

## **Further taxonomic studies on the families Calymperaceae (Musci) and Orthotrichaceae (Musci) in the bryoflora of Réunion Island, with notes on taxa from other islands in the western Indian Ocean**

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**Abstract** – The systematics and geographical distribution of some taxa in the moss families Calymperaceae and Orthotrichaceae that occur in Réunion and neighbouring islands are revised. In the family Calymperaceae, three new subspecies are proposed: *Calymperes taitense* (Sull.) Mitt. subsp. *pachyloma* (Hampe ex Müll. Hal.) L. T. Ellis, *comb. et stat. nov.*, *Syrrhopodon hispidocostatus* Renaud et Cardot subsp. *artsii* L. T. Ellis, *subsp. nov.* and *S. flexifolius* Mitt. subsp. *reunionensis* L. T. Ellis, *subsp. nov.*; three further new records for Réunion Island are cited: *Calymperes pallidum* Mitt., *Syrrhopodon dimorphophyllus* L. T. Ellis, *S. vardei* L. T. Ellis, and the presence and geographical distribution in the East African Islands is discussed of *Calymperes couguiense* Besch., *Syrrhopodon asper* Mitt., *S. africanus* (Mitt.) Paris, *S. gardneri* (Hook.) Schwägr., and *S. pulcher* W. D. Reese. In the family Orthotrichaceae, new synonymy and distribution records are reported for the genus *Macromitrium*. Several new synonyms are proposed under *Macromitrium microstomum* (Hook. & Grev.) Schwägr., *M. serpens* (Hook. et Grev.) Brid., *M. mauritianum* Schwägr. and *M. pallidum* (P. Beauv.) Wijk et Margad. *Macromitrium fimbriatum* (P. Beauv.) Schwägr. var. *chloromitrium* Besch. is recognised as a species in its own right, *M. chloromitrium* (Besch.) Wilbraham, *comb. et stat. nov.*, and is newly recorded from Réunion. *Macromitrium belangeri* Müll. Hal. is excluded from the Réunion Island's moss flora.

**Calymperaceae / Orthotrichaceae / Syrrhopodon / Calymperes / Macromitrium / Réunion Island / Mascarene Islands / taxonomy / phytogeography**

### **INTRODUCTION**

Ah-Peng & Bardat (2005) published the first modern, comprehensive checklist of bryophytes occurring in Réunion Island. Subsequently, Ellis & Wilbraham (2008) proposed some alterations to the taxa listed in the moss families Orthotrichaceae and Calymperaceae. Continuing research on these families indicates the need for yet further modification to the reported bryoflora of Réunion and also to the bryofloras of some of the other islands in the western Indian Ocean. In the family Calymperaceae, these changes include new records, proposals for new synonymy, the reclassification of various taxa, and the

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recognition of three new subspecies. They particularly concern taxa in the genus *Calymperes*, *Syrrhopodon* subg. *Pseudocalymperes* and the *Syrrhopodon prolifer* Schwägr. complex. Most significantly, among the collections of the latter group from Réunion, a distinct moss closely related to *S. hispidocostatus* Renauld & Cardot and *S. apertifolius* Besch., has become evident, and presently is probably best regarded as a subspecies of *S. hispidocostatus*. Below, this new subspecies is named after the late Theo Arts who made important contributions to our knowledge of the bryoflora of Réunion Island and collected the type material of the taxon.

Additionally, the presence and distribution in the East African islands of *Syrrhopodon gardneri* (Hook.) Schwägr. and *S. asper* Mitt. is discussed, and the proposed records for these islands of *Calymperes couguiense* Besch. and *Syrrhopodon pulcher* W. D. Reese are redetermined. Of the non-leucobryoid members of the family Calymperaceae occurring in Réunion island there presently appear to be eight distinct taxa of *Calymperes* and fifteen of *Syrrhopodon* (see Appendix). This is perhaps more than 60% of the accepted taxa in the non-leucobryoid Calymperaceae represented in the East African islands as a whole.

*Macromitrium* (Orthotrichaceae) represents one of the largest moss genera in the East African islands, with 26 taxa presently recognised from the region. Although the number of accepted species continues to be reduced with critical revision, there is clearly a naturally high diversity of *Macromitrium* in the East African islands. Nine species of *Macromitrium* are currently known from Réunion island (see Appendix). In this paper, several names used for taxa known from the Mascarenes are placed in synonymy under *Macromitrium mauritianum* Schwägr., *M. microstomum* (Hook. & Grev.) Schwägr., *M. pallidum* (P. Beauv.) Wijk & Margad. and *M. serpens* (Hook. & Grev.) Brid. The status of *M. fimbriation* var. *chloromitrium* Besch. is re-evaluated and recombined as the species *M. chloromitrium* (Besch.) Wilbraham, *comb. & stat. nov.* *Macromitrium lanceolatum* Broth. was originally recorded from Réunion by Een (1978) though this record has been overlooked in subsequent checklists of Réunion Island mosses.

## REVISED SYSTEMATICS AND GEOGRAPHICAL DISTRIBUTION

### CALYMPERES (Calymperaceae)

*Calymperes taitense* (Sull.) Mitt. **subsp. pachyloma** (Hampe) L. T. Ellis, *comb. & stat. nov.*

**Basionym:** *Calymperes pachyloma* Hampe ex Müll. Hal., *Linnaea* 40: 247.1876.

**Type citation.** Comoro-insula Johanna, inter *Rhynchostegium Comorae*, 600 met. supra mare, ad truncos arborum sylvae: J. M. Hildebrandt 1875 cespitulum unicum misit. **Type specimen.** Comoro Islands, Anjuoan [Johanna], *Hildebrandt s.n.* (BM000555463 – Hb. Hampe! – **lectotype**, *vide* Ellis, 1995).

*Syrrhopodon nossibeanus* Besch., *Ann. Sci. Nat. Bot.*, Sér. 6, 9: 347 1880. ≡ *Calymperes nossibeantum* (Besch.) Broth. in Engl. & Prantl, *Nat. Pflanzenfam.* 1(3): 389. 1901. **Type citation.** Nossi-bé, forêt du Loucoubé, mars 1851, Boivin (hb. Mus. Par.). **Type specimen.** Nossi-bé, forêt du Loucoubé, mars 1851, *Boivin s.n.* (BM000555467– Hb. Bescherelle! – **lectotype, selected here**).

*Syrrhopodon nossibeanus* var. *borbonicus* Renaud & Cardot, *Bull. Soc. Roy. Bot. Belgique* 33: 117. 1895. **Type citation.** Bourbon, secus rivulos (rev. Rodriguez). **Type specimen.** Bourbon [Réunion], *Rodriguez s.n.* (PC0105626 – Hb. Renaud! – **lectotype, selected here**; isolectotype – “Ex herb. F. Renaud”! – PC0105623)

**Discussion** – *Calymperes taitense* is distributed throughout the Palaeotropics, with its most typical form occurring in Asia and Oceania. However, atypical forms predominate at the western extreme of its geographical range in Africa and the East African Islands. For example, a form represented by two collections from the islands of Mahé and Silhouette in the Seychelles (*Norkett 17947 & 17790*, BM) (“Seychelles form”) is unusual in possessing leaves with a particularly narrow band of hyaline cells forming the margin in the proximal leaf base (1 row of cells broad). In typical collections this feature is consistently 2-5 rows of hyaline cells broad.

Of all the collections of *Calymperes taitense* examined from the East African islands two specimens (*Pócs & Kiss 9450/FK & 9450/EM*, EGR) from Mangabe in NE Madagascar (“Mangabe form”) have features closest to those of the typical form, differing only in the possession of particularly short, broad leaves. There is insufficient reason to justify attaching infraspecific names to most of the novel forms of *C. taitense* occurring in the western Indian Ocean region. However, the most significant of these forms was described by Müller (1876) as a distinct species, *Syrrhopodon pachyloma* Hampe ex Müll. Hal. Later, Bescherelle (1880) assigned the name *S. nossibeanus* Besch. to the same form but based on a different type specimen. Reese (1987) placed the later name, *C. nossibeanus*, in synonymy with *Calymperes taitense* proposing that the species was “indistinguishable from general run of *Calymperes taitense*”. Ellis (1995) recognised *Syrrhopodon pachyloma* Hampe ex Müll. Hal. and *S. nossibeanus* Besch. as representing a distinct form within *Calymperes taitense* but did not assign it a formal infraspecific rank. Subsequently, it has become evident that this unusual “*pachyloma*” form occurs in a more or less discrete geographical area and has sufficient consistently distinctive features to justify its recognition as a formal subspecies within *C. taitense*.

An obscure taxon, *Syrrhopodon nossibeanus* var. *borbonicus* was properly described from Réunion by Renaud & Cardot (1895), but first published as a *nomen nudum* (Renaud, 1891). This variety has been largely overlooked and omitted from subsequent literature, but its type and authentic material is identical to collections of *Calymperes taitense* subsp. *pachyloma*.

In leaves of *Calymperes taitense* subsp. *taitense* the distal hyaline base incorporates a differentiated intramarginal rib (teniole) of thick-walled linear cells; a narrow unistratose band of small chlorophyllose cells (extrateniolar lamina) forms the leaf margin (Fig. 2). The latter is about 12.5-35 µm broad and usually formed by 2-7 rows of cells. The chlorophyllose lamina in the leaf limb is unistratose (Fig. 4) with the cells in surface view mostly (3-)5-7.5(-12) × (3-)5-7.5 µm.

In *Calymperes taitense* subsp. *pachyloma*, these features consistently differ from those of the type subspecies. The extrateniolar lamina in the hyaline base mostly reaches 50-75 µm broad (Fig. 5), and is formed by around 10-15 rows of cells. The chlorophyllose lamina is mostly bistratose (Figs 7, 8) with cells in surface view (2.5-)3-5 × (2.5-)3-5 µm. This subspecies occurs in Madagascar, the Mascarenes and Tanzania. A published record of *C. taitense* from Zaire (Orbán, 1995) represents *C. afzelii* Sw. All specimens from Réunion examined for this study belong to subsp. *pachyloma*. Collections of *C. taitense* from eastward of the Mascarenes (e.g. Thailand, Andaman Islands, Philippines, Sarawak, New

Guinea, etc.) into Oceania, have the features of the type subspecies. Most collections of *C. taitense* subsp. *pachyloma* have been sampled from shaded rock in forest between 200-1390 m alt. The type subspecies is known from a broader range of habitats. Occurring in damp, shaded situations in forests, it is said to be more common at lower altitudes (Eddy, 1990; Ellis & Tan, 1999), forming tufts and mats on tree boles, exposed roots, rock (frequently collected from limestone), rotting wood and compacted earth.

### Specimens examined

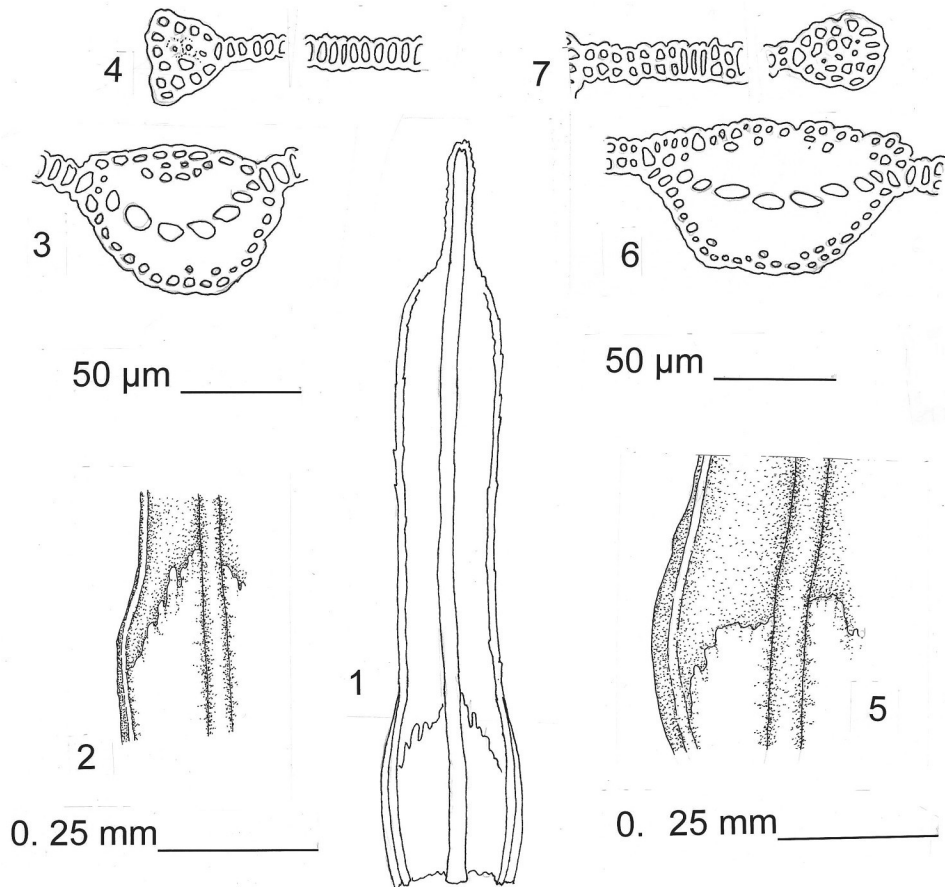
***Calymperes taitense* (Sull.) Mitt. subsp. *taicense*.** ANDAMAN ISLANDS: *Kurz s.n.* (BM000518458, holotype of *C. andamense*). THAILAND: Süd-Thailand, prov. Krabi, Naturpark Than Bok Koroni bei Ao Luk, 21 July 1994, *Schäfer-Verwimp & Verwimp 16178* (BM000518457). PHILIPPINES: Palawan Island, Apuran Barangay, Daan Sitio, vicinity of Mt Tinikbasan, 27 April 1992, *Tan 92-243* (BM000726628, FH). SARAWAK: 1888, *Everett E510* (BM000851681). Gunong Mulu National Park, around Sungei Berar Camp, SW of Bukit Berar, 14 March 1978, *Jermy 13788* (BM000517791). Gunong Mulu National Park, Melinau River, 8 August 1992, *Stevenson 69* (BM000728683). INDONESIA BORNEO: S Kalimantan, Tabalong District, 1°36'0"S, 115°31'27"E, 3 April 2000, *Ellis K5.14.00* (BM000725510). PAPUA NEW GUINEA: Sepik District, between Sumo and Mafoka, 4 July 1961, *Darbyshire & Hoogland 8067* (BM000919251). NEW IRELAND: Danfu Valley, February 1970, *Eddy 6328 pro parte* (BM000517794). SOLOMON ISLANDS: Russell Island, Lingatu, December 1935, *Lever s.n.* (BM000518486). FIJI: Labasa, 8 July 1923, *Greenwood 503* (BM000518484). SOCIETY ISLANDS: Tahiti, 1838-1842, *Wilkes Expedition s.n.* (BM000518474, isotype of *Syrrhopodon taitense* [= *Calymperes taitense* subsp. *taicense*]).

***Calymperes taitense* "Seychelles form":** SEYCHELLES: Mahé, Ridge of Brulee, 29 November 1973, *Norkett 17947* (BM000555466); Silhouette, forest below Corgate, 11 November 1973, *Norkett 17790* (BM000555465).

***Calymperes taitense* "Mangabe form":** MADAGASCAR: Antongil Bay, Nosy Mangabe Island, *Pócs & Kis 9450/FK & 9450/EM* (EGR).

### ***Calymperes taitense* subsp. *pachyloma* (Hampe ex Mull. Hal.) L. T. Ellis**

TANZANIA: Uluguru Mts. Mt Tumbako, , 5 February 1973, *Pócs & Lungwecha 6875/E* (EGR). COMORES: Mayotte, *Marie s.n.* (BM000555470) and *Marie 123* (BM000555471). Mayotte, Magi M'Bien, August 1880, *Marie 166* (BM000555468). MADAGASCAR. Tamatave, 25 October 1972, *Crosby & Crosby 6692* (EGR). Tamatave, Ivaloina, 17 February 1977, *Tixier 10454* (EGR). Masoala Peninsula, 9-11 September 1994, [*Pócs & Kis*] *9447/FB, 9447/FC & 9447/FA* (EGR). Antongil Bay, 8, 10 September 1994, *Pócs & Kis 9446/EX* (EGR). Toamosina Prov. Lohatanjon Peninsula, 12-18 August 1998, *Pócs & Szabo 9871/BE* (EGR). Toamasina Prov. Mananara Nord Biosphere Reserve and National Park, 14-16 August 1998, *Pócs & Szabo 9877/BS* (EGR). RÉUNION: Ste Philippe, 1891, *Rodriguez s.n.* (Hb. Bescherelle, BM); same locality, 1889, *Rodriguez s.n.* (PC01056254); same locality *sine dato*, *Rodriguez s.n.* (PC01056255). 14 km W of Ste Anne: Ravine d'Etang. Annette Falls, 21°5'20"S, 55°38'10"E, 29 August 1994, *Orbán 9434/C* (EGR). Takamaka gorge 13 km W of Ste Anne, around Cascade de l'Arc en Ciel. 21°4'35-45"S, 55°37'10-40"E, 30 August 1994, *Orbán 9436/CF* (EGR). Grand Etang, 27 September 1997, *Arts RÉU53/36* (BR-BRYO 316692-84; BM000555464). Forêt du Brulé, at the Cascade Maniquet, Bois de Couleur, 3 November 1998, *Arts RÉU70/62* (BR-BRYO 316693-85). Above La Montagne, route D41, at the junction to St Bernard, forest path to Ilet à Guillaume, Grid: A3.e5, 5 November 1998, *Arts RÉU80/32* (BR-BRYO 316694-86). Valley of the rivière Langevin from Grand Galet to Chap. du Cap Blanc, Grid: F6.b5, 7 November 1998, *Arts RÉU90/15* (BR-BRYO 316695-87). Circuit des Ravenales, ca 1 km west-northwest of Chemin de Ceinture, grid: C7.d2, 10 November 1998, *Arts RÉU97/20 pro parte* (BR-BRYO 316662-54). Gorge de la Rivière du Mat, Bras de Caverne forest path to the Cascade Blanche, Grid: B6.e1, 11 November 1998, *Arts RÉU101/08* (BR-BRYO 316696-88). Plaine des Grégués, Grid: F6.d2, 21 February 2000, *Arts RÉU131/41* (BR-BRYO 316697-89) and *RÉU131/54* (BR-BRYO 316698-90).

