

# Contribution to the Hepaticae and Anthocerotae of Mizoram - II. *Frullania apiculata* (Reinw. et al.) Dumort. new to Mizoram, India

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## ABSTRACT

Barbhuiya H. A. & Singh S. K. 2011. Contribution to the Hepaticae and Anthocerotae of Mizoram - II. *Frullania apiculata* (Reinw. et al.) Dumort. new to Mizoram, India. *Geophytology* 40(1-2): 69-73.

*Frullania apiculata* (Frullaniaceae: Hepaticae) is recently recorded from Mizoram, India for the first time. A detailed taxonomic description along with line drawing is provided for its easier identification.

**Key-words:** *Frullania apiculata*, new record, Mizoram, India

## INTRODUCTION

The genus *Frullania* Raddi is the largest genus of Frullaniaceae with ca. 1000 taxa in the world (Yuzawa 1991). In India, the genus is so far represented by approximately 66 taxa (Singh & Barbhuiya 2011), mainly distributed in Eastern Himalaya (50 taxa), Western Himalaya (21 taxa), Western Ghats (19 taxa), Central India (3 taxa) and Andaman and Nicobar Islands (6 species).

*Frullania apiculata* belongs to the subgenus *Frullania* Raddi of genus *Frullania*. This species was initially described as *Jungermannia apiculata* by Reinwardt et al. (1824). In India, the species was reported, for the first time, by Mitten (1861) from Khasi and Jaintia Hills of Eastern Himalaya on the basis of collections made by J. D. Hooker and T. Thomson. Chopra (1943) listed the plant from Khasi Hills and South India. Hattori and Thaithong (1978) reported this species on the basis of collections made by Sharp and Iwatsuki from Khasi and Jaintia Hills and Darjeeling area. Parihar et al. (1994) in his census listed it from Eastern Himalaya and South India. Nath and Asthana (1998) reported this species from Nilgiri Hills of Western Ghats. Singh et al. (2008) described this species from Meghalaya on the basis of collection made by D.

Kumar and D. K. Singh. Daniels (2010) recorded it from Tamil Nadu.

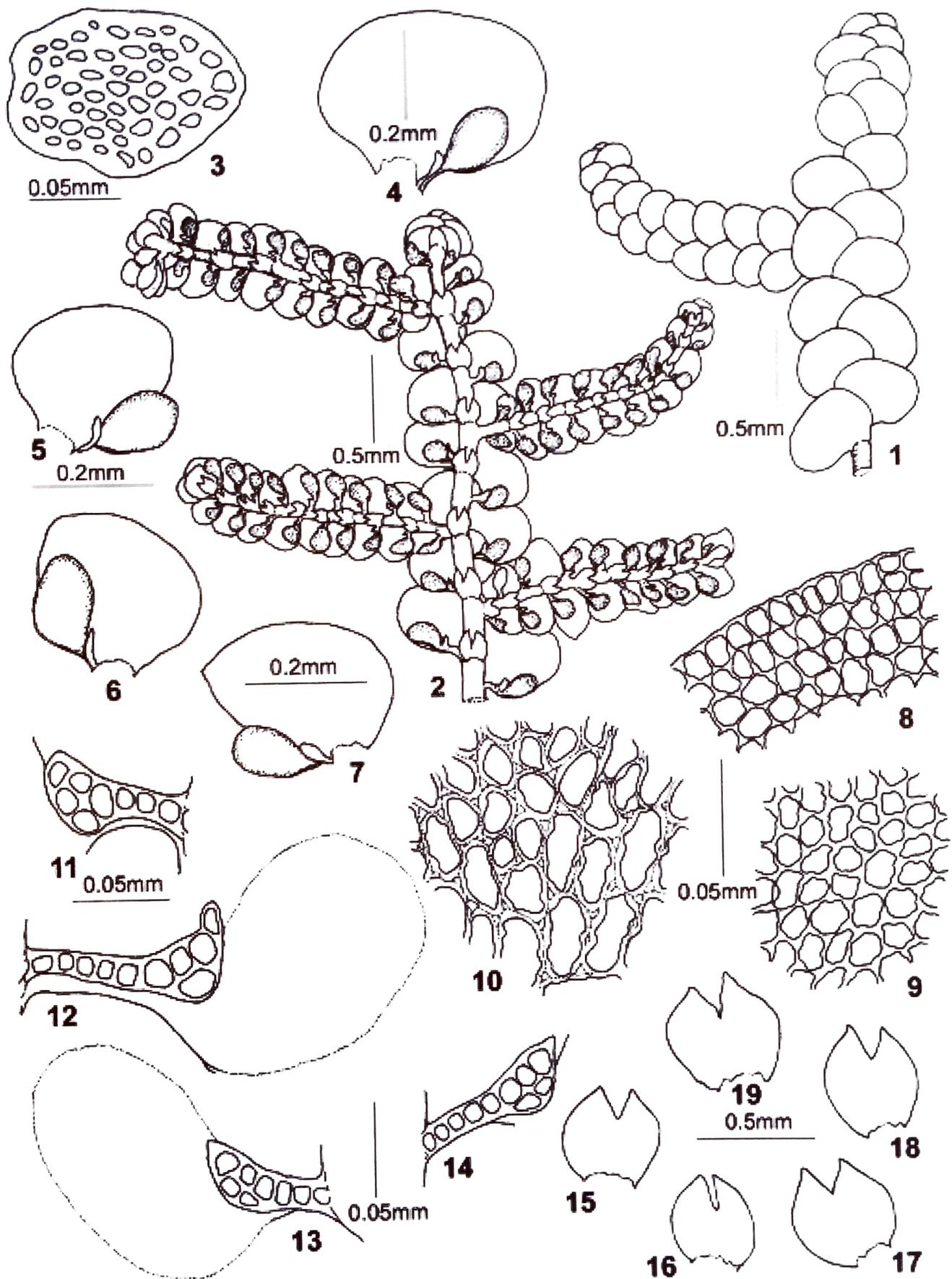
During a field exploration of Blue Mountain National Park, Mizoram, in 2008, the author (S.K.S.) encountered a small epiphytic population of this species. After critical examination, the identity of the plant was determined as *Frullania apiculata* hitherto undescribed species from Mizoram which constitute a new record for the State.

