

On the Identity of *Pterygoneurum macleanum* and *P. kemsleyi* (Pottiaceae, Musci)

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Abstract. *Pterygoneurum macleanum* Warnstorf and *P. kemsleyi* Willis, two taxa with austral distribution, from South Africa and Australia, respectively, are identical in all taxonomical characters. Phytogeographical considerations are offered.

Pterygoneurum kemsleyi and *P. macleanum* were described by Willis (1954) and Warnstorf (1916), respectively. The first is found exclusively in the Australian continent and the second in South Africa. Both taxa present a set of characters that are not found together in other species of the genus. The leaves have margins which are strongly involute to incurvate from the apex to the middle; the apex is cucullate and without a hyaline hair point, and the costa is excurrent in a more or less long mucro. In our opinion these taxa have been treated as independent species because no comparative study has ever been carried out on them. Nevertheless, Willis (1954) referred to a possible relationship between *P. kemsleyi*, which he described, and Warnstorf's South African species. Although Willis, as he remarked, was unable to study a sample of *P. macleanum*, he defended the independence of his taxon on the basis of the following characters of *P. macleanum*: "a rugose capsule," "no protonemal outgrowths on the leaf lamellae," and "excurrent nerve," characters not present in *P. kemsleyi*.

A careful study of the scarce available material of both taxa shows that these characters are not exclusive to *P. macleanum*. Capsule rugosity is a character without taxonomical value in the genus, and may refer to its dry appearance which is similar to that when dry in *P. kemsleyi*. Also, we have confirmed that the supracostal lamellae of *P. macleanum* can bear filaments, although they are not as frequent and conspicuous as in *P. kemsleyi*. Perhaps this is why it has been overlooked by some authors (cf. Magill 1981; Zander 1993). These filaments are relatively frequent in the lower leaves and less frequent in perichaetial leaves. An excurrent nerve is the other variable character in both taxa, fluctuating from mucronate to strongly excurrent in a yellowish short hair and never forming a hyaline hair point as in the other species of the genus (e.g., *P. ovatum*, *P. subsessile*).

The filaments, which are present on both sides of the lamellae, are identical in both taxa; they are generally short, formed by 2–3 subspherical cells with 3–6(–8) simple or furcate papillae.

In addition, the spore size and sculpturing are surprisingly similar in both taxa. The perine is made up of a basal layer of densely arranged granula (not larger than 0.9 μm diam.) and, overlying this, larger processes offer either a sparse or dense pattern. It must be added that this spore type does not appear in any other species of the genus, although it is remarkably similar to that of *Phascum cuynetii* Biz. & Pier. ex Guerra et al. (cf. Carrión et al. 1990).

Consequently we think this is a clear case of specific identity, which has probably been overlooked owing to the scarcity of herbarium material of both taxa and absence of a comparative study.

