VERSITA

Polish Botanical Journal 58(1): 237–243, 2013
DOI: 10.2478/pbj-2013-0024

BRACHYMENIUM REGNELLII AND *BRYUM LEPTOTORQUESCENS* (BRYACEAE) NEW TO SURINAME

BRUCE ALLEN

Abstract. The previously Brazilian endemic species, *Brachymenium regnellii* Hampe, has been found in Suriname. It is a member of sect. *Rostrata* Ochi, distinguished from all other members of that section in Suriname by its percurrent costae. *Brachymenium* Schwägr. is characterized by the sporophytic features of: erect to suberect capsules; conic-apiculate to short-beaked opercula; and diplolepideous peristomes with narrow, densely papillose exostome teeth and greatly reduced endostomes. *Bryum leptotorquescens* Müll. Hal *ex* Broth., previously known from Mexico to western South America, and tropical Africa is reported from Suriname. It differs from other similar mosses in Suriname by the combination of weakly developed leaf borders; strongly decurrent leaves; and costae in cross section with well-developed stereid bands. *Bryum billarderei* Schwägr. is the correct spelling of that often mis-spelled name.

Key words: *Brachymenium*, *Bryum*, *Bryum billarderei*, Kayserberg airstrip, Zuid River, Eilerts De Haan Gebergte.

Bruce Allen, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299, U.S.A; e-mail: bruce.allen@mobot.org

INTRODUCTION

The moss flora of Suriname was continuously studied by Peter Florschütz and Jean Florschütz-de Waard since near the middle of the last century (Florschütz 1964; Florschütz-de Waard 1986, 1996). A summation of this work has now been published (Florschütz-de Waard 2011). This excellent treatment represents a significant contribution to the study of bryology in the Neotropics. Nevertheless, this work was principally based on mosses gathered from relatively few collection localities. One reason for this is that the forests of Suriname – away from a fairly narrow coastal band – are astoundingly intact; there are very few roads into the interior and almost no roads in the southern half of the country. Accessing this immense southern region can only be done along river ways or by cutting trails from a few remote, grassy airstrips. Vast areas of Suriname remain completely unexplored. It is abundantly clear that despite the recent publication of the moss flora of the Guianas (Florschütz-de Waard 2011) there are many species still to be discovered in Suriname. Most of the mosses now known from Suriname are Caribbean, northern South American, or pantropical in distribution. As a result many of these new Suriname mosses will likely be Brazilian species because of the proximity of the two countries and the fact that the areas of Suriname closest to Brazil are those least collected areas of the country. This paper reports two moss species new to Suriname and the Guianas: one with Brazilian affinities; the other exhibiting a northern South American relationship.

For many years – between mid-1990 and early 2000 – the Missouri Botanical Garden maintained a field person (Dr. Randall Evans) in Paramaribo, Suriname. His principal task was to collect vascular plants to be later tested for biological activity. During this time Dr. Evans also organized many general botanical collecting expeditions to the interior of Suriname. These collecting trips often focused on Tafelberg, the easternmost of the Guayana tepuis. In May–June, 2003 a trip was organized to the Kayserberg airstrip near the Zuid River in southern Suriname. In addition to collecting near the airstrip and along the Zuid River a cut-trail was made to Eilerts De Haan Gebergte, two days walk from the airstrip.

Results

Brachymenium regnellii Hampe Fig. 1

Linnaea 22: 582. 1849. Protologue. [Brasiliae provincia Minarum prope Caldas. *A. Regnell*,] *375*.

