

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 \times 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. *Gynoecea* 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*

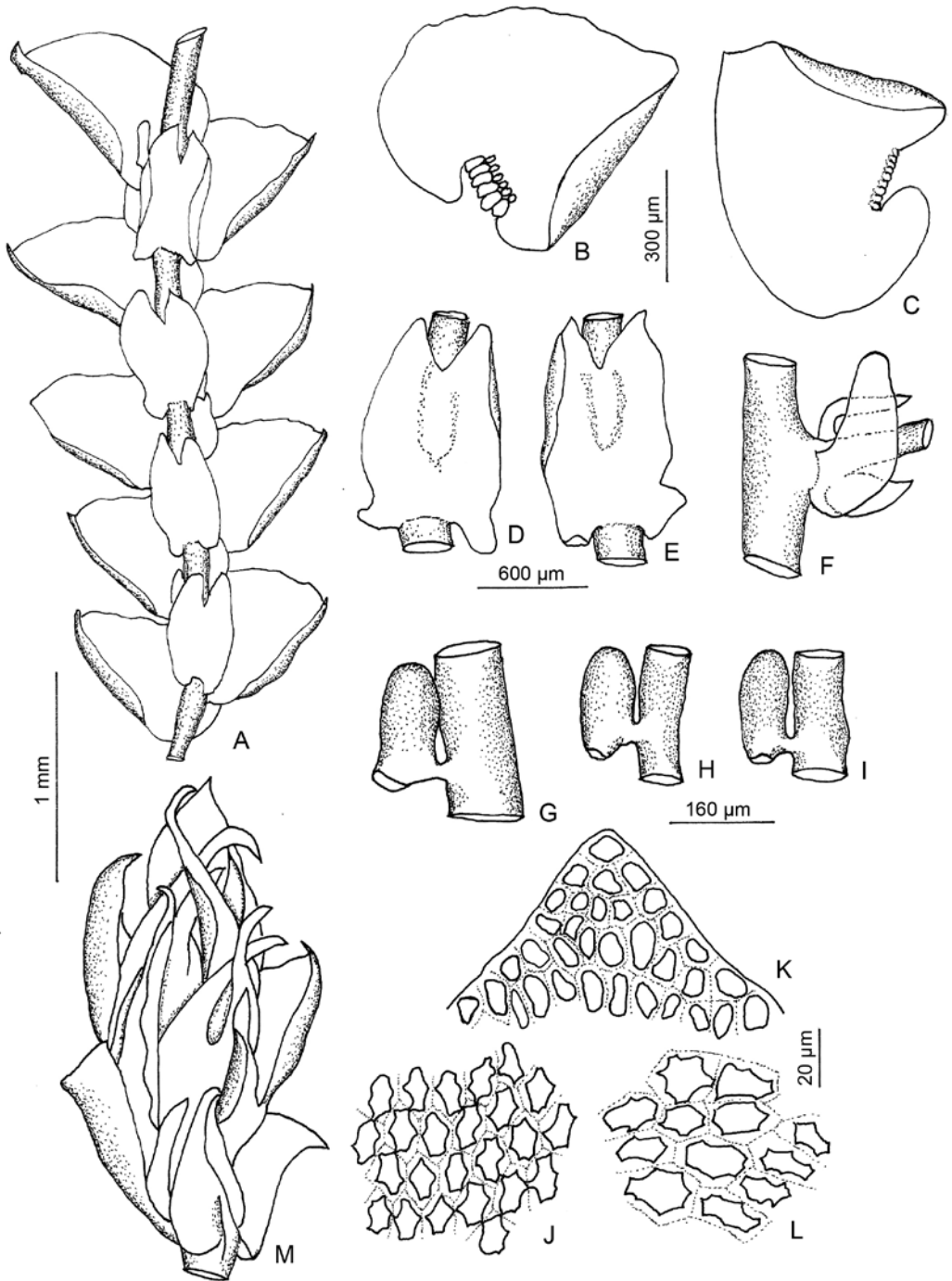


Fig. 1. *Frullania angulata* Mitt. A – part of shoot, ventral view, B & C – stem leaves, D & E – underleaves, F – first branch underleaf and first branch leaf, G–I – lobules, J – median leaf cells, K – apical leaf cells, L – basal leaf cells, M – gynoecial bracts and bracteoles (all from type of *F.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

