On *Cheilolejeunea tenella* (Jungermanniopsida: Lejeuneaceae), a poorly known species from Singapore

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*Cheilolejeunea tenella* (Taylor) J.J. Engel & B.C. Tan (Lejeuneaceae) has a proximal hyaline papilla of the leaf lobule and other typical characters of the genus *Lejeunea*. It is reinstated here as *Lejeunea tenella* Taylor. The species has to be excluded from the floras of Indonesia, New Zealand, and the Philippines because previous reports of *Cheilolejeunea tenella* for these countries are based on misidentifications. The description and illustrations of *Lejeunea tenella* here provided are based on the type specimen from Singapore.

Key words: *Cheilolejeunea*, distribution, *Lejeunea tenella*, Lejeuneaceae, taxonomy.

*Lejeunea tenella* was originally described by Taylor (1846) based on Wallich’s collection from Singapore. Stephani (1890) transferred this species to the genus *Euosmolejeunea*, as *E. tenella* (Taylor) Steph., and later (Stephani 1914) reported its occurrence in Java, the Philippines, and Singapore. Campbell (1971, 1977) recorded it in Fiji and New Zealand, respectively. Tan and Engel (1986) moved *Euosmolejeunea tenella* to *Cheilolejeunea*, as *C. tenella* (Taylor) J.J. Engel & B.C. Tan. Piippo *et al.* (2002) did not find additional collections of this species in their recent investigation of liverworts and hornworts from Singapore.

Owing to the lack of good drawings and a complete description, *Cheilolejeunea tenella* was poorly known and it has been confused with other taxa. Examination of the type specimen of *C. tenella* revealed that the species has a proximal hyaline papilla of the leaf lobule and other characters typical for *Lejeunea*. Therefore, the species is described and illustrated here as *Lejeunea tenella*, based on the type material, the only known collection of this taxon. The records of the species in Java (Stephani 1914 as *Euosmolejeunea tenella*, Bonner 1965 as *E. tenella*, Miller *et al.* 1983 as *E. tenella*), New Zealand (Campbell 1977 as *E. tenella*, Miller *et al.* 1983 as *E. tenella*), and the Philippines (Stephani 1914 as *E. tenella*, Bonner 1965 as *E. tenella*, Miller *et al.* 1983 as *E. tenella*, Tan & Engel 1986 as *C. tenella*) are based on misidentifications.

*Lejeunea tenella* Taylor (Fig. 1)

Fig. 1. *Lejeunea tenella* (from Wallich s.n., FH). — **A–C**: Portion of plant, ventral view. — **D**: Leaf, ventral view. — **E** and **F**: Transverse section of stem. — **G**: Median cells of leaf lobe showing punctate cuticle. — **H**: Basal cells of leaf lobe. — **I**: Underleaf. — **J** and **K**: Apex of leaf lobe. — **L**: Leaf lobule showing a proximal hyaline papilla. — **M**: Portion of stem showing the ventral merophyte.
Dioecious? Plants brown in dried condition. Stem 5–20 mm long, 80–100 µm in diameter, 0.5–0.8 mm wide with leaves, scarcely irregularly branched, branching of *Lejeunea* type, leaf sequence of lateral branches lejeuneoid, transverse section of stem with 7 cortical cells and 9–15 medullary cells, cortical cells quadrate to rectangular, 26–40 × 13–25 µm, medullary cells ± subsodiometric, or rarely rectangular, 14–28 × 10–16 µm. Ventral merophyte of stem 2 cells wide. Rhizoids at base of underleaves, numerous, tufted, usually hyaline, rhizoid disc absent. Leaves imbricate, sometimes contiguous, diverging from stem at an angle of 45°. Leaf lobes ovate, usually somewhat falcate, 0.40–0.60 mm long, 0.30–0.50 mm wide, apex rounded to rounded-obtuse, usually incurved, margin entire or slightly crenulate, dorsal margin slightly arched. Leaf lobules triangular-subquadrate, strongly inflated, 1/4–1/3 as long as leaf lobes, lateral free margin incurved, bordered by ca. 5 subquadrate to rectangular cells, apex sinuate, slightly constricted, with a unicellular apical tooth towards leaf apex, hyaline papilla oblong to spherical, ca. 11 × 7 µm, situated at proximal side of apical tooth, keel usually arched, occasionally almost straight, smooth. Leaf cells moderately thick-walled, trigones small to moderately large, intermediate thickenings usually frequent. Marginal cells of leaf lobe quadrant to rectangular, 12–20 × 7–14 µm, median cells ± isodiametric, 20–30 × 16–26 µm, basal cells isodiametric to rectangular, 22–32 × 16–22 µm, dorsal cuticle finely punctate. Vitta and ocelli absent. Oil bodies unknown. Underleaves remote, occasionally weakly imbricate, usually slightly longer than wide, 2–4 times as wide as stem, bilobed to ca. 1/3 underleaf length, sinus U- or V-shaped, lobes triangular, apex obtuse, 4–8 cells long, 6–10 cells wide at base, margin entire or slightly crenulate, insertion line arched, base cordate. Androecia unknown. Perianth “ovobate, 5-angled above, and crowned with a minute tube” (*fide* Taylor 1846).

