



FLORA OF NEW ZEALAND
MOSESSES

SELIGERIACEAE



A.J. FIFE

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Cover image: *Blindia magellanica*, habit with capsules. Drawn by Rebecca Wagstaff from A.J. Fife 9562, CHR 477528.

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Introduction

The Seligeriaceae are a family of six genera of predominantly temperate to cool-temperate distribution. *Blindia* and *Seligeria* are the largest genera. The former is primarily a southern hemisphere genus, albeit one with a northern hemisphere type. Seven species of *Blindia* occur in N.Z. Its members occur most commonly on non-calcareous rocks in moving water and they can form a conspicuous part of the aquatic flora of N.Z. streams. There is a strong southern bias to the N.Z. distribution of the genus, and only three of the seven species are known from the North I. The generic name *Blindia* was not used in early N.Z. literature and this can lead to confusion concerning early collections, which were assigned to other genera. The great Finnish bryologist Brotherus was the first to circumscribe *Blindia* in its modern sense, while Dixon was the first to discuss the genus in a N.Z. context. The variation of some N.Z. *Blindia* species is great and this makes the identification of some sterile collections difficult. However, even sterile plants of the genus usually present a distinctive facies. When leaves are stripped from the stem, leaf base fragments often persist on a stiff and often brittle stem, giving it a distinctive roughened appearance. In species with differentiated alar cells, the pigmented, abruptly differentiated and auriculate alar group is characteristic. *Seligeria*, by contrast, includes mostly minute plants that grow on weathered calcareous or cation-rich rock. This genus of c. 19 species is mostly distributed in temperate regions of the northern hemisphere and only two species are recorded from N.Z. These tiny plants are very unlikely to be collected, except when capsules are present. *Seligeria cardotii* occurs nearly throughout the country on sheltered and weathered limestone; it also occurs in Tasmania. The endemic and much rarer *S. diminuta* is known only from limestone crevices in Canterbury L.D. and is among the least collected moss species in N.Z. It is currently given a conservation ranking of nationally critical (the mostly highly threatened ranking for a plant in N.Z.) and its habitats are threatened by rock climbing activities in the Broken River basin.

Seligeriaceae

Plants minute to robust, often glossy, saxicolous. **Stems** simple or forking repeatedly, wiry or soft. **Leaves** lanceolate, subulate, or linear, usually with a distinct base and often \pm shouldered, plane, mostly entire or denticulate; **laminal cells** long- or short-rectangular or quadrate, firm- to thick-walled, not porose, smooth; **alar cells** absent or well-differentiated. **Costa** single, narrow or broad below, mostly filling the upper leaf, in cross-section usually with a differentiated median layer of guide cells.

Dioicous or autoicous. **Setae** elongate or short; **capsules** mostly exserted, symmetric, dark, often turbinate or urceolate when dry, usually thick-walled, often with an elongate and persistent columella; **mouth** transverse; **exothecial cells** usually uniformly thick-walled; **stomata** superficial, few at base of capsule or sometimes apparently absent; **annulus** not differentiated; **operculum** mostly conic-rostrate, smooth, often systylious. **Peristome** haplolepideous, well-developed or absent, with 16, lanceolate, mostly red teeth, the outer surface composed of strongly thickened and usually smooth (but sometimes appearing warty in N.Z. species due to presence of a preperistome) plates and with well-developed transverse walls, lacking a median zigzag line; **preperistome** absent or occasionally present (in *Blindia*). **Calyptra** cucullate and smooth. **Spores** spherical, smooth or papillose, often green.

Taxonomy: The family is placed within the subclass Dicranidae, order Grimmiales by Goffinet et al. (2009). The Seligeriaceae are considered to include six (including *Notothamia*) genera of predominantly temperate to cool-temperate distribution. *Blindia* and *Seligeria* are the largest genera in the family.

The genus *Notothamia* was recently erected by Ochyra & Seppelt (2011) to accommodate the rare Tasmanian taxon originally described as *Blindia ferruginea* Mitt. Only a few collections of *N. ferruginea* (Mitt.) Ochyra & Seppelt, from Tasmania and Victoria, have been verified. Its sporophyte morphology clearly suggests that it is correctly placed in the Seligeriaceae, although the leaf cells are aberrant in this family (as noted by Bartlett & Vitt 1986). This species is misplaced in *Blindia* and the genus *Notothamia* is worthy of recognition. The two Tasmanian collections verified are from 4000 and 4300 feet (1220 and 1311 m) elevation, while the one Victorian collection was from sandstone at an unspecified elevation in mountains of the Grampians National Park. *Notothamia ferruginea* could reasonably be expected in alpine areas of N.Z., where it might be confused, if sterile, with a *Dicranoweisia* or a costate *Andreaea*.

- 1 **Plants** medium-sized to robust, with elongate stems; **leaves** rarely less than 3 mm, mostly >5 mm; **mid laminal cells** elongate-rectangular to linear (rarely subquadrate); **alar cells** variably differentiated, usually coloured and inflated; **spores** c. 18–45 μm in N.Z. species; on non-calcareous rock, gravel, or silt (*B. magellanica* grows occasionally on limestone), mostly aquatic or subaquatic *Blindia*
- 1' **Plants** extremely small, with stems less than 3 mm in N.Z. species; **leaves** <2.2 mm; **mid laminal cells** quadrate to short-rectangular; **alar cells** not differentiated; **spores** smaller (c. 8–15 μm in N.Z. species); on calcareous or cation-rich rock, not aquatic (in N.Z. species) *Seligeria*

***Blindia* Bruch & Schimp. in Bruch et al., *Bryol. Eur.* 2, 17 (1846)**

Type taxon: *Blindia acuta* (Hedw.) Bruch & Schimp.

Elements in the following description are taken from Bartlett & Vitt (1986).

Plants medium-sized to robust, usually glossy and soft in texture, often yellow- or brown-green above and dark green to nearly black below, forming soft, densely interwoven mats or turves, aquatic, subaquatic, or on rocks in splash zones. **Stems** commonly much-branched by forking and innovation, wiry or less often soft, in cross-section with a central strand. **Leaves** erect-spreading or secund, sometimes falcate, usually little altered when dry, lanceolate or lanceolate-subulate, sometimes with a weakly defined oblong base, often appearing \pm shouldered and this accentuated by the leaf concavity, the upper portion of the leaf \pm filled by the costa, subtubulose below and clasping at base, plane at margins, entire or rarely denticulate above; **upper laminal cells** (in upper part of leaf base or $\frac{1}{3}$ above insertion) elongate-rectangular to linear, rarely short-rectangular (in *B. contecta*), thick-walled, not or very weakly porose, smooth; **lower laminal cells** often longer; **alar cells** variably differentiated but usually coloured and inflated, sometimes remaining attached to stem. **Costa** single, narrow or broad below, mostly filling the subula, in cross-section usually with a differentiated median layer of guide cells.

Dioicous or autoicous. Perichaetial leaves with a defined base and \pm abruptly shouldered, subulate. **Perigonia** on short lateral branches or terminal, with short, non-subulate bracts and mostly numerous antheridia intermixed with many filiform paraphyses. **Setae** variable in length, straight or curved; **capsules** erect, usually turbinate or urceolate when dry, \pm hemispheric when moist, immersed to exerted, dark, usually thick-walled, often with a persistent columella; **mouth** transverse; **exothecial cells** thick-walled, sometimes thickened in corners; **stomata** few at base of capsule or sometimes appearing absent; **annulus** not differentiated; **operculum** mostly conic-rostrate or rarely bluntly mammillate (in *B. martinii*), often systylious; **columella** short or exerted. **Peristome** single, well-developed or absent, with 16, lanceolate, red to hyaline teeth, the outer surface composed of strongly thickened and usually smooth plates and with well-developed transverse walls (but sometimes appearing warty in N.Z. species due to preperistome development); **preperistome** sometimes present. **Calyptra** cucullate and smooth. **Spores** spherical, smooth or papillose, often green.

Taxonomy: *Blindia* is a predominantly southern hemisphere genus of c. 20 species. Seven species are accepted from N.Z. A valuable survey of the genus in N.Z. was provided by Bartlett & Vitt (1986), while Andreas (2013) has recently published a revision for southern South America that treats several of our species. The N.Z. members of the genus most commonly occur on non-calcareous rocks, either irrigated or submerged, except for one species (*B. martinii*), which can occur on non-irrigated rock. There is a strong southern bias to the N.Z. distribution. Only three of the seven species have been found on the North I. where they are restricted to higher elevation sites.

The generic name *Blindia* was not used in early N.Z. literature, and this can lead to confusion concerning early collections which were assigned to other genera. The genus was erected in 1846 to accommodate the single widespread northern hemisphere *B. acuta* (Hedw.) Bruch. & Schimp. It was not until the early years of the 20th century that southern hemisphere species were assigned to the genus. Brotherus (1901–1909, p. 306) appears to have been the first to circumscribe *Blindia* in something like its modern sense. Dixon (1914) was the first to discuss the genus in a N.Z. context. The most recent revision of the genus was provided by Bartlett & Vitt (1986). Andreas (2013) provided a treatment for southern South America in which she described three new species. From her descriptions and illustrations, none of these three appear to be conspecific with N.Z. species.

Some N.Z. *Blindia* species show considerable variation, which makes the confident identification of a fraction of sterile collections difficult. The variability of *B. robusta* is particularly troublesome and some sterile material of this species can be very difficult to distinguish from either *B. immersa* or *B. lewinskyae*.

The isolated vegetative leaves of all N.Z. species of *Blindia* (with the exception of *B. contecta* and some populations of *B. immersa*) appear to have sharply differentiated leaf bases and subulae when viewed under the stereoscope. However in most N.Z. species, including *B. magellanica*, *B. martinii*, and *B. robusta*, the “shoulder” of the apparent leaf base is due primarily to the concavity of the leaves; if an isolated leaf is carefully flattened, the “shoulder” largely or entirely disappears. In most N.Z. species (including the three species just mentioned), perichaetial leaves are more distinctly shouldered than vegetative leaves, making the distinction between them critical. Therefore, when the laminal length or the lamina:subula ratio is used in keys and descriptions here, vegetative or perichaetial leaves are specified and the lamina is defined as that portion of the leaf in which laminal cells are visible in an unflattened leaf under the stereoscope. The subula is that portion of the leaf where laminal cells are not visible in an unflattened leaf under the stereoscope.

Bartlett & Vitt’s (1986) key to species (dichotomy 2) utilises lamina:subula length ratios to separate *Blindia* into two roughly equal-sized groups, with *B. robusta* keying out in both groups. This causes difficulty with sterile material, in part because the key does not specify whether the ratios were determined using perichaetial or vegetative leaves.

In the species where the vegetative leaves have no clearly defined leaf base, the term “upper laminal cells” is here used to describe cells taken $\frac{1}{3}$ above the insertion, while in the species with a clearly differentiated leaf base, the upper laminal cells are described from the upper portion of the leaf base.

Although most N.Z. species have a clearly defined layer of median guide cells in a vegetative leaf costal cross-section (taken near the upper limit of the distinct lamina), the costae in *B. acuta*, the northern hemisphere generitype (*vide* J.A. Allen 69 from Washington State, CHR 412729), is homogeneous in cross-section.

Recognition: While confusion between *Blindia* and other subaquatic mosses is possible, members of the genus generally present a distinctive facies, even when sterile. When leaves are stripped from the stem, leaf base fragments often persist on the stem in a way that gives it a distinctive roughened appearance. In the species with differentiated alar cells, the pigmented, abruptly differentiated, and auriculate alar group is distinctive. The terminal position of sex organs and associated innovations

also aid in distinguishing this genus from some superficially similar genera, including members of the Amblystegiaceae.

When sterile, more robust species of *Blindia* could be confused with aberrant material of *Dicranoloma*, particularly if the latter is growing submerged, as occasionally occurs. The stems of *Blindia* species are usually wiry and darkly coloured, with leaf bases adherent after leaves are removed, and have sparse (if any) rhizoids. The alar cells are mostly strongly pigmented and the leaves are mostly entire. The costae lack any spines or wings on the abaxial surface, and in cross-section are very simple in their anatomy (with a median band of guide cells) and mostly fill the subulae. The upper portion of the leaf thus lacks a distinct lamina. Species of *Dicranoloma*, by contrast, have softer and paler stems, usually lack adherent leaf bases, and are usually covered with dense pale-brown or whitish rhizoids. The alar cells there are often unpigmented and the leaf margins are mostly clearly toothed; the costae are often ornamented abaxially with spines or wings, and in cross-section have a more complex anatomy. The upper portion of the leaf in species of *Dicranoloma* nearly always has a distinct lamina. The rare and high-elevation *Holodontium strictum* (Hook.f. & Wilson) Ochyra (= *Chorisodontium burrowsii* Allison) could easily be misinterpreted as a robust species of *Blindia*. However, *H. strictum* can be distinguished from *Blindia* spp. by the presence of papillae on the adaxial surface of its laminal cells and the lack of a central strand, among other features. The strongly lustrous, narrowly lanceolate, and falcate-secund leaves of the very rare *Sematophyllum fiordensis* Fife are suggestive of a *Blindia*, but its branching pattern and the absence of both costae and a central strand preclude confusion.

Etymology: The genus is named after J.J. Blind, an 18th century pastor from Alsace.

The following key is modified from that of Bartlett & Vitt (1986).

