



## Studies on Lophocoleaceae. XXIV. *Chiloscyphus alpicola* J.J.Engel, an interesting new liverwort species from New Zealand together with nomenclatural changes in *Tetracymbaliella* Grolle

JOHN J. ENGEL

Science and Education, The Field Museum, Chicago, Illinois 60605-2496; email: [jengel@fieldmuseum.org](mailto:jengel@fieldmuseum.org)

### Abstract

*Chiloscyphus alpicola* J.J.Engel, a new member of the Lophocoleaceae from New Zealand, is described and illustrated and *Tetracymbaliella subsimplex* (Austin) J.J.Engel, endemic to Tasmanian, is a new combination.

**Key words:** liverworts, Marchantiophyta, *Chiloscyphus*, *Tetracymbaliella*, Lophocoleaceae, taxonomy, New Zealand, Tasmania.

### Introduction

During the course of investigations in connection with the forthcoming volume two of the Liverwort Flora of New Zealand, an additional interesting new species of *Chiloscyphus* Corda in Opiz (1829: 641) came to my attention and a nomenclatural realignment in *Tetracymbaliella* Grolle (1961: 48) became necessary. The names are being published separately to make them immediately available for use.

### Taxonomy

#### 1. A new species of *Chiloscyphus* Corda

##### *Chiloscyphus alpicola* J.J.Engel, sp. nov.

*Chiloscypho aperticauli* similis, sed lineis insertionis foliaris area angusta exfoliata usque ad 2–4-cellulas lata praeditis, superficie foliari, praesertim supra perimetrum luminis, velamine ceraceo obtecta, margine ventrali foliari saepe 1–5-ciliato, amphigastriis 4-lobis, tenacibus, non fragilibus, infragantibus, undique per caulem intactis, 2.1–2.6-plo latitudinem caulis aequantibus; habitu amphigastriorum in axem eodem plus minusquam regulariter ad caulem appressa vel leniter patente, contigua vel laxe imbricata differt.

**Holotype:**—New Zealand, South Island, Nelson Prov., Nelson Lakes Natl. Park, E slope of Robert Ridge in vicinity of Mt. Robert Skifield, W end of Lake Rotoiti, SSW of St. Arnaud, 1400–1480 m, *Engel* 22832 (F!); isotype: (CHR!).

Plants soft and flexuous, sometimes becoming long and stringy, brittle, loosely creeping, translucent, pale green to pale yellowish green, the shoots medium, to 3.5 mm wide. Branching rather common, the branches mostly of *Frullania*-type; lateral-intercalary type occasional. Stems with cortex moderately differentiated, in 1–2 layers of smaller cells which are thin-walled except for the weakly thickened exposed wall; medullary cells thin walled. Rhizoids short for plant size, in loose fascicles from stem at immediate base of underleaves. Leaves alternate, horizontal, widely spreading, loosely imbricate, free dorsally, the orientation and insertion strongly succubous, almost longitudinal, forming a straight line for nearly its entire length, and then abruptly recurved and comma-shaped at ventral end, the lines of insertion not extending to stem midline dorsally and delimiting a leaf-free strip of (1)2–4 cells wide; leaves convex, asymmetrically broadly ovate-subtrapezoid to obovate-subtrapezoid; apex undivided and broadly rounded to

