

## A REVISION OF HELICTOTRICHON (GRAMINEAE) IN MALESIA

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### SUMMARY

In Malesia there are two species of grasses here tentatively included in *Helictotrichon* Besser (Gramineae): *H. sumatrense* Ohwi and *H. virescens* (Nees ex Steud.) Henr. [incl. *H. asperum* (Munro ex Thw.) Bor and *H. junghuhnii* (Buse) Henr.]. The delimitation and nomenclature of *Helictotrichon*, *Avenastrum* Opiz and *Avenula* (Dum.) Dum. are discussed. It is proposed to lectotypify *Helictotrichon* with *Avena sempervirens* Vill. In the matter of automatic typification of superfluous names Art. 7. 11 is in conflict with Artt. 7. 10 and 63. 3; a correction is proposed.

### INTRODUCTION

Steudel (1854) described a *Trisetum virescens* from India, while Thwaites (1864) proposed an *Avena aspera* from Ceylon. Hooker f. (1896) regarded these as two varieties of what he for nomenclatural reasons called *A. aspera*. Henrard (1940) thought there was just a single taxon, *Helictotrichon virescens*, fortuitously so, as among the material available to him in L it turns out that there is not a single 'true' *H. virescens*. Bor (1960) regarded them as two distinct species.

Just after Steudel Buse described in the same year an *Avena junghuhnii* from Java, a species curiously enough not mentioned by Steudel, although both seem to have studied the same material, or sets of it. Koorders (1911), for once followed by Backer (1922), remarked that it might be conspecific with *A. aspera*, but Backer in his later publications retained *A. junghuhnii*. Henrard (1940) thought that the two were allied, but distinct.

Finally Ohwi (1947) described another species from Sumatra, *Helictotrichon sumatrense*.

The questions now were how many taxa there actually are in Malesia, whether any of these also occurs outside that area, and whether they really do belong to *Helictotrichon* Besser.

From the present study it is concluded that there are indeed but two species, 'sumatrense' and 'virescens', which are at present probably best included in *Helicto-*

*trichon*. The first is apparently closest to *H. burmanicum* Bor, which differs especially by its longer, glabrous ligule, the very contracted panicle and the smaller spikelets. As far as the second species is concerned Koorders was indeed correct: *Avena jung-huhnii* cannot be distinguished from *H. asperum*, while Henrard comes into his own, also, as *H. virescens* is at most a local form of *H. asperum*. When more material will become available from the Southern slopes of the Himalayas, where it grows, the apparent slight differences will no doubt fade away even more into the general variability of the wide-spread *H. asperum*.

#### TAXONOMY

Whether these taxa belong to *Helictotrichon* is another matter, however. The circumscription of that genus and actually the application of that name has been the subject of much, sometimes heated controversy, which as yet is not really resolved.

In the beginning, i.e. in 1753, there was *Avena* Linné, but this was too heterogeneous to maintain and several groups in it were raised to generic rank. Unfortunately the delimitation varied with the author, types of other genera were included, proper types were excluded, in short the group is a nice example of the taxonomic and nomenclatural muddle of European systematics. The problem for our two species revolves around the use of the names *Arrhenatherum* Beauv. (1812), *Helictotrichon* Besser (1827) and *Avenula* (Dum.) Dum. (1868) [incl. *Avenastrum* (Koch) Jessen (1863) and *Avenochloa* Holub (1962)], which pertain to perennial species with relatively small spikelets as in ours. 'True' *Avenas* are generally considered to be annual (but Baum, 1977, included the perennial *A. macrostachya* Coss. & Dur. after careful consideration) and to have relatively large spikelets. Both characters seem of doubtful generic value, but previous workers seem to have been happy enough with them.

The differences between the perennial genera are very slight. *Arrhenatherum* is generally defined by the presence of only two lemmas per spikelet, of which the lower one is awned from near the base and bears a staminate flower, and the upper one is unawned and has a bisexual flower. However, in the uncontested type species and some others bisexual lower florets ('forma *hermaphroditica*') and awned upper lemmas ('forma *biaristata*') are quite common if not the rule and may be found within the single inflorescence. Such observations caused for instance Saint-Yves (1931), who did not think much of life-cycle as a generic character, to include the species in *Avena* again.

Potztal (1951) following Vierhapper (1906) recognized three groups within the perennial species, mainly based on leaf anatomy: the 'Avena'-type, the 'Stipavena'-type and the 'Avenastrum'-type. Between the first two she found intermediary species, especially in Africa, and therefore united them into a single genus *Arrhenatherum*. The 'Avenastrum' group she called *Helictotrichon*. It must be noted here, immediately, that her use of the last name is *not* that of general usage. At present her *Helictotrichon* is called *Avenochloa*, while *Helictotrichon* as commonly understood is included in her *Arrhenatherum*! She defined her genera as follows (italics ours):

*Arrhenatherum* ('Avena'-, 'Stipavena'-type): *Prefoliation convolute. Blades flat or with involute margins or completely involute, finely ribbed on both sides or strongly so on the upper ones, bulliform cells, if present, not in a row on either side of the midrib. Spikelets 2-, or 3-, rarely 4-flowered.* Column of the awn strongly twisted, apparently of even thickness in profile.

