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AUSTRAL HEPATICAE 36. A NEW SPECIES OF *LEPIDOZIA* FROM NEW ZEALAND, TOGETHER WITH AN ASSESSMENT OF SUBG. *AUSTROLEPIDOZIA* (SCHUST.) SCHUST.

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ABSTRACT. *Lepidozia serrulata* Engel, a new member of the Lepidoziaceae, is described and illustrated from New Zealand. The species belongs to section *Kirkii* Schust.

The genus *Lepidozia* is one of the larger hepatic genera in New Zealand, with 22 species according to the recent treatment of Engel and Schuster (2001). During the course of continuing investigations of New Zealand hepatics, an interesting additional species of *Lepidozia* came to my attention. It is described and discussed as well as compared to some of the other New Zealand members of the genus below.

Lepidozia serrulata Engel, sp. nov.

Lepidoziae hirtae similis, sed bipinnatim ramificanti, paribus loborum dorsalium caudatis, parte distali eorum ciliiformi, serie uniseriata e cellulis 4–7 modice elongatis (2.3–4.3[5.3]:1) composita, distinguenda.

Holotype: New Zealand, Stewart Island, Rakiura Natl. Park, Mt. Rocky summit area, 530 m, *Engel, von Konrat & Braggins 24293* (F); isotype: AK.

Plants loosely prostrate, rather rigid, the hair-like leaf tips lending dried plants a subhoary apsect, pale yellow green, the shoots medium-sized, to 1.7 cm wide, including branches. Branching exclusively of *Frullania* type, regularly and rather densely bipinnate, the branches, particularly the secondary ones, ventrally-secund, both at times abruptly becoming flagelliform and whiplike; branch half-leaf subsymmetric (the dorsal margin a little dilated), ovate, 2-lobed, the dorsal margin sparingly and irregularly denticulate-dentate, at times with a few spinose teeth, the ventral margin with a few, stronger, spinose teeth; first branch underleaf 3–4 lobed, inserted on juncture of branch base and main shoot and aligned with underleaves of branch, asymmetric, the sinuses of unequal depth. Ventral-intercalary branching occasional, short, leafy or flagelliform. Stems rather soft and flexuous, 12–13 cells in diam., the cortical cells in 1 layer of thick-walled cells that are slightly larger than medullary cells; medullary cells distinctly firm walled. Leaves rigid, fragile, strongly concave, imbricate and nearly or completely hiding stem in dorsal view, 0.9–1.1 mm long at longest point, 0.8–1.1 mm wide at widest point, obliquely spreading, the insertion distinctly incubous, not or slightly recurved at dorsal end; leaves distinctly asymmetric, unequally 4-lobed, the leaves divided to ca. 0.5–0.55(0.7) (median sinus), the dorsal lobes subparallel, the 2(3) ventral lobes moderately divergent, the distance from dorsal sinus base to insertion much greater than that from ventral sinus to insertion, the dorsal lobes percept-