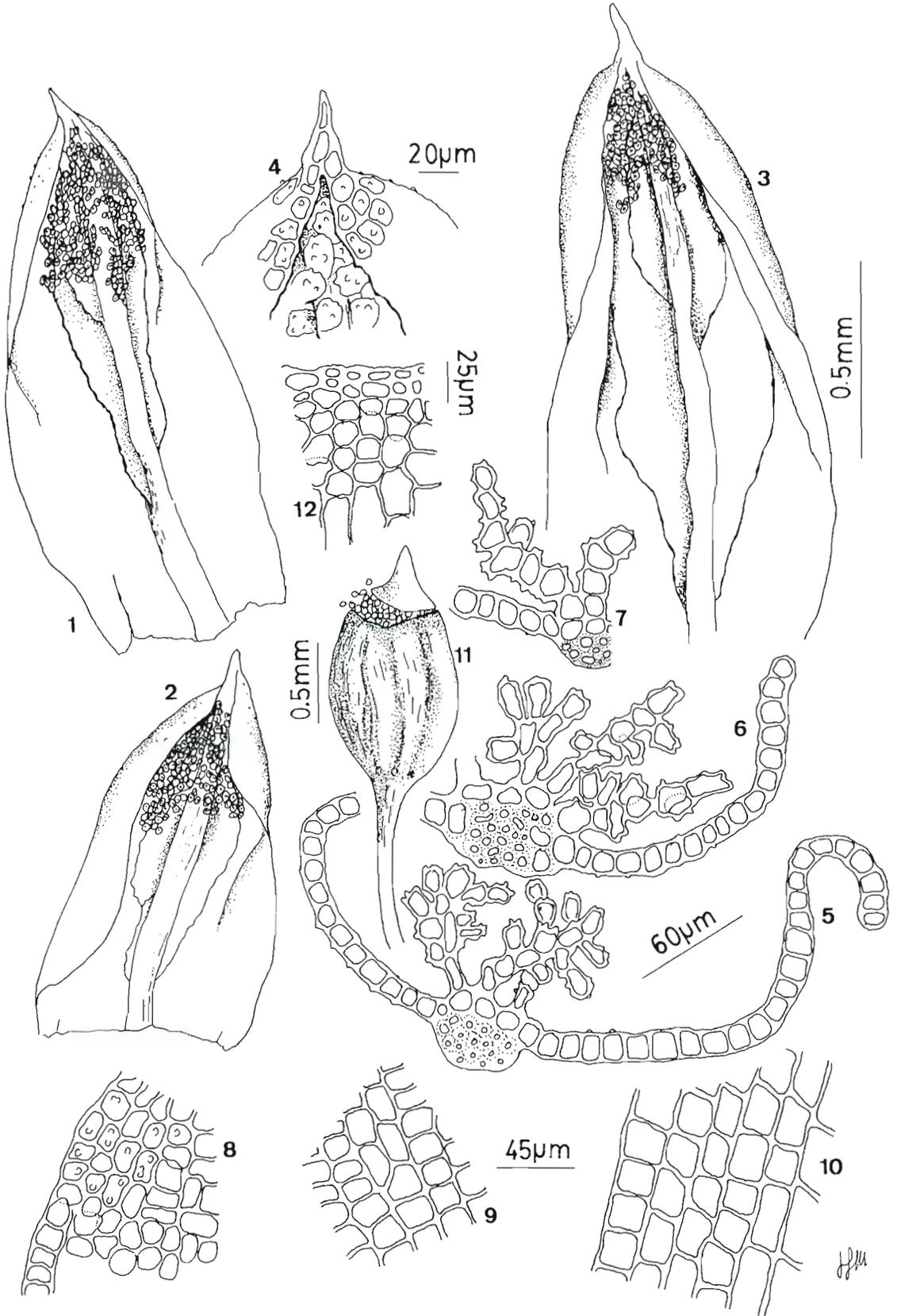
PTERYGONEURUM MACLEANUM Warnst., Hedwigia 58: 69. 1916. (FIG. 1–20)

TYPE: SOUTH AFRICA. Terra Capensis orientalis in aperti circa Graaf Reynett, *MacLea* (lectotype, designated here, BM!; isolectotypes, designated here, B!, PRE!).

Pottia macleai Rehm. in Kindb., Enum. Bryin. Exot. 94. 1889, nom. nud. *Pottia macleana* Rehm. in Par., Ind. Bryol. (Musci austro-africani cent. 461.) 1026. 1898, nom. nud.

Pterygoneurum kemsleyi Willis, Victorian Naturalist 71: 9. 1954. **TYPE:** AUSTRALIA. WESTERN AUSTRALIA. Feysville, 15 miles SE of Kalgoorlie, on bare red loam, 8. September 1951, *Kemsley* (lectotype, designated here, MEL!; isolectotypes, designated here, FH!, WEL!).

Plants bulbiform, sometimes forming small turfs, dark to light green, brown below; terricolous or terrisaxicolous; stem 2–5 mm high, simple, rarely branched; in section circular, without central strand; inner cortical cells in 8–10 rows, with thin and hyaline walls; outer cortex cells in 3–4 rows, walls thickened and brownish; leaves incurved or contorted in upper part of stem when dry, erect to erect-



