

# TAXONOMIC NOTES ON *DREPANOLEJEUNEA PLEIODICTYA* (MARCHANTIOPHYTA, LEJEUNEACEAE), A LITTLE-KNOWN ASIATIC SPECIES

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**Abstract.** *Drepanolejeunea pleiodictya* Herzog (Lejeuneaceae), a rare and poorly known species from Java and Malaysia, was newly discovered in tropical montane forest in southern Thailand. It is distinguished by the ventral margin of the leaf lobe being usually irregularly dentate with one large tooth, the apex of the lobule having a straight or slightly curved tooth, ocelli 3–4(–5) seriate in the leaf lobe separated by 2–5 ordinary leaf cells, and gynoecea usually with a single pycnolejeuneoid innovation. This species is described and illustrated in detail, and its diagnostic characters and geographical distribution are briefly discussed.

**Key words:** *Drepanolejeunea*, habitat, Indonesia, Lejeuneaceae, Peninsular Malaysia, Thailand

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## INTRODUCTION

The genus *Drepanolejeunea* (Spruce) Schiffn. was first described by Spruce (1884) as a subgenus of *Lejeunea* Lib. and was subsequently raised to generic rank by Schiffner (1893). The genus has been classified in the separate subtribe *Drepanolejeuneinae* Gradst. together with *Vitalianthus* R. M. Schust. & Giancotti (Gradstein 2013). The genus is characterized by yellowish green plant color, deeply bilobed underleaves with lobes frequently widely spreading, the presence of ocelli in the leaf lobes, leaf lobules having 1–2 apical teeth (a single, strongly curved one in most species) and a proximal hyaline papilla, female bracts connate with the bracteole on both sides, the pycnolejeuneoid leaf sequence of the gynoeceal innovation, inflated perianths usually with various projections near the apex, and vegetative reproduction by cladia or caducous leaves. *Drepanolejeunea* is common and widespread in the Tropics but has never been monographed on a worldwide basis. There are numerous floristic

reports of *Drepanolejeunea* species from tropical Asia, for example from China (Zhu & So 2001; Wang *et al.* 2011), India (Dey *et al.* 2013), Malaysia (Chuah-Petiot 2011; Lee *et al.* 2013), Java (Söderström *et al.* 2010), Singapore (Piippo *et al.* 2002), Borneo and the Philippines (Tan & Engel 1990), and Thailand (Lai *et al.* 2008; He *et al.* 2012; Inuthai *et al.* 2014). Nevertheless, the taxonomy of the genus in tropical Asia remains incompletely known.

As part of a revision of the genus *Drepanolejeunea* in Thailand and Peninsular Malaysia, numerous *Drepanolejeunea* specimens were collected in these areas and examined. One of the most interesting species in our material from Thailand is *Drepanolejeunea pleiodictya* Herzog. This species was first described by Herzog (1934) based on a collection made by Verdoorn in 1930 in Java, Indonesia, and was subsequently recorded by Tixier (1980) from Gunong Jasar, Cameron Highlands, Malaysia. Our collection is the third record of the species and the first one from Thailand. The following description and illustrations

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of *D. pleiodictya* are based on the holotype kept in Herbarium Haussknecht (JE) and on the collections from Thailand.

