



## *Prionolejeunea clementinae*, a new species of Lejeuneaceae (Marchantiophyta) from Panama

Anna Luiza Ilkiu-Borges<sup>1\*</sup>, Gregorio Dauphin<sup>2</sup> and Noris Salazar Allen<sup>3</sup>

<sup>1</sup> Museu Paraense Emílio Goeldi, Coordination of Botany, Av. Perimetral 1901, 66530-070 Belém, Brazil

<sup>2</sup> Apartado 5-1500, Acosta, Costa Rica, <sup>3</sup>Instituto Smithsonian de Investigaciones Tropicales. Apartado 0843-03092, Balboa, Ancón, Panama

With 2 figures

**Abstract:** A new species of *Prionolejeunea* collected in the tropical premontane wet forest of Parque Nacional General de División Omar Torrijos Herrera, El Cope, in Panama, is described and illustrated. The diagnostic characters of *Prionolejeunea clementinae* are: 1) a straight and well limited vitta extending from the base to the middle of the leaf lobe, 4–5 cells long and 2 (–3) cells wide; 2) the dorsal surface of the lobe is roughened throughout due to uni-papillose cells, including the vitta cells; 3) broadly acute to rounded leaf apex; 4) leaf margins denticulate to dentate, teeth 1-cell long; 5) lobule with denticulate keel and surface roughened by unipapillose cells, specially near the keel; 6) male bract keels denticulate and surface roughened by unipapillose cells.

**Key words:** Liverwort, Marchantiophyta, Jungermanniopsida, Lejeuneaceae, *Prionolejeunea*, Panamá, taxonomy.

### Introduction

The genus *Prionolejeunea* (Spruce) Schiffn. was reviewed and circumscribed with 24 species (Ilkiu-Borges 2006, 2016), including four new taxa treated in a taxonomic revision (Ilkiu-Borges & Schafer-Verwimp 2005, Ilkiu-Borges 2016).

Among the collections for the for the Project "Corredor Biológico Mesoamericano del Atlántico Panameño, Phase II (CBMAP II)", of the former National Authority of the Environment (ANAM), accomplished by GD and NSA (Dauphin et al. 2015), a new species was found. The new taxon possesses all characters fitting *Prionolejeunea*, i.e., leaf margins toothed by conically projected cells crowned by a small papilla, lobules with a proximal hyaline papilla, absence of ocelli, two-keeled perianths and

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\*corresponding author: alilkiuborges@gmail.com

occasional lejeuneoid subgynoecial innovations (Ilkiu-Borges 2016). Among other species in the genus it differs by a singular vitta on the leaves. The only other species of *Prionolejeunea* with a vitta is *P. diversitexta* (Hampe & Gottsche) Steph. However, the vitta in the new species is different from the one in *P. diversitexta*, in addition to other diagnostic characters which can clearly separate them.

The new species is described, illustrated and comments on its ecology, geographic distribution, morphology, and differences between the closest taxa are given. It is our pleasure to dedicate this remarkable new species to the late Clementina Chung in honor of her enthusiastic dedication to bryology in Panama.

## Description

*Prionolejeunea clementinae* Ilk.-Borg., G.Dauphin & N.Salazar Allen **sp. nov.**

Figs 1–2

TYPE: Panamá, Distrito La Pintada, Corregimiento El Copé, Parque Nacional General de División Omar Torrijos Herrera, Sendero Cuerpo de Paz, Transecto #2, UTM: 17 P, 545027 E 958212 N, 696 m, on trunk of *Ficus* tree, 1 m from the ground, in exposed site, 31.VII.2012, Dauphin & Gudiño L. 4442 (holotype, PMA; isotype, MG); idem, on trunk of *Ficus* tree, 0.5 m from the ground, in shaded site, 31.VII.2012, Dauphin & Gudiño L. 4445 (paratypes, PMA, MG).

