, much thicker and stiffer, unbranched stems, larger and thicker, bronze-tinged leaves, and larger capitula. The specimens from New Guinea (which conform to the type of *A. costatum*) have deeply slit leaf-sheaths with blackish margins, branching stems and green leaves. The flowers show minor differences as well, especially in the relative length of the column and the width of the midlobe. The latter is much more conspicuously papillose in the New Guinea specimens. I would be inclined to consider these specimens as representing different taxa, even different species, were it not for the presence of a great number of intermediates among the herbarium material studied. The character states mentioned here as distinguishing the cultivated Borneo and New Guinea specimens occur in various combinations among the collections studied.

In particular, specimens with deeply slit leaf-sheaths are found throughout the range of this species. As so much of the material is sterile (including the available type material of *Appendicula elongata* and *A. hasseltii*), it is at present almost impossible to assess the variability of the floral characters. The conclusion I have reached is that *A. elongatum* is a single widespread taxon, which is variable in several respects. The types of *Appendicula hasseltii* and *A. elongata* both represent rather slender forms with relatively narrow leaves and stems; that of *A. hasseltii* has entire as well as deeply slit leaf-sheaths on the same specimen, that of *A. elongata* has entire leaf-sheaths.

3. The nomenclature of this species is rather complex. It was first described by Blume (1825) as *Appendicula hasseltii*, based on his own collections from Java. Wight (1852) illustrated a very different species as *Appendicula hasseltii* Blume. In 1857 (*Bonplandia* 5: 41) Reichenbach pointed out that this illustration depicts a species of *Agrostophyllum*, but did not formally transfer it to that genus. In 1864 Reichenbach published the following note:

“AGROSTOPHYLLUM HASSELTII. Huc: ‘*Appendicula hasseltii* Bl.’ Wight l.c. 1748. 3: Stems simple, terete; leaves broadly linear, retusely mucronulate, sheaths of the leaves edentulate; limb of the lip erect, crenulate.
Mergui: Griffith.”

The most obvious interpretation of this note seems to me that Reichenbach here describes a new species of *Agrostophyllum* based on a wrongly identified plant illustrated by Wight. Griffith’s specimen from Mergui (Burma) would be the type. This is the interpretation advocated by Seidenfaden (1986) and Schuiteman (1990). The proper citation would then be *Agrostophyllum hasseltii* Rchb. f., not *A. hasseltii* (Wight) Rchb. f., as Seidenfaden has it.

Reichenbach cites Wight’s description, which in turn is a literal translation of Blume’s diagnosis. The latter is so terse, that it is indeed applicable to Wight’s utterly different species. In fact, the ‘crenulate’ limb of the lip mentioned in the diagnosis does not even fit the species we now call *Agrostophyllum elongatum*. Were it not for surviving type material, labelled *Appendicula hasseltii* (in P) or *A. hasseltiana* (in L) in Blume’s handwriting, one could question the traditional interpretation of that species. Reichenbach’s specific epithet is an unfortunate one, as Van Hasselt had nothing to do with Wight’s plant.

Consequently, when years later J.J. Smith published the combination *Agrostophyllum hasseltii* (Blume) J.J. Smith, this was an illegitimate name, a later homonym.

Agrostophyllum hasseltii Rchb. f. is now considered a synonym of *A. planicaule* (Wall. ex Lindley) Rchb. f., a species of sect. *Agrostophyllum* (Seidenfaden, 1986: 130).

4. On authority of J.J. Smith, who may have seen type material or illustrations, *Appendicula graminifolia* Teijsm. & Binnend. is frequently included in the synonymy of *Agrostophyllum elongatum*. I have not seen type material of *A. graminifolia* and the description is rather vague. It may refer to *A. elongatum*, but the specific epithet seems to suggest otherwise. Fortunately, the matter is largely of academic interest, as there already exists an *Agrostophyllum graminifolium* Schltr., a very different and aptly named species. The name *Appendicula graminifolia* is therefore not available as a basionym within *Agrostophyllum*.

2. *Agrostophyllum laterale* J.J. Smith — Fig. 3; Plate 1c

Agrostophyllum laterale J.J. Smith, Bull. Jard. Bot. Buitenzorg II, 13 (1914) 50; *ibid.* Suppl. 2 (1930) t. 30, fig. 3; J.J. Wood & Cribb, Checkl. Orch. Borneo (1994) 144. — Type: *Amjah 154* (BO, n.v.).
Poaephyllum hansenii J.J. Wood, Kew Bull. 39 (1984) 88, fig. 10; J.J. Wood & Cribb, Checkl. Orch. Borneo (1994) 231, *syn. nov.* — Type: *Hansen 40* (C holo, n.v.; K iso).

