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Anoetangium stracheyanum and *Pseudocrossidium hornschuchianum* (Pottiaceae, Bryophyta) in New Zealand

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The first author has made six bryological expeditions to New Zealand, in 1959, 1968, 1973–1974, 1982, 1993 and 2000 (van Zanten 2019). In 1993 both authors collected in 106 sites, from both the North and South Island, resulting in a collection of about 1700 numbers. All the material is deposited in the herbarium Leiden (L), except for a smaller part that is at the moment not yet fully accessible. The first author did many preliminary identifications in his large New Zealand collections. Experiments were conducted from these collections utilizing the spores from fruiting material with several resulting publications, including van Zanten (1978) and van Zanten & Pócs (1981). The second author gathered mainly tiny acrocarpous mosses, on the whole pottiaceous material. We found it worthwhile to publish here two mosses that are apparently new records for New Zealand.

Anoetangium stracheyanum Mitten (1859:31)

Collections deposited at the herbarium of the University of Michigan, Ann Arbor, Michigan, USA (MICH), made by the New Zealand bryologist A.J. Fife on the South Island and identified as *Anoetangium bellii* Brotherus ex Dixon (1926:162), upon comparative study proved to be *Anoetangium stracheyanum*. The collections were compared with Asian material of this species and with the lectotype of this name, viz. *Thompson 207* (BM!) from the Himalayas. This lectotype was recently chosen by Zander (2019) to preserve common use of this name (see conclusion). The three New Zealand collections examined fit well with *Anoetangium stracheyanum*. The cited collections below were also compared with original material of *Anoetangium bellii* in the herbaria BM and H. The type material is clearly different from the three collections cited below. Good descriptions, figures and discussions of *Anoetangium stracheyanum* are provided by Cano & Jiménez (2013), Ignatova (2009) and Zander & Eckel (2007).

Specimens examined:—NEW ZEALAND. South Island, Westland, Arthur's Pass Nat. Park, Upper Otira Valley, ca. 400 m, E. of footbridge over Otira River, deeply shaded mesic rock crevice with *Pohlia wahlenbergii* (F. Weber & D. Mohr) A.L. Andrews, N. facing stream gully and associated cascade over greywacke bedrock, subalpine, elev. ca. 1060 m, 15 Dec. 1983, *A.J. Fife 5947*, CHR 104.939, L!, MICH!; Buller, Paparoa Mts, N. flank of Mt Euclid, ca. 1.–1.3 km E of Morgan Tarn, weak seap on granite in gorge, NE facing stream, gorge with massive granite boulders in sub-alpine scrub dominated by—*Nothofagus*—elev. 900–1000 m, 24 Feb. 1984, *A.J. Fife 6468*, CHR 40.56.08, L!, MICH!, NY; Canterbury, Arthur's Pass Nat. Park—Twin Creek—42°55'S, 173°35'E, alpine herb fields associated with deeply cut stream gorges in—tussock grassland, greywacke bedrock, overhanging outcrop, elev. 1340–1350 m, 31 Jan. 1986, *A.J. Fife 7391*, CHR 406.531, L!, MICH!.

Distribution:—The geographical distribution of *Anoetangium stracheyanum* is broad and seemingly often in mountainous regions. In South America *A. stracheyanum* is known from various countries: Bolivia, Ecuador and Peru. See also the publication of Cano & Jiménez (2013).

Collections were examined from the following countries: AFRICA: Canary Islands, Comoros, Ethiopia, Kenya, Madeira, Réunion, Sao Tomé and Príncipe, Tanzania, Uganda, Zaire. AMERICAS, North America: Canada, USA (see also Zander & Eckel (2007)); Central America: Costa Rica, Guatemala, Hispaniola (Dominican Republic), Mexico, Panama; South America: Bolivia, Colombia, Ecuador, Peru, Venezuela; ASIA: Bhutan, China (see also Koponen & Sollman (2020)), India (NW Himalaya, South India), Indonesia (Java), Japan (Honshu), Korea, Myanmar, Nepal, Pakistan, Papua New Guinea (Mt. Gilowe, Mt. Hagen, Mt. Sarawaket, Mt. Wilhelm, Mt. Wilhelmina), Philippines (Luzon), Russian Federation (see also Ignatova (2009)), Sikkim, Sri Lanka (Central Prov.), Taiwan, Thailand, Vietnam; EUROPE: Austria, Germany, Slovakia, United Kingdom (Scotland) see Sollman (2023a); OCEANIA: Hawaii (Maui).

Pseudocrossidium hornschurchianum (K.F. Schultz) R.H. Zander (Schultz in C.F. Hornschuch 1822:35) R.H. Zander (1979:205)

This species was collected at several New Zealand sites in 1993 on the North Island. The plant is well described and figured in most European moss floras, for instance Smith (2006). Furthermore fruiting plants are beautifully illustrated in the moss atlases of Landwehr (1984) and Lüth (2019). In the first mentioned atlas the plant is treated as a *Barbula* (Hedwig 1801:115) species. All material examined in New Zealand was not fruiting.

