

Mosses of the Mt. Owen and Turks Cap Ranges, North-west Nelson, New Zealand

John K. Bartlett, Pakuranga, Auckland

Introduction by J. Lewinsky¹

When learning of John Bartlett's sudden death on 1 May 1986 his manuscript of the mosses of the Mt. Owen and Turks Cap Ranges was present on my desk. John had sent it to me to comment upon. In agreement with his father, Mr. K. Bartlett, I have made the paper ready for publication. Since John collected the mosses on a field-trip with the Wellington Botanical Society this bulletin was found to be an appropriate outlet.

When editing the manuscript I have tried to make as few alterations as possible. A few author citations and names have been changed to avoid invalid publication. The species concept and the annotations in the 'Species list' are John's alone and do not always represent my own opinion. I have not seen any of the specimens. From the manuscript it was not always possible to tell if the frequency given for each taxon refers only to the study area or to the whole of New Zealand. Sometimes the first seems to be the case, sometimes the latter. A few comments have been added after the list.

The number of species recorded in the paper shows how excellent a collector John was. Personally I benefitted from his keen eyes when he collected *Orthotrichum* for my revision of the Australasian taxa. He was in contact with many bryologists all over the world sending critical specimens for closer examination.

John kept all his collections in his home at Pakuranga. After his death they have been transferred to the Auckland Institute and Museum (AK). They will for many years be a rich source for the study of the New Zealand bryophyte flora.

INTRODUCTION

Collections of bryophytes, lichens and saxicolous algae were made during a field-trip to the Mt. Owen and Turks Cap Ranges by the Wellington Botanical Society in January 1983. Details of geology, soils and higher plants in the area visited are given in Bell (1973).

The following annotated list gives details of habitats and frequencies of the mosses found. In the list, collecting sites are given in detail and indicated by numbers and letters. In all, 39 different sites were sampled and the habitat diversity of the relatively small study area is readily apparent (cf. list of localities with habitat information). Approximately 178 taxa were collected. For comparison it can be mentioned that ca. 370 mosses are known from the Nelson region, an area west of the Pelorus River and north of the Buller Gorge, including the Mt. Richmond Forest Park. In New Zealand the number of mosses reported so far is ca. 550. The phytogeography of some of the more interesting species is briefly discussed.

1. Botanisk Museum, Copenhagen, Denmark.

All collections are held in my personal herbarium with few duplicates elsewhere (ALTA, HIRO, NICH, NY, WELT). Earlier some of the more interesting finds have been published by me (Bartlett 1984) and by Dr. A. Fife, who also participated in the excursion (Fife 1984).

List of localities with habitat information

1. *Billies Knob*: a. sink holes near summit; b. seepages at base of shaded marble bluffs on southern slopes.
2. *Saddle above 'staircase'*: a. *Nothofagus* forest over marble outcrops; b. marble bluffs at junction of forest and base of Billies Knob; c. clearing with burnt stumps of *Nothofagus*.
3. *West side of Blue Creek in Upper Blue Creek Gorge*: a. marble bluffs high above forest; b. *Hoheria lyallii*; c. *Libocedrus bidwillii*; d. *Dracophyllum traversii*; e. damp marble at interface of forest and cliffs; f. young *Nothofagus menziesii*; g. scrub near Blue Creek.
4. *Below 'staircase'*: in *Nothofagus* forest.
5. *Top between Blue Creek Gorge and Reverse Valley* (Sanctuary basin): tussock grassland.
6. *North end of Reverse Valley* (Sanctuary basin), junction of peat area and marble, many deep sinkholes: a. primarily from damp walls or calcareous soil near entrance to sinkholes; b. bogs at base of schist moraine; c. schist rock outcrops on terminal moraine; d. peat area at head of valley.
7. *West of Granity Pass*: schist moraine.
8. *East Granity Pass*: seepages in marble caves, bordering tussock.
9. *Upper catchment of Granity Creek*: a. *Nothofagus* forest below saddle leading to Lookout Range; b. marble bluffs with sparse, stunted *Nothofagus*.
10. *Mt. Bell*: a. fractured marble in sinkholes near summit, 1850 m; b. western slopes, near scree, on calcareous soil with cracks.
11. *West peak of Mt. Owen*: a. summit area with low herbs, 1970 m; b. Karst marble formation.
12. *Nuggety Creek Basin*: a. marble bluffs; b. *Hoheria* scrub; c. schist area of south-west flank of basin.
13. *Schist area of open tussock 'Hay Paddock'*: a. bog area in peat sward grassland; b. schist rock outcrops.
14. *North-west Mt. Bell*: a. damp soil on stream bank; b. caves in marble.
15. *West flank of ridge leading to clearing near 'staircase'*: *Nothofagus fusca* forest.
16. *North-east ridge of Turks Cap*: a. exposed area with sinkholes, *Dracophyllum*, *Hebe*, *Olearia* vegetation; b. sinkholes and low marble bluffs under dense tall scrub.
17. *Eastern slopes of Turks Cap Range*: open tussock with schistose outcrops.
18. *Branch Creek*: a. rocks in stream near Branch Hut; b. shaded, damp limestone bluffs on west side of creek.
19. *Valley from Branch Creek to base of Turks Cap*: *Nothofagus* forest.
20. *Ridge from west peak of Mt. Owen to forest above Branch Creek*: open area of eroded schistose rock.