Plants medium-sized, green to yellowish green in loose, glossy tufts. Stems 7–15 mm high, erect with rectangular superficial cells, terete-foliate, sparsely and irregularly branched, densely tomentose at base; stems in cross section with 1–2 rows of small, thick-walled outer cells, cortical cells enlarged, firm-walled, central strand present; axillary hairs 4–6 cells long, basal 2–3 cells subrectangular, light reddish, upper 2–3 cells cylindrical, hyaline; macronema rhizoidal initials clustered around branch primordia, micronema rhizoidal initials scattered on stems; rhizoids densely branched, reddish brown, papillose. Leaves evenly spaced leaves, reduced below, large above, erect-flexuose, crisped to twisted-contorted when dry, erect-spreading when wet, oblong-lanceolate, 1.4–2.0 mm long, symmetric to asymmetric, concave, short-acuminate, decurrent; margins plane above, narrowly recurved at base, serrulate above, entire below, bordered by 1–2 rows of linear, thick-walled cells; costae percurrent; cells smooth; apical and median cells rhomboidal-hexagonal, thin-walled, 40–100 × 12–20 μm, basal cells quadrate to short-rectangular. Dioicous. Sporophytes not present, description from *Mosén s.n.*, Brazil, MO. Setae 12–16 mm long, smooth, red. Capsules erect, oblong-cylindrical, 3–4 mm long, smooth or slightly wrinkled when dry, constricted at neck; exothecial cells oblong to subquadrate, firm-walled; stomata on neck; opercula obliquely short-rostrate, 0.5–1.0 mm long; annuli compound and revoluble; exostome teeth long-linear, reddish at base, yellowish above, densely papillose, sometimes perforate along the median line; endostome whitish, papillose, basal membranes ⅓ the exostome teeth length, segments rudimentary, stub-like, cilia rudimentary or absent. Spores spherical, 10–12 μm, smooth. Calyptrae cucullate, 2.5–2.0 mm long, pale-yellow, naked.

Specimens examined: SURINAME. Sipaliwini: Eilerts De Haan Gebergte, along trail to and around the mountain summit, 3°09′49″N, 56°27′41″W, 739 m, 20–21 June, 2003, *Allen 25495* (MO).

Illustrations. Ochi (1980, fig. 13). Fig. 1 A–F.

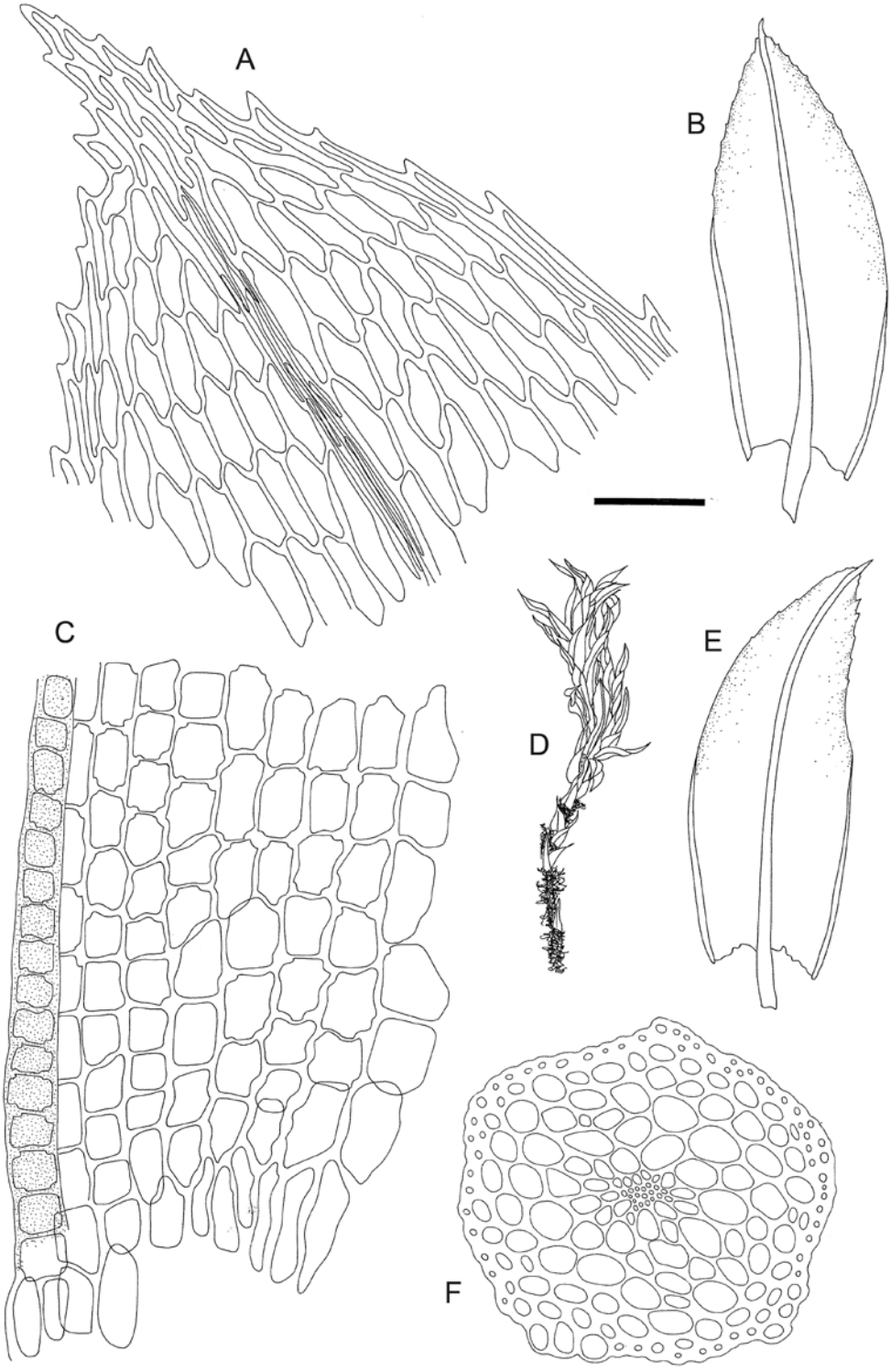
World range: Northern South America, Brazil.