Rhizome elongated. *Stems* not branching, 2–7 cm apart, slightly compressed, suberect to pendulous, 35–95 cm long, 2–3 mm wide across the sheaths. *Leaves* linear-lanceolate, 4.5–8.5 cm by 2.5–4 mm, obtuse, (obliquely) bilobulate, mucronate, with mucro longer than the lobules; distance between successive leaves on the same side of the stem 8–25 mm; sheaths entire, with a short broadly triangular tooth opposite the blade. *Inflorescences* usually exclusively lateral (the illustration of *Poaephyllum hansenii* shows a solitary terminal inflorescence besides lateral ones), 1–3 flowered. Peduncle 2–4 mm long, enveloped in c. 3 tubular overlapping scales c. 1 mm long. Floral bract ovate, subacute, 2–3 mm long. Pedicel and ovary c. 3 mm long. *Dorsal sepal* ovate-oblong to suborbicular, 2.4–3 by 1.7–2.2 mm, obtuse. *Lateral sepals* obliquely broadly ovate, c. 2.5 by 2.2 mm, subacute. *Petals* linear, c. 2.2 by 0.7 mm, obtuse. *Lip* 2.7 mm long; hypochilium 1.5 mm long, 1.8 mm wide (not flattened), concave, with the lateral margins not adnate to the column foot, with 3 parallel longitudinal ridges in the basal half, of which the median one is the most prominent, lobes triangular-semiorbicular, obtuse, c. 0.5 mm long, no callus between the lobes; epichilium transversely broadly elliptic, 1.2 by 1.6 mm, broadly rounded. *Column* 1.2–2.2 mm long, foot c. 0.5 mm long, stelidia very short, rectangular, rostellum short, bidentate. *Fruit* ellipsoid, c. 5 by 2 mm.

Colours — Sepals greenish cream colour. Petals and lip cream colour. Hypochilium with a faint brownish spot. Column dark purple at the top, anther light yellow.

Distribution — Borneo: Sarawak (Bahagian Miri, Kapit, Sibul), Kalimantan (Kalimantan Timur), 6 collections (K, L, P). Probably much more common than the small number of collections suggests.

Habitat & Ecology — Epiphyte on the lower part of tree trunks (e.g. *Dipterocarpus oblongifolius*) overhanging a river, rooting in clay deposited during floods. Also on steep riverbanks. See note 2 below. Locally abundant. Altitude: 0–950 m. Fl. Jan., Feb., Sept.

Notes — 1. *Agrostophyllum laterale* is in many ways a remarkable species. By the linear-lanceolate leaves and the mostly exclusively lateral inflorescences it is clearly distinguished from the other species in sect. *Appendiculopsis*. The flowers, on the other hand, strongly resemble those of *Agrostophyllum elongatum*. Habitually, except for the creeping rhizome, it is surprisingly similar to species of the genus *Poaephyllum*, a fact already pointed out by J.J. Smith. It is indeed difficult to find macromorphological characters which would separate *Agrostophyllum laterale* from *Poaephyllum*. Differences in the column foot, as suggested by earlier authors, clearly do not hold. I believe that, apart from the microscopically small stigmata (see paragraph on the systematic position of *Agrostophyllum*) and the creeping rhizome, only two characters would set *A. laterale* apart from *Poaephyllum*: the short, somewhat fleshy peduncle enveloped in bracts of *A. laterale* (as opposed to the very thin, largely naked peduncle of *Poaephyllum*) and the scale hairs outside on sepals and ovary, which *A. laterale* has in common with other species of *Agrostophyllum*, but which are lacking in *Poaephyllum*. An examination of fresh material of *Poaephyllum*-species may reveal additional differences in the structure of the pollinarium, e.g. in the viscidium.

2. Based on my observations in Sarawak, I believe that *A. laterale* is an example of an unusual, not previously recognized life-form: a rheophytic epiphyte. I observed *A. laterale* growing in large quantities on tree trunks along the Kanowit River, its rhizomes attached below the level of the highest floods, as indicated by clay deposits on the trunks. Consequently the plants are periodically (though probably erratically and infrequently) subject to

submersion. The tough, mat-forming rhizomes and narrow leaves apparently enable the plants to withstand the forces of the water. It remains to be seen if *A. laterale* is a strict rheophyte; however, collectors consistently report it as growing along rivers. This species is not listed in van Steenis' book 'Rheophytes of the World' (1981).

3. *Agrostophyllum stipulatum* (Griff.) Schltr. — Fig. 4, 5; Plate 1d

Rhizome short to somewhat elongated. *Stems* rarely branching, 0.1–2 cm apart, not or slightly compressed, suberect to pendulous, 12–50 cm long, 2–3.5 mm wide across the sheaths. *Leaves* (broadly) oblong, 0.4–1.7 cm by 2–6 mm, slightly narrowing towards the top; distance between successive leaves on the same side of the stem 3–9 mm, sheaths deeply slit, with two acicular-filiform, subfalcate appendages (one on each side of the stem) 2–3 mm long. *Capitulum* few-flowered. Pedicel and ovary 4–7 mm long. *Dorsal sepal* ovate, 3.5–4.5 by 2.5 mm, obtuse. *Lateral sepals* obliquely ovate, 3.6–4.5 by 4 mm, ± reflexed, acute. *Petals* linear, slightly dilated to the base, 2.9–3.5 by 0.7–1.2 mm, obtuse. *Lip* 5–5.8 mm long, hypochilium saccate, with lateral margins adnate to the column foot, 2-lobed in front, lobes rounded-triangular, obtuse, with a 2-ribbed callus in between; epichilium subcordate to rounded 5-angular, obtuse. *Column* c. 1.7 mm long, stelidia rounded-truncate. Rostellum oblong, entire, longer than stelidia. *Fruit* ellipsoid, c. 7 by 2.5 mm.

Distribution and Ecology — See under the subspecies.