21. *East side of Branch Creek* a. *Nothofagus* forest, b. shaded damp marble outcrops.
22. *Ridge from Turks Cap to Branch Creek Saddle*: a. schist outcrops with some solifluction terraces; b. *Nothofagus* forest.
23. *Top of Turks Cap Range*: open very exposed granite.
24. *Nuggety Creek Gorge near junction with Branch Creek*: rocks in stream.
25. *Lower southern slope of Culliford Hill*: marble outcrops.
26. *Above Granity Pass Hut*: in scrub of *Dracophyllum* (cf. *D. filifolium*), *D. uniflorum*, *Olearia lacunosa*, *Dacrydium bidwillii* and *Phyllocladus alpinus*.

Species List

- Acrophyllum dentatum* (Hook. f. & Wils.) Vitt & Crosby: 8, 18b. Common in damp, shaded seepages.
- Amblystegium serpens* (Hedw.) B.S.G.: 8, 12a, 14a. Three collections from different habitats. The plants from 12a grew in xeric conditions and have tiny leaves with poorly-defined nerves.
- Amblystegium varium* (Hedw.) Lindb.: 11b. On mesic calcareous detritus around base of a Karst marble formation. Plants less robust than collections from the Auckland area (Bartlett 1984).
- Amphidium cyathicarpum* (Mont.) Broth.: 22, 23a. Abundant in rock crevices in damp schist.
- Andreaea acutifolia* Hook. f. & Wils. ssp. *acuminata* (Mitt.) Vitt: 23a. Rare. In clefts in very damp schist.
- Andreaea mutabilis* Hook. f. & Wils.: 6c, 13, 14a, 17, 22a. Abundant on xeric schist.
- Anoetangium bellii* Broth. ex Dix.: 1a, 12a. Common on damp marble where it forms large cushions.
- Astomum austro-crispum* (Beck.) Broth.: 1a, 10a, 11a. On exposed soil usually with tiny *Luzula* spp. and *Carex pyrenaica* var. *cephalotes*. The Mt. Owen plants were associated with *Pottia starckeana*, *Bryoerythrophyllum recurvirostre*, *Desmatodon viridipilus* and *Riccia* sp.
- Atrichum androgynum* (C. Muell.) Jaeg.: 4, 15, 19. Abundant on damp soil in *Nothofagus* forest.
- Aulacomnium palustre* (Hedw.) Schwaegr.: 6b. Abundant in bogs.
- Bartramia halleriana* Hedw.: 9c, 22b. Common on dry schist in *Nothofagus* forest.
- Bartramia patens* Brid. var. *papillata* (Hook. f. & Wils.) Zant.: 9c, 17, 22a, 22b, 23a. Common on damp schist in forest and in more open rocky areas.
- Blindia robusta* Hamp.: 13b. On rocks in stream and seepages nearby. Sometimes the operculum adheres to the columella.
- Brachythecium* cf. *kuroishicum* Besch. var. *littorale* Card.: no locality given. Collections 22105 and 22312 are with some hesitation referred to this taxon by Dr. W.R. Buck, New York. He writes 'I am reluctant to use this name as it is a Japanese-Chinese taxon and I have seen no material, however, it is a perfect match for Takaki's drawing (*J. Hatori Bot. Lab. 15: 7, fig. 10: 12-18. 1955*)'.
- Brachythecium paradoxum* (Hook. f. & Wils.) Jaeg.: 1b, 12a, 14a. Common on mesic calcareous soils at base of marble outcrops. In damper shaded areas the leaves tend to be more distant, less falcate-secund and less plicate.
- Brachythecium plumosum* (Hedw.) B.S.G.: 18a, 24. Abundant on rocks in streams.

