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A new *Riccardia* (Aneuraceae, Marchantiophyta) from Myanmar

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Abstract

A new species of *Riccardia*, *R. meagheri*, is described from mountainous areas of northern Myanmar. The new species differs from other species by 1) inner cells of main axis and branches in thallus cross-section flattened, much wider than high, irregularly shaped and with curved cell walls, 2) dorsal epidermis cells mamillose protruding forwards, ventral epidermal cells enlarged, but externally flat, not mamillose, 3) a winged, translucent, single-layered margin on both the main axis and branches, 4) the identical structure of the main axis and branches in thallus cross-section.

Key words: Hepaticae, Indochina, SE Asia, simple thalloid liverworts

Introduction

In the course of biodiversity transect studies along elevational gradients in Myanmar (Mt Victoria, Natma Taung National Park, Chin State; Hponyin Razi and Hponkan Razi NW of Putao, Kachin State) from 2012–2014, Georg Miehe, Jürgen Kluge, Phyo Kay Kine and colleagues collected about 2350 bryophyte specimens. This material represents one of the world's largest collections of bryophytes from Myanmar. The entire collection was sent to the author for further processing and identification.

Among the specimens is the material of a *Riccardia* Gray (1821: 683) that cannot be assigned to any known species and is hereby newly described. *Riccardia* is the most species-rich genus of simple thalloid liverworts. In the World Checklist, Söderström *et al.* (2016) accepted ca. 280 species and 22 infraspecific taxa. In recent years, about 35 names were synonymized (e.g. Gradstein & Reeb 2018, Reeb & Gradstein 2020, Reeb *et al.* 2022), therefore the genus probably contains significantly fewer species.

Numerous publications are available on the taxonomy and distribution of the representatives of *Riccardia* from tropical and subtropical Asia (e.g. Furuki 1991, 1994, 1995, 2006, Singh & Singh 2017, Yin 2017). So far, not a single species of the genus has been reported from Myanmar.

Taxonomy

Riccardia meagheri Frank Müll. sp. nov. (Figs 1–2)

Diagnosis: The new species differs from other *Riccardia* species by 1) inner cells of main axis and branches in thallus cross-section flattened, much wider than high, irregularly shaped and with curved cell walls, 2) dorsal epidermis cells mamillose protruding forwards, ventral epidermal cells enlarged, but external cells flat, not mamillose, 3) a winged, translucent, single-layered margin on both the main axis and branches, 4) main axis and branches in thallus cross-section show an identical structure.

Description: Plants creeping, with bi- to tripinnate branching and indeterminate growth, when dry greyish-white with paler translucent white margin along main axis and branches, older thallus brownish in central area; when moist thallus brownish-green, with pale white translucent margin along main axis and branches. Thallus up to 30 mm long,

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width 0.3–0.8 mm, pinnate to bipinnate or tripinnate, main axis and branches similar in development, flat. Main axis with translucent margin of 2–7 cells, translucent marginal cells 52–117 µm long × 16–39 µm wide, moderately thick-walled, hyaline, smooth. Branches of the same width as the main axis, tip broadly rounded, rarely with a small incision in the middle; branches with translucent margin, marginal cells somewhat shorter than on the main axis, 32–52 µm long × 18–34 µm wide, thicker-walled. Dorsal cells in central part of main axis and branches mamillose protruding anteriorly, 28–53 µm long × 17–30 µm wide, thin-walled; ventral cells in central part of main axis and branches flat, 20–41 µm long × 15–23 µm wide, cell walls thickened, brownish. Mucilage hairs only on ventral surface of thallus and only at apices, 25–47 µm long × 15–23 µm wide. Oil bodies not seen.