*Helictotrichon* ('Avenastrum'-type): *Prefoliation conduplicate. Blades obtusely V-shaped in cross-section, smooth or finely ribbed on both sides, with a row of bulliform cells on either side of the midrib (as pale lines). Spikelets (2-)4-8-flowered. Column loosely twisted, thus apparently irregular in profile.*

Supposingly basing herself on these definitions Potzta (1968) included *A. jung-huhnii* and *T. virescens* in her *Arrhenatherum*. The anatomy of the leaves of both *H. virescens* (s.l.) and *H. sumatrense* we have observed to be of the 'Avena'-type as was also stated by Gervais (1973, p. 81) and Holub (1958). The latter made a separate subgenus *Archavenastrum* (Vierhapper) Holub in *Helictotrichon* for species with such leaf anatomy with *H. virescens* as its type. The spikelets, however, are more like those of Potzta's *Helictotrichon*. (See our italics above.)

If leaf anatomy is considered to be the most important criterion the species should then be included in *Helictotrichon* sensu Holub, to which they will key out in for instance Flora Europaea (Tutin, 1980; Holub, 1980). On the other hand the leaf anatomy alone makes no distinction here, as *Arrhenatherum* in the generally restricted sense and not Potzta's also is of the 'Avena'-type. It may be noted that Metcalfe (1960) said about this situation: 'It is clearly evident .... that the anatomical characters of leaves are, in themselves, generally insufficient to provide criteria for the delimitation of genera, not only in *Arrhenatherum* and its allies, but throughout the *Gramineae*.' (Italics ours.)

Holub (1958) thought he could distinguish *Arrhenatherum* from *Helictotrichon* by some additional characters:

*Arrhenatherum*. Palea flat, not deeply furrowed. Caryopsis  $\pm$  terete without a hilar furrow.

*Helictotrichon*. Palea at base with a furrow which fits into the hilar furrow of the caryopsis.

Unfortunately these characters seem to be valid mainly for *A. elatius*, as was also pointed out by Gervais (1973, p. 21).

The palea in the Malesian species (see fig. 1h) is somewhat concave but cannot be attributed to either form described by Holub, as the paleas in 'true' *Arrhenatherum* are also not really flat but concave, while those of 'true' *Helictotrichon* appear to be only slightly furrowed making this an unsatisfactory feature. Unfortunately no ripe fruits of our species have been found, which is rather surprising. Apparently the caryopsis dehisces very easily and is lost in collecting and drying. Some unripe ones of *H. virescens* seem to tend towards an ellipsoid shape in transverse section without a furrow, but Hooker f. (1900) reported sulcate caryopses.

Table 1

	Origin	Ring
<i>Helictotrichon virescens</i>		
Backer 21590	Java	—
Bünnemeijer 10367	Sumatra	very weak
Chand 7923	Assam	—
Junghuhn s.n. (holotype)	Java	—
Meijer 6123	Sumatra	intermediate
Perrotet 1279	Nilgirries	—
Van Steenis 4824	Java	—
<i>Helictotrichon sumatrense</i>		
Van Steenis 8572 p.p. (isotype)		—
De Wilde & De Wilde-Duyfjes 13321		intermediate

Specimens checked for the presence of a ring of sclerified cells around the endoderm of the roots in transverse section.

Gervais (1968, 1973) studied the anatomy of the roots and observed at first that the species attributed to *Helictotrichon* by Holub had a sheath of sclerified cells ('anneau de sclérenchyme' in transverse section, but not in fact sclerenchyma) around the endodermis, while those of his *Avenula* (*Helictotrichon* sensu Potztal) did not have this; it is also absent in *Arrhenatherum elatius*. He later (1973, p. 81) mentioned that the roots of *H. virescens* and *H. junghuhnii* lacked this sheath also and had at most a slight lignification of the outer layers of the endodermis. This is correct, the sheath is usually completely absent and the cross sections resemble his fig. 2. In *H. virescens* it was once (see table 1) weakly developed and once more or less intermediate between his fig. 1 and 2 with cells around the endodermis that were distinctly smaller than the 'normal' parenchyma with thicker walls. Of *H. sumatranum* only two collections had roots of which one lacked the sheath, while the other had an intermediary one.

So, judging from the anatomy the species are like *Avenula* by their roots and like *Arrhenatherum* and *Helictotrichon* sect. *Archavenastrum* by their leaves. By their spikelets they are more similar to *Avenula*.

In general generic differences in the grasses are based on characters observed in the spikelets, but unfortunately those pointed out by Potztal seem to be of little significance. The number of lemmas within a spikelet is variable in each species and so can hardly be expected to have a generical delimitative value. The shape of the column is occasionally indeed quite striking, but again variable within a species, some specimens being apparently constricted in profile, others parallel-edged.

With all these uncertainties in mind we have concluded in view of the perennial habit, the convolute prefoliation, the 'Avena'-type of anatomy of the leaves without two rows of bulliform cells along the midrib, the fine to coarse ribs on the upper surface of the blades, the spikelets with more than two florets, the disarticulation of the rachilla below the lemmas, which always have bisexual flowers and the awn inserted about halfway the lemmas, that the species are best placed in *Helictotrichon* (non Potztl).

