Tropical Bryology 13: 125-130, 1997

A revision of *Acanthorrhynchium* (Sematophyllaceae) in Africa

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Abstract: Of the three species of *Acanthorrhynchium* reported for Africa in a recent checklist, all prove to be the same as the widespread Asian species, *Acanthorrhynchium papillatum* (Harvey) Fleisch.: this is the first report of this taxon for Africa. *Acanthorrhynchium decolor* (Besch.) Fleisch. and *A. loucoubense* (Besch.) Fleisch. are made new synonyms of *A. papillatum*. *Acanthorrhynchium serratum* (Ren. & Card.) Fleisch. had already been made a synonym of *A. loucoubense* (as *Taxithelium loucoubense*) before Fleischer moved it into the genus *Acanthorrhynchium*.

Three species of *Acanthorrhynchium* (Harv.) Fleisch. were reported for Africa in a recent checklist (O'Shea, 1995): *A. decolor* (Seychelles), and *A. loucoubense* and *A. serratum* (both from Comoros and Madagascar). There are no known records from mainland Africa. A recent collection from Seychelles was identified by L.T. Ellis (BM) as the Asian *A. papillatum*, who noted (pers. comm.) that *A. decolor* and *A. papillatum* may possibly be synonyms. Investigations into all four species were then made, based largely on the type collections and recent collections from Seychelles.

Acanthorrhynchium was described by Fleischer (1923) as a segregate of *Taxithelium* Mitten, to include subgenera *Monostigma* and *Oligostigma* Renauld & Cardot (Renauld & Cardot, 1901), and as a replacement for the name *Acanthodium* Mitten, which was already in use outside the bryophytes. Generic boundaries and phylogeny in the Sematophyllaceae are poorly understood, but the genus is considered to be part of the subfamily Sematophylloideae, and to the subgroup with strongly collenchymatous exothecial cells, which includes *Acroporium*, *Rhaphidostichum*, *Sematophyllum* and *Trichosteleum* (Tan & Buck, 1989). The other subgroup, distinguished by having only semi-collenchymatous exothecial cells, contains genera such as *Taxithelium* and *Wijkia*, with which *Acanthorrhynchium* might be confused. The subgroup containing *Acanthorrhynchium* also has what Tan & Buck (1989) describe as "the most typical sematophyllaceous alar cells; a basal row of largely inflated, thin-walled, and only lightly colored cells", and is also the Sematophyllaceae *sensu stricto* of Seki (1969). The genus is also discussed by Buck & Tan (1989) who state that "we suspect that most, if not all, of the other taxa in this genus may be synonymous with [*A. papillatum*]." It is a genus with 11 described species, distributed from the

East African islands through southern Asia and western Oceania.

The taxonomy within this subgroup is confused in Africa because of the large and increasing number of species described in these genera, many based on single collections, but fortunately *Acanthorrhynchium* has escaped most of these problems. *Acanthorrhynchium decolor* (Besch.) Fleisch. and *A. loucoubense* (Besch.) Fleisch. were described (in *Rhaphidostegium*, now a synonym of *Sematophyllum*) by Bescherelle (1880) from Seychelles and Madagascar respectively, and *A. serratum* (Ren. & Card.) Fleisch. was described (as *Taxithelium*) from Madagascar (Renauld & Cardot, 1900). Renauld and Cardot (1915) made *A. serratum* a synonym of *A. loucoubense*, Cardot commenting that he had examined the type collection of *A. loucoubense* and found it "absolument la mème" as *A. serratum*; this was unfortunately missed by Fleischer (1923), Index Muscorum (van der Wijk, Margadant & Florschütz, 1959) and subsequent authors (e.g., Crosby, Schultze-Motel & Schultze-Motel, 1983), which led to its unfortunate inclusion in the checklist (O'Shea, 1995).