## TAXONOMIC DESCRIPTION

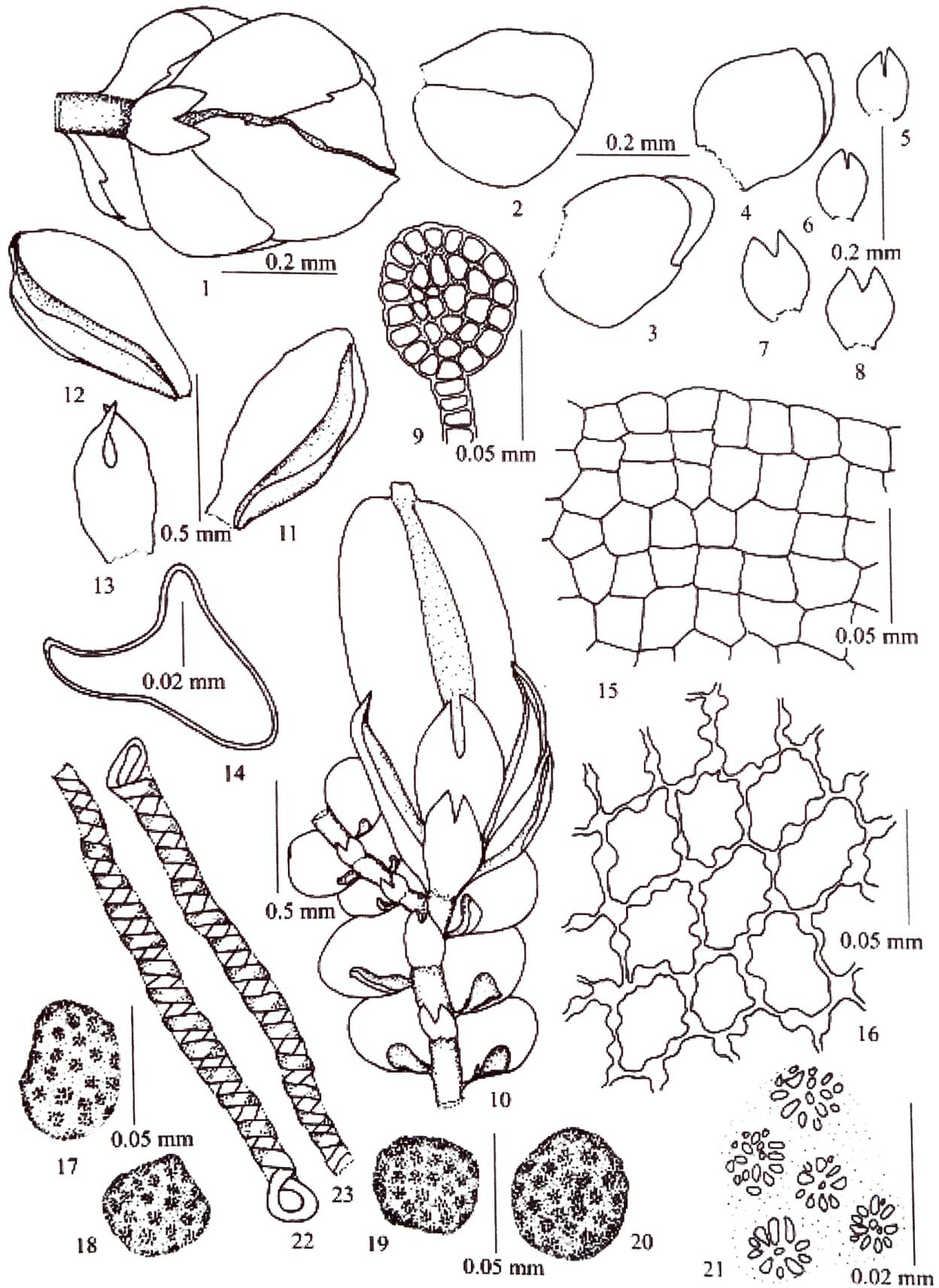
*Frullania apiculata* (Reinw. et al.) Dumort. in Recueil Observ. Jungerm. 13. 1835; Mitt. in Proc. J. Linn. Soc. Bot. 5: 121. 1861; Steph., Sp. Hepat. 4: 542. 1910; S. Hatt. in Bull. Natl. Sci. Mus. Ser. b 1: 147. 1975 and in J. Jap. Bot. 54: 22. 1979 and in J. Hatt. Bot. Lab. 47: 105. 1980; S. Hatt. and Thaith. in J. Hattori Bot. Lab 44: 177. 1978; A. P. Singh and V. Nath, Hep. Khasi and Jaintia Hills 188. 2007. *Jungermannia apiculata* Reinw. et al. in Nov. Acta Ceas. Leop. 12: 222. 1824.