Dioicous. PLANTS 0.6–0.8 mm wide, dull, light-green. Stems in cross section with (6–)7 thick-walled epidermal cells surrounding 6–8 smaller, thick-walled medullary cells. LEAVES widely spreading, imbricate,  $\pm$  convex, ovate, with a very short narrow base, dilated distally, 320–420  $\mu$ m long, 240–320  $\mu$ m wide, apex broadly acute to rounded, sometimes mucronate, reflexed, margins denticulate to dentate by outwards projected marginal cells, teeth 1 cell long, each marginal cell tipped by a papilla, dorsal surface of lobe roughened throughout due to uni-papillose cells (including the vitta cells), ventral surface smooth; vitta extending from the base to the middle of the leaf length, linear, well limited, 4–5 cells long and 2 (–3) cells wide, vitta cells retangular, 15–20  $\times$  30–50  $\mu$ m, uni-papillose to mamilllose, the papillae decreasing in size toward the leaf base, cells surrounding the vitta conspicuously smaller, isodiametric, 7–12  $\mu$ m (rarely a few short rectangular cells towards the base, 18  $\mu$ m long, 10  $\mu$ m wide), unipapillose, trigones small to inconspicuous, cell walls regularly thickened throughout, intermediate thickenings lacking, cuticle  $\pm$  finely papillose. LOBULE ovate,  $\pm$  1/3 of the lobe length, 140–150  $\mu$ m long, 90–110  $\mu$ m wide, often reduced, inflated throughout, surface roughened by unipapillose cells, especially near the keel, keel denticulate, free margin  $\pm$  incurved, first tooth 1 cell long, elongated, falcate. UNDERLEAVES distant, suborbicular, 1.5–2 times stem width, 130–190  $\mu$ m long, 130–180  $\mu$ m wide, bases cuneate to slightly rounded, an enlarged cell present at either base, 1/2 bifid or more, lobes acute, margins plane,  $\pm$  entire, surface smooth, sometimes with few papillose cells. *Androecia* terminal on a short branch, to 6 pairs of bracts, bract surface roughened by unipapillose cells, keels denticulate by papillose cells, without wing, 1–2 bracteoles restricted to the base of the spike. GYNOECIA on short branches, with 1 underleaf followed by 1 pair of bracts and 1 bracteole, innovations lacking; bracts ovate, different in size, the smaller outer one 300–320  $\mu$ m long, 200–220  $\mu$ m wide, the larger inner one 420–500  $\mu$ m long, 250–280  $\mu$ m wide, apex of bracts acute to rounded, lobule oblong, 1/2 of the