#### DESCRIPTION

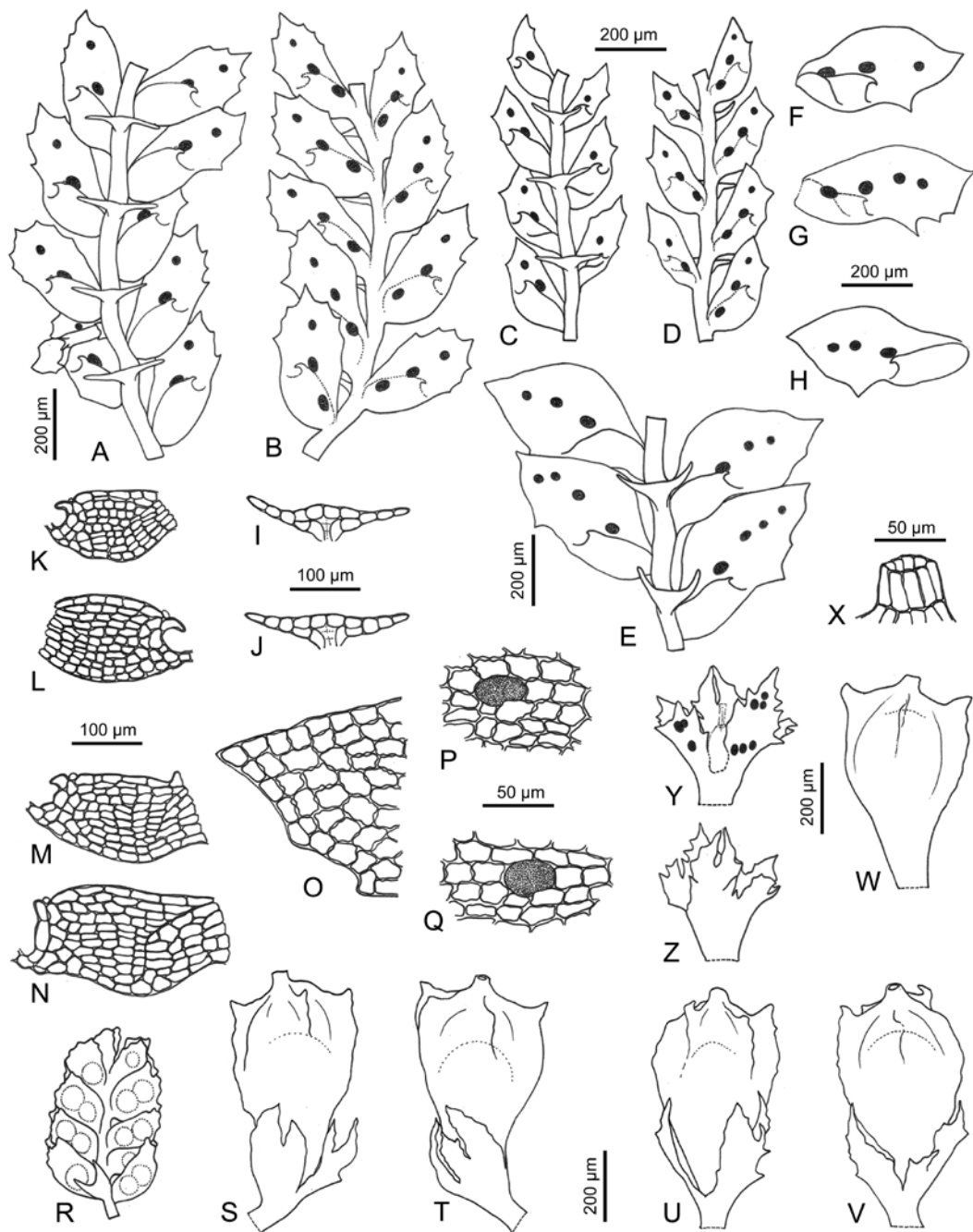
#### *Drepanolejeunea pleiodictya* Herzog Fig. 1

Ann. Bryol. 7: 89–90, Fig. 32–33. 1934.

TYPE: INDONESIA. JAVA: ‘Res. Priangan, in mm. Papandayan, G. Djaja, in decl. occ., in silv. primigen, 1700–1900 m’, August 1930, *Verdoorn s.n.* (HOLOTYPE: JE!).