#### NOMENCLATURE

Now that the genera have been more or less delimited the taxa of the complex can be pigeon-holed and can it be decided which generic names through their types are to be applied.

*Arrhenatherum* seems to cause no problems. It is typified by *A. elatius* (Linné) Presl, a species with an 'Avena'-type of leaf anatomy, and so apparently the oldest name present for that group.

*Helictotrichon* was first mentioned by Andrzejowski (1822) in a list of names as *Elicotrichum sempervirens* Besser, an invalid name. It was validated by Schultes & Schultes f. (1827), who without any comment cited a letter by Von Besser in which *Avena* and *Trisetum* are divided into a number of genera. Among the species attributed to it we find *Avena sempervirens* Host, which most authors have regarded as the type, e.g. Schweickerdt (1937), Mansfeld (1938), Hitchcock & Chase (1951), Holub (1962a, 1976), Jacques-Félix (1962) and Kerguelen (1975). The notable exception was Potztl (1951), who appointed *A. planiculmis*, because Reichenbach (1830, 1833) cited only this one of Besser's original species as *Helictotrichum planiculme*. The fact that an author in a regional flora included a name in the synonymy of a species seems to us a very weak argument to conclude that thereby a generic name is lectotypified, so because of this, the contrary general usage and the subsequent dire consequences, which will be outlined below, we will not follow Potztl's choice.

Holub (1958, p. 129–130) strongly suggested that he had seen Besser's actual material and thus the type (Art. 10. 4, Sydney Code) and that this would represent *H. desertorum* (Less.) Nevski (see also Holub, 1962b, p. 167: var. *basalticum* Podp.). In fact this identification was based on 'the geographic origin of Besser's plants .... not (on) a 'type' specimen (which cannot exist!) .... The lectotype .... is *Avena sempervirens*.' (Holub, in litt.). Although the absence of Besser specimens is surprising, we agree with the conclusion.

Going back to *A. planiculmis* it may be noted that this has the 'Avenastrum'-anatomy, which both Potztl and Holub have used for the delimitation of a distinct genus. Because the first used this species as the type of *Helictotrichon* she applied that name to it and its allies and in our view therefore created a later, heterotypic homonym. Holub made it the type of his new genus *Avenochloa*, now known as *Avenula* (Dum.) Dum. Now, if Potztl were to be followed, this genus must be called *Helictotrichon*, and that which nearly all other authors have called by that name must have another name. Obviously this would add too much to the havoc already existing here!

Koch (1837) created a section *Avenastrum* in *Avena* in which he included the perennial species of the groups we are concerned with, e.g. *A. planiculmis*, *A. pubescens*, *A. pratensis* and *A. sempervirens*. The name he used, however, is a later homonym of *Avena* sect. *Avenastrum* Dum. (1827), which included *A. strigosa* Schreb. only, a species placed in sect. '*Aveneae genuinae*' by Koch. Moreover, *A. pubescens* and *A. pratensis* are the two species placed in *Trisetum* sect. *Avenula* by Dumortier (1823), which makes Koch's *Avenastrum* superfluous and under Art. 7. 11 homotypic with sect. *Avenula*, lectotypified by *A. pratensis*. To complicate matters even more it may be noted that Baum (1975) included *A. strigosa* in his new section *Agraria*, for which the correct name therefore must be *Avenastrum* Dum. Surely all of his new names are invalidly published here, for in his combined Latin diagnosis of them he refers to a canonical loading matrix and axes, where with Arabic numerals OTUs (= species and not sections) are not really described nor depicted, so it is all Greek to us; Art. 34. 1. e applies here.

Opiz (1852) indirectly referring to Koch raised the section to generic rank mentioning only *A. planiculme*, *A. pubescens*, *A. pratense* and *A. bromoides*. If the first name is considered not to be the type of *Helictotrichon*, *Avenastrum* is here legitimate. But what is its type? At first sight one would assume that it would be homotypic with its basionym, but this is not automatically so, as Art. 7. 10 requires that to be legitimate which it is not. Art. 7. 2 states that a type and a name are permanently attached, but Art. 60. 1 says that when rank is changed a name or epithet *in no case* has priority outside its own rank (italics ours; it may be noted that Artt. 19. 4, 21 Note 1, 22. 1, 24 Note 1, 26. 1 and possibly 61. 1 are contrary to this). The new Art. 10. 1 (Sydney Code) says that the type of a genus is the type of the name of an included species, e.g. the ones directly mentioned by Opiz, and (Art. 10. 2) species referred to in the protologue, e.g. the species furthermore mentioned by Koch. Any of these may serve as the lectotype. Holub and Pouzar (1967) have appointed *A. sempervirens* Vill. and although they based themselves on the circumscription method which was outlawed after heated discussions in Sydney their choice is here supported, as otherwise the dust around *Avenula*, which seems to have settled, would be stirred up again. Still, we have the to many rather surprising fact that the same name for more or less the same taxon at different levels may have different types. Because of this lectotype *Avenastrum* Opiz is a superfluous name for *Helictotrichon*.