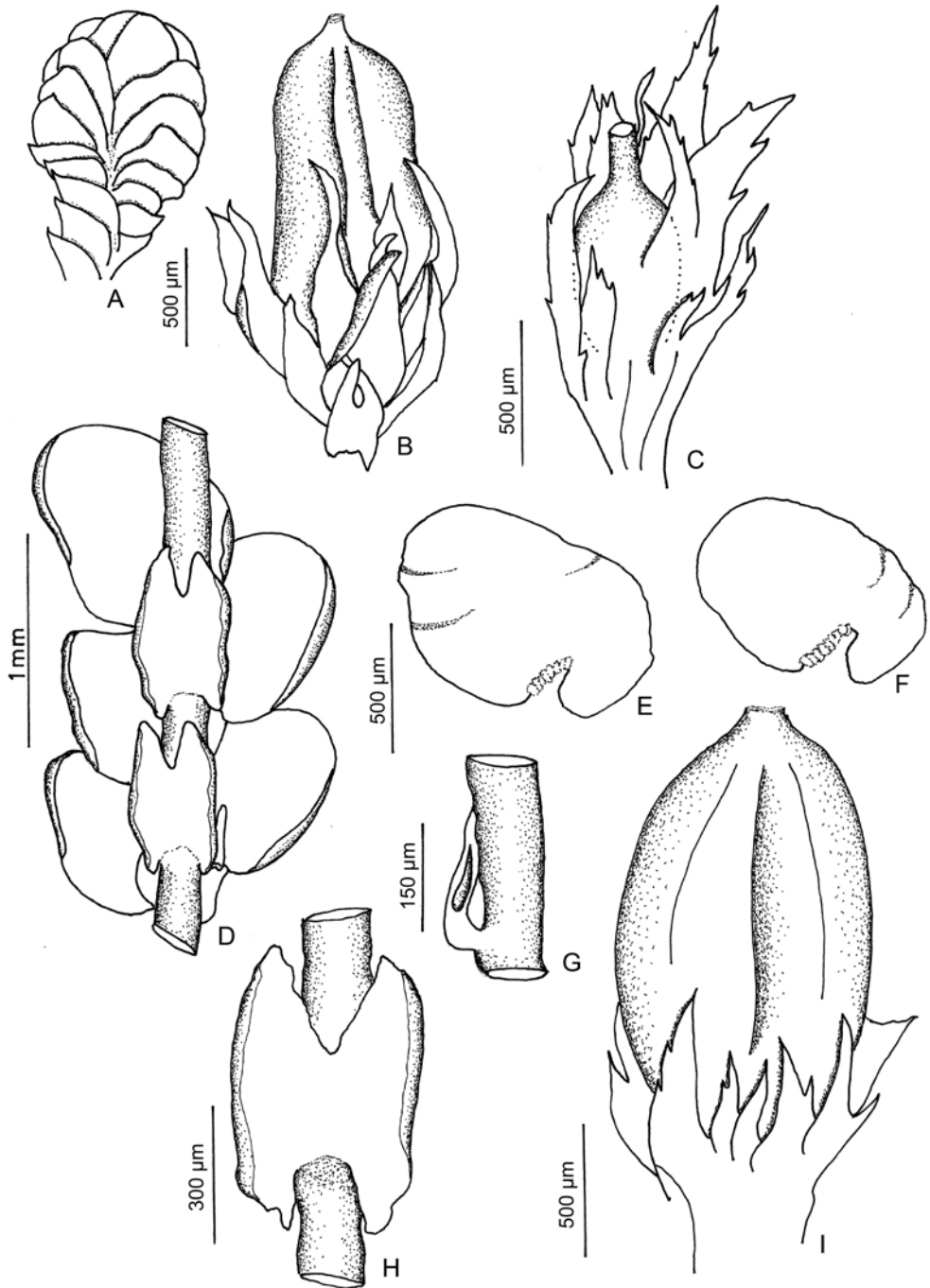


Fig. 2. *Frullania angulata* Mitt. A – androecium, B – perianth; *F. angulata* var. *laciniata* Vanden Berghen. C – perianth with laciniate bracts and bracteole. D–I – *F. longistipula* Steph. D – part of shoot, ventral view, E & F – stem leaves, G – lobules, canaliculate, H – underleaves, I – perianth (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 thickenings walls, and trigones not nodulose. This species is close to *F. angulata* but in the former the leaf apex is acute to apiculate.

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