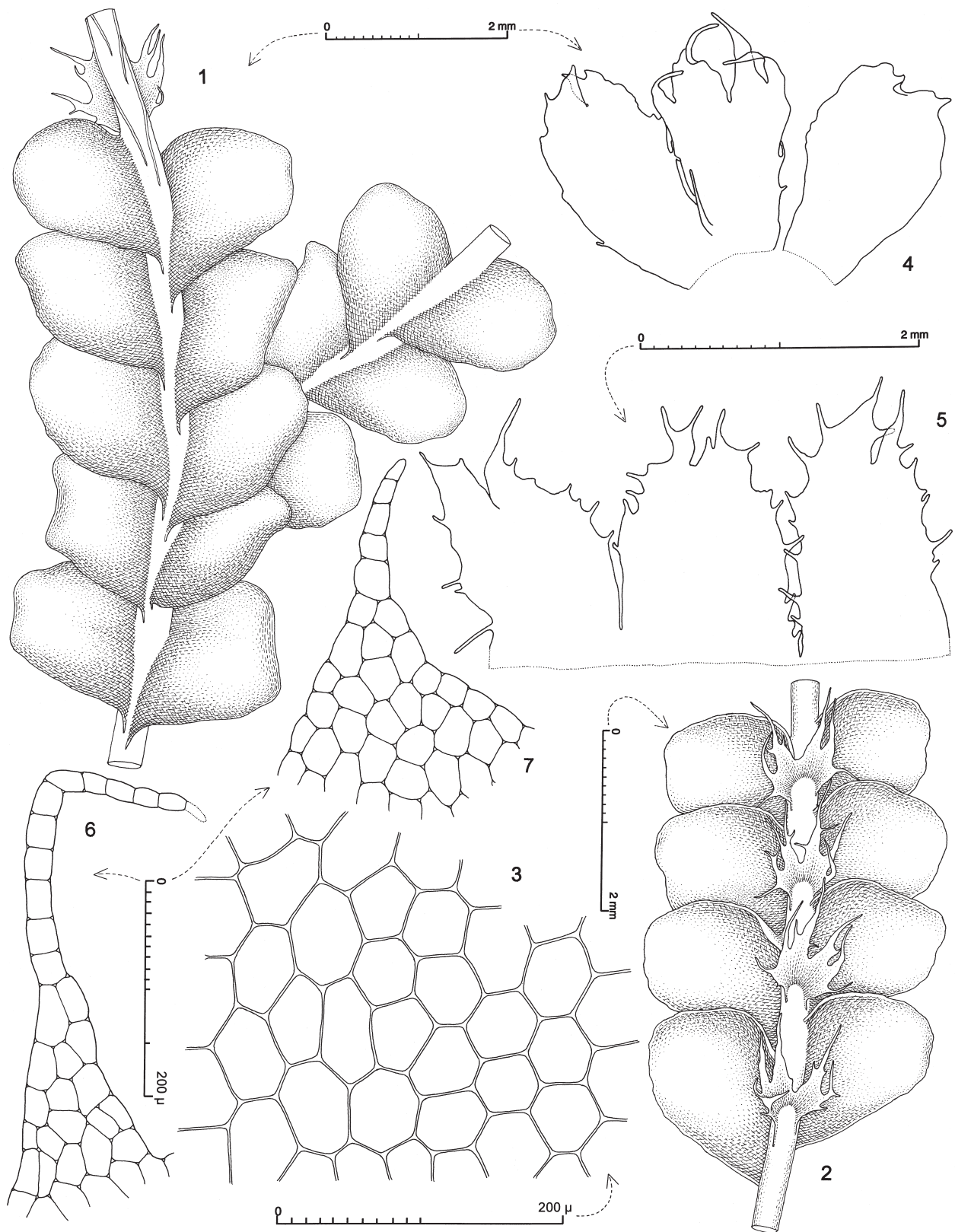
truncate, entire; dorsal margin broadly and gently arched to straight, plane to somewhat deflexed, entire, short to long decurrent; ventral margin broadly and rather strongly arched, the ventral margin plane or (often) reflexed in basal 0.35–0.5 and then the dorsal surface of leaf visible in ventral view, the ventral margin entire or with 1–5 cilia or, exceptionally, a broad-based dentiform to armed laciniiform process. Leaf cells with walls thin, trigones lacking or minute to small and concave-sided, the median leaf cells 36–48  $\mu\text{m}$  wide  $\times$  42–60  $\mu\text{m}$  long, hardly larger than the subapical; median basal cells a little larger, the ventral-basal cells sometimes longer and narrower in an ill-defined local area 1–2 cells wide; surface surffly, with an irregular wax-like covering occupying to various degrees the perimeter of the cell lumen, the edge that fringes the “opening” over the cell lumen appearing ragged and irregular. Underleaves firm, not fragile, often appearing highly dissected, remaining intact  $\pm$  throughout shoot, 2.1–2.6 $\times$  stem width, free or connate by 1 cell to the dorsal surface of leaf base (not by the extremity of the ventral margin), the insertion shallowly inverted U-shaped, the apex of insertion  $\pm$  aligned with the ventral extremity of the most closely associated leaf (or not as far); underleaf appressed to stem to weakly spreading, contiguous to loosely imbricate and with distal sector of lobes overlapping the lamina of underleaf above, the underleaves narrowly to broadly ovate to subrectangular,  $\pm$  similar in form and lobe symmetry, 4-lobed to (0.7)0.75–0.85 (median sinus); lobes parallel (often distinctly and closely so) to slightly diverging, the lateral lobes  $\pm$  subequal to or somewhat smaller than the median pair, all sinuses of  $\pm$  similar depth or with the median sinus a little shallower, the lobes long caudate, the distal sector often filiform, the lobes terminating in a uniseriate row of 4–8 moderately elongated cells subtended by up to 7 biseriate tiers, the lobe margins with 2 opposed teeth + 1–2 smaller accessory teeth, the marginal teeth often ciliiform; lamina margins plane (the disc then flat or weakly convex in ventral view) or slightly reflexed (the disc then slightly concave), each side with a ciliiform to laciniiform process (which may have a small tooth toward base), the margins otherwise entire or with a small tooth toward the base, the margins long decurrent. Asexual reproduction absent.

