

A NEW SPECIES OF *HAPLOMITRIUM*, *H. GROLLEI* KUMAR *ET* UDAR, FROM DARJEELING, EASTERN HIMALAYAS, INDIA\*

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ABSTRACT

*Haplomitrium grollei* sp. nov. has been described from Darjeeling, Eastern Himalayas, India. This species is characterised by large plants with leaves distant on axis and crowded at apex, clearly anisophyllous, and 3-4 stratosed at base. The gynoeical disc shows various degrees of elaboration, being normally anacrogynous with apical proliferation resulting in an innovation which is again fertile, or with archegonia in terminal receptacle apparently acrogynous and intermixed with narrow, irregular, lingulate bractlets.

INTRODUCTION

In India the order Calobryales is represented by the following four species from Eastern Himalayas: *Calobryum indicum* Udar *et* Chandra (UDAR & CHANDRA, 1961, 1965), *C. blumii* Nees (UDAR *et al.*, 1968), *C. dentatum* Kumar *et* Udar (KUMAR & UDAR, 1976) and *Haplomitrium hookeri* (Smith) Nees (UDAR & CHANDRA, 1965). During a plant collecting trip to Darjeeling (on Teesta valley road from Ghoom in December 1972—January 1973) several plants were collected which on critical investigation proved to be a new species (*H. grollei* sp. nov.). The discovery of this species makes a total of five species of this order in India—the largest number represented in any country in the world (*see also* UDAR, 1976).

TAXONOMIC DESCRIPTION

***Haplomitrium grollei* Kumar *et* Udar sp. nov.**

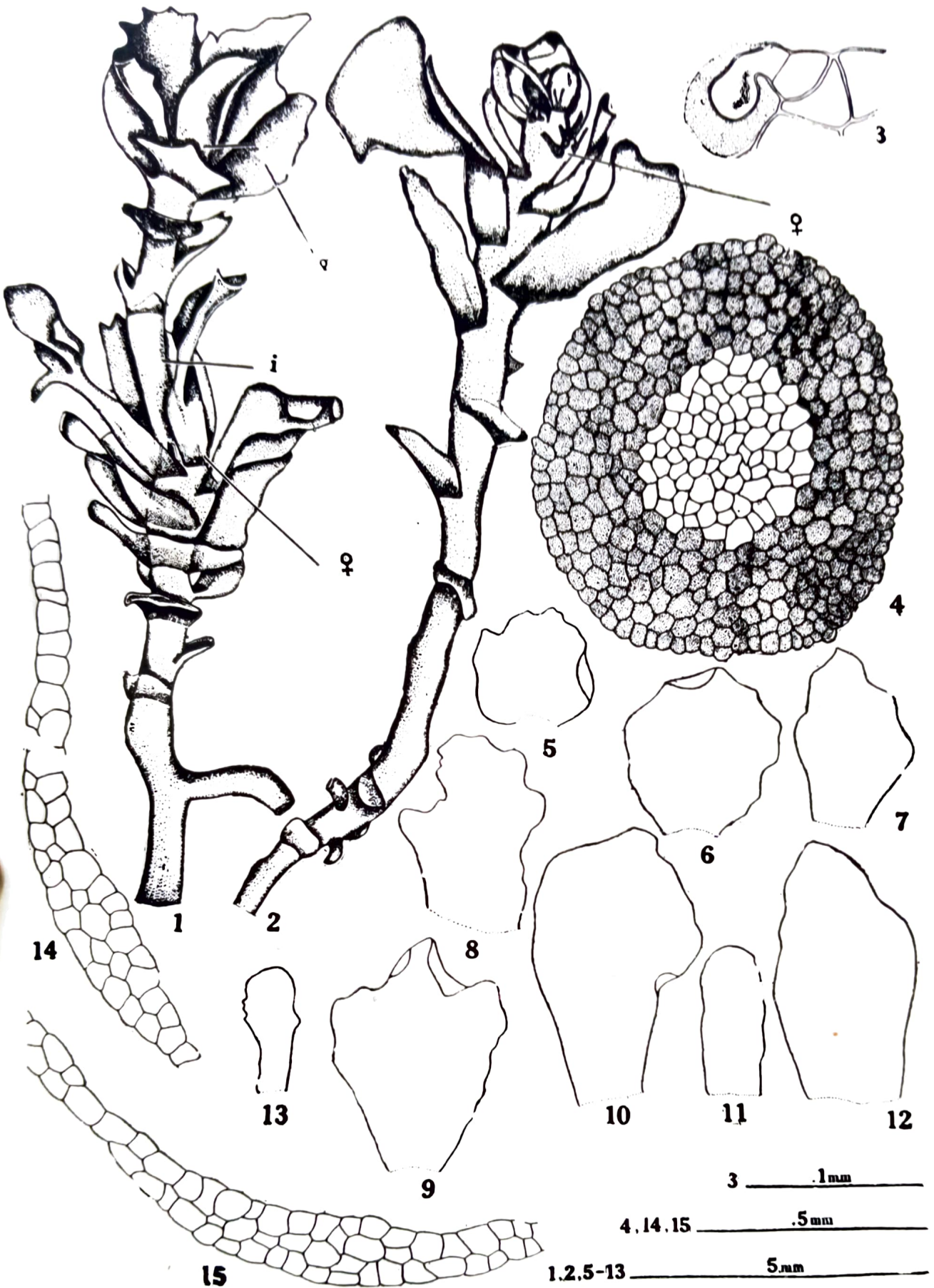
*Diagnosis*—Plantae magnae 10-20 (—23) mm longae, gametophoro erecto anisophyllo; folia ad apices aggregata, lingulata vel late ovato-elliptica, ad basim 3-4 stratosata; plantae dioicae anacrogynae; archegonia in axillis bractearum feminearum vel in gymnoecio plus minusve definito; folia perichaetiella magna irregulariter lobata; plantae masculinae et sporophyta ignota.