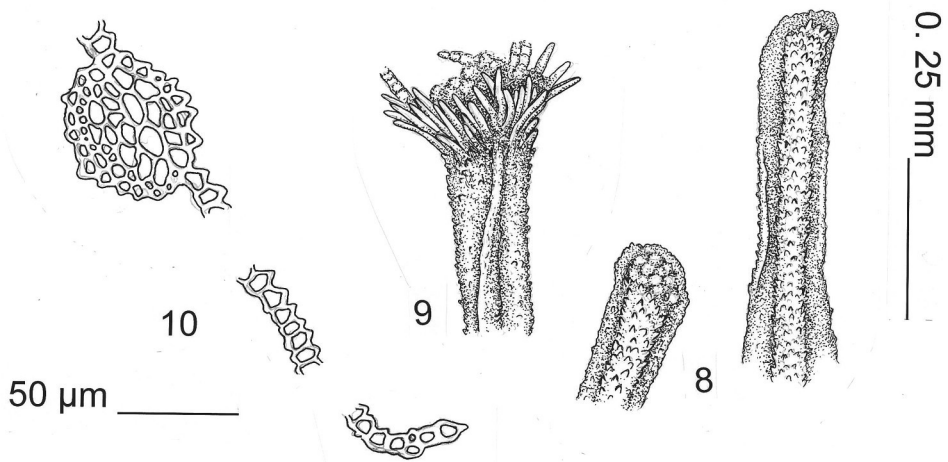


Figs 1-7. *Calymperes taitense* (Sull.) Mitt. subsp. *taitense* (1-4) and *C. taitense* subsp. *pachyloma* (Hampe) L. T. Ellis (5-7). **1.** Semi-diagram of leaf. **2, 5.** Detail of distal hyaline leaf base. **3, 6.** Costa in chlorophyllose limb in cross-section. **4, 7.** Chlorophyllose lamina and marginal rib in cross-section. (2 from Darbyshire & Hoogland 8067, BM; 3, 4 from Everett E510, BM; 5 from Orbán 9434/C, EGR; 6, 7 from Orbán 9436C/J, EGR).

*Calymperes afzelii* Sw. ZAIRE: 20 km N of Kisangani near the village of Bawombi, 11 September 1977, Lisowski 50339 (EGR).

***Calymperes pallidum* Mitt. (new to Réunion)**

*Calymperes pallidum* (Mitten, 1879) is widespread in both the New World and Old World tropics and has been recorded from several of the islands in the western Indian Ocean, including Madagascar, Seychelles, and Rodrigues in the Mascarenes. Its presence on Réunion, newly recorded here, is not unexpected. The leaves in this species possess features very similar to those in the pantropical species *C. erosum* Müll. Hal., but differ in that the costa lacks stereids (Fig. 10) and has an inflated appearance. This species is described and illustrated by Ellis (2007).



Figs 8-10. *Calymperes hispidum* Renauld *et* Cardot (8), *C. cougiense* Besch. (9) and *C. pallidum* Mitt. (10). **8, 9.** Apices of gemmiferous leaves (gemmae broken off). **10.** Cross-section of leaf, chlorophyllose limb. (8 from *Orbán 9357/F*, EGR; 9 from *Greenwood 474*, BM; *Arts RÉU152/13*, BR).

#### Specimen examined

RÉUNION: Bois Blanc, site de la Source, Grid: E8 a5, 26 Feb. 2000, *Arts RÉU 152/13* (BR-BRYO 316679-71).

#### *Calymperes cougiense* Besch.

*Calymperes cougiense*, described from New Caledonia (Bescherelle, 1873) and largely occurring in the islands of Oceania and in north eastern Australia (Ellis, 2002), has been erroneously recorded for Mauritius (Reese & Stone, 1987) and the Seychelles (Orbán, 1995a). The collections upon which the records are apparently based belong to *C. hispidum* Renauld *et* Cardot, a species with a well established distribution in the East African Islands (Ellis, 1988; O'Shea, 2006).

*Calymperes cougiense* and *C. hispidum* have dimorphic leaves, gemmiferous and non-gemmiferous. The dimorphism is particularly extreme in *C. cougiense* in which the gemmiferous leaves are linear and exserted from the shoot, well above the lingulate nongemmiferous leaves. Shoots and leaves in *C. hispidum* can sometimes have a similar appearance to those in *C. cougiense* (e.g. as in Seychelles, *Orbán 9357/F*), but are most plainly distinguishable by the form of the apices in their gemmiferous leaves. In gemmiferous leaves of *C. cougiense*, the lamina runs into the costa below its apex and the apical cells of the leaf are drawn out as blunt, finger-like projections that form a dense fringe at the base of a crown-like cluster of gemmae (Fig. 9). In gemmiferous leaves of *C. hispidum*, a narrow band of lamina completely borders the costal apex (Fig. 8), and gemmae are produced in a radiating cluster only from its ventral surface.

#### Specimens examined

*Calymperes cougiense* Besch. FIJI: Interior of Vanua Levu, 25 December 1922, *Greenwood 474* (BM000675201, holotype of *C. marginatum* Dixon [= *C. cougiense*]).

***Calymperes hispidum* Renault et Cardot** MAURITIUS. *Balfour s.n.* (NY). SEYCHELLES: Praslin, Grand Fond, summit at the NW part, 4°18'15"S 55°42'21"E, 31 August 1993, *Orban 9357/F* (EGR).

### *SYRRHOPODON PROLIFER-LIKE TAXA* (Calymperaceae)

Of the several *Syrrhopodon prolifer*-like taxa, with linear-ligulate, limbate leaves, that occur on Réunion, four have been particularly misunderstood or over-looked – *S. apertifolius* Besch., *S. hispidocostatus* Renault et Cardot with a newly recognised subspecies (see below), and the newly recorded *S. dimorphophyllus* L. T. Ellis. Many collections of these taxa from Réunion have been misidentified variously as *Syrrhopodon spiralis* Renault et Cardot, *S. prolifer* Schwägr. var. *seychellarum* Orbán [= *S. albidus* Thwaites et Mitt. subsp. *integrifolius* (E. B. Bartram) L. T. Ellis], *S. prolifer* var. *prolifer* and *S. prolifer* var. *acanthoneuros* (Müll. Hal.) W. D. Reese (see “specimens examined”). There is presently no evidence for the occurrence of these latter taxa on Réunion (Ellis, 2005; Ellis & Wilbraham, 2008).

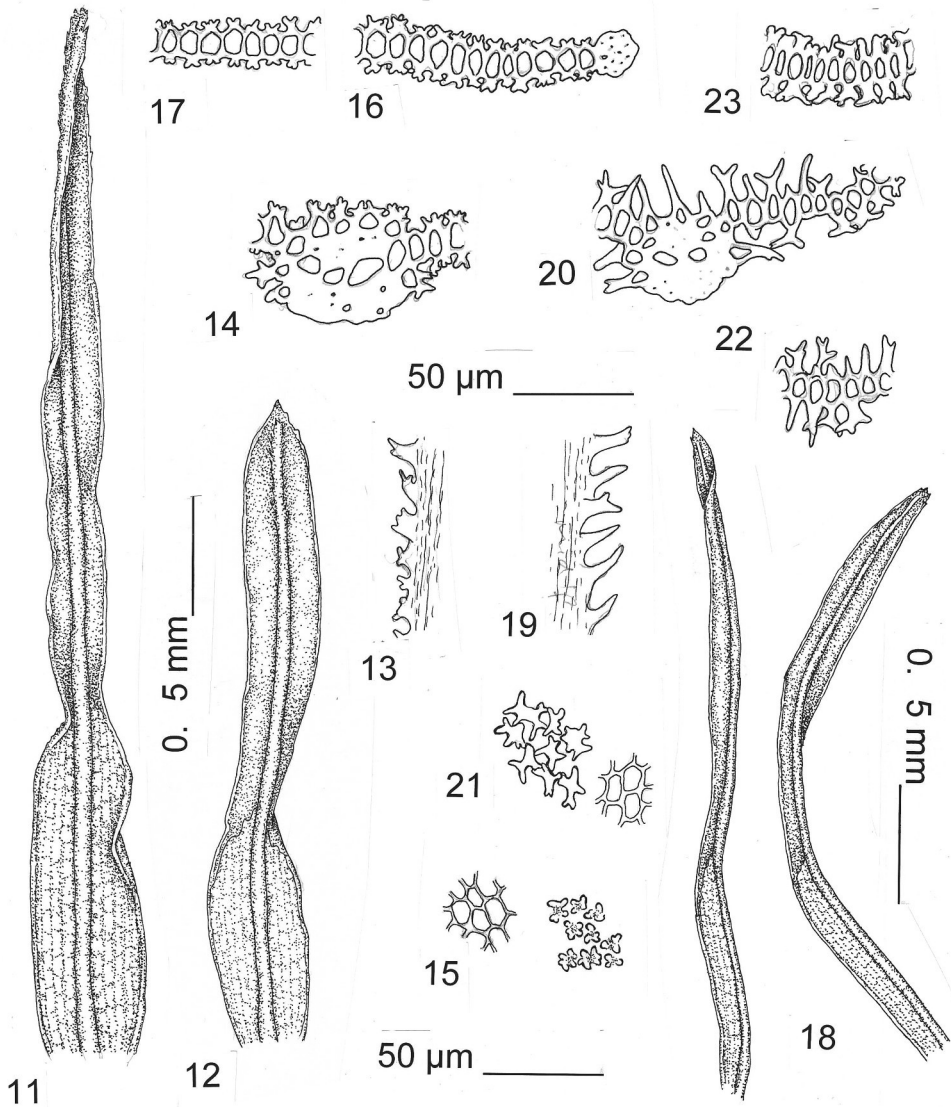
#### ***Syrrhopodon hispidocostatus* Renault et Cardot and *S. apertifolius* Besch.**

*Syrrhopodon hispidocostatus* is most likely to be confused with its sibling species – *S. apertifolius*. Both taxa are described, illustrated and discussed by Ellis (2005). Leaves in *S. hispidocostatus* have an extensively spiny costa, characteristically with a row of spines along either side of the dorsal surface (dorsal-lateral costal spines, Fig. 19) and often with tall (sometimes multifid) spines on the ventral surface (Fig. 20). The cells of the chlorophyllose lamina are relatively large (6-17.5(-20) × 7-12.5 µm) and mostly possess tall multifid projections (Figs 20-22) through which the underlying cells remain visible. In most leaves of *S. apertifolius* the costa has mostly simple spines only towards the leaf apex; proximally, ventral or dorsal-lateral projections from the costa tend to be short and multifid. The cells of the chlorophyllose lamina appear much smaller, (5-)7-12.5(-15) × (5-)7-10(-12.5) µm) than those in *S. hispidocostatus*; dorsally and ventrally they produce relatively small, low, multifid papillae (Fig. 23) that are so densely distributed as to almost entirely obscure the underlying cells and make the lamina rather opaque.

*Syrrhopodon hispidocostatus* and *S. apertifolius* have not been found outside of Madagascar, Mauritius and Réunion. Ellis (2005) suggested that *S. hispidocostatus* appeared generally to prefer habitats at higher altitudes. This proposition is undermined by the several collections made from lowland localities on Réunion by Arts (mostly held in BR). *Syrrhopodon hispidocostatus* is well distributed in Réunion where it has been recorded from tree trunks and stumps in forest at 110-1200 m alt. It appears to be at least as common as *S. apertifolius* with which it sometimes occurs. *Syrrhopodon apertifolius* prefers lowland habitats, having been most commonly collected in Réunion on trees and rotten stumps in forest between 40 and 340 m alt.

#### **Specimens examined**

***Syrrhopodon hispidocostatus* Renault et Cardot** MAURITIUS: Petrin Heath Nature Reserve, (loc. 5), 3 October 1962, *G. Een M198* (S, originally identified as *Syrrhopodon prolifer*). RÉUNION: Circuit des Ravenales, ca 1 km west-northwest of Chemin de Ceinture, Grid: C7.d2, 10 November 1998, *Arts RÉU97/12 pro parte* (BR-BRYO 319366-42), *RÉU97/57* (BR-BRYO 319369-45) and *RÉU97/60 pro parte* (BR-BRYO 319370-46). Gorge de la Rivière du Mat, Bras de Caverne forest path to the Cascade Blanche, Grid: B6.e1,



Figs 11-23. *Syrrhopodon hispidocostatus* Renauld et Cardot subsp. *artsii* L. T. Ellis (11-17), *S. hispidocostatus* subsp. *hispidocostatus* (18-22) and *S. apertifolius* Besch. (23). **11, 12, 18.** Leaves. **13, 19.** Dorsal-lateral costal projections in proximal leaf limb. **14, 20.** Chlorophyllose limb in cross-section. **15, 21.** Cells of chlorophyllose lamina and papillae in surface view. **16, 17, 22, 23.** Chlorophyllose lamina in cross-section. (11 from Arts RÉU97/42, BR; 12-16 from Arts RÉU146/91; 17 from Arts RÉU97/12, BR; 18, 19, 21 from Arts RÉU102/168, BR; 20, 22 from Arts RÉU102/152, BR; 23 from Arts RÉU54/13, BR).



11 November 1998, *Arts RÉU101/16 pro parte* (BR-BRYO 319372-48). From the “Aire de Pique-nique de la Plaine des Lianes” to the “Site touristique d’Eden”, Grid: C6.a3, 12 November 1998, *Arts RÉU102/81* (BR-BRYO 319373-49). Forêt Domaniale de Bras Panon, at the “Site touristique d’Eden”, a former tree plantation, Grid: C6.a3, 12 November 1998, *Arts RÉU102/154* (BR-BRYO 319374-50), *RÉU102/168* (BR-BRYO 319375-51) and *RÉU 102/170 pro parte* (BR-BRYO 319376-52). L’Oasis, west of St Benoit, Grid: C7.c1, 15 November 1998, *Arts RÉU110/05 pro parte* (BR-BRYO 319377-53). Tremblet, Grid: F8.c3, 8 December 1998, *Arts RÉU92/07* (BR-BRYO 319363-39); *Arts RÉU92/15* (BR-BRYO 319364-40). Basse Vallée forest road in *Cryptomeria* forest, Grid: F7.e3, 24 February 2000, *Arts RÉU144/12* (BR-BRYO 319379-55). Basse Vallée, north of de Gite de Basse Vallée forest road in *Cryptomeria* forest, Grid: F7.e3, 24 February 2000, *Arts RÉU144/67 pro parte* (BR-BRYO 319380-56) and *RÉU144/69* (BR-BRYO 319381-57). Forêt Mourouvin, above the “trois citerne” (water reservoirs), bush vegetation, Grid: D8 d1, 26 February 2000, *Arts RÉU150/61* (BR-BRYO 319382-58). Le Dimitile, Sentier de Dimitile par La Chapelle, Grid: E4.b5, along path in *Erica* forest, 1 March 2000, *Arts RÉU162/43* (BR-BRYO 319384-60).