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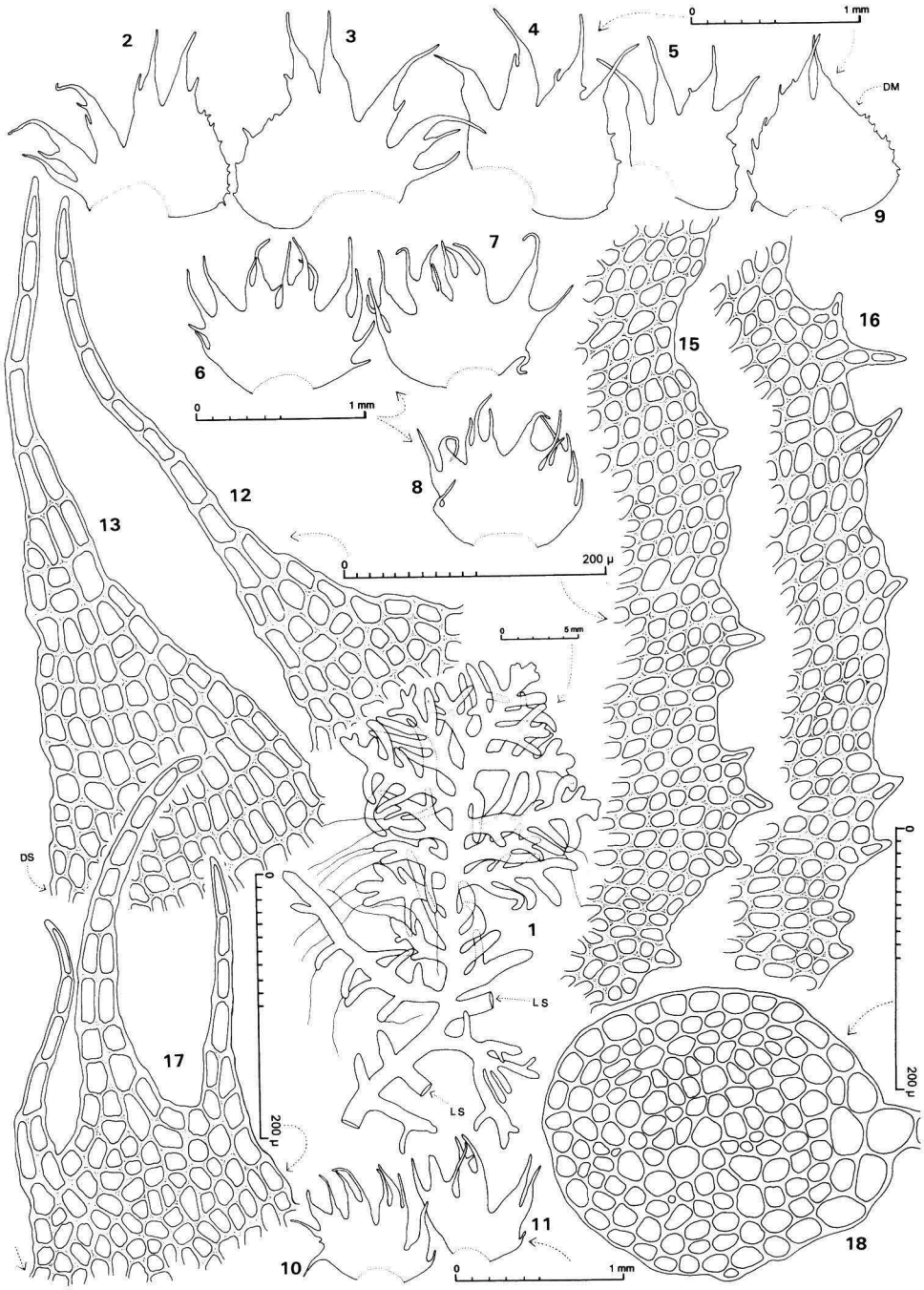

Fig. 1. *Lepidozia serrulata* Engel. 1. Cladograph; the single lines indicate flagelliform sectors of branches. 2–5. Four leaves. 6–8. Underleaves. 9. Half leaf (dm=dorsal margin). 10–11. First branch underleaves. 12, 13. Second dorsalmost (left) and dorsalmost (right) leaf lobes (ds=dorsal sinus); both drawn to same scale. 15, 16. Portion of dorsal margin of two leaves; both drawn to same scale. 17. Median lobe of underleaf (arrows indicate sinus bases). 18. Stem, cross section. (All from type.)

ably to distinctly paired, the dorsalmost sinus often notably shallower, the remaining sinuses then becoming gradually deeper ventrally. Lobes of differing shape, the dorsal pair of lobes caudate, the third lobe subcaudate to sublinear, the ventralmost lobe linear to attenuate, the lobes typically entire, occasionally with 1 small tooth or spine, the dorsal lobes 9–13 cells wide at base, the ventral lobe 6–13 cells wide at base, the lobes terminating in a uniseriate row of (3)4–7(8) cells; cells of uniseriate row moderately elongated (2.3–4.3[5.3]:1), thick-walled and with the septa thickened and swollen, the tip cell thickened at the summit. Disc distinctly asymmetric primarily due to strong dilation of dorsal sector, the disc 19–25 cells high at dorsal sinus, 7–12 cells high at ventral sinus; dorsal margin sparingly and irregularly denticulate-dentate, at times with a few small spinose teeth, the teeth often composed of only 1–2 cells; ventral margin much shorter than the dorsal, entire or occasionally with a lacinia, which if especially well-developed, the leaves then 5-lobed. Cells of disc middle evenly thick-walled, slightly to moderately elongated, 14–24 μm×28–34 μm, tending to occur in ± regular longitudinal files; cells in the ampliate sector ± isodiametric, 16–22 μm wide and long; median basal cells enlarged and forming an ill-defined field; surface finely striate-papillose. Underleaves 1.5–2× stem width, spreading, symmetrically basically 4-fid to 0.5 (median sinus), the lobe base tapering distally or ± parallel sided, 11–15 cells wide at extreme base, the distal portion acuminate-subcaudate, the lobes with 1–2 accessory, at times opposed, teeth or cilia that are always smaller than the lobe, the distal sector terminating in a single cell or a uniseriate row of 2–6 cells; disc 11–15 cells high at median sinus, the disc margins on each side with 1–2 cilia.