Brachymenium Schwägr. is a mostly tropical/subtropical genus of about 60 species (Ochi 1992). Nearly all *Brachymenium* species have hexagonal to rhomboidal upper leaf cells and many of the species also have quadrate basal leaf cells. *Brachymenium regnellii* is a medium-sized species with evenly spaced leaves that are reduced below and large above; oblong-lanceolate, often asymmetric leaves that are erect-flexuose to twisted-contorted when dry; large upper leaf cells, 40–100 × 12–20 μm; and quadrate basal cells.

The Suriname collection of *Brachymenium regnellii* did not have sporophytes, but the collection was favorably compared to a Brazilian collection (Minas Geraes: Caldas, *Mosén s.n.*, MO) of the species cited by Ochi (1980). This collection had abundant sporophytes; the above sporophytic description represents the first complete description of that structure. The presence in *B. regnellii* of long-beaked opercula, long-linear exostome teeth, and endostome with short basal membranes place it in *Brachymenium* sect. *Rostrata* Ochi. There are three other members of that section in Suriname: *B. speciosum* (Hook. & Wilson) Steere, *B. wrightii* (Sull.) Broth., and *B. klotzschii* (Schwägr.) Paris. All three species differ from *B. regnellii* in having excurrent costae. *Brachymenium speciosum* also differs in having leaves bordered by 3–4 rows of linear cells; upper leaf margins usually doubly serrate; and rectangular basal leaf cells. *Brachymenium wrightii* further differs from *B. regnellii* in having orbicular to broadly obovate-oblong leaves with

→

Fig. 1. *Brachymenium regnellii* Hampe: A – leaf apex, B & E – leaves, C – basal leaf cells and alar region, D – habit, F – stem in cross section. Scale in mm: bar = 0.06 (A & C); bar = 0.08 (F); bar = 0.5 (B & E); bar = 1.96 (D). All from *Allen 25495* (MO).


A
B
C
D
E
F

rectangular basal cells. *Brachymenium klotzschii* is similar to *B. regnellii* in having quadrate basal leaf cells. But, in addition to its stoutly long-excurrent costae it differs in having spirally contorted leaves bordered by narrow, rectangular cells with more or less right-angled end-walls, and leaf margins narrowly reflexed in the lower ⅔ of the leaf.

Brachymenium is a sporophyte-based genus with erect to suberect capsules and conic-apiculate to short-beaked opercula. Its peristome is diplolepideous with narrow, densely papillose exostome teeth, and greatly reduced endostomes. The *Brachymenium* endostome has a high or low basal membrane with the segments and cilia generally rudimentary to absent. When the segments and cilia are rudimentary, they are morphologically identical and as such the two structures can be identified only by their position relative to the exostome teeth. The genus has been divided into five sections (Ochi 1992) based on features such as plant size, operculum shape, capsule shape and size, spore size, limbate condition of the leaves and peristome structure. The sections, however, have species with reticulating character combinations that often makes it difficult to separate them. Some bryologists have now elevated the sections to generic level. But, an overall analysis of the genus within the context of an in-depth character analysis for the Bryaceae as well as extensive molecular studies are needed before a more natural generic classification for the group can be reasonably proposed.