Text-figures 1-2

Plant small, reddish-brown, 20-30 mm long, 0.6-1.7 mm wide; branching bi-pinnate, frullania-type. Stem



**Text-figure 1.** *Frullania apiculata* (Reinw. et al.) Dumort. 1. A portion of the plant in dorsal view. 2. The same in ventral view. 3. C.S. stem. 4-7. Leaves with lobule. 8. Marginal leaf cells towards apex. 9. Median leaf cells. 10. Basal leaf cells. 11-14. Styli. 15-19. Underleaves.



**Text-figure 2.** *Frullania apiculata* (Reinw. et al.) Dumort. 1. Male inflorescence showing arrangement of bract and bracteole. 2-4. Male bracts. 5-8. Male bracteoles. 9. Antheridium. 10. A portion of plant with female inflorescence showing arrangement of bract bracteoles and capsule wall. 11-12. Female bracts. 13. Female bracteole. 14. C.S. perianth. 15. Cells of inner layer of capsule wall. 16. Cells of outer layer of capsule wall. 17-20. Spores. 21. A magnified portion of spores showing rosettes and papillae. 22-23. Elaters.

in cross-section oval to subquadrangular in outline with slightly undulated margin, 133-135 x 95-98  $\mu\text{m}$ , 8-10 cells across diam., not differentiated into cortex and medulla; cells oval or sub-quadrangular or occasionally triangular, 5.0-22.5 x 5.0-15  $\mu\text{m}$ . Leaves complicate-bilobed; leaf-lobes subalternate - alternate, imbricate, widely spreading, concave, narrowly incurved, dorsal base truncate, margin entire, minutely apiculate-acute at apex, 0.3-0.5 mm long, 0.2-0.6 mm wide; marginal cells towards apex rectangular - quadrangular 7.5-15 x 7.5-12.5  $\mu\text{m}$ , median cells subrectangular to polygonal, 12.5-20 x 10-17.5  $\mu\text{m}$  with large confluent trigones, basal cells slightly elongated, 25-40 x 12.5-20  $\mu\text{m}$ , with large, nodulose, often confluent trigones; leaf-lobules remote from stem, short-cylindrical 172-182  $\mu\text{m}$  long, 100-102  $\mu\text{m}$  wide, with obtuse head and obliquely subtruncate-arched, crenulate-margined mouth; styli 6-10 celled, 107.5-150  $\mu\text{m}$  long, 10-40  $\mu\text{m}$  wide, linear at base and truncate near the apex. Underleaves remote, ovate, 0.1-0.2 mm long, 0.1-0.2 mm wide, almost equal to the stem width, 1/3-bifid rarely bifurcated up to half, sinus obtuse to subacute, lobes triangular, acute. Monoecious. Male inflorescence, small capitate, short stalked, ca. 0.6 x 0.4 mm; bracts 2-3 pairs, lobes ovate, 0.2-0.5 mm long, 0.2-0.3 mm wide, margin entire, apex obtuse, the lobule similar to lobe, 2/3-connate to lobe; bracteole small, ovate, 132-172  $\mu\text{m}$  long, 101-132  $\mu\text{m}$  wide, 1/3-bifid, lobes triangular, acute; antheridia ca. 30 celled, round, ca. 75 x 52.5  $\mu\text{m}$ , stalk about 37.5  $\mu\text{m}$  long and 15  $\mu\text{m}$  wide uniseriate. Female