**Pohlia australis** sp. nov. (Musci) from New Zealand with notes on some other austral Pohlia species

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Abstract  *Pohlia australis*, a new gemmiferous species, is described from the South Island, New Zealand. A key is provided to distinguish the three New Zealand species of *Pohlia* bearing axillary gemmae (*P. australis*, *P. camptotrachela*, and *P. ochii*). *Pohlia tenuifolia*, formerly thought to be endemic to Australasia, is reported from two localities in South America (Chile and Brazil).

**Keywords**  *Pohlia australis; P. ochii; P. camptotrachela; P. tenuifolia; Mielichhoferia brachycarpa*; Bryaceae; gemmae; phytogeography

**INTRODUCTION**

Compared with Northern Hemisphere temperate regions of similar area, New Zealand has relatively few species of Bryaceae. Only five of the thirteen Bryaceae genera are represented in the flora, and such genera as *Brachymenium, Pohlia,* and *Mielichhoferia* are quite diversified in other areas, have a few indigenous species in New Zealand. In Australasia as a whole, there are no endemic Bryaceae genera, and the number of endemic species also appears to be low (Sainsbury 1955, Ochi 1970, Scott & Stone 1976, Catcheside 1981).

The genus *Pohlia* is primarily north-temperate in distribution, penetrating the tropical latitudes only at high elevations. The Australasian flora includes few species of *Pohlia* and only about eight species occur in New Zealand. Several of these, including *P. nutans* (Hedw.), *P. cruda* (Hedw.) Lindb., and *P. wahlenbergii* (Web. & Mohr) Andr., are widespread in the Northern Hemisphere and occur disjunctively in Australasia and a few subantarctic localities. A gemmiferous *Pohlia, P. camptotrachela* (Ren. et Card.) Broth., previously reported only from western North America and western Europe (Shaw 1981, 1982; Smith 1978), was recently recorded from New Zealand for the first time (Fife 1984). Although long-term persistence cannot be entirely ruled-out, such disjunct occurrences of species that are common and widespread in the Northern Hemisphere suggest long range dispersal from north to south. *Pohlia nutans* and *P. cruda* are paroicous, whereas *P. wahlenbergii*, and *P. camptotrachela* are dioicous. Dispersal of the last species is probably facilitated by the production of gemmae.

The number of *Pohlia* species truly endemic to New Zealand must remain unknown until a revision of the southern temperate species in the genus is completed. One common New Zealand species, *P. tenuifolia* (Mitt.) Jaeg., reported from New South Wales by Scott & Stone (1976), also occurs in two countries in South America. There it was first collected by P. Dusén in 1896 (Chile australis ad Puerto Veras in terra, Dusén 754; BM-Hampe!). Dusén called the plant *Webera paucifolia* Dus., and the name was published as a nomen nudum by Paris in 1906. (It is not homotypic with *Pohlia paucifolia* (Hampe ex Jaeg.) Broth., which, based on type material in the Hampe herbarium, is synonymous with *Pohlia elongata* Hedw.) *Pohlia tenuifolia* was later redescribed from South America as *Mielichhoferia brachycarpa* Broth., based on specimens collected in Brazil (Rio de Janeiro, Petropolis, F. von Hohnel 66, 156, 332; H-Brl). Several other New Zealand *Pohlia* species recognised by Sainsbury (1955) as endemic need evaluation.

Vitt (1971) described a gemmiferous species, *P. ochii* Vitt, from Campbell Island; this species also occurs in the North and South Islands of New Zealand (Fife 1984). We provide below a description for a new gemmiferous *Pohlia*, presently known only from the South Island.

**Pohlia australis** Shaw et Fife, sp. nov.  Fig. 1-8  Plantae quoad staturam mediocres vix nitidae. Folia lanceolata ad 2 mm longa, prope apicem valde serrata deorum ad medium vel infra medium serrata vel serrulata;
Fig. 1-6 *Pohlia australis* 1 Moist plant, ×25. 2 Dry plant, ×25. 3 Leaves, ×50. 4 Upper leaf cells, ×360. 5 Apical leaf cells, ×360. 6 Gemmae, ×240 (from the holotype).
Shaw & Fife—Pohlia australis

Fig. 7-8 Scanning electron micrographs of gemmae from P. australis, x350.

cellulae lineari-rhomboida 100-150 μm longae plus minusce vermiculiformes. Gemmae in axillis foliorum superiorum fasciculatae, ovoideae vel oblongae ad 385 μm longae et 200 μm latae, pallide flavo-brunneae vel brunneae, translucentes, apice et subapice conspicue primordiis, primordiis late triangular-laminatis. Caetera ignota.