Inter Teesta Valley et Ghoom. Typus in herbario hepatico, University of Lucknow, India.

Named after Dr. R. Grolle, Deutsche D. R.

*Description*—Gametophore green, large, slender, in loose patches of 3 to 4 plants, gametophore erect, 10 mm–20 mm (—23 mm) long and 3 mm–4.50 mm wide at gynoeical region including leaves, arising from prostrate, creeping, brown, cylindrical rhizome. Rhizome coralloid, 0.6 mm–0.8 mm in diameter, devoid of scales and rhizoids. Aerial shoot not leafy throughout, cylindrical, 858  $\mu$ m–946  $\mu$ m (–1000  $\mu$ m) in diameter, 22–24 cells across the diameter. In cross section epidermal cells not differentiated from cortex, cortical cells polygonal, 6–7 cells wide with starchy contents, more or less isodiametrical, 22  $\mu$ m—44  $\mu$ m (—60  $\mu$ m) in diameter, medullary zone 10–11 cells wide, cells polygonal with trigones,

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Text-fig. 1. Plant showing apical proliferation with innovation (i) again fertile (♀). Note the swollen axis with much larger female bracts at the point of proliferation (♀). Text-fig. 2. Plant with axillary archegonia and leaves crowded distally. Text-fig. 3. Mucilage papilla from leaf cells. Text-fig. 4. Cross section of aerial axis. Text-figs. 5-7. Leaves from different portions of axis. Text-fig. 8-9. Female bracts. Text-figs. 10-12. Female bracts of other plant. Text-fig. 11. represents the dorsal row. Text-fig. 13. Intra-gynoecial bracts from terminal archegonial receptacle. Text-figs. 14, 15. Cross-section of leaf at base.

33  $\mu\text{m}$ –60  $\mu\text{m}$  (—71.5  $\mu\text{m}$ ) in diameter. Numerous short spur-like buds present towards basal portion of leafy shoot. Leaves in 5-8 cycles, crowded terminally otherwise distant in three rows, spirally arranged, transversely attached to axis, anisophyllous, dorsal row of leaves distinctly smaller. Lower leaves smaller than upper, spreading, of variable shape, suborbicular to rhomboidal, 3.3 mm wide and 3.3 mm long, irregularly lobed and folded, lobes obtuse. Upper leaves mostly longer than broad, lingulate, obovate to broadly ovate, ovate-orbicular to elliptical and the apex narrowly rounded to obtuse, 1.3 mm–3.3 mm wide and 2.3 mm–4.4 mm long. Dorsal row of leaves small, 1.4 mm–2.2 mm wide and 2.2 mm–2.5 mm long. Leaf cells thin walled, noncollenchymatous, polygonal, marginal cells 18.9  $\mu\text{m}$ –41.3  $\mu\text{m}$  wide and 27  $\mu\text{m}$ –48.6  $\mu\text{m}$  long, median cells polygonal, 32.4  $\mu\text{m}$ –45.9  $\mu\text{m}$  wide and 48.6  $\mu\text{m}$ –81  $\mu\text{m}$  long, basal cells large, rectangular, 27  $\mu\text{m}$ –62.1  $\mu\text{m}$  wide and 81  $\mu\text{m}$ –143.5  $\mu\text{m}$  long. Slime papillae on the margin and surface of leaves. Leaves in cross section 3-stratose at basal region, at certain points 4-stratose, while towards margins 1-2-stratose.