- 1 **Lamina of vegetative leaves** extending a third or more of the leaf length (under stereoscope); **perichaetial leaves** with a short subula that is 2 times or less the length of the leaf base 2
- 1' **Lamina of vegetative leaves** extending less than a third of the leaf length (under stereoscope); **perichaetial leaves** with an elongate subula that is usually 2–6 times the length of the leaf base 5
- 2 **Capsules** immersed in perichaetial leaves; **vegetative leaves** either denticulate at apices (in *B. martinii*) or **cells of the upper lamina** quadrate to short-rectangular (in *B. contecta*) 3
- 2' **Capsules** exerted beyond tips of perichaetial leaves; **vegetative leaves** entire throughout and **cells of the upper lamina** elongate 4
- 3 **Vegetative leaves** rigid; loosely erect to slightly secund; **upper leaf margins** entire; **cells of upper lamina** and of the abaxial surface of subula quadrate or short-rectangular, about 2:1; **operculum** long rostrate; **plants** usually submerged in streams and pools *B. contecta*
- 3' **Vegetative leaves** falcate-secund to circinate-flexuose; **upper leaf margins** denticulate; **cells of upper lamina** and of the abaxial surface of subula elongate; **operculum** low-conic or mammillate, not rostrate; **plants** on irrigated rock, not submerged *B. martinii*
- 4 **Vegetative leaves** mostly 3.0–5.0 mm, secund to ± falcate-secund but not circinate when moist; **setae** cygneous or strongly flexuose when moist; **spores** 18–24 µm *B. magellanica*
- 4' **Vegetative leaves** mostly 6.0–9.0 mm, falcate to circinate, less often flexuose-secund or rarely ± straight when moist, **setae** stiffly erect or variably flexuose; **spores** 27–45 µm *B. robusta*
- 5 **Setae** very short, <1.0 mm; **capsules** immersed; **costa** ill-defined and (150–)200–275 µm wide in leaf base, in cross-section lacking guide cells *B. immersa*
- 5' **Setae** elongate; **capsules** immersed, emergent, or exerted; **costa** mostly well-defined and <100 µm wide in leaf base, in cross-section with a median layer of guide cells 6

- 6 **Vegetative leaves** 9.0–12.0 mm; **capsules** immersed to emergent; **alar cells** poorly developed; restricted to Nelson & Westland L.D. *B. lewinskyae*
- 6' **Vegetative leaves** shorter, (5.0–)6.0–8.0(–9.0) mm; **capsules** ± exerted (usually clearly so); **alar cells** usually well-developed; widespread 7
- 7 **Alar cells** well-developed and usually visible in isolated vegetative leaves; **costae** mostly 50–60 µm wide and well-defined in lower leaf; **vegetative leaves** mostly distinctly falcate-secund (except when growing in still or slowly moving water); widely distributed on main islands *B. robusta*
- 7' **Alar cells** not differentiated in vegetative leaves; **costae** usually 70–90 µm wide and ill-defined in lower leaf; **vegetative leaves** flexuose to loosely falcate-secund; known only from Auckland, Campbell, and Macquarie Is *B. seppeltii*

Excluded Taxa: *Blindia maxwellii* Vitt was described from Campbell I. According to Seppelt (2004, p. 152), *B. maxwellii* “bears a close similarity” to what he termed the “short seta form of *Ditrichum strictum* from Macquarie Island”. I have examined the holotype of *B. maxwellii* (NY 267838) and consider it to be a *Ditrichum*. It is, in my opinion, taxonomically the same as the the polster-forming *Ditrichum* from Macquarie I. in which, quoting Seppelt, “the seta reaches only around 1.0 cm in length and the capsule is barely exerted above the tips of the perichaetial leaves”. The best name to apply to this *Ditrichum*, which occurs on Auckland, Campbell, and Macquarie Is, is unclear. Dale Vitt (pers. comm. 1 June 2015) has suggested that it may eventually prove to belong in the poorly understood genus *Verrucidens*.

***Blindia contecta* (Hook.f. & Wilson) Müll.Hal., Syn. Musc. Frond. 1, 344 (1848)**

≡ *Weissia contecta* Hook.f. & Wilson, *London J. Bot.* 3: 540 (1844)

Lectotype: N.Z., “Campbell's Island,” *J.D. Hooker s.n.* (“Wilson no. 30”), Antarctic Expedition 1839–1843, BM-Wilson! (Designated by Bartlett & Vitt 1986, p. 237.)

Elements in the following description are taken from Bartlett & Vitt (1986).

Plants golden-green to yellow-brown above, olive-green to black below, dull to lustrous. **Stems** stiff, sparsely branched, to at least 35 mm, in cross-section with a distinct central strand and c. 3 layers of thick-walled and pigmented cortical cells, with fragments of leaf bases adhering after leaves have been removed. **Leaves** rigid, loosely erect to slightly secund when dry, similar when moist, subulate from a weakly-defined ovate base, rather quickly tapered from base to a stout subula (obscured by concavity), not distinctly shouldered, clasping and ± auriculate at base, lamina extending 2/5 to 1/2 the leaf length (under stereoscope), obtuse or ± rounded at apex, entire, 5.0–6.0 × 0.7–0.9 mm (when flattened); **upper laminal cells** (c. 1/3 above base) quadrate to short-rectangular, straight, unistratose, firm-walled, (12–)15–21 × c. 6 µm, not expanded at ends; **lower laminal cells** longer, to c. 60 µm, strongly incrassate, not porose; **alar cells** subquadrate, oblate, or ± irregular, lax and thin-walled, pigmented, forming a large and auriculate group extending to the costa and c. 10 cells or more up the leaf margin. **Costa** c. 180–200 µm wide near base, well-defined, with both the abaxial and adaxial surface cells quadrate to short-rectangular, in cross-section c. 1/3 above base with a distinct median layer of guide cells and both abaxial and adaxial stereids; above (in middle of subula) with the guide cell layer less distinct.

Autoicous. Perichaetial leaves similar to vegetative, lacking a distinct shoulder, the subula ± equal the lamina. **Perigonia** lateral below the perichaetia; inner bracts not clearly seen, short and lacking a subula. **Setae** 1.0–2.0 mm (excluding the vaginula), straight, stout, not twisted, yellow-brown; **capsules** hemispheric to obovate when dry, little altered when moist, immersed, brown, c. 1.0 × 0.9 mm; **exothecial cells** thick-walled; **stomata** not seen; **operculum** long-rostrate from a conic base, apparently systylious. **Peristome** apparently well-developed, broken in material seen. **Spores** c. 42 µm.

Illustrations: Plate 1. Wilson & Hooker 1845, pl. 58, fig. iii (as *Weissia contecta*); Bartlett & Vitt 1986, figs. 135–142; Andreas 2013, fig. 4, A–K.

Distribution: A; C.

Austral. Reported from Kerguelen and Heard I. by Bartlett & Vitt (1986), but the Kerguelen record appears to have been based on a misidentification of material of *Ditrichum strictum* (in BM). They also cited literature records from Patagonia. Andreas (2013) largely repeated the localities cited by Bartlett

& Vitt (1986) and cited an “unusual specimen” from Easter I. The last locality seems dubious on phytogeographic grounds.

Habitat: According to Bartlett & Vitt (1986), *B. contecta* is always subaquatic; it occurs on wet rock faces, often beside waterfalls. An Auckland Is (Adams I.) collection has been seen from 579 m elevation.

Notes: This poorly documented species is recognisable by its rigid, loosely erect to slightly secund leaves, strongly differentiated alar cells, quadrate upper laminal cells, and immersed hemispheric capsules. The subula cells and both the abaxial and adaxial surface cells of the costa are quadrate to short-rectangular, in contrast to other N.Z. species of *Blindia*.

Andreas (2013) emphasised the brown colour of the axillary hairs in *B. contecta*; she described them as “brownish, with 2 basal cells, $7 \times 10 \mu\text{m}$ and 4–8 longer cells, $25\text{--}75 \times 5\text{--}10 \mu\text{m}$ ”.

Bartlett & Vitt (1986, p. 237) reported more variability in leaf length (3.0–8.0 mm) and in lower laminal cell length (to $140 \mu\text{m}$) than I have observed. I have not observed the details of the exothecial cells, which Bartlett & Vitt describe as “15–35 μm wide at mid-urn, decreasing in size towards rim, isodiametric to rounded, thick-walled, rim cells in 5–10 rows, oblate to quadrate, with thick, sinuous walls”, nor the range of spore size (32–40 μm) which they report, due to only one herbarium specimen being available for study. They described the peristome “of 16 lanceolate teeth, hyaline above, broken in upper portions in old capsules and blunt”.

Etymology: The epithet comes from *contectus*, an adjective derived from the verb *contego* (to cover or conceal) and thus meaning “covered” or “concealed by a covering” (D. Meagher, pers. comm., 5 May 2015); it probably refers to the immersed or concealed capsules.

***Blindia immersa* (E.B.Bartram & Dixon) Sainsbury, Rev. Bryol. Lichenol., n.s. 21: 215 (1952)**

≡ *Blindiopsis immersa* E.B.Bartram & Dixon in Dixon & Bartram, *Bot. Not.* 1937: 68 (1937)
Lectotype: N.Z., “Martin’s Bay, South I., 1874; coll. *Capt. Hutton*, herb. S. Berggren (B 105)”, FH (Not seen.) Isolectotypes: CHR 570797!, WELT M005033! (Lectotype designated by Bartlett & Vitt 1986, p. 236.)

Plants gold-brown or dark, dirty green, often brighter green near apices, not or weakly glossy. **Stems** commonly 40–90(–180) mm, flexuose, branching by forking and innovation, in cross-section with the cortical cells thick-walled in c. 3 layers, and with a faint central strand. **Leaves** flexuose-erect when dry, little altered when moist, often forming a \pm penicillate terminal tuft, with an oblong base c. 2.0–2.5 mm long and gradually narrowed to a long, flexuose subula which is c. 3.5–5 times the base, entire, clasping at base, 8–11(–14) mm; **upper laminal cells** (from upper portion of the oblong base) linear-rectangular, mostly $45\text{--}90 \times 6\text{--}10 \mu\text{m}$, moderately incrassate, the lumina mostly expanded at cell ends, becoming shorter and \pm rhombic or more irregular at shoulder; **lower laminal cells** similar; **alar cells** not differentiated. **Costa** (150–)200–275 μm wide and filling c. $\frac{2}{3}$ of the leaf base, strong but ill-defined, the abaxial surface with short, rectangular cells, in cross-section with no differentiated guide cells.

Autoicous. Perichaetia often clustered at plant apex, sometimes overtopped by innovation; **perichaetial leaves** with a broader base and somewhat shorter than vegetative, otherwise similar. **Perigonia** on short branches directly below the perichaetia, the inner bracts short, broadly ovate and acute. **Setae** <0.5–1.0 mm, stout and erect, not twisted; **capsules** broadly turbinate when dry, becoming more hemispherical when moist and with age, immersed, yellow-brown with an orange rim, becoming dark brown with age, c. 0.8–1.0 long \times 0.8–1.0 mm diam., often appearing gymnostomous under the stereoscope; **exothecial cells** regular in outline, oblong-hexagonal, mostly 25–50 μm in greater diam., moderately incrassate and not or only weakly collenchymatous, c. 3–5 rows thicker-walled and rounded to oblate at rim; **stomata** not seen; **columella** persistent; **operculum** long-rostrate from a conic base, c. 1.2 mm. **Peristome** rudimentary, with the teeth poorly formed and irregular, mostly extending c. 80–100 μm beyond the rim, distinctly red-pigmented and cribose. **Spores** 24–36 μm , green, smooth.

Illustrations: Plate 1. Dixon & Bartram 1937, fig. 3 (as *Blindiopsis immersa*); Bartlett & Vitt 1986, figs. 125–133, 154.

Distribution: SI: Nelson (Pikikiruna Range, Stockton Plateau), Westland or Otago (Martins Bay or Milford Sound); St (Glory Harbour, Pegasus Creek, Table Hill); Ch (Makara River); A. Endemic.

Habitat: On submerged rocks, often in or at the base of waterfalls; also from “granite sand in stream” through *Chionochloa rubra* grassland on the Stockton Plateau and “on silty bed of stream” near Pegasus Creek. The number of herbarium collections from the three Stewart I. localities suggests that *B. immersa* is abundant there. *Cryptochila grandiflora* (as *Jamesoniella sonderi*) was noted by Martin (*in herb.*) as an associate at Staircase Falls, Glory Harbour. The Stewart I. collections were made between sea level and c. 200 m elevation, while collections from the Stockton Plateau are from c. 700 m elevation.

Notes: There is confusion concerning both the provenance and the collection date of the lectotype and its duplicates. The protologue cites the Hutton collection (there cited as a syntype) from “Martin’s Bay, South I., 1874; coll. *Capt. Hutton*, herb. S. Berggren (B 105)”. An isolectotype in WELT (M005033!) is labelled (apparently in W. Martin’s hand) as B 105, “Martin’s Bay, Ins. austr., Novae Zelandiae, 1874, *Capt. Hutton*”. It bears supplementary notes (not relating to the specimen’s provenance) in Sainsbury’s hand. An apparent isolectotype in CHR (CHR 570797!) cites (in the hand of W. Martin) the provenance of this Hutton collection as “Milford Sound” and the year of collection as “1862?”. Berggren collected neither at Martins Bay nor Milford Sound during his 1874–75 travels in N.Z. The syntype of *Capt. [F.W.] Hutton* (subsequently lectotypified by Bartlett & Vitt) was probably collected in 1862, rather than 1874, and its origin may have been either Martins Bay (in Otago L.D.) or nearby Milford Sound (in Southland L.D.).

One of the Taramakau [“Teremakau”] paratypes (*S. Berggren* 226, CHR 570807!; WELT M005035!) cited by Dixon & Bartram (1937, p. 68) is referable to *B. lewinskyae*. Although neither *S. Berggren* 149 nor 30 have been seen, the reported occurrences of this species at Taramakau and Bealey are considered doubtful. The Pikikiruna Range record is based on J.K. Bartlett collections from “Moa Park” (c. 7 km east of Harwoods Hole, Nelson L.D.).

Bartlett & Vitt (1986, fig. 134) mapped four South I. localities (including “Moa Park”, and both Martins Bay and Milford Sound). Their fourth locality is in the general vicinity of Hokitika (Westland L.D.) but no material has been confirmed from there.

The type collection is paler and more yellow-green than the bulk of herbarium collections, which are dark and often dirty green, with little or no lustre. The peristome is “of an irregular row of 1–3 hyaline cells” according to Bartlett & Vitt (1986), but in the few peristomate capsules I have seen, the irregular teeth are pigmented and as described above. Unfortunately, capsules in all the fruiting Stewart I. collections are rather old; sporophyte details in the description are primarily from Stockton Plateau collections made by D. Glenny (CHR).