- Brachythecium rutabulum* (Hedw.) B.S.G.: no locality given. Abundant throughout, very variable.
- Brachythecium salebrosum* (Web. & Mohr) B.S.G.: no locality given. Abundant in *Nothofagus* forest, particularly young *N. menziesii*.
- Brachythecium subplicatum* (Hamp.) Jaeg.: 6b. Common in upland bogs and seepages. Growing with *Climacium dendroides* and *Calliergon* spp.
- Brachythecium velutinum* (Hedw.) B.S.G.: 12a. Not common. Occurs in the North-west Nelson area in open localities at high altitudes.
- Breutelia elongata* (Hook. f. & Wils.) Mitt.: 22b. Abundant in damp areas.
- Bryobartlettia costata* Buck: 3b. Not common. On twigs, branchlets and even leaves in very humid areas with *Calyptopogon*, *Crosbya*, *Cryphaea*, *Daltonia*, *Sauloma*, and *Tetraphidopsis*. Reported from the Mt. Owen Range by Fife (1984).
- Bryoerythrophyllum recurvirostre* (Hedw.) Chen: 1a, 11a. Restricted to the most exposed and highest sites. Often with *Desmatodon viridipilus* and *D. lingulatus*.
- Bryum argenteum* Hedw.: 12a, 21b. A weedy moss of anthropogenic habitats.
- Bryum australe* Hamp.: 22a. Rare. Collected at 1200 m a.s.l.
- Bryum billardieri* Schwaegr. var. *billardieri*: 9a, 14, 15, 19, 22. Abundant.
- Bryum billardieri* Schwaegr. var. *platyloma* Mohamed: 6c, 9a, 19, 22. Common. Showing a wide ecological amplitude, but seems to be most common in damper areas at high altitudes.
- Bryum blandum* Hook. f. & Wils. ssp. *blandum*: 18a, 24. Abundant on silt or rocks in streams.
- [*Bryum clavatum*¹ Schleich.: 18b. Common at lower altitudes on vertical limestone seepages often with *Eucladium irroratum*.]
- Bryum harriottii* R. Brown ter.: 2b, 11, 18b. Rather common. Collected from peat derived as well as calcareous soils.
- Bryum laevigatum* Hook. f. & Wils.: 14a, 24. Common in damp habitats.
- Bryum muehlenbeckii* B.S.G.: 1a, 10a, 10b, 11a.
- Bryum pseudotriquetrum* (Hedw.) G.M.S.: 6b, 6d. Rare. At high elevations in bogs with *Aulacomnium*, *Calliergon*, *Climacium*, and *Drepanocladus*.
- Bryum torquescens* Bruch ex De Not.: 2c, 9a. Common upland species.
- Calliergon cordifolium* (Hedw.) Kindb.: 6b. First report for New Zealand (Bartlett 25587). In bogs with *Aulacomnium palustre*, *Calliergon sarmentosum*, and *C. stramineum*. Also found near Westport in bogs in old disused paddocks.
- Calliergon sarmentosum* (Wahlenb.) Kindb.: 6b, 13. Common in bogs, tarns, rocky streams, and other aquatic habitats at high elevations. Known from both islands and now more widespread than indicated by Sainsbury (1955).
- Calliergon stramineum* (Brid.) Kindb.: 6b. Common on the west coast of the South Island at sea level always in man-made habitats, e.g. bogs in paddocks. Probably introduced at the end of the last century.
- Calyptopogon mnioides* (Schwaegr.) Broth.: 3b, 12b, 16b, 18b. Abundant on branchlets in humid forest.
- Camptochaete aciphylla* Dix. & Sainsb.: 3e, 9b, 16b, 18b, 21. Abundant in North-west Nelson, rare elsewhere. On damp calcareous substrates.
- Camptochaete gracilis* (Hook. f. & Wils.) Par.: 18a, 24. Abundant. On acidic rocks in streams.
- Campylopus stellatum* (Hedw.) C. Jens.: 6b. Rare in this bog area, otherwise common in North-west Nelson and the Arthurs Pass region.
- Campylopus clavatus* (R. Brown) Wils.: 13. Abundant on damp soil.

