

Oxyrrhynchium asperisetum (Brachytheciaceae, Musci) new to Malaysia and Vietnam, with the overview of Oxyrrhynchium in Southeast Asia

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Abstract. The taxonomic distinctions among four species of *Oxyrrhynchium*, i.e., *O. asperisetum*, *O. vagans*, *O. hians* and *O. savatieri* in SE Asia are discussed. *Oxyrrhynchium asperisetum* is reported new to Malaysia and Vietnam.

Introduction

Oxyrrhynchium asperisetum (C. Muell.) Broth. (= *Eurhynchium asperisetum* (C. Muell.) Bartr.) was originally described from Java and subsequently reported from the Philippines (Bartram, 1939), Thailand (Horikawa & Ando, 1964; Tixier, 1971), Ryukyu in Japan (cf. Iwatsuki, 1991), southern China and Taiwan (cf. Redfearn et al., 1996), and Papua New Guinea (Ignatov et al., 1999).

Several new collections have expanded its range further to include:

(1) Vietnam (new record for the country, cf. Tan & Iwatsuki, 1993): Thanh Hoa Province, karstic area near Bien Son town, in dry evergreen forest, on shaded calcareous rocky wall at cave entrance, *Pócs* 02112. [SINU, MHA].

(2) Malaysia (new record for the country, cf. Mohamed & Tan, 1988): Peninsular Malaysia, Cameron Highland, Gn. Brinchang, on tree fern, 3.IX. 1998, B. C. Tan, s.n. (SINU, MHA).

(3) China, Yunnan, about 15 km SE of Xishuangbanna Tropical Bota-

nical Garden, roadside limestone rainforest in Tsui-Peng-Feng (Hill) along a river tributary, 12.XII.1999, B. C. Tan 99-173 (SINU, MHA).

(4) Philippines, Mindanao, North Cotabato Province, Mt. Apo, tropical montane forest near Lake Venado, 7°00' N, 125°16' E, on humus above rocks, 2,270 m, 10.VIII.1999. Schumm & Schwarz 4543 (SINU); *ibid*, on tree fern, 2,370 m, Schumm & Schwarz 4544 (SINU); *ibid*, on bark, 2,210 m, 20.III.1999, Schumm & Schwarz 3785 (SINU).

Earlier, Bartram (1939) noted that his Philippine material was sterile and therefore he retained the final judgement on the species identity to subsequent investigation. Fortunately in 1999, Schumm and Schwarz collected material with sporophytes that have very rough setae, thus confirming the occurrence of *O. asperisetum* in Philippines.

Oxyrrhynchium asperistenum belongs to the genus known as one of the most variable in Brachytheciaceae (see Ignatov & Huttunen, 2003, for revised generic classification). *Oxyrrhynchium hians* (Hedw.) Loeske alone poses quite many taxonomical puzzles due to its enormous variability (cf. Touw & Knowl, 1978). In areas where two or more species of *Oxyrrhynchium* occur, the situation of correct species determination becomes much more difficult, for examples, in Europe, between the pair of *O. hian* and *O. schleicheri* (Hedw. f.) Roell, and in Malesia, between *O. vagans* (Jaeg.) Ignatov & Huttunen and *O. asperisetum*. The ultimate complication is the separation of *Oxyrrhynchium* species in areas where four species of the genus occur together, such as in Central China [*O. hians*, *O. protractum* (C. Muell.) Broth., *O. savatieri* (Schimp. ex Besch.) Broth. and *O. vagans* (cf. Ignatov et al., 2003)], and Southeast China [*O. hians*, *O. savatieri*, *O. vagans* and *O. asperisetum*]. Sterile collections of slender phenotypes of some taxa often are difficult, if not impossible, to assign to any species. This need for sporophyte material must always be considered when collecting specimens of *Oxyrrhynchium*.

Taxonomic key to four difficult species in Southeast Asia

1. Branch foliage complanate where leaves densely arranged
..... *O. savatieri*
1. Branch foliage subjulaceous where leaves densely arranged 2.
2. Laminal cells of branch leaves more commonly measure (50–)70–110(–120) × (4–)5–6(–7) μm wide; acumen of branch leaves more or less abruptly delimited; polyoicous or dioicous; seta rough
..... *O. asperisetum*
2. Laminal cells of branch leaves more commonly measure (30–)50–100(–120) × (4–)5–8(–9) μm; acumen of branch leaves not abruptly delimited; dioicous; seta rough or smooth 3.

3. Plants rather robust; medium laminal cells of branch leaves measure (70-)100-120(-140) \times 5-9 μm ; seta smooth *O. vagans*
3. Plants rather slender; median laminal cells measure (30-)50-80(-105) \times 5-7 μm ; seta rough *O. hians*

Taxonomic comments

Oxyrrhynchium asperisetum (C. Muell.) Broth.

This is a relatively small moss and we have no explanation why Bart-ram (1939) considered it to be larger than *O. vagans*. Fleischer (1923) also reported leaves of *O. asperisetum* up to 1.8 mm, but we never saw them larger than 1.5 mm. Branch leaves often have the characteristically abruptly constricted leaf acumen, though it is not always very well expressed in New Guinean specimens (cf. Figs. 13-14 in Ignatov et al., 1999). Leaf cells of *O. asperisetum* are usually 60-110 μm long, even in quite small leaves, and always narrow, ca. 5-6 μm wide. This allows the slender form of *O. asperisetum* to be distinguished from *O. vagans* that has leaf cells of about 5-9 μm wide and often longer than 100 μm . Takaki (1956) pointed that *O. asperisetum* has complanate branches; sometimes this aspect is more or less clear, though it is never so distinct as in *O. savatieri*. The distributional range of these two species has nearly no overlap, the later being a more northern one. In critical cases, *O. savatieri* is different from *O. asperisetum* in having smaller cells (50-)65-80(-110) \times (4-)5(-6) μm [vs. (50-)70-110(-120) \times (4-)5-6(-7) μm] and rarely having abruptly constricted acumen in branch leaves in Chinese materials (though observed in more xeric phenotypes in Japanese specimens). Brownish pigmentation is sometimes present, but in many collections plants of *O. asperisetum* are purely green.