***Acanthorrhynchium* Fleischer,** Musci Fl. Buitenzorg **4**: 1331. 1923.

Acanthodium Mitt., *J. Linn. Soc. Bot.* **10**: 182. 1868, *hom. illeg.*, non *Acanthodium* Delile, Fl. Egypte 241. *33*. 1813 (Phan.).
Taxithelium subgen. *Monostigma* Ren. & Card., *Rev. Bryol*. 28: 111. 1901, *Taxithelium* subgen. *Oligostigma* Ren. & Card., *Rev. Bryol*. 28: 111. 1901.

Type: *A. papillatum* (Harvey) Fleischer.

The characteristic swollen alar cells, the short, unipapillate cells and the gibbous capsule are sufficient to identify the genus. Seychelles material appears to be frequently found with capsules (although this could be caused by preferential collecting), but this was less apparent with Asian material. Collections without capsules might be mistaken for other sematophyllaceous genera, particularly *Trichosteleum*, *Radulina* or *Taxithelium*. *Trichosteleum* would normally differ in its less complanate, slightly glossier, narrower (c. 1:4.5), more erect leaves with longer leaf cells, usually with a yellowish base to the leaf, and with a shorter, more delicate seta with papillae at the upper end, and a shorter, straighter, pendent capsule, usually strongly narrowed behind the mouth. Even if the capsules have disappeared, the bend in the seta and the papillae are still present. Mixed collections of *T. stictum* and *A. papillatum* are found on Seychelles (e.g., *Pócs 9350/AU*, EGR, hb. O'Shea). *Radulina* (Buck & Tan, 1989) and *Taxithelium* can be separated by their pluripapillose cells, and the latter also by its smaller alar cells. Buck & Tan (1989) discuss the delimitation of these and other related genera in more detail.

***Acanthorrhynchium papillatum* (Harvey) Fleischer,** Musci Fl. Buitenzorg **4**: 1331. *216*. 1923.

Hypnum papillatum Harvey in Hooker, *Icon. Pl. Rar.* **1**: 23 *f. 8*. 1836, *London J. Bot.* **2**: 18. 1840; *Stereodon papillatus* (Harv.) Mitt., *J. Linn. Soc. Suppl. Bot.* **1**: 113. 1859; *Acanthodium papillatum* (Harv.) Mitt., *J. Linn. Soc. Bot.* **10**:182. 1868; *Sematophyllum papillatus* (Harv.) Mitt. in Seem., Fl. Vit. 398. 1873; *Trichosteleum papillatum* (Harv.) Jaeg., *Ber. S. Gall. Naturw. Ges.* **1876-77**: 417. 1878 (Ad. 2:483); *Taxithelium papillatum* (Harv.) Broth., *Bot. Tidskr.* **24**: 123. 1901.
Type: 'Nepal' (probably Burma/Malaya, see Long (1995)): Wallich (Holotype, TCD).

Acanthorrhynchium decolor (Besch.) Fleisch., Musci Fl. Buitenzorg **4**: 1335. 1923, **syn. nov.**; *Rhaphidostegium decolor* Bescherelle, *Ann. Sci. Nat. Bot. sér. 6*, **10**: 306. 1880.
Type: Seychelles: 1875?, G. de l'Isle (Holotype, BM).

Acanthorrhynchium loucoubense (Besch.) Fleisch., Musci Fl. Buitenzorg **4**: 1335. 1923, **syn. nov.**; *Rhaphidostegium loucoubense* Bescherelle, *Ann. Sci. Nat. Bot. sér. 6*, **10**: 306. 1880; *Taxithelium*

loucoubense (Besch.) Ren. & Card., *Rev. Bryol.* **28**: 111. 1901.
Type: Forêt du Loucoubé, Nossi Bé, Madagascar, mars 1851, Boivin,
(Lectotype here designated, BM).

Acanthorrhynchium serratum (Ren. & Card.) Fleisch., Musci Fl. Buitenzorg **4**: 1335. 1923; *Taxithelium serratum* Ren. & Card., *Bull. Soc. R. Bot. Belg.* **38(1)**: 40. 1900.
Type: In silvis circa Mahambo, Mada gascar, Perrot frères (Holotype, PC?).

