

TYPE STUDIES ON *FRULLANIA* SUBGENUS *METEORIOPSIS* (MARCHANTIOPHYTA). VII. ON *F. ANGULATA* MITT. AND *F. LONGISTIPULA* STEPH.

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Abstract. As a result of a redefinition of *Frullania* subg. *Meteoriopsis* Spruce and study of the type material, *Frullania angulata* Mitt. and *F. longistipula* Steph. are affiliated to *Frullania* sect. *Intumescentes* R. M. Schust. Full descriptions and illustrations of the two species are provided.

Key words: Hepaticae, *Frullania* sect. *Intumescentes*, *Frullania* subgenus *Meteoriopsis*

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INTRODUCTION

Stephani (1911) assigned 60 species of *Frullania* to *F.* subg. *Meteoriopsis* Spruce based solely on possession of a pendant habit, including nine species from Africa. Vanden Berghen (1976) reduced six of them to synonymy of *F. angulata* and transferred *F. bullata* Steph. (= *F. sphaeroflora* Steph.) to *F.* subg. *Chonantheia* and treated these African species as a separate group within the subgenus *Thyopsiella* Spruce (as subg. *Frullania*). Uribe and Gradstein (2003) and Uribe (2008) pointed out that the main diagnostic characters of subg. *Meteoriopsis* are (i) leaves deeply cordate-auriculate with two large auricles at leaf base, one dorsal and one ventral, and (ii) leaves strongly convoluted and spreading widely when moistened. Accordingly, several species previously assigned to subg. *Meteoriopsis* were transferred to other subgenera by Uribe (2008). Demaret and Vanden Berghen (1950) treated *F. angulata* and *F. longistipula* within *F.* subg. *Meteoriopsis*. Later, Vanden Berghen (1976) treated both species as ‘Groupe du *F. angulata*’, and considered *F.* subg. *Meteoriopsis* as a synonym of this group. In this paper, *F. angulata* Mitt. and *F. longistipula* Steph. are affiliated to sect. *Intumescentes* R. M. Schust. as defined by Hentschel *et al.* (2009), and character-

ized by lobules long-cylindrical to clavate, stylus filiform (Schuster 1985), leaves convoluted around the stem when dry, obliquely spreading when wet. As Hentschel *et al.* (2009) pointed out, ‘The presence of the African *F. angulata* Mitt. within *F.* sect. *Obtusilobae* seems somewhat anomalous because this species matches the morphology of *F.* sect. *Intumescentes* rather than of *F.* sect. *Obtusilobae*.’

RESULTS

***Frullania angulata* Mitt.** Figs 1 & 2A, B
J. Proc. Linn. Soc. [London], Bot. 7: 169. 1864.

TYPE: CAMEROON, Mt. Cameroon, Jan 1862, Mann *s.n.* (HOLOTYPE, NY!).

Plants of medium to large size, up to 18 cm long and 1.5 mm wide including leaves, dark reddish to black, irregularly pinnate. *Branches* frequent, *Frullania*-type, to 1 cm long. *Stems* 275–300 µm wide in cross section. *Leaf-lobes* slightly imbricate, slightly convoluted around the stem when dry, spreading when wet, ovate, rounded, symmetrical, concave, 600–1675 × 520–1175 µm, apex acute to apiculate, margin entire, dorsal base auriculate, arching over the stem, ventral base not

auriculate. *Leaf-lobe cells*: apical cells 10–15 × 5–7 μm, median cells 12–15 × 7–10 μm, basal cells 17–20 × 7–10 μm, walls thick, sinuous, with trigones inconspicuous and intermediate thickenings. *Lobules* cylindrical to long-cylindrical to clavate, contiguous and parallel to the stem, 160–180 × 70–80 μm, sometimes lobules canaliculate to lanceolate. *Stylus* filiform, three cells long, with a terminal slime papilla. *Underleaves* subcuadrate, oblong to obovate, contiguous to distant, 1200 × 700–725 μm, up to 2 × wider than stem, margin entire, undulate, recurved, bifid to 1/4 of their length, segments acute or blunt, base auriculate, auricles rather long, to 200 μm, undulate, insertion line straight. *Branch appendages*: first branch underleaf divided to the base into two triangular, entire ventral and dorsal segments. *Androecia* lateral on short branches, capitate, 1 mm long, bracts in 4–6 series. *Gynoecia* terminal on stem, the bracts and bracteoles in three series, bracts bifid, margins entire. *Perianth* 1/2 exerted, oblong-elliptic, ca 1.5 mm long, 3-keeled, with a short beak.

DISTRIBUTION. Widespread in Tropical Africa (Wigginton 2009).