KEY TO THE SUBSPECIES

- 1a. Callus of the lip only slightly projecting from between the flattened lateral lobes **a. subsp. *stipulatum***
- b. Callus of the lip distinctly projecting from between the flattened lateral lobes, extending to about halfway the midlobe **b. subsp. *bicuspidatum***

a. subsp. *stipulatum* — Fig. 4; Plate 1d

Agrostophyllum stipulatum (Griff.) Schltr. ('*Agrostophyllum*'), Bot. Jahrb. 45, Beibl. 104 (1911) 22; Seidenf., Bot. Tidsskr. 68 (1973) 53; Opera Bot. 89 (1986) 126; Seidenf. & J.J. Wood, Orch. Penins. Malaya (1992) 319; J.J. Wood & Cribb, Checkl. Orch. Borneo (1994) 145. — *Appendicula stipulata* Griff., Notul. Pl. As. 3 (1851) 358; Icon. Pl. As. (1851) t. 335, fig. 1 & 2. — *Appendicula callosa* auct. non Blume: Griff., Calc. J. Nat. Hist. 5 (1845) 362, t. 62. — Type: *Lewis s.n.* (?), lost, fide Seidenfaden, 1973). Neotype (here selected): the drawing in Griffith (1851).

Agrostophyllum confusum J.J. Smith, Bull. Jard. Bot. Buitenzorg III, 2 (1920) 37; *ibid.*, Suppl. 2 (1930) t. 31, fig. 1; in Fedde, Rep. 32 (1933) 207. — Syntypes: *Bünnemeijer 1445* (K, L), 1891 (L lecto, here chosen; K, P iso), 2223 (L); Bogor. cult. II M (BO, n.v.), a 81 (leg. Heldt) (BO, n.v.), II M, d 118 (leg. Gusdorf) (L).

Agrostophyllum celebicum Schltr. in Fedde, Rep. 10 (1911) 40; *ibid.*, Beih. 74 (1934) t. 26, fig. 102; J.J. Smith, Bull. Jard. Bot. Buitenzorg, Suppl. 2 (1930) t. 31, fig. 2; Bot. Jahrb. 65 (1933) 473, syn. nov. — Type: *Schlechter 20655* (B holo, lost; lecto L, here chosen; K iso).

Agrostophyllum bicuspidatum auct. non J.J. Smith: Holttum, Rev. Fl. Malaya, Orch., ed. 3 (1964) 487; Seidenf., Opera Bot. 89 (1986) fig. 76; Seidenf. & J.J. Wood, Orch. Penins. Malaya (1992) fig. 140a–g.

Leaves 0.4–1.1 cm by 2–4(–5) mm; distance between successive leaves on the same side of the stem 3–6 mm. *Dorsal sepal* 3.5–4.5 by 2.5 mm. *Lateral sepals* c. 3.6 by 4 mm. *Petals* 2.9–3.5 by 0.7–0.9 mm. *Lip* 5–5.8 mm long (but see note 5); hypochilium c. 3.2

mm long, 2 mm wide (not flattened), lobes c. 0.8 mm long, callus between the lobes a transverse bar, with two short parallel longitudinal ridges, only slightly projecting from between the lobes of the hypochilium; epichilium c. 2.2 by 2.2 mm. *Stelidia* rounded-truncate, recurved at the top, conspicuous, usually making right angles with the lower margin of the stigma, rarely decurrent.

Colours — Sepals white or cream colour. Petals white. Lip white, often with two yellow spots at the base of the epichilium. Callus white or yellow. *Stelidia* purple.

Distribution — Burma (Tenasserim), 1 collection (K). Thailand (Peninsular and South-eastern), 11 coll. (K, L). Malay Peninsula (Kedah, Padang, Johor, Kelantan, Penang), 14 coll. (K, L, P). Singapore, 2 coll. (K, L, P). Sumatra (Sumatera Barat, Utara, Lampung, Jambi, Selatan, Riau), 13 coll. (K, L). Borneo: Sabah (Bahagian Pedalaman, Pantai Barat, Sandakan), Brunei (Temburong District, Tutong Dist.), Sarawak (Bahagian Kuching, Sarikei, Miri, Kapit), Kalimantan (Kalimantan Timur, Tengah, Selatan), 19 coll. (K, L). Philippines (Luzon), 1 coll. (K). Sulawesi (Sulawesi Utara), 1 coll. (K, L). Sula Archipelago, 1 coll. (K, L).

Habitat & Ecology — Primary rain forest, riverine forest, swamp forest and lower montane forest. Altitude 0–1500 m. Fl. throughout the year.

Notes — 1. The complicated taxonomic and nomenclatural history of *A. stipulatum* was unravelled by Seidenfaden (1973), see there.

2. Schlechter's (1934) drawing of *A. celebicum* is inaccurate, in particular the column as depicted does not agree with the type material. Smith's (1930) illustration is better in this respect, and there can be no doubt that *A. celebicum* is conspecific with *A. stipulatum* (subsp. *stipulatum*), as already suggested by Garay (in Seidenfaden, 1973).

3. *Agrostophyllum stipulatum* subsp. *stipulatum* was not previously recorded from the Philippines.