1. See J. Lewinsky's concluding comments on this paper — Ed.

- Campylopus introflexus* (Hedw.) Brid.: 2b, 15. On burnt stumps of *Nothofagus* with *Orthodontium lineare* and *Zygodon minutus*.
- Ceratodon purpureus* (Hedw.) Brid.: 1a.
- Cheilothela chilensis* (Mont.) Broth.: 12c, 14a. Common on peat-derived soils and schistose silt.
- Climacium dendroides* (Hedw.) Web. & Mohr: 5b. Abundant in sward grassland, bogs, streamsides, and shallow water.
- Conostomum pentastichum* (Brid.) Lindb.: 13, 17.
- Cratoneuron filicinum* (Hedw.) Spruc.: 1a, 5, 6a, 10a, 11a, 11b, 12a. Common on calcareous soil. Very variable.
- Cratoneuron filicinum* (Hedw.) Spruc. var. *curvicaule* (Jur.) Moenk.: 6a. This variety is characterized by straight imbricate leaves with weak nerves, and apices drawn out into a fine acumen.
- Cratoneurosis relaxa* (Hood. f. & Wils.) Fleisch.: 8, 9b, 11b, 12a, 16a. Abundant. Very variable.
- Crosbya straminea* (Mitt.) Vitt: 3b, 12b. On branchlets in dense humid bush often with other Hookeriaceous mosses.
- Cryphaea tenella* Hornsch. ex C. Muell.: 3b, 12b, 16a. Common in mesic areas.
- Cyathophorum bulbosum* (Hedw.) C. Muell.: 2b, 16a, 18b, 21b. Unexpectedly this moss was found as a saxicolous calcicole in mesic conditions.
- Cyrtopus setosus* (Hedw.) Hook. f.: 15.
A common species in mature *Nothofagus* forest at low altitudes.
- Daltonia splachnoides* (Sm.) Hook. & Tayl.: 3b, 3c. On twigs or leaves in very humid habitats.
- Dawsonia superba* Grev. var. *superba*: 15. Abundant. In leaf litter in *Nothofagus fusca* forest.
- Dendrologotrichum dendroides* (Hedw.) Broth.: 9a, 15, 20, 22b. Abundant in forests at higher altitudes.
- ¹*Desmatodon viridipilus* (Dix & Sainsb.) Sainsb.: 1a, 11a. Common on Mt. Owen. Associated with *Astomum austro-crispum* and *Bryoerythrophyllum recurvirostre*.
- Dicnemon calycinum* (Hook.) Schwaegr.: 3b, 3c, 15, 19, 21a, 22b, 26. Abundant, epiphytic.
- Dicnemon semicryptum* C. Muell.: 4, 19. Locally common in the Mt. Owen area.
- Dicranella clathrata* (Hook. f. & Wils.) Jaeg.: 14a. Common throughout New Zealand.
- Dicranoloma billardieri* (Brid.) Par.: 2b, 13a, 17, 22b. Abundant. Very variable, particularly when growing in bogs.
- Dicranoloma dicarpum* (Nees) Par.: 9, 15, 19. Common in *Nothofagus* forest.
- Dicranoloma menziesii* (Tayl.) Par.: 15. Epiphytic at base of mature *Nothofagus fusca*.
- Dicranoloma platycaulon* (C. Muell.) Dix.: 15, 19. Common in low altitude *Nothofagus* forest on rotting logs and damp soil.
- Dicranoloma plurisetum* Dix.: 9, 15, 19. Quite common.
- Dicranoloma robustum* (Hook. f. & Wils.) Par.: 1b, 6d, 10b, 13a. Very variable; aquatic plants approach forms of *D. billardieri*.

1. *Desmatodon lingulatus* (Hook. f. & Wils.) Sainsb. in 1a and/or 11a. John appears to have omitted this moss from the list although it is mentioned earlier in this paper as part of an association with *Bryoerythrophyllum recurvirostre*. R. Lewington.