A remarkable feature of this species is the apparent complete lack of guide cell development in the costae (although the median cells are larger than the peripheral cells); all could be interpreted as stereids.

Recognition: This species is most likely confused with *B. lewinskyae*. When sterile, *B. immersa* is best separated from *B. lewinskyae* by its ill-defined and broad costae, more flexuose stems, and shorter (mostly 45–90 μm vs mostly 90–200 μm long) cells in the upper portion of the leaf base. When fruiting, the very short seta of the present species readily distinguishes it from *B. lewinskyae*.

Although the capsules of *B. immersa* can be difficult to see, when they are located *B. immersa* could only be confused in N.Z. with *B. martinii* and *B. contecta*. Compared to the former, *B. immersa* is a more robust plant growing submerged rather than on damp rock. The present species has erect-flexuose, long subulate leaves with entire margins, which contrast with the falcate-secund, short-subulate, and denticulate leaves of *B. martinii*. Compared to *B. contecta*, the longer cells in the upper leaf base (mostly 45–90 μm vs 8–20 μm), the longer leaf subulae, and the shorter setae serve to separate the species. Their known distributions do not overlap.

Blindia immersa has been confused with *Ditrichum strictum*, but the latter is a coarser looking plant, with leaves thicker in appearance, twisted when dry, and distinctly rounded and toothed apically. *Ditrichum strictum* has a narrower and more clearly defined costa with a strong medial band of guide cells and exserted capsules.

Etymology: The epithet refers to the immersed capsules.

***Blindia lewinskyae* J.K.Bartlett & Vitt, *New Zealand J. Bot.* 24: 227 (1986)**

Type: N.Z., South Island, Westland, Cedar Creek, Sep. 14, 1978, *J.K. Bartlett* 23125.
Holotype: ALTA. Not seen. Isotypes: AK 197347!, CHR 412477!

Plants olive-green to black, usually yellow-green to dark green at tips, very soft and silky, lustrous. **Stems** rather soft, commonly to c. 90 mm, sparsely branched by forking and probably also by innovation, in cross-section with a central strand, firm-walled internal cells and a single layer of darkly-pigmented cortical cells. **Leaves** erect, flexuose to weakly secund when dry, unchanged when moist, often more secund at stem apex, with a narrowly oblong base and gradually narrowed to a filiform subula which is 3–5 times the length of the base, entire, subtubulose below, neither decurrent nor clasping at base, 9.0–12.0 × 0.5–0.6 mm; **upper laminal cells** (from upper portion of oblong base) linear and ± straight, strongly incrassate (the walls ± equal to the lumina), c. 60–100 × 3 µm, but with the lumina expanded slightly at cell ends; **lower laminal cells** similar; **alar cells** weakly differentiated, slightly inflated and thinner-walled than adjacent laminal cells, not auriculate, separated from the costa by several rows of elongate cells. **Costa** c. 60–90 µm wide below, mostly well-defined and filling the subula, in some leaves becoming ± ill-defined in lower portion of base, in cross-section with a layer of median guide cells.

Autoicous. Perichaetia terminating the stem but usually overtopped by innovation and occurring at several points on the well-developed plants; **perichaetial leaves** from a broadly oblong and sheathing base, abruptly shouldered and narrowed to a long and slender subula. **Perigonia** on short branches below the perichaetia. **Setae** 4.0–7.0 mm, straight or gently curved, not twisted; **capsules** turbinate and wide-mouthed when dry, ± hemispheric when moist, immersed in the perichaetial and surrounding vegetative leaves or emergent, yellow-brown at maturity and becoming dark brown with age, pachydermous, 0.6–0.9 × 0.7 mm diam.; **exothecial cells** highly irregular in shape and size, moderately incrassate and weakly collenchymatous, c. 5–6 rows thicker-walled, and oblate to isodiametric at rim; **stomata** not seen; **operculum** long and finely rostrate from a nearly plane base, longer than the capsule. **Peristome** reduced to a few, hyaline, rectangular cells. **Calyptra** as per genus. **Spores** 27–36 µm, smooth, green.

Illustrations: Plate 2. Bartlett & Vitt 1986, figs. 101–108.

Distribution: SI: Nelson (Stockton Plateau, Denniston Plateau, Big River, near Ikamatua), Westland (Taramakau River, near Kūmara, Doolan Creek, Pattison Creek, Ōkārito and vicinity). *Blindia lewinskyae* occurs abundantly at several of its known localities, including the Waimangaroa River and its tributaries on the Denniston Plateau, in streams on the Stockton Plateau, and at Doolan Creek (near Craigieburn, Westland L.D.).

Endemic.

Habitat: Occurring submerged (or emergent at low flows) and on sandstone and granitic rock and derived gravels. Mostly in shallow streams of moderate flow. In the Waimangaroa River (Denniston Plateau, near confluence with Cedar Creek), *B. lewinskyae* is one of few bryophyte species dominating the epilithic, submerged vegetation. It co-occurs at this site with the aquatic hepatics *Chiloscyphus austrigenus*, *Hepatostolonophora rotata* var. *rotata*, and *Pachyglossa tenacifolia* (D. Glenn, pers. comm., 1 May 2015). The Waimangaroa River drains an extensive area of cushion bogs; the water is highly tannin-stained and very little insect life is present in this shallow river of moderate water speed, probably partly due to an acidic pH. Unusual habitats are recorded from Kōhuamārua Bluff (near Ōkārito), where this species occurred “in cascading water on littoral boulder within spray zone at high tide.” Also, at Cemetery Creek (near Ōkārito) this species was collected from the “concrete bottom of [a] culvert.” Bartlett & Vitt (1986) recorded *B. lewinskyae* as forming “pure stands on submerged rocks” at the Ōmoeroa River (Westland L.D.), a stream they described as having a similar peat bog source as the streams on the Denniston Plateau. The Ōmoeroa River material has not been available for study. A Bartlett collection of *Blindia lewinskyae* labelled (*in herb.*) from “Moa Park” (Pikikiruna Range, Nelson L.D., AK 197698 & CHR 590999) is of doubtful provenance; this locality is not recorded by Bartlett & Vitt (1986).

Notes: Older portions of plants of *B. lewinskyae* are often heavily encrusted with cyanobacteria. Herbarium records suggest that at some localities *B. lewinskyae* may co-occur with *B. immersa*. Occurring from sea level (near Ōkārito) to 900 m elevation (Mt Frederick, Stockton Plateau), with the bulk of herbarium records from c. 535–660 m.

At least some sterile paratype material (e.g., *S. Berggren* 226, CHR 570807) of *B. immersa* from the Taramakau River is better referred to *B. lewinskyae*.

Recognition: I agree with Bartlett & Vitt (1986) that the long (c. 60–100 µm) and narrow cells of the upper portion of the leaf base and long, slender subulae facilitate recognition of this species. The taper from the leaf base to the subula is gradual (and accentuated by the subtubulose nature of the leaves). However, the leaves are not as evenly tapered as in *B. robusta* or *B. magellanica*. The alar cells of *B. lewinskyae* are only weakly differentiated.

Confusion is most likely with *B. immersa*. The relatively narrow (c. 60–90 µm wide below) and mostly well-defined costae with a median layer of guide cells in this species provide the most reliable means of separating it from *B. immersa* (where the costae are mostly 200–275 µm wide, ill-defined, and lack guide cells) when sterile. The length of the laminal cells in the upper portion of the leaf base also distinguishes these species. When fruiting, the differences in the length of their setae distinguishes them.

Etymology: The epithet honours the Danish bryologist Jette Lewinsky (1948–1998), who worked in N.Z. and published treatments of Australasian *Orthotrichum* and *Zygodon*.

***Blindia magellanica* Schimp. in Müller, *Bot. Zeitung (Berlin)* 20: 328 (1862)**

Syntype: Chile, “Insula Eremitae: *J.D. Hooker*,” BM-Hampe! (Cited as a Holotype by Bartlett & Vitt 1986, p. 218.)

= *Blindia acuta* var. *curviseta* Hook.f. & Wilson, Bot. Antarct. Voy. III. (Fl. Tasman.) Part II 172 (1859)
Lectotype: Tasmania, “rivulet near Cumming’s Head, Western Mountains, *Archer*”, BM-Hooker! (Designated by Bartlett & Vitt 1986, p. 218.)

= *Blindia theriotii* R.Br.bis., *Trans. & Proc. New Zealand Inst.* 35: 335 (1903)

Type: N.Z., “On wet rocks or banks, Staircase Gully and Cascade Creek, Mount Torlesse. Collected by R. Brown, January, 1900”. Not seen.

Plants gold-green, or yellow-green above, light brown to olive-green in lower portions and in submerged forms, glossy. **Stems** c. 5–40 mm, flexuose, repeatedly branched by both innovation and forking, in cross-section with a central strand and thick-walled cortical cells. **Leaves** secund to ± falcate-secund (especially near stem apex), occasionally nearly straight when dry, similar when moist, not penicillate, narrowly ovate-lanceolate or with a weakly defined ± oblong base, evenly tapered or weakly shouldered with a rather stout subula which is $\frac{1}{3}$ – $\frac{1}{2}$ the total leaf length, narrowly acute or rarely ± rounded at apex, entire, crenulate, or denticulate at apex, subtubulose in lower half, (2.0–)3.0–5.0 mm; **upper laminal cells** (c. $\frac{1}{3}$ above base) linear, weakly sinuose, strongly incrassate (the walls ± equal the lumina), variable in length, c. (21–)45–60 × 3–4 µm, expanded slightly at cell ends; **lower laminal cells** ± longer, but becoming very short and incrassate at extreme base; **alar cells** inflated, orange or hyaline, forming a very distinct group extending c. 4 cells up the leaf, and contiguous with a small number of subquadrate and incrassate cells that merge upwards with the laminal cells, separated from the costa by elongate, thick-walled, orange cells. **Costa** mostly 45–60 µm wide $\frac{1}{3}$ above the leaf base, well-defined or occasionally ± fading at leaf base, stoutly excurrent and filling the subula, otherwise as per genus.

Dioicous. **Perichaetia** terminal but usually overtopped by innovations; **perichaetial leaves** from a broadly oblong and sheathing base, abruptly shouldered and narrowed to rather stout subula. **Perigonia** terminal, <1 mm, brown, usually overtopped by innovations, with inner perigonal bracts broadly ovate. **Setae** mostly 4–5 mm, flexuose-erect and twisted to the right when dry, strongly cygneous when moist; **capsules** broadly urceolate and weakly constricted below the mouth when dry, broadly obovoid to ± globose when moist, exserted, yellow-brown, 0.7–0.8 × 0.65–0.8 mm; **exothecial cells** irregular, strongly incrassate and weakly collenchymatous, several rows oblate and pigmented at rim; **stomata** few, superficial, and rather large; **operculum** rostrate from a weakly conic base, oblique, c. $\frac{1}{2}$ – $\frac{2}{3}$ the capsule in length, often systylious. **Peristome** well-developed but often broken in older capsules, the 16 teeth broadly lanceolate, neither perforate nor cribose, red, the outer surface nearly smooth; **preperistome** apparently absent. **Calyptra** as per genus. **Spores** 18–24 µm, smooth, green.

Illustrations: Plate 2. Bartlett & Vitt 1986, figs. 56–63, 145, 149; Seppelt 2004, fig. 99; Andreas 2013, fig. 5.

Distribution: NI: Gisborne (Lake Waikaremoana, Mt Maungapōhatu, Mt Te Wana), Taranaki (Mt Egmont), Wellington (Tararua Range); SI: Nelson, Marlborough (Mt Tapuaenuku), Canterbury, Westland (Ōtira, Franz Josef, Wilberg Range) Otago, Southland (Lake Manapōuri, Eyre Mountains, Mt Burns); Ch.

Austral. Tasmania*, Argentina*, Chile*. Reported by Bartlett & Vitt (1986) from South Africa, New Guinea, mainland Australia (Vic.), the Falklands, South Georgia, Hermite I., Staten I., Marion and Prince Edward Is, Kerguelen, and Tristan da Cunha, Colombia, Ecuador, and Brazil. According to Bartlett & Vitt (1986), *B. magellanica* “has the widest distribution of any of the southern hemisphere species of the genus”. It is one of several “austral” mosses occurring in southern South America that also occur in high elevation ““páramos”” of the tropical Andes (Griffin et al. 1982).

Habitat: On rock in the beds of swift streams, both submerged and emergent; often well developed in spray zones of waterfalls, seepages, irrigated/dripping outcrops, and on rocks at tarn and lake margins (as at Lake Waikaremoana and Lake Manapōuri). Occurring on a wide variety of rock types including granite, gneiss, schist, basalt, and greywacke. *Blindia magellanica* is the only member of the genus in N.Z. that sometimes occurs over limestone (as at Fenian Creek, Nelson L.D. and at Lake Orbell, Southland L.D.). Andreas (2013) recorded an occurrence on limestone in South America. Frequently associated species include *Bryum laevigatum*, *Dicranella cardotii*, *Ochiobryum blandum*, *Philonotis tenuis*, *Rhacocarpus purpurascens*, *Schistidium apocarpum* s.l., and *Tridontium tasmanicum*. Ranging from c. 600 (Lake Waikaremoana) to c. 1800 m elevation (Mt Egmont) on North I. and from 15 m (Waitātī, Otago L.D.) to c. 1800 m elevation (Mt Tapuaenuku) on South I.

Notes: *Blindia magellanica* has vegetative leaves that are ± evenly tapered from the base to the ill-defined subula whereas the perichaetial leaves are strongly differentiated and very distinctly shouldered. Bartlett & Vitt (1986) probably determined the subula:leaf base ratios for this species using perichaetial leaves.

Occasional specimens occur in which the leaf apices are distinctly rounded (e.g. G.O.K. Sainsbury 190 from Lake Waikaremoana, CHR 556425).

The collection history of this species in N.Z. is very confused. The species was treated by neither Wilson (1854) nor Hooker (1867), probably reflecting the few higher-elevation South I. collections available to those authors. Nor, apparently and surprisingly, is it represented in the Beckett herbarium. The scarcity of early N.Z. collections of this relatively widespread species in herbaria is perplexing. In 1874 S. Berggren collected *B. magellanica* from four South I. localities, all in the general vicinity of Arthur's Pass, but these collections were not reported for more than six decades (Dixon & Bartram 1937).