*Syrhropodon apertifolius* Besch. RÉUNION: *Rodriguez s.n.* (ex Hb. Möller com. Brotherus) (S, originally identified as *S. prolifer*) and *Rodriguez s.n.* (ex Hb. Roth com. Brotherus) (S, originally identified as *S. prolifer*). Sentier du Tremblet au nord de Ste Philippe, forêt primaire humide d’egradée, 10 September 1971, *Onraedt 71.R.9453* (BR-BRYO 234495-46). Ravine du Tremblet, forêt domaniale de Ste Philippe, 10 September 1971, *Onraedt 71.R.9353* (BR-BRYO 234496-47) and *71.R.9353* (Hb. Bizot 19297) (PC0092698, BR-BRYO 052400-20, originally identified as *S. spiralis*). Laves récente du Grand Brule, 12 April 1972, *Cadet 435* (Hb. Bizot 19420) (PC0092700, originally identified as *S. spiralis*). Grande Brule, 27 April 1972, *Cadet 458* (Hb. Bizot 19421) (PC0092699, originally identified as *S. spiralis*). Réserve Naturelle Mare Longue on the slope of Piton de la Fournaise volcano, 5 September 1994, *Vojtko & Vojtko 9432/CB* (RÉU, originally identified as *S. prolifer* var. *seychellarum*). Ste Philippe, Route forestière de Mare Longue, Réserve Naturelle, 7 March 1997, *Arts RÉU11/50* (BR-BRYO 319360-36). St Philippe, Réserve Naturelle de Mare Longue, forest trail, 7 March 1997, *Arts RÉU11/87* (BR-BRYO 319361-37). La Côte aux vents, Le Grand Brulé, Ravine du Tremblet, 28 September 1997, *Arts RÉU54/13* (BR-BRYO 319362-38). Forêt de Bois Blanc, Grid: E8.b4, 8 November 1998, *Arts RÉU93/18* (BR-BRYO 319365-41). Circuit des Ravenales, ca 1 km west-northwest of Chemin de Ceinture, Grid: C7.d2, 10 November 1998, *Arts RÉU97/60 pro parte* (BR-BRYO 319370-46) and *RÉU97/69* (BR-BRYO 319371-47). Gorge de la Rivière du Mat, Bras de Caverne forest path to the Cascade Blanche, Grid: B6.e1, 11 November 1998, *Arts RÉU101/16 pro parte* (BR-BRYO 319372-48). L’Oasis, west of St Benoit, Grid: C7.c1, 15 November 1998, *Arts RÉU110/05 pro parte* (BR-BRYO 319377-53). Forest path from route N2 to Pointe de La Table, Grid: F8.e4, 28 February 2000, *Arts RÉU156/04* (BR-BRYO 319383-59).

***Syrhropodon hispidocostatus* subsp. *artsii* L. T. Ellis, subsp. nov.**

*Subspecies haec subspeciei typico similis sed papillis laminae humilibus recedit.*

**Type specimen.** Réunion. Le serré, north of Saint-Joseph, Grid: F6.d4, 25 February 2000, *Arts RÉU146/91* (holotype - BR-BRYO 319385-61).

Shoots mostly 0.5-2.0 cm tall. Leaves < 3-5 mm long, with a narrowly subelliptical semisheathing hyaline base and a linear to ligulate chlorophyllose limb. Costa ending just short of leaf apex; dorsal surface mostly smooth and formed by stereids, but generally spinose near leaf apex, a lateral row of chlorophyllose cells often project as spines or multifid protuberances along either side of the costa; ventral surface formed by stereids or a partial layer of projecting, multipapillose chlorophyllose cells (projections often more spine-like near leaf apex). Hyaline lamina sharply defined, occupying less than a third to half of the leaf length. Cells of chlorophyllose lamina polygonal with 4-6 sides or rounded,

mostly  $7.5\text{-}17.5 \times 7\text{-}10(-12.5) \mu\text{m}$ , slightly longer than broad to slightly broader than long, dorsally and ventrally multipapillose with low, knobby multifid papillae. Leaf margin differentiated from leaf base to apex; distally from around distal hyaline base formed by a strand of stereids, mostly entire but usually toothed near leaf apex. Gemmae fusiform, uniseriate produced from dorsal and ventral surfaces of costal apex. Sporophytes not seen.

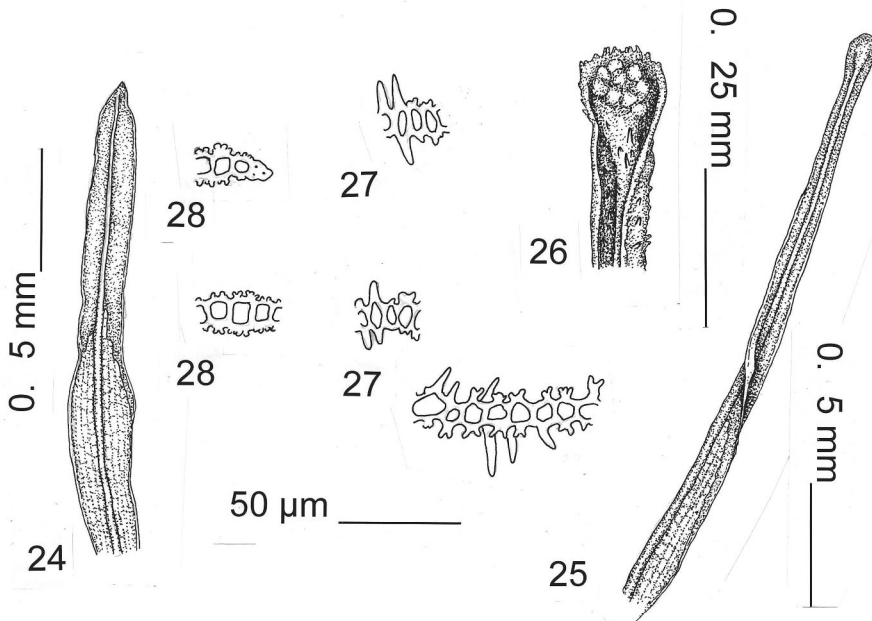
**Discussion** – The leaves of *Syrrhodon hispidocostatus* subsp. *artsii* most consistently differ from those of the type subspecies in their ornamentation. This subspecies possesses cells in the chlorophyllose lamina comparable in size (mostly  $7.5\text{-}17.5 \times 7\text{-}10(-12.5) \mu\text{m}$ ) to those in typical *S. hispidocostatus* but which lack the tall, multifid projections found in the latter. Instead, the laminal cells bear small, low multifid papillae (Figs 15-17). The ornamentation of the costa is a less constant feature distinguishing subsp. *artsii* from the type subspecies. In some leaves in subsp. *artsii*, dorsal-lateral spines occur extensively along the costa (as in the type subspecies), but in many leaves the equivalent projections, at least in the proximal chlorophyllose limb, often tend to be short and multifid rather than spine-like (Figs 13, 14). In addition, chlorophyllose cells at the ventral surface of the costa often project as low multifid papillae, whereas in the type subspecies, these cells more frequently project as tall simple or multifid spines. Finally, leaf shape is a variable feature in subsp. *artsii*; in some specimens (including the type collection) the leaves tend towards being more ligulate than linear (Figs 11, 12), the latter is a more common shape in the type subspecies (Fig. 18).

The leaves in *Syrrhodon hispidocostatus* subsp. *artsii* are also comparable to, but are easily distinguished from, those in *S. apertifolius*. In the latter, the chlorophyllose lamina is rendered opaque by densely crowded multifid papillae; the tiny underlying cells seldom reach more than  $12.5 \mu\text{m}$  long. In contrast, the chlorophyllose lamina in subsp. *artsii* is pellucid, with small multifid papillae that are well spaced out; the underlying cells are easily visible and can reach  $17.5 \mu\text{m}$  long. *Syrrhodon albidus* subsp. *integrifolius* (E. B. Bartram) L. T. Ellis is a related moss occurring in the Seychelles and Malesia (Ellis, 2005), but can also be distinguished from *S. hispidocostatus* subsp. *artsii* by the size of its laminal cells. The cells forming the chlorophyllose lamina in *S. albidus* subsp. *integrifolius* are consistently much larger than those in *S. hispidocostatus* subsp. *artsii*, with many reaching  $20\text{-}25 \mu\text{m}$  long.

*Syrrhodon hispidocostatus* subsp. *artsii* appears to be endemic to Réunion. It occurs between 650 and 920 m alt., apparently preferring earthy substrates and has often been collected in association with the type subspecies and *S. apertifolius*, which are otherwise largely corticolous mosses.

### Specimens examined

*Syrrhodon hispidocostatus* subsp. *artsii* L. T. Ellis RÉUNION: 14 km W of Ste Anne, Ravine d'Étang, 29 August 1994, *Orbán 9434/CH & 9434/CG* (REU, originally identified as *S. prolifer* var. *seychellarum*). Circuit des Ravenales, ca 1 km west-northwest of Chemin de Ceinture, Grid: C7.d2, 10 November 1998, *Arts RÉU97/12 pro parte* (BR-BRYO 319366-42), *RÉU97/42* (BR-BRYO 319367-43) and *RÉU97/47* (BR-BRYO 319368-44). Forêt Domaniale de Bras Panon, at the "Site touristique d'Éden", a former tree plantation, Grid: C6.a3, 12 November 1998, *Arts RÉU 102/170 pro parte* (BR-BRYO 319376-52). L'Oasis, west of St Benoit, Grid: C7.c1, 15 November 1998, *Arts RÉU110/05 pro parte* (BR-BRYO 319377-53). Basse Vallée, north of de Gite de Basse Vallée forest road in *Cryptomeria* forest, Grid: F7.e3, 24 February 2000, *Arts RÉU144/67 pro parte* (BR-BRYO 319380-56).



Figs 24-28. *Syrrhopodon dimorphophyllus* L. T. Ellis. **24.** Non-gemmiferous leaf. **25.** Gemmiferous leaf. **26.** Apex of gemmiferous leaf (gemmae broken off). **27.** Chlorophyllose lamina in gemmiferous leaf in cross-section. **28.** Chlorophyllose lamina in nongemmiferous leaf in cross-section. (24-28 from *Arts RÉU142/74*, BR).

***Syrrhopodon dimorphophyllus* L.T. Ellis (new to Réunion)**

*Syrrhopodon dimorphophyllus*, described from Malawi and Madagascar (Ellis, 2005), is newly recorded for Réunion Island. The species appears to have been often overlooked or misidentified, but nine collections have now been determined from diverse localities on the island. Many taxa in the Calymperaceae, including *S. dimorphophyllus*, characteristically exhibit leaf dimorphism, with leaves producing gemmae being significantly modified relative to “normal” leaves. As in some other taxa, shoots of *S. dimorphophyllus* usually possess some leaves with a form transitional between that of their gemmiferous and nongemmiferous leaves. In some specimens, the most characteristic extreme expression of the gemmiferous leaf may not always be attained. This can cause difficulty with the identification of material.

The gemmiferous leaves in *Syrrhopodon dimorphophyllus*, at their best developed, are linear with a modified gemmae-bearing apex (Fig. 25); the cells of the chlorophyllose lamina are relatively large and spinose throughout the leaf limb (Fig. 27). Non-gemmiferous leaves are shorter, ligulate (Fig. 24) and have smaller laminal cells with low papillae (Fig. 28). Leaves with a “transitional” form are modified from the latter to various degrees. In most collections of *S. dimorphophyllus* examined from Malawi, the most extremely modified form of gemmiferous leaf is well represented. However, in some collections examined from Réunion (e.g. *Onraedi 73.R.8777*), gemmiferous leaves often appear less completely developed. Although these leaves can be linear with a distinct gemmiferous apex, the cells of the chlorophyllose lamina tend to be small with

low papillae, and only rarely, become larger and spinose near the leaf apex. In other specimens (e.g. *Arts REU142/74*), at least a few gemmiferous leaves are sufficiently developed to possess spinose laminal cells throughout the leaf limb. Fortunately, non-gemmiferous leaves in *S. dimorphophyllus* possess features in the chlorophyllose lamina that distinguish them from the leaves of the other local taxa in the *S. prolifer*-like group. In *S. dimorphophyllus*, the cells of the chlorophyllose lamina in nongemmiferous leaves are relatively tiny, on average 5-7.5 µm diam. in surface view. Each cell possesses several small, low, knobby papillae (dorsally and ventrally), which tend to lean outwards over the cell walls. In other local *S. prolifer*-like taxa, the cells of the chlorophyllose lamina are generally larger, seldom less than 7.5 × 7.5 µm, and are mostly more coarsely papillose, often with each cell appearing to possess a single, large multifid papilla (see Ellis, 2005).

*Syrrhodon dimorphophyllus* occurs in Malawi, Madagascar and Réunion. Throughout its range it has been collected between 1200 and 2375 m alt., mostly on the trunks of trees and tree ferns in humid, shaded situations in forest.

### Specimens examined

***Syrrhodon dimorphophyllus* L. T. Ellis** MALAWI: Mulanje, Mulanje Mountain, Lichenya River, 15°58'50"S 35°33'19"E, 28 June 1991, *Wigginton 1683a* (BM000745235, holotype of *S. dimorphophyllus*). RÉUNION: Plaine des Cafres, forêt de Bébou, 23 December 1973, *Onraedt 73.R. 8777* (BR-BRYO 234494-45, originally determined as *S. spiralis*). Forêt de Bélouve, sentier de la Tamaraias, SW of the Gîte de Bélouve, grid: C5.d3, 23 February 2000, *Arts RÉU 142/74* (BR-BRYO 319378-54). Plaine des Fougères, track of the GR towards the Piton Bé Massoune, 16 March 2004, *Ah-Peng R 49-B2 pro parte* (PC). Forêt de Belouve, Trou de Fer path, 21°3'40"S 55°32'10"E, 12 September 2008, *Ellis & Wilbraham R08-159* (BM000890375), Forêt de Belouve, Sentier de L'École Normale, 21°4'39.9"S 55°32'34"E, 13 September 2008, *Ellis & Wilbraham R08-202* (BM000890379) & *R08-209* (BM000890377). Plaine des Chicots, Reserve Naturelle Roche Ecrite, 20°57'7.4"S 55°26'13"E, 14 September 2008, *Ellis & Wilbraham R08-233a* (BM000890380). Salazie, route de Piton Marmite, 21°3'40"S, 55°27'3"E, 16 September 2008, *Ellis & Wilbraham R08-263* (BM000890376); *R08-264* (BM000890378).

### ***Syrrhodon vardei* L. T. Ellis (new to Réunion) and *S. pulcher* W. D. Reese**

*Syrrhodon vardei*, until now regarded as a rare Madagascan endemic, is here newly recorded for Réunion Island. Unfortunately, the collection (*Ellis & Wilbraham 314b*, BM) consists of a single shoot. It was found in association with *S. gardneri* and *S. hispidocostatus* on the shaded underside of roots on a vertical stream-side bank at 1220 m alt.

*Syrrhodon pulcher* W. D. Reese was described from Seram and Sulawesi in SE Asia (Reese *et al.*, 1991). Orbán (1995b) cited two collections as new records of this species for Madagascar ["*Pócs, Magill & LaFarge England*" [*Magill & Randrianasolo*] 90114/AS & 90114/AV (EGR)]. The presence of the species in Madagascar was reiterated by Orbán (2007), but subsequently, he correctly redetermined and annotated the previously cited specimens as *Syrrhodon vardei*. There is no evidence for the occurrence of *S. pulcher* in Madagascar.

*S. pulcher* and *S. vardei* are superficially very similar, but their leaves are easily distinguished under the microscope. In *S. pulcher*, the cells of the chlorophyllose lamina are strongly protuberant from the ventral leaf surface, each with an acute, simple or multifid papilla. Dorsally the cells of the lamina are not protuberant, but smooth or unipapillose. A marginal rib (stereome) in the chlorophyllose limb is thick and entirely composed of stereids. In contrast, the

cells of the chlorophyllose lamina in *S. vardei* are flat to barely protuberant and each is covered dorsally and ventrally with several small, knobby papillae. The marginal stereome often includes a median layer of guide cells, partially dividing dorsal and ventral groups of stereids (see Ellis, 2005).

#### Specimens examined

***Syrrhopodon vardei* L. T. Ellis** MADAGASCAR. Antsiranana. Reserve Intergrale Nationale de Matojezy. Elfin forest – on ridge between Camp II and III at 1000-1400(-1800) m alt., 26-28 March 1990, *Magill & Randrianasolo 90114/AS & 90114/AV* (EGR). RÉUNION. Plaine des Fougères, 20°58'30''S 55°31'13''E, 19 September 2008, *Ellis & Wilbraham R08-314b* (BM000890381).

#### SYRRHOPODON SUBG. PSEUDOCALYMPERES BROTH. (Calymperaceae)

*Syrrhopodon* subg. *Pseudocalymperes* includes a distinctive group of species previously referred to the genus *Calymperopsis* (Müll. Hal.) M. Fleisch. The group's generic status was discarded by Reese (1978) and its correct name established by Reese (1993). Reese (1994a, 1994b) revised the taxa described from West Africa, and later Reese (1995) usefully, but briefly, rationalised the taxa in the entire subgenus.