Androecia and gynoecia not seen.

Comments: Upon initial examination of this new species, the distal sector of the leaf lobes is notable in being ciliiform and comprised of a uniseriate row of rather long and narrow cells. The leaf lobe features bring to mind those of *L. ulothrix* (Schwägr.) Lindenb. of New Zealand, Tasmania and southeast Australia (compare Fig. 1: 12, 13 with 2: 6, 7). However, *L. serrulata* differs from *L. ulothrix* in having a) the leaf lobes entire (or very sparingly denticulate); b) the dorsal margin of the disk denticulate-dentate (Fig. 1: 15, 16); c) bipinnate branching (Fig. 1: 1); and d) a pale yellow green color. *Lepidozia ulothrix*, on the other hand, has lobe margins with paired cilia and the dorsal margin of the disc with numerous spinose teeth or cilia (Fig. 2: 1, 2) as well as once-pinnate branching (Engel and Schuster, 2001, fig. 33: 14) and a pale olive green to whitish green color. The two species also differ in the form of their underleaves. In *L. ulothrix* the lobe bases (particularly the median lobes) are ± parallel sided and 8–9 cells wide, and the summit of the median lobes is truncate and bears 2–3 cilia that are subequal in size (Fig. 2: 4). The distal sector of the median underleaf lobes is setaceous and each of the 2–3 cilia terminates in a single cell or a uniseriate row of 5–13 cells. In *L. serrulata* the underleaf lobe bases either taper or they are ± parallel sided but are 11–15 cells wide (Fig. 1: 6–8, 17). The lobes typically have 1–2 accessory, at times opposed, teeth or cilia, but unlike in *L. ulothrix*, these are always smaller in size (narrower at the base and often shorter) than the lobe (Fig. 1: 6–8, 17). The distal sector of the median lobes terminates in a single cell or a uniseriate row of 2–6 cells (Fig. 1: 17).

Lepidozia serrulata appears to be more closely related to *L. hirta* Steph. of New Zealand, sharing with that species leaf lobe margins entire or sparingly toothed, and a shorter uniseriate row of the leaf lobes, each terminating in a uniseriate row of 4–7(8) cells (vs. 8–15 in *L. ulothrix*). Also, the irregular small teeth of the disc dorsal margin in *L. serrulata* (Fig. 1: 15, 16) are much closer in form to those of *L. hirta* (Fig. 3: 1, 2, 4) than to those of *L. ulothrix*, which has up to 19 spinose teeth or cilia (Fig. 2: 1–3).

This new species belongs to Sect. *Kirkii* Schust., which also contains two New Zealand species, one, the just mentioned *L. hirta*, and the other *L. kirkii* Steph., and also *L. borneensis* Steph. of Borneo and New Guinea (see Mizutani, 1968; Piippo, 1984). Section *Kirkii* was previously thought to be restricted to New Zealand.

The species of Sect. *Kirkii* may be separated by the following key.