Specimens collected:—NEW ZEALAND. North Island, Coromandel Peninsula, Thames, near police station, roadside near the sea, compacted sandy soil in footpath, elev. ca. 5 m, 24 Sep. 1993, *B.O. van Zanten & P. Sollman*, vZ. 93.09.1210!, L.; North Island, Auckland, Mt Wellington, quarry along Lunn Avenue, rocky soil, elev. ca. 50 m, 26 Sep. 1993, *B.O. van Zanten & P. Sollman*, vZ. 93.09.1260!, L.; North Island, about 30 km N. of Napier, White Pine Bush, Scenic Reserve, elev. ca. 200 m, on gravelly soil in lawn, partial shade, 2 Oct. 1993, *B.O. van Zanten & P. Sollman*, vZ. 93.09.1673!, L.; North Island, Taihape, motorcamp, on dusty old concrete with soil, partial shade, elev. ca. 200–300 m, 4 Oct. 1993, *B.O. van Zanten & P. Sollman*, vZ. 93.10.1722!, L.

Notes:—*Pseudocrossidium hornschurchianum* is very likely rather commonly distributed in New Zealand. In our opinion it has been overlooked in the past or identified as something else. Occasionally it was treated as a *Ceratodon Bridel* (1826:480) species or a slender form of *Barbula torquata* Taylor (1846:50), now *Didymodon torquatus* (Tayl.) Catcheside (1980:174). The plant is recently treated as *Gertrudiella torquata* (Taylor) J.A. Jiménez & M.J. Cano Jiménez *et al.* 2022: 297). Only one older collection was recently found in New Zealand herbaria, collected by K.W. Allison in 1962 from Napier Botanical Gardens (CHR 578.655). It was labeled as a slender form of *Barbula torquata*. In 1993 J. Beever (Auckland) was informed that *Pseudocrossidium hornschurchianum* was collected by us in New Zealand. Subsequently, she then discovered, in the following years, many new localities also on the South Island, including fruiting plants. Only very recently *Pseudocrossidium hornschurchianum* appeared in the New Zealand checklist for Hornworts, Liverworts and Mosses (Gibb. *et al.* 2021).

Distribution:—The information on the distribution of *Pseudocrossidium hornschurchianum* is taken from Smith (2006): Europe, Asia minor, Macaronesia, N. Africa, N. America. Furthermore collections were examined in herbarium Leiden (L) from Australia, Republic of South Africa, southern Chile. See also Müller (2009) for the occurrence of this moss in Chile.

Ecology and habitat:—In New Zealand, *Pseudocrossidium hornschurchianum*, has been collected on rocky and gravelly soil, open clay in lawn, old concrete with ground and on sandy, loamy soil. These locations are very often open and the soil is mostly compacted. Sometimes the local situation is partially shaded. All sites are at low altitudes. The Coromandel location near the small town of Thames looked quite undisturbed to us. The species grows there on a sandy footpath near the sea. All collections were made in 1993. This agrees well with the locations known from Europe near the sea in open dunes, often as a sand-binder. In our opinion this species is native in New Zealand although it often grows in somewhat modified habitats.

Conclusion

Anoetangium bellii Broth. ex Dixon: Type material from herbarium Brotherus (H) was studied, cited and discussed in Sollman (2022b). Collections from the H.N. Dixon herbarium (BM) were also examined. Dixon was apparently in doubt on the status of the New Zealand plants, judging from his herbarium notes. He compared the material with the European *Anoetangium aestivum* (Hedw.) Mitt. Recently Sollman (2023b) treated *Anoetangium bellii* as a synonym of *Anoetangium aestivum*. The few *Anoetangium* collections from New Zealand cited here, all from A.J. Fife, clearly deviated from *Anoetangium bellii*, in having for instance much longer oblong-lanceolate leaves often with a constriction above the leafbase and a short excurrent costa. Although *Anoetangium strachyanum* is a rather variable species (Sollman 2023a) it is usually rather easily identified.

The lectotype of *Anoetangium strachyanum*: After restudying the relevant publications of Mitten (1859), Li & Iwatsuki (1997) and Zander (2019), we agree with Zander (2019) and suppose his choice is right as well as the consideration to preserve the current use of this name. However, Cano *et al.* (2023) view this choice with caution. The second author of this article restudied also his notes and sketches of *T. Thomson 207* (BM). This collection fits the current concept of this species. It is also in agreement with the description, figure and key characters given by Chen (1941), although he does not cite *T. Thomson 207* in his publication. The selection of lectotype material has been complicated likely, but we are satisfied with the current choice.

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