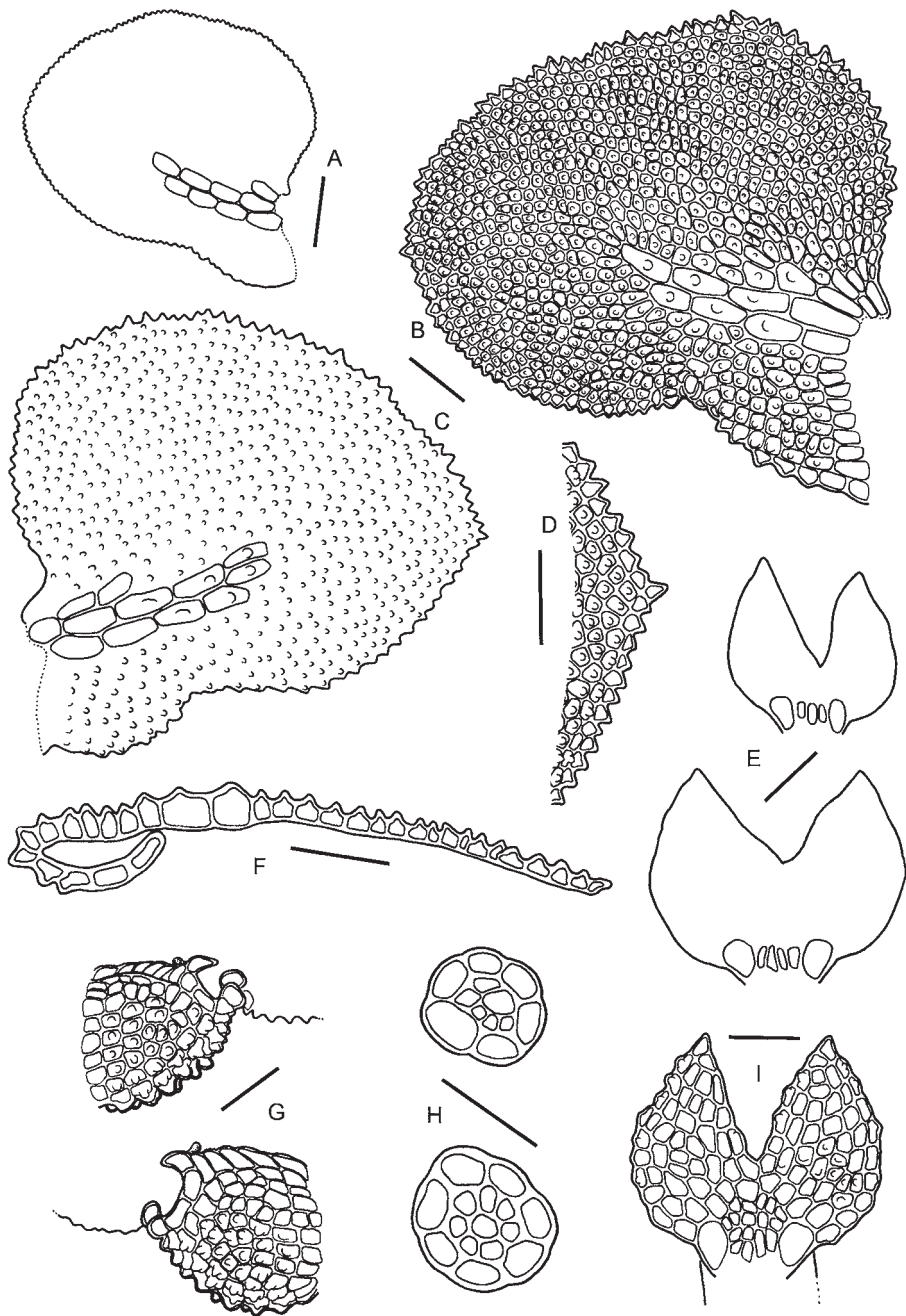


Fig. 1. *Prionolejeunea clementinae*. A–C. Dorsal view of leaves. D. Leaf apex. E. Underleaves. F. Cross section of Leaf. G. Leaf lobules. H. Cross section of stems. I. Underleaf. (A, B, D, F, H from Dauphin & Gudiño L. 4445; C, E, G, I from Dauphin & Gudiño L. 4442; A = 100 µm, B–I = 50 µm).

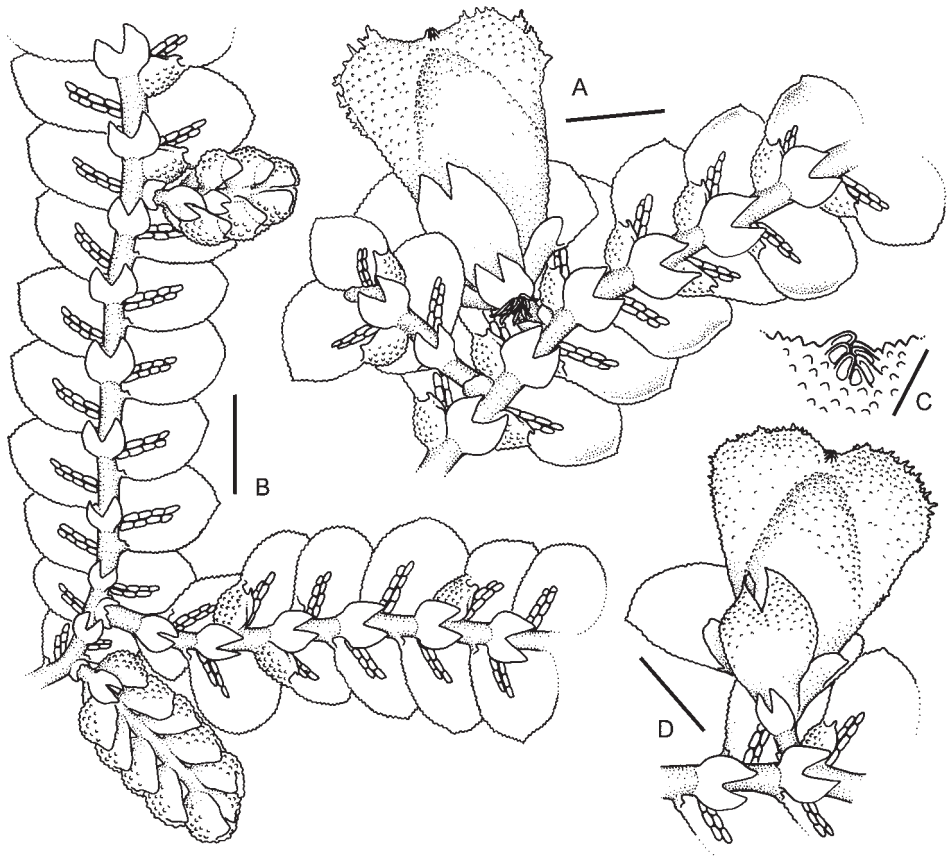


Fig. 2. *Prionolejeunea clementinae*. A. Female plant. B. Male plant. C. Perianth beak. D. Female branch (A–C from Dauphin & Gudiño L. 4442, D from Dauphin & Gudiño L. 4445; A, B, D = 250  $\mu$ m, C = 50  $\mu$ m).

lobe length; bracteole long-obovate, 350–400  $\mu$ m long, 220–230  $\mu$ m wide, 1/3 bifid, apex of lobes acute, margins  $\pm$  entire to denticulate. PERIANTH obconical, 600–750  $\mu$ m long, 450–520  $\mu$ m wide, with 2 flattened lateral keels with dentate to cristate margins by teeth or short laciniae (up to 5 cells long and 2–4 cells wide), surface roughened by unipapillose cells, beak short, formed by one row of elongate cells. VEGETATIVE REPRODUCTION rare, by means of caducous branches and elongate gemmae.

