

MORPHO-TAXONOMY OF *HETEROSCYPHUS ARGUTUS* (NEES) SCHIFFN. FROM INDIA

Previous reports of this taxon (*Heteroscyphus argutus*) from India by different workers under the genus *Chiloscyphus* (Mitten, 1861; Kashyap, 1932; Chopra, 1943; Parihar, 1961-62) are merely based on incomplete plants lacking reproductive structures specially the sporophyte. A recent survey of numerous gatherings from different sites in Himalayas, as well as in South India revealed a number of androecial and gynoecial plants with excellent sporogonia which on investigation turned out to be *Heteroscyphus argutus*, one of the widely distributed leafy liverwort forming saxicolous or corticolous population in different parts of the country.

Schiffner (1910) shifted this species under the genus *Heteroscyphus* mainly on androecial characters (i.e. position of androecia and size and shape of perigonal leaves). Following him, Pande et al (1960) retaining it under the genus *Heteroscyphus*, published an account of the species, but this description also lacked sporophytic details.

The present paper provides a complete morphotaxonomic account of the species along with detailed description of the sporophyte.

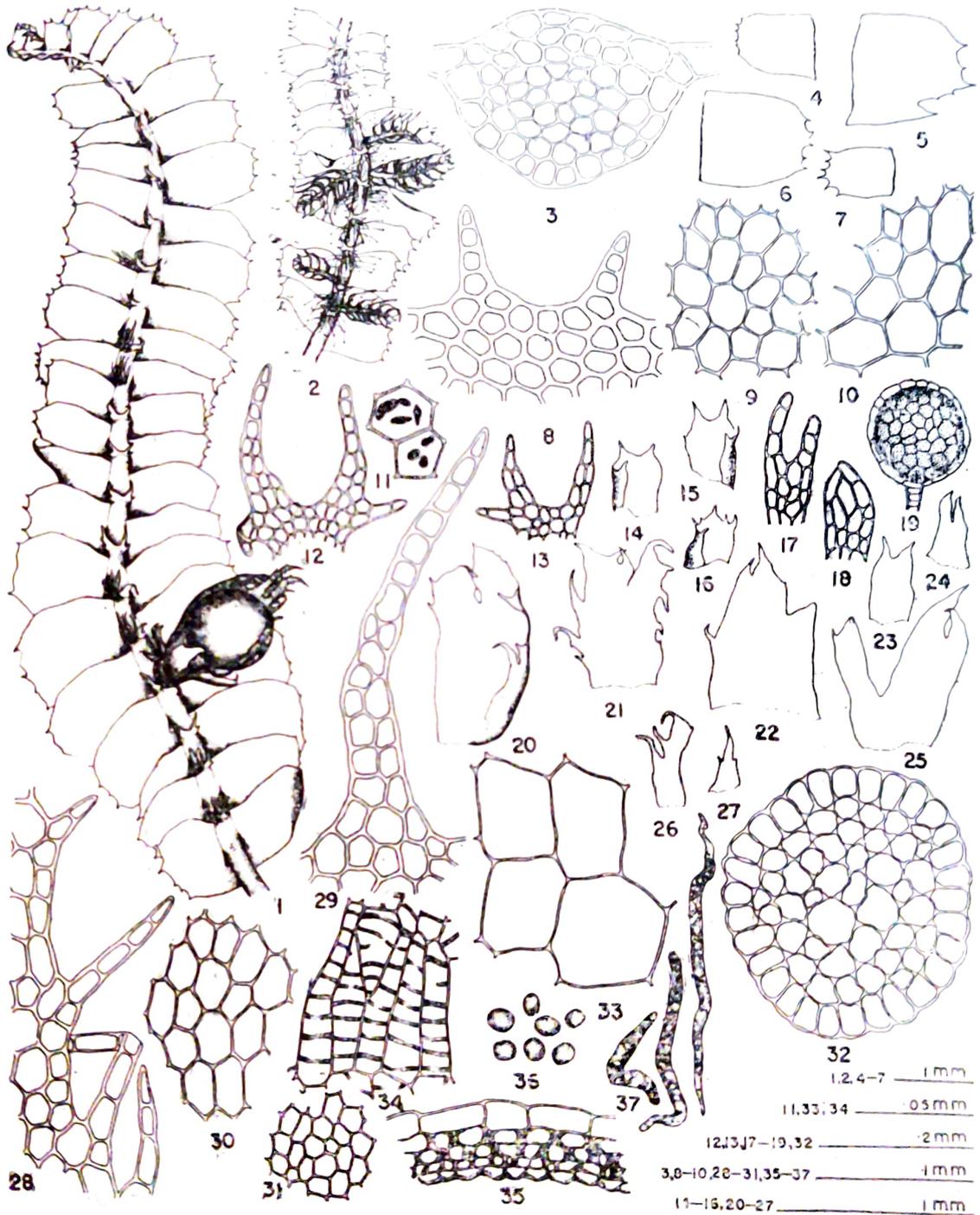
Toxonomic description

Heteroscyphus argutus (Nees) Schiffn. *Oesterr. Bot. Zeitschr.* 60 : 172 (1910)