Frullania angulata Mitt. was erroneously included in *F.* subg. *Meteoriopsis* by Stephani (1911). Vanden Berghen's (1976) treatment of *F.* subg. *Meteoriopsis* as a group of *F.* subg. *Thyopsiella* was correct based on the two African species of the group treated. My study of the type specimen of *F. angulata* revealed, however, that this species has an acute to apiculate, not rounded leaf-lobe apex (Fig. 1C). This species is apparently a member of *F.* subg. *Intumescentes*. (Hentschel *et al.* 2009) along with *F. brasiliensis* Raddi, *F. atrata* (Sw.) Nees and *F. intumescens* (Lehm. & Lindenb.) Lehm. & Lindenb.

Frullania angulata can be recognized by its ovate, acute to apiculate stem leaf-lobes and auriculate underleaves, with undulate auricles. This species is related to *F. serrata* Gottsche but in the latter the underleaves are 3–4 times the stem width and have no or very short auricles. Vanden Berghen (1976) also described a new variety, *F. angulata* var. *laciniata* Vanden Berghen, which is accepted here. The variety is characterized by its female

bracts and bracteoles being dentate and laciniate (Fig. 2C).

SPECIMENS EXAMINED: TANZANIA: Southern highland in Mbeya Region, E slope of caldera rim of Rungwe volcano, 2500–2600 m alt. 21 Jan. 1972, *Pócs 6504/L* (EGR, COL); Mt. Rungwe, N of Tukuyu, 2500–2600 m alt. 17 Sept. 1972, *Pócs & Swai 6767/A* (EGR, COL); Kiboriani Mts. 1800 m alt. 11 March 1972, *Pócs & Mezosi 6566/L* (EGR, COL); Kilimanjaro, between Umbve and Lonzo rivers, 1900–2000 m alt. 30 Dec. 1970, *Pócs & Jones 6352/AL* (EGR, COL); Morogoro region: Mt. Kanga N of Turiani, 1200–1300 m alt. 27 Feb. 1970, *Pócs 6138/L* (EGR, COL). ZAÏRE: Nioka, Ituri, 1700 m alt. 30 March 1978, *Lisowski 50803* (EGR, COL).

Frullania angulata var. *laciniata* Vanden Berghen Fig. 2C

Bull. Jard. Bot. Nat. Belg. 46: 72. 1976.

TYPE: MADAGASCAR, *sine loco*, *Forsyth Mayor 526* (HOLOTYPE, G!).

Frullania angulata var. *laciniata* differs from *F. angulata* var. *angulata* only by female bracts and bracteoles with the margin dentate-laciniate (Vanden Berghen 1976).

DISTRIBUTION. Madagascar.

Frullania longistipula Steph. Fig. 2 D–I

in Renaud & Cardot, Bull. Soc. Roy. Bot. Belg. 30: 199. 1891.

TYPE: MADAGASCAR, *Camboué 162* (HOLOTYPE, G!).

Plants of medium to large size, 8–15 cm long, 1.3 mm wide including leaves, reddish to dark reddish, pendent growth (not projecting). *Stems* 150–190 μm wide in cross section. *Branches* frequent, *Frullania*-type, large, to 6 cm long. *Leaf-lobes* distant to subimbricate, convoluted around the stem when dry, obliquely spreading when wet, ovate, symmetric, plane, 700–980 × 800–1100 μm, apex rounded, margin entire, dorsal base auriculate, ventral base not truncate. *Leaf cells*: apical cells 7–10 × 7–14 μm, median cells 10–15 × 12–20 μm, and basal cells 20–25 × 24–35 μm; cells with walls thick, sinuous, with cordate trigones and without intermediate thickenings. *Lobules*

