



Cololejeunea nanhutashanensis (Lejeuneaceae), a new species from Taiwan

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Abstract

Cololejeunea nanhutashanensis is described as a new species from Taiwan. The new taxon is included in subgenus *Cololejeunea* (Spruce) Schiffner, and characterized mainly by its ovate to broadly ovate leaves with obtuse apex; large leaf lobule, 2/3–3/4 of lobe length; lobule with 2 teeth, separated by 2–4 cells from each other; stylus 5–16 cells long, 1–3 seriate; leaf cells thin-walled with large trigones and hemispherical dorsal protrusions; androecia terminal on short lateral branches with male bracts in 3–5 pairs; female bracts large, bract lobule almost as long as bract lobe; perianth obovate to oblong, 5-keeled, with dorsal protrusions on upper 1/3 surface. Its main characters are illustrated, and its distinction from other closely related consubgeneric species is discussed.

Key words: *Cololejeunea*, liverworts, taxonomy, Taiwan

Introduction

Cololejeunea (Spruce 1884: 291) Schiffner (1893: 121) is a large pantropical genus of the liverwort family Lejeuneaceae. In Taiwan 48 species of this genus have been recorded from lowlands to mountain forests at 2500 m in elevation, mostly on living leaves as epiphylls but some on bark, rock, or decaying wood (Yang 2009; Wang *et al.* 2011; Ellis *et al.* 2013).

Examining the Taiwanese specimens of *Cololejeunea*, we found an interesting taxon from Mt. Nanhutashan area, one of the highest mountains in Taiwan. We compared the specimen with those of *Cololejeunea* material in Taiwan, and to relevant literature (Pearson 1890; Evans 1902, 1938; Mizutani 1961; Schuster 1980; Paton 1999; Zhu & So 2001; Yang 2009). We found it not matching the concept of any known species of the genus, and consequently described as a new species.

Material and methods

The holotype and isotype of the new species are deposited in TUNG and TAIE separately. The samples were studied with the typical anatomically and morphologically. Microscopic examinations and measurements were taken with a Zeiss Imager A2 light microscope and a Jenoptik ProgRes C14 Plus camera mounted on this microscope. Line drawings were prepared using the microphotographs obtained.

Description

Cololejeunea nanhutashanensis J.D.Yang & S.H.Lin, *sp. nov.* (Fig. 1)

Diagnosis: *Cololejeunea nanhutashanensis* differs from the otherwise similar *Cololejeunea biddlecomiae* (Aust. in Pearson 1890: 5) Evans (1902: 168) in its leaves with obtuse to rounded apex; large leaf lobule to 2/3–3/4 of lobe length; stylus 5–16 cells long, 1–3 seriate; leaf cells thin-walled with large trigones and hemispherical dorsal protrusions; androecia terminal on short lateral branches with male bracts in 3–5 pairs; female bracts large, bract lobule almost as long as bract lobe; perianth obovate to oblong, 5-keeled, with dorsal protrusions on its upper 1/3 surface.

TABLE 1. A comparison of characters among *Cololejeunea nanhutashanensis*, *C. biddlecomiae*, *C. calcarea*, and *C. ornata*.

Characters	<i>C. nanhutashanensis</i>	<i>C. biddlecomiae</i>	<i>C. calcarea</i>	<i>C. ornata</i>
Plant length	Up to 5 mm	3–9 mm	Up to 5 mm	Up to 5 mm
Plant width	0.40–0.65 mm	0.50–0.70 mm	0.25–0.70(–0.90) mm	0.25–0.40 mm
Stem width	33–82 µm	(40–)50–65 µm	46–70 µm	36–45 µm
Shape of leaves	Ovate to broadly ovate	Ovate to ovate-lanceolate	Ovate-lanceolate	Ovate
Shape of leaf apex	Obtuse	Acute to obtuse	Acute to acuminate	Acute
Leaf length	0.22–0.39 mm	0.32–0.40 mm	0.30–0.45 mm	0.18–0.25 mm
Leaf width	0.21–0.28 mm	0.20–0.25 mm	0.15–0.30 mm	0.10–0.18 mm
Cell walls	With large trigones, dorsal protrusions hemispherical	With minute trigones, dorsal protrusions conical	With small trigones, dorsal protrusions conically acute	With small trigones, dorsal protrusions spinose
Leaf lobule	2/3–3/4 the leaf length, surface smooth	1/3–1/2 the leaf length, surface smooth	1/2–2/3 the leaf length, surface smooth	Up to 2/3 the leaf length, reduced frequently, surface densely spinose
Lobule teeth	With 2 teeth, distant, separated by 2–4 cells	With 2 teeth, distant, separated by 1–2 cells	With 2 teeth, distant or crossing each other, separated by 1 cell	With 2 teeth, distant, separated by 1–3 cells
Stylus	Linear, 5–16 cells long, 1–3 seriate	Linear, 5–8(–12) cells long, uniseriate, rarely 2–3 cells wide at base	Linear, 2–6(–7) cells long, uniseriate	Linear, 2–9 cells long, 1–3 seriate, denticulate due to the projecting cells
Number of Male bracts	3–5 pairs	2–6 pairs	1–4 pairs	2–4 pairs
Length of female bracts	0.40–0.70 mm	ca. 0.35 mm	ca. 0.35 mm	0.22–0.26 mm
Length of female bract lobules	Almost as long as bract lobes	ca. 1/2 the bract lobes length	ca. 2/3 the bract lobes length	ca. 4/5 the bract lobes length
Perianth position	Emergent up to 1/5	Emergent up to 4/5	Emergent up to 4/5	Emergent up to 1/3
Habitat	On trees	On trees or rocks	On limestone, calcicolous	On limestone, calcicolous