The types cited here from BM are designated on the basis that BM is the holder of Bescherelle's herbarium, and that there are specimens annotated in Bescherelle's handwriting giving the same collector and locality as described in the original publication. Where there are more than one of these, the one appearing most consistent with other Bescherelle types has been chosen as lectotype. The sheets in BM have been annotated accordingly. It is not known whether there are duplicates elsewhere. The specimens designated as types of *A. decolor* and *A. loucoubense* do not have sporophytes.

See Fleischer (1923) for a fuller description and illustration. The plant is also described in Brotherus (1925) and described and illustrated in Renauld & Cardot (1915), Bartram (1939) and Gangulee (1980). The measurements in the following description are taken from the specimens examined.

Plants creeping in tangled mats, often with other bryophytes, including other species of Sematophyllaceae. Stems flattened, complanate, soft greyish-green to pale-green, often brownish in herbarium specimens, not shiny. Leaves spreading, symmetric to asymmetric, ovate-lanceolate, usually narrowing to an acuminate point (10-)20-30(-40) % of leaf length, (0.6-)0.8-1.1(-1.25) mm long, with a length to width ratio of (2.5-)3-3.6:1, narrowed at the base, slightly concave, ecostate, usually toothed throughout the length, although teeth sometimes absent where the apiculus is particularly long, the teeth formed from projecting cell ends, branch leaves usually smaller than stem leaves (Fig. 1a-k). Alar cells 2-3(-4), large, oblong, inflated, hyaline, yellowish or brownish, (35-)70-75 µm long and (12-)20(-33) µm wide (the cell nearest the margin being the largest), reduced or absent at one side on asymmetric leaves (Fig. 1l). Mid-leaf cells oblong-rhomboidal, with a single papilla over the centre of the cell lumen (many leaves having at least one cell with two papillae), (12-)30-45(-56) µm, with a length to width ratio of (5-)7-8(-17):1, papillae on the dorsal side more prominent, the papillae often appearing to be distributed in oblique rows across the leaf (Fig. 1a,k). Seta 1-3.5 cm long, smooth throughout. Capsule gibbous (Fig. 1m), peristome as for the genus.

Ecology Little information is given for most collections, but many specimens show evidence of being corticolous, and where details are given, these usually refer to tree stumps, dead branches or fallen logs, and occasionally leaf litter.

Distribution East African islands (Comoros, Madagascar, Seychelles), Indochina, China, Indonesia, Borneo, Philippines, New Guinea, Australia, Fiji, Samoa. (Nepal, the locality given by Harvey and Hooker for the type specimen, is treated as erroneous by Long (1995), and Burma or Penang are suggested as more likely original localities.)

Discussion Collections of this taxon from Africa in the Nineteenth Century were few, and the two taxa synonymised here were described on the basis of single collections, with little evidence being available about variation. We now have more collections from a larger number of localities and habitats and it is possible to see a fuller picture. The variation evident in the collections of *A. papillatum*, both from Africa and Asia, clearly belongs to one taxon, and is sufficient to embrace the variation represented by *A. decolor* and *A. loucoubense*. Fleischer (1923) commented that there is a wide range of general form and leaf structure in the plant, and that even within one turf, leaves can vary from narrow to widely oval, and shorter to more longly pointed. Evidence of habitat and altitude is regrettably absent from many early collections, but the few plants with smaller more shortly-pointed leaves appear to be found at lower altitudes. More strongly toothed margins appear to be particularly prevalent in the Seychelles specimens, but also appeared in the