patent when moist, obovate to narrowly oblong, 0.8–1(–1.5) mm long, 0.3–0.5(–0.8) mm wide; apex obtuse, margins entire, strongly involute to incurvate from apex to midleaf, slightly recurved or plane below; costa shortly excurrent to mucronate, sometimes with a yellowish hair to 240 μm long; in cross section rounded above and elliptical below; ventral superficial cells in single layer of 2–4(–5) cells, dorsal sterid band of 2–4 layers of thickened cells, brown or dark green; dorsal superficial cells long rectangular, 60–70 \times 3–8 μm , strongly incrassate, ventral superficial cells slightly rectangular or quadrate, 10–30 \times 15–30 μm ; ventral surface of costa with 2–3(–4) lamellae of variable height, to 15–20 cells high, generally papillose, short filaments—2–3 cells long—arising from both sides of lamellae on upper part of leaves; terminal cells of filaments spherical, with 3–6(–8) furcate papillae, filaments and lamellae forming a dense cushion toward apex of younger leaves; cells in upper half of leaves quadrate, 14–20 μm ; paracostal basal cells quadrate, 20–25 μm , or short-rectangular, 35–40 \times 15–20 μm ; basal marginal cells quadrate, 10–15 μm , or elongated transversely, 15–20 \times 30–35 μm . Autoicous; perigonia small, on base of perichaetial branches; perichaetial leaves undifferentiated. Seta straight, 1–3(–4) mm long, yellowish or reddish; capsule ovoid to subglobose, striate when dry, 0.5–1 mm long, exothecial cells irregularly rectangular, to 250 μm long, stomata superficial at extreme base of capsule; peristome lacking; operculum rostrate, 0.4–0.5 mm long; calyptra cucullate, 0.5–0.6 mm long; spores 29–43 μm diam., perine composed of a basal layer of granula (0.08–0.9 μm) and, overlying this, sparse or dense irregularly arranged larger processes (up to 2 μm).

Pterygoneurum macleanum is known from the semiarid South African shrublands of the Central Cape Province (cf. Magill 1981 p. 198 and map 3), and in Australia (under *P. kemsleyi*) from the states of Western Australia, South Australia, Victoria, and New South Wales in arid to semiarid environments (cf. Catcheside 1980; Scott et al. 1976). This species

presents a typical distribution pattern of the xerophytic taxa related to the Permo-Triassic continental Pangaeian range. Mainly taxa of the Marchantiales (cf. Schuster 1981, 1983), Ricciales, and Pottiales belong to this distribution pattern. The present known distribution of many genera of Pottiaceae, such as *Crossidium*, *Aloina*, *Acaulon* (subg. *Alaticosta*), *Pterygoneurum* (cf. Cano et al. 1993; Delgadillo 1975; Herzog 1926) indicates their origin in the ancient Xerothermic Pangaeian and Circum-Tethyan ranges (cf. Frey & Kürschner 1988a). Nevertheless, morphologically and ecologically these taxa are highly differentiated. They possess filaments of lamellae on the adaxial surface of the nerve, and functionally they can be compared with the thallus structure of the Marchantiidae and probably originated by a parallel evolution; these gametophytic structures—Xeropottioid and Xerothalloid life syndromes, sensu Frey and Kürschner (1988a)—enabled the progenitors of these groups to colonize the arid areas of Pangaea continent. The actual distribution of *P. macleanum*, occurring in austral arid or semiarid areas, allows us to expect future records in other similar areas on the world. This is the case of *Crossidium geheebii* (Broth.) Broth. (Frey & Kürschner 1988b) or *Trichostomopsis trivialis* (C. Müll.) Robins. (Frey & Kürschner 1993).

Other samples studied.—As *P. kemsleyi*: AUSTRALIA. Victoria Boundary Bend, Swan Hill, 19.71969, Stone (herb, I.G. Stone).