Plants dioicous;  $\sigma$  plants smaller. Androecia on main shoot or elongate, indeterminate lateral-intercalary or *Frullania*-type branches, the androecia initially terminal but eventually becoming intercalary in position, the androecia also on short lateral-intercalary branches that proliferate vegetatively distally (the androecium then basal on a branch), the androecia spicate to subspicate; bracts in 4–5 pairs, suberect to strongly erect, dorsally assurgent, loosely to tightly appressed to bract immediately above, the saccate portion fused to opposing bract; bracts with an inflated dorsal pocket, the distal portion concave and then the entire bract ventricose-saccate, or the distal portion somewhat reflexed, the apices broadly to narrowly rounded, at times retuse, entire, the ventral margin entire; lobule margin inflexed, the distal sector with 1–2 teeth at the apex, with several few-celled teeth below; antheridia 1 per bract, the stalk long, uniseriate; bracteoles free or very narrowly connate on 1 side, 2–4-lobed, narrowly elliptic-subrectangular to subrectangular, without antheridia. Gynoecia mostly terminal on main shoot and long *Frullania*-type branches, occasionally on short to long lateral-intercalary branches or rather short subfloral innovations; bracts and bracteoles in 3 series, those of innermost series erect and  $\pm$  appressed to perianth, the bracts of innermost series dorsally free from one another, plane or more often with 1 or both margins reflexed at least distally and then often lending the distal sector canaliculate, the bracts narrowly obovate from a narrow base, bifid to 0.1–0.15, the lobes blunt or acute, entire or with small teeth, the lamina margins entire or with a 1–2 small teeth; bracteoles free on both sides or narrowly connate on 1 side and free on the other side, similar to bracts in size, narrowly obtrapezoidal, 4-lobed to 0.35 (median sinus), the median lobes larger, the lobe margins entire, the lamina margins with 2–3 small ciliiform processes, the lamina base at times with a long filiform-attenuate process. Perianth distinctly exerted beyond bracts, sharply trigonous throughout, narrowly elliptic-subclavate, not or slightly expanding toward the wide, deeply 3-lobed mouth, the lobes divided to ca. 0.4; lobes distinctly bifid, the segments acuminate to caudate, terminating in a uniseriate row of to 11 cells and capped by a slime papilla, the lobe margins with several dentiform to ciliiform processes, the lobes dentate to ciliate below level of segments; keels sharp, with keelar wings occasional, of a few cells high.

Sporophyte not seen.