- Dicranoweisia antarctica* (C Muell.) Par.: 1b, 10a. On calcareous detritus in clefts often in xeric habitats. Plants from high altitudes, e.g. Mt. Bell 1850 m, tend to be very small (0.7-0.9cm).
- Dicranum aucklandicum* Dix.: 17b. Rare. On schist-derived soils in clefts.
- Distichium capillaceum* (Hedw.) B.S.G.: 1b, 2b, 3e, 5, 9b, 10b, 11b, 12a, 16a. Abundant in damp shaded cracks in marble.
- Distichophyllum microcarpum* (Hedw.) Mitt.: 8. On marble in cave.
- Distichophyllum pulchellum* (Hamp.) Mitt.: 17. Abundant on damp rock face.
- Ditrichum brachycarpum* Hamp.: 1a. Rare. In sinkhole near summit of Mt. Owen.
- Ditrichum difficile* (Dub.) Fleisch.: 12c, 17, 20, 22a. Abundant weed.
- Ditrichum cf. flexicaule* (Schwaegr.) Hamp.: 1, 2b, 5, 10a, 11a. On damp calcareous soil in cracks in marble.
- Drepanocladus aduncus* (Hedw.) Warnst.: 6b, 6d, 13a. Abundant in bogs.
- Drepanocladus fluitans* (Hedw.) Warnst.: 6d, 13a. With *D. aduncus* at margins of tarns or floating in large red-purple masses.
- Drepanocladus revolvens* (Sw.) Warnst.: 6d.
- Echinodium hispidum* (Hook.f. & Wils.) Reichdt.: 3e, 18b. Common on damp calcareous rocks.
- Encalypta rhyptocarpa* Schwaegr.: 1b, 3e, 5, 9b. Damp calcareous rock at high altitude.
- Encalypta vulgaris* Hedw.: 1b, 3a, 11b, 12a. Common on limestone; prefers drier habitats than *E. rhyptocarpa*.
- Entodon truncorum* Mitt.: 21. Rare, sporadically distributed in New Zealand. In North-west Nelson usually on damp shaded calcareous rock.
- Eriopus brownii* Dix.: 21a, 22b.
- Eriopus cristatus* (Hedw.) Jaeg.: 21a. Common. On rotting log in deep shade.
- Eucyadiium irroratum* (Mitt.) Jaeg.: 12a, 18b. A common moss of calcareous seepages.
- Eurhynchium asperipes* (Mitt.) Dix.: 1a, 10a, 11a. Abundant between tussock and bases of marble bluffs.
- Fissidens asplenioides* Hedw.: 15. Common on damp compacted soil.
- Fissidens oblongifolius* Hook. f. & Wils.: 9a. Rare. Found on damp soil at base of *Nothofagus menziesii*.
- Fissidens rigidulus* Hook. f. & Wils.: 24. Abundant on rocks in streams.
- Glyphothecium sciuroides* (Hook.) Hamp.: 9a, 15. on *Nothofagus fusca*.
- Gymnostomum calcareum* Nees & Hornsch.: 2b, 12a. Very common on damp, shaded marble.
- Hampeella alaris* (Dix. & Sainsb.) Sainsb.: 3d, 21a. Abundant on branchlets in dense humid bush.
- Hypnodendron comosum* (Labill.) Mitt.: 15, 22b. Common in dryer *Nothofagus* forest.
- Hypnum cupressiforme* Hedw. var. *filiforme* Brid.: 3d. Pendant on branchlets of shrubs in dense, humid bush.
- Hypnum cupressiforme* Hedw. var. *lacunosum* Brid.: 6a. On damp marble. A rare taxon in New Zealand.
- Hypopterygium filiculaeforme* (Hedw.) Brid.: 15, 18b. Common on forest floor or along streams in humid forest.
- Hypopterygium novae-seelandiae* C. Muell.: 2b, 3e, 9b, 21b. Abundant on calcareous soil.
- Isopterygium limatum* (Hook. f. & Wils.) Broth.: 3e, 21b. Abundant on damp marble, together with species of *Bryum*, *Lembophyllum*, and *Plagiothecium*. A robust species.

- Isopterygium pulchellum* (Hedw.) Jaeg.: 1b, 3e. Common in seepages in marble, usually in shaded vertical crevices.
- Lembophyllum divulsum* (Hook. f. & Wils.) Par.: 2b, 5, 9b, 10b, 11b. Abundant on marble outcrops in light forest and on damp marble at the base of cliffs and bluffs.
- Leptobryum pyriforme* (Hedw.) Wils.: 3e. Common weedy moss usually found on damp, shaded, calcareous soil.
- Leptodon smithii* (Hedw.) Web. & Mohr: 3e, 9b, 18a, 21b. Common on damp marble in open forest.
- Leptostomum inclinans* R. Brown: 3d, 19. A common epiphyte.
- Leptotheca gaudichaudii* Schwaegr.: 3d, 4, 9a, 15, 19, 22b. Common in many habitats. Most common in *Nothofagus* forest at base of trees or on old logs.
- Lepyrodon australis* Hamp. ex Broth.: 3d, 15, 19, 21, 22b. Common epiphyte.
- Lepyrodon lagurus* (Hook.) Mitt.: 3d, 21b. Very common. Usually an epiphyte widespread in *Nothofagus* forest. In this area observed also on damp marble. Altitudinal range: sea level to 1300m.
- Leucobryum candidum* (P. Beauv.) Wils.: 19, 22b. A common species of very damp forest floor.
- Lopidium concinnum* (Hook.) Wils.: 4. Common forest species.
- Macrocoma tenue* (Hook. & Grev.) Vitt: 3b, 3f, 3g. Abundant.
- Macromitrium gracile* (Hook.) Schwaegr.: 4, 22b. Very common.
- Macromitrium grossirete* C. Muell.: 15, 26. Rare; able to tolerate xeric conditions on stems of exposed shrubs.
- Macromitrium longipes* (Hook.) Schwaegr.: 9, 15. Abundant.
- Macromitrium microstomum* (Hook. & Grev.) Schwaegr.: 4, 22b. Very common with wide altitudinal range.
- Macromitrium orthophyllum* Mitt.: 22b, 26. Rare. On twigs and stems of slender shrubs.
- Macromitrium prorepens* (Hook.) Schwaegr.: 3c, 4, 9, 14. Very common.
- Meesia muelleri* C. Muell. & Hamp.: 6d. Rare, only few scattered plants seen.
- Mesotus celatus* Mitt. in Hook.f.: 3d, 4, 9a, 15, 19, 22b. Abundant; epiphyte on *Nothofagus* spp.
- Neckera laevigata* Hook. f. & Wils.: 21a. Most common on forest trees, but in this area found on mesic marble.
- Neckera pennata* Hedw.: 3b, 12b. Common on branchlets of *Hoheria lyallii*.
- Orthodontium lineare* Schwaegr.: 2c, 15. Common, usually on rotting wood that is well-drained and thus not permanently water-logged.
- Orthothecium strictum* Lor.: 1a, 1b, 10a, 11a, 12a. Restricted to the highest, most exposed areas of Mt. Owen Range. It usually grows between low tussocks and bases of marble outcrops or around openings of sinkholes and small caves. The plants are identical to specimens examined from the Yukon, Canada.
- Orthotrichum cupulatum* var. *austro-cupulatum* (Dix. & Sainsb.) Lewinsky: 1, 5, 10, 11, 17. Abundant on exposed marble with *Schistidium apocarpum* and *Tortula phaea*.
- Orthotrichum beckettii* C. Muell.: 3b. On twigs in very damp areas of high humidity.
- Orthotrichum graphiomitrium* C. Muell. ex Beckett: 3b, 18b. On twigs and branches in very humid conditions.
- Palamocladium macrostegium* (Sull. & Lesq.) Iwats. & Tak.: 2b, 3e, 8, 18b. Abundant on the Mt. Owen Range. Grows preferably on very damp marble at high altitudes.
- Papillaria amblyacis* (C. Muell.) Jaeg.: 3f, 15. Rare epiphyte on young *Nothofagus* in the study area.