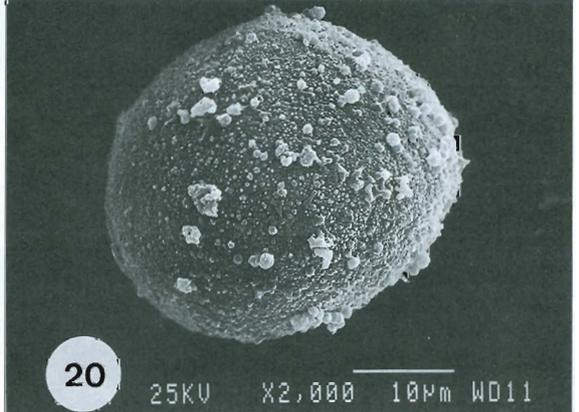
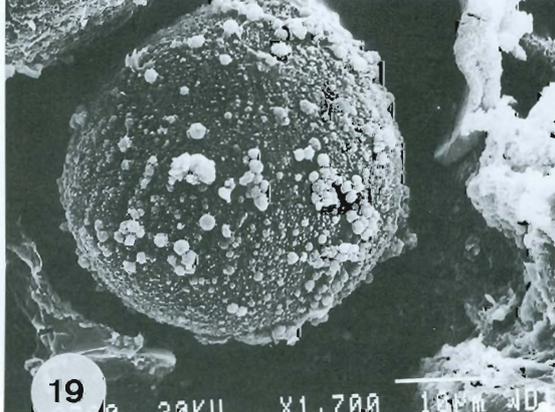
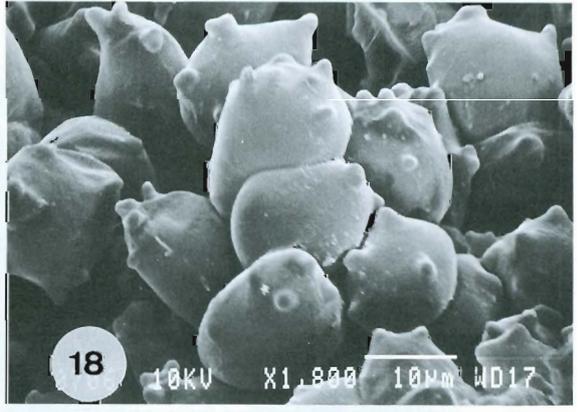
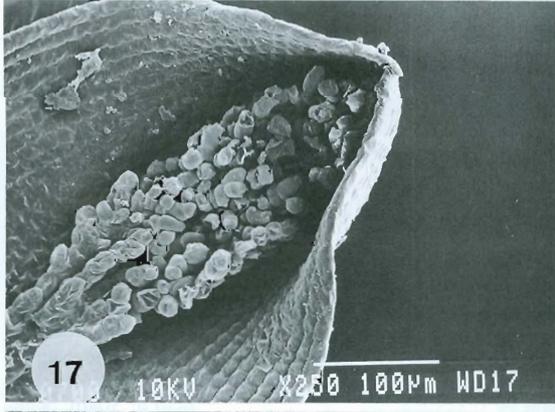
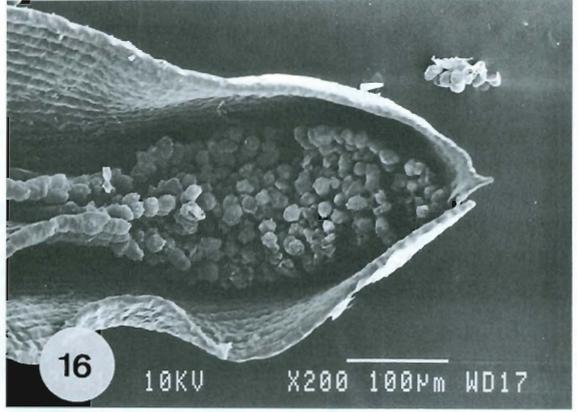
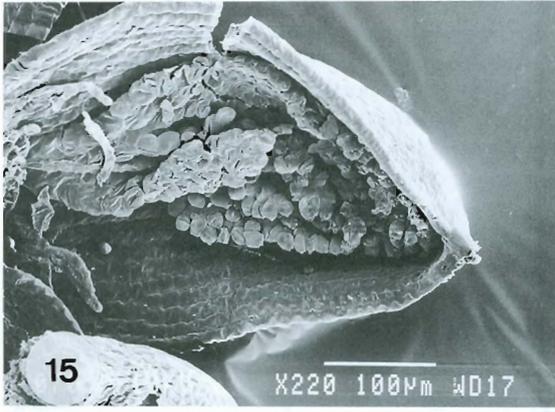
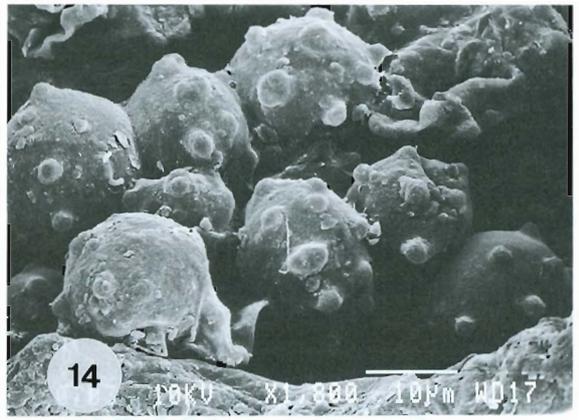
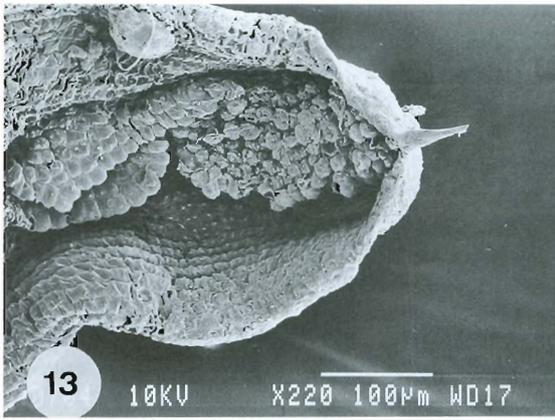
As *P. macleanum*: SOUTH AFRICA. TRANSVAAL. Milledersfarm, *Maclea* (BM). Cape, Beaufort West distr., farm Aardoorns, on ridge near farmhouse, Retief & Reid (PRE); 22 Km from Britstown at Smartt Syn. Dam, Karro Veld, growing in shade of rocks in seepage area from dam, Magill (PRE).

