

A REMARKABLE *CALOBRYUM* FROM INDIA

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Abstract

Some remarkable specimens of *Calobryum* Nees exhibiting haphazard pattern of antheridial development on the axis, presumably teratologic or even seemingly stabilized representing a primitive conditions, have been described from Darjeeling, Eastern Himalayas, India. The female plants are strictly acrogynous.

Introduction

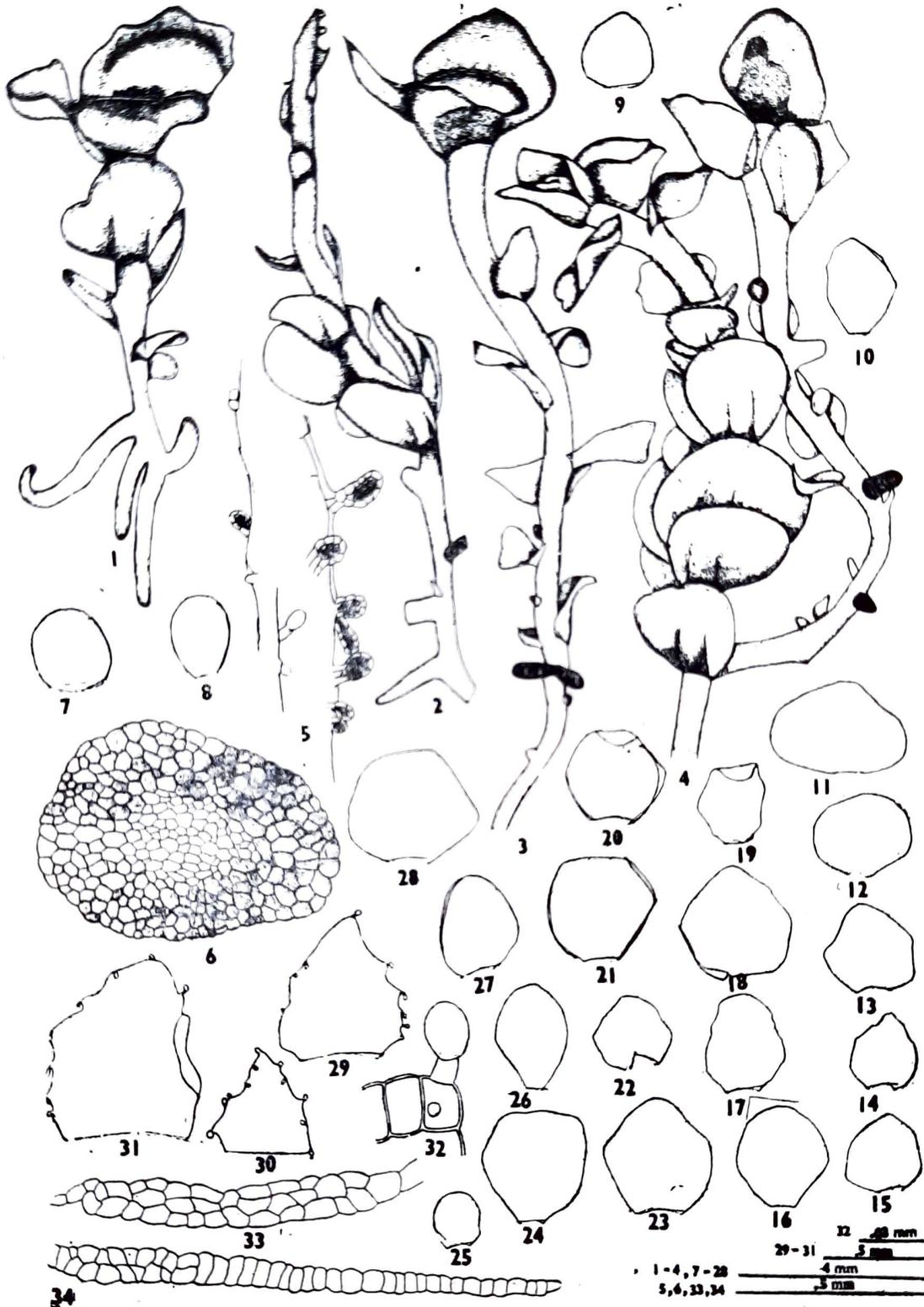
During a plant collection trip to Darjeeling, eastern Himalayas, in the month of April and May 1976, several population of *Calobryum* and *Haplomitrium* were collected. These on critical investigation revealed the presence of various species of *Calobryum* Nees and *Haplomitrium* Nees earlier known from this territory (see Kumar & Udar, 1976, 1977; Udar & Kumar, 1982; Udar, 1980). In one population a number of specimens of *Calobryum* were extremely interesting and remarkable in the mode of antheridial development as well as their placement over the axis—showing morphological levels which are of considerable significance. These relate to the superficial and scattered distribution of antheridia over the axis and their haphazard formation in irregular sequence. Such a condition is not known so far among any of the leafy liverworts.