- Philonotis pyriformis* (R. Brown ter.) Wijk. & Marg.: 3e, 8, 9b, 18b. Common in very wet seepages.
- Philonotis scabrifolia* (Hook. f. & Wils.) Braithw.: 4, 6c, 13, 14a. Abundant on dry soil under rock ledges.
- Plagiobryum novae-zealandiae* Broth.: 2b, 3a, 3e, 8, 11b. An uncommon calciphile taxon.
- Plagiomnium novae-zealandiae* (Col.) T Kop.: 9a, 24. Abundant in wet areas throughout New Zealand.
- Plagiopus oederi* (Brid.) Limpr. (Syn. *P. javanicus* (Doz. & Molck.) Fleisch.): 1b, 3e. In very damp shaded seepages in marble.
- Plagiothecium denticulatum* (Hedw.) B. S. G.: 4, 9, 16a, 19, 21b, 22b. Common on damp marble under *Nothofagus*.
- Plagiothecium laetum* B. S. G.: 21b. The plants are smaller than the preceding species, have leaf cells 5-8 μm wide and decurrent leaf bases of rectangular cells. First record for mainland New Zealand.
- Pohlia cruda* (Hedw.) Lindb.: 9b, 10b, 16a. Common on calcareous soil.
- Pohlia nutans* (Hedw.) Lindb.: 6a, 12a, 16a. Not uncommon. In damper habitats than *P. cruda*. In 16a growing with the liverworts *Asterella tenera* and *Allisonia cockaynei*.
- Polytrichadelphus magellanicus* (Hedw.) Mitt.: 6b, 6c, 13, 14a. Abundant in bogs and on damp soil.
- Polytrichastrum alpinum* (Hedw.) G. L. Smith.: 13. Common on acid rock at high altitude in both islands.
- c.f. *Pottia starckeana* (Hedw.) C. Muell. var. *brachyoda* (B. S. G.) C. Muell. (syn.: *P. zealandiae* (R. Brown ter.) Par. pers. comm. D. T. Chamberlain): No locality given. Bartlett 25808 consists of a few tiny sterile plants in morphology very close to this taxon. Compares well with collections from Napier and Otago.
- Ptychomnion aciculare* (Brid.) Mitt.: 4, 15. Abundant on forest floor in mesic environment.
- Pyrrhobryum mnioides* (Hook.) Manuel: 24. Very common. On soil beside stream.
- Racomitrium crispulum* (Hook. f. & Wils.) Dix.: No locality given. Abundant on damp schist.
- Racomitrium lanuginosum* (Hedw.) Brid.: 6c, 13, 14. Abundant on exposed soil.
- Racopilum robustum* Hook. f. & Wils.: 18b. On damp marble covered with thin layer of soil.
- Rhacocarpus purpurascens* (Brid.) Par.: 14, 17, 22a. Abundant on damp schist.
- Rhizogonium novae-hollandiae* (Brid.) Brid.: 8, 9b. On damp soil on forest floor.
- Sauloma tenella* (Hook. f. & Wils.) Mitt.: 3b, 3c, 3d, 3e, 9a, 9b. Mostly found on branchlets on damp bark, but in the study area common on very damp marble.
- [*Schistidium alpicola* (Hedw.) Limpr.: 24. Submerged in stream.]
- Schistidium apocarpum* (Hedw.) B. S. G.: 13, 22a. Abundant on damp acidic or basic rock.
- Schlotheimia brownii* Schwaegr.: 4. Common on mature *Nothofagus* spp.
- Seligeria cardotii* R. Brown ter.: 1b, 2b, 3e, 6a, 9b, 11b, 16a, 18b. Very common on undersides of marble bluffs.