In general Opiz' name has been regarded as invalid because of his cryptic references and the name has been attributed to Jessen (1863) or Beck (1890). As it was more or less used for what we now call *Helictotrichon*, in line therefore with the lectotypification proposed by Holub and Pouzar, it was even proposed for conservation against that name, but this was roundly rejected (Pichi Sermolli, 1954).

Jessen's use of the name was for a hodge-podge of species in which he included the types of the older generic names *Aira* Linné, *Trisetum* and *Arrhenatherum*. Beck restricted it again to Koch's original circumscription.

*Heuffelia* Schur (1866) was also based on Koch's *Avenastrum*, at least this is the only name cited in its synonymy. Again it might be assumed that the names would be homotypic, but again this is not the case because of the illegitimacy of the basi-

onym. Schur included *H. sempervirens* (Vill.) Schur and this has been appointed a lectotype by Holub and Pouzar (1967), whereby it became homotypic with *Helictotrichon* and hence superfluous. It is illegitimate, anyway, because of the earlier *Heufelia* Opiz (1845), a Cyperaceae.

*Avena* sect. *Avenula* was raised to generic rank by Dumortier (1868). Here Art. 7. 10 clearly applies and the type must be sought among the two species originally included in the section. It may be noted that except for these two Dumortier did not make valid combinations as no references to the basionyms of the other species included are given at all. Although an 'A. sempervirens' is mentioned it may be questioned in whose sense it was meant. It is speculative to suggest that it is Villars', and to argue that, since that is the type of *Helictotrichon*, *Avenula* would therefore be superfluous. Even so Art. 7. 11 cannot apply, requiring that *Avenula* would be homotypic with *Helictotrichon*, because that would be contrary to both Artt. 7. 10 and 63. 3. *Avenula*, according to the latter rule becomes legitimate and correct when 'A. sempervirens' is removed, because the basionym is legitimate. The situation here is similar to that of *Hordelymus* given as an example. Article 7. 11 should therefore be clarified by adding the warning 'or when Art. 7. 10 and 63. 3 apply.'

This survey would not be complete without mention of *Avenochloa* Holub (1962a). As it included the lectotype of *Avenula* it was superfluous, grudgingly accepted by Holub (1976). If *A. planiculmis* is accepted as the type of *Helictotrichon*, as Potztdid, it would be a homotypic synonym of the latter name.

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### HELICTOTRICHON

- Helictotrichon* Bess. in Schult. & Schult. f., *Mantissa* 3 (1827) 526; Schweickerd, *Bothalia* 3 (1937) 185; C.E. Hubb., *Fl. Trop. E. Afr.* 10 (1937) 103; Bor, *Grasses* (1960) 438; Holub, *Fl. Eur.* 5 (1980) 208. – *Avenastrum* Opiz, *Šeznam* (1852) 112, nom. superfl. – *Heuffelia* Schur, *Enum. Pl. Transsilv.* (1866) 760, non Opiz (1845). – Lectotype: *Avena sempervirens* Vill. = *Avenastrum sempervirens* (Vill.) Vierh. = *Heuffelia sempervirens* (Vill.) Schur [= *Helictotrichon sempervirens* (Vill.) Pilg.; cf. Holub & Pouzar, *Fol. Geobot. & Phytotax.* 2 (1967) 403].
- Arrhenatherum auct. non* Beauv.: Potz, *Bot. Jb.* 75 (1951) 321, p.p.; *Willdenowia* 4 (1968) 399.

Caespitose perennials, branching intra- and/or extra-vaginally at base. Prefoliation convolute. Lowermost *sheaths* usually open to base. *Ligule* membranous, usually truncate. *Blades* flat or convolute, distinctly ribbed above, without a row of bulliform cells on either side of the midrib. *Inflorescence* a panicle, usually contracted, erect. *Spikelets* many, erect to patent, narrowly oblong to elliptic-oblong, at first ± terete, later laterally compressed, with 2–4 fertile and 1 (or 2) sterile distal florets; fertile florets bisexual or the upper staminate. *Glumes* persistent, lanceolate, unequal, usually shorter than the lemmas, ± membranous; lower glume 1–3-nerved, upper glume 3–7-nerved. Rachilla articulating below the lemmas, not produced, usually pilose. *Lemmas* 5–11-nerved, ± herbaceous with scarious to hyaline tips, acute to acuminate, 2(–4)-fid, lobes aristate or not; callus short to elongated, pilose; awn inserted at ± the middle of the lemma, perfect, geniculated, column usually contorted. *Palea* shorter than the lemma, membranous, apex ± bifid, keels ciliate, ± concave in between. Lodicules 2. *Stamens* (1 or) 3. *Ovary* with a hairy apex. Styles 2, free to base, stigmas laterally exerted. *Caryopsis* oblong, sulcate (always?), subterete; hilum linear, 0.5–1 times as long as the caryopsis; embryo small.

**Distribution.** About 95 species in temperate regions of the Northern hemisphere, extending through the high mountains of tropical Africa to South Africa, in Madagascar, India, Ceylon, South America and with 2 species in Malesia.