Key to Sect. *Kirkii*

1. Dorsal pair of lobes terminating in a uniseriate row of 4–7 cells, the cells at least at times moderately elongated (2.3–4.3[5.3]:1) 2
   2. Dorsal pair of lobes caudate, the distal portion ciliiform; branching bipinnate. New Zealand, Stewart Is. ..... *L. serrulata*
   2. Dorsal pair of lobes acuminate, the distal portion not ciliiform; branching once bipinnate. Borneo, New Guinea ..... *L. borneensis*
1. Dorsal pair of lobes terminating in a uniseriate row of 2–3 cells, the cells ± isodiametric to somewhat longer than wide (2:1 or less). New Zealand 3
   3. Dorsal margin of disc and contiguous margin of lobe irregularly dentate to coarsely serrate; leaf lobes acute; underleaves divided to at most 0.5 (the disc 12–16 cells high), the lobe margins entire or sparingly toothed ..... *L. kirkii*
   3. Dorsal margin of disc and confluent margin of lobe ± regularly spinose-dentate, with discrete, often curved, acuminate spines; leaf lobes acuminate; underleaves divided to 0.55–0.8 (the disc 6–9 cells high), the lobe margins laciniate-multifid (rarely entire) ..... *L. hirta*

The above mentioned *L. ulothrix* was placed by Schuster (2000) in Sect. *Austrolepidozia* Schust. of Subg. *Lepidozia*. *Austrolepidozia* (Schust.) Schust. was elevated to the rank of subgenus in Engel and Schuster (2001). The discussion above argues for a closer relationship of *L. ulothrix* to Sect. *Kirkii*, for recognition of *Austrolepidozia* at the rank of section and for including it as the most specialized element in subg. *Notholepidozia* Schust. (see Engel and Schuster, 2001, p. 18–19).

This is one of only four New Zealand *Lepidozia* species with regularly and consistently twice-pinnate branching, the others being *L. spinosissima*, *L. microphylla*, and *L. pendulina*. The last three species are all erect plants with rigid, woody stems with slender and drooping branches and have leaves that are transversely inserted, typically distant and vertically oriented. *Lepidozia spinosissima*, *L. microphylla* and *L. pendulina* are segregated into three different subgenera in Schuster (2000) and Engel and Schuster (2001), i.e., *Dendrolepidozia*, *Mastigolepidozia* and *Notholepidozia* respectively. *Lepidozia serrulata* also belongs to subgenus *Notholepidozia*, but, as discussed above, the species is related to the more specialized taxa in the subgenus, i.e., with *L. kirkii* and *L. hirta* of the same section,