Dixon (1914, p. 60) discussed at length the confused taxonomic, nomenclatural, and collection history of this species in Tasmania, N.Z., and other parts of the southern hemisphere.

Dixon (1914, p. 61) mentioned R. Brown's name *B. theriotii* from the Torlesse Range, Canterbury L.D., but neither he nor Bartlett & Vitt (1986) were able to locate type material of this name. According to Dixon “there can be no doubt from the description and figures that it belongs to *B. magellanica*”.

Recognition: *Blindia magellanica* is in some respects similar to *B. robusta* and sterile plants can be best distinguished by the smaller stature and shorter leaves of the former. When capsules are present, the flexuose to cygneous setae of *B. magellanica* make confusion unlikely. There are no other species in the N.Z. flora with which confusion could occur.

Etymology: The epithet refers to the South American type locality.

***Blindia martinii* Sainsbury, Rev. Bryol. Lichenol., n.s. 18: 111 (1949)**

Holotype: N.Z., “Arthur's Pass, Canterbury, South Island; coll. W. Martin (6315), 14th January 1944”. WELT M005054! Isotypes: WELT M005076/A!, M005076/B! The number 6315 is a Sainsbury herbarium number. Further collection data is attached to the holotype specimen indicating it was collected at Avalanche Creek and grew on large boulders in tufts of 3–4 inches (7.5–10 cm) diameter. One isotype (WELT M005076/A), bearing descriptive notes by Sainsbury, was clearly referred to in the writing of the protologue. The latter specimen was, erroneously in my opinion, provisionally considered to be the holotype by Vitt in 1985 (*in herb.*). The WELT holotype and isotypes are all derived from W. Martin 85. Some isotypes bear the Sainsbury herbarium number 1012. There is a slight discrepancy between the collection date given on the holotype and that in the protologue. Paratypes: CHR 380530!; CHR 570810!

= *Blindia egmontensis* Sainsbury, Rev. Bryol. Lichenol., n.s. 18: 111 (1949)

Holotype: N.Z., Wilkes Pool Gorge, Mt Egmont, 10 Jan. 1945, G.O.K. Sainsbury 6295, WELT M005029! Paratype: CHR 570808!

Plants gold-brown or yellow-green above, darker below, glossy and silky. **Stems** commonly 10–30 mm, wiry, much-branched by forking (and often by innovation in male plants), flexuose, with

cortical cells thick-walled in c. 2 layers and a large central strand, with adherent fragments of stripped leaf bases not conspicuous. **Leaves** falcate-secund to circinate when dry, similar when moist, lanceolate-subulate, not penicillate, clasping and \pm auriculate at base, evenly tapered to a fine subula \pm equal the lamina (under stereoscope), acute, denticulate near apex, subtubulose below, c. 3.5–4.5(–6.0) mm; **upper laminal cells** (c. $\frac{1}{3}$ above base) linear and \pm straight, unistratose, strongly incrassate (the walls \pm equal the lumina), c. 39–50(–60) \times c. 3–5 μ m, but slightly expanded at cell ends; **lower laminal cells** somewhat longer, either straight or \pm sinuose, not porose; **alar cells** variably differentiated and often more developed on one side of the leaf base, usually forming a well-defined, weakly auriculate, and red group of moderately inflated, \pm oblong, and \pm thin-walled cells which are isolated from the costa by elongate cells. **Costa** c. 30–40 μ m wide, narrow and ill-defined in lower leaf (c. $\frac{1}{3}$ above base), becoming \pm broader but faint at leaf base, filling the subula, in cross-section with stereids and guide cells poorly differentiated.

Dioicous or **autoicous**. **Perichaetia** terminating the stem but often overtopped by innovations; **perichaetial leaves** from a broadly oblong and sheathing base, abruptly shouldered and narrowed to a long and flexuose subula. **Perigonia** apparently terminal and overtopped by innovations, on autoicous plants occurring both above and below the perichaetia, the inner bracts <1.0 mm, lacking a subula, broadly ovate. **Setae** c. 0.2–0.6(–0.7) mm (above the foot which is c. 0.5 mm long), erect and \pm straight, apparently untwisted; **capsules** broadly urceolate or obovate and wide-mouthed when dry, becoming hemispheric when moist, immersed, yellow-brown, not pachydermous, 0.6–0.8 \times 0.6–0.7 mm; **exothecial cells** mostly oblong but somewhat irregular, incrassate and weakly collenchymatous, with several rows isodiametric or oblate at rim; **stomata** not seen; **operculum** low-conic or mammillate from convex base; **columella** sometimes adherent to and falling with the operculum. **Peristome** well-developed, yellow-brown, the 16 teeth broadly lanceolate-truncate, cribose and irregularly divided above, extending c. 150–180 μ m beyond the rim, the outer surface nearly smooth; **preperistome** lacking. **Calyptra** as per genus. **Spores** c. 18–24 μ m, green, papillose.

Illustrations: Plate 3. Sainsbury 1955, pl. 13, fig. 2; Bartlett & Vitt 1986, figs. 65–73, 153, 158.

Distribution: NI: Gisborne (Mt Hikurangi), Taranaki (Mt Egmont); SI: Nelson, Marlborough (Mt Fishtail), Canterbury, Westland (Sewell Peak, Upper Ōtira Valley, Hōhonu Range), Otago (Old Man Range, Rock and Pillar Range, Siberia Valley), Southland (Hollyford River, Mt Burns, Gertrude Valley). Reported from A and C by Bartlett & Vitt (1986).

Australasian. Tasmania*.

Habitat: On irrigated rock, especially at the margins of cascading mountain streams or in the beds of intermittent watercourses. Also occurring on high-altitude rock faces and in seepages associated with late snow beds (here often with *Andreaea australis*). This species is virtually never found submerged, and occurs on a range of rock types, including gneiss, greywacke, and sandstone. One collection has been seen from dolomite (Mt Burnett, Nelson L.D.). On North I. material has only been seen from above 1200 m; on South I. ranging from c. 850 (Ōtira Valley) to c. 1900 m elevation (Malte Brun, Canterbury L.D.) Associated species can include *Andreaea acutifolia*, *A. australis*, *A. nitida*, *Blindia magellanica*, *B. robusta*, *Dicranoweisia antarctica*, *Racomitrium crispulum* s.l., *R. crumianum*, *R. ptychophyllum*, *Rhacocarpus purpurascens*, and *Schizymerium bryoides* as well as the hepatics *Jamesoniella colorata* and *Nothogymnomitrium erosum*.

Notes: Bartlett & Vitt (1986) described this species as abundant on Mt Egmont, at Arthurs Pass, and in Fiordland. It is widespread and abundant at higher altitudes in the Paparoa Range (Nelson and Westland L.D.) and probably more common in wetter parts of the South I. than collections suggest. It is distributed primarily in areas of high rainfall.

Sainsbury (1949) described *B. martinii* and *B. egmontensis* in the same paper, with the latter termed “in most respects a miniature” of the former. The range of variation of plant stature, alar cell development, and upper leaf cell length is considerable in populations of *B. martinii* and Bartlett & Vitt (1986) placement of *B. egmontensis* in synonymy is followed here.

The plants usually have a decidedly “silky” appearance, although material from the southern South I. appears less so.

Blindia martinii is the only species of *Blindia* from N.Z. (and likely anywhere) with low-conic to mammillate and non-rostrate opercula. Its deeply immersed capsules with well-developed peristomes, along with yellow-green or golden-brown falcate-secund leaves that have denticulate upper leaf margins (best seen in leaves from near the stem apex), and differentiated alar cells further distinguish this species. According to Bartlett & Vitt (1986) “no other species of *Blindia* has such strongly falcate-secund leaves (moist or dry) and such deeply immersed, peristomate capsules”.

The sexuality of plants of *B. martinii* is difficult to demonstrate. While the species appears to be mostly dioicous, the much-branched male and female stems are often closely intertwined. Bartlett & Vitt (1986, p. 223) indicate the sexuality to be either “dioicous or autoicous”. I have seen definite autoicous plants (CHR 438172 from Scarlett Range, Nelson L.D.) and have also seen material that I considered to be dioicous (CHR 380530 from Arthur’s Pass).

The single specimen seen from Tasmania (A.J. Fife & R.S. Tangney 8944, CHR 475612; HO 544022) differs from representative N.Z. material in a number of ways including setae length (0.7–1.0 mm), larger capsules (0.80–0.95 × 0.9–1.0 mm), spore diameter (c. 24–42 µm vs 18–24 µm in N.Z. material), and central strand development (apparently lacking vs large and conspicuous in N.Z. material). The Tasmanian plants are not glossy, but relative lack of gloss is a feature of *B. martinii* from the southern South I. While an argument could be made for describing the Tasmanian material at some taxonomic level, I consider that its segregation from *B. martinii* would be unwarranted. *Blindia martinii* is not recorded from Tasmania by Dalton et al. (1991) and additional collections would be useful.

Etymology: The epithet commemorates William Martin (1886–1975), who collected the type and contributed greatly to our understanding of the N.Z. cryptogam flora.

***Blindia robusta* Hampe, *Linnaea* 30: 627 (1860)**

Lectotype: Australia, Munyang Mountains, in bogs, 6000 ft., *F. Mueller s.n.*, BM-Hampe!
(Designated by Bartlett & Vitt 1986, p. 224.)

= *Dicranum tenuifolium* Hook.f. & Wilson, *London J. Bot.* 3: 542 (1844) nom. illeg.

≡ *Blindia tenuifolia* Mitt., *J. Linn. Soc., Bot.* 12: 56 (1869)

Lectotype: Chile, Hermite Island, presumably *J.D. Hooker*, (“Wilson 128”), BM-Wilson!
(Designated by Bartlett & Vitt 1986, p. 225.)

= *Dicranum colinum* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 29: 460 (1897)

Isotypes: N.Z., Stewart Island, on the summit of Thomson’s Range, *R. Brown s.n.*, CHR 573756!, CHR 335704!

= *Dicranum rupestre* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 29: 459 (1897) nom. illeg.

Type: N.Z., on rocks, old moraine near Waimakariri glaciers, Feb. 1889, *R. Brown s.n.*, CHR 573755!, CHR 335706!

= *Blindia tasmanica* Sainsbury, *Vict. Naturalist* 70: 30 (1953) nom. illeg.

Holotype: Tasmania, Cradle Mountain, *L. Rodway s.n.*, Dec. 1916, WELT M006434! Isotype: HO 69082!

Plants yellow-green, gold-green to nearly black in submerged forms, glossy. **Stems** wiry, commonly 40–70 mm, moderately branched by subperigonal innovation (possibly also by forking), in cross-section with thick-walled cortical cells and a small but distinct central strand, with fragments of leaf bases adhering after leaves are removed. **Leaves** mostly falcate to flexuose-second or ± straight when dry, mostly nearly circinate at stem apices, similar when moist, subtubulose, narrowly lanceolate-acuminate, lacking distinct shoulders, evenly tapered to a long, fine, and entire subula, clasping and ± auriculate at base, with lamina extending c. 1/3 (rarely c. 1/2) the leaf length (viewed under stereoscope), (5–)6–9 × (0.3–)0.4–0.55(–0.9) mm (when flattened); **upper laminal cells** (c. 1/3 above insertion) linear and ± straight, unistratose, strongly incrassate (the walls equal to or wider than the lumina), c. 36–60 × 3 µm, slightly expanded at cell ends; **lower laminal cells** longer, to c. 100 µm, and becoming moderately porose; **alar cells** mostly inflated and thinner-walled, pigmented, forming a well-defined, clasping, and ± auriculate group, usually extending 5–8 cells up the leaf and there merging abruptly with the laminal cells, separated from the costa by elongate cells, occasionally poorly differentiated and differentiation often variable on a single stem. **Costa** c. 50–60(–110) µm wide near base, well-defined and filling the subula, in cross-section with a median layer of guide cells (c. 1/3 above base).

Autoicous or sometimes dioicous. **Perichaetia** terminating the stem but usually overtopped by innovation; **perichaetial leaves** from a broadly oblong and sheathing base, abruptly shouldered and narrowed to a long and flexuose subula. **Perigonia** rather large, in autoicous plants below the perichaetia, either very close (c. ≤1 mm) or separated by up to 9 mm; in male plants terminal and generally overtopped by innovations; **inner perigonal bracts** short (c. 1.0–1.5 mm) and strongly shouldered, lacking a long subula. **Setae** (8–)10–16 mm, flexuose-erect, stout, twisted to the right when dry, little altered when moist, orange; **capsules** urceolate or turbinate and wide-mouthed when dry, turbinate to ± hemispheric when moist, long-exserted, yellow- or red-brown, pachydermous, (0.8–)1.0–1.5 × 0.8–1.2 mm; **exothecial cells** irregular in shape and size, incrassate and weakly

collenchymatous, c. 3–4 rows thicker-walled and more regularly isodiametric to \pm oblate at rim, 1–2 rows there often hyaline; **stomata** apparently absent; **operculum** long-rostrate from a weakly conic base, oblique, equal or somewhat longer than the urn, systylious. **Peristome** well-developed but often broken, red-brown, the 16 teeth broadly lanceolate, irregularly divided and \pm cribose above, the outer surface often appearing densely and coarsely cribose-warty near base (apparently due to preperistome development) and papillose above, the inner surface with a median line but otherwise smooth (very difficult to see). **Spores** 27–45 μm , smooth, green.

Illustrations: Plate 3. Bartlett & Vitt 1986, figs. 75–83, 146, 152, 157; Malcolm & Malcolm 2003, p. 6; Seppelt 2004, fig. 100.

Distribution: NI: Wellington (Mt Ruapehu, Mt Tongariro and environs, Tararua Range), Hawke's Bay (Ruahine Range), Taranaki (Mt Egmont); SI: Nelson, Canterbury (Arthur's Pass and environs, Rolleston Range, Ben Ōhau Range), Westland, Otago (Remarkable Range), Southland; St. Reported from A, C, and M by Bartlett & Vitt (1986).