Plants dioecious, male plants unknown. Female plants anacrogynous, archegonia borne in the axil of upper leaves or remote from them when superficial or associated with several narrow, lingulate, irregular bractlets produced from the centre of gynoecium. Archegonial disc variably elaborated, occasionally sharply defined then appearing acrogynous, normally clearly anacrogynous with apical proliferation. In the case of apical proliferation, the innovation again fertile, resulting in alternation of long internodes and swollen fertile nodes. Perichaetial leaves or female bracts large, spreading, sometimes patent, transversely inserted, irregularly lobed, lobes obtuse or margins wavy. Dorsal perichaetial leaves exceptionally small, variable in shape, lingulate, rhomboidal, sometimes irregularly lobed as in other perichaetial leaves, generally 2.4 mm–3.3 mm wide and 3.5 mm–3.8 mm long, but in few cases smaller 1.2 mm–1.9 mm wide and 2.3 mm–3.0 mm long. The lateral row of female bracts large, narrow at the base, widest a little above from middle, apex broadly rounded to obtuse, margin irregularly lobed similar to leaves, lobes obtuse, 2.5 mm–3.0 mm wide and 4 mm–5 mm long. Sporophyte not known.

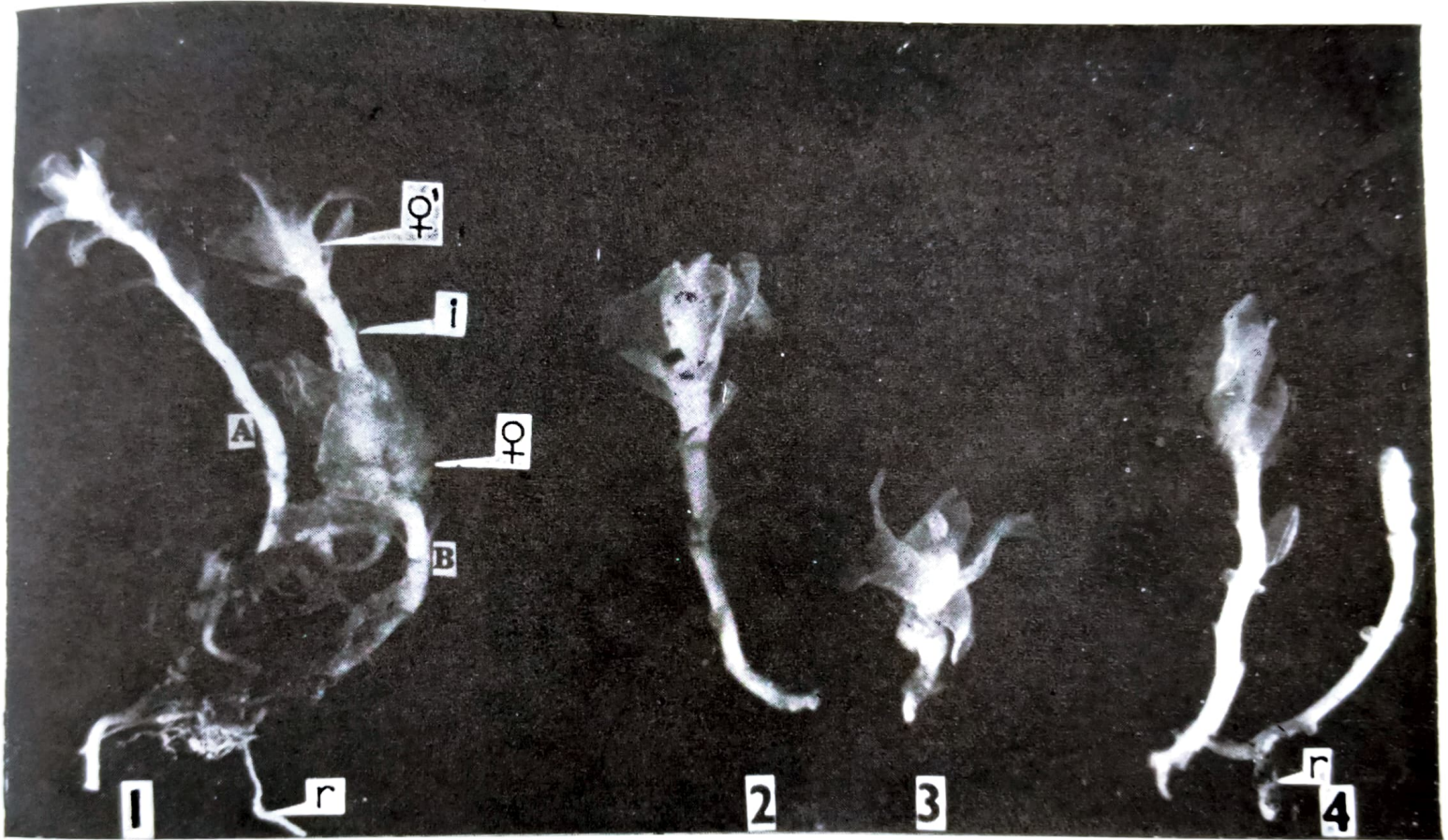
Type specimens deposited in Lucknow University Hepatic Herbarium : Collection of Liverworts from Eastern Himalayas No. C 72/1. (Holotype). Female plants preserved in 90% alc. (*Haplomitrium grollei* Kumar *et* Udar sp. nov.) Loc. On way (ca 6000 ft) to Teesta valley from Ghoom, Darjeeling, India. Leg. and Det. R. Udar and Dinesh Kumar. Date 31.12.1972.