Main axis and branches in cross-section with a characteristic stratification; ventral region with a 2–3 cell layer of enlarged cells, cells 20–33 µm wide × 13–28 µm high, outer walls of the outer cell layer thin, inner cell walls thickened and brownish; internal thallus area with a layer of 4–6 strongly flattened cells, cells 19–28 µm wide × 6–10 µm high, irregularly shaped, cell walls curved, thickened; dorsal region with a 2–3 cell layer of enlarged cells, thin-walled, subepidermal cells 14–22 µm wide × 11–24 µm high, epidermal cells elongated and up to 50 µm long, mamillose; marginal cells in cross-section 17–45 µm wide × 21–37 µm high, becoming smaller towards thallus margin, outer ones in 2–4 cell rows single-layered.

Dioicous (? Male branches not seen). Female branches lateral on ultimate branches or on main axis, ascending; wings composed of large, triangular, irregularly toothed scales. Calyptrae and sporophytes not seen.

Type:—MYANMAR. Kachin State. Hponyin Razi, *Lithocarpus-Magnolia-Rhododendron* forest, 2839 m, 27.620157 N, 96.981314 E, 26 October 2013, *G. Miehe, P.K. Kine, L. Shein, M. Kyaw, P. Ma & S. Lan Wan 13-073-060-D* (holo DR, iso HSNU).

Additional material seen:—MYANMAR. Kachin State. Hponyin Razi, *Lithocarpus-Magnolia-Rhododendron* forest, 2807 m, 27.61956 N, 96.982098 E, 27 October 2013, *G. Miehe, P.K. Kine, L. Shein, M. Kyaw, P. Ma & S. Lan Wan 13-075-059-F* (DR, HSNU).

Ecology: The species was found creeping between *Herbertus* Gray (1821: 705), *Bazzania* Gray (1821: 704), *Wijkia* Crum (1971: 170), *Dicranodontium* Bruch & Schimper (1847: 157), and *Mastigophora woodsii* (Hooker 1816: pl. 66) Nees (1838: 95) in *Lithocarpus-Magnolia-Rhododendron* forests at elevation of 2807–2839 m.

Etymology: The new species is named in honour of Dr David Meagher (1958–2023), an eminent Australian bryologist who sadly passed away far too early. He assisted the author in the identification of *Bazzania* from New Caledonia.

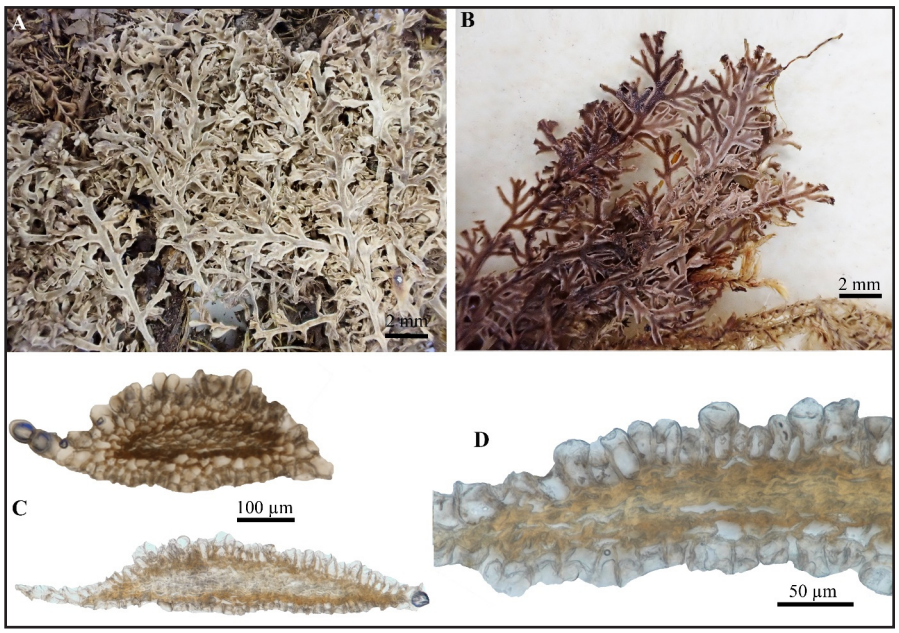

FIGURE 1. *Riccardia meagheri* Frank Müll. A—Plants in dry condition, B—plants in wet condition, C—cross sections of main axis, D—detail of cross-section of main axis. A, B & C (upper) from holotype, C (below) & D from *Miehe et al. 13-075-059-F*.