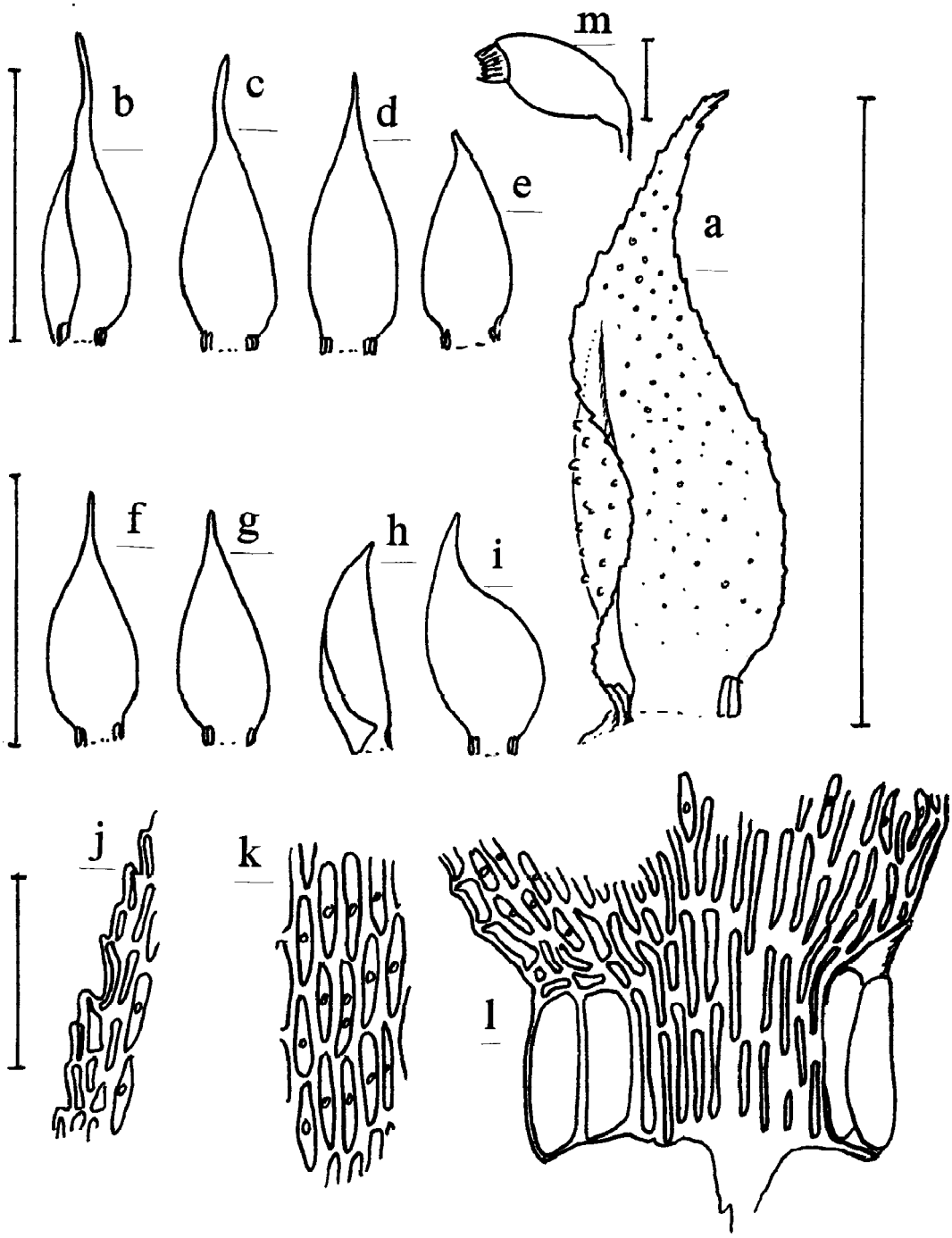

Figure 1. *Acanthorrhynchium papillatum* (Harvey) Fleisch. *a*, overall leaf structure; *b-i*, variation in leaf shape; *j*, marginal teeth near apex; *k*, mid-leaf cells; *l*, leaf base; *m*, capsule. (*a,j, Jeffrey & Zelia 444*, Seychelles; *b,c, Norkett 17471*, Seychelles; *d, Norkett 16420*, Seychelles; *e,k, Norkett 16758*, Seychelles; *f, Touw 11277*, Thailand; *g,h, Boivin s.n.*, Madagascar (type of *A. loucoubense*); *i, Weber B-32390*, Australia; *l, de l'Isle s.n.*, Seychelles (type of *A. decolor*); *m, Kis 9322/AS*, Seychelles.) Scale bars: leaves and sporophyte, 1 mm; leaf cells, 100 µm.