Austral. Tasmania*, mainland Australia (A.C.T., N.S.W., Vic.)*, Chile*. Reported from Tristan da Cunha by Bednarek-Ochyra (2014).

Habitat: Most common and best developed at the margins of small subalpine and alpine streams and in seepages. Often associated with late snow beds and less commonly with waterfall margins. A large fraction of herbarium collections are from granite-derived gravels, but it also occurs on larger rocks, as well as coal faces and peaty or silt soils. It can grow in pools in *Sphagnum*-dominated bogs (as at Mt Anglem, Stewart I.) and in tarns, as well as *Empodisma minus*-dominated flushes. It is usually not deeply submerged. Associated with a wide-range of non-calcareous rock types. Frequently associated mosses include *Blindia magellanica*, *Calliargon sarmentosum*, and *Sphagnum falcatulum*. Ranging on North I. from c. 1220 to 1725 m (both on Mt Ruapehu) and on South I. from 540 (Denniston Plateau, Nelson L.D.) to c. 1890 m (Remarkable Range). On Stewart I. it occurs from sea level upwards.

On Mt Tongariro it occurs shallowly submerged in water of pH between 3 and 5 on rocks at the margin of Blue Lake at 1725 m elevation. It also occurs in circumneutral water in Lower Tama Lake, in Tongariro N.P. (L. Roberts, pers. comm., 28 May 2010).

Notes: When well-developed and fertile, the long, finely subulate and falcate to circinate leaves, the erect-flexuose and rather stout setae bearing exerted capsules make this widespread and common species unlikely to be mistaken.

However, *B. robusta* shows considerable morphological variability. In a small fraction of aberrant collections from the South I., the leaves are weakly secund to \pm straight. In such plants the overall coloration is dark green to nearly black, the leaves near the upper end of continuous variation for length (c. 7.0–9.0 mm), and wider than usual at the insertion (to c. 0.7–0.9 mm). Such plants generally occur in slow-moving small streams. Similar material but with moderately secund leaves occurs on Stewart I. William Martin (*in herb.*) termed it “the usual form on most Stewart Island Mountains”. In such Stewart I. and South I. material the alar cell fragments remaining attached to the removed leaves are quite variable. The alar group may be pigmented and form a well-defined, clasping, and \pm auriculate group (as in *A.J. Fife 5456* from Mt Priestly, Nelson L.D.), hyaline in a large auriculate group that is visible in nearly all leaves (as in *J. Child 6670* from “Ajax Swamp” near Mt Pye, Otago L.D.), or mostly absent (as in *A.J. Fife 9563* from Percy Stream, Southland L.D., CHR 477529). When a large number of collections are viewed, a range of variability suggestive of an ecological cline is observable. Material growing in slow-moving or stagnant water is usually sterile. In some populations of slow-moving water (as in *A.J. Fife 5456*) the costae are broader (to c. 110 μm) and less clearly defined than usual. Bartlett & Vitt (1986, p. 226) considered basal costal width to extend to 150 μm in this variable species. They concluded that “the falcate-secund habit of the leaves is ... variable, as is the width of the leaves and their manner of insertion”.

As noted by Bartlett & Vitt (1986, p. 225), the frequency with which the operculum remains attached to the columella in this species varies, but this variability does not seem to correlate with any habitat or geographic feature. It is possible that some of this variability is merely a function of capsule age.

Recognition: The \pm straight-leaved forms discussed above are most likely to be confused with *B. lewinskyae*, especially in the absence of capsules. The somewhat shorter leaves of even the extreme forms of *B. robusta* help to separate these species; when capsules are present confusion is impossible.

Sterile material of falcate-leaved forms of *B. robusta* could be confused with species of *Drepanocladus* or *Warnstorfia*. However, in *B. robusta* the leaves are much finer, with the subulae filled by the costae, and the stems more wiry than in any species of *Drepanocladus* or *Warnstorfia*. The manner in which

the leaf base fragments adhere to the wiry stems provides additional distinction, as do the generally more distinctly pigmented and auriculate alar cells.

Etymology: The epithet is self-explanatory.

***Blindia seppeltii* J.K.Bartlett & Vitt, *New Zealand J. Bot.* 24: 225 (1986)**

Isotype: Australia, Macquarie Island, 1.8 km east of Mt Ifould, 110 m elevation, Nov. 21, 1981, *R.D. Seppelt 11918*, HO!

Elements in the following description are taken from Bartlett & Vitt (1986).

Plants yellow-brown in emergent portions, dark brown to black below (or throughout) when submerged, moderately glossy. **Stems** not wiry, c. (10–)30–60 mm, moderately branched by innovation and forking, with 2–3 thick-walled cortical cell layers and a small central strand, with leaf fragments not conspicuously adherent. **Leaves** erect-flexuose to loosely falcate-secund when moist, not penicillate, little altered when dry, with an oblong-lanceolate base of (1.0–)1.2–2.0 mm and \pm gradually or \pm abruptly narrowed to a long and slender subula which is (2–)3–4 times the length of the base, not distinctly shouldered, entire throughout or crenulate above, subtubulose, clasping at base, 5.0–9.0 \times 0.4–0.6 mm (when flattened); **upper laminal cells** (from upper portion of base) linear and \pm straight, incrassate, c. 60–120 \times c. 4 μ m, but with the lumina mostly expanded at leaf ends; **lower laminal cells** similar; **alar cells** nearly always absent from removed leaves. **Costa** (40–)70–90(–100) μ m wide, ill-defined at base, filling the subula, in cross-section with a moderately-defined median layer of guide cells (near base of the subula).

Autoicous. Perichaetia terminating the stem or branch, apparently sometimes overtopped by innovation, the **perichaetial leaves** more abruptly shouldered and more clasping than vegetative leaves. **Perigonia** rather large, often occurring at tips of innovative branches, with inner perigonal bracts short (c. 1.0–1.5 mm), strongly shouldered, and lacking a long subula. **Setae** 8–12 mm, flexuose-erect, twisted to the right when dry, little altered when moist, orange; **capsules** turbinate and wide-mouthed when dry, turbinate or obovoid when moist, exerted, black, pachydermous, c. 1.0 \times 0.8–1.0 mm; **exothecial cells** highly irregular in shape and size, mostly longer than wide, incrassate, weakly collenchymatous, c. 2–3 rows oblate at rim; **stomata** not seen; **operculum** conic-rostrate, \pm oblique. **Peristome** well-developed, but fragile and often missing, the 16 teeth lanceolate and acute, the outer surface densely and coarsely cribose-warty below (apparently due to preperistome development). **Spores** variable in size in a single capsule, (16–)21–36(–40) μ m, smooth, green.

Illustrations: Plate 4. Bartlett & Vitt 1986, figs. 85–100, 156; Seppelt 2004, fig. 101.

Distribution: A; M. Reported from C by Bartlett & Vitt (1986) and Seppelt (2004).

Endemic.

Habitat: *Blindia seppeltii* is reported from “moist rocks and from aquatic habitats in lakes and seepages” by Bartlett & Vitt (1986). The type collection from Macquarie I. is from the edge of a small lake at 110 m elevation and grew with *Ditrichum strictum* and the hepatics *Pachyglossa tenacifolia* and *Riccardia aequicellularis*. Two collections from Auckland I. (*P.N. Johnson 20/35*, WELT M027147 and *P.N. Johnson 15/16*, WELT M027146) occurred in fellfields at 480 m elevation. The first of these two collections has no identifiable associated species, while the latter grew in a mat of *Ochiobryum blandum*, suggesting at least some seepage.

Recognition: I agree with Bartlett & Vitt (1986) that this species is probably closely related to *B. robusta*. The vegetative leaves in *B. seppeltii* have a more defined base that tapers more abruptly to the subula than the leaves of *B. robusta*. The taper in *B. seppeltii* is emphasized by the subtubulose nature of the leaf base but appears more gradual when the leaf base is gently flattened on a microscope slide. The wider and ill-defined costa further distinguishes this species from *B. robusta*. With rare exceptions alar cells are not present in removed leaves, although a well-differentiated alar group of c. 15 inflated cells has been seen in *D.H. Vitt 8977* from Auckland I. (CHR 412478).

Although Bartlett & Vitt (1986) suggest that the seta here is stouter than in *B. robusta*, I do not consider this useful to distinguish the two species. They also note a wider variation in seta length than I have observed (in the type and one other collection). The capsules available for examination were in poor condition.

Etymology: The epithet commemorates the Australian bryologist R.D. Seppelt, an authority on Antarctic mosses, the collector of the type, and the author of *The Moss Flora of Macquarie Island*.

***Seligeria* Bruch & Schimp. in Bruch et al., *Bryol. Eur.* 2, 7 (1846)**

Type taxon: *Seligeria pusilla* (Hedw.) Bruch & Schimp.

Elements in the following description are taken from Vitt (1976).

Plants minute, gregarious, light to dark green, closely adherent to calcareous rock. **Stems** very short, unbranched or forked, cross-section not observed. **Leaves** small below, larger and more crowded above, often stiff when dry, spreading, erect spreading, or weakly secund when moist, usually subulate from a ± ovate to lanceolate base, sometimes linear, the upper portion usually filled by the costa, entire or ± denticulate, sheathing or not at base; **laminal cells** quadrate or short-rectangular, smooth; **alar cells** not differentiated. **Costa** single, usually becoming broader above and mostly filling the subula.

Autoicous. Perichaetial leaves either not differentiated or with a more strongly defined base. **Setae** slender or stout, straight, flexuose, or cygneous when moist, to c. 3 mm; **capsules** erect and symmetric, urceolate or pyriform, emergent or exerted, with a short or elongate columella; **exothecial cells** variable in shape; **stomata** few, restricted to base, superficial; **annulus** mostly not differentiated; **operculum** conic-rostrate, often systylious. **Peristome** single, with 16 well-developed, triangular, red-brown teeth, sometimes reduced or absent, the outer surface smooth except for transverse articulations, lacking a median zig zag line; **preperistome** absent. **Calyptra** cucullate and smooth. **Spores** c. 8–14 µm in N.Z. species, smooth or finely papillose, green.

Taxonomy: A genus of c. 19 species, mostly distributed in temperate regions of the northern hemisphere. Most species, including the N.Z. ones, are minute plants which grow closely affixed to weathered calcareous or cation-rich rock, usually in sheltered microhabitats. New Zealand and Tasmania are the only regions in the southern hemisphere where the genus is recorded.

A revision of the North American species was undertaken by Vitt (1976), who treated 13 species for that continent and who proposed the recognition of five subgenera. Vitt & Bartlett (1983) provided a treatment of the two N.Z. species and the following draws considerably from that publication. Lönnell (2006) provided a beautifully illustrated account of 14 species occurring in Fennoscandia. In Europe and Britain members of *Seligeria* are sometimes termed “rock-bristles”.

Etymology: The genus is named after Ignaz Seliger (1752–1812), a priest from Silesia (part of modern day Poland).

- 1 **Plants** light green to blue-green; **leaves** linear; **mid laminal cells** mostly longer than wide, clear, unistratose; **setae** straight or slightly curved when moist; **capsules** hemispheric when mature and moist *S. cardotii*
- 1' **Plants** dark green to brown-green; **leaves** long-subulate from an expanded base; **mid laminal cells** mostly as long as wide, obscure, partially bistratose; **setae** cygneous when moist; **capsules** narrowly ellipsoid when mature and moist *S. diminuta*

***Seligeria cardotii* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 30: 398 (1898)**

Lectotype: N.Z., West Coast Road, Castle Hill, limestone rocks, Mar. 1891, *R. Brown s.n.*, BM-Dixon! (Designated by Vitt & Bartlett 1983.) Isolectotype: CHR 334058!

Plants light green to blue-green, erect, pale and rather shiny, loosely gregarious. **Stems** erect, simple, c. 0.5–1.5 mm, usually several arising from a common base. **Leaves** wiry, stiffly flexuose-erect to flexuose-twisted when dry, flexuose-erect when moist, (0.2–)1.0–2.2 × c. 0.05–0.10 mm, setaceous, not or scarcely widened at base, entire to slightly crenulate at margins, not sheathing; **mid laminal cells** clear and unistratose, in 1 or 2 rows beside the costa, rectangular or ± quadrate, (8–)10–26(–30) × 4–8 µm, smooth; **lower laminal cells** often slightly longer, but not otherwise differentiated; **basal** and **alar cells** not differentiated or slightly enlarged, not forming distinct groups. **Costa** narrow, weak below, somewhat wider above, ending in or a few cells below the apex, not filling the upper part of leaf.

Autoicous. Perichaetial leaves distinctly shorter than vegetative, c. 1.0–1.5 mm, lanceolate to ovate-lanceolate, shortly subulate, with laminal cells to 80 µm. **Perigonia** terminal on male shoots which arise from base of perichaetial shoots. **Setae** 0.8–1.2(–1.5) mm (excluding the vaginula), straight or slightly curved when moist, erect and twisted strongly to the right when dry; **capsules** exerted, turbinate and widest at the mouth when dry, obovate-hemispheric when moist, gradually contracted to

the setae, smooth, erect, symmetric, 0.3–0.5(–0.6) mm, with a short and immersed columella; **exothecial cells** irregular to \pm rhombic, \pm evenly thin-walled, with rounded-subquadrate and somewhat darker cells at mouth; **annulus** not differentiated; **stomata** as per genus; **operculum** obliquely rostrate from a plano-convex base, c. 0.3–0.5 mm, not systylious, often falling with the calyptra. **Peristome** of 16 moderately short, reddish, rounded or truncate teeth (the fragile tips often falling with the operculum), smooth except for thickened transverse walls on outer surface, smooth on inner surface, inserted at the mouth and extending c. 120–180 μ m beyond rim. **Spores** (10–)12–15 μ m, \pm smooth, green.

Illustrations: Plate 5. Vitt & Bartlett 1983, fig. 1–7; Malcolm & Malcolm 2003, p. 62.