4. The absence of subsp. *stipulatum* in Java is peculiar; it is apparently replaced there by subsp. *bicuspidatum*.

5. One collection from Brunei, Leiden cult. 30222 (spirit material), has considerably smaller flowers than all other specimens studied. The lip is only 3.5 mm long. Its morphology is entirely that of the present taxon. For the time being it is regarded here as a deviating specimen of *A. stipulatum* subsp. *stipulatum*, but the measurements are not included in the description.

b. subsp. *bicuspidatum* (J.J. Smith) Schuit., comb. & stat. nov. — Fig. 5

Agrostophyllum bicuspidatum J.J. Smith, Ic. Bogor. 2 (1903) 55; Bull. Jard. Bot. Buitenzorg III, 3 (1921) 272; in Fedde, Rep. 32 (1933) 206; Backer & Bakh. f., Fl. Java 3 (1968) 309; Seidenf., Opera Bot. 89 (1986) 125 (p. p., excl. fig. 77 = subsp. *stipulatum*); Comber, Orch. Java (1990) 190; Backer & Bakh. f., Fl. Java 3 (1968) 309; Seidenf. & J.J. Wood, Orch. Penins. Malaya (1992) 319 (p. p., excl. fig. 140a–g = subsp. *stipulatum*); J.J. Wood & Cribb, Checkl. Orch. Borneo (1994) 143 (probably based on erroneous identifications). — *Appendicula callosa* Blume, Bijdr. (1825) 303. — *Podochilus callosus* (Blume) Schltr., Mém. Herb. Boiss. 21 (1900) 62. — *Agrostophyllum callosum* (Blume) J.J. Smith, Ic. Bogor. 2 (1904) 259; Fl. Buitenzorg 6 (1905) 286; Fig.-Atlas (1910) fig. 219. — Type: *Blume s.n.* (L lecto, here chosen, sh. 938.280–469, see note 4; P iso).

non *Agrostophyllum callosum* Rchb. f. in Seem., Fl. Vitiensis (1868) 296. — *Agrostophyllum reichenbachii* J.J. Smith, Ic. Bogor. 2 (1904) 259.

non *Agrostophyllum bicuspidatum* auctt. non J.J. Smith [e.g., Holttum, Rev. Fl. Malaya, Orch., ed. 3 (1964) 487 (= subsp. *stipulatum* (Griff.) Schltr.)].

Rhizome short to somewhat elongated. *Stems* rarely branching, 0.1–1.5 cm apart, slightly compressed, suberect to patent, 20–50 cm long, 2.5–3.5 mm wide across the sheaths. *Leaves* 0.7–1.7 cm by 3.5–6 mm; distance between the leaves on the same side of the stem 6–9 mm. *Dorsal sepal* 3.7–4.5 by c. 2.5 mm. *Lateral sepals* c. 4 by 3 mm. *Petals* c. 3.5 by 0.7–1.2 mm. *Lip* c. 5 mm long; hypochilium c. 3.4 mm long, c. 1.8 mm wide (not flattened), lobes c. 1 mm long, callus between the lobes consisting of a fleshy blade with the erect margins folded together lengthwise, extending to about halfway the epichilium; epichilium c. 2.2 by 2.1 mm. *Stelidia* usually obliquely decurrent on the lower margin of the stigma or less frequently making right angles with it.

Colours — Sepals cream colour or dull yellowish. Petals yellowish or white. Lip white, at the base either or not bright yellow, or with two yellow and two purple spots. Column cream colour, sometimes with purple margins, stelidia purple.

Distribution — Sumatra (Sumatera Barat), 1 collection (L). Java (Jawa Barat, Tengah), 19 coll. (K, L, P). ?Borneo (some sterile collections may belong to this subspecies). Sulawesi (Sulawesi Selatan, Tengah), 2 coll. (L).

Habitat & Ecology — Epiphyte in primary and (rarely) secondary forest. Altitude 100–1200 m. Fl. Jan., Feb. (most of the material undated).

Notes — 1. *Agrostophyllum stipulatum* subsp. *bicuspidatum* may be distinguished from subsp. *stipulatum* by the callus, which in the latter projects only slightly from between the lateral lobes, whereas in subsp. *bicuspidatum* it extends almost to the centre of the midlobe. The morphology of the callus is also different, as can be seen by comparing the illustrations. The leaves of subsp. *bicuspidatum* are usually longer and broader than those of subsp. *stipulatum*, but there is considerable overlap in this respect. I do not believe that the shape of the stelidia can be used to distinguish between the two, as suggested by Seidenfaden. I have seen specimens from Java (e.g. Bogor cult. 1) that had the same kind of stelidia as those illustrated by Seidenfaden as being typical for *A. stipulatum*, yet they had the callus of subsp. *bicuspidatum*. The flower illustrated by Seidenfaden (1986) as *A. bicuspidatum* does not have the callus of that taxon; I would consider it a form of subsp. *stipulatum*. I cannot confirm Seidenfaden's observation that the epichilium of subsp. *bicuspidatum* is distinctly more fleshy than that of subsp. *stipulatum*. Most of the specimens cited by Seidenfaden as *A. bicuspidatum*, as far as I have studied them, belong in my opinion to subsp. *stipulatum* and some to *A. trifidum* (Beccari 563) and *A. sumatranum* (Kloss 14468). Seidenfaden's records of *A. bicuspidatum* from Burma, Thailand and the Malay Peninsula are therefore open to doubt; they are probably subsp. *stipulatum*, but I have not seen much of the Burmese material cited by him. The specimen illustrated by Holttum (1964), which Seidenfaden (1973) accepts as representing *A. bicuspidatum*, is in my opinion clearly subsp. *stipulatum*, as it has the short callus of that taxon.