Plants medium size and rather dull, in small loose tufts, to 1 cm high, frequently mixed with other species. Stems simple (when sterile), in transverse section terete, about 150 μm in diam., with an inconspicuous central strand of small, thin-walled cells gradually grading into larger, thin-walled cells, and 1(-2) layers(s) of thick-walled cells on the periphery. Leaves erect-spreading to spreading, becoming rather twisted when dry, lanceolate, slenderly acute, rather long-decurrent, 1.4–2.0 mm long, 0.25–0.35 mm wide; margins plane when moist, loosely recurved when dry, strongly serrate near the apex, serrate to sulcate to midleaf or below; costa ending a few cells below the apex, in transverse section with 2–3 guide cells and a group of dorsal stereids; upper leaf cells linear-rhomboidal or linear-hexagonal, vermicular, 100–150 μm long, 8–11 μm wide, with thin or firm walls, long-rectangular near the base. Gemmae arising in clusters of three or more in the upper leaf axils, yellow-green to yellow-brown and becoming darker with age, oblong, 200–385 μm long, c. 200 μm broad, with 4-9 triangular-laminate leaf primordia at the apex and lower on the gemma body; cells of the body isodiametric to short-rectangular, to 30 μm long, those of the leaf primordia more elongate. Inflorescences and sporophytes unknown.


DISCUSSION
All three collections of P. australis were made in the subalpine zone where shrub species (e.g., Dracophyllum longifolium (J. R. & G. Forst.) R. Br., D. uniflorum J. D. Hook., Olearia colensoi J. D. Hook., and Phormium cookianum Le Jolis) are conspicuous components of the vegetation. The plants were collected from soil-filled crevices and beneath overhanging boulders, microhabitats which are typical of gemmiferous Pohlia species in the Northern Hemisphere. The bedrock of both areas is siliceous and it is evident from the vegetation that the soil is at least mildly acidic. At both localities P. australis was growing in proximity to P. ochii, which was somewhat more common. At Arthur’s Pass the two species were collected intermixed.

Pohlia australis is readily distinguished from P. ochii by its dull leaves and oblong gemmae. It resembles P. camptotrichela in the lack of gloss to its leaves, but the gemmae of P. camptotrichela are significantly smaller, more spherical in shape, and have inconspicuous, peg-like leaf primordia. In addition, the leaves of P. australis are longer than those of P. camptotrichela, longly decurrent, and the apices are more strongly serrate. Pohlia annotina (Hedw.) Lindb., occurring in temperate North America and Europe, sometimes has oblong gemmae resembling those of P. australis but they are
KEY TO THE GEMMIFEROUS SPECIES OF Pohlia IN NEW ZEALAND

1 Plants glossy; gemmae linear-vermicular, greater than 500 μm long, with 1-2 short, peg-like leaf primordia.................................................P. ochii

Plants dull; gemmae spherical to oblong, less than 400 μm long, with 3-8 peg-like or laminate (flattened, multi-cellular, and leaf-like) leaf primordia...........P. australis

2 Leaves 1.5-2.0 mm long, strongly decurrent, strongly serrate near the apex; gemmae oblong, 200-400 μm long, leaf primordia broadly triangular-laminate.................................................................P. australis

Leaves 0.8-1.4 mm long, not or weakly decurrent, serrulate near the apex; gemmae spherical, less than 150 μm in diameter, leaf primordia short and peg-like.................................................................P. camptotrachela

most frequently orange, and have the leaf primordia more restricted to the apex. The gemmae of P. annotina are commonly narrow and oblong, and plants with oblong gemmae superficially resembling those of P. australis are relatively rare (Shaw 1981). In contrast to the variable gemmae of P. annotina, those of P. australis are relatively uniform in shape. These two species can also be distinguished by the longer, more strongly serrate, and decurrent leaves of P. australis.

The two groups of Pohlia species producing gemmae appear to represent different phylogenetic lineages (Shaw 1984). The two groups, subgenus Nyholmiella Shaw and subgenus Cacodon section Cacodon (Lindb.) Broth., are distinguished primarily by differences in capsule and peristome structure, but they also differ gametophytically. Plants of Pohlia subgenus Nyholmiella are not glossy, and their sterile stems are frequently much branched. Plants of section Cacodon may be glossy or dull, with the sterile stems unbranched. Using these criteria (sporophytes are unknown in both P. australis and P. ochii), these two species appear to belong to section Cacodon, as does P. camptotrachela (for which sporophytes are known). Pohlia ochii, both in terms of vegetative and gemma characters, resembles P. proliger (Lindb. ex Breidl.) Lindb. ex Arn. of the Northern Hemisphere boreal zone, and it is tempting to interpret P. ochii as a derivative of it, perhaps having diverged subsequent to colonisation of New Zealand and neighbouring islands.

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