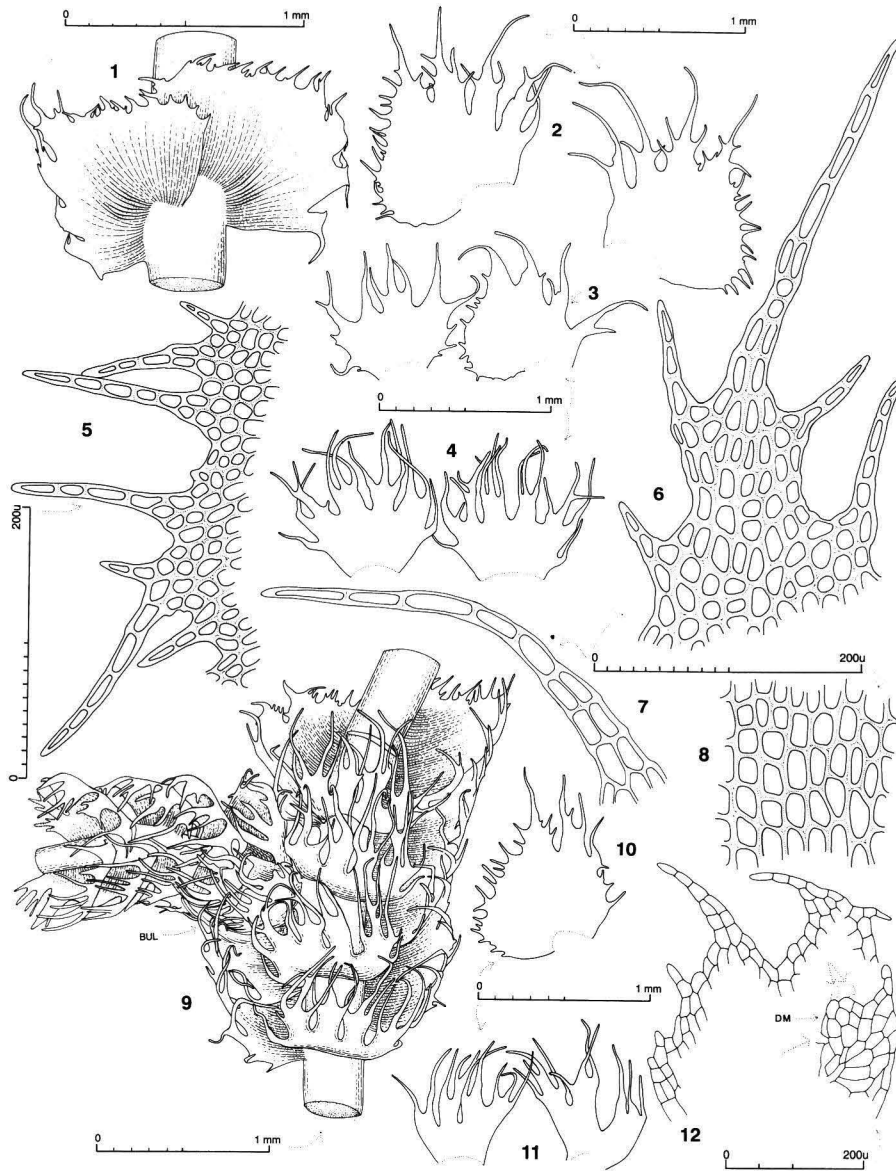

Fig. 2. *Lepidozia ulothrix* (Schwaegr.) Lindenb. 1. Sector of main shoot, dorsal view. 2. Leaves. 3. Underleaf and to right, leaf. 4. Underleaves. 5. Sector of dorsal margin of leaf. 6. Portion of dorsal lobe. 7. Distal sector of dorsalmost leaf lobe. 8. Median disc cells of leaf. 9. Sector of main shoot with *Frullania*-type branch, ventral view (BUL=first branch underleaf). 10. Half leaf. 11. First branch underleaves. 12. ♂ Bract (DM=dilated dorsal margin, slime papillae at arrows). (Figs. 1, 2, 4–6, 8–11 from *Fife 8987*, New Zealand, South Is., Arthur's Pass Natl. Park, Bealey Glacier Track; figs. 3, 7 from type of *L. albula.*)