Australian specimen and some Asian specimens, and showed no correlation with the little information available about habitat or altitude.

Acanthorrhynchium loucoubense is a form with a very short acumen (Fig. 1g) and rather short leaf cells, but this is mirrored by collections from Asia and Australia, and by the more extreme *Norkett 16758* from Seychelles (Fig. 1e). The two collections (leg. M. Onraedt, det. M. Bizot) published under this name in a recent Seychelles checklist (O'Shea, Frahm & Porembski, 1966) proved on examination to belong to *Taxithelium*, probably *Taxithelium instratum*. This mistake is understandable, as the illustration in Renauld & Cardot (1915) (Plate 105) is clearly incorrect in showing multipapillose mid-leaf cells (the type is unipapillate and the description is very specific). The alar cells for both *A. loucoubense* and *A. decolor* are also incorrectly drawn, the latter apparently mistakenly drawn from *Ectropothecium seychellarum* Besch. (Thériot, 1923).

Specimens examined (specimens in BM unless otherwise stated)

Africa-3. MADAGASCAR: Nossi Bé - Loucoubé, 3/1851, *Boivin s.n.* (Lectotype of *A. loucoubense*); Masoala Peninsula, summit ridge SE of Ambanizana village at 660-720 m, 9/1994, *G. Kis 9449/EG* (EGR, hb. B.J. O'Shea). SEYCHELLES: (all previous published collections as *A. decolor*) ?1895 ,*G. de l'Isle s.n.* (Holotype of *A.* decolor); Mahé: Cascade Forest, Morne Pilot, Cascade Mountain, Mt. Harrison, *Sealark* Expedition, 1908, *J. Stanley Gardiner, s.n.*; Morne Seychellois & SW slopes of Trois Frères, 11/1961, *C. Jeffrey & M. Zelia 419, 444a*; Silhouette: ridge above La Passe, 1/1962, *C. Jeffrey, A. Moulinié & M. Zelia*; Mahé: Path to Signal Hill, Vingt Cinq Sous, Forêt Noir road, Helvetia, Salazie, Congo Rouge, 9/1973-1/1974, *Norkett 16394, 16420, 16506, 16758, 16762, 16830, 16839, 17097, 17228, 17258, 17302, 17471, 18519a, 18676*; Mahé: Morne Seychellois National Park, SE ridge of Congo Rouge at 640-720 m, Morne Blanc at 450-590 m, Trois Frères at 590-640 m, summit ridge SW of Trois Frères rocks at 740-770 m, summit ridge of Congo Rouge at 690-730 m, NW slope of Mt. Le Niol below Bernard Peak at 500-630 m, Val Riche at 330-450 m, 8/1993, *G. Kis 9319/O, 9322/AS, 9333/BN, 9341/AB, 9343/B, 9343/BM, 9345/PE, 9350/AU, 9350/AX* (EGR, hb. B.J. O'Shea); Mahé: Old Mission, 3/1995, *Bird s.n.*

Asia-3 or Asia-4. BURMA or PENANG: 'Nepal', *Wallich H3168* (possible isotype of *A. papillatum*: see Long, 1995).

Asia-3. THAILAND:, 1/1966, *Touw 11277*.

Asia-4. SARAWAK: Mt. Dulit, 1932, *P.W. Richards 1164*; Tg. Lintang Path, Bako National Park, 4/1959, *J. Carrick and I.C. Enoch JC359* (hb. C.C. Townsend). SUMATRA: Berbak Nature Reserve, Jambi, 11/1980, *Laumonier TFB1816* (hb. C.C. Townsend). SINGAPORE: Taban Circle, Bukit Timah, 19/04/1960, *J. Menon, Univ. Sing. 2006* (hb. C.C. Townsend).

Australia-1. North Queensland, Mossman River Gorge, 19/04/1968, *W.A. Weber B-32390* (hb. C.C. Townsend)

Acknowledgements

Thanks to Len Ellis for suggesting this paper and for his continued assistance with discussions, specimens and literature, and to Ben Tan and Bill Buck for comments on the manuscript.

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