*Plants* bright green to yellowish when fresh, 0.5–0.8 cm long. *Shoots* 0.3–0.5 mm wide, usually unbranched or slightly branched, occasionally irregularly pinnate, branches of *Lejeunea* type, leaf sequence of vegetative branches lejeuneoid. *Stem* in transverse section with 7 cortical cells and 3 medullary cells; ventral merophyte 2 cells wide. *Rhizoids* present at base of underleaves, few to numerous, tufted, usually hyaline, rhizoid disc absent. *Leaves* contiguous, diverging from stem at 45°–60° angle; leaf lobe elliptic, oblanceolate to spatulate, not falcate, 0.45–0.75 mm long, 0.20–0.35 mm wide, apex acute, plane, ventral margin usually irregularly dentate with one large tooth, dorsal margin entire to slightly dentate; leaf lobules elliptic to oblong, 2/5–1/2 as long as lobes, lateral free margin bordered by 5–6 elongate rectangular marginal cells, apex usually constricted, with unicellular, straight or slightly curved tooth, 22.5–29.0 × 10–15 μm, keel arched, almost smooth to weakly crenulate, hyaline papilla suborbicular to oblong, 10–12 × 8–10 μm, situated at proximal base of tooth. *Cells* of leaf lobe with thin walls and very small trigones, intermediate thickenings indistinct or small; cells at margin of leaf lobe subquadrate, 22–30 × 8–12 μm, in middle subquadrate, 20–40 × 16–18 μm, near base similar to median cells in shape but slightly smaller, 30–35 × 10–16 μm. *Cuticle* smooth. *Ocelli* 3–4(–5) seriate in leaf lobe separated by 2–5 ordinary leaf cells, apical ocelli 20–35 × 20–25 μm, median ocelli 30–45 × 22–30 μm, basal ocelli 42–48 × 25–28 μm. *Underleaves* distant, 3 times as wide as stem, bilobed to near base, lobes uniseriate

with 3–4 cells long, spreading at 65°–90° angle with stem. *Dioicous*. *Androecia* on short or long lateral branches, bracts in 3–7 pairs, imbricate, concave and inflated, obliquely spreading, lobes 0.22–0.24 mm long, 0.09–0.10 mm wide, apex acute, margin slightly dentate, lobule slightly shorter than or almost as long as lobe, keel strongly arched; bracteole 1, present at basal portion of androecial shoot. *Gynoecia* terminal on short branches, usually with single pycnolejeuneoid innovation; bracts ovate-oblong, 0.35–0.45 mm long, 0.12–0.15 mm wide, lobe elliptic-oblong, with scattered ocelli, apex acute or acuminate, margin slightly dentate, lobule oblong, 2/3 as long as bract lobe, apex acute, keel dentate; bracteole connate with bracts on both sides at base, obovate-oblong, margin usually dentate, apex bilobed to 1/3–2/5 its length. *Perianths* about 1/2–2/3 exerted, obtriangular to obovate, ca 0.80 mm long, 0.30–0.40 mm wide at middle, inflated, with 5 wings, wings decurrent equal in size, lacinate to crenulate with 1–2 coarse teeth at apex; surface of perianth smooth to slightly mamilllose, with scattered ocelli; beak 1–2 cells long. *Sporophyte* common. *Seta* in transverse section with 4 inner and 12 outer cells, articulate, with 8 articulations. *Capsule* black, spherical, 175–180 μm in diameter, splitting ± 2/3 its length into four erect valves after dehiscence, capsule valves 240–280 μm long and 145–160 μm wide, hyaline. *Elaters* 36 per capsule; marginal elaters 22 per capsule, each valve contains 4 or 3 upper and 2 lower marginal elaters; upper marginal elaters 157.5–162.5 μm long, 12.5–20.0 μm wide, hyaline, with rudimentary spiral band, tip attached to valve, free base truncate; lower marginal elaters ca 100 μm long, ca 10 μm wide, attached to valve by both end, hyaline; inner or additional elaters 14 per capsule, either 3 or 4 per valve, 125–150 μm long, ca 6.2 μm wide, hyaline, end narrowly tapered to expanded. *Spores* green, irregular oblong or elongate-rectangular in shape, 50–85 × 32.5–35.0 μm; spore surface covered with small granules and with 3–5 rosettes on the surface. *Asexual reproduction* by cladia, originating on normal branches, more or less attached to substrate, rhizoid disc present, cells of rhizoid disc large.