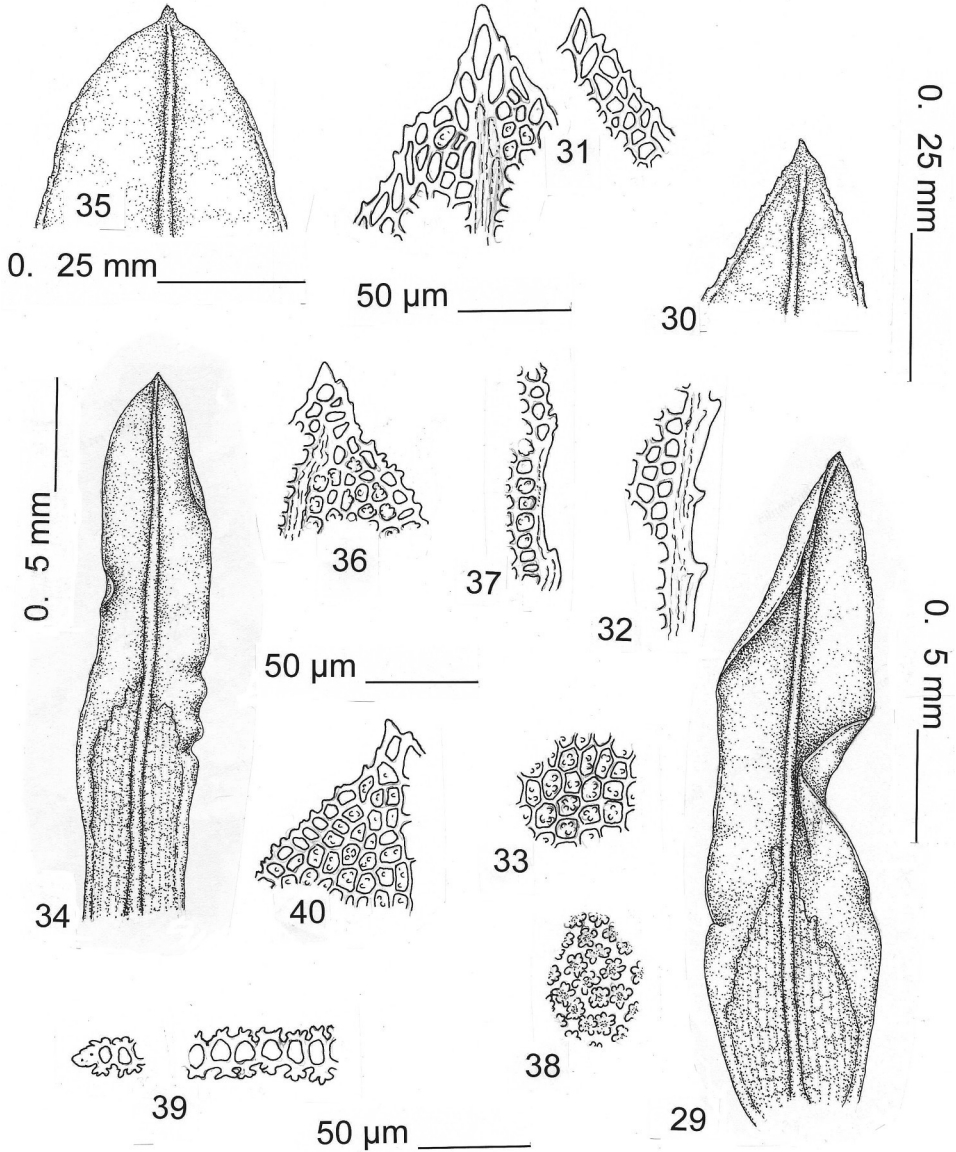
Mosses of *Syrrhopodon* subg. *Pseudocalymperes* characteristically possess erect shoots with leaves somewhat resembling those of *Mitthyridium*. In some species there is a strong degree of leaf dimorphism, gemmae-bearing leaves are somewhat modified relative to normal leaves. The latter are usually lingulate and in most species have a differentiated margin formed by a narrow strand of stereids (stereome). Gemmae-bearing leaves tend to be shorter and broader, in some cases more deltoid than lingulate. They mostly form a small cup at the apices of shoots (coma)<sup>1</sup>. Long, filamentous, uniseriate gemmae are commonly produced in a fan-shaped weft from the ventral leaf surface distally of the hyaline lamina.

Three species of *Syrrhopodon* subg. *Pseudocalymperes* have been recorded for Réunion Island: *S. africanus* (Mitt.) Paris, *S. crenulatus* (P. Tix.) W. D. Reese (Arts, 2005; O'Shea, 2006) and *S. parasiticus* (Brid.) Paris (Müller, 2002). The record for *S. africanus* appears to be correctly determined, but as demonstrated below, the record of *S. crenulatus* is erroneous, and the material upon which it is based has features similar to those of *S. flexifolius* Mitt. The proposed record of *S. parasiticus* from Réunion has not been available for examination.

#### *Syrrhopodon africanus* (Mitt.) Paris

*Syrrhopodon africanus* as recognised by Reese (1995) has somewhat variable features. Most collections from continental eastern Africa (including Tanzania, *Last s.n.* (BM, isotype of *S. africanus*) possess lingulate leaves with broadly acute to obtuse (often apiculate) apices (Fig. 29); the marginal stereome and the costa usually fail short of the leaf apex. The margin of the leaf apex is often papillose-crenulate, but sometimes entire or irregularly denticulate (Figs 31, 36, 40). At the apex of some shoots a gemmae-cup (coma) is formed by modified

<sup>1</sup> New growth with unmodified leaves often develops from within a coma, so that the coma no longer appears to be apical. The new growth may produce a gemmiferous apical coma of its own, which in turn may give rise to further new growth, ultimately producing another new coma. In this way, after several seasons of growth, groups of gemmiferous and nongemmiferous leaves can appear to alternate along a shoot.



Figs 29-40. *Syrrhodon africanus* (Mitt.) Paris var. *africanus*. **29, 34**. Non-gemmiferous leaves and **30, 35**. details of apices. **31, 36, 40**. Leaf margin at apex and **32, 37**. in distal chlorophyllose limb. **33, 38**. Surface of chlorophyllose lamina showing papillae. **39**. Cross-section of lamina (29-33 from *Last s.n.*, BM, isotype of *S. africanus*; 34-39 from *Arts RÉU92/28*, BR; 40 from *Porley 269a*, E).

gemmaiferous leaves. Collections from West Africa in BM, annotated as *S. africanus* by Reese, differ from the East African material in possessing narrower leaves with narrowly acute apices and an excurrent costa, the marginal stereome usually reaches the leaf apex. These latter collections appear to represent a distinct local form of *S. africanus*.

Yet another variant of this species, *Syrrhopodon africanus* var. *mandrakensis* (P. Tix.) W. D. Reese, was originally described from Madagascar as *Calymperopsis mandrakensis* P. Tix. (Tixier, 1992). Presently accepted as a formal variety of *S. africanus*, its type material (Madagascar, Tixier 11355 [“11335”], PC) has been unavailable for examination in this study. Tixier (1992) and Reese (1995) distinguish its leaves from those of related taxa by the possession of a crenulate apical margin. In the context of the apparent variability of leaf apices within *S. africanus*, this feature may seem of rather dubious critical value. However, Tixier (1992) describes the cells of the chlorophyllose lamina in his *C. mandrakensis* as having a diameter of about 5 µm, very much smaller than those in most other taxa (including *S. africanus*) in the subgenus *Pseudocalymperes*. Rediscovery of the type material will be required to properly assess the status of *S. africanus* var. *mandrakensis*.

Arts (2005) recorded *Syrrhopodon africanus* for Réunion Island based on three collections – Arts REU92/28 (BM, BR), REU102/150 (BR) and REU70/43 (BR). These specimens appear to represent another distinct form of the species. Their features largely agree with those of collections from eastern continental Africa. However, the leaves consistently differ from those of the latter in some features of the chlorophyllose lamina and leaf apex. For example, the apices of leaves in Arts’s collections (Fig. 35) tend to be slightly more obtuse than those found in most specimens of *S. africanus*. More significantly, in *S. africanus* the cells of the chlorophyllose lamina each possess a few simple, low papillae, in nongemmaiferous leaves these cells are (7.5-)10-20 × (7.5-)10-15 µm in surface view, while in gemmaiferous leaves they reach 10-25(-27.5) × 10-20 µm. The cells of the chlorophyllose lamina in Arts’s collections possess more strongly developed papillae (especially on the dorsal surface of the lamina) (Figs 38, 39) and are generally slightly smaller. In nongemmaiferous leaves the cells reach (7.5-)10-17.5 × (7.5-)8-12.5 µm, and in gemmaiferous leaves 10-20 × 8-15 µm. Considering the apparent plasticity of *S. africanus* (as currently recognised), Arts’ collections from Réunion probably represent a small, obtuse leaved form of the species with well developed laminal papillae, and therefore, were correctly identified by Arts (2005).

*Syrrhopodon africanus* is widespread across tropical Africa (O’Shea, 2006), and has been collected on trunks, branches and twigs of trees in forest between 230 and 1650 m alt.

### Specimens examined

***Syrrhopodon africanus* (Mitt.) Paris** SIERRA LEONE: Kasewe Forest Reserve, 27 February 1971, Richards R7207 (BM000663242). NIGERIA: Benin, Okomu Forest Reserve, 9 December 1947, Richards 3628 (BM000663243), 17 December 1947, Richards 3681 (BM000663244) and 24 December 1947, Jones 3894 (BM000663240). Agbadi village near Sapoba, 14 November 1949, Keay & Meikle UD23 (BM000736191). CAMEROON: *Dusén exsicc. no. 500* (BM000663246, PC0094867, isoelectotypes of *Syrrhopodon spurio-disciformis* Dusén [= *S. africanus*, vide Reese, 1994]). CONGO: Pengbe, 3 February 1914, Bequeart s.n. (BM000677677). UGANDA: Bushenyi, Kalinzu FR, near Nkombe sawmill, 0°23’S 30°5’E, Hodgetts U4557a (E). Bwindi National Park, 2 February 1996, Porely 269a (E). TANZANIA: Usagara Mts., Last s.n. (BM000663239, isotype of *S. africanus*). REUNION: Forêt du Brulé, footpath to Cascade Maniquet, Bois de Couleur, 3 November

1998, *Arts RÉU70/43* (BR-BRYO 319331-07). Tremblet, Grid: F8.c3, 8 November 1998, *Arts RÉU92/28* (BM000678107; BR-BRYO 319332-08); Forêt Domaniale de Bras Panon: at the “Site touristique d’Eden”, a former tree plantation. Grid: C6.a3, 12 November 1998, *Arts RÉU102/150* (BR-BRYO 319333-09).

***Syrrhopodon flexifolius* subsp. *reunionensis* L. T. Ellis, *subsp. nov.***

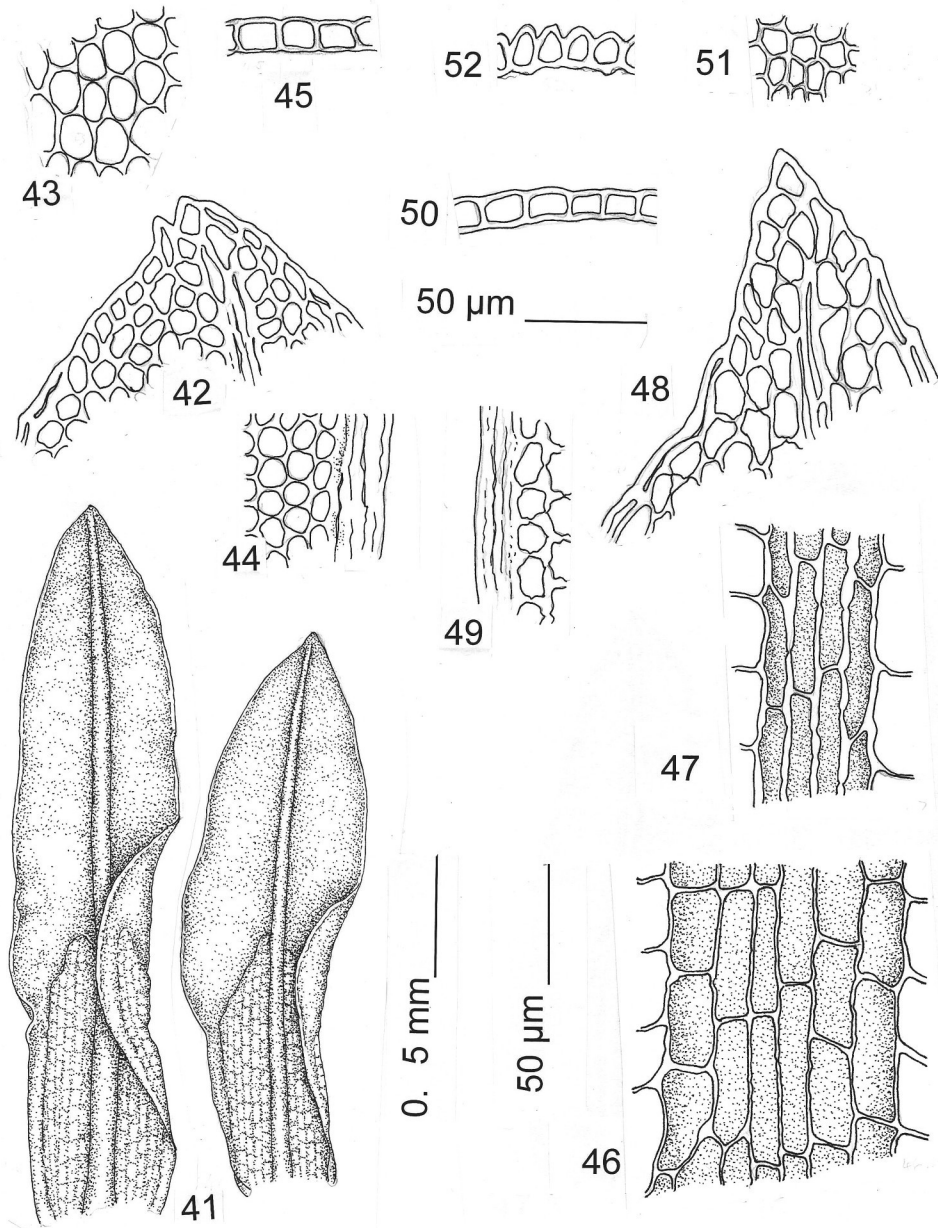
*Subspecies haec subspeciei flexifolio similis sed costa in base hyalina folii incrassata, cellulis superficialibus parietibus tenuibus differt.*

**Type specimen.** Forêt Domaniale de Bras Panon: at the “Site touristique d’Eden”, a former tree plantation, Grid: C6.a3, 12 November 1998, *Arts RÉU102/192* (BR-BRYO 319335-11, **holotype**; BM000678105, **isotype**).

Shoots curved to erect, 0.5-2.0 cm high, densely leaved, older growth brown, often with dense tufts of rhizoids between leaf bases, younger growth yellowish green. Leaves dimorphic as gemmiferous (modified) and non-gemmiferous (normal) leaves (modified gemmiferous leaves forming terminal gemmae cups (comae)). Normal leaves when dry incurved (somewhat appressed in younger growth) and spirally twisting forming a pointed shoot tip, when moist erect to patent, mostly 2.5-4.0 mm long, lingulate to elliptical-lingulate with an obtuse to obtuse-apiculate apex; consisting of semi-sheathing hyaline base and a broad chlorophyllose limb (lamina in distal leaf base often slightly but abruptly broadening into limb). Costa robust (especially in hyaline base), ending immediately below leaf apex, smooth, dorsal surface largely formed by stereids, ventral surface in distal chlorophyllose limb also formed by stereids, but in proximal chlorophyllose limb superficial cells sometimes becoming shortly rectangular with thick, porose walls, in hyaline base (mostly 60-100 µm wide) cells becoming longer and broader, hyaline with thin, porose walls (like those of cells in adjacent hyaline lamina). Chlorophyllose lamina gently undulating; cells in surface view rounded to shortly rectangular, chlorenchymatous (only distinctly porose near apex of hyaline lamina), (10-)12.5-25(-30) × (10-)12.5-15(-20) µm, smooth, in transverse section rectangular. Hyaline lamina usually sharply defined, occupying less than half of the leaf length and with an acute apex, most cells with a superficial pore at the proximal end. Leaf margin slightly undulate, differentiated from leaf base to near apex; in leaf base a flat, narrow unistratose rib of often orange-brown, thick-walled, porose, linear cells, in distal hyaline base rib bordered by marginal strand of stereids that continues distally into chlorophyllose limb ending near the leaf apex, strand largely entire to distantly toothed; apical margin formed by cells of chlorophyllose lamina, usually entire, sometimes sparsely toothed. Modified “gemmiferous” leaves forming apical comae, ca 3 mm long, similar to normal leaves except more concave and broadly lingulate and with a more incrassate costa, cells of chlorophyllose lamina slightly larger, reaching > 30 µm long. Gemmae produced ventrally from above apex of hyaline lamina to beyond midleaf, developing from lateral costal and juxtacostal laminal cells, filamentous, uniseriate, mostly 400-650 µm long, dark green to reddish brown. Sporophytes not seen.

**Discussion** – A published record of *Syrrhopodon crenulatus* on Réunion Island (Arts, 2005) was based on *Arts RÉU102/192* (BR, BM). Using Reese (1995), the best available key to *Syrrhopodon* subg. *Pseudocalymperes*, this collection can indeed be identified as *S. crenulatus*. However, neither the author of the key nor the collector of the specimen was able to examine the type material of *S. crenulatus*; its whereabouts are still a mystery. Consequently, the true nature of the species is uncertain.





Figs 41-52. *Syrrhopodon flexifolius* Mitt. subsp. *reunionensis* L. T. Ellis (41-46), *S. flexifolius* subsp. *flexifolius* (47-50) and *S. parasiticus* (Brid.) Paris (51, 52). **41.** Non-gemmiferous leaves. **42, 48.** Leaf apices. **46, 47.** Ventral superficial cells of costa in mid-hyaline leaf base **43, 51.** Cells of chlorophyllose lamina in surface view and **45, 50, 52.** in cross-section. **44, 49.** Leaf margin in surface view. (41-45 from *Arts RÉU102/192*, BR; 46 from *Porley 9728*, BM; 47 from *Allen 23571*, MO; 48, 50 from *Casado 585*, MO; 49 from *Allen 23164*; 51, 52 from *Swartz s.n. [H2269]*, BM, isotype of *S. parasiticus*).