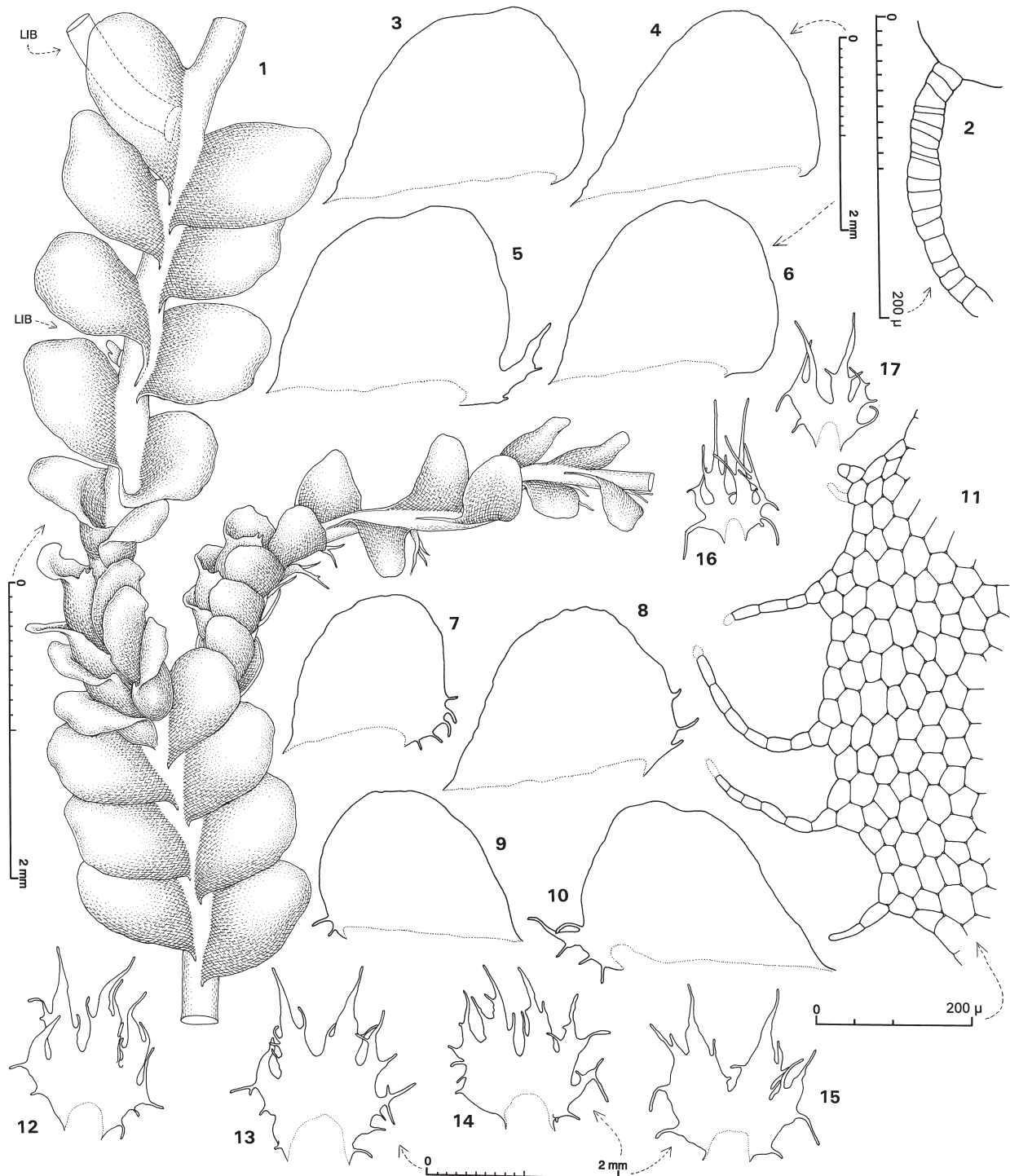
**Distribution and Ecology:**—New Zealand: South Island (1220–1480 m). A penalpine-alpine species known from a few sites on South Island. Several collections were associated with tussock. For example, in the vicinity of Mt. Robert Skifield on the east slope of Robert Ridge (above W end of Lake Rotoiti, Nelson Lakes Natl. Park, Nelson Prov., 1400–1480 m), plants occurred in a very wet niche between tussock and covered by old, dead tussock blades at the edge of a tarn in an area of tarns in low alpine vegetation. The type was found under old, rotted, prostrate blades of tussocks in a mosaic of tussock grass and alpine vegetation along with tarns, rills, rocky outcrops, and boulderfields. Several collections made by John Child on Mt. Shrimpton (Mt. Aspiring Natl. Park, Otago Prov.) are also associated with tussock: two under snow tussock at 1220–1370 m (*Child 4168, 4215*, F), another associated with a small watercourse in a tussock herbfield, 1220 m (*Child 4219*, F). Also occurring deep under protection of *Dracophyllum* in a penalpine scrub consisting mainly of *Chionochoa*, *Dracophyllum*, and *Hebe* (below and W of Mt. Shrimpton, Mt. Aspiring Natl.