**Fig. 1.** *Drepanolejeunea pleiodictya* Herzog. A–E – portions of plants, ventral and dorsal views; F–H – lateral leaves; I & J – underleaves; K–N – leaf lobules; O – apical cells of leaf lobe; P – medial cells of leaf lobe; Q – basal cells of leaf lobe; R – androecium, ventral view; S–V – gynoecium, ventral and dorsal views; W – perianth, lateral view; X – beak of perianth; Y & Z – female bracts and bracteole. A, B, G–I and K–R drawn from *Chantanoorrapint & Inuthai 1634D*, C–F, J and S–X drawn from *Chantanoorrapint & Inuthai 1621B*, and Y–Z drawn from *Chantanoorrapint & Inuthai 2878D*.

**HABITAT.** *Drepanolejeunea pleiodictya* occurs on living leaves in tropical montane forest above 1000 m, and was found growing associated with *D. actinogyne* J. Inuthai *et al.*, *D. dactylophora* (Nees *et al.*) Schiffn., *D. levicornua* Steph., *D. pentadactyla* (Mont.) Steph. and *D. tenera* K. I. Goebel, among others.

**DISTRIBUTION.** Indonesia (Java), Peninsular Malaysia and new to Thailand.

**SPECIMENS EXAMINED:** THAILAND. NAKHON SI THAMMARAT PROVINCE: Ron Phibun District, Khao Ramrome Mountain, montane forest, 08°23'882"N, 99°80'562"E, ca 1000 m, 20 Sept. 2012, *Chantanaorrapint & Inuthai 1620C, 1621B, 1634D* (PSU); 25 Sept. 2013, *Chantanaorrapint & Inuthai 2878D* (PSU).

**TAXONOMIC NOTES.** *Drepanolejeunea pleiodictya* is characterized by (i) the leaf lobe obliquely spreading, elliptic, oblanceolate to spatulate, not falcate, ventral margin usually irregularly dentate with one large tooth, (ii) the apex of the lobule with a straight or slightly curved tooth, 22.5–29.0 × 10–15 μm, (iii) ocelli 3–4(–5) seriate in the leaf lobe and separated by 2–5 ordinary leaf cells, and (iv) gynoecia usually with a single pycnolejeuneoid innovation. Interestingly, the wings of the perianth in the type material from Indonesia (only 2 perianths seen) are lacinate, while being crenulate with 1–2 coarse teeth at the apex in the material from Thailand. We consider this difference to be part of the variation of *D. pleiodictya*. Similar variation of the perianth wings can be found in other species such as *D. longicornua* (Herzog) Mizut., *D. pentadactyla*, *D. thwaitesiana* var. *zhengii* R. L. Zhu and *D. yunnanensis* (P. C. Chen) Grolle & R. L. Zhu.

*Drepanolejeunea pleiodictya* can be confused with *D. moluccensis* Herzog from the Moluccas and Bali (Herzog 1934). They share many characters such as small plant size, yellowish green plant color, seriate ocelli, male bracteole restricted to the base of the androecium, and lacinate perianths. However, *D. moluccensis* differs by having only one large tooth on the leaf lobe (ventral margin usually irregularly dentate in *D. pleiodictya*), and by the presence of only two ocelli in the leaf lobe, separated by one ordinary leaf cell [ocelli 3–4(–5)

seriate in the leaf lobe, separated by 2–5 ordinary leaf cells in *D. pleiodictya*].

*Drepanolejeunea pleiodictya* was formerly known only from Java and Peninsular Malaysia, and is new for Thailand. The new record represents the northernmost locality of this species. This species could easily be overlooked in botanical explorations because of its small size. In Thailand it is known only from Khao Ramrome Mountain but it might have a wider distribution and may occur in other areas of southern Thailand as well. The recent discovery of a new species and new records of bryophytes from southern Thailand (Chantanaorrapint & Pócs 2014; Chantanaorrapint *et al.* 2014; Inuthai *et al.* 2014; Lee *et al.* 2014) indicates that this is an important region for bryophyte diversity investigation, and that further new species records may be expected from unexplored areas in this part of the country, especially in the Nakhon Si Thammarat mountain range.

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