2. I am uncertain about the status of this taxon; it seems to replace the typical subspecies in Java, but the distribution outside Java remains unclear, mainly due to the great number of sterile collections.

3. Records of *A. bicuspidatum* from the Solomon Islands are based on erroneous identifications. *Agrostophyllum elongatum* is the only representative of sect. *Appendiculopsis* there.

4. There are several Blume collections in L, most of which are probably syntypes. They carry unpublished manuscript names, except for one sheet labelled *Appendicula callosa* in Blume's handwriting. I have selected the latter as the type specimen.

4. *Agrostophyllum sumatranum* Schltr. & J.J. Smith — Fig. 6; Plate 2a

Agrostophyllum sumatranum Schltr. & J.J. Smith, Bull. Dép. Agric. Ind. Néerl. 15 (1908) 7; Schltr., Bot. Jahrb. 45, Beibl. 104 (1911) 22; in Fedde, Rep., Beih. 74 (1934) t. 27, fig. 106; J.J. Smith, Bull. Jard. Bot. Buitenzorg, Suppl. 2 (1930) t. 32, fig. 1; in Fedde, Rep. 32 (1933) 210. — Type: *Schlechter 15881* (B holo, lost; K lecto, here chosen; P iso).

Agrostophyllum sumatranum Schltr. & J.J. Smith var. *borneense* J.J. Smith, Bull. Jard. Bot. Buitenzorg III, 2 (1920) 37; Mitt. Inst. Allg. Bot. Hamburg 7 (1927) 45; J.J. Wood & Cribb, Checkl. Orch. Borneo (1994) 145, syn. nov. — Type: *Bogor cult. 734* (leg. Hallier) (BO, n.v.).

Rhizome short, sometimes more elongated. *Stems* rarely branching, 0.1–1 cm apart, slightly compressed, suberect to pendulous, 20–50 cm long, 2–3.5 mm wide across the sheaths. *Leaves* broadly oblong to oblong, 0.8–1.7 cm by 3–8 mm, slightly narrowing towards the top; distance between the leaves on the same side of the stem 5–8 mm, sheaths deeply slit, without appendages, but sometimes with two small teeth (one on either side of the stem) pointing horizontally away from the stem. *Capitulum* few- to several-flowered. Pedicel and ovary c. 5 mm long. *Dorsal sepal* broadly ovate, 3.2–4 by 2.2–2.5 mm, obtuse to subacute. *Lateral sepals* obliquely broadly ovate, c. 4.0 by 2.7 mm, acute. *Petals* linear-lanceolate, 2.9–3.6 by 1.0 mm. *Lip* c. 4 mm long; hypochilium saccate, with the lateral margins adnate to the column foot, c. 2 by 1.5 mm (not flattened), lobes semi-orbicular, rounded, 0.6 mm long, with a short more or less rectangular, smooth callus between the lobes; epichilium suborbicular to rounded 5-angular, 1.7–2.2 by 2.0 mm, obtuse. *Column* c. 1.5 mm long, stelidia obliquely rounded-rectangular, sometimes emarginate, rostellum narrowly triangular, about as long as the stelidia. *Fruit* ellipsoid, c. 7 by 2 mm.

Colours — Sepals cream colour. Petals white. Lip white, either or not with two reddish purple lines on the epichilium, callus yellow with red-purple margins. Lower margin of stigma and margins of stelidia dark purple. Anther pale yellow.

Distribution — Sumatra, (Sumatera Barat, Riau, Aceh, Utara), 7 collections (K, L, P). Borneo: Sarawak (Bahagian Kuching, Sibul), Sabah (Bahagian Pedalaman), Kalimantan (Kalimantan Timur), 7 coll. (L).

Habitat & Ecology — Epiphyte in primary rain forest and swamp forest. Altitude 0–1000 m. Fl. throughout the year.

Notes — 1. *Agrostophyllum sumatranum* may be recognized by the leaf-sheaths without appendages (sometimes with small horizontal teeth), in combination with a saccate lip having a small entire, smooth callus between the lobes of the hypochilium. It is in many ways intermediate between *A. elongatum* and *A. stipulatum*, but it is unlikely to be a hybrid. This follows from the fact that *A. sumatranum* is not always found together with one of its putative parents and only very rarely with both. Furthermore, it is absent from many areas where the ranges of *A. stipulatum* and *A. elongatum* overlap.

2. *Agrostophyllum sumatranum* is variable in the size of the leaves. In my opinion *A. sumatranum* var. *borneense* is nothing more than a small-leaved form, the flowers being virtually indistinguishable from those of the typical form. Not all specimens from Borneo have such small leaves.

5. *Agrostophyllum trifidum* Schltr. — Fig. 7

Agrostophyllum trifidum Schltr., Bot. Jahrb. 45, Beibl. 104 (1911) 22; in Fedde, Rep., Beih. 74 (1934) t. 27, fig. 107; Ridley, Kew Bull. (1925) 91 (*'tricuspidatum'*); J.J. Smith, Bull. Jard. Bot. Buitenzorg, Suppl. 2 (1930) t. 31, fig. 3; Bull. Jard. Bot. Buitenzorg III, 11 (1931) 125; in Fedde, Rep. 32 (1933) 210;

Blumea 5 (1945) 717; J.J. Wood & Cribb, *Checkl. Orch. Borneo* (1994) 145. — Syntypes: *Schlechter 15964* (L lecto, here chosen; K, P iso), *Schlechter 16029* (L, P).