Park, 1370–1470 m). A collection from Roys Peak, Wanaka, Otago Prov., 1460 m, (C. D. Meurk, CHR 577648) was on grass litter in *Chionochloa macra* tussockland, and was associated with *Brachythecium salebrosum*.



**FIGURE 1.** *Chiloscypus alpicola* J.J. Engel. 1. Sector of main shoot with *Frullania*-type branch, dorsal view. 2. Sector of main shoot ventral view. 3. Median leaf cells. 4. Innermost ♀ bracts, and in middle, bracteole. 5. Perianth mouth, ventral lobe in middle. 6, 7. Segments of perianth mouth. (Figs. 1, 2, 4–7, from holotype; 3, from Engel 22755, New Zealand, South Is., Nelson Prov., Arnaud Range, Rainbow Skifield.)

**Comments:**—This interesting species has much the same general appearance, especially in the field, as *Chiloscyphus semiteres* (Lehmann, 1829: 363) Lehm. & Lindenb. in Gottsche *et al.* (1844–47: 190) and *C. aperticaulis* J.J.Engel (2010: 229) as well as *Heteroscyphus planiusculus* (Hooker & Taylor, 1844: 382) J.J.Engel (1990: 315). This similarity easily may cause confusion when sterile plants are at hand since all four species are of similar general size and have undivided, convex, widely spreading leaves. Moreover, *Chiloscyphus semiteres* may have four-lobed, deeply divided underleaves, and in this respect is similar to *C. alpicola*, which further adds to potential confusion. The four species may be distinguished by the following key:



**FIGURE 2.** *Chiloscyphus alpicola* J.J. Engel. 1. Sector of leading lateral-intercalary type branch (dorsal view) with an androecium intercalary in position and a rather short lateral-intercalary branch with an androecium basal on the branch, the branch at upper left (= lib + ♂) is similar in form and position of androecium to branch at right. 2. Antheridial stalk. 3–10. Leaves. 11. Ventral base of leaf. 12–17. Underleaves. (Figs. 1–6, from holotype; 7–15, from Engel 22755, New Zealand, South Is., Nelson Prov., Arnaud Range, Rainbow Skifield; 16, 17, from Engel 17862, New Zealand, South Is., Otago Prov., Mt. Aspiring Natl. Park, below and W of Mt. Shrimpton.)