Comparing the features described in the protologue of *Calymperopsis crenulatus* P. Tix. [= *Syrrhopodon crenulatus*] (Tixier, 1967) with those of *Arts RÉU102/192* indicates that the latter does not belong to this species. For example, the cells of the chlorophyllose lamina in leaves of *S. crenulatus* are described as “cellules isodiamétriques d’environ 15  $\mu$  munies d’une papille à la face dorsale” (not unlike those in *S. parasiticus*, Figs 51, 52), whereas the cells of the chlorophyllose lamina in *Arts RÉU102/192* are mostly significantly larger, and flat and smooth on both dorsal and ventral surfaces. This is an unusual feature in the subgenus *Pseudocalymperes*. In other species cells of the chlorophyllose lamina are usually papillose and/or protuberant. Large, smooth, flat cells are apparently characteristic of only one other species, *Syrrhopodon flexifolius* from Central America. This species was formerly erroneously considered conspecific with *S. parasiticus* but latterly recognised by Reese (1993) as a good species. Unfortunately, shoots in the two available duplicates of *Arts RÉU102/192* (BR, BM) are relatively sparse, but this collection has very recently been supplemented by *Porley 9728* (BM), a specimen with identical features from a different locality on Réunion. Some consistent features of these collections appear to distinguish them from those of *S. flexifolius* in the New World, and justify their recognition as representing a new subspecies – *S. flexifolius* subsp. *reunionensis* L. T. Ellis.

Generally, plants of the American type subspecies are larger than those in the collections from Réunion, with shoots reaching around 1-3 cm high. Unmodified, nongemmiferous leaves are mostly 3.0-4.5 mm long and lingulate, with strongly undulating margins. When dry, they appear variously curled and twisted, when moist erect to patent (to reflexed in well-developed material, e.g. *Allen 20668*, MO). The costa in mid-hyaline base is narrow (usually *ca* 50  $\mu$  wide), with a ventral surface formed by long rectangular, thick-walled, porose cells (Fig. 47). Cells in the chlorophyllose lamina are chlorenchymatous, flat and smooth, (10-)12.5-27.5(-37.5)  $\times$  (10-)12.5-22.5(-25)  $\mu$ m, mostly with thick, distinctly porose walls (Figs 49, 50). The marginal stereome often continues distally to the leaf apex. At the apices of some shoots shorter, broader gemmiferous leaves with thick costae form distinct comae; gemmae reach around 650  $\mu$ m long. In a few specimens (e.g. *Allen 23144*, MO) atypical, tall shoots are present, bearing short, incurved leaves. These are neatly arranged on the stem in a slight spiral, but are otherwise identical to leaves on normal shoots in typical *Syrrhopodon flexifolius*.

There are several features of *Syrrhopodon flexifolius* subsp. *reunionensis* that consistently contrast with those of the type subspecies as outlined above. Shoots in this subspecies are a little reminiscent of the atypical shoots in *Allen 23144*. They reach 0.5-2.0 cm high and possess broadly lingulate leaves (Fig. 41), which are mostly 2.5-4 mm long. When dry they are incurved and appressed, arranged on the stem in a slight spiral twist; when moist they are erect to patent, their margins slightly undulating. The curled and twisted leaves characterising dry shoots of typical *S. flexifolius* are absent. There is a tendency in many leaves in the Réunion collections to slightly but abruptly broaden from the distal hyaline base into the chlorophyllose limb, a leaf shape not generally apparent in New World collections of *S. flexifolius*. In further, more significant contrast to the latter, the costa around mid-hyaline base is often relatively thick (< 60->100  $\mu$ m wide), with the cells forming the ventral surface long rectangular and hyaline with very thin, porose walls (Fig. 46). Cells in the chlorophyllose lamina in leaves of *S. flexifolius* subsp. *reunionensis* are chlorenchymatous, flat and smooth, mostly (10-)12.5-25(-30)  $\times$  (10-)12.5-17.5(-20)  $\mu$ m (Figs 43-45), relatively thin-walled compared with those of typical *S. flexifolius* and, unlike in the latter, are only

obviously porose near the hyaline leaf base. Although the range of sizes of the chlorophyllose cells is comparable to that in the type subspecies, most cells fall within the lower end of the range and none reach the extreme larger end of the range. This is particularly evident comparing cells near the leaf margin; those in New World specimens of *S. flexifolius* appear generally larger than those in the Réunion collections (Figs 44, 49). The marginal stereome in leaves of the latter collections fails short of the leaf apex. Here, the margin is formed by laminal cells and is usually entire or may have one or two teeth (Fig. 42). In the extreme leaf base, the linear marginal cells are strongly differentiated, mostly tinted orange and with thick, porose walls; those in New World collections of *S. flexifolius* are seldom distinctly coloured. Discrete gemmiferous comae are present on shoots in both of the available collections of subsp. *reunionensis*. The gemmiferous leaves in *Arts RÉU102/192* are accurately illustrated by Arts (2005). Gemmae are similar to those in typical *S. flexifolius*, mostly 400–650 µm long.

The type collection of *Syrrhodon flexifolius* subsp. *reunionensis* was collected on an earth slope and on fern stolons (*Dryopteris*) at 650 m alt., while the other known collection, *Porley 9728*, occurred on the stilt roots at the base of a *Pandanus* trunk in mire somewhat below 900 m alt. These habitats are well within the range of those occupied by *S. flexifolius* in the New World, which has been recorded on trees and herbaceous stems between 450 and 900 m alt. The evidently sparse material in the available collections of *S. flexifolius* subsp. *reunionensis* suggest that it probably mostly occurs as scattered shoots rather than in dense tufts or mats.

#### Selection of specimens examined

***Syrrhodon flexifolius* Mitt. subsp. *reunionensis* L. T. Ellis** RÉUNION: La Plaine des Palmistes, Place de la Université, 21°6'56"S, 55°38'41.3"E, 12 September 2008, *Porley 9728* (BM000890374).

Representative selection from 45 specimens in MO:

***Syrrhodon flexifolius* Mitt. subsp. *flexifolius*** COSTA RICA: Puntarenas, 9.5 km northwest of Rincon de Osa, 08°34'N, 083°31'W, 17 July 1967, *Bowers 327a* (MO). BRAZIL. São Gabriel, *Spruce s.n.* (MO, isoelectotype of *S. flexifolius*). Rio Negro, *Spruce '12' [=11?]* (BM000663854; BM000663855). Roraima, vicinity of army base, Acampamento do 6<sup>o</sup>BEC-Jundia, at Km 328, 16–17 November 1977, *Buck et al. 1848* (MO). Amazonas, along Rio Marié, at Manauná, 00°40'S, 66°45'W, 5 July 1979, *Buck 2386* (MO). Serra Curicuriari, from Igarapé Arabú of the Rio Curicuriari to the summit, 00°20'S, 60°50'W, 9–12 July 1979, *Buck 2442* (MO). Amazonas, along road (U.H.E. de Balbina) to Balbina hydroelectric dam project from Manaus-Caracarái Road (BR 174), 02°03'S 59°50'W, 8, 11 August 1979, *Buck 2737J* (MO). VENEZUELA: Bolívar, 0–6 km SE of El Puaji, 04°30'N, 61°35'W, 9 November 1985, *Liesner 19795* (MO). SURINAME: Sipaliwini, Tafelberg National Park, north rim of Tafelberg, Lisa Creek – savanna area, 03°54'26"N, 56°12'45"W, 26 June 1998, *Allen 20525* (MO); Lisa Creek – Grace Falls trail, between Lisa and Augustus Creeks, 03°54'22"N, 56°11'26"W, 30 June 1998, *Allen 20668* (MO); upper reaches of Grace Creek, 03°53'34"N, 56°09'35"W, 5 July 1998, *Allen 20780* (MO); South East Lisa Creek, 03°54'26"N, 56°12'45"W, July 1998, *Casado 585* (MO). Sipaliwini, Tafelberg, trail from Augustus Creek to North Ridge, 03°55'30"N, 56°11'55"W, 20 June 2001, *Allen 23144* (MO); trail from Augustus Falls to Old Augustus Creek Camp, 03°55'10"N, 56°11'15"W, 21 June 2001, *Allen 23164* (MO); trail from Caiman Camp to Bothrops Hill, 03°53'30"N, 56°10'39"W, 1 July 2001, *Allen 23471* (MO); trail from South Rim Lookout west along south rim, 03°52'53"N, 56°10'31"W, 6 & 7 July 2001, *Allen 23571* (MO).

***Syrrhodon parasiticus* (Brid.) Paris** JAMAICA: *Swartz s.n. [H.2269]* (BM000664063, isotype of *S. parasiticus*)

## SYRRHOPODON GARDNERI-LIKE TAXA (Calymperaceae)

***Syrrhopodon asper* Mitt. and *S. gardneri* (Hook.) Schwägr.**

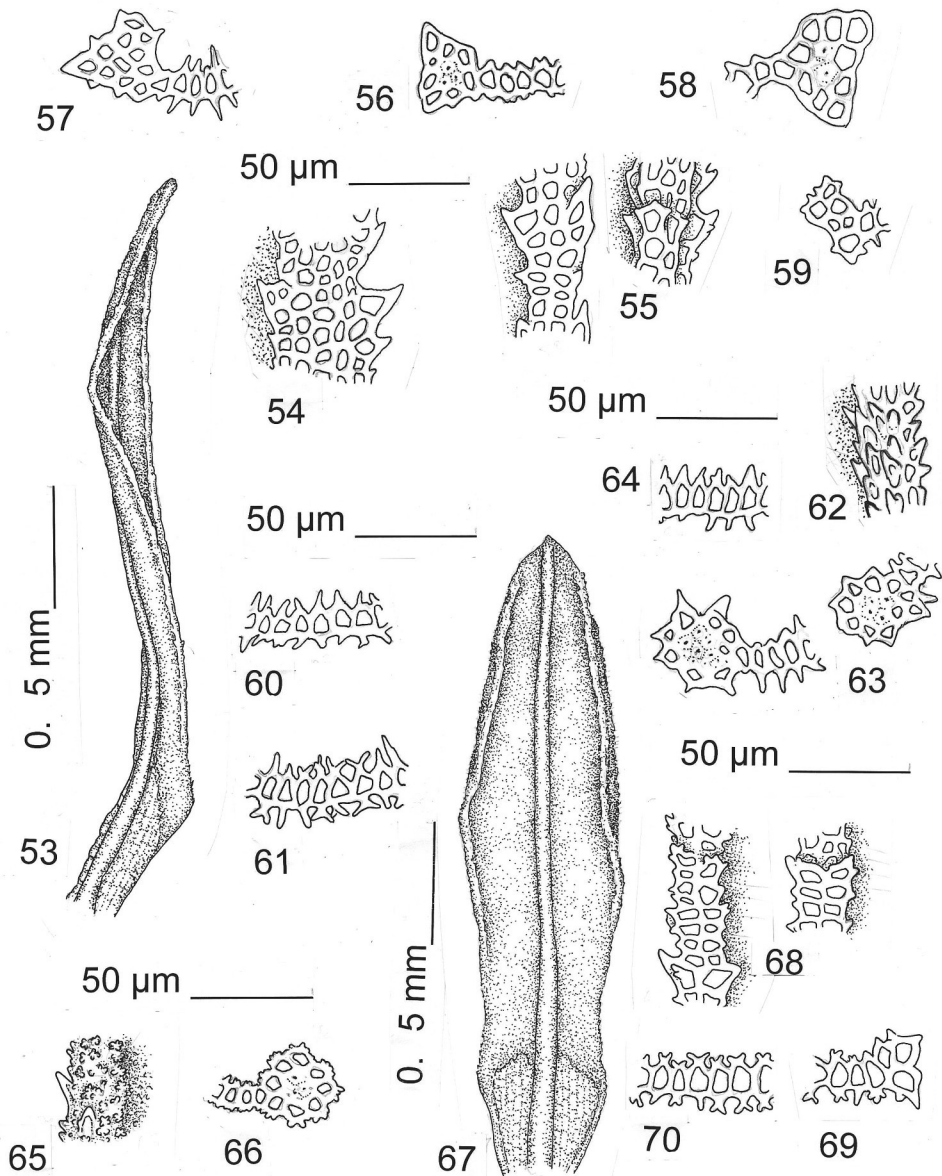
*Syrrhopodon asper*, as its name suggests, has leaves that bristle with acute projections. It occurs largely in continental Africa and evidence for its presence in East African Islands is sparse. A collection from Grand Comoro Island, NW of Madagascar (*Pócs 9268/M*, MO), was correctly annotated as *S. asper* by W. D. Reese. Reese (1991) also reported *S. asper* from the island of Madagascar (based on *Crosby & Crosby 5315* and *6676*, MO), and from Réunion Island (based on *Crosby & Crosby 8905*, MO). The latter collection represents the distinctive local species *S. mahensis* Besch. (discussed and illustrated by Ellis & Wilbraham, 2008). Although leaves of *S. asper* have a structure similar to those of *S. mahensis* they are easily distinguished. In the latter species, most superficial cells of the marginal rib in the chlorophyllose limb are multipapillose (Figs 65, 66), whilst those in *S. asper* are mostly exerted as small, smooth acute teeth (Figs 62, 63).

Of the Madagascan collections originally identified as *Syrrhopodon asper*, *Crosby 6676* has not been available for examination, but *Crosby & Crosby 5315* represents a hispid leaved form of *Syrrhopodon gardneri* (see below). Presently, *S. asper* is unknown in Réunion Island, and in Madagascar, its presence requires confirmation.

*Syrrhopodon gardneri*, a nearly pantropical species, is widely distributed across sub-Saharan Africa (O'Shea, 2006). Leaves in *S. gardneri* are papillose, but often with relatively small, low papillae (e.g. as in Uganda, *Mugizi 1317/25*, BM) (Fig. 56). However, many collections of *S. gardneri* from the western Indian Ocean region possess unusual, almost hispid leaves with bristle-like laminal papillae (Figs 60, 61) that could easily be confused with those of, the similarly bristled, *S. asper* (Fig. 64). Notable examples of this hispid form of *S. gardneri* from Madagascar include *Deans Cowan s.n.* (BM) and *Crosby & Crosby 5315* (MO); and from Réunion, *Crosby & Crosby 8860* (MO) and *Lepervanche s.n.* (BM, type material of *S. aculeato-serratus* Besch. [= *S. gardneri*]). The hispid form of *S. gardneri* may be readily distinguished from *S. asper* by the structure of the thickened rib at the margins of its leaves. In *S. asper*, these ribs are terete in cross-section with most superficial cells exerted as acute, distally leaning projections (Figs 62, 63). Those in *S. gardneri* are angular (mostly subtriangular) in cross-section and mostly have flat superficial cells; although intermittent, often geminate, teeth are formed at the angles of the rib (Figs 54-59).

Occasionally in specimens of *S. gardneri*, teeth emerge from the flat surface of the marginal rib adjacent to those at the angles, and consequently form a distinct transverse group (Fig. 55). These geminate or multi-toothed groups are usually well spaced out along the leaf margin, but become more frequent towards the leaf apex.

The superficial appearance of the leaf margin may cause some confusion of *S. gardneri* with another, local rough-leaved species, *S. pottiioides* Orbán. This species was described from Madagascar (Orbán, 1995) and is recorded from Réunion (Ah-Peng *et al.*, 2005). It resembles a tiny, depauperate form of *S. gardneri*, but appears to be distinguished by its tiny *Pottia*-like shoots with lingulate leaves (Fig. 67). In some specimens of otherwise typical *S. gardneri* (hispid form) from Réunion (e.g. *Coode 4686a*, BR) pairs or groups of teeth occur relatively frequently and close together along the marginal rib, and unusually, some teeth may bare one or two small papillae (Fig 55). This structure and ornamentation of the marginal rib is very similar to that in the leaves of



Figs 53-67. *Syrrhopodon gardneri* (Hook.) Schwägr. (53-61), *S. asper* Mitt. (62-64), *S. mahensis* Besch. (65, 66) and *S. pottoides* Orbán (67-70). **53, 67.** Leaves. **54, 55, 62, 65, 68.** Erect leaf margin in ventral view. **56-59, 63, 66, 69.** Marginal rib in cross-section. **60, 61, 64, 70.** Chlorophyllose lamina in cross-section. (53, 55, 59 *Coode 4686a*, BR; 56 *Mugizi 1317/25*, BM; 57, 61 from *Crosby & Crosby 5315*, MO; 58, 60 from *Lepervanche s.n.*, BM, holotype of *S. aculeato-serratus*; 63, 64 from *Loveridge JPL397*, BM; 62 from *Pócs 9268/M*, MO; 65, 66 from *Balslev 637a*, MO; 67-70 from *Kiss 9443/ED*, EGR, holotype of *S. pottoides*).

*S. pottioides* (Fig. 68). Features distinguishing *S. gardneri* and *S. pottioides* are presented by Orbán (2007), but study of further collections may show these species to be more closely related than is presently recognised.

Although present in the Mascarenes and Madagascar, there is as yet no evidence for the occurrence of *Syrrhopodon gardneri* (hispid or otherwise) in the Seychelles. A specimen in MO, collected from Praslin Island (*Balslev 637*) and annotated as *S. gardneri* by W. D. Reese, is *S. mahensis*; its leaves immediately distinguishable from those of *S. gardneri* by their papillose, rather than smooth and flat, marginal cells.

#### Specimens examined

***Syrrhopodon asper* Mitt.** UGANDA: Kasese, Ruwenzori Mts, above Minimba Camp, 22 January 1962, *Loveridge JPL397* (BM000661412). COMORES: Ngasidja (Grande Comore) Island, 11°45'43"S, 043°18'40"E, 1-3 August 1992, *Pócs 9268/M* (MO).