Rhizome short. *Stems* not branching, 0.1–0.5 mm apart, not or slightly compressed, suberect to subpatent, 15–50 cm long, 2–3 mm wide across the sheaths. *Leaves* (broadly) oblong, 0.5–1.2 cm by 2–5 mm, slightly narrowing towards the top; distance between the leaves on the same side of the stem 4–7 mm, sheaths deeply slit, with two straight or subfalcate acicular to subfiliform appendages 1–2 mm long. *Capitulum* few-flowered. Pedicel and ovary 5–7 mm long. *Dorsal sepal* obovate, 4.5–5.2 by c. 2.5 mm, obtuse. *Lateral sepals* obliquely broadly ovate, 4–4.5 by c. 3.8 mm, obtuse to acute. *Petals* linear, 3.5–4.3 by c. 1 mm. *Lip* 4–5 mm long; hypochilium (excl. callus) c. 1.5 mm long, 2.2 mm wide (not flattened), saccate, with the lateral margins adnate to the column foot, lobes oblong, rounded, 2.5–3 mm long, callus between the lobes oblong, laterally flattened, concave above, extending to the top of the epichilium or beyond; epichilium subcordate, 1.9–2.4 by 2.5–2.8 mm, obtuse. *Column* 2.2–2.7 mm long, foot very short, stelia short, truncate. Rostellum oblong, entire, much longer than the stelia. *Fruit* not seen.

Colours — Sepals and petals dull yellow. Lip white or cream colour, epichilium yellow or orange at the base, tips of lateral lobes purple. Column creamy white, stelia pale purple. Anther yellow.

Distribution — Sumatra (Sumatera Barat, Aceh, Bengkulu, Lampung), 11 collections (K, L, P). Borneo: Sabah (Bahagian Tawau, Pedalaman, Pantai Barat, Sandakan), Brunei (Belait Dist., Temburong Dist.), Sarawak (Bahagian Kuching, Sibul, Kapit), Kalimantan (Kalimantan Selatan, Tengah, Timur), 25 coll. (K, L).

Habitat & Ecology — Epiphyte on tree trunks in rain forest, swamp and heath forest. Altitude 150–1300 m. Fl. throughout the year.

Notes — 1. *Agrostophyllum trifidum* is easily recognized by the large callus extending to the top of the epichilium or even beyond. Vegetatively it is most similar to *A. stipulatum*, from which sterile specimens are sometimes virtually indistinguishable. In *A. trifidum* the appendages of the leaf-sheaths are often, but not always, straight and rather short, in *A. stipulatum* they are always curved. Living specimens cultivated in Leiden alongside *A. stipulatum* have dark green leaves, those of *A. trifidum* have lighter, more yellowish or sometimes glaucous green leaves.

2. The specimen *Leiden cult. 914216* shows an interesting abnormality: the basal part of the stem looks normal for the species, but the sheaths on the upper part lack appendages; because of this, the upper part of the plant is morphologically indistinguishable from a specimen of *A. sumatranum*. This is possibly some kind of atavism; the flowers look normal.

3. *Agrostophyllum trifidum* seems to be absent from Peninsular Malaysia, even though it is a common species in North Sumatra and Borneo. The same observation can be made with respect to the less common *A. sumatranum*. If this absence is not due to undercollecting, it may have biogeographical significance.

INSUFFICIENTLY KNOWN SPECIES

6. *Agrostophyllum leytense* Ames

Agrostophyllum leytense Ames, *Orch.* 6 (1920) 298; Valmayor, *Orch. Philipp.* 1 (1984) 89. — Type: *Wenzel 597* (AMES, n.v.).

?*Agrostophyllum spec.*, Ames, *Orchid.* 5 (1915) 87.

“Slender herb. Stems elongated, covered by the leaf-sheaths, c. 20 cm long, strongly flattened. Leaves distichous, c. 2 cm long, c. 4 mm wide, obtuse-ovate, bilobed, shortly mucronate. Leaf-sheaths enveloping the stem, bicuspidate, c. 7 mm long, longitudinally rugose. Flowers arranged in a lax head, white. Peduncle abbreviated, covered by a few imbricating scales. Floral bracts glumaceous, oblong-lanceolate. Lateral sepals 3.5 mm long, near the base 2.5 mm wide, broadly triangular-ovate, acute, forming an open mentum. Dorsal sepal 3.5 mm long, oblong-ovate, strongly concave. Petals c. 3 mm long, subspathulate, acute. Lip c. 3.5 mm long, slightly saccate to strongly concave near the column, oblong-ovate, subacute, ecallose, margins rolled inwards. Column short, thickened.” [ex Ames, translated from the Latin description.]

Colours — Sepals and petals white, lip yellowish.

Distribution — Philippines (Leyte, Agusan, ex Valmayor).

Habitat & Ecology — Epiphyte in forest. Altitude 600–700 m.

Note — I have not seen any material of this species, which is said to be allied to *A. stipulatum* (Griff.) Schltr. From the description, especially by the combination of bicuspidate leaf-sheaths and an entire, ecallose lip, it appears to be distinct from the other species in sect. *Appendiculopsis*. The description leaves much to be desired, however. Possibly it is a peloric form of *A. stipulatum* subsp. *stipulatum*; the latter is known to occur in the Philippines.

