

A new species of the liverwort genus *Microlejeunea* (Lejeuneaceae) from Brazil

Cid José P. Bastos¹ | Silvana B. Vilas Bôas-Bastos¹

¹ Universidade Federal da Bahia, Instituto de Biologia, Laboratório de Taxonomia de Briófitas – BrioFLORA, Campus de Ondina, 40170-280 Salvador, Bahia, Brazil.

¹ Correspondence: cidbastos@gmail.com; cjpbasto@ufba.br

ABSTRACT

The new species *Microlejeunea jiboensis* C.J.Bastos & S.Vilas Bôas-Bastos (Lejeuneaceae, Marchantiophyta) from the state of Bahia, northeastern Brazil, is described and illustrated. The most striking diagnostic characters of the new species are the lobule with free margin folded inward and large, deeply bifid underleaves, with acute, diverging lobes.

1 | INTRODUCTION

Microlejeunea Steph. is a pantropical liverwort genus of Lejeuneaceae whose circumscription has been controversial. It has been treated either as a genus or as a subgenus of the large and taxonomically complex genus *Lejeunea* Lib. (see Dong *et al.* 2013 for detailed circumscription of *Microlejeunea*). However, it differs from *Lejeunea* mainly by the presence of ocelli and large lobules. Recent molecular phylogenetic analyses of Lejeuneaceae have placed *Microlejeunea* as sister to *Lejeunea* (Ahoonen *et al.* 2003, Wilson *et al.* 2004, Dong *et al.* 2013, Schäfer-Verwimp *et al.* 2014, Bechteler *et al.* 2015). Based on molecular and morphological evidences, Dong *et al.* (2013) transferred to *Microlejeunea* four species previously assigned to the genera *Harpalejeunea* (Spruce) Schiffn. and *Pluvianthus* R.M.Schust. & Schäf.-Verw. Wei & Zhu (2013) transferred two Asiatic species from *Lejeunea* Lib. to *Microlejeunea*. Approximately fifty species in *Microlejeunea* are cited in the World checklist of hornworts and liverworts (Söderström *et al.* 2016); a few of them are poorly known taxa in need of revision.

The genus *Microlejeunea* is readily recognized by having ocelli, ovate underleaves with forward-directed, blunt to acute lobes separated by a narrow or large sinus, and lejeuneoid innovation. In Brazil, the genus is represented by nine species (Gradstein & Costa 2003), but the Brazilian species have not been taxonomically revised. Among the material collected during our recent field explorations in the state of Bahia, northeastern Brazil, an unusual and undescribed species of *Microlejeunea* was detected. The species bears deeply bifid underleaves with acute lobes and lobule strongly inflated with free margin folded inwards, prompting us to propose as a new species that is described and illustrated in detail below.

Bastos & Vilas Bôas-Bastos – New *Microlejeunea*

2 | TAXONOMY

Microlejeunea jiboensis C.J.Bastos & S.Vilas Bôas-Bastos, *sp. nov.* (Figure 1).

Autoicous plants, lejeuneoid innovation present, underleaves deeply bifid with acute lobes, sinus acute, lobule strongly inflated, free margin folded inwards, apical tooth blunt, hyaline papilla at the proximal base of the apical tooth, two basal ocelli in an unbroken row, rarely three with two adjacent ocelli at the leaf bases.

Typus—BRAZIL: Bahia, Santa Teresinha, povoado de Pedra Branca, Serra da Jiboia, Morro da Pioneira, in rocky outcrop, growing on a stem of Velloziaceae, 12°51'16.1"S, 39°28'31.8"W, elev. 820 m, 19 Jan 2017, S.B.Vilas Bôas-Bastos 2856 (holotype: ALCB; isotype: SP).

