BULL. BOT. SURV. INDIA
Vol. 21, Nos. 1-4 : pp. 81-83, 1979

FRULLANIA TUYAMAE HATT. & THAITH. (HEPATICAE) FROM MANIPUR (EASTERN INDIA)—NEW TO INDIA

JAGDISH LAL

Botanical Survey of India, Howrah

ABSTRACT

While investigating the Hepaticae of Manipur State (23°47′—25°41′ N and 93°61′—94°43′ E) collected during February-March 1978, the presence of an interesting species of *Frullania* was noticed. The point of interest centered round the numerous gemmae borne on the margins of dorsal leaf-lobes, a rare feature for the genus *Frullania*. This plant resembles *Frullania tuyamae* Hatt. & Thaith., a species recently instituted by Hattori and Thaithong (1978) from Laos. The species so far endemic to Laos is being reported for the first time from India. The present species of *Frullania* is distinctive from all other known species from India in having numerous gemmae restricted to the margins of leaf-lobes and leaf-lobules. The relevant taxonomic features of the plant are given below.

Frullania (*Trachycolea*) **tuyamae** Hatt. & Thaith. in Journ. Jap. Bot. 53(6): 175. 1978.

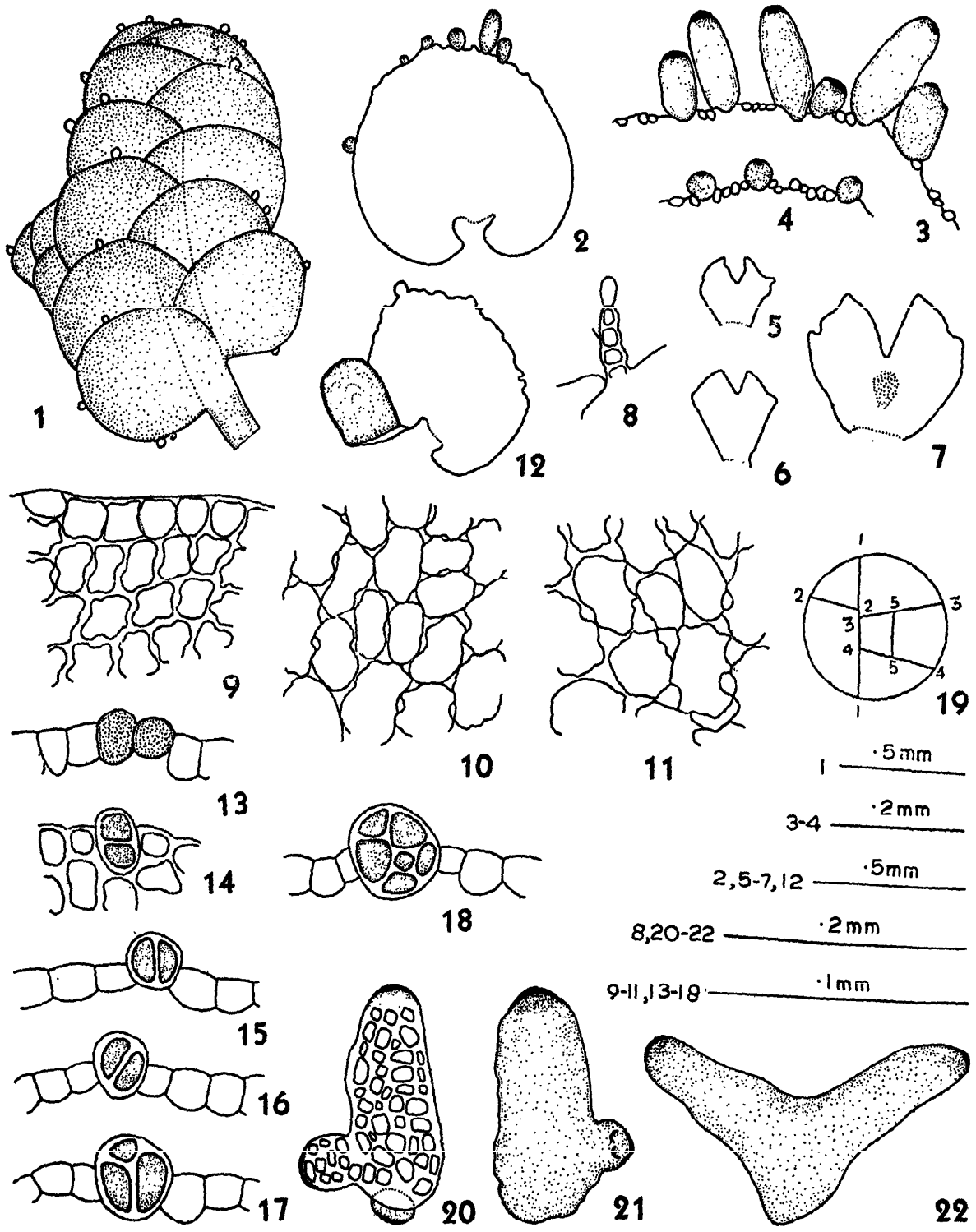
Plants small, 1.5-2 cm long, epiphytic. Stem 0.12-0.15 mm in diameter, branching bipinnate; disposition of branches oblique, rarely parallel. Leaf-lobes ovate to orbicular 0.65 × 0.9 mm long and broad, apex rounded, with abundant marginal gemmae; cells at the margin 14.2-22.4 μ m long and 12.2-16.3 μ m broad, cells at middle 24.4-36.7 μ m long and 14.2-18.3μ m broad, walls $\pm$ sinuate with subnodulose trigones, intermediate thickenings present, cells at base 24.4-38.7 μ m long and 16.3-22.4 μm broad, yellow to reddish-brown, with nodulose and often confluent trigones; leaf-lobules large, campanulate, 0.38 mm long, 0.28 mm broad, mouth truncate, styli filiform, 5-7 cells long, 1-2 cells wide at base, hyaline papilla at the top of styli present. Amphigastria obovate, 0.37-0.49 mm long and 0.35-0.47 mm broad, apex bilobed, lobes triangular, obtuse to subacute, with one lateral tooth, sinus wide, obtuse to acute. (Figs. 1-12)