ADDITIONAL NOTE

A recent publication by D.L. Szlachetko [‘Systema Orchidarium’, *Fragm. Flor. Geobot. Suppl.* 3 (1995) 1–152], came too late to my attention to be incorporated in this revision. Among many other innovations, Szlachetko raises *Agrostophyllum* section *Appendiculopsis* to genus level, and makes nine new combinations in *Appendiculopsis* (Schltr.) Szlach. He also describes a new subtribe, *Agrostophyllinae*, consisting of *Agrostophyllum* and *Appendiculopsis*.

Szlachetko’s diagnosis of *Appendiculopsis* (l.c.: 119) contains some errors; when these are corrected, it becomes equally applicable to *Agrostophyllum*. First, the rostellum is not always elongate and ribbon-like; second, the leaves are not always right-angled with the axis of the stem and shortly petiolate. If all character states in section *Appendiculopsis* are considered, the change of status is not at all justified, in my opinion. Several of the new combinations are superfluous, not only because Szlachetko failed to notice some well-established synonyms, but also because he overlooked the fact that Blume’s *Appendicula callosa* and *A. hasseltii* become available as basionyms in *Appendiculopsis* when this is raised to genus level. In addition *Agrostophyllum leytense* and *A. laterale* are omitted in the list of new combinations. Elsewhere in this paper I have indicated why I consider *Agrostophyllum* (as well as *Earina*, which Szlachetko refers to the *Glomerinae*) to be a member of the subtribe *Podochilinae*. Again, there are several inaccuracies in Szlachetko’s descriptions of the relevant subtribes; if these are taken into account his diagnoses cease to have diagnostic value.

The new combinations are:

Appendiculopsis (Schltr.) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 119 [= *Agrostophyllum* sect. *Appendiculopsis* Schltr.].

- Appendiculopsis bicuspidata* (J.J. Smith) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum stipulatum* (Griff.) Schltr. subsp. *bicuspidatum* (J.J. Smith) Schuit.].
- Appendiculopsis celebica* (Schltr.) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum stipulatum* (Griff.) Schltr. subsp. *stipulatum*].
- Appendiculopsis confusa* (J.J. Smith) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum stipulatum* (Griff.) Schltr. subsp. *stipulatum*].
- Appendiculopsis costata* (J.J. Smith) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum elongatum* (Ridley) Schuit.].
- Appendiculopsis costata* (J.J. Smith) Szlach. var. *concava* (Schltr.) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum elongatum* (Ridley) Schuit.].
- Appendiculopsis elongata* (Ridley) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum elongatum* (Ridley) Schuit.].
- Appendiculopsis stipulata* (Griff.) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum stipulatum* (Griff.) Schltr. subsp. *stipulatum*].
- Appendiculopsis sumatrana* (Schltr. & J.J. Smith) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum sumatranum* Schltr. & J.J. Smith].
- Appendiculopsis trifida* (Schltr.) Szlach., *Fragm. Flor. Geobot. Suppl.* 3 (1995) 120 [= *Agrostophyllum trifidum* Schltr.].

IDENTIFICATION LIST

- Agrostophyllum*
 el = *elongatum* (Ridley) Schuit.
 la = *laterale* J.J. Smith
 stipulatum (Griff.) Schltr.
 sts = subsp. *stipulatum*
 stb = subsp. *bicuspidatum* (J.J. Smith) Schuit.
 su = *sumatranum* Schltr. & J.J. Smith
 tr = *trifidum* Schltr.

A question mark after the identification usually indicates that the specimens seen were sterile

- Adelbert 471 (stb) — Amjah 96 (tr), 221 (la), 228 (tr), 249 (la), 269 (tr), 279 (tr).
 Bakhuizen van den Brink 3132 (el), 4760 (stb) — Bartlett 6645 (sts ?) — Beaman 8429 (sts ?), 10022a (tr), 10262 (sts ?) — Beccari 561 (el), 563 (tr) — Blume s. n. (el), s. n. (stb) — Bogor cult. (Bakhuizen van den Brink) 1 (stb), (Hallier) 2 (el), 8 (stb), 55 (tr), 59 (el), (Bünnemeijer) 63 (sts), (van Hulsteijn) 68 (sts), 170 (su), 205 (su), F.52 (tr), II.M.d. 118 (sts), a 143 (su), (Ender) s. n. (sts), (van Gelder) s. n. (sts) — Bourdy 966 (el) — Brooke 8961 (la), 10162 (tr), 10874 (sts) — Brooks 9001 (tr) — Burley et al. 696 (sts ?), 853 (tr) — Bünnemeijer 1445 (sts), 1891 (sts), 2223 (sts), 6813 (su), 6849 (sts).
 Carr 273 (sts), 10049 (el), 10682 (el), 17023 (el) — Castro & Melegrito 1458 (sts ?) — Chaplin 755 (el) — Cheesman 33 (el) — Clemens 1399 (el), 20712 (tr ?), 21165 (la), 26774 (el) — Coleman 27 (sts ?) — Commerson s. n. (el), s. n. (stb) — Creagh s. n. (sts) — Cruttwell 211 (el), 281 (el) — Curtis 358 (sts).
 Docters van Leeuwen-Reijnvaan 1254 (stb).