Plants robust, 1.2 mm wide, poorly branched, vegetative branches *Lejeunea*-type. Stem to 80 µm, in cross section with 7 cortical cells and 3 medullary cells, cortical and medullary cells large, cortical cells 32–35 × 18–22 µm, medullary cells 25–30 × 22–25 µm; ventral merophyte two cells wide. Leaves imbricate, spreading; lobes triangular-ovate, 510–630 × 330–450 µm, dorsal margin arched, slightly crenulate to irregular, ventral margin curved upward, entire, apex acute; cells oblong, 25–35 × 15–18 µm, thin-walled, mammillose, trigones small, intermediate thickenings occasional; ocelli 2 in a unbroken row or three with two adjacent ocelli at leaf bases, 40–50 × 35–40 µm; oil bodies not seen; lobule ovate, strongly inflated, free margin folded inwards, apical tooth blunt, lobule apex hidden by the basal portion of the ventral lobe margin, hyaline papilla at proximal base of the apical tooth, keel arched, with mammillose cells. Underleaves 370–470 × 210–230 µm, remote, oblong, bifid 1/2 to 2/3 its length, sinus acute, lobes erect, acute, 5 cells wide at base, underleaf base cuneate, insertion line straight to slightly curved. Autoicous. Androecia 3–5 pairs in short or long lateral branches, bracteoles present throughout. Gynoecium terminal, innovation lejeuneoid, bracts with lobe obovate, 700 × 380 µm, margin entire, apex apiculate, lobule obovate, 550 × 140 µm, margins dentate, apex acute and irregularly dentate, bracteole oblong, bifid, 650 × 280 µm, margins slightly dentate, perianth not found.

Etymology—In reference to the type locality (Serra da Jiboia).

Distribution and habitat—*Microlejeunea jiboensis* is only known from the type locality. The specimens were found growing on stem of Velloziaceae in a rocky outcrop, at ca. 820 m altitude.

Comments—The new species is here circumscribed in the genus *Microlejeunea* (sensu Dong *et al.* 2013) based on the following characters: (a) underleaves deeply bifid with acute lobes, sinus acute; (b) presence of ocelli; (c) lejeuneoid innovation. The morphological aspect of the gametophyte (arrangement and shape of leaf lobe, as well as the lobule morphology) is similar to *Harpalejeunea*, but in the latter genus the underleaves are obtrapezoid, with diverging, blunt (obtuse to rounded) lobes separated by a wide sinus (Dong *et al.* 2013).