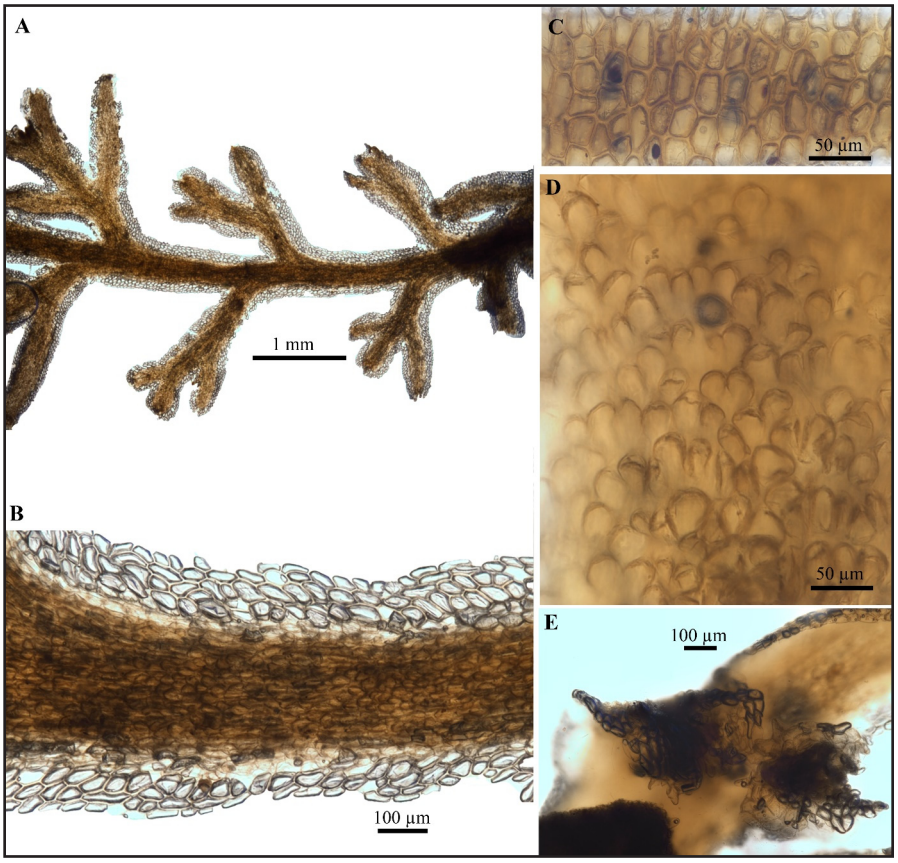

FIGURE 2. *Riccardia meagheri* Frank Müll. A—part of a plant with main axis and branches, B—detail of main axis, C—ventral epidermal cells of main axis, D—dorsal epidermal cells of main axis, E—female branches with scales. A–D from holotype, E from *Miehe et al. 13-075-059-F*.

Discussion

The species shows a combination of features not known otherwise in *Riccardia*—a translucent, single-layered margin both on main axis and branches, in cross-section, the same structure makes up the main axis and branches, dorsal epidermis with enlarged, mamillose protruding cells, ventral epidermal cells enlarged, but externally flat, not with mamillose cell walls; inner cells of main axis and branches flattened, much wider than high, irregularly shaped and with curved cell walls.