Edaño 6305 (el) — Endert 2685 (tr), s. n. (sts).
 Franken & Roos 247 (el).
 Gaudichaud 104 (sts) — Griffith 743 (sts ?) — Gusdorf 69 (sts).
 Hallier s. n. (el) — Hartley 10144 (el) — Haviland 947 (sts ?) — Hewitt s. n. (tr) — Hosakawa 6873 (el)
 — Hunt 2380 (el).
 Iboet 46 (tr).
 Jacobson 846 (tr) — Johansson et al. 98 (L, p. p.) (el), 98 (L, p. p.) (stb) — Junghuhn 1 (stb).
 Kadim bin Tassim 456 (el) — Kairo 107 (el) — Kato et al. B 7745 (sts) — Kerr 66 (sts), 66A (sts), 100
 (sts), 412 (sts), 412A (sts), 443 (sts), 632 (sts) — King's collector 745 (sts) — Kokawa & Hotta 73
 (sts), 2637 (tr ?) — Koorders 14929b (stb) — Korthals 420 (tr), s. n. (sts ?), s. n. (el), s. n. (tr), s. n. (tr ?) —
 Kostermans 4490 (sts), 5042 (su), 12847 (su), 13802 (tr), 13881 (tr), s. n. (sts) — Kuhl & van Hasselt
 s. n. (stb), s. n. (el).
 Larsen & Larsen 32625 (sts) — Lawas s. n. (stb) — Leiden cult. (de Vogel & Vermeulen) 25512 (stb), (de
 Vogel) 27481 (su), (de Vogel) 27679 (tr), (de Vogel) 30264 (sts), (Schuiteman, Mulder & Vogel)
 32276 (el), (de Vogel) 911154 (sts), (de Vogel) 911209 (tr), (van Donkelaar) 913174 (sts), (de Vogel)
 913324 (tr), (de Vogel) 913448 (tr), (de Vogel) 913521 (sts), (de Vogel) 913551 (tr), (de Vogel) 913565
 (su), (de Vogel) 913566 (sts), (de Vogel) 913567 (sts), (de Vogel) 914277 (tr ?), (de Vogel) 914576 (el), (de
 Vogel) 914578 (tr), (de Vogel) 914677 (sts), (de Vogel) 914678 (el), (de Vogel) 914700 (sts), (Kofman)
 931089 (stb), (Schuiteman, Mulder & Vogel) 932544 (tr), (Schuiteman, Mulder & Vogel) 933059 (la),
 (Schuiteman, Mulder & Vogel) 933197 (su) — Lewis & McDonagh 136 (el), 151 (el) — Lobb s. n.
 (stb) — Loher 2148 (sts).
 Maingay 1652 (sts) — Maxwell 76-418 (sts) — Meijer 571 (sts), 782 (el) — Mogeia 4086 (sts), 4142 (el)
 — Morley & Kondin 100 (sts ?) — Motley 816 (sts) — Murata et al. B 341 (el), B 367 (sts), B 795
 (sts), B 1153 (tr ?), B 1762 (tr ?).
 NGF series (Streiman & Kairo) 21105 (el) — Nooteboom 1151 (sts).
 Orolfo 6290 (el).
 Pleyte 600 (el) — Posthumus 905 (sts).
 Rahmat si Boeoa 5832 (su), 8867 (su ?), 8894 (sts), 8906 (sts), 9602 (sts) — Ramos 4346 (el) — Ridley
 90 (sts), 8991 (stb ?), Ridley s. n. (el), s. n. 2-1-1915 (tr), s. n. 2-1915 (stb) — Robinson & Kloss
 6133 (sts); s. n. (tr ?) — Rutten 2148 (el), 2268 (el).
 S series (Ismawi) 42316 (sts), (Lee) 51065 (la) — SAN series (Dewol et al.) 74971 (tr), (Dewol et al.)
 109262 (tr) — Sands, Pattison & Wood 1407 (el) — Sangkhachand & Nimanong 1215 (sts) — Saunders
 235 (el) — Schiffner 1815 (stb), 1840 (stb) — Schlechter 15881 (su), 15964 (tr), 16029 (tr), 16931
 (el), 19429 (el), 20655 (sts) — Schuiteman, Mulder & Vogel 56 (el) — Scortechini 388b (sts) —
 Segerbäck 2068 (sts) — SF series (Burkill) 1480 (el), (Kloss) 14468 (su), (Henderson) 29559 (sts),
 (Corner) 30727 (sts), (Kiah) 31926 (sts), (Sinclair) 40341 (el) — Shah & Noor MS 916 (sts) —
 Smith 450 (sts) — J.J. Smith 817 (stb) — Stone 4562 (el), 15579 (sts) — Synge 81 (sts), 176 (sts).
 Takamatsu 1113 (el), 1715 (el).
 Veldkamp 8369 (el) — Vermeulen 870 (tr) — Vermeulen & Duistermaat 1040 (sts) — de Vogel 715 (sts),
 1436 (su), 7682 (stb), 8182 (su), 8439 (tr), 8833 (tr) — de Vriese s. n. (stb).
 Walker 187 (sts) — Waterhouse 626 (el) — Wenzel 763 (el) — Whitmore 6265 (el) — Wickison 35 (el),
 215 (el) — de Wilde 1177 (el) — de Wilde & de Wilde-Duyfjes 12415 (tr), 18101 (su), 19013 (tr) —
 Winckel s. n. (stb) — Wiradinata 3334 (sts).
 Zollinger 1565 (stb).