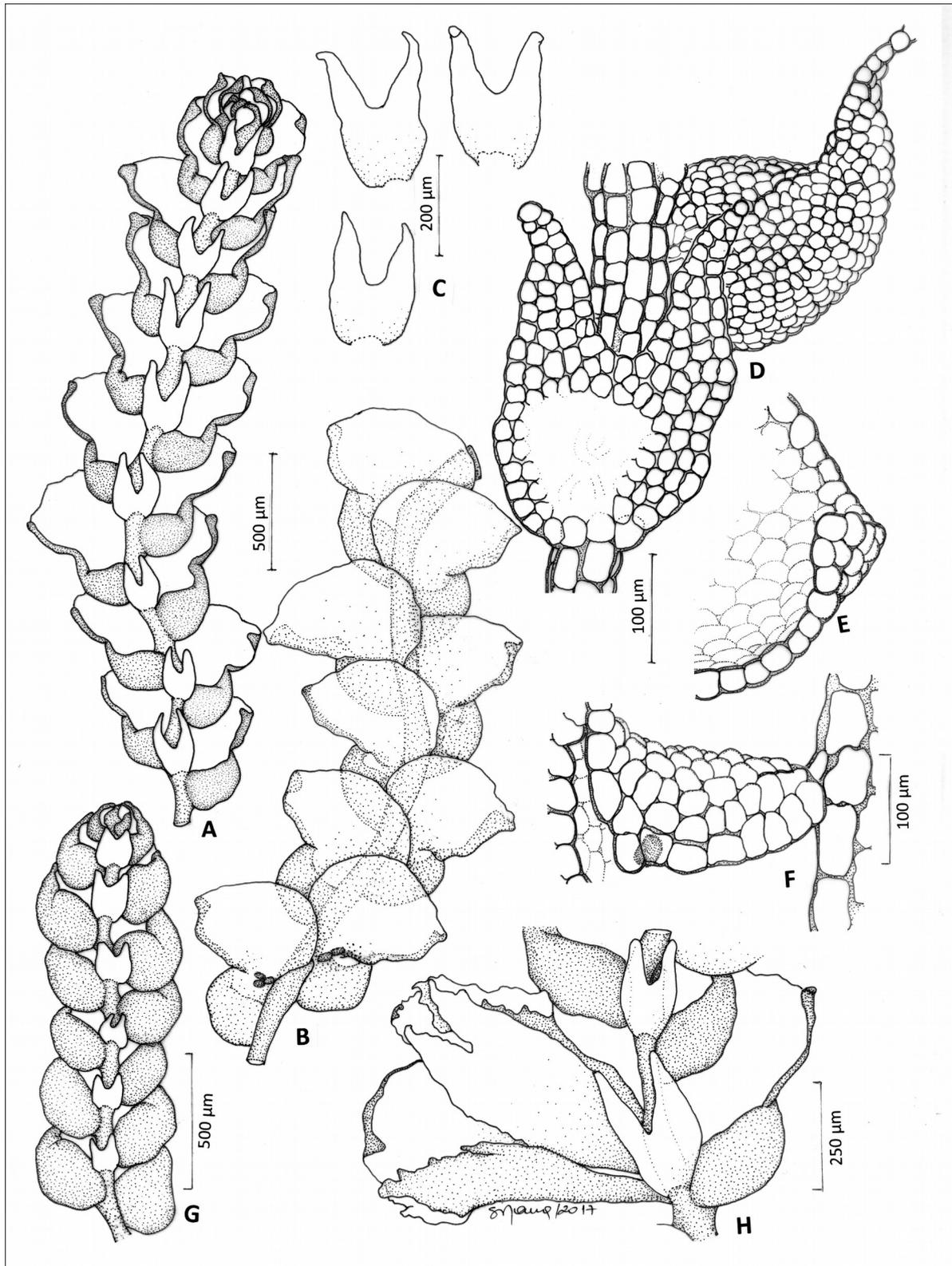


Figure 1. *Microlejeunea jiboiensis* C.J.Bastos & S.B.Vilas Bôas-Bastos, *sp. nov.* A. Gametophyte, ventral view. B. Gametophyte, dorsal view. C. Underleaves. D. Underleaf and leaf lobule. E. Leaf lobe apex. F. Lobule free margin folded inwards. G. Androecial branch, ventral view. H. Gynoecium, ventral view (all figures from the holotype).

Bastos & Vilas Bôas-Bastos – New *Microlejeunea*

Vitalianthus R.M.Schust. & Giancotti, another lejeuneoid genus with ocelli, somewhat resembles some species of *Microlejeunea*. However, *Vitalianthus* has typically moniliate rows of ocelli and pycnolejeuneoid innovation (Schuster & Giancotti 1993).

Microlejeunea jiboensis is readily recognized by the deeply bifid underleaves with acute lobes and by the leaf lobule with free margin folded inwards, as well as by the blunt apical tooth. Additionally, *M. jiboensis* has large size (1.2 mm wide), which is very unusual within *Microlejeunea*. Large-size plants are also observed *Microlejeunea squarrosa* (Steph.) Heinrichs, Schäf.-Verw., Pócs & S.Dong but the latter species is dioecious, the leaf lobule free margin is involute, and the innovation has enlarged and inflated lobules forming spherical utriculi, the underleaves are obovate to orbicular with triangular lobules, and the male bracteole is basal and solitary [Schuster & Schäfer-Verwimp 1995, as *Pluvianthus squarrosus* (Steph) R.M.Schust. & Schäf.-Verw.].