## Key to sterile plants of *Chiloscyphus alpicola* and similar-appearing species

1. Leaf insertion lines not extending to stem midline dorsally, a leaf-free gutter present, the insertion recurved at ventral end (comma- or J-shaped); leaves convex throughout (at times with a weak adaxial concavity in ventral-basal sector in *H. planiusculus*) .....2
2. Leaves with insertion lines delimiting a leaf-free strip of 2–4 cells wide; leaf surface with a wax-like cover, particularly over the lumen perimeter; ventral margin of leaf often with 1–5 cilia (exceptionally with a broad-based dentiform to laciniiform process near base); underleaves 4-lobed, not fragile and fragmenting, remaining intact  $\pm$  throughout shoot, 2.1–2.6 $\times$  stem width; underleaf orientation on same axis  $\pm$  consistently appressed to stem to weakly spreading, contiguous to loosely imbricate .....  
..... *Chiloscyphus alpicola*
2. Leaves with insertion lines delimiting a leaf-free strip of (5)6–9 cells wide; leaf surface smooth; ventral margin of leaf entire or at most sporadically with a tooth or slime papilla near base; underleaves bifid, fragile, often broken, 0.65–1.4 $\times$  stem width; underleaf orientation on same axis often varying from not to hardly spreading to squarrose, markedly distant ..... 3
3. Ventral margin of leaf broadly curved to  $\pm$  straight, uniformly entire; median leaf cells small, 18–24  $\mu\text{m}$  wide  $\times$  20–32(38)  $\mu\text{m}$  long; branching often predominantly lateral intercalary; underleaves  $\pm$  symmetrically lobed, the two lobes  $\pm$  similar in form; androecia on leading shoots, with  $\sigma$  bracts  $\pm$  leaflike; predominantly a forest species ..... *C. aperticaulis*
3. Ventral margin of leaf dilated and subauriculate in basal sector (well-developed leaves), at times with a tooth or slime papilla; median leaf cells larger, 28–40  $\mu\text{m}$  wide  $\times$  32–42  $\mu\text{m}$  long; branching mostly of *Frullania*-type; underleaves often asymmetrically lobed, the lobes of differing size and configuration; androecia on abbreviated, determinate, lateral-intercalary branches, subsperate; penalpine-alpine species ..... *Heteroscyphus planiusculus*
1. Leaf insertion lines extending to stem midline dorsally, no gutter present, the insertion not recurved at ventral end; leaves with a broad adaxial concavity ..... *C. semiteres*

*Chiloscyphus alpicola* belongs to sect. *Aperticaules* J.J.Engel (2010: 119), a group now with, three species, *C. alpicola*, *C. mediifrons* J.J.Engel & Braggins in Engel (2010: 119), and *C. aperticaulis*, all confined to New Zealand. *Chiloscyphus alpicola*, as the name suggests, is a penalpine-alpine species while *C. aperticaulis* nearly always occurs in forested sites and *C. mediifrons*, known only from a low elevation forest on Stewart Is. (Engel, 2010).

Care should be taken in assessment of presence of a leaf-free strip of stem cells. Leaf insertion lines are variable as to their extent dorsally. Insertion lines may delimit a conspicuous leaf-free strip of 3–4 cells wide, but some populations, as in the type, may have a leaf-free gutter of only one stem cell wide. The presence of a narrower gutter, though, is variable, even on a single shoot, with wider gutters often also present. If the dorsal margins are long decurrent, as in the type, particular care should be exercised, and shoots should be examined under a compound microscope to confirm gutter presence.

The leaf surface has a wax-like covering that occupies, to varying degrees, the lumen perimeter. On leaves toward the shoot apex the wax covering likely is present over the entire leaf surface, but with enlargement and expansion of the cell, the free, exposed tangential faces bulge outward forming a convexity, with the wax covering, likely inflexible, appearing to disappear over the median sector of the lumen. The result is a solid wax covering around the cell perimeter, with the free edge of the wax irregular and ragged creating an  $\pm$  orbicular sector over the median portion of the wall that is smooth and wax free.

**Specimens seen.**—NEW ZEALAND. South Island. Otago Prov.: Mt. Aspiring Natl. Park, below and W of Mt. Shrimpton, 1370–1470 m, *Engel 17862* (F); Mt. Shrimpton, Makaroa, 1220–1370 m, *Child 4168, 4215, 4219* (F). NELSON PROV.: St. Arnaud Range, Rainbow Skifield, E of S end of Lake Rotoiti, S of St. Arnaud, 1360–1480 m, *Engel 22755* (F).

## 2. A new combination in *Tetracymbaliella* Grolle.

### *Tetracymbaliella subsimplex* (Austin) J.J.Engel, comb. nov.

*Polyotus subsimplex* Austin, Bull. Torrey Bot. Club 6: 46. 1875. Type: Tasmania (Van Diemen's Land), Mt. Wellington, 1850, *Mossman*, herb. Sullivan (FH!).

*Tetracymbaliella rodwayana* Grolle, Nova Hedwigia 3: 52, f. 34, k-n. 1961, *syn. nov.* Holotype: Tasmania, Wilmot, 1927, *Weindorfer*, herb. Herzog (JE, *non vide*).

*Tetracymbaliella subsimplex* is endemic to Tasmania.

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