**Chromosome number.**  $x = 7$ .

## KEY TO THE SPECIES

- 1a. Ligule glabrous. Glumes acuminate. Lemma 7(–9)-nerved. Column twisted for at least 360°. Anthers (2.2–)3.3–4 mm long . . . . . **1. *H. virescens***  
 b. Ligule hairy outside. Glumes acute. Lemma 5(–7)-nerved. Column twisted for at most 180°. Anthers c. 2 mm long . . . . . **2. *H. sumatrense***

This key and the following descriptive part is for Malesian material only.

**1. *Helictotrichon virescens* (Nees ex Steud.) Henr. – Fig. 1.**

*H. virescens* (Nees ex Steud.) Henr., Blumea 3 (1940) 425; Seneratna, Grasses Ceylon (1956) 51; Bor, Grasses (1960) 438; in Hara et al., Enum. Fl. Pl. Nepal 1 (1978) 135. – *Trisetum virescens* Nees ex Steud., Syn. 1 (April 1854) 226. – *Arrhenatherum virescens* Potztal, Willdenowia 4 (1968) 400, comb. ill. – Types: *Royle 137, 138* (see note), India.

*Avena junghuhnii* Buse in Miq., Pl. Jungh. (August 1854) 345; Miq., Fl. Ind. Bat. 3 (1857) 427; Koord., Exk. Fl. Java 1 (1911) 150; ?Ridl., J. Fed. Mal. St. Mus. 8 (1917) 127; Back. in Heyne, Nutt. Pl. Ned.-Ind. 1 (1922) 234; Handb. Fl. Java 2 (1928) 213; St.-Yves, Candollea 4 (1931) 385, f. 4; Chase in Hochr., Candollea 6 (1936) 415. – *H. junghuhnii* Henr., Blumea 3 (1940) 425; Holub in Klášterský, Opiz (1958) 123; Monod de F. in Back. & Bakh. f., Fl. Java 3 (1968) 523; Veldk. in Steen., Mt. Fl. Java (1972) t. 22, f. 2. – *Arrhenatherum junghuhnii* Potztal, Willdenowia 4 (1968) 400, comb. ill. – Type: *Junghuhn s.n.* (L, holo, sub no. 903. 342–86), Java, Kedu, Dieng, March.

*Avena aspera* Munro ex Thw., Enum. Pl. Zeyl. (1864) 372; Hook. f., Fl. Br. Ind. 7 (1896) 277; in Trimen, Handb. Fl. Ceyl. 5 (1900) 265. – *Avenastrum asperum* Vierh., Verh. Ges. Deutsch. Naturf., Leipzig 85 (1913) 672. – *H. asperum* Bor, Ind. For. Rec., n.s. 1, Bot. (1938) 68; Grasses (1960) 438; in Hara et al., Enum. Fl. Pl. Nepal 1 (1978) 135; Mehra & Sharma, Taxon 21 (1972) 341. – Type: *Thwaites CP 916* (PDA, holo, n.v.; K), Ceylon, 1825 m alt.

*Avena aspera* Thw. var. *roylei* Hook. f., Fl. Br. Ind. 7 (1896) 277; Collett, Fl. Siml. (1902) 618, f. 195 (based on type!). – *Avena roylei* Keng, Bull. Fan Mem. Inst. Biol. 7 (1936) 36, nom. superfl. – *H. roylei* Keng, Clav. Gram. Prim. Sin. (1957) 200 (n.v.), nom. superfl., fide Chase & Niles, Index 2 (1962) 225a. – Lectotype: *Royle s.n.* (K, holo; LIV ?, see K neg. 18361, and note), N.W. India.

Rhizome short. *Culms* ± erect, up to 1.2(–1.8) m high, often branching extravaginally at base, terete, smooth, glabrous; cataphylls pubescent at base, smooth, sometimes shiny; nodes 4 or more, glabrous, or with a ring of 1–2 mm long hairs immediately below them. *Sheaths* terete, rarely slightly keeled, ± smooth and glabrous, apically rarely with some hairs, the basal ones sometimes retrorsely pubescent. *Ligule* rounded to triangular (rarely trapezoid), 1.5–4(–5) mm long, glabrous, rarely scabrid, margin entire to erose, glabrous. *Blades* flat to ± convolute, 10–40(–80) cm by 1–6(–8) mm when expanded, gradually acuminate, flaccid, smooth to variously scabrid, upper surface rarely with some hairs, underneath slightly keeled. *Panicle* contracted, (9–)20–30(–40) by 1–3(–9) cm diam. Axis scabrid upwards, sometimes with some short hairs below the branches; these ± erect, scabrid, the lowermost 2 or 3(–5) together, the longest 4–11(–20) cm long, with (2 or) 3–5(–8) spikelets, naked in the lower 0.4th. *Spikelets* (10–)12–18(–21) mm long, 3–5-flowered (incl. the much reduced upper ones). *Glumes* acuminate, nerves ± scabrid; lower glume 5.5–10 by c. 1(–2) mm, (0.5–)0.7 times as long as the first lemma, 1–3-nerved; up-