3 | ACKNOWLEDGEMENTS

The authors are grateful to the Universidade Federal da Bahia (UFBA) for supporting fieldwork. Cid Bastos is grateful to Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the Research Productivity Fellowship. We also thank the reviewers for the corrections and suggestions. Special thanks are also due to Dr. S.R. Gradstein for crucial comments on the new species.

4 | LITERATURE CITED

- Ahonen, I., Mouna, J. & Piippo, S. 2003. Inferring the phylogeny of the Lejeuneaceae (Jungermanniopsida): a first appraisal of molecular data. *The Bryologist* 106: 297–308.
- Bechteler, J., Lee, G.E., Schäfer-Verwimp, A., Pócs, T., Peralta, D.F., Renner, M.A.M., Schneider, H. & Heinrichs, J. 2015. Towards a monophyletic classification of Lejeuneaceae IV: reinstatement of *Allorgella*, transfer of *Microlejeunea aphanella* to *Vitalianthus* and refinements of subtribal classification. *Plant Systematics and Evolution* 302: 187–201.
- Dong, S., Schäfer-Verwimp, A., Pócs, T., Feldberg, K., Czumaj, A., Schmidt, A.R., Schneider, H. & Heinrichs, J. 2013. Size doesn't matter—recircumscription of *Microlejeunea* (Lejeuneaceae, Porellales) based on molecular and morphological evidence. *Phytotaxa* 85: 41–55.
- Gradstein, S.R. & Costa, D.P. 2003. The Hepaticae and Anthocerotae of Brazil. *Memoirs of the New York Botanical Garden* 87: 1–318.
- Schäfer-Verwimp, A., Feldberg, K., Dong, S., Van Mellick, H., Peralta, D.F., Schmidt, A.R., Schneider, H. & Heinrichs, J. 2014. Towards a monophyletic classification of Lejeuneaceae III: the systematic position of *Leiolejeunea*. *Phytotaxa* 170: 187–198.
- Schuster, R.M. & Giancotti, C. 1993. On *Vitalianthus* Schust. & Giancotti, a new genus of Lejeuneaceae. *Nova Hedwigia* 57: 445–456.
- Schuster, R.M. & Schäfer-Verwimp, A. 1995. On *Pluvianthus* (Lejeuneaceae: Lejeuneoideae). *Nova Hedwigia* 60: 59–72.

Bastos & Vilas Bôas-Bastos – New *Microlejeunea*

- Söderström, L., Hagborg, A., Von Konrat, M., Bartholomew-Began, S., Bell, D., Briscoe, L., Brown, E., Cargill, D.C., Cooper, E.D., Costa, D.P., Crandall-Stotler, B.J., Dauphin, G., Engel, J.J., Feldberg, K., Glenny, D., Gradstein, S.R., He, X., Heinrichs, J., Hentschel, J., Ilkiu-Borges, A.L., Katagiri, T., Konstantinova, N.A., Larraín, J., Long, D.G., Nebel, M., Pócs, T., Puche, F., Reiner-Drehwald, M.E., Renner, M.A.M., Sass-Gyarmatii, A., Schäfer-Verwimp, A., Sagarra-Moragues, J.G., Stotler, R.E., Sukkharak, P., Thiers, B.M., Uribe, J., Váña, J., Villarreal, J.C., Wigginton, M., Zhang, L. & Zhu, R.L. 2016. World checklist of hornworts and liverworts. *PhytoKeys* 59: 1–828.
- Wei, Y.-M. & Zhu, R.L. 2013. Transfer of two Asiatic taxa from *Lejeunea* to *Microlejeunea* (Lejeuneaceae, Marchantiophyta). *Cryptogamie, Bryologie* 34: 307–311.
- Wilson, R., Gradstein, S.R., Heinrichs, J., Groth, H., Ilkiu-Borges, A.L. & Hartmann, F.A. 2004. Phylogeny of Lejeuneaceae: a cladistic analysis of chloroplast gene *rbcL* sequences and morphology, with preliminary comments on the mitochondrial NAD4-2 spacer region. *Monographs in Systematic Botany from Missouri Botanical Garden* 98: 189–202.