Due to its mamillose protruding epidermis cells, the new species has the greatest resemblance to *Riccardia eriocaula* (Hooker 1818: 72) Bescherelle & Massalongo (1889: 244) from New Zealand and Australia (Brown & Braggins 1989, Hewson 1970), *R. prehensilis* (Hooker & Taylor 1844: 480) Massalongo (1885: 22) (Hässel 1972) from southern South America, and the SE Asian *R. hymenophylloides* Schiffner (1898: 175) (Hewson 1970 as *R. demkarmana* Hewson 1970: 111, Schiffner 1898, 1900).

All these species are distinguished by their upright growth (creeping in *R. meagheri*), inner cells of main axis isodiametric (flattened, much wider than high, irregularly shaped, curved cell walls in *R. meagheri*), main axis without wing (main axis with translucent wing in *R. meagheri*), dorsal and ventral epidermal cells similar in size and shape (only dorsal epidermal cells mamillose, ventral epidermal cells flat in *R. meagheri*).

Riccardia eriocaula is further distinguished by branches that tend to be slightly curled and downturned (flat in *R. meagheri*), some epidermal cells form large papillae (without large papillae in *R. meagheri*), dorsal subepidermal cells elongate, on average >100 µm long (short in *R. meagheri*).

Riccardia prehensilis further differs from the new species by branches tending to be slightly curled and downturned (flat in *R. meagheri*), and margin of the branches three cells thick (one-layered in *R. meagheri*).

Riccardia hymenophylloides is additionally distinguished by recurved and marginally undulate branch margins (flat in *R. meagheri*). The branches of this species are more strongly winged, with wing wider than nerve, and in cross-section the nerve area is only 2–5 cells thick (nerve wider than wing in *R. meagheri*, nerve stouter, > 5 cells thick).

Riccardia lachungensis Singh & Singh (2017: 36), described from the eastern Himalayas (Sikkim) in India, also has mamillose epidermal cells. However, this is a very delicate species with a main axis only 0.25–0.35 mm wide. It also differs from *R. meagheri* in having mamillose ventral epidermal cells, in cross-section isodiametric inner thallus cells, a very narrow wing of the main axis and branches, and mucilage hairs scattered on the entire ventral side of the thallus.

Table 1 shows the most important distinguishing features of *R. meagheri* compared to these four other *Riccardia* species with mamillose epidermal cells discussed here.

With regard to the systematic position of *R. meagheri* within *Riccardia*, nothing definite can be said at present. Due to the special characteristics, it may well be that the species belongs to an independent group. This can only be clarified in the course of a general revision of the genus using molecular methods.

TABLE 1. Comparison of *Riccardia meagheri* with four other *Riccardia* species with mamillose epidermal cells.

	R. meagheri	*R. eriocaula*	*R. prehensilis*	*R. hymenophylloides*	*R. lachungensis*
Dorsal epidermal cells	mamillose protruding anteriorly	mamillose protruding upwards	mamillose protruding upwards	mamillose protruding upwards	mamillose protruding upwards
Ventral epidermis cells	flat	mamillose	mamillose	mamillose	mamillose
Inner cells of main axis and branches in cross-section	flattened, much wider than high, irregularly shaped and with curved cell walls	isodiametric, cell walls regularly	isodiametric, cell walls regularly	isodiametric, cell walls regularly	isodiametric, cell walls regularly
Growth direction of plants	creeping	upright	upright	upright	creeping
Wing of main axis	2–7 cells wide, translucent	none	none	none	1–2 cells wide
Unicellular wing of branches	2–7 cells wide, translucent	2–4 cells wide	none	6–8 cells wide	1–2 cells wide
Orientation of branches	straight and flat	slightly curled and downturned	slightly curled and downturned	branch margins recurved and marginally undulate	straight and flat
Width of main axis	0.3–0.8 mm	0.3–1.0 mm	0.5–1.0 mm	0.5–1.0 mm	0.25–0.35 mm
Mucilage hairs	ventral, at apices	ventral?	ventral and dorsal, scattered	ventral, at apices	ventral, scattered

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