***Syrrhopodon gardneri* (Hook.) Schwägr. (hispid fo.)** MADAGASCAR. *Deans Cowan 5* (BM000677020). Tananarive, along road N-2, between Atolaona and Mandraka, 40 km E of Tananarive, 18°55'S, 47°55'E, 22 October 1972, *Crosby & Crosby 5315* (MO), originally identified as *S. asper*. RÉUNION: *Lepervanche s.n.* (Hb. Besch.) (BM000677018, type of *S. aculeato-serratus*). Petite Plaine des Palmistes, 10 December 1969, *Onraedt 69.R.211* (BR-BRYO 234467-17, BR-BRYO 234467-18) and *69.R.1969* (BR-BRYO 236493-07); Plaine des Cafres, au Col Bellevue, 7 September 1971, *Onraedt 71.R.9156* (BR-BRYO 234489-39; BR-BRYO 234489-40; BR-BRYO 052435-55). Arrt. du Vent, along trail to La Roche Ecrite. From vicinity of forest station (gite) at NW corner of Plaine des Chicots down to parking area at end of road CF-1bis, 8-12 km S of St Denis, 20°56'-58'S, 55°27'E, 26 November 1972, *Crosby & Crosby 8860* (MO); Sentier de la Roche Ecrite au dessus de Sainte Denis, 25 November 1973, *Coode 4686a* (BR-BRYO 234469-20); Forêt de Bélouve, forest path: "Le trou du fer par le chemin de l'école normale", Grid: C5.d4, 9 November 1998, *Arts RÉU94/40* (BR-BRYO 319337-13); Forêt de Bélouve, sentier de la Tamaraies, southwest of the Gite de Bélouve, Grid: C5.d3, 23 February 2000, *Arts RÉU142/39* (BR-BRYO 319339-15), *RÉU142/12* (BR-BRYO 319338-14) and *RÉU142/77* (BR-BRYO 319340-16).

***Syrrhopodon gardneri* (Hook.) Schwägr. (typical fo.)** UGANDA: Bwindi Impenetrable Forest National Park, Buhoma, Habinyanja Hill, 14 March 2005, *Mugizi 1317/25* (BM000919752). RÉUNION: Sentier vers la Plaine des Chicots, 2 September 1971, *Onraedt 71.R.9177* (BR-BRYO 234468-19; BR-BRYO 052346-63). Route Forestière de la Roche Ecrite, Forêt du Brulé, above Camp Mamode, Zone Bois de Couleur, 4 November 1998, *Arts RÉU73/21* (BR-BRYO 319336-12).

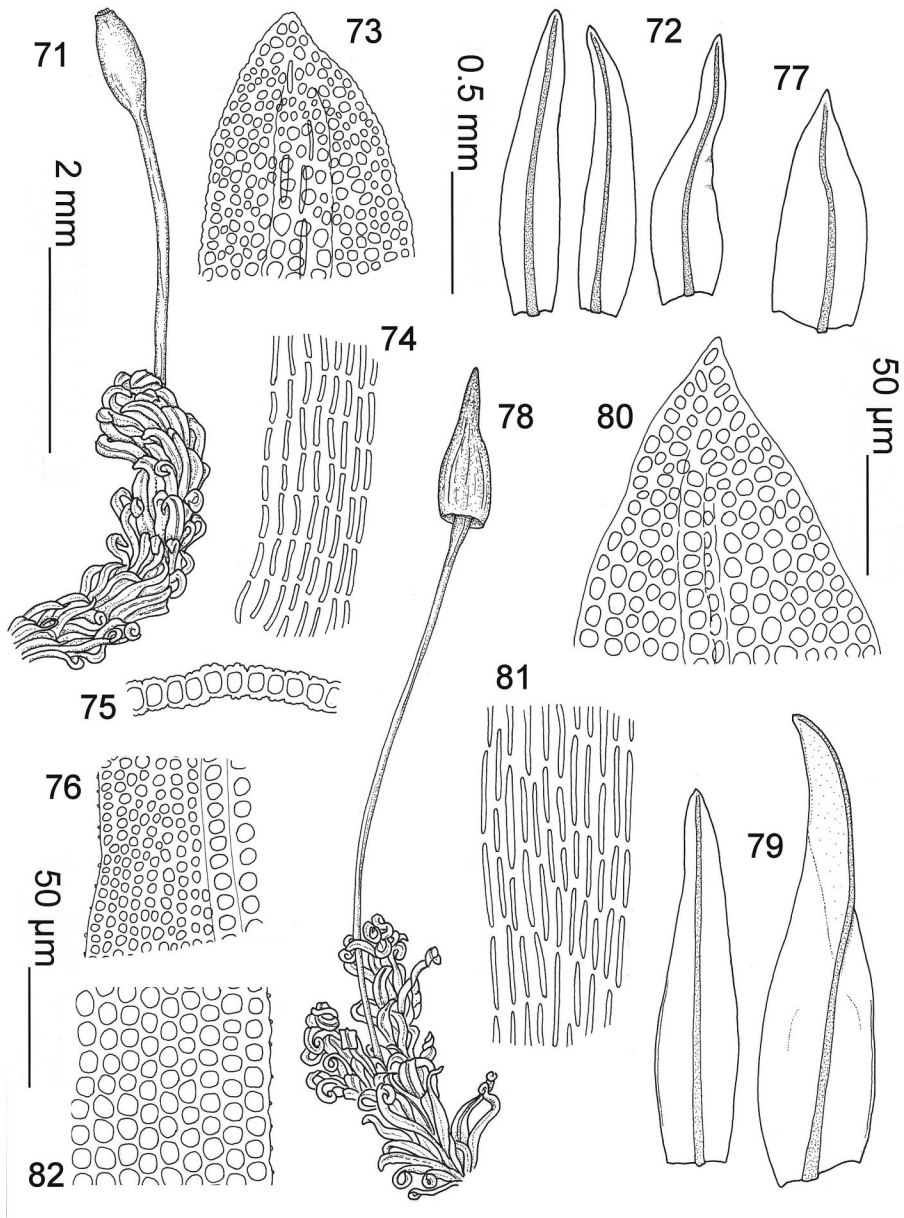
***Syrrhopodon mahensis* Besch.** RÉUNION. Arrt. Sous le Vent: Forest N of St Philippe, along tract through Réserve Touristique. 53 km by S from Ste Denis, 21°20'S, 55° 46'E, 28 November 1972, *Crosby & Crosby 8905* (MO, originally identified as *S. asper*). Sentier du Tremblet au Nord de Sainte Philippe, 18 December 1973, *Onraedt 73.R.6607* (BR-BRYO 234470-21). SEYCHELLES: Praslin Island. Valle de mai, 26 November 1979, *Balslev 637* (MO, originally identified as *S. gardneri*).

***Syrrhopodon pottioides* Orbán** MADAGASCAR: 69 km NW of Antananarivo along Mahajanga road, N of Soaniadanana village, 18°29'54"S, 47°17'02"E, 4 September 1994, *Kis 9443/ED* (EGR, holotype of *Syrrhopodon pottioides*).

#### MACROMITRIUM (Orthotrichaceae)

***Macromitrium chloromitrium* (Besch.) Wilbraham, *comb. et stat. nov.***

**Basionym.** *Macromitrium fimbriatum* (P. Beauv.) Schwägr. var. *chloromitrium* Besch., *Ann. Sci. Nat. Bot.*, Sér. 6, 9: 359. 1880. **Type citation.** Maurice: montagne du Pavillon, BOIVIN (herb. Mus. Par.). **Type specimen.** Mauritius, *Boivin s.n.* (BM000873890! – **lectotype, selected here**).



Figs 71-82. *Macromitrium chloromitrium* (Besch.) Wilbraham (71-77) and *M. fimbriatum* (P. Beauv.) Schwägr. (78-82). **71, 78.** Habit. **72, 79.** Branch leaves. **73, 80.** Branch leaf apex. **74, 81.** Basal laminal cells. **75.** Cross-section of upper lamina. **76, 82.** Upper laminal cells. **77.** Perichaetial leaf. (71-77 from *Arts REU32/11*, BR; 78-82 from *Arts REU179/18*, BR).

**Discussion** – *Macromitrium fimbriatum* var. *chloromitrium* possesses features sufficiently distinct from those of the type variety of *M. fimbriatum* to be recognised as a distinct species, *M. chloromitrium*. Both the latter and *M. fimbriatum* possess branch leaves with bluntly acute to obtuse apices; bulging, irregularly rounded and multipapillose cells in the upper lamina, and differentiated basal cells restricted to a relatively small proportion of the leaf base. However, *M. chloromitrium* is distinguished by the possession of relatively small upper laminal cells (< 9 µm diameter), with cell walls partially obscured by papillae (Fig. 76); basal cells < 30 µm long (Fig. 74), and anisoporous sporophytes. In contrast, *M. fimbriatum* possesses larger cells in the upper lamina (> 8 µm diameter) with clearly visible walls, not obscured by papillae (Fig. 82); it has generally more elongate cells in the basal lamina (< 41 µm long) (Fig. 81), and isoporous sporophytes.

*Macromitrium chloromitrium* is newly recorded here for Réunion Island, having been previously considered as endemic to Mauritius. It has been collected from altitudes between 500 and 1700 m a.s.l. and grows as an epiphyte or on rocks. *Macromitrium fimbriatum* is known from Madagascar, Mauritius, Réunion Island (O’Shea 2006), Brazil (Yano, 1989) and Tristan de Cunha (Palisot de Beauvois, 1805). It typically occurs at lower altitudes than *M. chloromitrium*, (20-890 m a.s.l.) and grows as an epiphyte.

#### Selection of specimens examined

##### *Macromitrium chloromitrium* (Besch.) Wilbraham

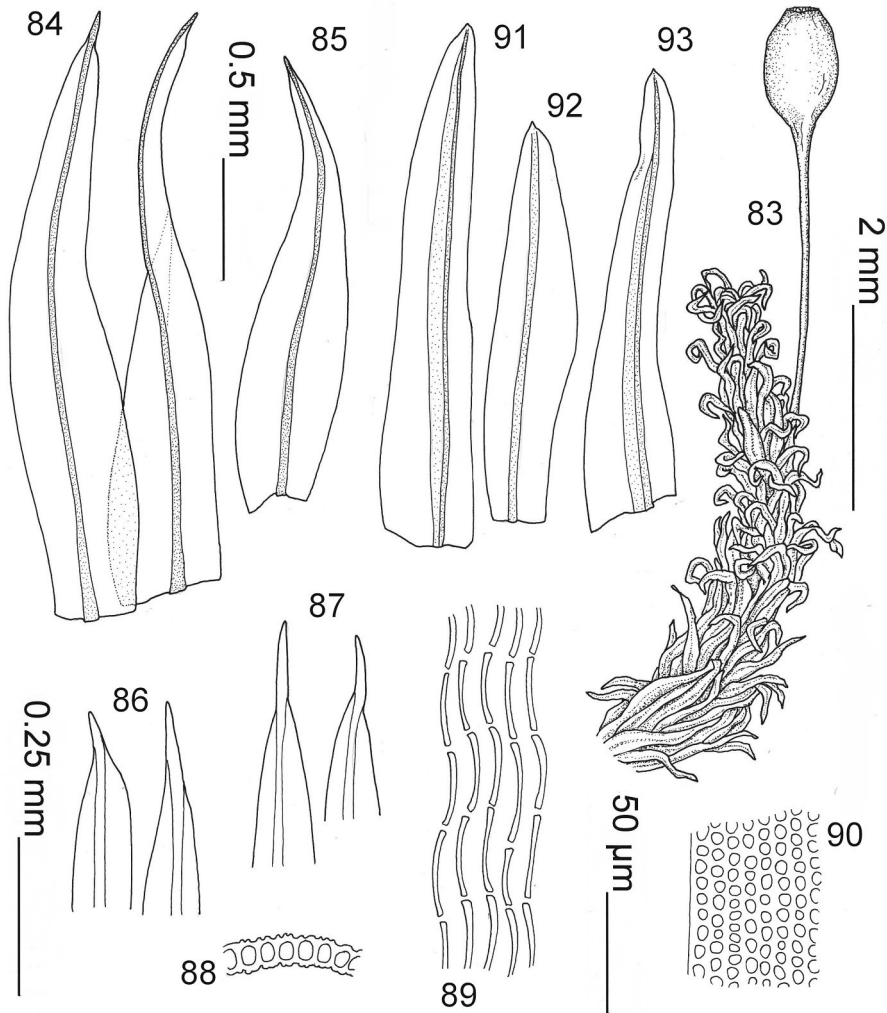
RÉUNION: Cilaos, 100 m above the village, 29 September 1962, *Een R453* (S, B13353). Forest above Ste Denis, 11 October 1962, *Een R463* (S, B13363). Route St Pierre – St Benoit près du Mourne de l’Etang, 28 December 1973, *Onraedt 73.R.6555* (BR-BRYO 236584-01). Route de la Montagne, W. de Ste Denis, 31 December 1973, *Onraedt 73.R.6851* (BR-BRYO 236550-64). Foot path from Bois Court to Grand Bassin (Plaine des Cafres), 20 September 1997, *Arts RÉU32/11* (BR-BRYO 318207-47). Cirque de Cilaos, Le Grand Matarum surroundings of La Roche Merveilleuse, 29 September 1997, *Arts RÉU57/15* (BR-BRYO 318230-70). Cirque de Cilaos, sentier GR-R1 from le Plateau des Chênes (Le Grand Matarum) and îlets du Bois Rouge, 30 September 1997, *Arts RÉU58/02* (BR-BRYO 318231-71). Dos-d’Âne, footpath to Cap Noir, 14 Nov 1998, *Arts RÉU106/04* (BR-BRYO 318287-30). Le serré, north of Saint -Joseph, 25 February 2000, *Arts RÉU146/48* (BR-BRYO 318312-55). Jacques Payet, Sentier du Volcan, 27 February 2000, *Arts RÉU153/59* (BR-BRYO 318318-61).

##### *Macromitrium fimbriatum* (P. Beauv.) Schwägr.

RÉUNION: *Rodriguez s.n.* (BM000873893). Le Pont suspendu de la Rivière de l’Est, 22 September 1997, *Arts RÉU35/06* (BR-BRYO 318214-54). Above La Montagne, footpath to Ilet à Guillaume, from route D41, at the junction to St. Bernard, 5 November 1998, *Arts RÉU82/21* (BR-BRYO 318249-89). Valley of the rivière Langevin, Grand Galet, 7 November 1998, *Arts RÉU 88/04* (BR-BRYO 318252-92). La Paix, west of Bras Panon, 13 November 1998, *Arts RÉU104/16* (BR-BRYO 318277-20). Commune d’Entre-Deux, La mare, 20 February 2000, *Arts RÉU127/39* (BRYO-BR 318303-46). Le serré, north of Saint-Joseph, 25 February 2000, *Arts RÉU146/27* (BR-BRYO 318310-53). Forest path from route N2 to Pointe de La Table, 28 February 2000, *Arts RÉU156/25* (BR-BRYO 318326-69). Sainte-Anne, Ravine du Rivière Ste-Anne near the Church, 7 March 2000, *Arts RÉU179/18* (BR-BRYO 318345-88). La Rivière des Pluies, “La Zone de Plaisir de l’Ilet Quinquina”, 9 March 2000, *Arts RÉU183/07* (BR-BRYO 318346-89). TRISTAN DE CUNHA: comm. *M. Dupetit-Thouars s.n.* (G00120670 – type specimen of *M. fimbriatum*).

*Macromitrium mauritianum* Schwägr., *Sp. Musc. Frond., Suppl.* 2(2): 127, pl. 189. 1827. **Type citation.** In insula Mauritiï lectum misit cl. Sieber. **Type specimen.** Mauritius. *Sieber s.n.* (G00046151! – **lectotype, selected here**; BM000873885!, BM000873884!, BM000873807! - isoelectotypes).





Figs 83-93. *Macromitrium mauritianum* Schwägr. **83.** Habit. **84-85.** Branch leaves. **86-87.** Branch leaf apices. **88.** Cross-section of upper lamina. **89.** Basal laminal cells. **90.** Upper laminal cells. **91-93.** Perichaetial leaves. (83, 91 from Arts *REU102/137*; 84 from BM000873884, type of *M. mauritianum*; 86, 88, 89, 92 from BM000873885, type of *M. mauritianum*; 85, 93 from BM000878258, type of *M. rhizomatosum*; 87 from BM000868316, type of *M. subpungens*; 90 from H-BR 2608007, type of *M. mauritianum* var. *viride*).

*Macromitrium mauritianum* var. *viride* Broth., *Reise Ostafri.*, *Syst. Arbeit.* 3: 55. 1908, **syn. nov.** **Type citation.** Mauritius [Voeltzkow]. **Type specimen.** Mauritius, 1904, *Voeltzkow s.n.* (H-BR 2608007! – **lectotype, selected here**; H-BR 2608005!, H-BR 2608006!, H-BR 2608008! - isolectotypes).

*Macromitrium subpungens* Hampe ex Müll. Hal., *Linnaea* 40: 249. 1876, **syn. nov.** **Type citation.** Comoro-insula Johanna, 1000 met. supra mare, in lingo putrido sylvestri: J.M. Hildebrandt Junio–Aug. 1875. Coll. No. 1814, cum

*Macromitrium Hildebrandti* associatum. **Type specimen.** Comores, *Hildebrandt s.n.* (BM000868296! – **lectotype, selected here**; BM000868316!, BM000878256! – isolectotypes).