*Cheilolejeunea* is distinguished from *Lejeunea* mainly by the distal hyaline papilla and lack of punctate cuticle of leaf cells (cf. Gradstein *et al.* 2001, Zhu & So 2001, Grolle *et al.* 2002). *Lejeunea tenella* has the typical characters of *Lejeunea*, including the proximal hyaline papilla (Fig. 1L) and punctate cuticle of leaf cells (Fig. 1G). The combinations of Stephani (1890) and Tan and Engel (1986), therefore, are erroneous.

The type material of *Lejeunea tenella* in FH and G contains only sterile plants. The only perianth known for this species was seen by Taylor (1846), who illustrated it in pencil on the label of the type in FH. Stephani’s (1914: p. 591, as *Euosmolejeunea tenella*) descriptions of androecia “numerosa, breviter spicata, sessilia, ex apice vegetative, saepe repetito spicata, bracteis paucijugis” might be based on the collections of *Cheilolejeunea trifaria* or *C. serpentina*, which were often confused with *Euosmolejeunea tenella* (see below).

*Lejeunea tenella* resembles the East-Asian *Lejeunea compacta* (Zhu 2000), the Himalayan *L. princeps* (Mizutani 1971), and the Bornean *L. contracta* (Mizutani 1970). The differences are summarized in Table 1. When sterile, it is difficult to separate one from another. The differences between *L. tenella* and the other species mentioned above are still unclear because

### Table 1. Comparison of *Lejeunea tenella* with morphologically similar species.

<table>
<thead>
<tr>
<th>Species</th>
<th>Male bracteoles</th>
<th>Sexuality</th>
<th>Lobule</th>
<th>Perianth keels</th>
<th>Trigones</th>
<th>Lobular apex</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>L. compacta</em></td>
<td>present throughout</td>
<td>dioecious</td>
<td>1/3(2/5) as long as lobe</td>
<td>non expanded</td>
<td>large</td>
<td>slightly contracted</td>
</tr>
<tr>
<td><em>L. contracta</em></td>
<td>present only at base of androecium</td>
<td>dioecious</td>
<td>1/4 as long as lobe</td>
<td>non expanded</td>
<td>indistinct</td>
<td>strongly contracted</td>
</tr>
<tr>
<td><em>L. princeps</em></td>
<td>present throughout androecium</td>
<td>autoecious</td>
<td>1/5–1/4 as long as lobe</td>
<td>expanded as ± undulate wings</td>
<td>large</td>
<td>slightly contracted</td>
</tr>
<tr>
<td><em>L. tenella</em></td>
<td>unknown</td>
<td>dioecious?</td>
<td>1/4–1/3 as long as lobe</td>
<td>non expanded</td>
<td>moderately large</td>
<td>slightly contracted</td>
</tr>
</tbody>
</table>
the sexuality and male plants of *L. tenella* are unknown.


**Distribution:** Only known from the type collection from Singapore. The record from Fiji (Campbell 1971) could not be confirmed (voucher specimens not available for the present study), but considering Campbell’s (1977) concept of the species, this record refers probably to a species of *Cheilolejeunea* rather than *Lejeunea*.

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