ACKNOWLEDGMENTS

We thank Dr. J. S. Carrión for his help with the SEM and the curators of the herbaria consulted for the loan of material. This work was carried out as a part of the Project PB93-1141, subsidized by the DGICYT (Dirección General de Investigación Científica y Técnica) of Spain.

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FIGURES 1–12. *Pterygoneurum macleanum*. — 1–3. Leaves. — 4. Leaf apex. — 5–7. Leaf cross sections. — 8. Upper cells from leaf. — 9. Median cells of leaf. — 10. Basal cells of leaf. — 11. Capsule. — 12. Cells from mouth of capsule. (1–2, 4, 6–10 from lectotype of *P. kemsleyi* in MEL; 3, 5, 11–12 from Retief & Reid 133 in PRE).



LITERATURE CITED

- CANO, M. J., J. GUERRA & R. M. ROS. 1993. A revision of the moss genus *Crossidium* (Pottiaceae) with the description of the new genus *Microcrossidium*. *Plant Systematics and Evolution* 188: 213–235.
- CARRIÓN, J. S., J. GUERRA & R. M. ROS. 1990. Spore morphology of the European species of *Phascum* Hedw. (Pottiaceae, Musci). *Nova Hedwigia* 51: 411–433.
- CATCHESIDE, D. G. 1980. Mosses of South Australia. Government Printer. South Australia.
- DELGADILLO M. C. 1975. Taxonomic revision of *Aloina*, *Aloinella*, and *Crossidium* (Musci). *THE BRYOLOGIST* 78: 245–303.
- FREY, W. & H. KÜRSCHNER. 1988a. Bryophytes of the Arabian Peninsula and Socotra. Floristics, phytoecology and definition of the Xerothermic Pangaeen element. *Studien in Arabian bryophytes* 12. *Nova Hedwigia* 46: 37–120.
- & ———. 1988b. Re-evaluation of *Crossidium geheebii* (Broth.) Broth. (Pottiaceae) from Sinai, a xerothermic Pangaeen element. *Journal of Bryology* 15: 123–126.
- & ———. 1993. *Trichostomopsis trivialis* (C. Müll.) Robins. (Pottiaceae, Musci) eine südafrikanisch-mediterran disjunkte Sippe, neu für die Bryoflora Jordaniens. *Cryptogamic Botany* 3: 152–156.
- HERZOG, T. 1926. *Geographie der Moose*. Jena.
- MAGILL, R. E. 1981. Bryophyta part I. Mosses. Fasc. I. Sphagnaceae–Grimmiaceae. In O. A. Leistner (ed.), *Flora of Southern Africa*. Pretoria.
- SCHUSTER, R. M. 1981. Paleoecology, origin, distribution through time, and evolution of Hepaticae and Anthocerotae, pp. 129–191. In K. J. Niklas (ed.), *Paleobotany, Paleoecology, and Evolution.*, Vol. 2. New York.
- . 1983. Phytoecology of Bryophyta, pp. 463–626. In R. M. Schuster (ed.), *New Manual of Bryology*, vol. 1. Nichinan.
- SCOTT, G. A. M., I. G. STONE & C. ROSSER. 1976. *The Mosses of Southern Australia*. London, New York, San Francisco.
- WARNSTORF, C. 1916. *Pottia* Studien. *Hedwigia* 58: 35–152.
- WILLIS, J. H. 1954. Mosses new to Western Australia. *Victorian Naturalist* 71: 8–10.
- ZANDER, R. H. 1993. Genera of the Pottiaceae: Mosses of harsh environments. *Bulletin of the Buffalo Society of Natural Sciences* 32: 1–378.

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FIGURES 13–20. *Pterygoneurum macleanum*. — 13, 15–17. Adaxial surface of leaves to show lamellae with filaments. — 14, 18. Terminal cells of filaments. — 19–20. Spores. (13–14, 20 from lectotype of *P. macleanum* in BM; 15–19 from lectotype of *P. kemsleyi* in MEL).