Plants light greenish brown, growing on moist soil or on bark. Stem up to 5 cm. in length, slender, branching lateral intercalary, stem usually 8-10 (12) cells across diameter, cells 12-27 (31) \times 8-20 (31) μ m, walls of outermost 2-3 layers of cells thicker in comparison to the inner cells. Leaves alternate, succubous, free, .72 to 1.76 mm long, .45 to 1.58 mm broad, slightly imbricate (may be contiguous also), quadrate to rectangulate or ovato-rectangulate, apex rounded to truncate, pleuridentate, dentitions usually 2 to 8(10) in number, (1) 2 to 5 (7) cells long; leaf cells without trigones, 13-27 \times 8-12 μ m at apex, 12-39 \times 12-31 (39) μ m in the middle and 16-47 (51) \times 16-47 (51) μ m at the base, 2-3 rows of marginal cells with relatively thicker walls. Oil bodies 1 to 7 per cell, rounded to elongated or spindle shaped, finely segmented, 2.8 to 14 μ m long, 2.8 to 5.6 μ m broad. Underleaves small, free, .18 to .4 mm long and .18 to .5 mm broad, deeply bifid, with a broad rounded sinus, dentitions diverging, 4 to 8 cells long and uniseriate at tip, sometimes with a single tooth on inner margin of the long dentition; outer lateral margins of the underleaf usually with 1(2) tooth on either side; tooth 2-3 celled. Rhizoids arising in bunch from underleaf bases, sometimes also seen arising from stem surface a little away from underleaf bases.

Dioecious, androecia terminal on short lateral branches (although in some plants collected from eastern himalayas intercalary androecia also seen either alone or mixed with terminal androecia on short lateral branches in the same plant), male branches usually consisting of 3-8 pairs of male bracts; bracts very small, .4 to .72 mm long and .27 to .45 mm broad, bidentate, with a dorsal toothed flap at antical end subtending an antheridium, male bracteoles as much in number as bracts, much smaller in size, .16 to .25 mm long and .09 to .1 mm wide, deeply bifid; antheridial body .10 to .23 mm in dia-

meter, antheridial wall almost of isodiametric cells, stalk biseriate, 4-8 cells long. Female inflorescence terminal on very short lateral branches lacking normal vegetative leaves, bracts and bracteoles in two whorls, free, showing a wide range in their size and shape,



Text-figs. 1-36. *Heteroscyphus argutus* 1. A portion of female plant with mature sporophyte; 2. A portion of plant showing short lateral male branches; 3. T. S. of stem; 4-7. Leaves; 8-10. Cells of leaf from apex, middle and base, respectively; 11. Leaf cells showing oil bodies; 12, 13. Underleaves; 14-16. Male bracts; 17, 18. Male bracteoles; 19. Antheridium; 20-22. Female bracts of inner whorl; 23, 24. Female bracts of outer whorl; 25. Female bracteole of inner whorl; 26, 27 : Female bracteoles of outer whorl; 28. Marginal cells of perianth lobes; 29-31. Cells of perianth from apex, middle and base, respectively; 32. T. S. of Seta; 33. Epidermal layer cells of capsule wall; 34. Innermost layer cells of capsule wall; 35. T. S. Capsule wall; 36. Spores and 37. Elaters.

bracts of outer whorl smaller, bifid and those of inner whorl larger, bifid, show further lobing, margins irregularly dentate, bracteole of outer whorl smaller, shape variable, dentate, bracteoles of inner whorl deeply bilobed, may show further lobing and margins dentate. Perianth mouth broad, trilobed, each lobe shows further lobing, margins heavily dentate, cells $16-23 \times 4-12 \mu\text{m}$ at apex, $16-47 \times 12-27 \mu\text{m}$ in the middle and $12-27 (55) \times 12-23 (55) \mu\text{m}$ at the base. Calyptra well-developed, closely adherent to the capsule wall. Seta .27 to .35 mm (9 cells across) in diameter, massive type, cells isodiametric $23-59 \times 23-47 \mu\text{m}$. Capsule spherical, 4-valved; capsule wall 5-stratose, cells of the epidermal layer $36-60 \times 34-48 \mu\text{m}$, hyaline without thickening bands; cells of the innermost layer narrower, $42-84 \mu\text{m}$ long, $14-20 \mu\text{m}$ wide, with nodular thickenings on both the sides of the radial walls which extend on the inner tangential wall of the layer forming U-shaped thickening in cross section and transverse bands in surface view. Spores light brown, $12-16 \mu\text{m}$ in diameter, surface slightly granular. Elaters bispirate, 78 to $149 \mu\text{m}$ long and $8-10 \mu\text{m}$ wide.

Specimens examined—Herbarium E. Levier, 132, *Chiloscyphus argutus* (R. Bl. et N. ab E.) N. ab E. C. per, forma, Singapore, 12 March 1898, Legit. Max. Fleischer, determ. Schiffner 1899; LWU: 8832/85, *H. argutus*, Legit: S. C. Srivastava and party, Locality: Mercara (South India), Date: 11.10.85, Det.: S. C. Srivastava & A. Srivastava; LWU: 8865/85, *H. argutus*, Legit. U. S. Awasthi, Loc.: Kabi (Sikkim), Date: 27.11.85, Det.: S. C. Srivastava & A. Srivastava; LWU: 8939/85, *H. argutus*, Legit: U. S. Awasthi, Loc.: Singhik (E. H.), Date: 29.11.85, Det.: S. C. Srivastava & A. Srivastava; LWU: 7590/83, *H. argutus*, Legit: R. U. & Party, Loc.: Periyakulum (South India), Date: 1.10.83, Det.: S. C. Srivastava & A. Srivastava; LWU: 8203/78, *H. argutus*, Legit: S. C. Srivastava & U. S. Awasthi & Adarsh Kumar, Loc.: Mongpo (E. H.), Date: 1.1.78, Det.: S. C. Srivastava & A. Srivastava; LWU: 1944/71, *H. argutus*, Legit: R. Udar, Loc.: Seetlakhet (Western Himalayas), Date: 2.5.71, Det.: S. C. Srivastava & A. Srivastava.

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