*Macromitrium subpungens* var. *madagassum* Cardot, *Hist. Phys. Madagascar, Mousses* 239. 1915. **Type citation.** Zone inférieure des forêts: Maroantsetra, dans la baie d'Antongil (Ch. Mathieu). **Type specimen.** Madagascar, *Mathieu s.n.* (PC0101522! – **lectotype, selected here**).

*Macromitrium rhizomatosum* Müll. Hal. ex Besch., *Ann. Sci. Nat. Bot., Sér. 6, 9*: 360. 1880, **syn. nov.** **Type citation.** Nossi-bé: bord des ruisseaux, avril 1841, PERVILLÉ, n. 789. **Type specimen.** Nossi-bé, *Perville s.n.* (BM000878259! – **lectotype, selected here**; BM000878258! – isolectotype).

**Discussion** – *Macromitrium mauritianum* is recognised by the possession of lanceolate branch leaves with excurrent costae (Fig. 84-87); cells in the upper lamina obscured by papillae (Fig. 88), and smooth cells in the basal lamina with curved lumina, which occupy up to 1/3 of the leaf (Fig. 89). The perichaetial leaves are relatively short or of a similar length to the vegetative leaves, and are oblong with rounded obtuse to bluntly acute apices (Fig. 91-93). Sporophytes are anisoporous with ovoid capsules and sparsely hairy calyptrae. An examination of the type specimens of *M. mauritianum*, *M. mauritianum* var. *viride* Broth., *M. subpungens* Hampe ex Müll. Hal., *M. subpungens* var. *madagassum* Cardot and *M. rhizomatosum* Müll. Hal. ex Besch. has shown them to represent the same species, with characters closely matching the above description. Consequently, all of these taxa are considered here as synonyms under *M. mauritianum*, the earliest available name.

Brotherus (1908) distinguishes his variety *Macromitrium mauritianum* var. *viride* by the dark green colour of the plant, though he states that he found no difference in the leaves or peristome to those of the type variety. Specimens of *M. mauritianum* are variable in colour, ranging from reddish brown to olive green. The name var. *viride* has been restricted in use to collections from Madagascar, and examination of the type material confirms it to be inseparable from var. *mauritianum*.

In his protologue for *Macromitrium subpungens*, Müller (1876) distinguishes his new species from related taxa by the presence of excurrent costae in its branch leaves, hence the epithet “*subpungens*”. However, the length to which the costa extends beyond the cuspidate-acuminate apex of the branch leaves is a variable feature in *M. mauritianum*, ranging from the costa ending shortly above the acuminate apex to being stoutly excurrent. The type material of *M. subpungens* (*Hildebrandt s.n.*, BM) and additional specimens examined from the Seychelles (*Norkett 16409 & 18239*, BM) possess excurrent costae falling at the upper end of the range of lengths observed in *M. mauritianum*. The type material of *M. subpungens* var. *madagassum* Cardot (*Mathieu s.n.*, PC0101522), also has features matching those of *M. mauritianum*.

In his protologue of *Macromitrium rhizomatosum*, Beschereille (1880) distinguishes the new species from *M. mauritianum* by its possession of perichaetial leaves that are longer than the vegetative leaves. However, type material of *M. rhizomatosum* (*Perville s.n.*, BM) has perichaetial leaves of approximately equal size to the vegetative leaves, and an isotype specimen of *M. mauritianum* (*Sieber s.n.*, BM000873885) has perichaetial leaves in different perichaetia of the same specimen ranging from shorter to approximately equal in size to the vegetative leaves. Therefore, the size of perichaetial leaves does not appear to be a satisfactory character to delimit these taxa, which are here considered as conspecific.

*Macromitrium mauritanium* is recorded from the Agalega Islands, Madagascar, Tanzania, Mauritius and Réunion Island (O’Shea, 2006). The synonymy with the name *Macromitrium subpungens* adds the Comoros and Seychelles to its known distribution. It is commonly found at low to mid-level altitudes and has been collected from sea level up to 1200 m a.s.l., growing as an epiphyte or on rocks.

#### Selection of specimens examined

##### *Macromitrium mauritanium* Schwägr.

COMORES: Grande Comore, SW slopes of Karthala, 26 July 1992, *Magill & Pócs 10918*, (BM000862001). MAURITIUS: 1881, *Robillard 1772* (BM000960608). South of Tamarin Reservoir on banks of Riviere des Aigrettes, 31 November 1968, *Barclay 1379a* (Priv. Herb. Townsend). RÉUNION ISLAND: St Philippe, Réserve Naturelle de Mare Longue forest trail, 7 March 1997, *Arts RÉU11/01* (BR-BRYO 318195-35) and *RÉU11/02* (BR-BRYO 318196-36). La Cote aux vents, Ste-Rose, 22 September 1997, *Arts RÉU36/04* (BR-BRYO 318215-55). Tremblet, 8 November 1998, *Arts RÉU92/29* (BR-BRYO 318258-01). Circuit des Ravenales, ca 1 km NW of Chemin de Ceinture, 10 November 1998, *Arts RÉU97/82* (BR-BRYO 318269-12). Forêt Domaniale de Bras Panon, at the “Site touristique d’Eden”, a former tree plantation, 12 November 1998, *Arts RÉU102/137* (BR-BRYO 318272-15). Forêt Mourouvin, N-NE slope of Piton de la fournaise, along the road to les 3 citernes, 13 November 1998, *Arts RÉU105/15* (BR-BRYO 318280-23). La Grande Montagne, Route Forestière de La Plaine d’Affouche, 20 November 1998, *Arts RÉU122/07* (BR-BRYO 318299-42). Bois Blanc, site de la Source, 26 February 2000, *Arts RÉU152/07* (BR-BRYO 318315-58). SEYCHELLES: Mahé, Salazie, Forêt Noir Road, 4 September 1973, *Norkett 16409* (BM000873865). Mahé, Vingt-Cinq-Sous, 22 December 1973, *Norkett 18239* (BM000873862). Mahé, Morne Blanc, 23 January 1974, *Norkett 18740* (BM000960613).

*Macromitrium pallidum* (P. Beauv.) Wijk et Margad., *Taxon* 9: 190. 1960. **Basionym.** *Orthotrichum pallidum* P. Beauv., *Prodr. Aethéogam.* 81. 1805. **Type citation.** Ile de Bourbon; communique par M. Bory-St-Vincent. Communique par M. Dupetit-Thouars qui la recueillie aux Iles de France et de Bourbon. **Type specimen.** Réunion, *Bory-St-Vincent s.n.* (G00120669! – **lectotype, selected here**).

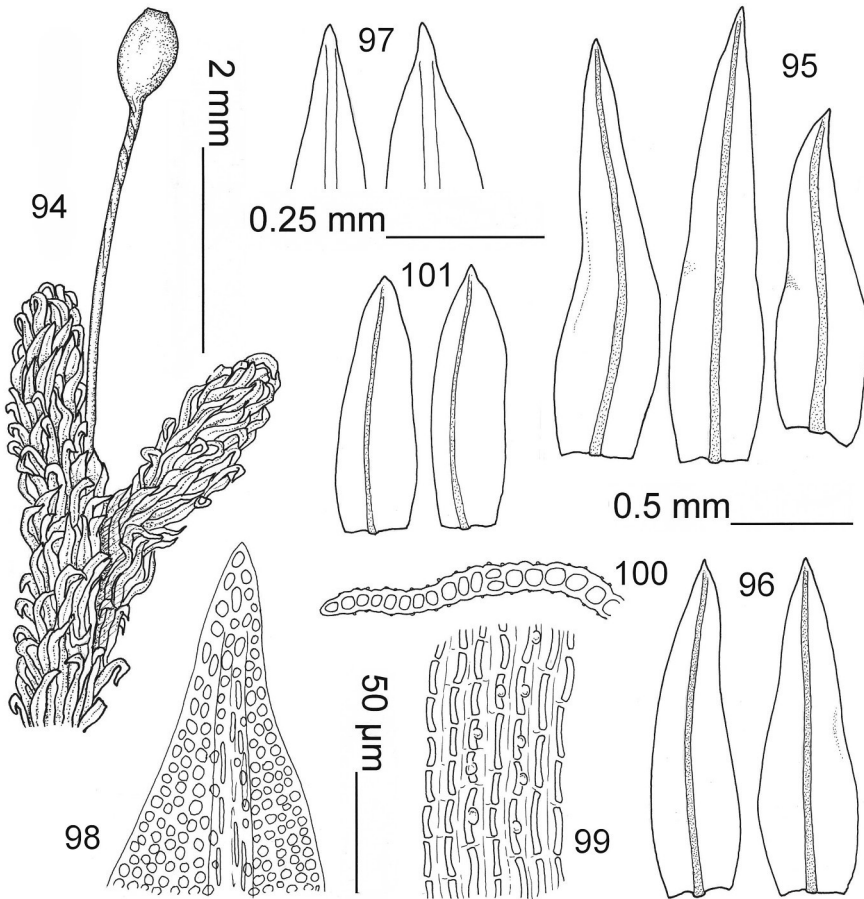
*Macromitrium voeltzkowii* Broth., *Reise Ostaf., Syst. Arbeit.* 3: 55. 1908, **syn. nov.** **Type citation.** Mauritius [Voeltzkow]. **Type specimen.** Mauritius, *Voeltzkow s.n.* (H-BR 2616005! – **holotype**).

**Discussion** – *Macromitrium pallidum* closely resembles *M. mauritanium* but is distinguished from the latter by the possession of lanceolate branch leaves with sparsely tuberculate basal cells (Fig. 99); an upper lamina that is densely papillose with occasional bistratose patches (Fig. 100); a costa ending in or below the acute leaf apex (Fig. 97), and short, ovate-lanceolate perichaetial leaves with bluntly acute apices (Fig. 101). The type material of *M. voeltzkowii* (*Voeltzkowi s.n.*, H-BR), described from Mauritius, has features matching those of *M. pallidum* (P. Beauv.) Wijk et Margad. (Réunion, *Bory-St-Vincent s.n.*, G – lectotype). Previous records of *M. voeltzkowii* Broth. occurring on Réunion Island (Een 1978) are referable to *M. chloromitrium* (Besch.) Wilbraham (see discussion here under this species). *Macromitrium pallidum* has been recorded from Brazil (Yano, 1981), Réunion, Mauritius and the Seychelles (O’Shea, 2006). It has been collected between altitudes of 220 and 980 m a.s.l., growing as an epiphyte.

#### Selection of specimens examined

##### *Macromitrium pallidum* (P. Beauv.) Wijk et Margad.

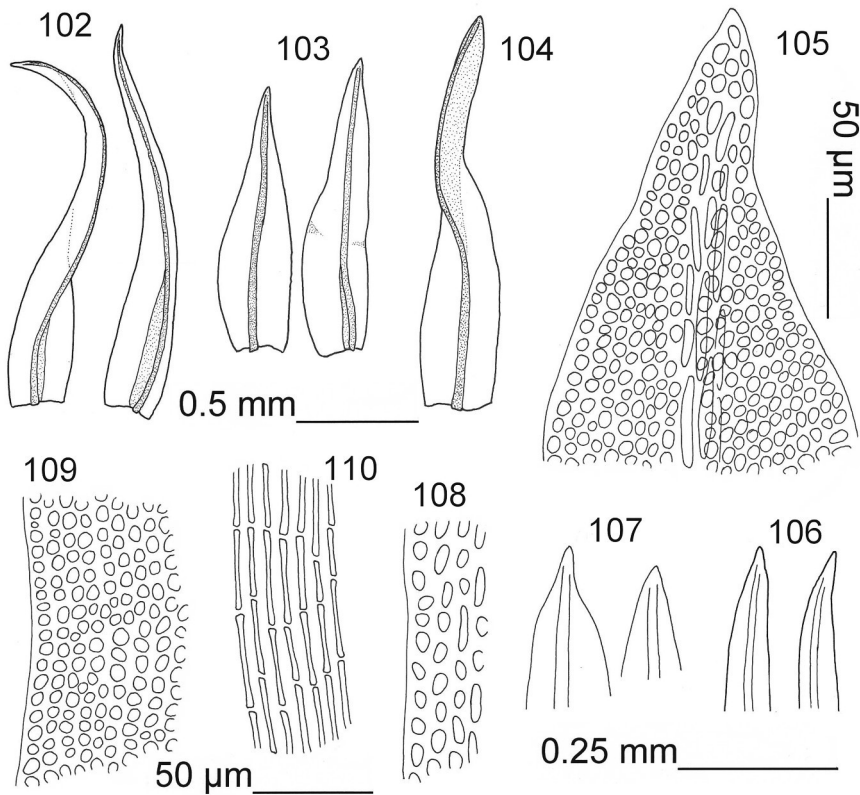
MAURITIUS: Mauritius, *Dupetit Thouars s.n.* (BM000873859! – syntype of *Macromitrium pallidum*). RÉUNION: *Rodriguez s.n.* (BM000873894). Plaine des Palmistes, de la route



Figs 94-101. *Macromitrium pallidum* (P. Beauv.) Wijk. et Margad. **94.** Habit. **95-96.** Branch leaves. **97-98.** Branch leaf apices. **99.** Basal laminal cells. **100.** Cross-section of upper lamina. **101.** Perichaetial leaves. (94 from *Arts RÉU102/143*, BR; 96-98, 100-101 from BM000873859, type of *M. pallidum*; 95, 99 from H-BR 2616005, type of *M. voeltkowi*).

St Pierre – St Benoit, 27 December 1969, *Onraedt 69.R.742* (BR-BRYO 235773-63). Sud-ouest de Saint-Benoit, entre le Grand Etang et la route, 28 December 1973, *De Sloover 17.858* (BR-BRYO 273489-46). Tremblet, 8 November 1998, *Arts RÉU92/27* (BR-BRYO 318257-00). Forêt Domaniale de Bras Panon: at the “Site touristique d’Eden”, a former tree plantation, 12 November 1998, *Arts RÉU102/143* (BR-BRYO 318273-16). Forêt Mourouvin, N-NE slope of Piton de la fournaise, above les 3 citernes, 13 November 1998, *Arts RÉU105/47* (BR-BRYO 318282-25) and *Arts RÉU105/50* (BR-BRYO 318283-26). Jacques Payet, Sentier du Volcan, 27 February 2000, *Arts RÉU153/21* (BR-BRYO 318316-59), *RÉU153/28* (BR-BRYO 318317-60) AND *RÉU153/85* (BR-BRYO 318321-64).

***Macromitrium microstomum*** (Hook. et Grev.) Schwägr., *Sp. Musc. Frond.*, *Suppl.* 2(2): 130. 1827. **Basionym:** *Orthotrichum microstomum* Hook. et Grev., *Edinburgh J. Sci.* 1: 114, *pl.* 4. 1824. **Type citation.** Van Dieman’s Land, Dr. Spence. **Type specimen.** Tasmania, *Spence & Neill s.n.* (E00011665! – **lectotype**, *Vide Vitt & Ramsay*, 1985; isotype – BM000873897!).



Figs 102-110. *Macromitrium microstomum* (Hook. et Grev.) Schwägr. **102-104.** Branch leaves. **105-107.** Branch leaf apices. **108-109.** Upper laminal cells. **110.** Basal laminal cells. (103, 105, 107, 110 from NY00970201, type of *M. fasciculare*; 102, 106, 108, from PC0105915, type of *M. fasciculare* var. *angustifolium*; 104 from BM000868312, type of *Dasymitrium borbonicum*; 109 from FH, type of *M. fasciculare* var. *javense*).

*Macromitrium fasciculare* Mitt. var. *fasciculare*, *J. Proc. Linn. Soc., Bot., Suppl.* 1: 51. 1859, **syn. nov. Type citation.** Hab. In Ceylon ad Horton Plains et Newera Ellia, *Gardner!* (No. 225, 229, 230). **Type specimen.** Sri Lanka, Horton Plains, Feb 1846, *Gardner 230* (NY 00970201! – **lectotype, selected here**; isotype – BM000919522!).

*Macromitrium fasciculare* var. *javense* M. Fleisch., *Musci Buitenzorg* 2: 432. 1904, **syn. nov. Type citation.** Exsiccata: M. FLEISCHER, *Musc. Archip. Ind.*, No. 281 (1902). **Type specimen.** Java, *Fleischer exicc.281* (FH 00258463! – **lectotype, selected here**).

*Macromitrium fasciculare* var. *angustifolium* P. de la Varde, *Rev. Bryol. Lichénol.* 19: 152. 1950. **Type citation.** Sommet oriental du massif du Marojéjy à l'ouest de la haute Manantenina. Gneiss et quartzite. Alt. 1.850–2.100 m. **Type specimen.** Madagascar, *Humbert s.n.* (PC0105915! – **lectotype, selected here**).