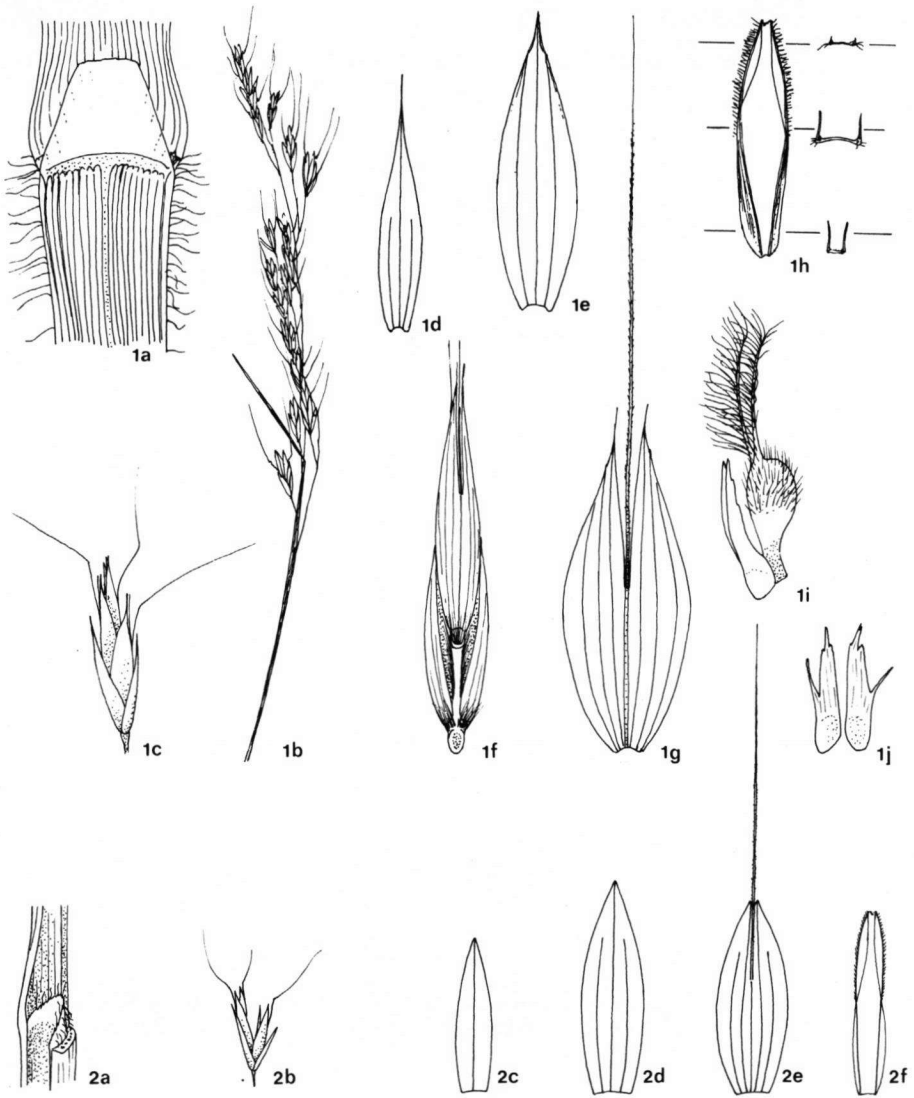


Fig. 1, 2. *Helictotrichon*. — 1. *H. virescens* (Steud.) Henr. (Backer 21590, Java), a. ligule, x 5 (note absence of hairs); b. inflorescence, x 0.5; c. spikelets, x 2; d. lower glume, x 5; e. upper glume, x 5; f. upper florets, x 5; g. first lemma (awn straightened out), x 5; h. first palea with transverse sections, x 5; i. lodicules and ovary, lateral view, x 10; j. lodicules, x 10. — 2. *H. sumatrense* Ohwi (De Wilde & De Wilde-Duyfjes 13221), a. ligule (note the hairs), x 3; b. spikelet, x 2; lower glume, x 5; d. upper glume, x 5; e. first lemma (awn straightened out); f. first palea, x 5. (JGS del.).

per glume 8.5–12.5 by 2.5–4 mm, (3–)5-nerved. Rachilla joints 3.3–4 mm long, laterally with 1–2 mm long hairs. First *lemma* ovate-oblong, 10–12.5 by 3–4.5 mm, 7(–9)-nerved, scabrid to very scabrid, apical lobes 1–5 mm long, acuminate, often with an up to 3 mm long arista; callus obliquely obconical, c. 0.7 mm long, obtuse, hairs 0.5–2 mm long; awn inserted at 0.5–0.6(–0.7)th of the lemma, 15–24 mm long, antrorsely scabrid; column 5–8 mm long, twisted for at least 360°; arista 10–17 mm long, straight. First *palea* lanceolate, 7–9.5 mm long, margins sharply folded inwards, keels ciliate in the upper 0.5–0.8th. Lodicules 1.5–2 by 0.2–0.4 mm, sometimes swollen at base, membranous, unequally 2-lobed, lateral lobe very narrow, nervature indistinct, glabrous. *Anthems* (2.2–)3.3–4 mm long. No ripe fruits seen, but hilum c. 0.56 times as long as the caryopsis in unripe ones.