*Ecology*—The plants of *Haplomitrium grollei* grow in very small loose patches of 3-4 plants in shaded to subexposed conditions on soil over the rocks, associated with *Aplozia* sp. and *Jungermannia* sp. No male plants were collected.

*Characteristics of the species*—(1) Plants large, in very loose patches (2) Leaves distantly arranged on the aerial shoot becoming crowded towards the apex, usually longer than wide, irregularly lobed, lobes obtuse, clearly anisophyllous, leaf cells very large, in cross section 3–4 stratose at base in the median region and becoming 1-2 stratose at the margin (3) Medullary cells of the stem with walls thickened at angles in cross section. (4) Normally anacrogynous with apical proliferation ; innovation again fertile resulting in an alternation of long internodes and swollen fertile nodes. Sometimes apparently acrogynous with a well defined terminal gynoecial disc.

In this species there is a clear distinction between the creeping horizontal rhizome, the aerial erect shoot and the vertically downwardly directed 'root'\* (Plate 1, Figs. 1, 4).

\*GRUBB (1970) has adopted the term 'root' for the downwardly directed leafless, cylindrical structures developing from main shoot or rhizome in Calobryales and Takakiales.



At the base or near the basal region of the aerial shoot, a number of short spur like branches are present some of which develop into narrow stoloniform downwardly directed 'roots' and one or two develop into a horizontal rhizome the tip of which becomes upturned to form an erect aerial shoot, which in turn produces a 'root'.

*Differentiation*—*H. grollei* seems to be closely allied to *H. intermedium* in the position of archegonia. In both the species the gynoeceal discs show various degrees of elaboration from a typical anacrogynous condition with apical proliferation to a nearly typical acrogynous condition. At the point of proliferation the axis swells and forms a 'node like' fertile portion. SCHUSTER (1967) has observed as many as five nodal fertile portions on a single female plant in *H. intermedium*, but even then this plant does not attain the much larger size of *H. grollei* which shows only two fertile nodal portions. The axis in *H. intermedium* is leafy throughout and the leaves are not crowded distally, but the axis in *H. grollei* is not leafy throughout and the leaves are crowded distally. In addition the leaves in *H. grollei* are 2-4 or even five times larger as well as 3-4 stratosed at base in contrast to the smaller leaves of *H. intermedium* which are unistratosed at base. The furcate terminal type of branching of the erect aerial shoot of *H. intermedium* is totally lacking in *H. grollei*. Also, in *H. intermedium* there is no creeping rhizome system which is distinct in *H. grollei*. Thus the two species are quite distinct.

#### ACKNOWLEDGEMENTS

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#### EXPLANATION OF PLATE 1

1. A. Plant with distantly arranged leaves on the axis but aggregated at the distal end. Archegonia at apex.  $\times 3.7$ , B. Plant showing apical proliferation with innovation (i) again fertile. Note the swollen axis with much larger perichaetial leaves at the point of proliferation (o). A & B plants connected with rhizome and some downwardly directed 'roots' (r)  $\times 3.7$ , 2. Plant with axillary archegonia and leaves confined distally.  $\times 3.7$ , 3. A small plant in which archegonia on raised receptacle.  $\times 3.7$ , 4. Plant showing horizontal rhizome and a 'root' (r) associated with an erect aerial shoot.  $\times 3.7$ .