*Dasymitrium borbonicum* Besch., *Ann. Sci. Nat. Bot., Sér.* 6, 9: 355. 1880, **syn. nov. Type citation.** La Réunion: plaine des Chicots, BORY (herb. COSSON); BOIVIN, 1849 (in herb. Mus. Par.); plaine des Palmistes, G. DE L'ISLE, 1875,

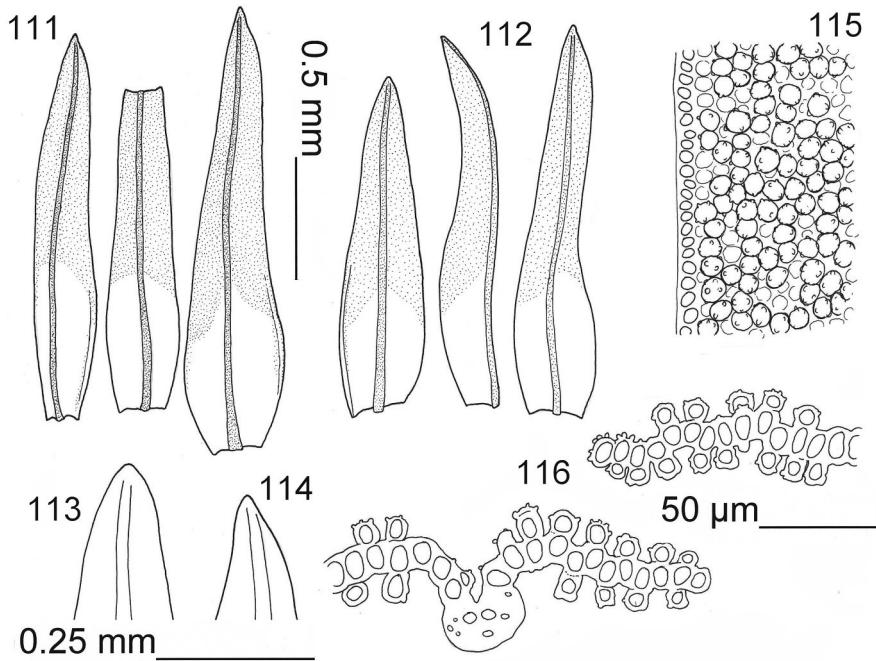
nos. 200 et 286; pas de Belcombe, P. LÉPERVANICHE, 1877 (hb. Mus. Par., sub *Macromitrio schizomitrio* Nob. prius). Madagascar (N.O.): PERVILLE, 1849, no. 827. **Type specimen.** Réunion Island, *G. d'Isle* 286 (BM000868311! – **lectotype, selected here**).

**Discussion** – *Macromitrium microstomum* has lanceolate branch leaves with acute to acuminate apices (Fig. 102, 103). Cells in the upper lamina are irregularly rounded to shortly oblong and smooth (Fig. 109), whilst those in the basal lamina are linear and smooth, occupying the lower 1/3-1/2 of the leaf (Fig. 110). Sporophytes in this species are isosporous with elongate, smooth setae and capsules that are puckered at the mouth, the calyptra is essentially hairless. This pantropical species has been recognised under a large number of local names and additional research into *Macromitrium* is likely to increase this list of synonyms still further.

In the protologue for *Macromitrium fasciculare*, Mitten (1859) compares his plant with *M. reinwardtii* Schwägr., a name which is later placed in synonymy with *M. microstomum* by Vitt & Ramsay (1985). Mitten considered his *M. fasciculare* to be similar to the species now known as *M. microstomum*, but distinguished by the “*structura foliorum, cellulis minoribus numerosioribus infra medium folii descendentibus et calyptra parce pilosa disprensans*”. Examination of the lectotype material of *M. fasciculare* (*Gardner* 230, NY) found the leaf shape and laminal cells to be a good match for those of the lectotype of *M. microstomum* (*Spence & Neill s.n.*, E). The upper laminal cells of this species are somewhat irregular in shape, range in diameter from 3.5–8  $\mu\text{m}$ , and vary slightly in the thickness of their cell walls. Calyptrae in type material of *M. fasciculare* (*Gardner* 229, NY) are essentially glabrous, though an occasional hair is visible. Isotype material of *M. fasciculare* (*Gardner* 230, BM) has also been determined by Shuiliang Guo (Shanghai Normal University) as *M. microstomum* (pers. comm.).

*Macromitrium fasciculare* has two recognised varieties: var. *angustifolium* P. de la Varde described from Madagascar and var. *javense* M. Fleisch. described from Java. The type material of var. *angustifolium* (*Humbert s.n.*, PC0105915) represents an unusual form of *M. microstomum*. This specimen possesses branch leaves which are narrower than is typically found in *M. microstomum* and has upper laminal cells which are more distinctly elongate (Fig. 108). However, these distinguishing features of var. *angustifolium* are somewhat plastic within *M. microstomum* and though extreme in this plant do not justify recognition at an infraspecific level. The type material of *M. fasciculare* var. *javense* (*Fleischer exsicc.* 281, FH) was found to be inseparable from collections of the type variety. Fleisch (1904) had considered var. *javense* distinct in possessing smaller upper laminal cells than the type variety, but these actually fall well within the range of sizes observed in *M. microstomum*.

*Dasymitrium borbonicum* was treated as a synonym of *Macromitrium serpens* by Sim (1926), though he did not support his synonymy with cited specimens. Syntype specimens of *D. borbonicum* in Bescherelle's herbarium, BM (*Lépervanche s.n.*; *Boivin s.n.*; *G. d'Isle* 286; *Perville s.n.*), are all referable to *Macromitrium microstomum*, a species clearly distinct from *M. serpens*. Crosby *et al.* (1983) also list *D. borbonicum* as a synonym of *M. serpens*, but again, evidential specimens are not cited. Part of the type material of *Dasymitrium borbonicum* (Réunion, *Lépervanche s.n.*, BM) is also the basis for Bescherelle's herbarium name *Macromitrium schizomitrium*. This material was examined by Fleisch (1904), who placed *M. schizomitrium*, *nom. nud.* in synonymy with *M. fasciculare* [= *M. microstomum*]. The available evidence suggests that



Figs 111-116. *Macromitrium serpens* (Hook. et Grev.) Brid. **111-112**. Branch leaves. **113-114**. Branch leaf apices. **115**. Upper laminal cells. **116**. Cross-section of upper lamina. (111, 114, 115 from BM000873888, isotype of *M. serpens*; 112, 113, 116 from NY00518241, type of *M. astroideum*).

*D. borbonicum* should be placed in synonymy with *M. microstomum*. Owing to the past confusion of these taxa, distribution records of *Dasymitrium borbonicum* from Réunion Island and Madagascar, have been mistakenly allocated to *M. serpens*. However, as both *M. microstomum* and *M. serpens* occur on these islands, this does not affect their recorded distributions.

*Macromitrium microstomum* was previously known to occur in Bolivia (Churchill, 2005), Brazil, Dominican Republic, Cuba, South Pacific Islands, Hawaii, St Helena, South Africa, Malawi, Sri Lanka, Java, New Guinea, Eastern Australia, Tasmania and New Zealand (Wilbraham, 2007). It was known under the name *M. fasciculare* from Tanzania, Madagascar, Réunion Island (O'Shea, 2006), Philippines (Tan, 1991), Java, Sulawesi, New Guinea (Eddy, 1996) and China, Hainan Province (Redfearn *et al.* 1996). *Macromitrium microstomum* is commonly encountered in montane forests on Réunion, and has been collected from 1000–2300 m a.s.l., growing as an epiphyte or rarely on rocks.

#### Selection of specimens examined

##### *Macromitrium microstomum* (Hook. et Grev.) Schwägr.

TANZANIA. Iushoto District, East Usambara Mts, 25 March 1975, *Townsend 75/476* (Priv. Herb. Townsend). MADAGASCAR: *Pervillé s.n.* (BM000868313, syntype of *Dasymitrium borbonicum*). RÉUNION ISLAND. *Lépervanche s.n.* (BM000868312, syntype of *D. borbonicum*) and *Boivin s.n.* (BM000868314, syntype of *D. borbonicum*). Forêt de Plaine des Palmistes, Premier Village, sentier vers la Cascade Biberon, 13 March 1997, *Arts*

*RÉU25/21* (BR-BRYO 318205-45). Plaine des Cafres, sentier GR-R2 vers le Piton des Neiges, entre Piton Mare a boue et Piton Tortue, 21 September 1997, *Arts RÉU33/106* (BR-BRYO 318212-52). Forêt de Notre Dame de La Paix, Sentier botanique, 25 September 1997, *Arts RÉU48/55* (BR-BRYO 318223-63). Cirque de Mafate, footpath GR R1 from the Pas de Col du Boeuf (Grand Îlet) to La Nouvelle, 3 October 1997, *Arts RÉU61/41* (BR-BRYO 318237-77). Forêt de Belouve, forest path, 9 November 1998, *Arts RÉU94/57* (BR-BRYO 318263-06). Plaine des Cafres, Source Reilhac, west side of piton de la Source, 10 November 1998, *Arts RÉU96/48* (BR-BRYO 318267-10). Forêt de Tevelave, Sentier des Tamarins, 18 November 1998, *Arts RÉU116/05* (MEISE, BR-BRYO-318293-36). Cirque de Cilaos, Bras Sec, Sentier des Calumets north of 'le Bonnet de Pretre', 4 March 2000, *Arts RÉU171/62* (BR-BRYO 318337-80). SRI LANKA: Nuwara Eliya, July 1845, *Gardner 225(37)* (NY 00970199, syntype of *Macromitrium fasciculare*). Horton Plains, February 1846, *Gardner 229* (NY 00970200, syntype of *M. fasciculare*).

***Macromitrium serpens*** (Hook. et Grev.) Brid., *Bryol. Univ.* 1: 736. 1826. **Basionym.** *Orthotrichum serpens* Hook. et Grev., *Edinburgh J. Sci.* 1: 119, pl. 5. 1824. **Type citation.** Trunks and branches of trees in woods at Sylvas Station, near George's Plain, Anteniqua Land, Cape of Good Hope. W.J. Burchell, Esq. **Type specimen.** South Africa, *Burchell s.n.* (E – **lectotype**, *vide* van Rooy & van Wyk, 1992, not seen; isotype – BM000870451!).

*Macromitrium astroideum* Mitt., *Philos. Trans.* 168 (extra vol.): 390. 1879, **syn. nov.** **Type citation.** Rare. Only at the top of Oyster River valley. Trailing over boulders. **Type specimen.** Rodriguez, *Balfour s.n.* (NY00518241! – **lectotype**, **selected here**; isotype – BM000873888!)

**Discussion** – *Macromitrium astroideum* has been considered endemic to the island of Rodriguez (Mitten, 1879) though it is found here to be a synonym of the more widespread *M. serpens* which is characterised by the possession of a long, creeping primary stem with short secondary branches; lanceolate branch leaves with fragile apices (Figs 111, 112) and basal laminal cells that are often tuberculate. The upper lamina is formed by multipapillose cells but has an unusual structure in possessing irregularly distributed unicellular protruberances from both dorsal and ventral surfaces (Fig. 116). The type material of *M. astroideum* (Rodriguez, *Balfour s.n.*, BM, NY) possesses all of these critical features, and is indistinguishable from collections of *M. serpens*. *Macromitrium serpens* has been recorded from Madagascar, Malawi, Mozambique, Réunion Island, South Africa and Tanzania (O'Shea, 2006) and was previously unrecognised from Rodriguez. It is a rare plant on Réunion.

#### Selection of specimens examined

##### ***Macromitrium serpens* (Hook. et Grev.) Brid.**

SOUTH AFRICA: Cape Province, Storms River Forest, 1 August 1952, *Taylor 468* (BM 000873891). Cape, Knysna, *Eddy & Sims 7098* (BM000878010). RÉUNION ISLAND: Above La Montagne, at the junction to St. Bernard, 5 November 1998, *Arts RÉU82/19* (BR-BRYO 318248-88).

##### ***Macromitrium lanceolatum* Broth.**

*Macromitrium lanceolatum* was newly recorded for Réunion Island by Een (1978). However, this record has been overlooked in recent checklists for this island (Ah-Peng & Bardat, 2005; Ellis & Wilbraham, 2007). This species is known from Mauritius and from a single collection from Réunion (*Rodriguez s.n.*, S-B63459). *Macromitrium lanceolatum* is morphologically very close to the more widespread *M. orthostichum* Nees ex Schwägr. *Macromitrium orthostichum* possesses ovate leaves with strongly bulging upper laminal cells while



*M. lanceolatum* differs by the lanceolate acute branch leaves with flatter upper laminal cells. Additional specimens of *M. lanceolatum* need to be examined before the taxonomic status of this species can be determined. Both taxa belong to the distinct *Macromitrium* subg. *Cometium*, which is discussed by Wilbraham (2007).

#### Specimens examined

##### ***Macromitrium lanceolatum* Broth.**

RÉUNION: *Rodrigues s.n.* (S – B63459).

##### ***Macromitrium orthostichum* Nees ex Schwägr.**

RÉUNION: Plaine des Palmistes, sous le village La Plaine des Palmistes, 28 December 1973, *De Sloover 17.826* (BR-BRYO 273490-47). Forêt Domaniale de Bras Panon, at the “Site touristique d’Eden”, a former tree plantation, 12 November 1998, *Arts RÉU102/162* (BR-BRYO 318275-18).

##### ***Macromitrium belangeri* Müll. Hal.**

*Macromitrium belangeri* is considered endemic to Réunion Island. The type material (Réunion Island, *Belanger 4*, in herb. C. Müller) was probably destroyed with Müller’s herbarium in Berlin, and extant material associated with Müller’s protologue of *M. belangeri* (Müller, 1862) has not been located. However, his original description of the species suggests a close affinity with *M. sulcatum*. In particular, Müller (1862) refers to the denticulate leaf apex and tuberculate basal cells typical of *M. sulcatum*. It is very likely these two names are synonymous.

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## APPENDIX

### List of taxa in *Calymperes*, *Syrrhopodon* and *Macromitrium* known from Réunion Island. Modified from Ah-Peng & Bardat (2005) and Ellis & Wilbraham (2008).

**Bold print** = currently accepted name

**E** = Taxa considered endemic to Réunion Island

#### CALYMPERES (Calymperaceae)

*Calymperes afzelii* Sw.

*C. erosum* Müll. Hal.

*C. graeffeanum* Müll. Hal.

*C. hispidum* Renaud & Cardot

*C. palisotii* Schwägr.

*C. pallidum* Mitt. (new to Réunion)

*C. taitense* (Sull.) Mitt. subsp. *pachyloma* (Hampe) L. T. Ellis

*C. tenerum* Müll. Hal.

#### SYRRHOPODON (Calymperaceae)

*Syrrhopodon africanus* (Mitt.) Paris subsp. *africanus*

*S. apertifolius* Besch.

*S. armatus* Mitt. subsp. *insularum* (Bizot & Onr.) Orbán & W. D. Reese

*S. dimorphophyllus* L. T. Ellis (new to Réunion)

*S. flexifolius* Mitt. subsp. *reunionensis* L. T. Ellis (**E**)

*S. hispidocostatus* Renaud & Cardot subsp. *hispidocostatus*

*S. hispidocostatus* Renaud & Cardot subsp. *artsii* L. T. Ellis (**E**)

*S. gardneri* (Hook.) Schwägr.

*S. gaudichaudii* Mont.

*S. involutus* Schwägr.

*S. mahensis* Besch.

*S. mauritanus* Müll. Hal. ex Ångstr.

*S. parasiticus* (Brid.) Paris

*S. pottioides* Orbán

*S. vardei* L. T. Ellis (new to Réunion)

## MACROMITRIUM (Orthotrichaceae)

*Dasymitrium borbonicum* Besch. = *Macromitrium microstomum*

*Macromitrium astroideum* Mitt. = *M. serpens*

***M. chloromitrium*** (Besch.) Wilbraham

*M. fasciculare* Mitt. var. *fasciculare* = *M. microstomum*

*M. fasciculare* Mitt. var. *angustifolium* P. de la Varde = *M. microstomum*

*M. fasciculare* Mitt. var. *javense* M. Fleisch. = *M. microstomum*

***M. fimbriatum*** (P. Beauv.) Schwägr.

*M. fimbriatum* (P. Beauv.) Schwägr. var. *chloromitrium* Besch. ≡ *M. chloromitrium*

***M. lanceolatum*** Broth.

***M. mauritianum*** Schwägr.

*M. mauritianum* Schwägr. var. *viride* Broth. = *M. mauritianum*

***M. microstomum*** (Hook. & Grev.) Schwägr. (new to Reunion)

***M. orthostichum*** Nees ex Schwägr.

***M. pallidum*** (P. Beauv.) Wijk & Margad.

*M. rhizomatosum* Müll. Hal. ex Besch. = *M. mauritianum*

***M. serpens*** (Hook. & Grev.) Brid.

*M. subpungens* Hampe ex Müll. Hal. = *M. mauritianum*

*M. subpungens* Hampe ex Müll. Hal. var. *madagassum* Cardot. = *M. mauritianum*

***M. sulcatum*** (Hook.) Brid.

*M. voeltzkowii* Broth. = *M. pallidum*

**Taxa newly excluded from the moss flora of Réunion Island:**

*Calymperes taitense* (Sull.) Mitt. subsp. *taitense*

*Syrrhopodon albidus* Thwaites & Mitt. subsp. *integrifolius* (E. B. Bartram) L. T.

Ellis (= *S. prolifer* var. *seychellarum* Orbán)

*S. asper* Mitt.

*S. crenulatus* Mitt.

*S. prolifer* Schwägr.

*Macromitrium belangeri* Müll. Hal.