1. It was the author's opinion that *Schistidium alpicola* was found at this location. However the material cannot be located in the author's herbarium. Dr Allan J. Fife (Botany Division, DSIR) is now of the opinion that *S. alpicola* does not occur in New Zealand. R. Lewington.

See also J Lewinsky's concluding remarks on this paper — *Ed.*

- Sematophyllum contiguum* (Mitt.) Mitt.: 4. Common epiphyte on damp rough bark.
- Sematophyllum leucocytus* (C. Muell.) Sainsb.: 22b. Rare, first collection from North-west Nelson.
- Sematophyllum uncinatum* Stone & Scott: 18a, 24. Common in streams on submerged rocks.
- Sphagnum cristatum* Hamp.: 6b, 6d. In bogs in Reverse Valley.
- Sphagnum falciculatum* Besch.: 6b, 6d. Floating in tarns in Reverse Valley.
- Tayloria octoblepharum* (Hook.) Mitt.: 5, 9a, 11, 14. Common on deer dung, old deer carcasses or other rotting organic material.
- Tayloria purpurascens* (Hook. f. & Wils.) Broth.: 2a, 9a, 19, 22b, 26. Common on deer dung or rich decomposing organic matter.
- Tetraphidopsis pusilla* (Hook. f. & Wils) Dix.: 3b. Common on twigs in humid areas. Tiny and therefore often overlooked.
- Timmia norvegica* Zett.: 9b. Det. D. G. Horton.
- Tortella fragilis* (Hook. f. & Wils.) Limpr.: 1b, 5, 9b, 11. Det. D. H. Vitt. Common at the Owen Massif. At 9b the moss covered 2-3 square feet (ca. 0.19-0.28 m²: Ed.)
- Tortula anderssonii* Aongstr. (syn.: *T. beauleyensis* R. Brown ter.): No locality given. Abundant in upland subalpine areas.
- Tortula petriei* Beck.: 9, 11b, 14. Probably widespread on Mt. Owen Range.
- Tortula phaea* (Hook. f. & Wils.) Dix.: 1a, 1b, 5, 8, 9b, 10b, 11b. Abundant on xeric marble.
- Tortula princeps* De Not.: 3d, 13, 14a. On soil at base of schistose outcrops. The collection from 3d was also epigeal from base of *Dracophyllum traversii*.
- Tortula rubra* Mitt.: 17, 22a. In damp *Chionochloa australis* vegetation. Common in North-west Nelson.
- Tortula serrulata* Hook. & Grev.: 9b, 10b. A usually corticolous species here collected from bases of marble bluffs.
- Trachyloma diversinerve* Hamp. in F. Muell.: 3f, 15. On damp bark.
- Trachyloma planifolium* (Hedw.) Brid.: 15. Seems to prefer a more open habitat than the former.
- Trematodon flexipes* Mitt. in Hook.: 22a. Rare alpine species restricted to damp, exposed soil or seepages.
- Tridontium tasmanicum* Hook. f. in Hook.: 18a, 24. Abundant on rocks in streams.
- Ulota laticiliata* Malta: 3g, 26. Abundant on slender twigs of *Dracophyllum* spp.
- Weissia controversa* Hedw.: 9, 11b, 12a, 25. Abundant on damp, calcareous soil at base of bluffs.
- Weymouthia cochlearifolia* (Schwaegr.) Dix.: 4, 15. Abundant on fallen trees and old rotting logs.
- Weymouthia mollis* (Hedw.) Broth.: 15. Pendant on twigs of understorey shrubs.
- Zygodon hookeri* Hamp.: 3e, 3f, 9a, 18b. Common on damp rough bark.
- Zygodon intermedius* B.S.G.: 2a, 4, 9a, 15, 19, 22b. Very common on tree-trunks in damp forest.
- Zygodon menziesii* (Schwaegr.) Arnott: 2a, 9a, 15, 21b. On damp bark in forest or more rarely on damp marble.
- Zygodon minutus* C. Muell. & Hamp.: 2c. A tiny species often found on the inner, damper surface of hollow *Nothofagus* spp. often associated with *Orthodontium lineare*. Due to its small size and seldom-viewed habitat the moss is often overlooked, and has consequently been considered rarer than it is.