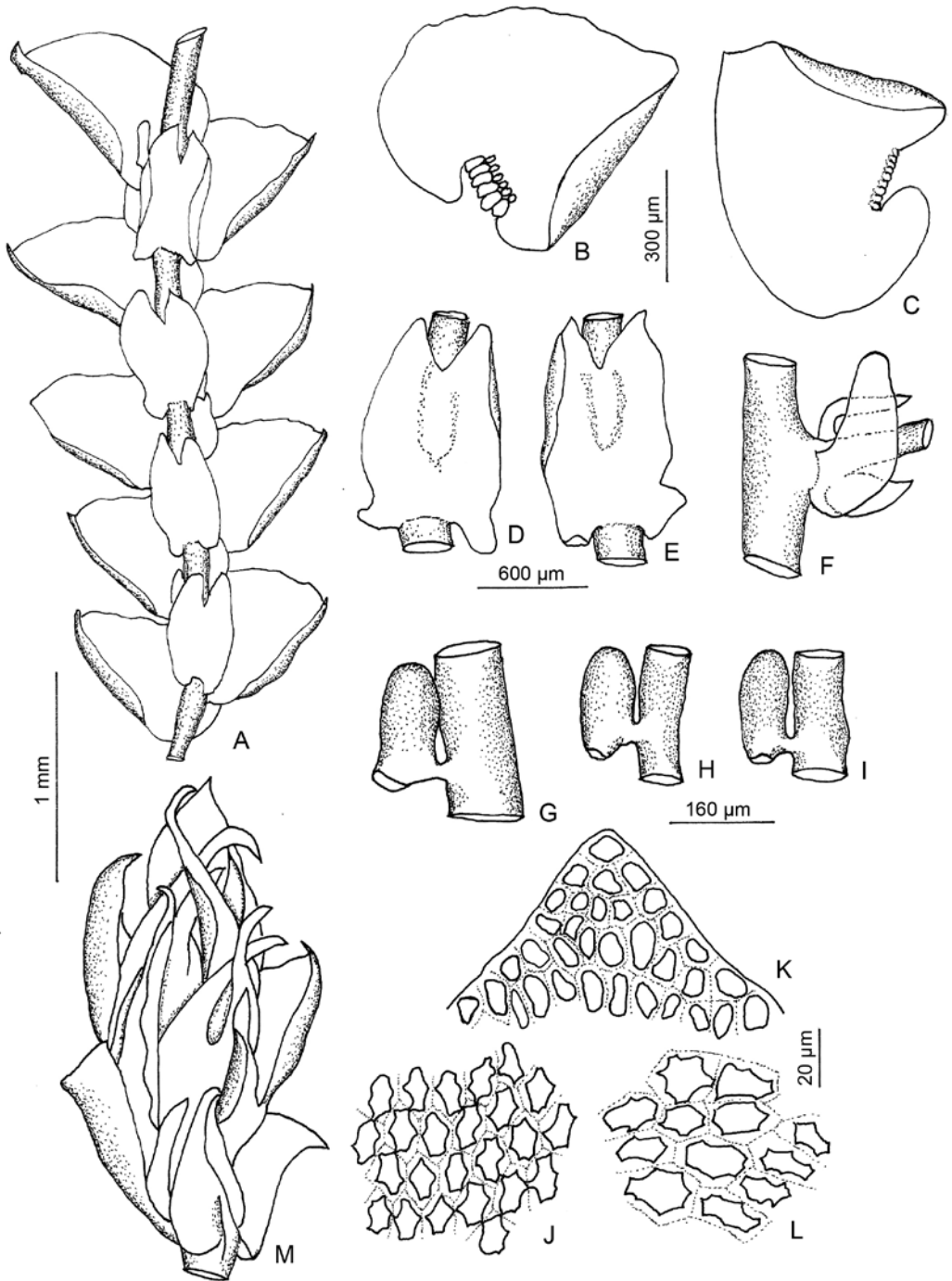


Fig. 1. *Frullania angulata* Mitt. A – part of shoot, ventral view, B & C – stem leaves, D & E – underleaves, F – first branch underleaf and first branch leaf, G–I – lobules, J – median leaf cells, K – apical leaf cells, L – basal leaf cells, M – gynoecial bracts and bracteoles (all from type of *F. angulata*).