Distribution. Pakistan (Chitral, Swat), India (Kashmir, Punjab, Sikkim, Assam, Madras, Nilgiris, Puleys), Nepal, Bhutan, China (Yunnan), Sri Lanka, Malesia: Sumatra (Aceh: Laut Pupanji, G. Leuser; W. Coast: G. Kerinci), Java (Priangan: G. Papan-dayan; Kedu: Dieng, G. Merbabu; Malang: G. Arjuno, G. Kawi, Tengger; Besuki: Ijen, fide Veldkamp, 1972).

Ecology. Sunny to moderately shaded dry ground, in thickets and forest margins, locally abundant, 1900–2200 m alt.; in Asia from 1500 (Nilgiris) to 4400 m (Nepal).

Collector's notes. Tufted grass.

Chromosome number.  $n = 14$  (Mehra & Sharma, 1972).

Uses. Leaves with sufficient feeding value, readily eaten by cattle. Grains rarely used for porridge (Dieng) (Backer, 1922).

Vernacular names. Pari apa, pari kesit (Jav.).

Notes. Whether *H. virescens* and *Avena aspera* var. *roylei* are actually homotypic is a question, which could not be solved now, if ever. The syntypes of the first names, presumably in P, have not been seen. Of the syntypes in K the Royle collection bears no number. Lectotypification must therefore be left to the future when the specimens can be compared. The most logical choice would then of course be to take that specimen, which matches the holotype in K, if such a match would be possible. To which of the two numbers cited the LIV-specimen belongs is not clear, either.

*Avena roylei* and *H. roylei* are superfluous names because Keng based them on Hooker's *A. aspera* var. *roylei*, which included *Trisetum virescens*.

Bor (1960, 1978) distinguished *H. virescens* from *H. asperum*. The first tends to have less scabrid, more membranous, greener lemmas and shorter hairs on the keels of the palea (c. 0.1 mm long vs. c. 0.2 mm long in the second). These differences are too slight to base species or even varieties on and more likely represent differences between populations, which may well vanish when the slopes of the Himalayas have been better explored. At least in Central and East Nepal they seem to grow together (Bor, 1978).

Some specimens from Kashmir (e.g. *Stewart 23235*) and the Nilgiris (*Perrotet 1276, 1282*) are somewhat different in habit. They have tufted, bristle-like leaves at base, more or less leafless culms, relatively more contracted panicles and statistically (at least so it seems from so few samples) smaller spikelets. With Bor's key (1960) they therefore key out with *H. schmidii* (Hook. f.) Bor, but that endemic species of

the Nilgirris is easily distinguished by the even more contracted panicle, the  $\pm$  straight, soon patent aristas with a small (c. 1 mm long) column. Without more specimens a decision about a separate status, if any, cannot be made; note also the so remote provenances. Local populations can well have some minor differences without a special status being accorded to them by necessity.

In Malesia, too, plants from Sumatra and Java exhibit some minute differences. The c. 15 collections studied from Java have no hairy ring below the nodes, while in Sumatra the one collection from Laut Pupanji and two out of three from G. Kerinci have it below some of the nodes. The scrap from G. Leuser is too poor.

Saint-Yves labeled such a 'hairy' specimen from the Kerinci (*Bünnemeijer 10042*, L) 'subvar. *ampla*', an apparently unpublished name, supposingly referring to the lax inflorescence with long branches. Except perhaps for the ring of hairs it is a rather normal specimen.

The anthers seem to be smallest in Sumatra, even approaching the dimensions of *H. sumatrense*, e.g. in *Van Steenis 6387* (Laut Pupanji), where they are c. 2.2 mm long, but they may not be completely mature.

Ridley's record (1917) of *Avena junghuhnii* from the Kerinci most likely refers to the present species, but his vouchers have not been seen.

## 2. *Helictotrichon sumatrense* Ohwi. – Fig. 2.

*H. sumatrense* Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 7; Holub in Klášterský, Opiz (1958) 123. – Type: *Van Steenis 8572* (BO, n.v.; L). Sumatra, Aceh, G. Leuser, Middentop, 3300–3440 m, 2 February 1937.