Description

Plant green to bright green, medium sized, growing in loose patches; gametophore erect, leafy, arising from leafless, prostrate to obliquely ascending rhizome. Rhizome cylindrical, thickly coated with mucilage, without scale leaves, whitish to pale in colour. Aerial axis cylindrical, 20-24 cells wide and 0.5 mm-0.8 mm in diameter, differentiated into cortical and medullary zones. Cortical zone 3-5 cells wide, cells large, polygonal thin-walled, non collenchymatous, 22.4×16.8 — 84.0×33.0 μm with dense contents, medullary zone 10-13 cells wide, cells thin walled, small, non collenchymatous polygonal, 16.0×11.0 — 50.0×33.0 μm . Numerous short spur like buds present in lower region of aerial axis.

Dioecious. Male plants growing in loose patches, erect 10-18 mm long, 0.4 mm—1.2 mm wide at androecial region including leaves; aerial axis usually unbranched, leafy throughout, leaves in 3-5 cycles, distant, spirally arranged in 3 rows, transversely attached, isophyllous to subisophyllous, erect spreading, variable in shape and size; ovate-obovate, orbicular, rhomboid, sometimes slightly lobed, 1.15—2.30 mm long, 1.00—2.0 mm wide. Male bracts large, with copious mucilage papillae at the margins. Antheridia terminal as well as scattered in haphazard manner with irregular development over the stem, without the association of any leaf or bract. Leaves and bracts multistratose at the base.

Female and male plants equal in length and width. Aerial axis leafy throughout. Leaves in many cycles, distantly in 2 rows, isophyllous to subisophyllous, highly variable



Text-fig. 1—1. Male plant with terminal group of antheridia; 2. Male plant showing the antheridia on stem surface without any set pattern of placement; 3. Male plant showing leaves of various shapes; 4. Female plant with terminal group of archegonia and the leaves are of various shapes and size; 5. A part of male plant showing the development of antheridia in haphazard and irregular sequence; 6. Cross-section of stem showing cortical (stippled) cells and medullary cells; 7-28. Leaves of various shapes and sizes; 29-31. Perichaetial leaves, heterophyllous, and large number of mucilage papillae at margins; 32. Mucilage Papilla at the marginal cells of leaf; 33. Cross section of the leaf at base (towards base); and 34. Cross section of the leaf at base (towards margins).

in shape, orbicular, ovate to obovate, rhomboid to rhomboid-reniform, longer than broad and vice-versa, 1.15—2.5 mm long, 1.0-2.8 mm wide with 1-2 celled mucilage papillae at the margins and surface; centrally multistratose at the base and unistratose towards margin. Archegonia strictly terminal surrounded by abbreviated female bracts. Sporophyte not seen. Specimens deposited in Lucknow University Hepatic Herbarium (LWU 76/EH). Collection of liverworts from Eastern Himalayas Darjeeling. Specimens preserved in 90% Alcohol. Loc.: On way to Teesta Valley from Ghoom, Darjeeling (ca. 2000 m) Leg. : Dinesh Kumar, April 1976. Det. : Dinesh Kumar, November 1981).

Discussion

The specimens described here approaches *Calobryum dentatum* Kumar & Udar (Kumar & Udar, 1976) in almost equal male and female plants with aerial axis leafy throughout differing in number of cycles of leaves (few, only 3-5 cycles in male plants and many cycles in female plants). However, it differs strongly in the structure, shape and size of the leaves (figs. 7-28). These specimens never form a compact patch. The most remarkable feature of the presence of practically all shapes of leaves known among the various taxa of Calobryales. Interestingly all these types of leaves are multistratose (2-3 cells thick) centrally at the basal region (fig. 33) and are unistratose towards the margin (fig. 34). Usually one to two celled mucilage papillae (fig. 32) are present at the margin and surface of leaves.

The male plants exhibiting various morphological levels are of considerable significance. Besides, the plants with terminal group of antheridia (fig. 1) some plants also show superficial and scattered distribution of antheridia over the axis and their haphazard formation in irregular sequence as well as without any set pattern of placement (figs. 2,5), are indicative of a highly primitive organization. Such a condition is not known so far among leafy liverworts. The mature antheridia are found towards the apex of the aerial shoot while the antheridia with different stages of their development are seen at lower region and without any association of leaves of male bracts (fig. 5). The female plants are strictly acrogynous, and the perichaetial leaves surrounding the group of archegonia are considerably abbreviated, heterophyllous and beset with copious mucilage papillae at the margin (figs. 29-31). Normally the perichaetial leaves in other species of *Calobryum* and the leaves associated with archegonium in various species of *Haplomitrium* are much more enlarged and modified (Udar & Kumar, 1982). But the condition is reverse in these specimens. Although the specimens undoubtedly deserve the status of a new taxon but at present only few specimens are at hand which may be considered abnormal because of several unknown factors. Further studies on such type of plants, if collected again in near future will definitely solve the problem for creation of a new species.

These specimens are not comparable with any of the known species of *Calobryum* in totality as it exhibits a wide range of variations in the shape and size of the leaves and the position of antheridia in male plants.

Acknowledgements

The author is grateful to late Professor Ram Udar for encouragements and to Dr S. C. Srivastava for going through the manuscript.

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