Collection of *O. asperisetum* from Vietnam and Malaysia has no sporophytes and represent a relatively poorly developed phenotype growing in shade. Its attribution to this species is based largely on leaf shape and laminal cell dimensions.

O. savatieri (Schimp. ex Besch.) Broth.

Many authors have reported that the main diagnostic characters of the species is the complanate foliage. This statement needs some comments because the aspect of complanateness is characteristic for all species of the genus. However, in many species the foliage is more complanate in loose growth form and in remotely foliated parts of the plant, while in *O. savatieri* the pattern is opposite: the denser is its foliage, the more complanate is the leaf arrangement. Slender plants without the more or less densely

foliated branches are almost impossible to identify. Brownish pigmentation is sometimes present, but in many collections plants are purely green (at least in Chinese collections).

O. hians (Hedw.) Loeske

Laminal cells of the Chinese specimens of this species have cells shorter than 60–70 μm . Most of Chinese plants are small to medium-sized and have brownish pigmentation.

O. vagans (Jaeg.) Ignatov & Huttunen

When sporophyte is present, this species can be separated immediately by its smooth seta (all other Asian species of *Oxyrrhynchium* have rough setae). However, many of the Chinese collections are sterile. *Oxyrrhynchium vagans* is the largest species of the genus in the region. When optimally developed it has long laminal cells of about 100–120 μm long (longer than in *O. savatieri*). Slender phenotypes with cells up to 80 μm would be extremely difficult to separate from the large phenotypes of *O. hians*. Branch leaves are very shortly acute in the slender plants of *O. vagans*, whereas they are variable and often narrowly acute in *O. hians*. Brownish pigmentation is commonly present.

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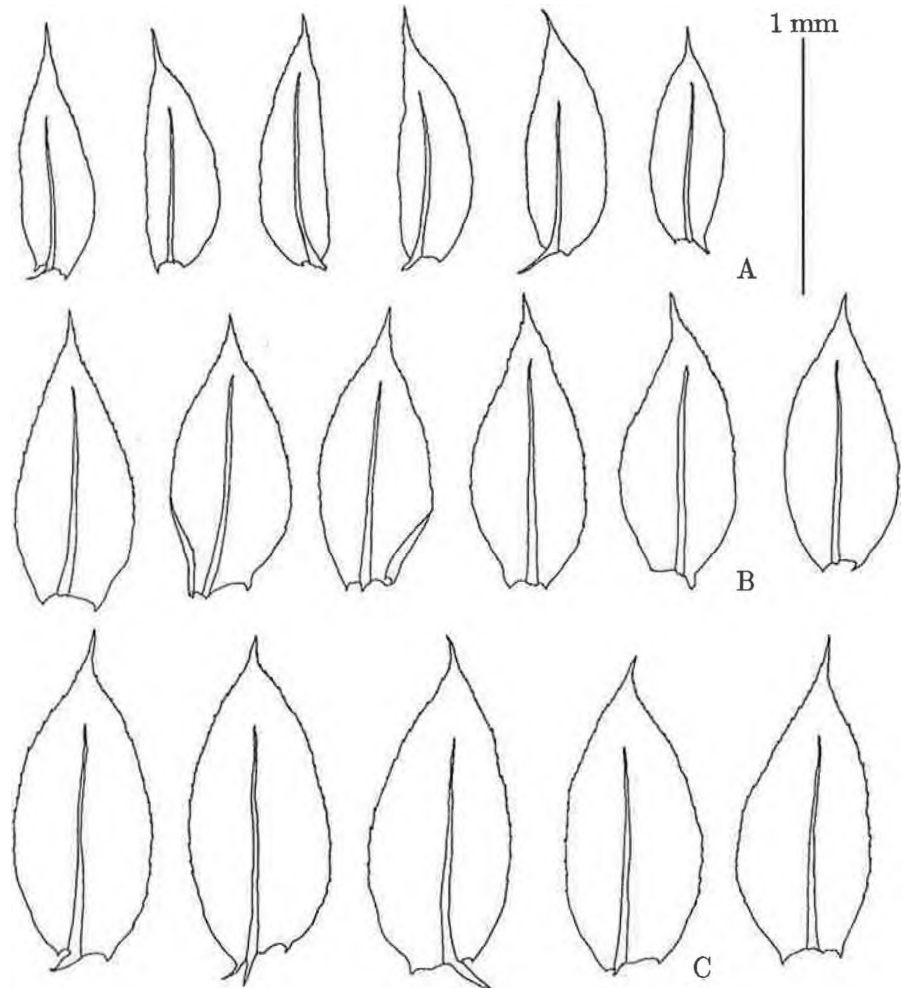


Fig. 1 Various shapes of branch leaves of *Oxyrrhynchium asperisetum* from three collections: A: Vietnam, *Pócs 02112*; B: Philippines, *Schumm & Schwarz 4544* (from plants with sporophytes); Papua New Guinea, *T. Koponen 30850* (from plants with sporophytes).