Rhizome short. *Culms*  $\pm$  erect, 40–70 cm high, terete, smooth, glabrous; nodes at least 4, glabrous. *Sheaths* terete,  $\pm$  glabrous,  $\pm$  smooth, the basal one often densely retrorsely pubescent. *Ligule*  $\pm$  rounded to triangular, 1–2 mm long, outside with c. 0.5 mm long, retrorse, white hairs, margin erose, ciliate. *Blades*  $\pm$  persistently convolute (sometimes only at the margins), rigid, linear to subulate, 10–40 cm by 1–6 mm when expanded,  $\pm$  smooth, glabrous, not keeled. *Panicle* lax to  $\pm$  contracted, often secundly nodding, 7–20 by 4–7 cm diam. Axis scabrid upwards, especially below the nodes. Branches patent (to  $\pm$  erect), usually undulate, thin, scabrid, the lower 3–6 together, the longest 4–6 cm long, 4–8-spikeled, spikeled to base to naked in the lower half. *Spikelets* 8–11(–13) mm long, 3- or 4-flowered, incl. the much reduced upper one. *Glumes* acute, nerves  $\pm$  scabrid; lower glume 4–8 by c. 1 mm, c. 0.5 times as long as the first lemma, 1(–3)-nerved; upper glume 6–10 by 2–3 mm, 3-nerved. Rachilla joints 2.6–3.1 mm long, lateral hairs 1–2 mm long. First *lemma* ovate-oblong, 7–9.3 by c. 3 mm, 5(–7)-nerved, nerves  $\pm$  scabrid, otherwise smooth (rarely  $\pm$  scabrid), apical lobes c. 0.5 mm long,  $\pm$  acute, not aristate; callus obliquely obconical, c. 0.4 mm long, obtuse, hairs 0.5–1.5 mm long; awn inserted at c. 0.6th of the lemma, 7.5–15 mm long, very shortly antrorsely puberulous; column 1.5–3 mm long, twisted for at most 180°; arista 6–12 mm long, straight. First *palea* lanceolate, nearly as long as the lemma, 6.5–7.5 by c. 1 mm, the margins

sharply infolded, keels ciliate in the upper 0.8th. Lodicules oblong, c. 1 by 0.3 mm, apex  $\pm$  truncate, nervature indistinct, glabrous. *Anthers* c. 2(–2.5?, see note) mm long. No ripe fruits seen.

Distribution. Indonesia: Sumatra (Aceh: G. Leuser, G. Bandahara).

Ecology. Subalpine grasslands, grassy place along rivulet, 2600–3500 m alt.

Collector's notes. Spikes greenish to dull purplish tinged.

Notes. The isotype in L is a mixture of this species and *H. virescens*.

Both Ohwi (1947) and Jansen (msc.) describe the lemmas as 7-nerved. This was only observed in *Van Steenis 8572*, where an extra set of outer nerves is somewhat developed; in *H. virescens* the 7 nerves are always  $\pm$  equally strong.

Ohwi also described the anthers as 2–2.5 mm long; the ones I saw were all c. 2 mm long.

#### INDEX TO COLLECTORS

Specimens not seen, but reasonably trustworthily identified have the specific number between brackets. Unnumbered collections have been excluded.

Backer 8386: 1, 21590: 1 – Bhatracharrya 24571: 1 – Bor 5338: (1) – Bor's collector 582: (1), 1008: 1 – Bourne 1036: (1), 1966: (1), 1967: (1) – Bünne-meijer 10042: 1, 10367: 1.  
 Chand 2289: 1, 7923: 1, 8120: 1 – Clarke 18659: (1) – Clayton 5505: 1 – Coert 113: 1.  
 Dunbar 17: 1 – Duthie 13315: (1), 25030: (1).  
 Ekanayake 70: 1.  
 Field 327: 1.  
 Gardner 1064: 1 – Gisius 16: 1 – Gould & Cooray 13789: 1.  
 Harlan 1226: 1 – Hochreutiner 2649: (1), 2666: (1), 2698: (1), 2710: (1).  
 Koelz 23776: 1 – Koorders 37596: 1, 43768: 1.  
 Leeuwen-Reijnvaan 12240: 1, 13347: 1.  
 Mehra & Sharma 6: (1) – Meijer 6123: 1.  
 Perrotet 1276: 1, 1279: 1, 1281: 1 – Polunin 315: (1).  
 Royle 137: 1, 138: 1.  
 Siddiqui & Rahman 26714: (1) – Stainton 1088: (1), 8477: (1) – Steenis 4107: 1, 4318: 1, 4355: 1, 4824: 1, 6387: 1, 7070a: 1, 8572: 2, 9581: 2, 11681: 1 – Stewart 23235: 1, 23264: 1, 23430: 1, 24366: 1, 24577: (1) – Stewart & Rahman 25066: (1), 25240: (1).  
 Thwaites CP 916: 1 – TI 6302284: (1).  
 Wallich 3793: 1 – Wilde & Wilde-Duyfjes 13321: 2 – Wisse 507: 1.

#### *Helictotrichon imberbe* (Nees) Veldk., *comb. nov.*

*Trisetum imberbe* Nees, Fl. Afr. Austr. 1 (1841) 349. – *Avena turgidula* Stapf, Kew Bull. (1897) 293, nom. superfl. – *Avenastrum turgidulum* Stapf, Fl. Cap. 7 (1899) 474. – *H. turgidulum* Schweickerd, Bothalia 3 (1937) 196. – Type: *Drège 3918* (L, iso), South Africa, Cape Prov., Aliwal North Dist., Leeuwenspruit between Kraai Rivier and the Wittebergen.

Because the type was infected by *Tilletia*, which caused monstrous spikelets Nees' combination was rejected by later authors. This has now become an incorrect decision after the rescinding of the pertinent article necessitating a new combination. Stapf's name is superfluous and homotypic with Nees' combination and Schweickerd's lectotypification of the first with *Zeyher 463* must be rejected.