Distribution: NI: S Auckland (Piopio), Gisborne (Rosie Bay at Lake Waikaremoana), Wellington (Okupata Stream, NW Ruahine Range); SI: Nelson (Rockville, Tākaka Hill, Fenian Creek, Cobb Valley, Mt Arthur Range, Fyfe River, Fox River, Punakaikī, Mt Owen Range, near Reefton), Marlborough (Gorge Creek, Waima River, Clinton River), Canterbury (Waipara Gorge, Broken River basin including Castle Hill), Southland (Lake Orbell, Borland Burn, Pig Creek); Ch (Te Whanga).

Australasian. Recorded from Tasmania by Dalton (1995, 1998).

Habitat: *Seligeria cardotii* is not uncommon on sheltered and weathered limestone and marble; it is collected most frequently on vertical rock walls and beneath overhangs. At Dry Rock Shelter on the Mt Arthur Range this species formed colonies of c. 1 \times 0.3 m on limestone that was probably subject to some irrigation following heavy rains. It grows abundantly on the deeply shaded undersurface of massive limestone blocks overhanging flowing water (possibly immersed in floods) in the gorges of the Porter River (Broken River basin). This species is found in various vegetation types, including broad-leaved and southern beech forest, scrubland, grassland, or alpine vegetation. *Gymnostomum calcareum* is the most frequent close associate. Near the type locality at Castle Hill, it is found at the base of limestone cliffs growing with the much rarer *Seligeria diminuta* and close to *Encalypta rhamnoides*, *Gymnostomum calcareum*, *Orthotrichum cupulatum*, and *Syntrichia phaea*. At other sites, loosely associated species include *Anoetangium bellii*, *Eucladium irroratum*, *Meesia uliginosa*, and *Palamocladium leskeoides* (the last at Piopio and the Cobb Valley). At Lake Orbell in Southland L.D. *S. cardotii* occurred in intimate association with an extensive growth (c. 1 m²) of *Blindia magellanica* (the only species of *Blindia* in N.Z. that sometimes occurs on calcareous rock) on moist, shaded south-facing limestone cliffs. Vitt & Bartlett (1983) recorded it from “sloping rock surface with *B. magellanica*” from near Reefton (Nelson L.D.). Occurring between elevations of near sea level (as at Punakaikī) and at least 1500 m (Mt Arthur Range).

Seligeria cardotii is distinguished by its pale, bluish green coloration and linear vegetative leaves, with median laminal cells (limited to one to two rows beside the costa) mostly longer than wide. The capsule is hemispheric, becoming obconic to turbinate with age. The setae are short (but long enough for the capsule to be exerted) and straight or somewhat flexuose, with little or no curvature. The spores are 10–15 μ m diam, (which is small for the genus *vide* Vitt & Bartlett 1983).

Notes: The peristome teeth are nearly always truncate or rounded, and often extend to c. 180 μ m beyond the rim. Intact peristome teeth are rare in herbarium material, as the tips generally break off and fall with the operculum. In older capsules peristome teeth are mostly unobservable. The intact peristome teeth were described as “lanceolate” by Vitt & Bartlett (1983).

Vitt & Bartlett (1983) suggest that *S. cardotii* is morphologically most similar to the northern hemisphere *S. pusilla* in the subgenus *Seligeria* (Vitt 1976) by virtue of its small spore size, straight setae, and light green, delicate gametophytes with relatively long and clear median leaf cells, narrow costa, and linear leaves.

Recognition: *Seligeria cardotii* is easily differentiated from the much rarer *S. diminuta* by its straight or slightly curved setae, setaceous leaves that are not or scarcely widened at the base, and its pale gametophytes. Microscopic characters, such as the nature of the laminal cells and spore diameters, also help to differentiate these two indigenous species. Sterile material is rarely, if ever, collected, but could possibly be confused with smaller forms of *Ditrichum* spp.

Etymology: The epithet commemorates the French bryologist Jules Cardot (1860–1934), who wrote a moss flora of Magellanica, South Georgia, and Antarctic regions (Cardot 1908).

***Seligeria diminuta* (R.Br.bis) Dixon, *Bull. New Zealand Inst.* 3: 76 (1923)**

≡ *Grimmia diminuta* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 27: 417 (1895)

Isotype: N.Z., Limestone rocks near Castle Hill, growing along with *Blindia calcarea*, Mar. 1891, R. Brown, CHR 333275!

Plants dark green to brown-green, erect, rather dull. **Stems** erect, simple (or branched if perigonia are present), c. 0.5 mm, usually 2(–3) arising from a common base. **Leaves** flexuose-erect when dry, not altered or slightly secund when moist, (0.4–)1.0–1.5(–2.7) mm (including perichaetial leaves), subulate from a narrowly ovate to ± obovate base, entire, gradually or ± abruptly narrowed to the subula, the lower portion ± sheathing the stem; **mid laminal cells** often bistratose, mostly in 1–3 rows beside the costa, rounded-quadrate to rounded and short-oblong, 6–12 × 5–6 µm, smooth, moderately thick-walled; **lower laminal cells** larger (to c. 24 × 12 µm), mostly rectangular; **basal** and **alar cells** not differentiated. **Costa** weak below, obscure, filling the upper leaf.

Apparently autoicous. Perichaetial leaves not or slightly differentiated from vegetative leaves, with expanded base reaching ½ the leaf length. **Perigonia** terminal and on short lateral branches of male shoots that appear to arise from the base of perichaetial shoots, the bracts short and broadly acute. **Setae** 2.5–3.2 mm, strongly flexuose and twisted to the right when dry, strongly cygneous when moist; **capsules** exserted, ellipsoid when mature and moist, ± smooth, pendent due to curvature of the seta, symmetric, the neck short and poorly defined, 0.5–0.8 mm; **columella** short and immersed; **exothecial cells** irregularly rounded-oblong, ± evenly thin-walled; cells at rim rounded, subquadrate and more pigmented; **annulus** not differentiated; **stomata** as per genus; **operculum** conic-rostrate, oblique, not systylious, apparently not falling with the calyptra. **Peristome** of 16, short, reddish, lanceolate teeth, smooth except for thickened, transverse walls on outer surface, smooth on inner surface, inserted near the mouth, mostly extending c. 75–90 µm beyond the rim, ± erect, often fragile. **Spores** 8–12 µm, smooth or very faintly papillose, green.

Illustrations: Plate 5. Vitt & Bartlett 1983, fig. 9–15.

Distribution: SI: Canterbury (Broken River basin including Castle Hill and Cave Stream, Mt Alford). Endemic.

Habitat: Among the most rarely collected moss species in N.Z., *S. diminuta* occurs in sheltered limestone crevices. The most recent collection from the Castle Hill area was collected at “Castle Rock” by J.K. Bartlett on 26 Aug. 1980 (CHR 266206), at an elevation of c. 820 m. Although Vitt & Bartlett (1983) recorded it from nearby Cave Stream, the collection they cited (CHR 266211) is predominantly *S. cardotii* and I have been unable to find any convincing *S. diminuta* in it. A collection of *S. cardotii* by G. Brownlie from the “Cave Stream area at 2200 ft.” (CHR 428004) includes a few stems of *S. diminuta*, as well as *Gymnostomum calcareum*. An unlocalised collection by J.K. Bartlett from “Malvern Co.” (AK 199137) contains several plants of *Syntrichia muralis*. The collection from Mt Alford (D. Glenny 89-559; WELT M026841) is relatively ample and contains only the single species. It was collected at 520 m from a “slightly overhanging face” of “limestone outcrops in pasture”.

Notes: The dry setae in *S. diminuta* are flexuose and they become cygneous only with hydration.

Seligeria diminuta is given a current conservation ranking of nationally critical (the highest possible conservation ranking for a plant in N.Z.) by Glenny et al. 2011. Rock climbing and activities in Castle Hill and Cave Stream Scenic Reserves are likely to have an adverse impact on the long-term survival of this species. The location of populations in the general Castle Hill area, but off-limits to rock climbers, is desirable. Despite efforts to relocate this species there, no collections have been made in the Broken River basin more recently than 1980.

According to Vitt & Bartlett (1983), the small spore size, cygneous very long and thin setae, and long capsules with thin, delicate exothecial cells place this species in the subgenus *Cyrtoseligeria*. They suggest that it may prove to be conspecific with *S. recurvata*, which occurs in northern and central Europe and eastern and western North America.

Recognition: This species could only be confused with *S. cardotii*, from which it is readily differentiated by the characters enumerated in the species key.

Etymology: The epithet refers to the small size of this species.

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Conventions

Abbreviations and Latin terms

Abbreviations	Meaning
A	Auckland Islands
A.C.T.	Australian Capital Territory
<i>aff.</i>	allied to (<i>affinis</i>)
agg.	aggregate
Ant	Antipodes Islands
a.s.l.	above sea level
<i>auct.</i>	of authors (<i>auctorum</i>)
B	Bounty Islands
C	Campbell Island
c.	about (<i>circa</i>)
cf.	compare with, possibly the species named (<i>confer</i>)
<i>c.fr.</i>	with fruit (<i>cum fructibus</i>)
Ch	Chatham Islands
<i>comb. nov.</i>	new combination (<i>combinatio nova</i>)
D'U	D'Urville Island
et al.	and others (<i>et alia</i>)
et seq.	and following pages (<i>et sequentia</i>)
ex	from
fasc.	fascicle
<i>fide</i>	according to
GB	Great Barrier Island
HC	Hen and Chicken Islands
Herb.	Herbarium
hom. illeg.	illegitimate homonym
I.	Island
ibid.	in the same place (<i>ibidem</i>)
incl.	including
<i>in herb.</i>	in herbarium (<i>in herbario</i>)
<i>in litt.</i>	in a letter (<i>in litteris</i>)
<i>inter alia</i>	among other things (<i>inter alia</i>)
Is	Islands
K	Kermadec Islands
KA	Kapiti Island
LB	Little Barrier Island
L.D.	Land District or Districts
<i>leg.</i>	collected by (<i>legit</i>)
loc. cit.	in the same place (<i>loco citato</i>)
l:w	length:width ratio
M	Macquarie Island
Mt	Mount
<i>nec</i>	nor
NI	North Island
no.	number
nom. cons.	conserved name (<i>nomen conservandum</i>)
nom. dub.	name of doubtful application (<i>nomen dubium</i>)
nom. illeg.	name contrary to the rules of nomenclature (<i>nomen illegitimum</i>)
nom. inval.	invalid name (<i>nomen invalidum</i>)
nom. nud.	name published without a description (<i>nomen nudum</i>)
<i>non</i>	not
N.P.	National Park
N.S.W.	New South Wales
N.T.	Northern Territory (Australia)
N.Z.	New Zealand
op. cit.	in the work cited (<i>opere citato</i>)
pers. comm.	personal communication

PK	Poor Knights Islands
P.N.G.	Papua New Guinea
<i>pro parte</i>	in part
Qld	Queensland
q.v.	which see (<i>quod vide</i>)
RT	Rangitoto Island
S.A.	South Australia
<i>s.coll.</i>	without collector (<i>sine collectore</i>)
<i>s.d.</i>	without date (<i>sine die</i>)
sect.	section
SEM	scanning electron microscope/microscopy
<i>sensu</i>	in the taxonomic sense of
SI	South Island
<i>sic</i>	as written
<i>s.l.</i>	in a broad taxonomic sense (<i>sensu lato</i>)
<i>s.loc.</i>	without location (<i>sine locus</i>)
Sn	Snares Islands
<i>s.n.</i>	without a collection number (<i>sine numero</i>)
Sol	Solander Island
sp.	species (singular)
spp.	species (plural)
<i>s.s.</i>	in a narrow taxonomic sense (<i>sensu stricto</i>)
St	Stewart Island
<i>stat. nov.</i>	new status (<i>status novus</i>)
subg.	subgenus
subsect.	subsection
subsp.	subspecies (singular)
subsp.	subspecies (plural)
Tas.	Tasmania
TK	Three Kings Islands
U.S.A.	United States of America
var.	variety
vars	varieties
Vic.	Victoria
viz.	that is to say (<i>videlicet</i>)
vs	versus
W.A.	Western Australia

Symbols

Symbol	Meaning
µm	micrometre
♂	male
♀	female
±	more or less, somewhat
×	times; dimensions connected by × refer to length times width
>	greater than
<	less than
≥	greater than or equal to
≤	less than or equal to
=	heterotypic synonym of the preceding name
≡	homotypic synonym of the preceding name
!	confirmed by the author
*	in distribution statements, indicates non-N.Z. localities from which material has been confirmed by the author

Technical terms conform to Malcolm, B.; Malcolm, N. 2006: *Mosses and other Bryophytes: an Illustrated Glossary*. Edition 2. Micro-Optics Press, Nelson.

Abbreviations for Herbaria follow the standard abbreviations listed in *Index Herbariorum*.