inflorescence terminal on stem; female bracts usually in 3 pairs, bract lobe oblong 0.7-0.8 mm long, 0.3-0.4 mm wide, margin entire, sometimes slightly wavy, obtuse at apex, bract-lobule acuminate-acute, 0.5-0.8 mm long, 0.2-0.3 mm wide, 1/2-connate to lobe, free side of the lobule recurved, entire-margined; bracteole approximately 0.6 mm long, 0.3 mm wide, 1/3 bifid, lobes narrowly triangular, acuminate-acute, narrowly recurved; perianth oblong, 3-keeled, ca. 1.9 x 0.8 mm, smooth, with large beak. Capsule globose, cells of inner layer of capsule wall hyaline, quadrangular - hexagonal, 22.5-30 x 12.5-25  $\mu\text{m}$ ; cells of outer layer of capsule wall subquadrangular to subrectangular,

47.5-60 x 35-45  $\mu\text{m}$ , with large nodulose - bulging trigones and intermediate thickenings. Spores spherical or subquadrangular, 40-60 x 37.5-50  $\mu\text{m}$ , with 43-60 rosettes each consisting of 12-22 irregular out growth. Elaters 187.5-205  $\mu\text{m}$  long, 12.5-17.5  $\mu\text{m}$  wide with uni-spiral thickening band.

**Distribution:** India: Andaman and Nicobar Islands, Meghalaya, Tamil Nadu, West Bengal Hills (Darjeeling); Mizoram (present study). China, Sri Lanka, Thailand, Philippines, Indonesia, Carolines, Hawaii, New Guinea, Africa, Australia (Stephani 1910, Mitten 1861, Hattori 1975, 1979, 1980, Hattori & Thaitong 1978a, b, Singh & Nath 2007, Singh et al. 2008).

**Specimen examined:** Epiphytic, in association with other liverworts, Mizoram, Blue Mountain National Park, 25.06.2008. S. K. Singh 119770, 119776, 119783.

This is one of the variable species of the genus *Frullania* as remarked by Hattori (1972) while describing the Asiatic species of the genus *Frullania*. He (Hattori l.c.) synonymised three species, viz. *F. anamensis* Steph. (from Laos), *F. densifolia* Steph. (from Aracan Hill of Myanmar), *F. engleri* Steph. (from India Orientalis - probably, Khasia Mts). For other synonymy under this species, Hattori's work on New Guinean *Frullania* (Hattori 1982) may be referred. This species can be distinguished from its allied species in having apiculate to acute apices, truncate dorsal bases of the leaf lobes, entire female bracts and bracteoles and 3-keeled smooth perianth. Our plant slightly differs from the earlier descriptions by having comparatively less acute apices which are sometimes rounded in outline.

#### ACKNOWLEDGEMENT

The authors are grateful to the Director, Botanical Survey of India, Kolkata and Head, Eastern Regional Centre, Botanical Survey of India, Shillong for facilities and encouragements and to the officials of Forest Department of Mizoram for rendering the logistic support during field exploration.

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