Phytogeographical considerations

Six phytogeographical elements can be recognized within the bryoflora of the Mt. Owen Range. The most interesting of these is the disjunct bipolar group comprising 41 of the 178 mosses collected or 23%. The very high percentage reflects the extreme richness of the flora that contains many interesting and surprising additions. Some of these are *Amblystegium varium*, *Calliergon cordifolium*, and *C. stramineum* from anthropogenic habitats, and *Encalypta rhaptocarpa*, *Orthothecium strictum*, *Plagiopus oederi*, *Timmia norvegica*, *Tortella fragilis* and *Schistidium alpicola*¹ from natural vegetation.

Some other bipolar species have been collected on Mt. Arthur but not yet on the Mt. Owen Range. These are *Hypnum curpressiforme* var. *julaceum*, *Polytrichastrum formosum*, and *Tetradontium brownianum*.

Another very small but interesting element is the eastern Asian consisting of two species: *Palamocladium macrostegium* and *Brachythecium* cf. *kuroishicum* var. *littorale*.

The austral-subantarctic element is represented by some 12 species, most of which are common in the lower North Island and in the mountainous areas of the South Island. *Brachythecium subplicatum* and *Camptochaete aciphylla* reach their northernmost limit in the Mt. Owen area. These are obviously species that have survived glaciation and are now relicts. *C. aciphylla* is particularly common in North-west Nelson, rarer further south, to be common again only on Auckland and Campbell Islands.

As could be expected, the majority of the recorded mosses belong to the Australian-Tasmanian element, thus showing strong similarity to the distribution of the phanerogamic flora in the same region.

Species endemic to New Zealand are well-represented, particularly by uncommon species restricted to particular habitats, e.g. specific substrates. This group accounts for ca. 11% of the recorded taxa and contains a rich calciphile component that is unique to New Zealand. *Anoetangium bellii*, *Astomum austro-crispum*, *Desmatodon viridipilus*, *Eucladium irroratum*, *Orthotrichum cupulatum* var. *austro-cupulatum*, *Plagiobryum novae seelandiae*, *Seligeria cardotii*, and *Tortula phaea* belong to this category. Other are confined to bark, e.g. *Bryobartlettia costata* and *Orthotrichum graphiomitrium*.

The cosmopolitan element is represented by *Bryum argenteum*, *Ceratodon purpureus*, and *Leptobryum pyriforme*.

Comments to the 'Species list' (J. Lewinsky)

In the manuscript, John reports of several presumably undescribed species belonging to the genera *Andreaea* (JKB 23516), *Brachythecium*, *Camptochaete* (JKB 25608), *Dicranella*, *Schlotheimia*, *Sphagnum*, and *Ulota*, and to the family Neckeraceae. I am sure many, if not all, of these collections have been sent to specialists for closer study. It will be interesting to learn about their identity. Unfortunately, collection numbers are given for only two of the specimens.

Among the *Bryum* species John lists *Bryum clavatum* Schleich. a nom.nud. and therefore not valid. It relates to a European taxon named in 1821. The valid combination *Bryum clavatum* (Schimp.) C. Muell. is used

¹See species list — Ed.

for a South American taxon which has not been reported from New Zealand. There is, however, also an illegitimate homonym *Bryum clavatum* Hook. f. & Wils. referring to Australasian material. In the Handbook (Sainsbury 1955) this species is named *Bryum curvicolium* Mitt., a name which has recently been reduced to synonymy of *Bryum erythrocarpoides* C. Muell. & Hamp. (Ochi 1970).

Isopterygium limatum is described by John as a robust species, whereas Sainsbury (1955) and Scott and Stone (1976) refer to it as slender and small, comparable to tiny forms of *Hypnum curpressiforme*. My own impression of *I. limatum* is also of small plants. Either the Mt. Owen mosses are exceptionally big or maybe they belong to another taxon.

The correct name for *Schistidium alpicola* (Hedw.) Limpr. is, according to Bremer (1980), *Schistidium rivulare* (Brid.) Podp. It was under this name Bremer recorded this taxon new to New Zealand. *S. alpicola* is a synonym for *S. agassizii* Sull. & Lesq.

John states in the ms. that *Trachyloma diversinerve* can be easily separated in the field from *T. planifolium* on the presence of black pseudopodia of the exerted brood body clusters. This character is not mentioned by other authors, e.g. Scott & Stone (1976), who are more likely to regard the two taxa as conspecific.

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