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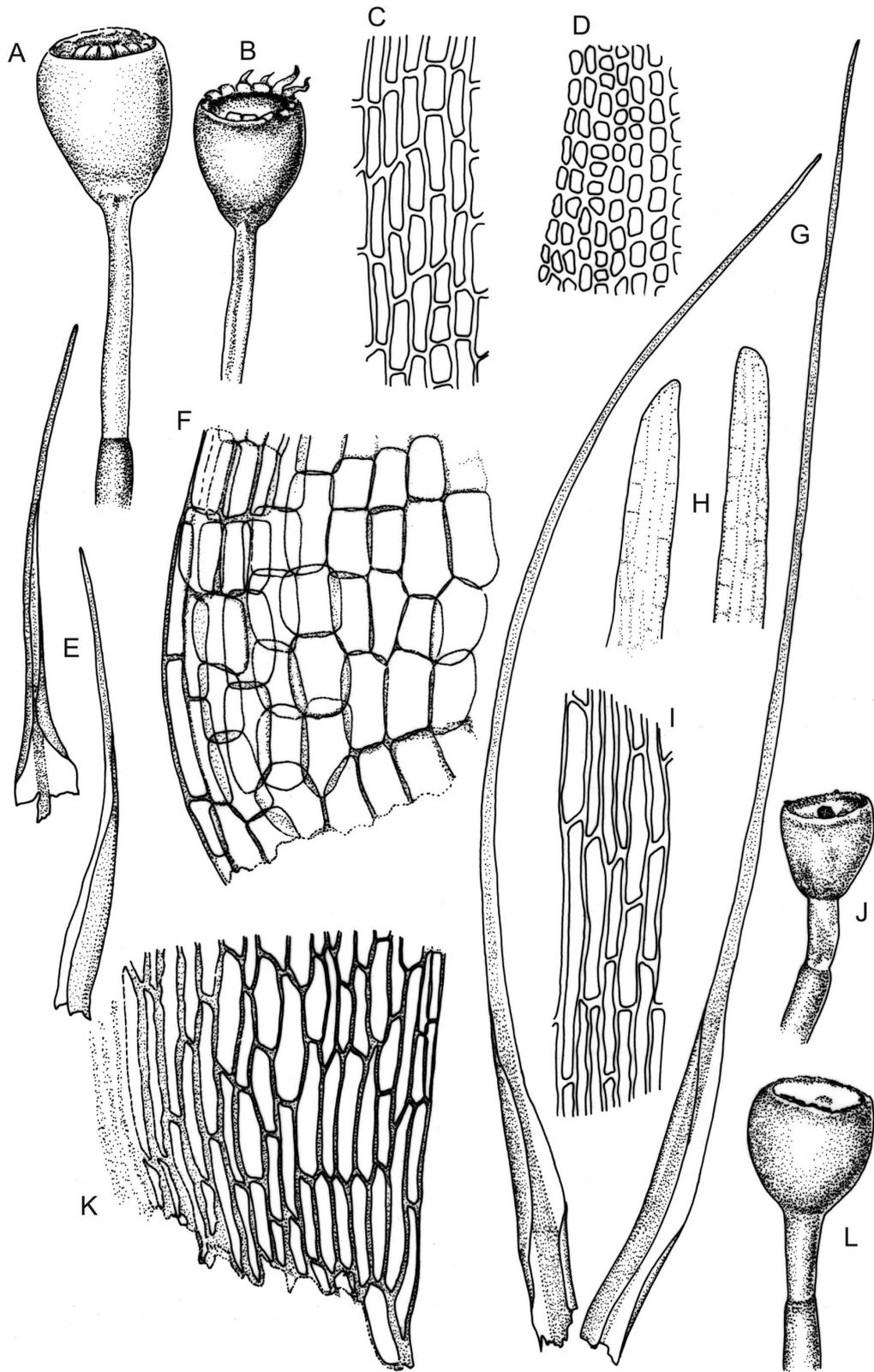


Plate 1: *Blindia*. A–F: *B. conlecta*. A, capsule. B, capsule, dry. C, lower laminal cells, c. 200 μm above upper limit of alar cells. D, upper laminal cells at shoulder. E, leaves. F, alar cells. G–L: *B. immersa*. G, leaves. H, leaf apices. I, lower laminal cells, c. 250 μm above leaf base. J, capsule, dry. K, alar cells. L, capsule. *B. conlecta* drawn from Vitt 2496, CHR 185989; *B. immersa* drawn from W. Martin, 9 Feb. 1947, CHR 570804, and D. Glenny 7604, CHR 518919.

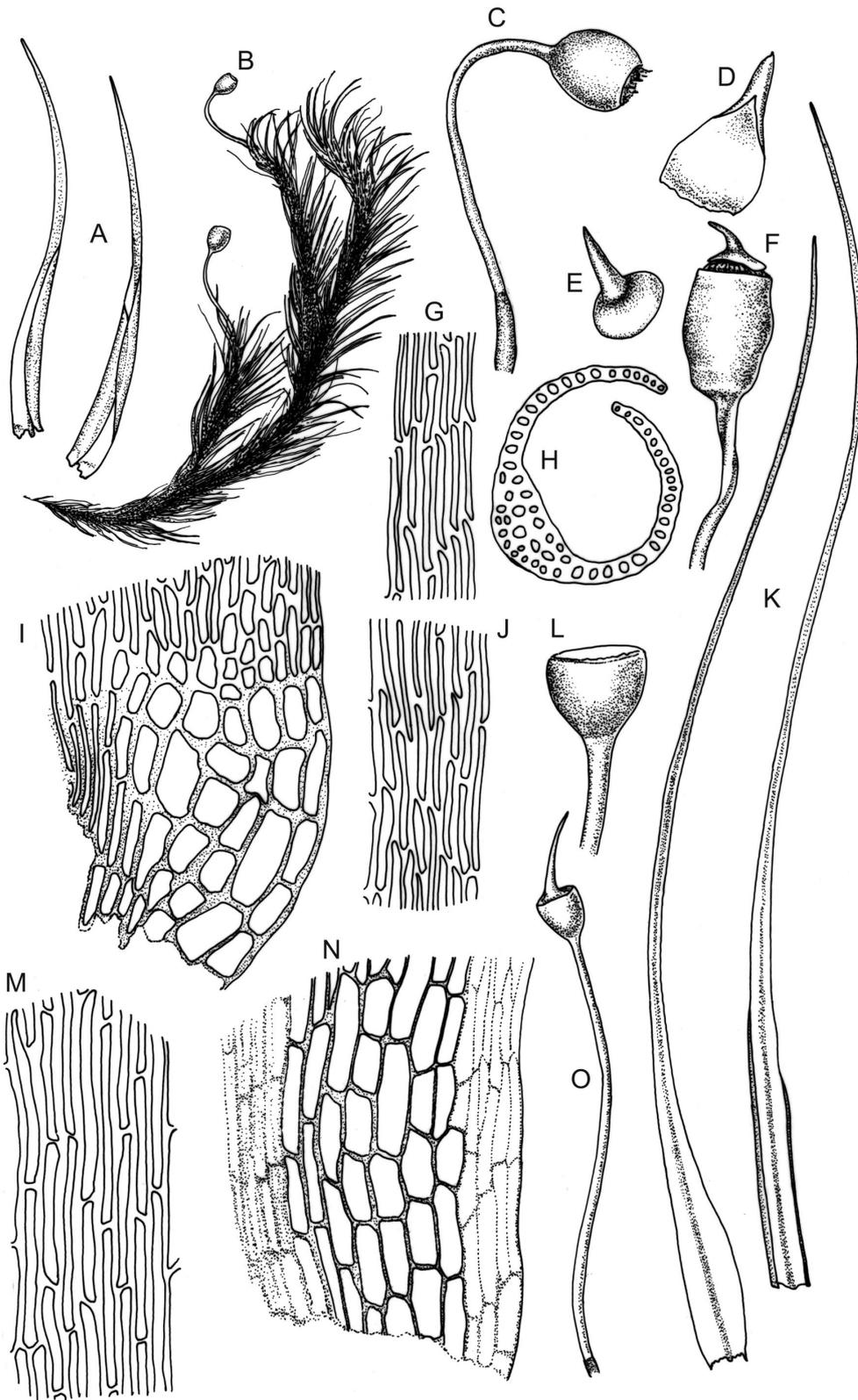


Plate 2: *Blindia*. A–J: *B. magellanica*. A, leaves. B, habit with capsules. C, capsule. D, calyptra. E, operculum. F, capsule with operculum, dry. G, lower laminal cells, c. 200 μm above upper limit of alar cells. H, leaf cross-section. I, alar cells. J, lower laminal cells, c. 150 μm above upper limit of alar cells. **K–O: *B. lewinskyae*.** K, leaves. L, capsule. M, lower laminal cells, c. 150 μm above upper limit of alar cells. N, alar cells. O, capsule with operculum. *B. magellanica* drawn from A.J. Fife 9562, CHR 477528; *B. lewinskyae* drawn from A.J. Fife 11138, CHR 515100.

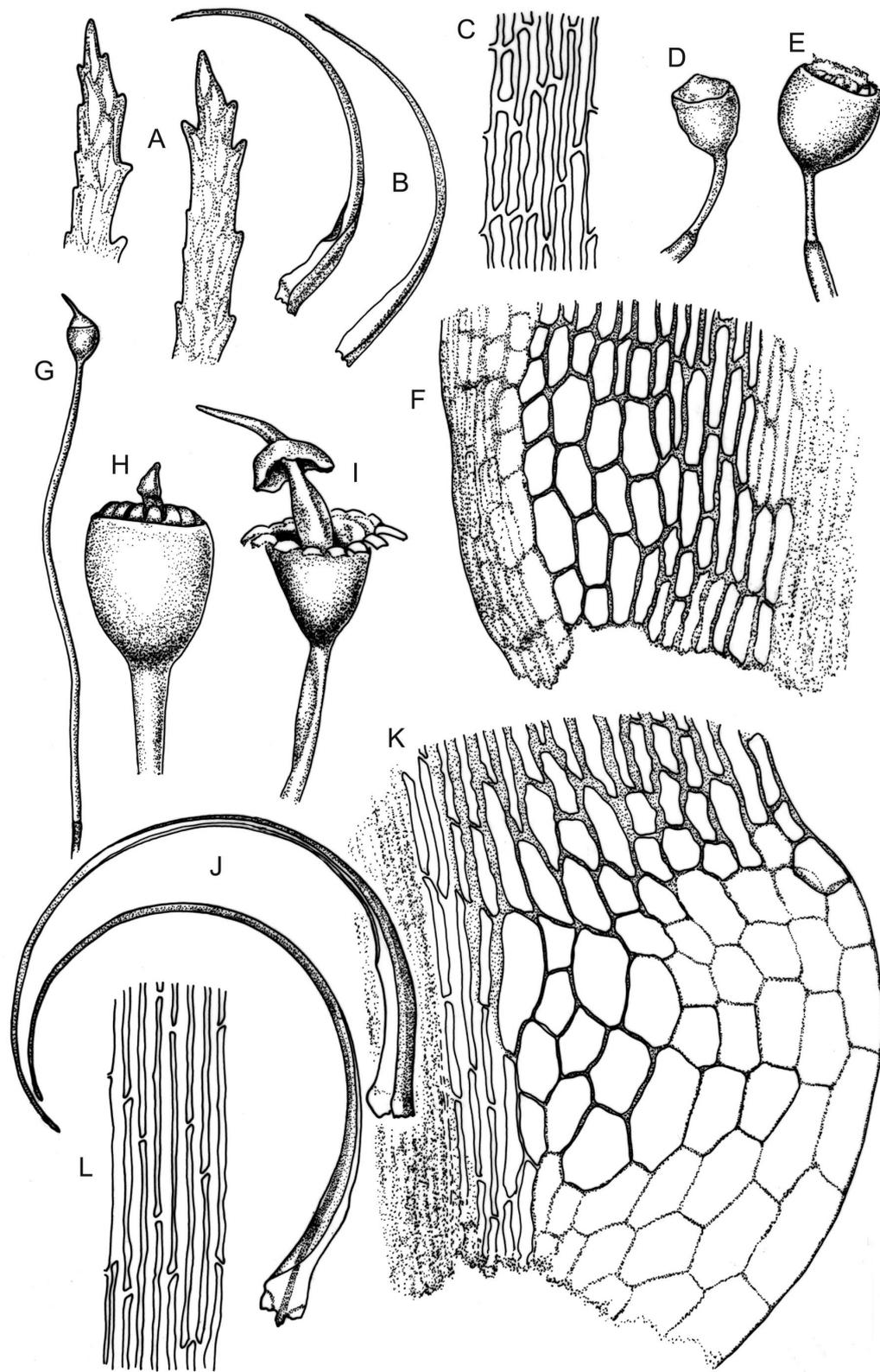


Plate 3: *Blindia*. A–F: *B. martinii*. A, leaf apices. B, leaves. C, lower laminal cells, c. 100 μm above upper limit of alar cells. D, capsule, dry. E, capsule. F, alar cells. **G–L: *B. robusta*.** G, capsule with operculum. H, capsule. I, capsule with operculum, dry. J, leaves. K, alar cells. L, lower laminal cells, c. 150 μm above upper limit of alar cells. *B. martinii* drawn from *W. Martin*, Jan. 1944, CHR 380530; *B. robusta* drawn from *B.H. Macmillan 00/18*, CHR 542759.

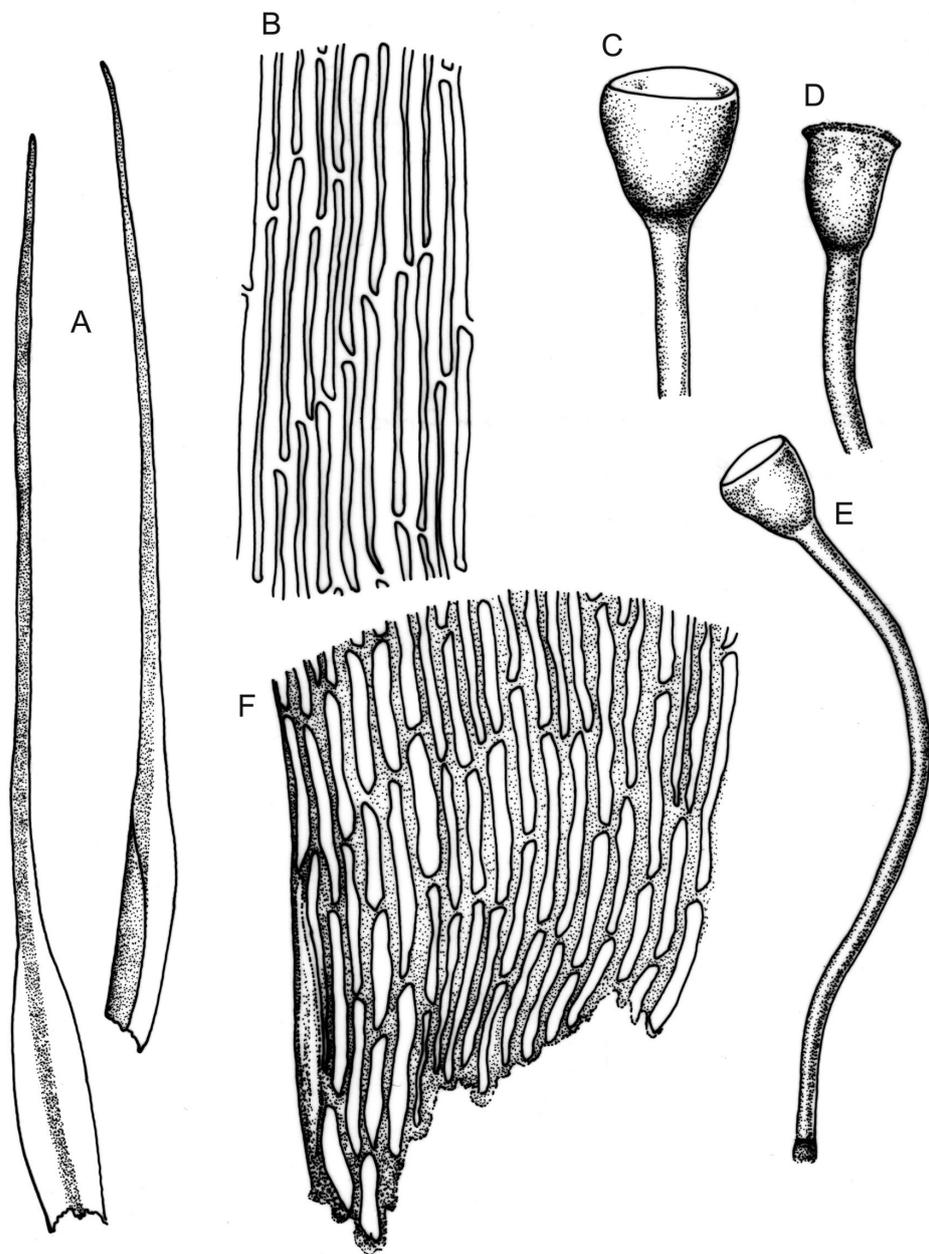


Plate 4: *Blindia*. A–F: *B. seppeltii*. A, leaves. B, lower laminal cells, c. 400 μ m above base. C, capsule. D, capsule, dry. E, capsule. F, alar cells. Drawn from D.H. Vitt 8977, CHR 412478.