Bryum leptotorquescens Müll. Hal. *ex* Broth.

Fig. 2

Bot. Jahrb. Syst. 24: 246. 1897. Protologue. Kamerun: an Felsen in Bächen bei Buea (DUSÉN n. 208).

Plants medium-sized to robust, green to yellowish green, in loose, glossy tufts. Stems 13–30 mm high, erect with rectangular superficial cells, evenly-foliate or weakly rosulate, sparsely and irregularly branched, densely tomentose at base; stems in cross section with 1–2 rows of small, thick-walled outer cells, cortical cells enlarged, firm-walled, central strand present; axillary hairs 5–6 cells long, basal cell subrectangular, light reddish, upper 4–5 cells cylindrical, hyaline; macronema rhizoidal initials clustered around branch primordia, micronema rhizoidal initials scattered on stems, at times in short, uniseriate rows; rhizoids densely branched, reddish brown, papillose. Lower leaves distant and reduced. Upper leaves crowded, spirally twisted to spreading flexuose when dry, erect-spreading when wet, oblong to broadly spathulate, 2.5–4.0 mm long, symmetric, concave, acuminate, long-decurrent; margins recurved in lower ½, serrate above, entire below, indistinctly bordered by 2–4 rows of linear, thick-walled cells; costae subpercurrent to shortly excurrent, in cross section with strongly developed dorsal stereid bands; cells smooth; apical and median cells rhomboidal-hexagonal, thin-walled, 30–70 ×10–20 μm; basal cells thin-walled, lax, broadly rectangular, 40–100 μm long. Pseudautoicous. Sporophytes not present; description from Ochi (1994). Male plants 1–2 mm high, on the tomentum of female stems. Setae 2 cm long. Capsules pendulous, oblong-pyriform, neck short and slender; opercula nearly hemispheric, apiculate; endostome with a low basal membrane, narrowly perforate segments, and well-developed, appendiculate cilia. Spores to 20 μm, roughened.

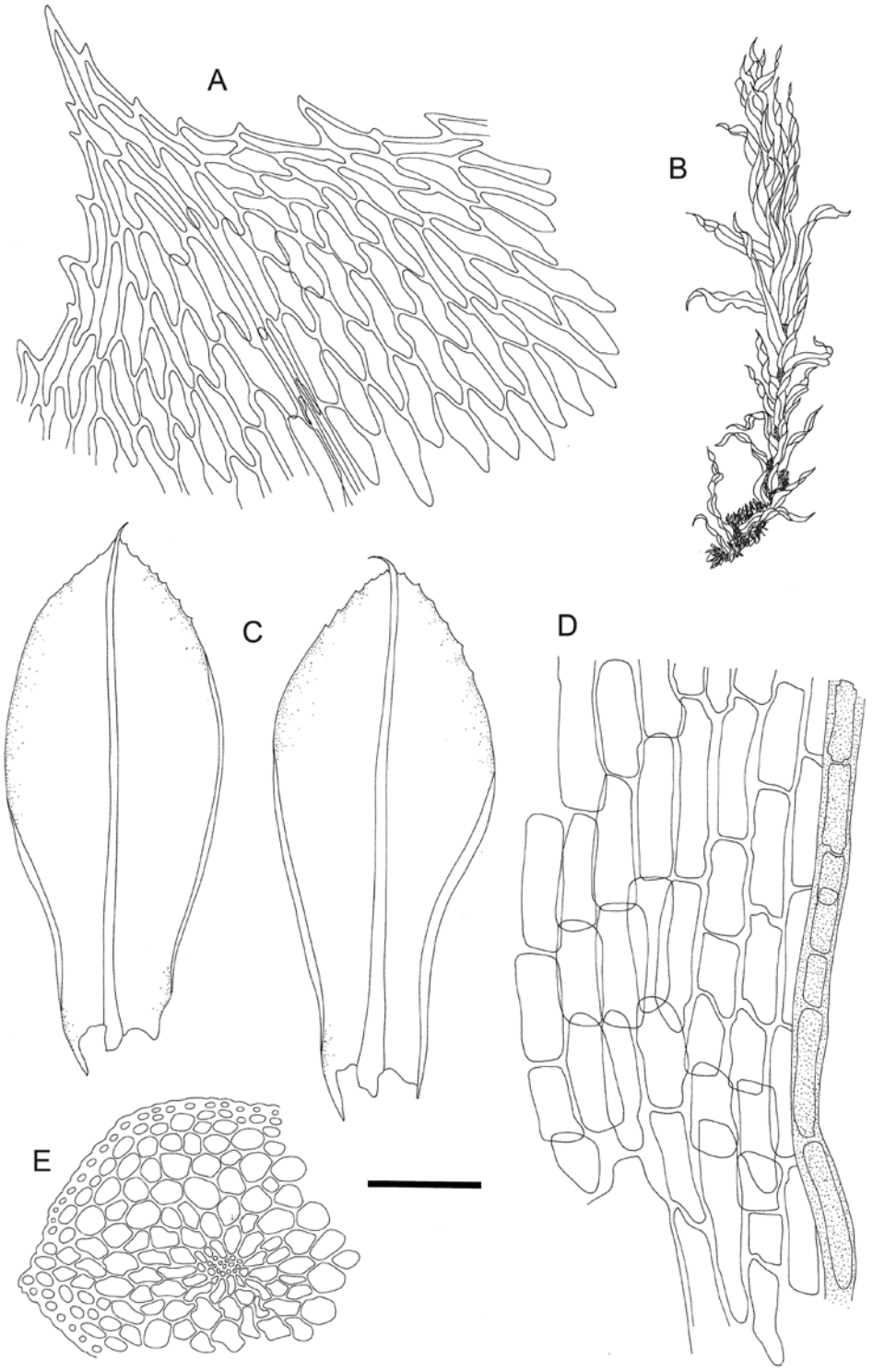
SPECIMENS EXAMINED: SURINAME. SIPALWINI: hill northeast of Kayserberg airstrip, in savanna near and on summit, 3°08′24″N, 56°27′24″W, 285–300 m, 5 June, 2003, *Allen 25271* (MO).