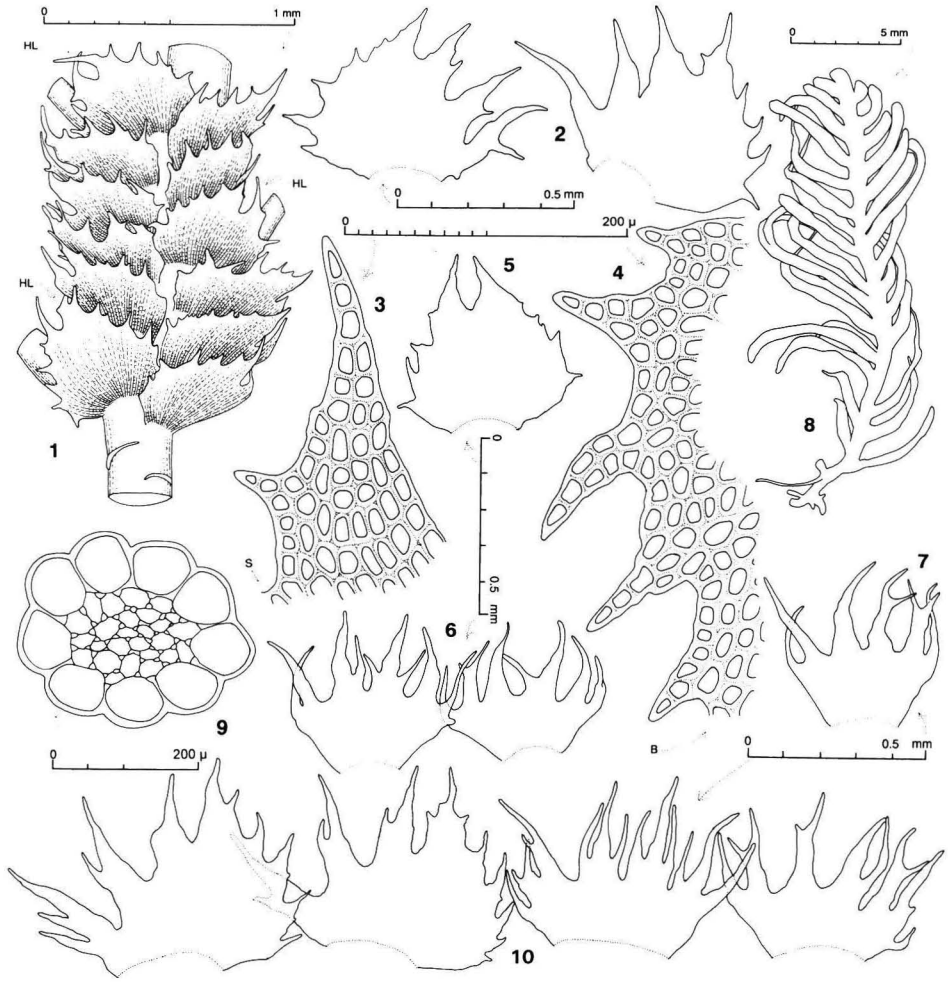

Fig. 3. *Lepidozia hirta* Steph. 1. Sector of main shoot, dorsal view (hl=half leaf). 2. Leaves. 3. Dorsalmost lobe of leaf (s=sinus). 4. Dorsal margin of leaf (B=leaf base). 5. Half leaf. 6, 7. Underleaves. 8. Outline of plant at low magnification. 9. Seta, cross section. 10. Two leaves and to right, two underleaves, all at same scale. (Figs. 1–8, from *Engel 19205*, New Zealand, South Is., Nelson/Westland Prov. Boundary, Paparoa Range, S side of Porarari River; 9, from *Hatcher 136*, New Zealand, South Is., Canterbury Prov., Mt. Tourlesse; 10, from *Braggins 94/241*, New Zealand North Auckland Prov., SE corner of Waipoua Forest.)

Kirkii. Section *Pendulinae*, with only *L. pendulina* of New Zealand, Tasmania and Australia, is treated as the basalmost section in subgenus *Notholepidozia*.

Distribution-Ecology: Endemic to Stewart Is., New Zealand. Ranging from 5–530 m, plants occur in protected, non-exposed sites, such as under cover of monica in mosaic com-

munities of dense heath-forming shrubs to 3 m tall, subalpine herbs, and dwarf heaths to 0.5 m tall, with vegetation dominated by stunted *Leptospermum scoparium* and *Dracophyllum* and a ground tier including *Empodisma* (type). Also under an open canopy of stunted *Dacrydium cupressinum* and dense *Dracophyllum* understory (ca. 2–3 m above river behind Belltopper Falls). The species also occurs in mosaic communities of stagnant ponds, *Sphagnum* bog, open *Leptospermum scoparium-Dracophyllum* heath to 1–2 m tall, and dense communities of *Gleichenia dicarpa* and *Empodisma* (Freshwater Landing). At Pryse Peak *L. serrulata* occurs in open forest, including stunted *Dacryidium cupressinum*, *Podocarpus hallii*, *Olearia colensoi*, *Gahnia*, *Blechnum*, and bryophyte cushions on the forest floor. The species is a ground dweller, occurring on the floor, either over soil or over a layer of thick humus, and at times may form soft cushions.

Specimens seen: NEW ZEALAND. STEWART ISLAND: Rakiura Natl. Park, Port Pegasus, immediately adjacent to Belltopper Falls, North Arm, ca. 10–80 m, *Engel, von Konrat & Braggins 24154* (F); ibid., Mt. Rocky summit area, 530 m, *Engel, von Konrat & Braggins 24321* (F); ibid., Mt. Rocky Track, 390–475 m, *Engel, von Konrat & Braggins 24377A* (F); ibid., track to Mason's Bay, ca. 1–1.8 km W of Freshwater Hut/Landing, 5 m, *Engel, von Konrat & Braggins 24432* (F); ibid., track to Mt. Rakeahua summit area, 355 m, *Engel, von Konrat & Braggins 24582* (F); ibid., Pryse Peak, immediate vicinity of trig, South West Arm, 350–355 m, *Engel, von Konrat & Braggins 24631* (F); ibid., Pryse Peak, plateau area on western side of summit, South West Arm, 330–340 m, *Engel, von Konrat & Braggins 24656* (F).

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