### Distribution and ecology

The new species is thus far known only from two collections from one site in Panamá, in an old growth, secondary premontane tropical wet forest at 696 m elevation (Dauphin

et al. 2015). *Prionolejeunea clementinae* was growing exclusively on *Ficus* bark, at about 1 m from the ground, in both exposed and shaded places.

## Discussion

The most remarkable character of *Prionolejeunea clementinae* is a vitta on its leaves, which is shared only with *Prionolejeunea diversitexta* (Hampe & Gottsche) Steph.

Zwickel (1932), studying ocelli in liverworts, distinguished vitta from a band of ocelli, which he called moniliate or seriate ocelli a feature present in *Cololejeunea falcata* (Horik.) Benedix (formerly *Physocolea falcata* Horik.), instead of a vitta as described by Horikawa (1931). However, the term was used once again by Benedix (1953), concerning the same species and related ones, in reference to a ribbon of distinct cells, either for ocelli or enlarged cells. The vitta was extensively used by Tixier (1985) in the subgeneric classification of *Cololejeunea*; he also applied the terms "sub-vitta" (p. 68) and "pseudo-vitta" (p. 202). Furthermore, Tixier (1985, p. 340) defined the vitta as a small group of "coxal" cells at the base of the lobule.

In the bryological literature, the term vitta has been applied either to a strip of ocelli (Benedix 1953), e.g., in *Vitalianthus* Schuster & Giancotti [= *Cheilolejeunea* (Spruce) Steph. fide Wei et al. 2013], or to a band of enlarged cells as in *Bazzania* Gray (e.g., Fulford 1963, Wei et al. 2013). The vitta in *Prionolejeunea* refers to a longitudinal band of enlarged cells in the leaves, without thickened cells, which are not ocelli (Zwickel 1932, Magill 1990).

Schuster (1992), mentioned the presence of basal „pseudocelli“ with several large oil bodies for two species of *Prionolejeunea*, but according to Ilkiu-Borges (2016) this concept was ill-defined and confusing, and was not considered in her treatment.

The vitta is strikingly different in *Prionolejeunea clementinae* and *P. diversitexta*. The vitta in *P. clementinae* extends from the base to the middle of the leaf lobe, is straight and well defined, 4–5 cells long and 2(–3) cells wide. In *P. diversitexta*, the vitta is lingular with irregular limits, up to 9 cells of long and 5–8 cells wide (Ilkiu-Borges 2016). The two species have unipapillose cells on the dorsal leaf surface, but differently. In *P. clementinae* the dorsal surface of the lobe is roughened throughout due to uni-papillose cells, including the vitta cells, while in *P. diversitexta* papillae are absent from vitta cells.

Both species *Prionolejeunea clementinae* and *P. diversitexta* possess widely spreading, ovate leaves with a short narrow base dilated distally, although this base is shorter in the new species. However, *P. clementinae* also differs by the broadly acute to rounded leaf apex (acute to apiculate in *P. diversitexta*), leaf margins denticulate to dentate, teeth 1-cell long (dentate by 1–3 celled teeth in *P. diversitexta*), lobule with denticulate keel and surface roughened by unipapillose cells, especially near the keel (lobule keel entire and lobule surface smooth in *P. diversitexta*), and male bract keels denticulate and surface roughened by unipapillose cells (male bract keels entire and surface smooth in *P. diversitexta*). Besides, *P. diversitexta* is a very rare plant known from the

type specimen from Trinidad & Tobago, collected by an unknown collector and first described as *Lejeunea diversitexta* Hampe & Gottsche in 1852 (Ilkiu-Borges 2016).

The type specimen of *Prionolejeunea clementinae* was fertile with both male and female branches on different plants (dioicous). Its gynoecia are constantly on short branches bearing no innovation, which is otherwise common in the genus.

Further, *Prionolejeunea* species with papillose cells are *P. mucronata* (Sande Lac.) Steph. and *P. trachyodes* (Spruce) Steph. However, these two species lack a vitta on their leaves.

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