ILLUSTRATIONS. Williams (1916, pl. 20, as *Bryum biforme* R. S. Williams); Thériot (1928, fig. 5, as *Bryum sublimbatum* Thér.); Ochi (1972, fig. 49); Ochi (1977, fig. 6); Sharp *et al.* (1994, fig. 367 j–m); Allen (2002, fig. 147 E–G). Fig. 2 A–E.

WORLD RANGE: Mexico; Central America; Western and Northern South America; West-Central and South Tropical Africa.

→

Fig. 2. *Bryum leptotorquescens* Müll. Hal. *ex* Broth.: A – leaf apex, B – habit, C – leaves, D – basal leaf cells and alar region, E – stem in cross section. Scale in mm: Scale in mm: bar = 0.06 (A & D); bar = 0.08 (E); bar = 0.6 (C); bar = 1.96 (B). All from *Allen 25271* (MO).


A
B
C
D
E

Bryum leptotorquescens is a large moss with a weakly rosulate to evenly foliate habit. Its leaves are spirally twisted to contorted when dry and often do not completely flatten out when wetted. It has long-decurrent leaves with serrate margins that are more or less indistinctly bordered by several rows of linear, thick-walled cells. The large leaf cells are thin-walled throughout: rhomboidal-hexagonal above; laxly rectangular below. The costae vary from shortly excurrent to subpercurrent and in cross section have strongly developed dorsal stereid bands. In Suriname the only species likely to be confused with *B. leptotorquescens* are *B. billarderei* Schwägr. or *Rhodobryum beyrichianum* (Hornsch.) Müll. Hal. *ex* Hampe. *Bryum billarderei* differs from *B. leptotorquescens* in having strongly rosulate plants; better developed leaf borders (2–6 vs. 2–4 rows of cells); non-decurrent leaves; and often axillary clusters of reddish brown, papillose, rhizoid-like filaments. There has been considerable confusion over the spelling of the name *billarderei* (see, Allen 2002, p. 336). Article 60.1, Ex. 1 of the Code of Nomenclature (McNeill *et al*. 2012) indicates the 'i' between the 'd' and 'e' in de la Billardière should be dropped; Article 60.7 stipulates that 'ei' is the correct termination for the name. *Rhodobryum beyrichianum* is a robust moss with plants that can reach 8 cm in height. Its leaves are considerably larger than those of *B. leptotorquescens* (8–12 vs. 2.5–4.0 mm long) and while its costae in cross section sometimes have ventral substereids there are no dorsal stereid cells.

