



## *Frullania dorsimamillosa*, a unique new species from Central China and the resurrection of *Frullania chinlingensis* (Frullaniaceae, Marchantiophyta)

ALEXEY D. POTEKIN<sup>1,\*</sup>, JÖRN HENTSCHEL<sup>2</sup>, ELENA V. SOFRONOVA<sup>3</sup> & YURIY S. MAMONTOV<sup>1,4,5</sup>

<sup>1</sup>Laboratory of Lichenology and Bryology, Komarov Botanical Institute, Russian Academy of Sciences, 2 Professor Popov Street, St. Petersburg 197376, Russia; email: [potemkin\\_alexey@binran.ru](mailto:potemkin_alexey@binran.ru)

<sup>2</sup>Department of Systematic Botany with Herbarium Haussknecht and Botanical Garden, Friedrich Schiller University, Fürstengraben 1, 07737 Jena, Germany; email: [j.hentschel@uni-jena.de](mailto:j.hentschel@uni-jena.de)

<sup>3</sup>Institute for Biological Problems of Cryolithozone, Siberian Branch of the Russian Academy of Sciences, 41 Lenin Avenue, Yakutsk 677980, Russia; email: [soflena@mail.ru](mailto:soflena@mail.ru)

<sup>4</sup>Tsitsin Main Botanical Garden, Russian Academy of Sciences, Botanicheskaya 4, Moscow 127276, Russia; email: [yur-mamontov@yandex.ru](mailto:yur-mamontov@yandex.ru)

<sup>5</sup>Polar-alpine Botanical Garden-Institute, Kola Science Centre, Russian Academy of Sciences, 184236 Kirovsk-6, Russia

\*Author for correspondence

### Abstract

*Frullania dorsimamillosa* is described as new to science based on collections from northeastern Sichuan, China. The closely related *F. chinlingensis* from Shaanxi has been erroneously treated as a synonym of *F. dilatata* and has to be resurrected. The distinguishing features are discussed and a determination key is provided. *Frullania dorsimamillosa* and *F. chinlingensis* are ascribed to *F.* subg. *Frullania* and are unique in having conspicuous protrusions on the dorsal leaf surface. The development of papillae-like structures is considered to be an ecophysiological adaptation primarily aiding for light reflection and for water uptake.

**Key words:** ecophysiological adaptation, leaf cell protrusions, liverwort, morphology, Porellales, Sichuan, taxonomy

### Introduction

*Frullania* Raddi (1818: 9) with a worldwide distribution is one of the most species-rich and taxonomically complex genera of liverworts with more than 2000 validly published binomials (Yuzawa 1991; von Konrat *et al.* 2010b). Conservative estimates suggest there are between 300 and 375 accepted species (*e.g.*, Schuster 1992; Gradstein *et al.* 2001), but growing evidence points to a probably much higher extent of species diversity (von Konrat *et al.* 2010b). However, until now no data has been provided to support either supposition since a revision of the genus is still lacking. Preliminary data of Early Land Plants Today (ELPT) project indicate that there are 576 accepted binomials. Recent taxonomic studies in conjunction with molecular data continuously uncover an often complex genetic structure but without a conspicuous morphological differentiation at the species level. This phenomenon is especially observed within polymorphous species suggested to be composed of closely related taxa, like *F. ericoides* (Nees von Esenbeck 1833: 346) Montagne (1839: 51) (Hentschel *et al.* 2009), *F. rostrata* (Hooker & Taylor 1845: 87) Hook.f. & Taylor ex Gottsche *et al.* (1845: 445) (von Konrat *et al.* 2012, 2013) or *F. tamarisci* (Linnaeus 1753: 1134) Dumortier (1835: 13) (Heinrichs *et al.* 2010; Vilnet *et al.* 2014). These genetically distinct species were often assumed to be cryptic or nearly cryptic species (*e.g.*, Heinrichs *et al.* 2010; Ramaiya *et al.* 2010). For numerous examples the approaches of integrative taxonomy (Dayrat 2005) were successfully applied. A thorough morphological investigation and critical reevaluation of characters, especially the examination of living plants and the study of reproductive structures together with consideration of complementary sources of information, like ecology, biogeography, development or secondary metabolite composition, revealed diagnostic characters for genetically distinct lineages formerly merged within a single taxon and provided sufficient support for the recognition of morphologically discernible species (*e.g.*, von Konrat *et al.* 2006, 2012, 2013; Vilnet *et al.* 2014).

The application of molecular data to the taxonomy of *Frullania* may allow for an assessment and subsequent