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References

- Ellis, L.T., Bednarek-Ochyra, H., Ochyra, R., Benjumea, M.J., Saïs, L.V., Caparrós, R., Lara, F., Mazimpaka, V., Dulin, M.V., Garilleti, R., Gremmen, N., Grundling, P.-L., Heras, P., Infante, M., Huttunen, S., Ignatov, M.S., Korvenpää, T., Lebouvier, M., Lewis Smith, R.I., Lin, S.-H., Yang, J.-D., Linström, A., Plášek, V., Rosselló, J.A., Sawicki, J., van Rooy, J., Smith, V.R. (2013) New national and regional bryophyte records, 35. *Journal of Bryology* 35: 129–39.
<http://dx.doi.org/10.1179/1743282013y.0000000049>

- Evans, A.W. (1902) The Lejeuneae of the United States and Canada. *Memoirs of the Torrey Botanical Club* 8: 113–183.
- Evans, A.W. (1911) Hepaticae of Puerto Rico. X. *Cololejeunea*, *Leptocolea*, and *Aphanolejeunea*. *Bulletin of the Torrey Botanical Club* 38: 251–286.
<http://dx.doi.org/10.2307/2479100>
- Evans, A.W. (1938) Notes on the Genus *Cololejeunea*. *The Bryologist* 41: 71–82.
- Libert, M.A. (1829) Sur un genre nouveau d'hépatiques, *Leveunia*. *Annales Générales des Sciences Physiques* 16: 372–374.
<http://dx.doi.org/10.2307/3239339>
- Mizutani, M. (1961) A revision of Japanese Lejeuneaceae. *Journal of the Hattori Botanical Laboratory* 24: 115–302.
- Pearson, W.H. (1890) *List of Canadian Hepaticae*. W. Foster Brown, Montreal.
<http://dx.doi.org/10.5962/bhl.title.60082>
- Paton, J.A. (1999) *The liverwort flora of the British Isles*. Harley Books, Colchester, 626 pp.
- Schiffner, V. (1893) Hepaticae (Lebermoose). In: Engler, A. & Prantl, K. (Eds.) *Die Natürlichen Pflanzenfamilien*, Teil. I, Abt. 3. Engelmann, Leipzig, pp. 97–141.
- Schuster, R.M. (1963) An annotated synopsis of the genera and subgenera of Lejeuneaceae. *Nova Hedwigia, Beihefte* 9: 1–203.
- Schuster, R.M. (1980) *The Hepaticae and Anthocerotae of North America. Vol. IV*. Columbia University Press, New York, 1334 pp.
- Spruce, R. (1884) Hepaticae Amazonicae et Andinae. I. *Transactions and Proceedings of the Botanical Society of Edinburgh* 15: 1–308.
- Stephani, F. (1890) Die Gattung *Lejeunea* im Herbarium Lindenberg. *Hedwigia* 29: 68–99.
- Wang, J., Lai, M.-J. & Zhu, R.-L. (2011) Liverworts and hornworts of Taiwan: an updated checklist and floristic accounts. *Annales Botanici Fennici* 48: 369–395.
<http://dx.doi.org/10.5735/085.048.0501>
- Yang, J.-D. (2009) *Liverworts and Hornworts of Taiwan I. Lejeuneaceae*. Endemic Species Research Institute, Nantou, 144 pp.
- Zhu, R.-L. & So, M.L. (2001) Epiphyllous liverworts of China. *Nova Hedwigia, Beihefte* 121: 1–418.