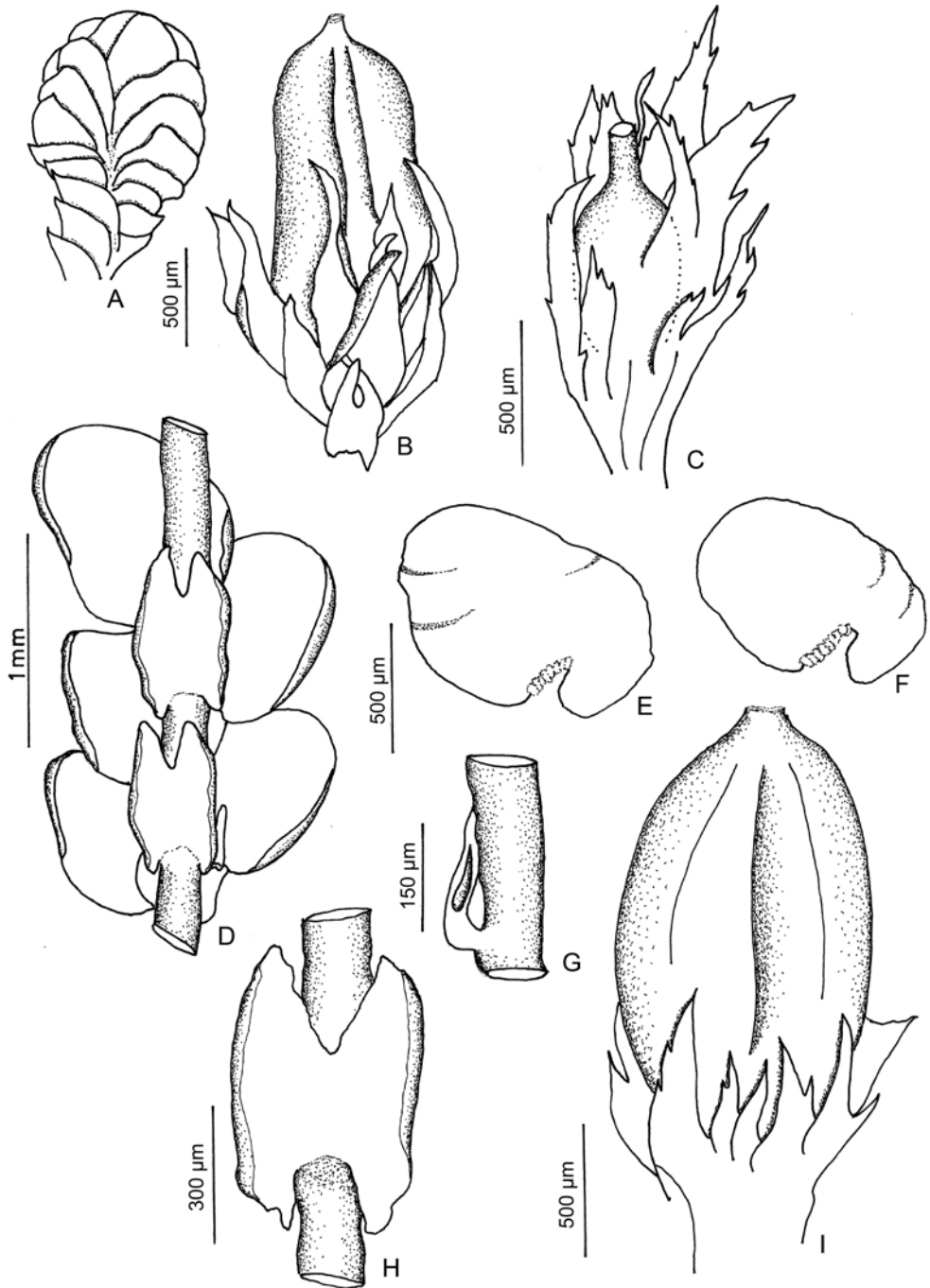


Fig. 2. *Frullania angulata* Mitt. A – androecium, B – perianth; *F. angulata* var. *laciniata* Vanden Berghen. C – perianth with laciniate bracts and bracteole. D–I – *F. longistipula* Steph. D – part of shoot, ventral view, E & F – stem leaves, G – lobules, canaliculate, H – underleaves, I – perianth (A & B from type of *F. angulata*; C from type of *F. angulata* var. *laciniata*; D modified from Vanden Berghen (1976); E–I from the type of *F. longistipula*).

clavate, sometimes explanate or laminate, 200–230 μm , parallel and contiguous to stem. *Stylus* 3–4 cells, to 60 μm long. *Underleaves* ovate to subquadrate, distant, to 275–510 \times 420–600 μm , up to 3 times wider than stem, margin entire, bifid to 1/3 of their length, segments acute, base with auricles, insertion line slightly curved. *Androecia* not seen. *Gynoecia* on short lateral branches, bracts and bracteoles in 2–3 series, acute, margins entire. *Perianth* oblong, 750 μm long and to 1.5 mm wide, 5-keeled, smooth, narrowed to a short beak.

DISTRIBUTION. Madagascar.

Frullania longistipula is a poorly known species. The presence of canaliculate lobules, an important character for placement in a particular subgenus, renders identification difficult. *F. longistipula* can be recognized by its ovate leaves with a rounded apex and auriculate underleaves, leaf cells without intermediate thickening walls, and trigones not nodulose. This species is close to *F. angulata* but in the former the leaf apex is acute to apiculate.

ACKNOWLEDGEMENTS. This paper is dedicated to Dr. Tamás Pócs on the occasion of his 80th birthday. Dr. Pócs gave me several specimens of African *Frullania* from his excellent collections for my studies. I thank the National University of Colombia for granting me a leave of absence, the Deutsche Akademischer Austauschdienst (DAAD) for a scholarship to work during the first half of 2002 in the Department of Systematic Botany of the University of Göttingen, the curators of herbaria G and

NY for the loan of the type specimens, Dr. Robert Gradstein (Paris) for helpful comments on the manuscript, and Jörn Hentschel (Jena) for comments about subgeneric classification of the genus *Frullania*.

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Received 5 May 2013