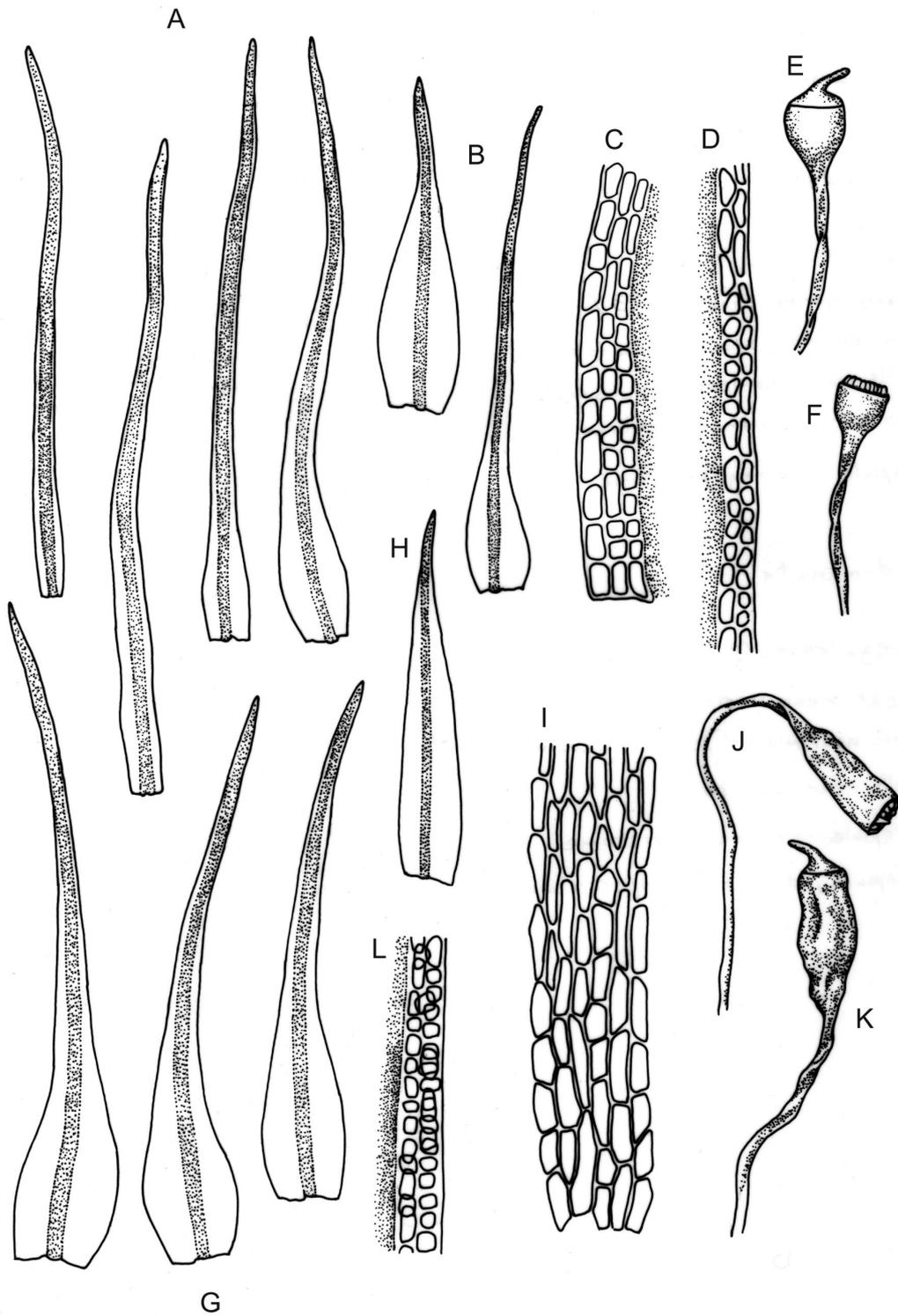
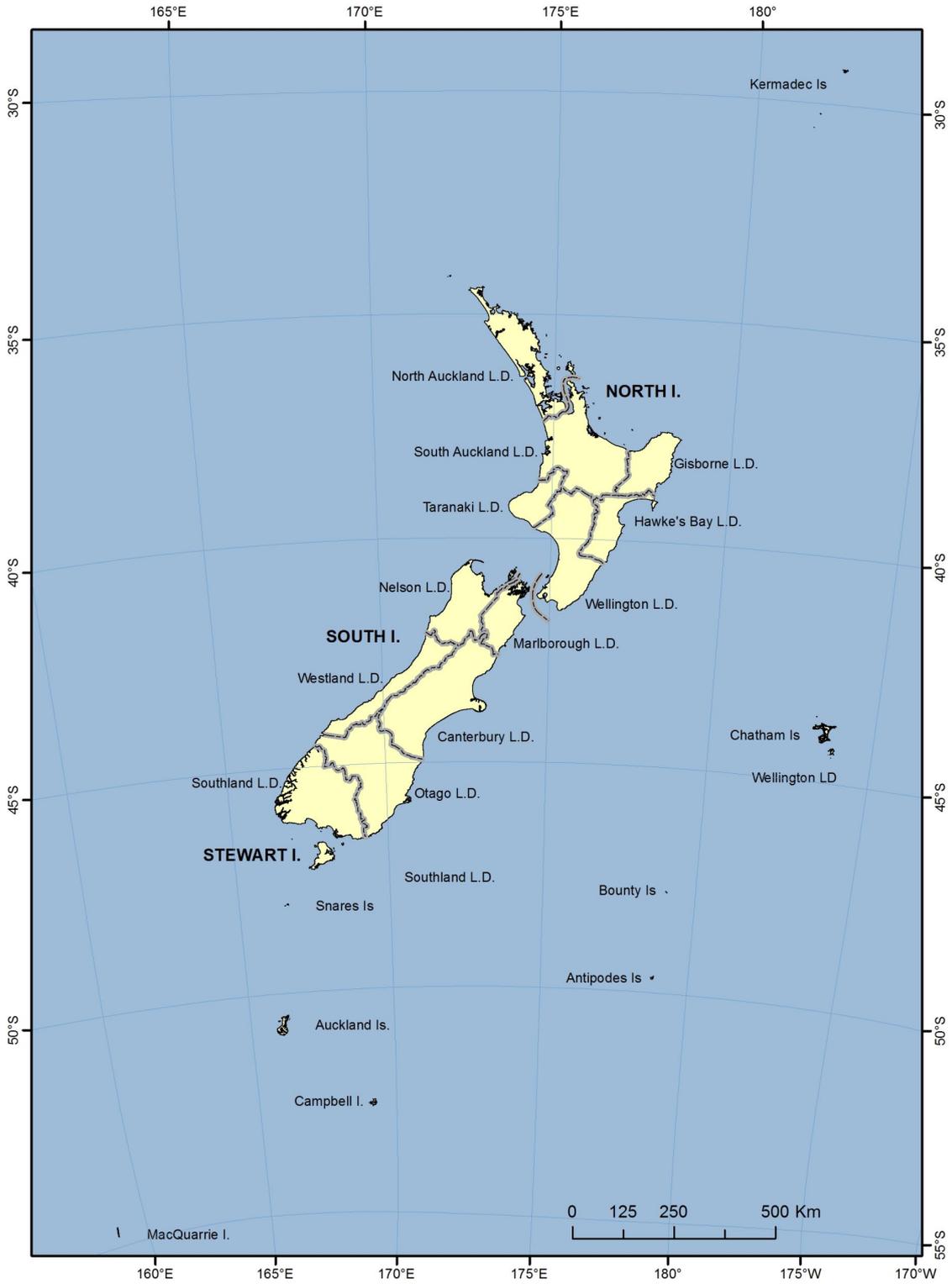
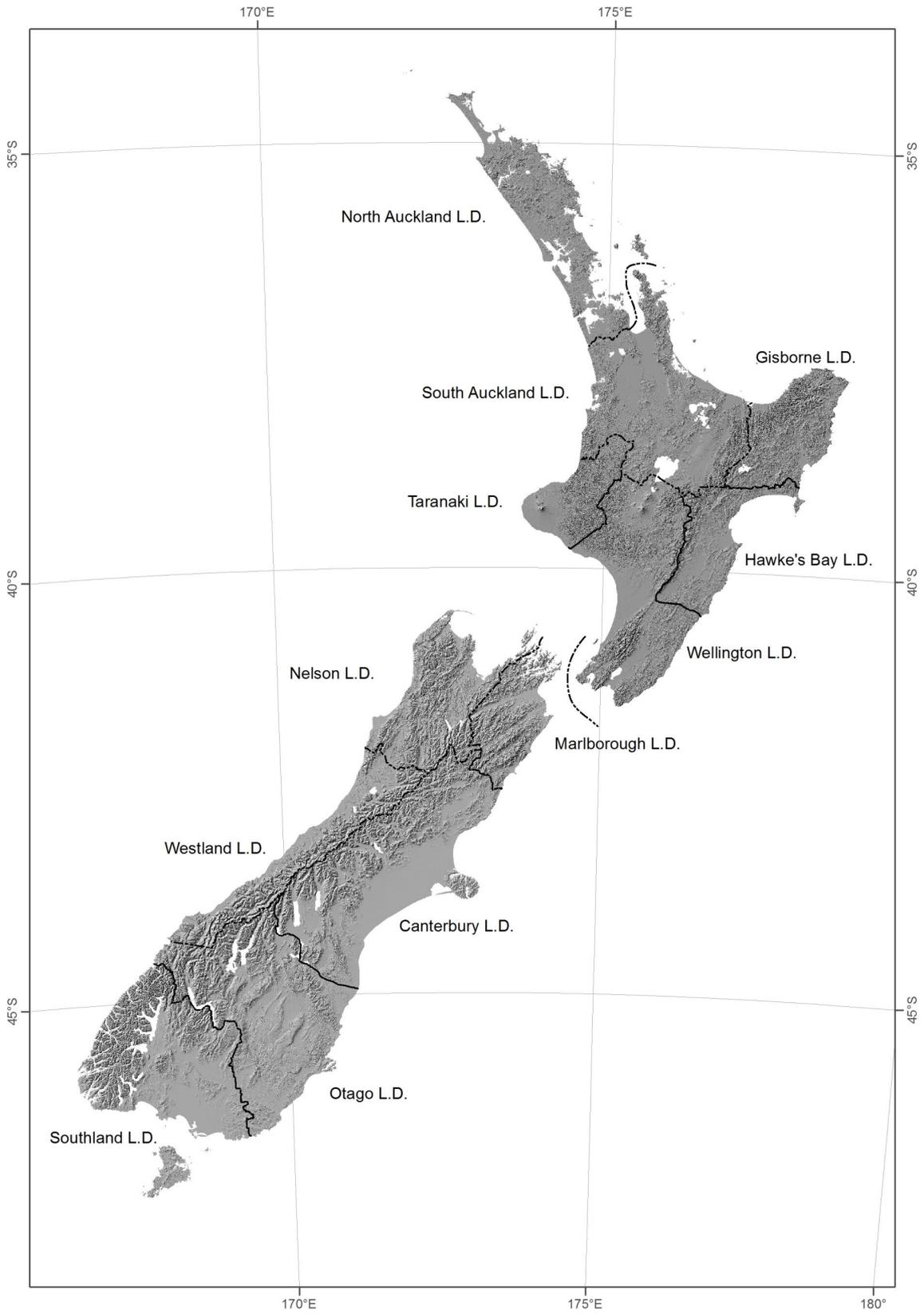


Plate 5: *Seligeria*. A–F: *S. cardotii*. A, four leaves. B, leaves from near perichaetium. C, basal and lower laminal cells from costa to margin. D, mid laminal cells from costa to margin. E–F, capsules. **G–L: *S. diminuta*.** G, leaves. H, leaf from near perichaetium. I, basal and lower laminal cells. J, capsule. K, capsule, dry. L, mid laminal cells from costa to margin. Redrawn from Vitt and Bartlett (1983).



Map 1: Map of New Zealand and offshore islands showing Land District boundaries



Map 2: Map of main islands of New Zealand showing Land District boundaries

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Page numbers are in **bold** for the main entry,
and *italic* for synonyms.

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