Specimens examined: Manipur: Ukhrul, alt. ca. 1876 m, Feb. 20th 1978. *J. Lal & B. D. Kar*, No. 97 (CAL); Laos: 2 km east of Mr. Hase's farm, *ca.* 20 km northeast of Phongsavanh, or *ca.* 3 km south of Ban Hang, alt. *ca.* 1,000 m Dat. Jan. 3, 1958. T. Tuyama, no. 10. (Holotype, NICH, Japan).

Gemmae: Gemmae were seen at the margin of leaves and also the perichaetial leaves. All the leaves bearing gemmae were intact and not caducous. Very rarely dedifferentiated cells also occurred at the mouth of the lobule, but no such structures were seen on amphigastria.

Development of Gemma: The probable mode of development of gemma is as follows: At the time of formation of gemmae many marginal cells, singly or in a row of 8-10 cells, become strongly pigmented and distinct from other leaf-cells. These cells then protrude out and act as gemma initial (Fig. 13). The first division in these dedifferentiated cells is vertical (rarely it may be transverse also) resulting in the formation of two equal or unequal cells (Figs. 14-16). It is followed by a transverse division in one of the cells and a 3-celled stage is formed

Date of receipt: 11. 4. 79. Date of acceptance: 20. 2. 80



Frullania tuyamae Hatt. & Thaith.

Figs.1-22: 1. Dorsal view of the shoot showing marginal gemmae on the leaf-lobes. 2. Leaf-lobe bearing marginal gemmae. 3-4. Marginal portions of the leaf-lobe showing simple and lobed gemmae. 5-7. Underleaves. 8. Stylus. 9. Marginal leaf cells. 10. Median leaf cells. 11. Basal leaf cells. 12. Leaf. 13-18. Stages in the development of the gemma. 19. Diagrammatic representation of the pattern of successive divisions in the development of the gemma. 20-22. Mature gemmae.

(Fig. 17). The other cell divides by two transverse divisions followed by a vertical intersecting division with the result a 6-celled disc-shaped structure is achieved (Fig. 18). After this the divisions become irregular and ultimately multicellular cylindrical gemmae are formed. A diagrammatic representation of the sequence of divisions is shown in Fig. 19.

Mature Gemma: It is cylindrical, multicellular and composed of approx. 40 cells. The apical region shows a slight tapering in most of the gemmae. The gemmae may be simple or lobed (Figs. 20-22). No *in situ* germination was observed.

ECOLOGY AND DISTRIBUTION

Grows epiphytic on loose bark of trees, intermixed with *Radula, Cololejeunea* and *Frullania* species. Locality Ukhrul, rare. Previously known from Laos only.

Remarks: *Frullania tuyamae* from eastern India closely resembles the holotype from Laos, but the overall measurements of lobes, lobules, underleaves and leaf-cells are slightly larger in Indian population. Critical observations revealed that the leaves in plants from Laos are little squarrose while these are ovate to orbicular in the Indian plants. In both hyaline papillae are present, though it is not reported in Laos material by Hattori & Thaithong (1978). The vegetative variations in Indian plants may be attributed to ecological conditions particularly high humidity and higher altitude.

ACKNOWLEDGEMENTS

I am grateful to Mr. M. L. D. Kumar, Forest Ranger, Ukhrul Division, Manipur for his help during the collection. Thanks are also extended to Dr. S. Hattori, Director, Hattori Botanical Laboratory, Japan for sending the holotype of the taxon under study and to Dr. Ram Udar, Department of Botany, Lucknow University for his valuable suggestions.

REFERENCE

HATTORI, S. AND OBCHANT THAITHONG. A *Frullania* collection made by Dr. T. Tuyama in Laos. *J. Jap. Bot.* 53(6): 172-177. 1978.