Bryum Hedw. is a large genus with incredibly variable gametophytes. It is taxonomically difficult due to its often small size and generally non-descript (often peristomial), technical characters. Adding to the difficulty, leaves taken from different parts of single plants may have dissimilar morphologies and character states. The *Bryum* peristome in its best development is perfect. Although some diplolepideous mosses in the Mniaceae and Hylocomiaceae exhibit equally perfect peristomes, none is better developed. Plants in *Bryum* often have a rosette growth form with the upper leaves larger and better developed than the lower leaves. But, this growth form in *Bryum* is extremely variable in expression; in some species the feature is sometimes present, other times absent. The weakly rosulate stems of *Bryum leptotorquescens* place the species into *Bryum* sect. *Capillaria* Spruce subsect. *Rosulata* (Müll. Hal.) Broth. (Ochi 1992). This subsection (along with subsect. *Capillaria*) has recently been recognized at the generic level as *Rosulabryum* J. R. Spence (Spence 1996). Although within *Bryum* groups of seemingly related forms can sometimes be recognized '.... a clear division into subgenera or sections is not indicated.' (Andrews 1940).

References

Allen B. 2002. Moss Flora of Central America. Part 2. Encalyptaceae–Orthotrichaceae. *Monogr. Syst. Bot. Missouri Bot. Gard*. **90**: 1–699.

Andrews A. L. 1940. *Bryum*. In: A. J. Grout (ed.), *Moss Flora of North America North of Mexico* **2**(4): 211–240. Published by the author, Newfane, Vermont.

Florschütz P. A. 1964. Musci: In: J. Lanjouw (ed.), *Flora of Suriname* **6**(1): 1–271. E. J. Brill, Leiden.

Florschütz-De Waard J. 1986. Musci (Part II). *In* A. L. Stoffers & J. C. Lindeman (eds), *Flora of Suriname* **6**(1): i–x, 273–361. E. J. Brill, Leiden.

Florschütz-De Waard J. 1996. Flora of the Guianas, Series C, Bryophytes. Musci **3**: [i–ii], 363–490. E. J. Brill, Leiden.

Florschütz-De Waard J. 2011. Flora of the Guianas, Series C, Bryophytes Fascicle 2. Musci **4**: [i–iv], 1–423. E. J. Brill, Leiden.

McNeill J, Barrie F. R., Buck W. R., Demoulin V., Greuter W., Hawksworth D. L., Herendeen P. S., Knapp S., Marhold K., Prado J., Prud'Homme van Reine W. F., Smith G. F., Weirsema J. H. & Turland N. J. 2012. International Code of Nomenclature for algae, fungi, and plants (Melbourne Code). *Regnum Veg*. **154**: [i]–xxx, 1–208.

Ochi H. 1972. A revision of African Bryoideae, Musci (First Part). *J. Fac. Educ. Tottori Univ.*, *Nat. Sci.* **23**: 1–26.

Ochi H. 1977. Central and South American bryaceous mosses, new to science or of geographical significance. *J. Fac. Educ. Tottori Univ.*, *Nat. Sci.* **27**: 33–41.

Ochi H. 1980. A revision of the Neotropical Bryoideae, Musci (First Part). *J. Fac. Educ. Tottori Univ.*, *Nat. Sci.* **29**: 49–154.

Ochi H. 1992. A revised infrageneric classification of the genus *Bryum* and related genera (Bryaceae, Musci). *Bryobrothera* **1**: 231–244.

OCHI H. 1994. *Bryum* and *Brachymenium*. In: A. J. SHARP, H. CRUM & P. M. ECKEL (eds), *The Moss Flora of Mexico*. *Mem. New York Bot. Gard.* **69**: 454–501.

SHARP A. J., CRUM H. & ECKEL P. M. (eds). 1994. Moss flora of Mexico. *Mem. New York Bot. Gard.* **69**: i–x, 1–1113, I–XVII.

SPENCE J. R. 1996. *Rosulabryum* genus novum (Bryaceae). *Bryologist* **99**: 221–225.

THÉRIOT I. 1928. Mexican mosses collected by Brother Arsène Brouard – II. *Smithsonian Misc. Collect.* **81**(1): 1–26.

WILLIAMS R. S. 1916. Peruvian Mosses. *Bull. Torrey Bot. Club* **43**: 323–334.

Received 29 April 2013